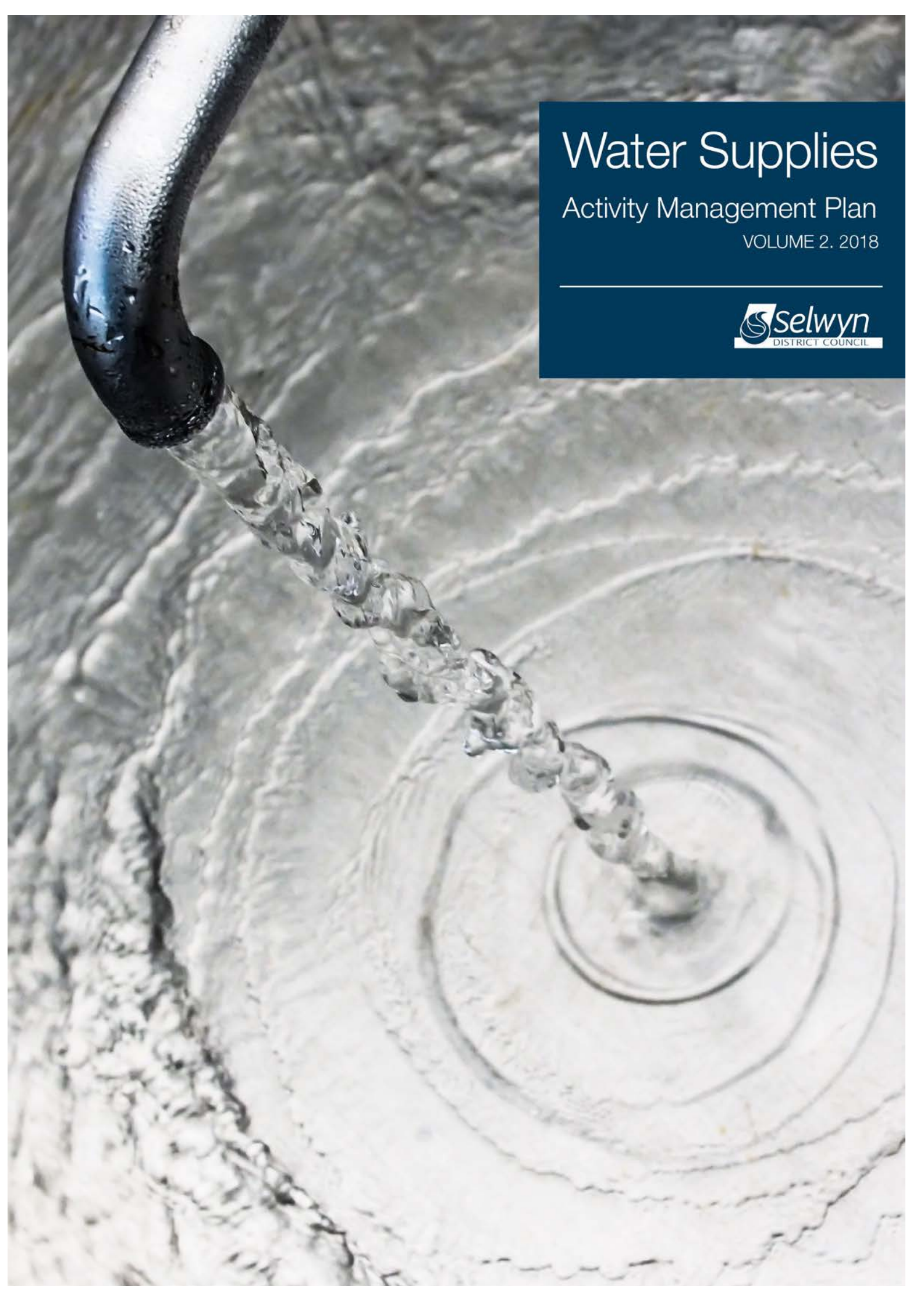




# Water Supplies

Activity Management Plan

VOLUME 2. 2018



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## 1.0 ARTHURS PASS WATER SUPPLY

### 1.1 Scheme Summary

| Description                                   |                                   | Quantity                       |
|-----------------------------------------------|-----------------------------------|--------------------------------|
| <b>Estimated Population Served</b>            |                                   | 347                            |
| <b>Scheme Coverage</b><br>(1 Jan 2018)        | Full Charges                      | 120                            |
|                                               | Half Charges                      | 12                             |
|                                               | >1 Charges                        | 4                              |
| <b>System Components</b>                      | Bores/Intakes (No.)               | 3                              |
|                                               | Treatment/Disinfection            | Filtration/UV                  |
|                                               | Reservoirs (No.)                  | 0                              |
|                                               | Pump Stations (No.)               | 0                              |
|                                               | Piped (m)                         | 4583.64                        |
| <b>History</b>                                | Original scheme installation date | 1923                           |
| <b>Value (\$)</b>                             | Replacement Cost                  | \$680,780.03                   |
|                                               | Depreciated Replacement Cost      | \$312,376.66                   |
| <b>Financial</b>                              | 2018/2019 Estimate                | \$53,125                       |
|                                               | Annual maintenance cost           | 1.66%                          |
|                                               | % of total                        |                                |
| <b>Demand (m3)</b><br>(1 Jan – 31 Dec 2017)   | Average daily                     | 113                            |
|                                               | Peak daily                        | 168                            |
|                                               | Minimum daily                     | -                              |
|                                               | Average daily per connection      | 0.94                           |
| <b>Type of Supply</b>                         |                                   | High pressure and unrestricted |
| <b>Target Pressure &amp; Flow at boundary</b> | Pressure                          |                                |
|                                               | Flow                              | >15 L/min                      |
| <b>Sustainability</b>                         | Well Security                     | Unsecure                       |

### 1.2 Key Issues

The following key issues are associated with the Arthurs Pass water supply. A list of district wide issues are located in 5Waters Activity Management Plan: Volume 1.



**Table 1-1 Arthurs Pass Scheme Issues**

| What's the Problem                                                                                                                                                                                                                              | What we plan to do                                                                                                                                                                                                                                          |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| High cost to carry out maintenance and operation due to isolated location and distance from the maintenance contractors base. The rating base is small and there are also limited skills available in Arthurs Pass.                             | Council will investigate the potential for increased remote monitoring. Council also plan to investigate optimisation of maintenance and renewals to ensure costs stay at the minimum.                                                                      |
| The Arthurs Pass reticulation requires upgrading to comply with NZ Fire Fighting Code of Practise. For compliance this scheme would need to upgrade a number of existing water mains to 150 and 100 mm diameter and include headwork's storage. | Investigate and cost works required, including upsizing mains and sufficient storage, to ensure sufficient fire fighting flows and volumes in accordance with the NZFFCoP<br><br>This work will occur as part of the water supply treatment upgrade..       |
| The Arthurs Pass water treatment plant requires upgrading to comply with the DWNZ.                                                                                                                                                              | The upgrade will address turbidity and protozoa compliance issues. It is important to deliver high quality water to Arthurs Pass as it is a popular tourist destination and risks will be managed through the Water Safety Plans. Upgrade budgeted 2017/18. |

### 1.3 Overview & History

The original scheme was installed in 1923 by the New Zealand Railways to serve a number of railway houses. The maintenance and administration of the scheme was taken over in 1975 by the then Malvern County Council. The scheme reticulation was extended during the 1980's and an upgrade of the intake and installation of a treatment plant occurred during 1999.

The water supply intake is located in a modified pool on Avalanche Creek, sourced from an unprotected alpine catchment above the village. Water is treated (UV and filtration) but doesn't comply with DWSNZ. Fire fighting capacity is available but when operational will cause contamination of the supply. In effect bypass of the treatment system is required to allow for fire fighting flows.

There are few permanent residents in the village, with most properties occupied periodically during weekends and holidays. Several businesses serve tourists and travellers passing through the village and provide tourist accommodation and services.

The remote location and harsh alpine environment present challenges for operation and maintenance of a water supply. The village can be isolated following heavy snowfall and storm events that periodically close State Highway 73.

The community is located within the alpine fault line, and is expected to incur significant damage to its water infrastructure resulting from a 76MMI event.

Treatment is provided by:

- Prefilter (four in parallel) with 20 micron cartridges
- Cartridge filter (two in parallel) with 1 micron cartridge
- UV Steriliser

Council's Supervisory Control and Data Acquisition (SCADA) system monitors the UV and cartridge filtration systems, UPS, turbidity meter, temperature gauges and flowmeter recording among other things, daily water usage, differential pressure across the filters, UV system intensity, and air and water temperatures. Alarms include low UV intensity, high turbidity, low battery, low water temperature and communications failure. The telemetry system has battery backup.



**Figure 1-1 Scheme Map**



## 1.4 System Capacity

The water supply infrastructure provides sufficient capacity for the current level of development in Arthur's Pass and will be sufficient to meet some increased demand from allocated connections that are not presently in use. Further development within the Arthur's Pass supply area is constrained by its location within a National Park so longer-term planning for growth related capacity upgrades is not necessary.

It is noted that the treatment system (filtration and UV) is the primary capacity constraint. A treatment bypass has been provided to facilitate higher flow rates if required for firefighting purposes, although this does have adverse water quality impacts.

Current demand (daily and annual volume) exceeds that permitted by resource consent.

**Table 1-2 Capacity Summary**

|                                                                                                             | Flow Rate<br>(L/s) | Daily Volume<br>(m <sup>3</sup> ) | Annual Volume<br>(m <sup>3</sup> ) | Comments                  |
|-------------------------------------------------------------------------------------------------------------|--------------------|-----------------------------------|------------------------------------|---------------------------|
| Abstraction Capacity                                                                                        | > treatment        | -                                 | -                                  | Stream intake, no pumping |
| Treatment Capacity                                                                                          | 7.2*               | 622                               | -                                  | Filtration and UV         |
| Consented Take                                                                                              | 11                 | 200                               | 30,000 **                          |                           |
| Peak Demand                                                                                                 | 8.3                | <b>260 ***</b><br><b>198 ****</b> | 43,000*****                        |                           |
| * UV is limiting factor (95% UVT)<br>** inferred value<br>*** 21 Jan 2015<br>**** 29 Jan 2015<br>***** 2014 |                    |                                   |                                    |                           |

A treatment upgrade is proposed which will increase capacity.

## 1.5 Resource Consents

The Arthurs Pass water supply has a number of resource consents. Table 1-3 shows the water take permitted by the resource consents for this scheme.

**Table 1-3 Resource Consents**

| Consent                      | Description                                                                                        | Location                            | Date Issued | Expiry Date | Consented Max Instantaneous Flow (L/s) | Consented Max Daily Volume (m <sup>3</sup> /day) |
|------------------------------|----------------------------------------------------------------------------------------------------|-------------------------------------|-------------|-------------|----------------------------------------|--------------------------------------------------|
| CRC991057<br>(Issued-Active) | To take surface water, at or about map reference NZMS 260 K33:925-064, for community water supply. | Arthurs Pass Township, ARTHURS PASS | 12-Aug-99   | 9-Feb-34    | 11                                     | 200                                              |

## 1.6 Water Quality

The Arthurs Pass water supply is a non-secure source and is currently sampled weekly for the source, treatment plant and monthly for the reticulation.

The following details E. coli transgressions for the sample periods 2012 to 2017.

### Source

There have been 119 E. coli source transgressions during this period, with the last 18 transgressions occurring in 2017.

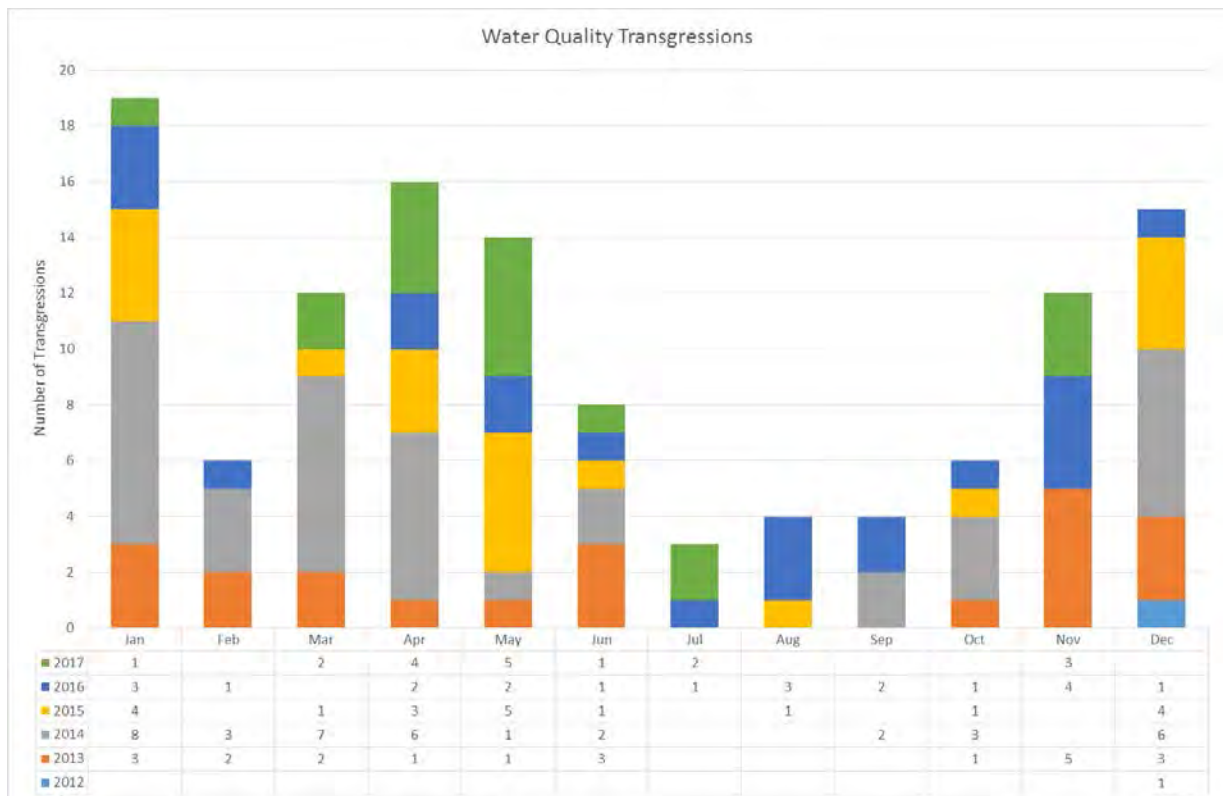


**Figure 1-3 E.coli Transgressions - Source**

### Treatment

There have been five E. coli treatment transgressions during this period.



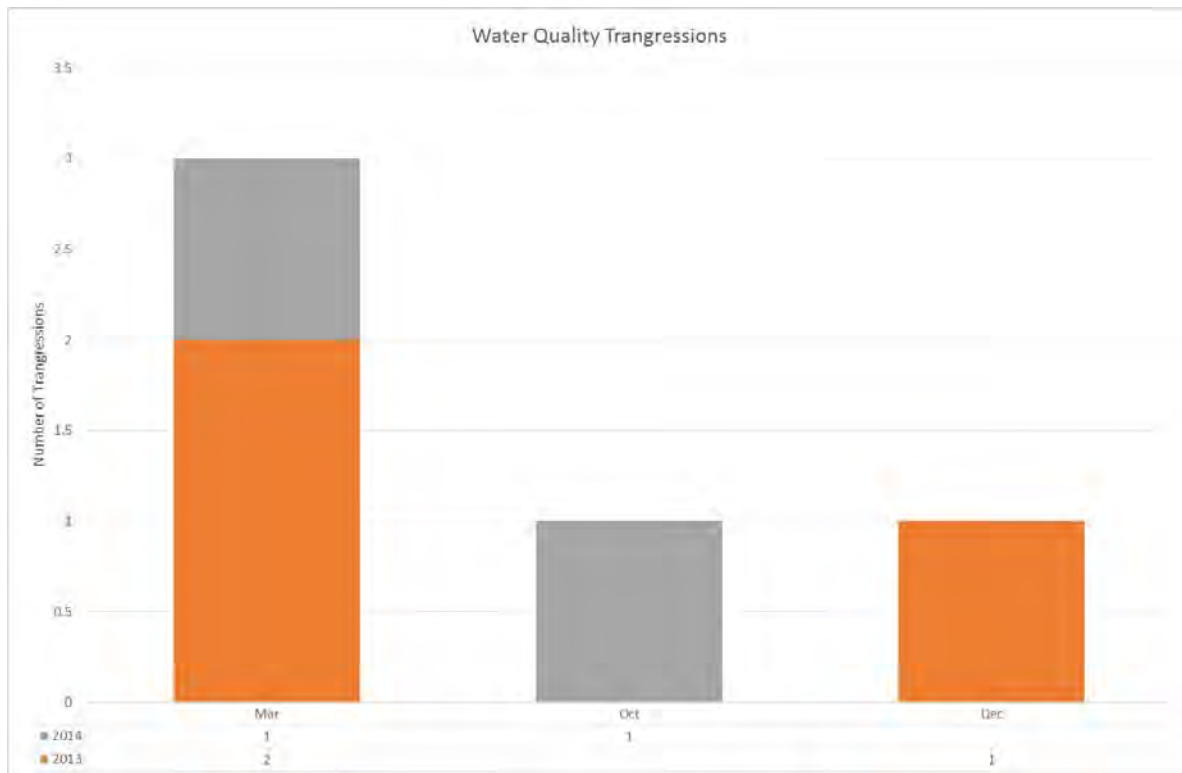


**Figure 1-4 E. coli Transgressions – Treatment**

#### Zone

There have been eight E. coli transgressions during this period.

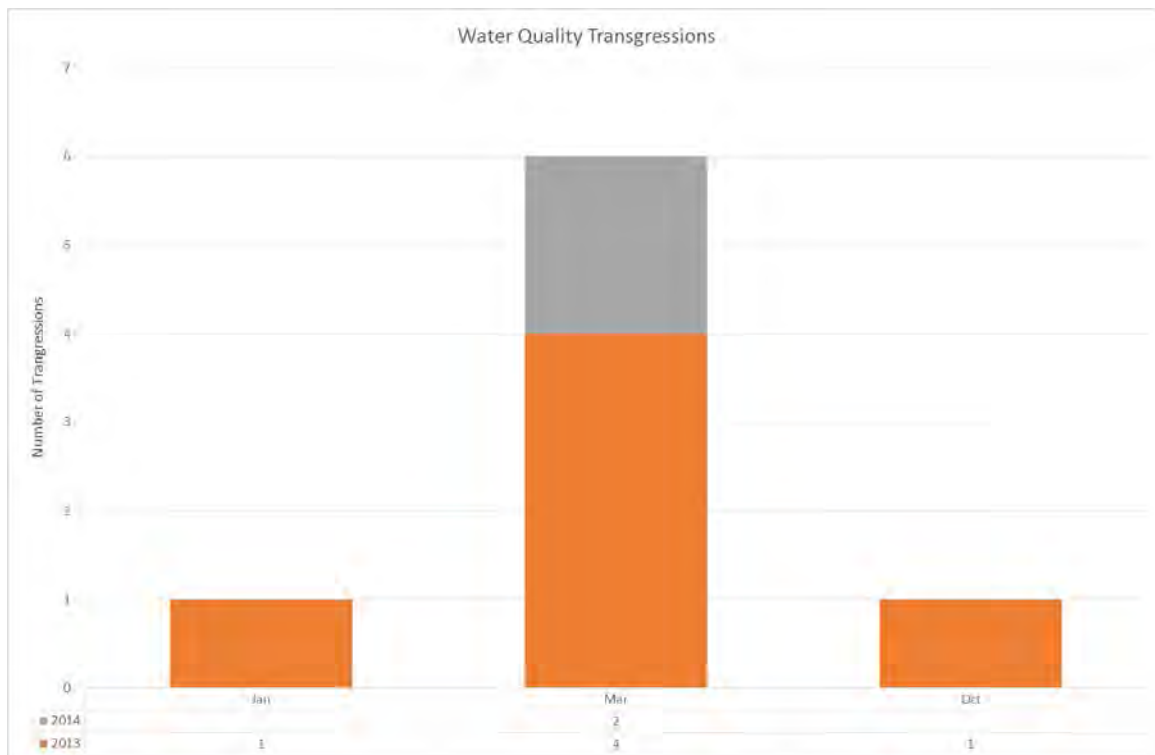


**Figure 1-5 E. coli Transgressions - Zone**

## Chemical Analysis

The following is a summary of the raw water chemical analysis carried out at the Arthur's Pass Water Supply.

**Table 1-4 Arthur's Pass Water Supply Raw Water Chemical Analysis Summary**

| Parameter                                   | Standards<br>MAV* (GV)** | Plant 2015 | Plant 2017 | Status |
|---------------------------------------------|--------------------------|------------|------------|--------|
| Total Lead (g/m3)                           | 0.01                     | <0.00011   | 0.000267   | ✓      |
| pH (pH units)                               | 7-8.5                    | 7.8        | 7.4        | ✓      |
| Total Hardness (g/m3 as CaCO <sub>3</sub> ) | <200                     | 44         | 23.8       | ✓      |
| Total Calcium (g/m3)                        | n/v                      | 16.5       | 8.88       | ✓      |
| Total Iron (g/m3)                           | <0.2                     | <0.021     | < 0.021    | ✓      |
| Total Sodium (g/m3)                         | <200                     | 2.1        | 1.27       | ✓      |
| Nitrate - Nitrogen (g/m3)                   | 11.3                     | <0.05      | < 0.05     | ✓      |

\* MAV – Maximum Acceptable Value

\*\* (GV) – Guideline Value

## 1.7 Scheme Assets

A summary of material and diameter for pipes in Arthurs Pass is shown below by Figure 1-6 and Figure 1-7.

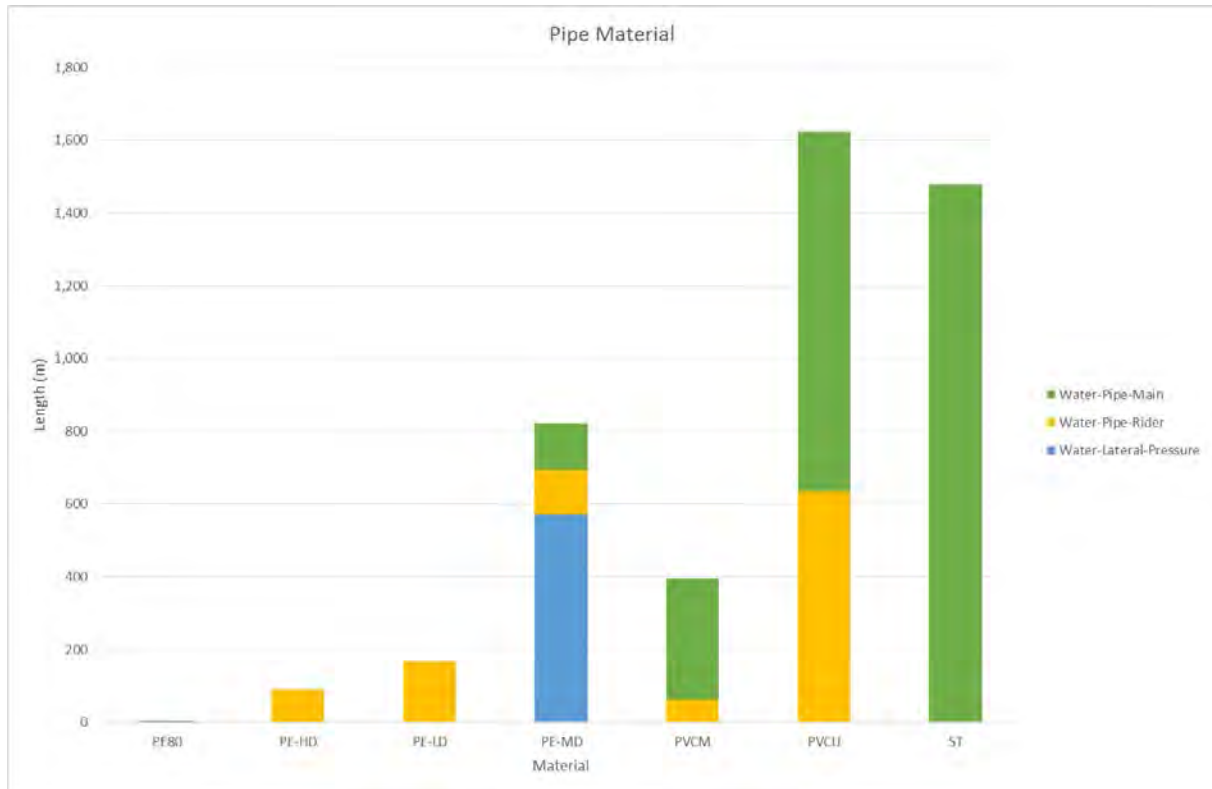


Figure 1-6 Pipe Material – Arthurs Pass

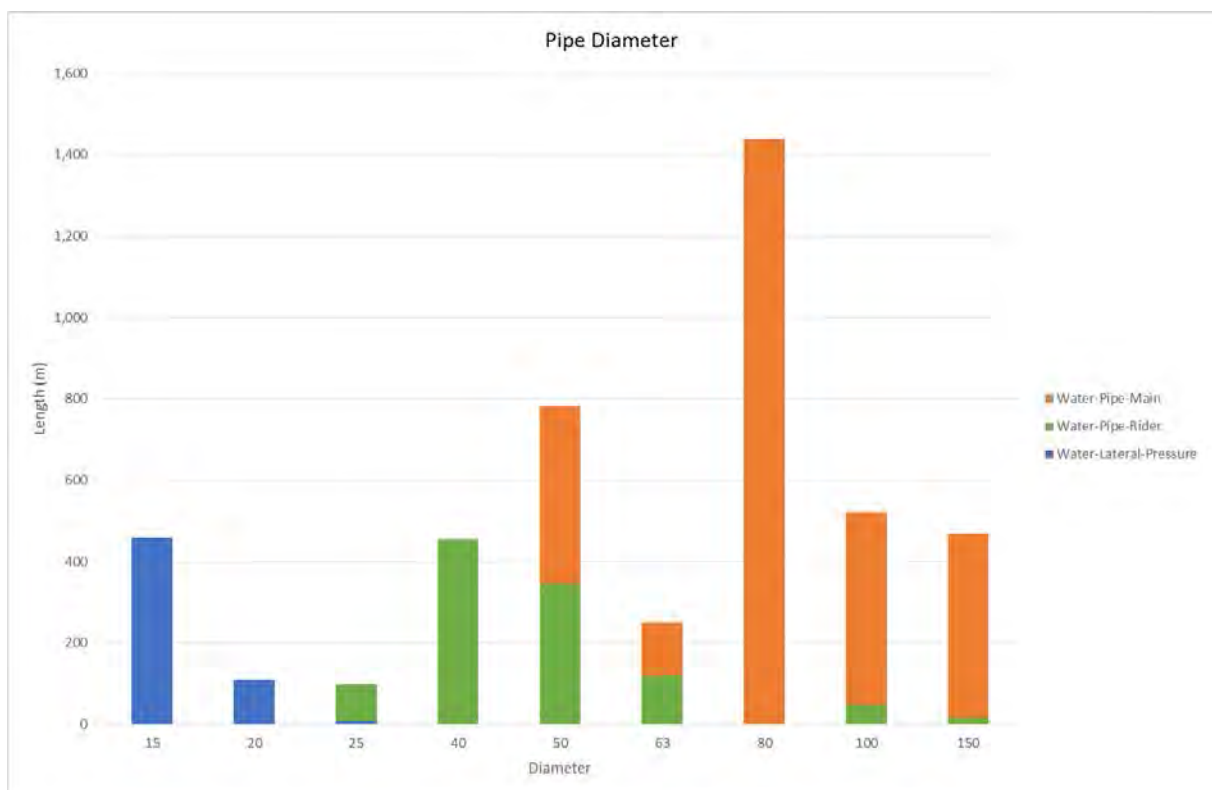


Figure 1-7 Pipe Diameter – Arthurs Pass

## 1.8 Operational Management

The water supply is operated and maintained under two maintenance contracts as follows:

- Contract 1241: Water Services Contract. Contract is with SICON Ferguson who undertakes investigations, conditions inspections, proactive and reactive maintenance and minor asset renewals; and
- Contract 1202: Parks and Reserves Contract. Contract is with SICON Ferguson who undertakes the maintenance of land scape features related to water services e.g. mowing, gardens etc.

Water quality sampling is completed under an agreement with Food and Health Ltd as required.

## 1.9 Photos of Main Assets



**Photo 1: Catchment**

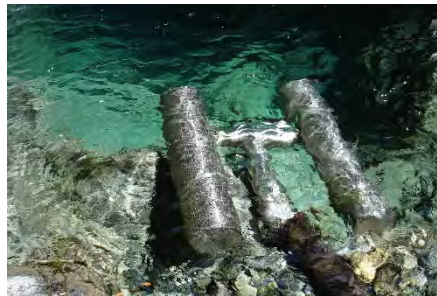


**Photo 2: Intake**



**Photo 3: Treatment Shed**

## 1.10 Risk Assessment

A risk assessment has been undertaken for the Arthurs Pass scheme. The key output from the risk assessment is the identification of any extreme and high risks which need to be mitigated. In order to mitigate these risks they have been included and budgeted for in the projects within this LTP. Table 1-5 outlines the risk priority rating and Table 1-6 outlines the risks.

**Table 1-5 Risk Priority Rating**

| Risk Score | Level of Risk | Risk Response                                                                                                                                                         |
|------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| > 50       | Extreme       | Awareness of the event to be reported to Council.<br>Urgent action to eliminate / mitigate / manage the risk.<br><br>Document risk and action in the AMP.             |
| 35-50      | Very High     | Risk to be eliminated / mitigated / managed through normal business planning processes with responsibility assigned.                                                  |
| 14-35      | High          | Manage risk using routine procedures.                                                                                                                                 |
| 3.5-14     | Moderate      | Monitor the risk.                                                                                                                                                     |
| < 3.5      | Low           | Awareness of the event to be reported to Council.<br>Immediate action required to eliminate / mitigate / manage the risk.<br><br>Document risk and action in the AMP. |

**Table 1-6 Risks – Arthurs Pass**

| Risk                                                              | Action/Project                                                                                                                                                                                                                        | Year Identified | 2014 Risk Rating | 2017 Risk Rating | Residual Risk Rating |
|-------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|------------------|------------------|----------------------|
| Electrical failure due to lightning or network spikes             | Install surge diverters                                                                                                                                                                                                               | 2014            | 6                | 6                | 6                    |
| Failure to meet NES water meter standards                         | NES Water Meter Compliance                                                                                                                                                                                                            | 2014            | 20               | 6                | 6                    |
| Inability to collect income from non-metered properties           | Install property water meters                                                                                                                                                                                                         | 2014            | 27               | 27               | 2.1                  |
| Non-consented activities                                          | Renewal of consents                                                                                                                                                                                                                   | 2014            | 27               | 27               | 6                    |
| Frost issues                                                      | Review frost / freeze protection                                                                                                                                                                                                      | 2014            | 27               | 6                | 6                    |
| Treatment is inadequate                                           | Review treatment and upgrade as required                                                                                                                                                                                              | 2014            | 4                | 4                | 4                    |
| Water outages or treatment bypass when maintenance is carried out | Install reservoirs storage that could provide up to 8 hours storage to carry out maintenance without shutting off the water system. Place the reservoirs above shed or install booster pumps and you can put the reservoirs anywhere. | 2014            | 27               | 27               | 27                   |

The list of district wide risks can be found in 5Waters Activity Management Plan: Volume 1.

## 1.11 Asset Valuation Details

The total replacement value of assets within the Arthurs Pass water scheme is \$680,780 with further details in Table 1-7 below.

**Table 1-7 Replacement Value, Arthurs Pass**

| Asset Class 1              | Asset Class 2 | Sum of Replacement Value |
|----------------------------|---------------|--------------------------|
| <b>Plant and Equipment</b> |               | \$211,853                |
| <b>Water Reticulation</b>  | Fire          | \$645                    |
|                            | Hydrant       | \$25,904                 |
|                            | Lateral       | \$25,141                 |
|                            | Pipe          | \$336,024                |
|                            | Supply Point  | \$50,169                 |
|                            | Valve         | \$31,044                 |

Replacement values for these different types of assets are shown in Figure 1-8 below.

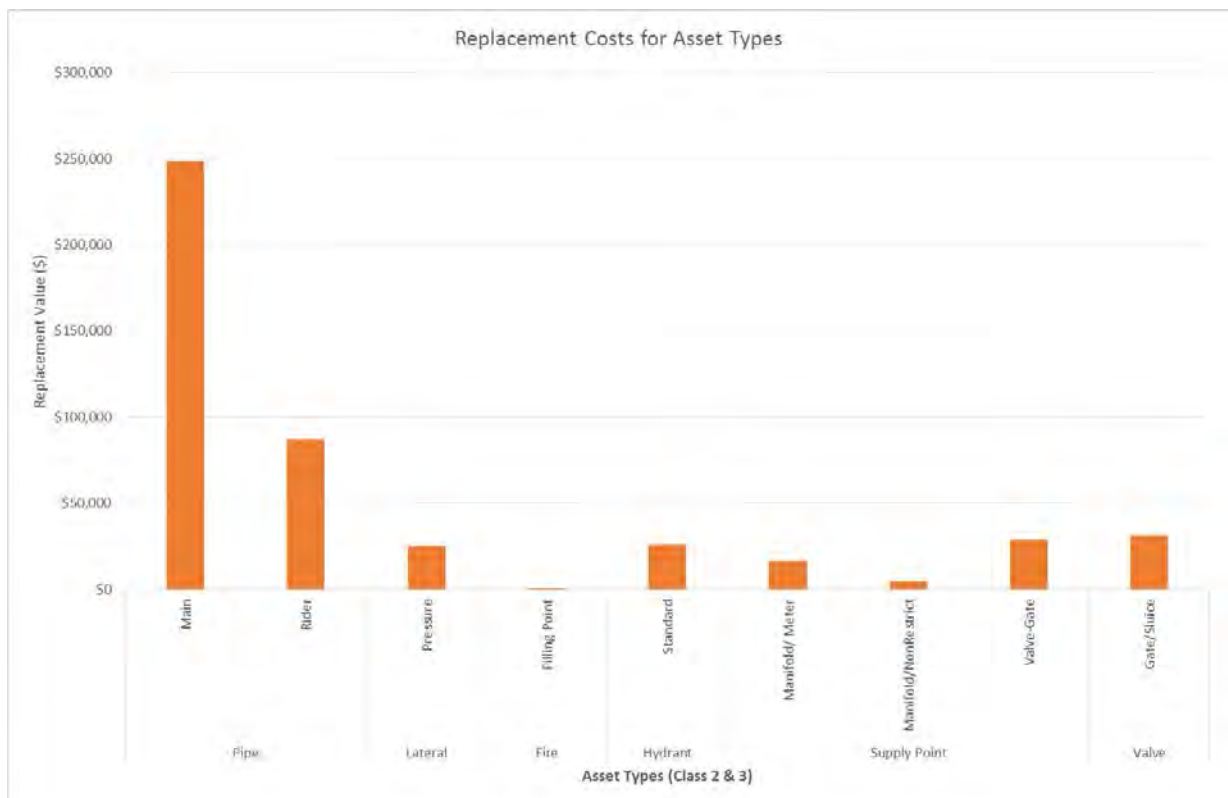


**Figure 1-8 Replacement Costs for Arthurs Pass**

## 1.12 Renewals

The renewal profile has been taken from the 2017 5 Waters Valuation. A graph showing the renewals for this scheme are shown by Figure 1-9 below. The majority of renewals occur in 2023/2024.



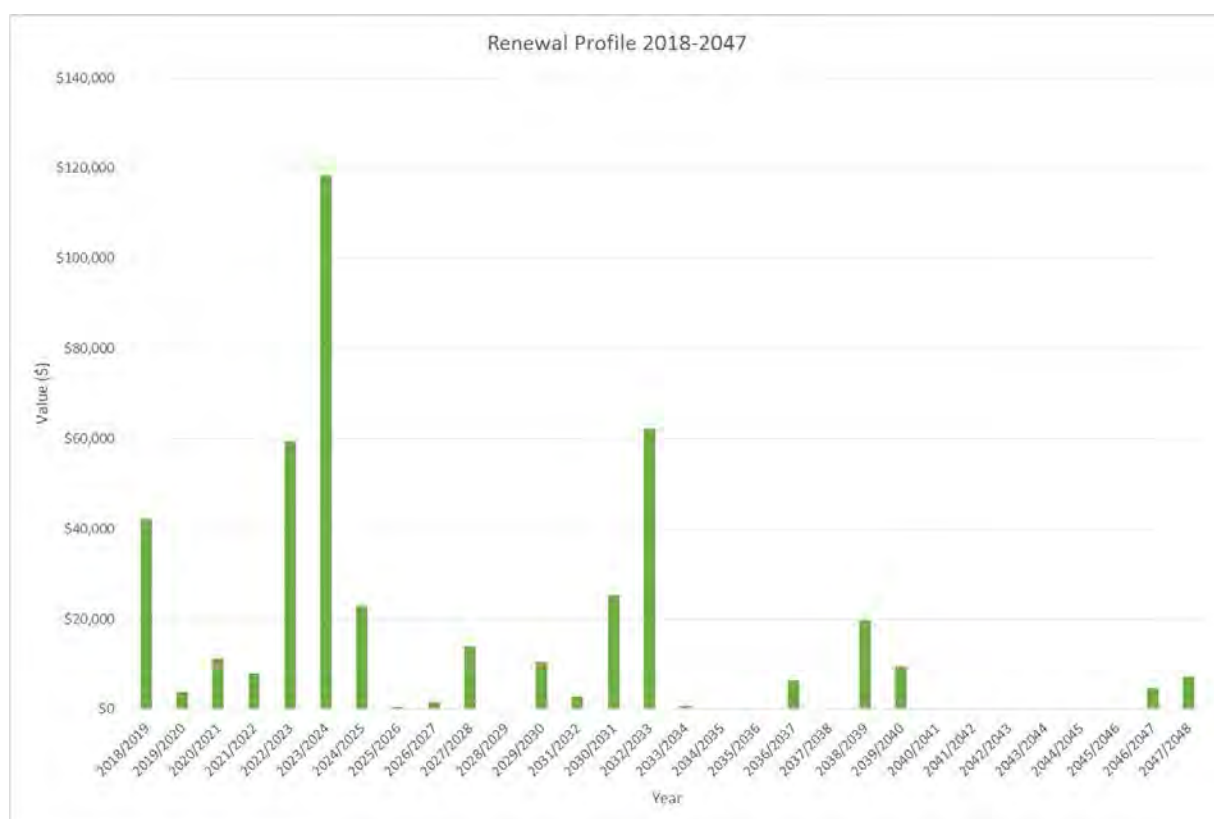


**Figure 1-9 Arthurs Pass Water Renewal Profile**

### 1.13 Critical Assets

The criticality model for Arthurs Pass has been updated for the 2018 AcMP. The methodology of the criticality model can be found in 5Waters Activity Management Plan: Volume 1 and it provides details of how the criticality has been calculated for the reticulation assets. Table 1-8 and Figure 1-10 below shows the calculated criticality for all of the assets within this scheme that have a recorded known length.

**Table 1-8 Length of Assets per Criticality Level**

| Criticality Bands |             | Length (m) |
|-------------------|-------------|------------|
| 5                 | Low         | 1,294      |
| 4                 | Medium-Low  | 2,306      |
| 3                 | Medium      | 281        |
| 2                 | Medium-High | 718        |
| 1                 | High        | 0          |

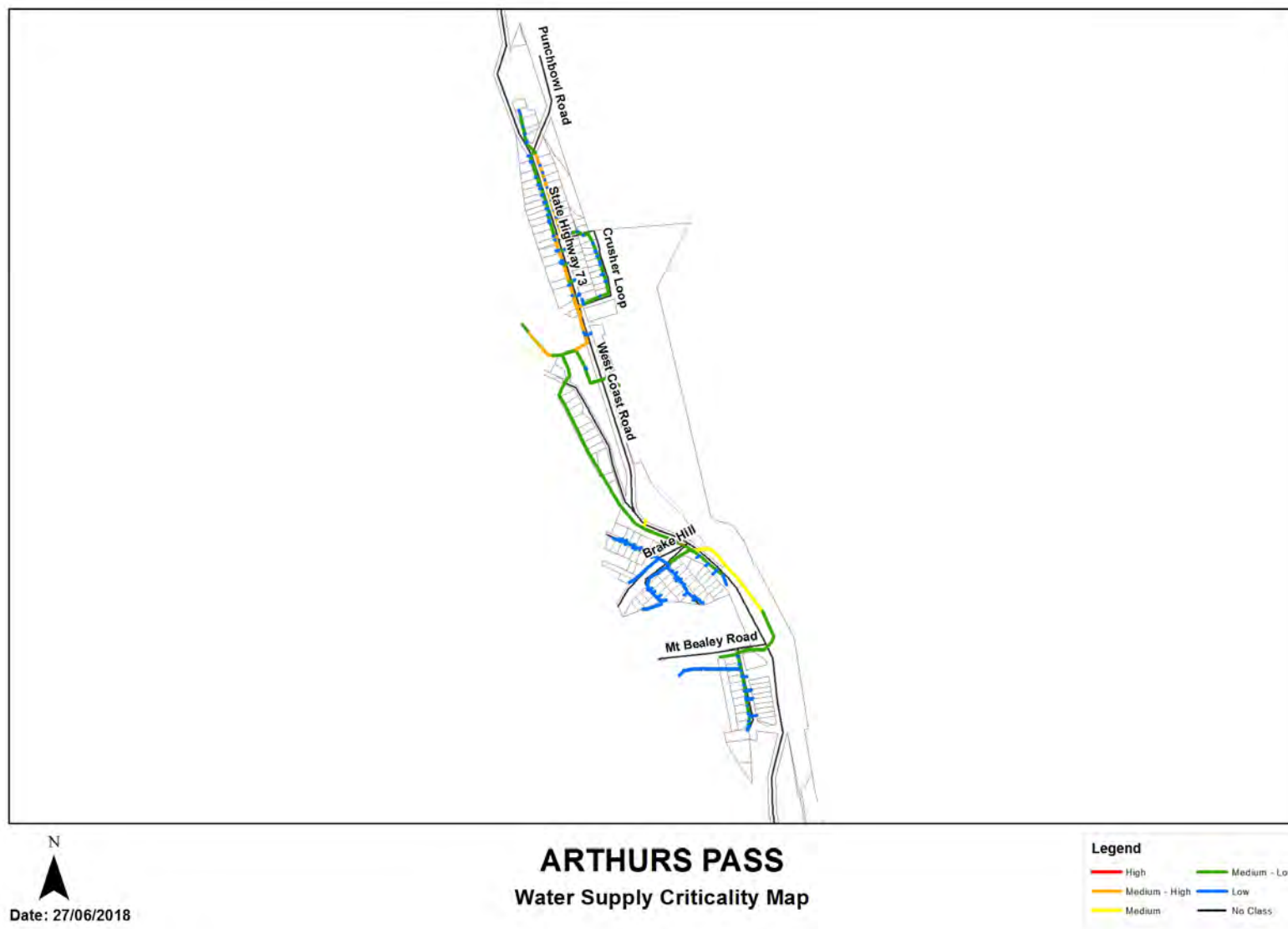


Figure 1-10 Criticality Map

## 1.14 Asset Condition

The asset condition model was run for Arthurs Pass in 2017. The methodology of the model can be found in 5Waters Activity Management Plan: Volume 1 which provides details of how the model has been calculated for the pipe reticulation assets. Figure 1-11 below shows the level of asset condition for these assets within this scheme that have a recorded known condition.

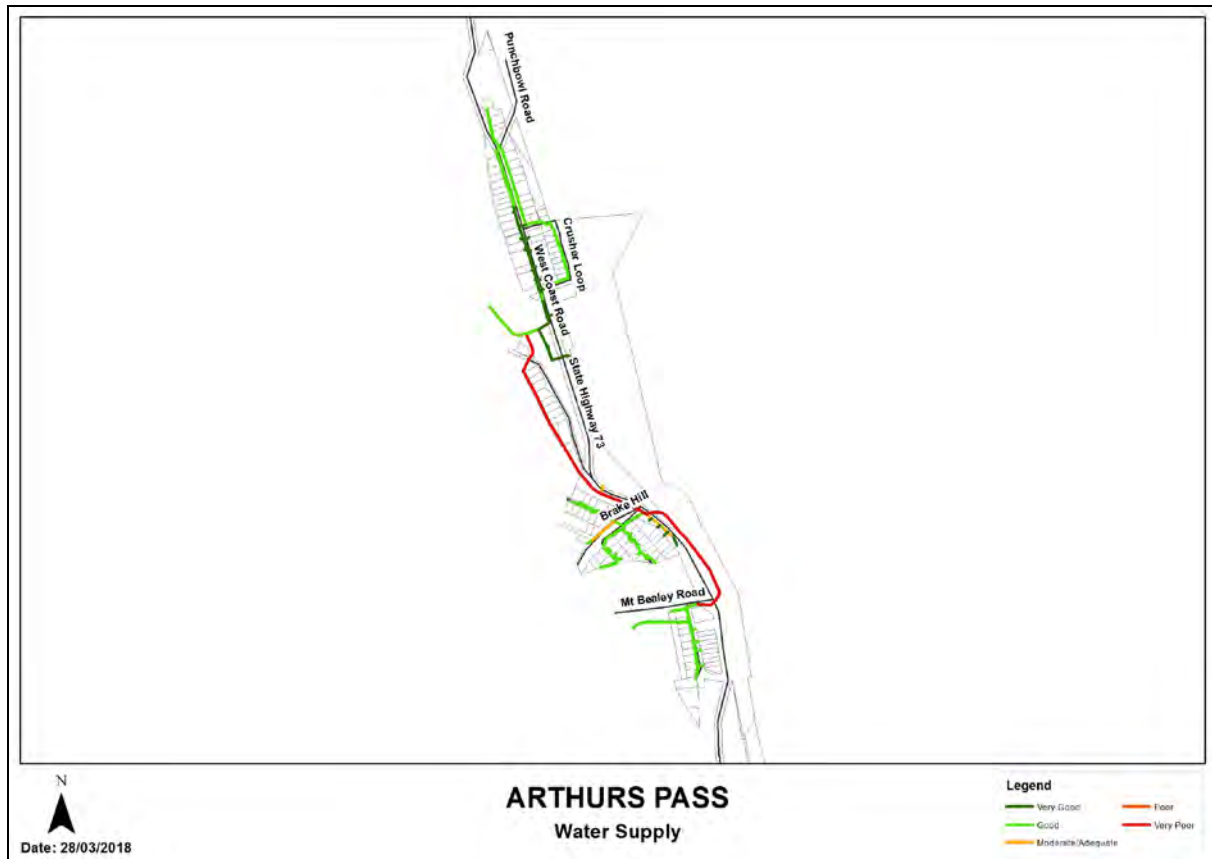


**Figure 1-11 Asset Condition – Arthurs Pass**

Table 1-9 provides a description of the condition rating used within the condition model.

**Table 1-9 Asset Condition Grading**

| Condition Rating | Grading   |
|------------------|-----------|
| 1.0              | Excellent |
| 2.0              | Good      |
| 3.0              | Moderate  |
| 4.0              | Poor      |
| 5.0+             | Fail      |

The number of pipe faults is also measured through the asset management system. Figure 1-12 shows the known historic pipe failures within this scheme.

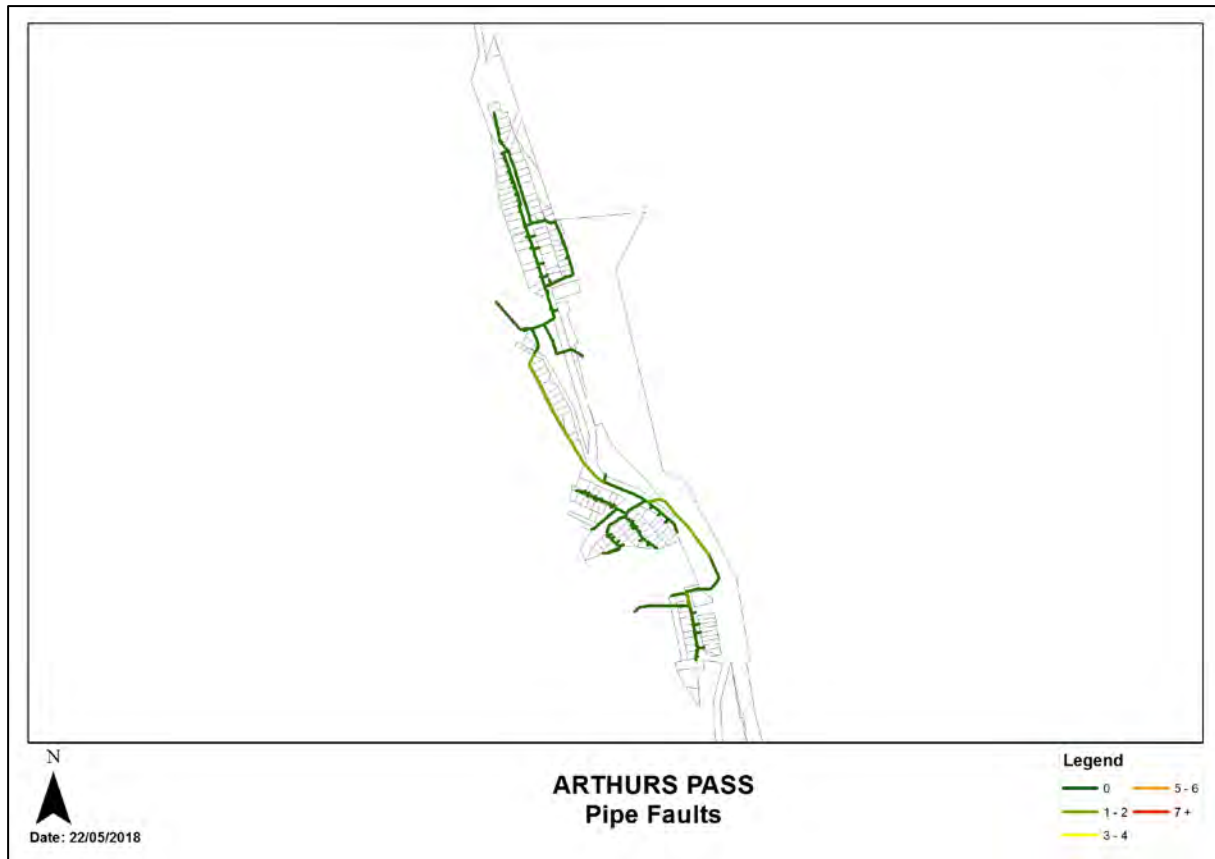


**Figure 1-12 Pipe Faults, Arthurs Pass**

### 1.15 Funding Program

The 10 year budgets for Arthurs Pass are shown by Table 1-10 and Figure 1-13. Budgets are split into expenditure, renewals, projects and capital projects.

All figures are (\$) not adjusted for CPI “inflation”. They are calculated on historical data, and population growth where relevant.

**Table 1-10 Arthurs Pass Budget Summary**

| Years     | Expenditure | Renewals  | Projects | Capital Projects |
|-----------|-------------|-----------|----------|------------------|
| 2018/2019 | \$53,125    | \$42,217  |          |                  |
| 2019/2020 | \$53,125    | \$3,744   |          |                  |
| 2020/2021 | \$53,125    | \$11,257  |          |                  |
| 2021/2022 | \$53,125    | \$7,860   |          |                  |
| 2022/2023 | \$53,125    | \$59,362  |          |                  |
| 2023/2024 | \$53,125    | \$118,369 |          |                  |

|           |           |           |  |  |
|-----------|-----------|-----------|--|--|
| 2024/2025 | \$53,125  | \$22,926  |  |  |
| 2025/2026 | \$53,125  | \$498     |  |  |
| 2026/2027 | \$53,125  | \$1,668   |  |  |
| 2027/2028 | \$53,125  | \$13,901  |  |  |
| Total     | \$531,250 | \$281,802 |  |  |

An explanation of the categories within the budgets are as follows below:

- Expenditure consists of operation and maintenance costs;
- Renewals are replacement of assets which are nearing or exceeded their useful life;
- Projects are investigations, decisions and planning activities which exclude capital works; and
- Capital projects are activities involving physical works.

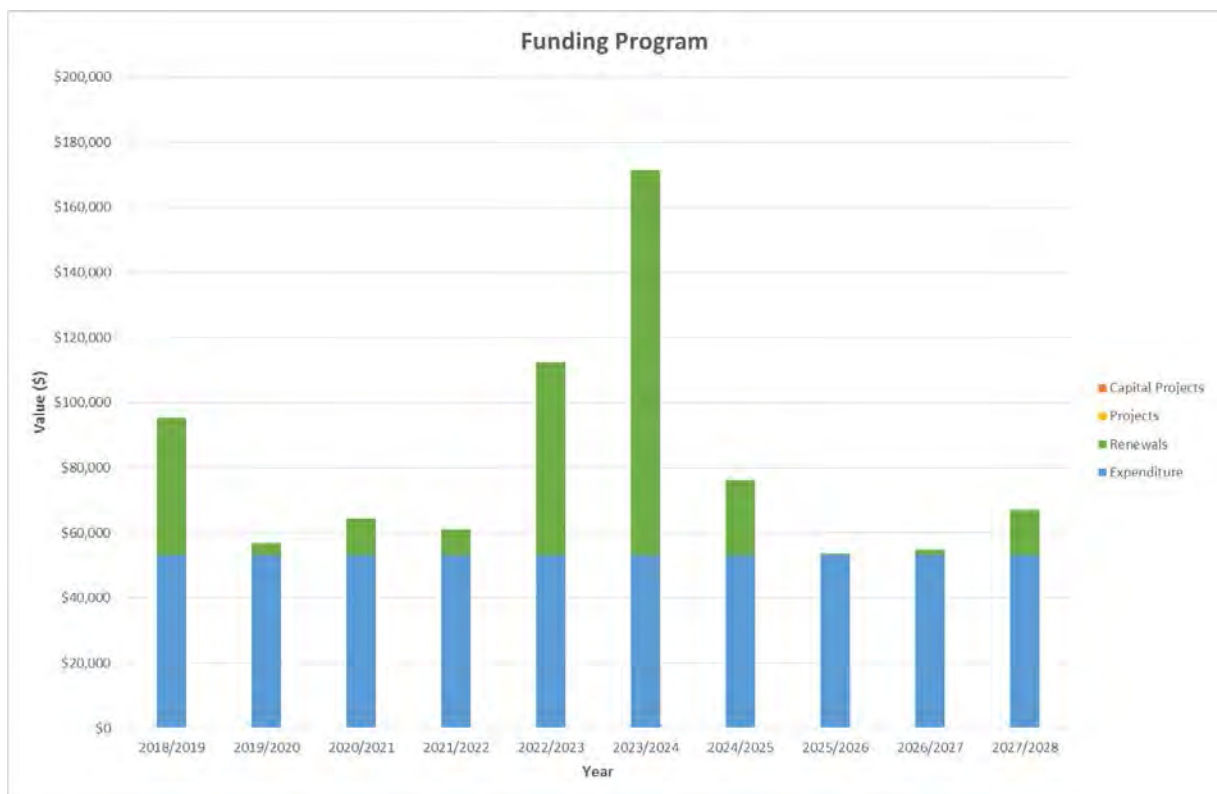


**Figure 1-13 Arthurs Pass Funding Summary**

There are no major projects for Arthurs Pass water scheme in the LTP budget.

The list of district wide projects can be found in 5Waters Activity Management Plan: Volume 1.

## 2.0 CASTLE HILL WATER SUPPLY

### 2.1 Scheme Summary

| Description                                   |                                   | Quantity        |
|-----------------------------------------------|-----------------------------------|-----------------|
| <b>Estimated Population Served</b>            |                                   | 347             |
| <b>Scheme Coverage</b><br>(1 Jan 2018)        | Full Charges                      | 124             |
|                                               | Half Charges                      | 86              |
|                                               | >1 Charges                        | 0               |
| <b>System Components</b>                      | Bores/Intakes (No.)               | 1 River Gallery |
|                                               | Treatment/Disinfection            | Chlorination    |
|                                               | Reservoirs (No.)                  | 4               |
|                                               | Pump Stations (No.)               | 0               |
|                                               | Piped (m)                         | 7477            |
| <b>History</b>                                | Original scheme installation date | 1982            |
| <b>Value (\$)</b>                             | Replacement Cost                  | \$2,347,904.91  |
|                                               | Depreciated Replacement Cost      | \$1,085,541.37  |
| <b>Financial</b>                              | 2018/2019 Estimate                | \$62,290        |
|                                               | Annual maintenance cost           | 1.95%           |
|                                               | % of total                        |                 |
| <b>Demand (m3)</b><br>(1 Jan – 31 Dec 2017)   | Average daily                     | 281             |
|                                               | Peak daily                        | 677             |
|                                               | Minimum daily                     | -               |
|                                               | Average daily per connection      | 2.27            |
| <b>Type of Supply</b>                         |                                   | Unrestricted    |
| <b>Target Pressure &amp; Flow at boundary</b> | Pressure                          | >310 kPa        |
|                                               | Flow                              | >20 L/min       |
| <b>Sustainability</b>                         | Well Security                     | Unsecure        |

### 2.2 Key Issues

The following key issues are associated with the Castle Hill water supply. A list of district wide issues are located in 5Waters Activity Management Plan: Volume 1.

**Table 2-1 Castle Hill Scheme Issues**

| What's the Problem                                                                                                                                                                                                           | What we plan to do                                                                                                                                                                                                                                                                                                                                              |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Castle Hills isolated location and distance from the maintenance contractors base keeps the operational and maintenance costs high. The rating base is small and there are also limited skills available within Castle Hill. | Council will investigate the potential for remote monitoring in conjunction with identifying and training local operators to perform basic operation and maintenance tasks, including consideration of health, safety and employment regulations. Council also plans to investigate optimisation of maintenance and renewals to ensure costs stay at a minimum. |
| The water treatment plant requires upgrading to comply with the Health Act and DWSNZ. However, this may prove difficult for an unprotected source catchment with variable water quality.                                     | Council will identify options. Through the Water Safety Plans, process barriers will be installed to manage potential risks.                                                                                                                                                                                                                                    |

## 2.3 Overview & History

The Castle Hill Water Supply was commissioned during 1982 servicing the township, which was developed to utilise the high country tourist attractions within the area i.e. skiing and tramping.

The scheme draws water from an infiltration gallery established in the base of Thomas Stream, an unprotected, but undeveloped catchment. Water is treated and has turbidity control and chlorination but does not fully comply with DWSNZ. This is a gravity fed supply and full fire fighting capacity is provided from 3 of 500 m<sup>3</sup> timber tanks.

There are few permanent residents in the village which has been developed in stages since the early 1980s. Most properties are used as seasonal holiday homes with a number available for holiday rental. There are currently no business activities in the village. Further development is planned, with a hospitality facility. The water headworks will provide sufficient capacity, in line with the 1982 design.

The remote location and harsh alpine environment present challenges for operation and maintenance of a water supply. The village can be isolated following heavy snowfall and storm events that periodically close State Highway 73.

The community is located within the alpine fault line, and is expected to incur significant damage to its water infrastructure resulting from a 76MMI event.



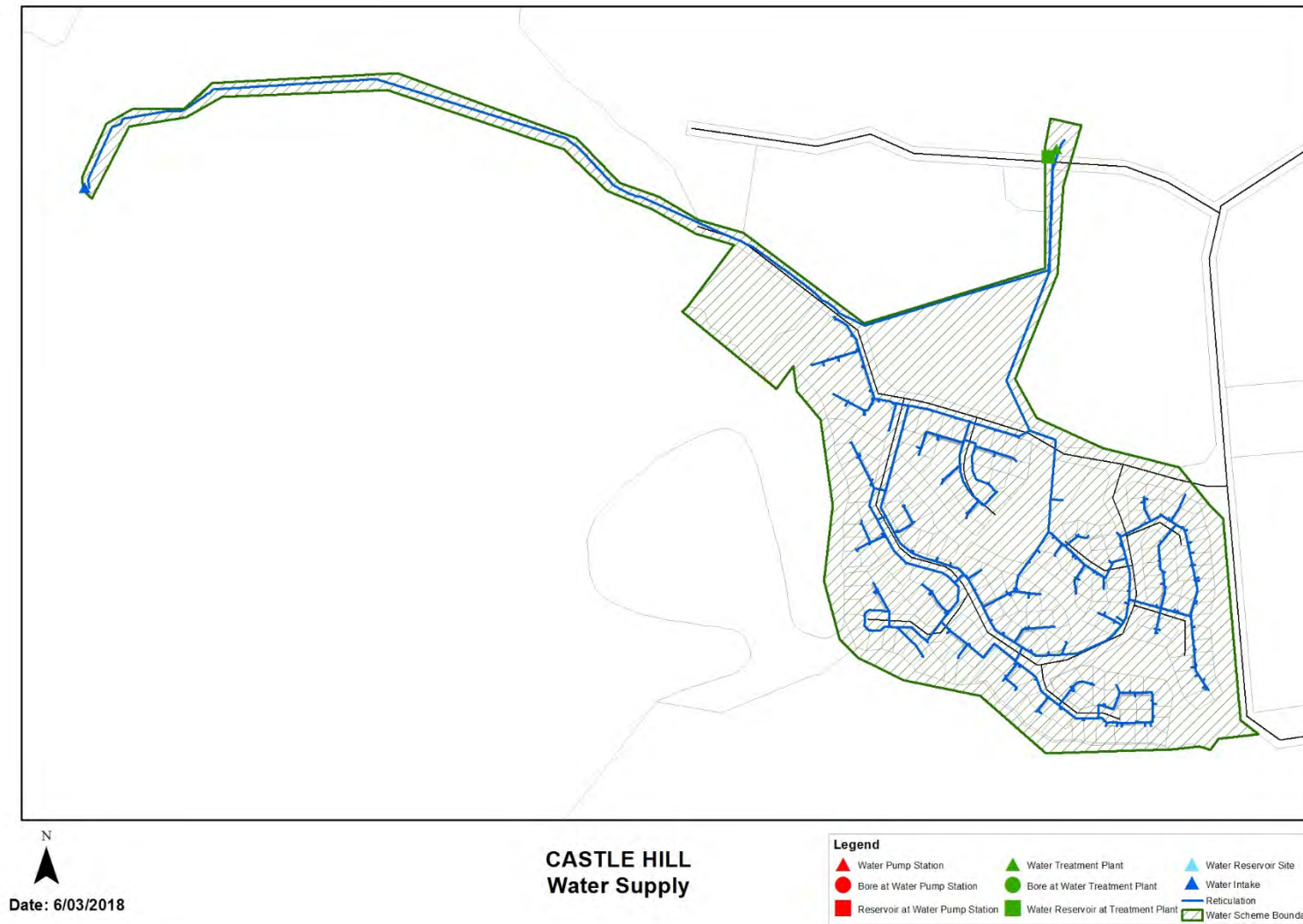


**Figure 2-1 Scheme Map**

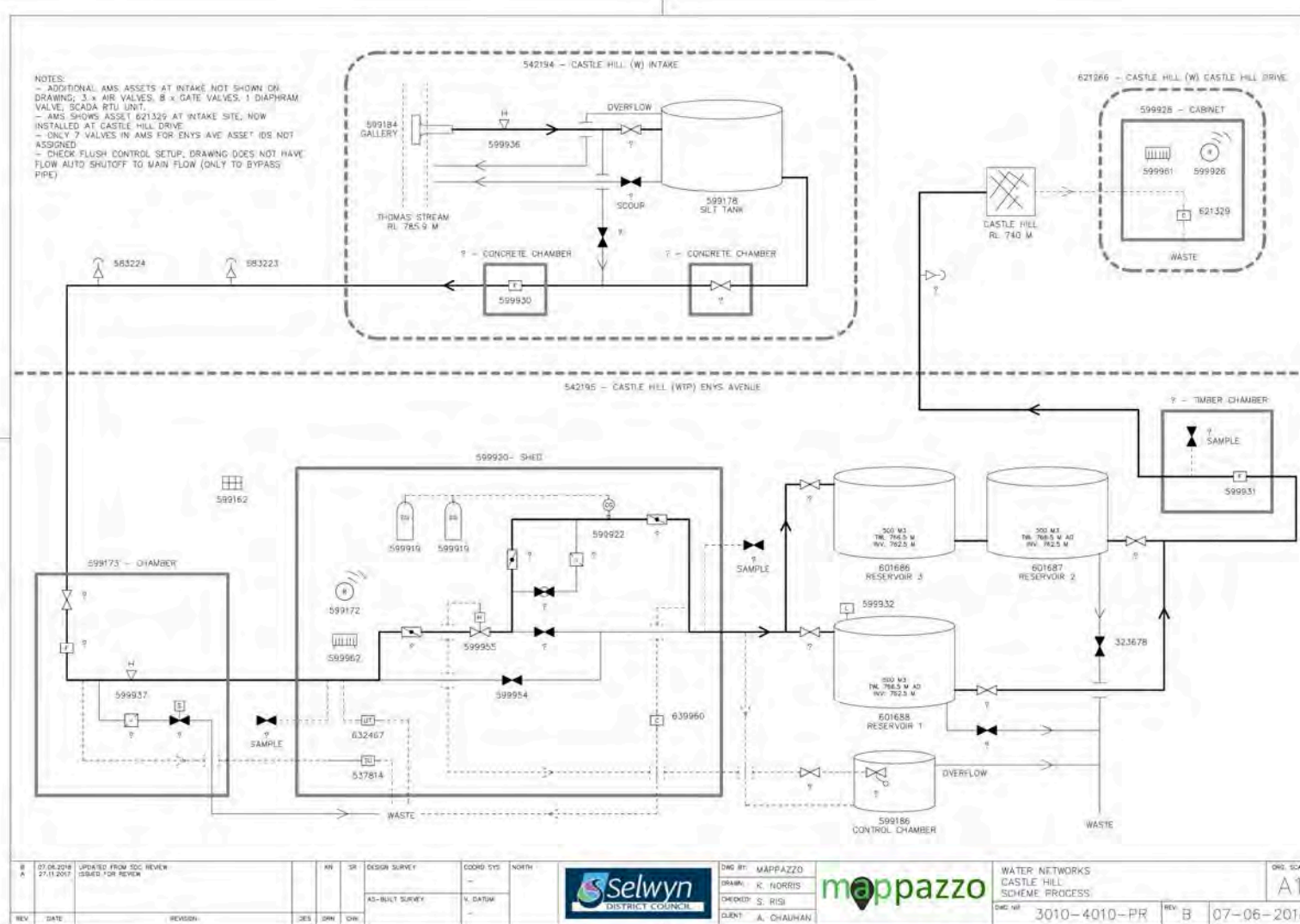


Figure 2-2 Scheme Schematic

## 2.4 System Capacity

Castle Hill Village has not developed to the extent anticipated when the water supply was constructed in the early 1980s. About 126 houses have been built. Most are holiday homes used predominantly over the winter period (ski season) with a few occupied by permanent residents. There is no business activity. Small subdivisions and land sales continue but this can easily be accommodated by the current headworks infrastructure.

The supply includes three large reservoirs providing a total of around 1500 m<sup>3</sup> of treated water storage capacity, about five times peak day demand. The large storage volume permits selective abstraction of water from Thomas Stream, i.e. when water quality is poor the intake is shut down. The 200mm diameter supply main from the reservoir offers plenty of capacity for current and foreseeable needs.

Capacity planning for this supply should consider current and likely future needs, which may be considerably less than originally allowed for. This would include the scale of source and treatment improvements required to achieve standards compliance, and renewal planning for the reservoirs.

**Table 2-2 Capacity Summary**

|                  | Flow Rate<br>(L/s) | Daily Volume<br>(m <sup>3</sup> ) | Annual Volume<br>(m <sup>3</sup> ) | Comments |
|------------------|--------------------|-----------------------------------|------------------------------------|----------|
| Consented Take   | 13.8               | 1192                              | 178,800 *                          | -        |
| Peak Demand      | 9.2**              | 580**                             | ~60,800                            | -        |
| * inferred value |                    |                                   |                                    |          |
| ** 10 Jan 2015   |                    |                                   |                                    |          |

## 2.5 Resource Consents

The Castle Hill water supply has a number of resource consents. Table 2-3 shows the water take permitted by the resource consents for this scheme.

**Table 2-3 Resource Consents**

| Consent                      | Description                                                                                        | Location                         | Date Issued | Expiry Date | Consented Max Instantaneous Flow (L/s) | Consented Max Daily Volume (m <sup>3</sup> /day) |
|------------------------------|----------------------------------------------------------------------------------------------------|----------------------------------|-------------|-------------|----------------------------------------|--------------------------------------------------|
| CRC991053<br>(Issued-Active) | To take surface water, at or about map reference NZMS 260 K34:040-773, for community water supply. | Castle Hill Village, CASTLE HILL | 24-Dec-98   | 23-Dec-33   | 13.8                                   | 1192                                             |

## 2.6 Water Quality

The Castle Hill water supply is a non-secure source where the source and treatment plant is sampled weekly and reticulation is sampled monthly.

The following details E. coli transgressions for the sample periods 2012 to 2017.

## Source

There have been 43 E. coli source transgressions during this period, with the last transgression occurring in 2017.

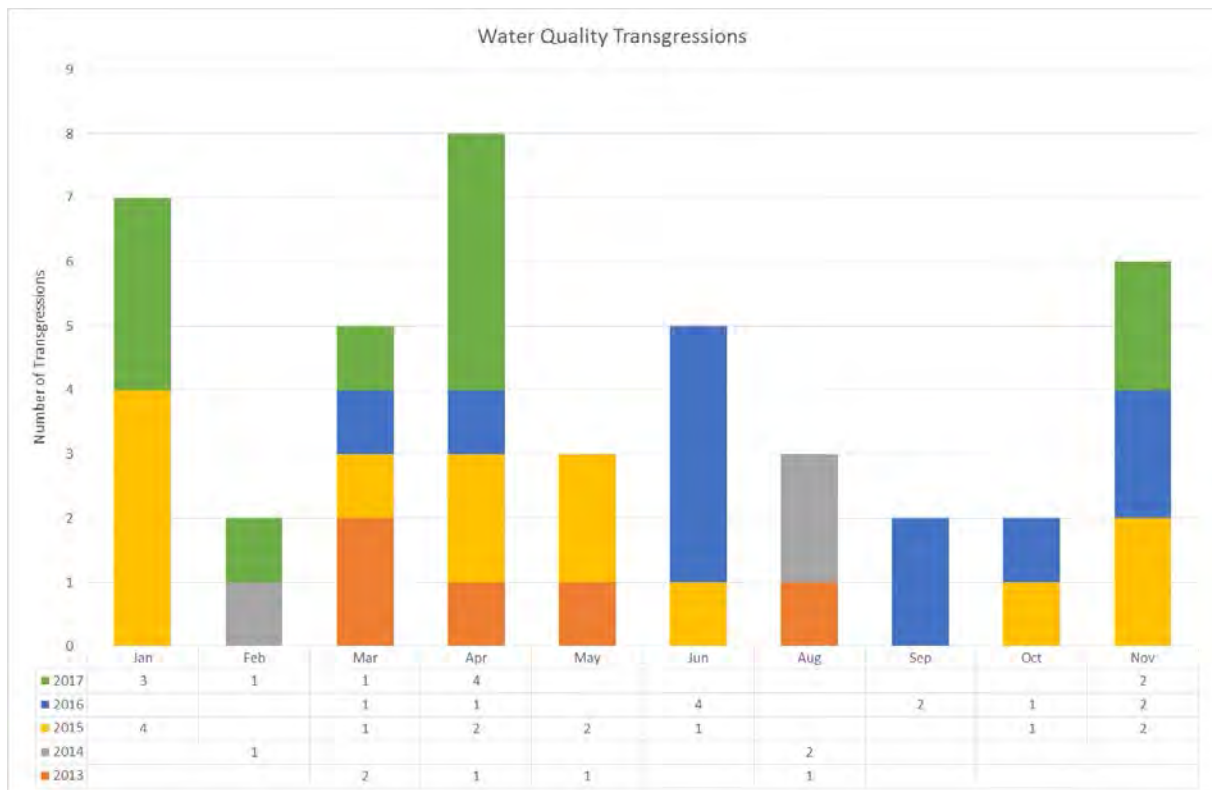


**Figure 2-3 E. coli Transgressions - Source**

## Treatment

There have been four E. coli treatment transgressions within this period, they all occurred in July 2012.

## Zone

There has been three E. coli transgression during this period, they all occurred in July 2012.

## Chemical Analysis

The following is a summary of the raw water chemical analysis carried out at the Castle Hill Water Supply.

**Table 2-4 Castle Hill Water Supply Raw Water Chemical Analysis Summary**

| Parameter                                   | Standards<br>MAV* (GV)** | Plant 2015 | Plant 2017 | Status |
|---------------------------------------------|--------------------------|------------|------------|--------|
| Total Lead (g/m3)                           | 0.01                     | 0.00031    | 0.000130   | ✓      |
| pH (pH units)                               | 7-8.5                    | 7.4        | 7.4        | ✓      |
| Total Hardness (g/m3 as CaCO <sub>3</sub> ) | <200                     | 21         | 22.3       | ✓      |
| Total Calcium (g/m3)                        | n/v                      | 7.3        | 7.67       | ✓      |
| Total Iron (g/m3)                           | <0.2                     | 0.023      | < 0.021    | ✓      |

|                           |      |      |        |   |
|---------------------------|------|------|--------|---|
| Total Sodium (g/m3)       | <200 | 2.6  | 2.55   | ✓ |
| Nitrate - Nitrogen (g/m3) | 11.3 | 0.08 | < 0.05 | ✓ |

\* MAV – Maximum Acceptable Value

\*\* (GV) – Guideline Value

## 2.7 Scheme Assets

A summary of material and diameter for pipes in Castle Hill is shown below by Figure 2-4 and Figure 2-5.

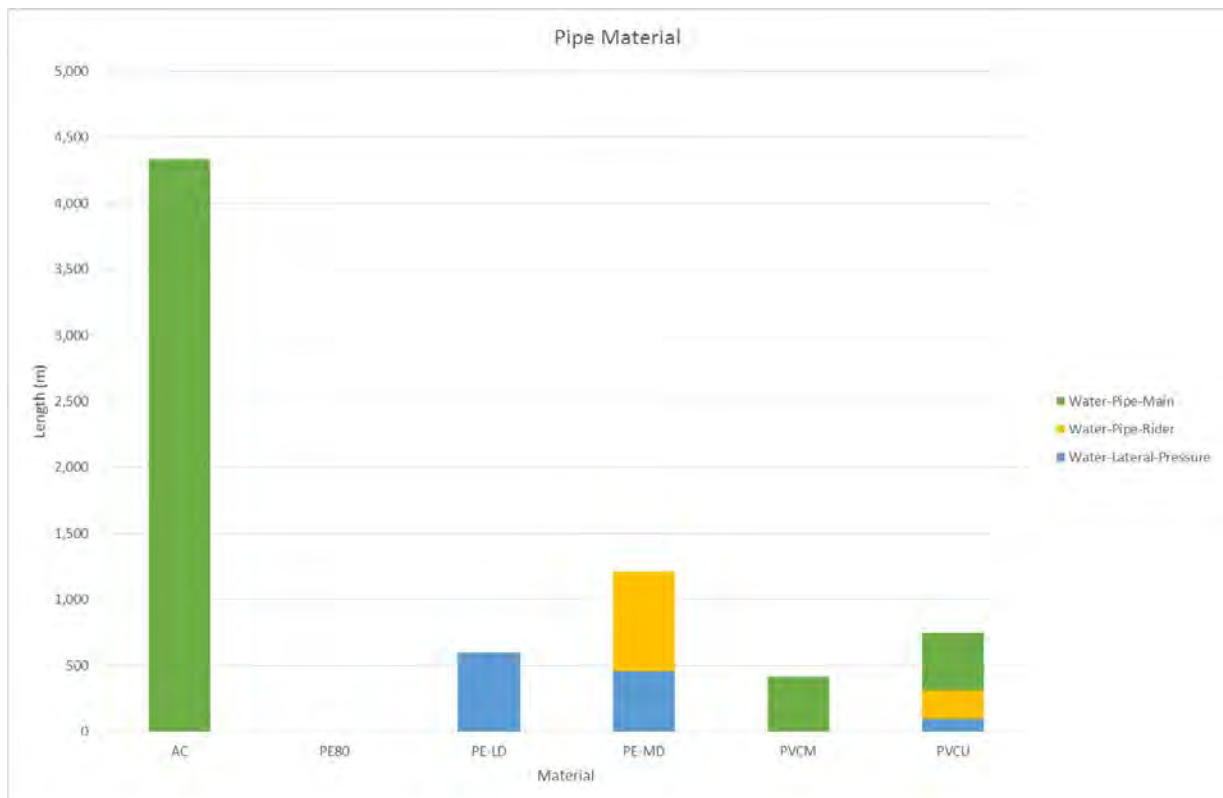


Figure 2-4 Pipe Material – Castle Hill

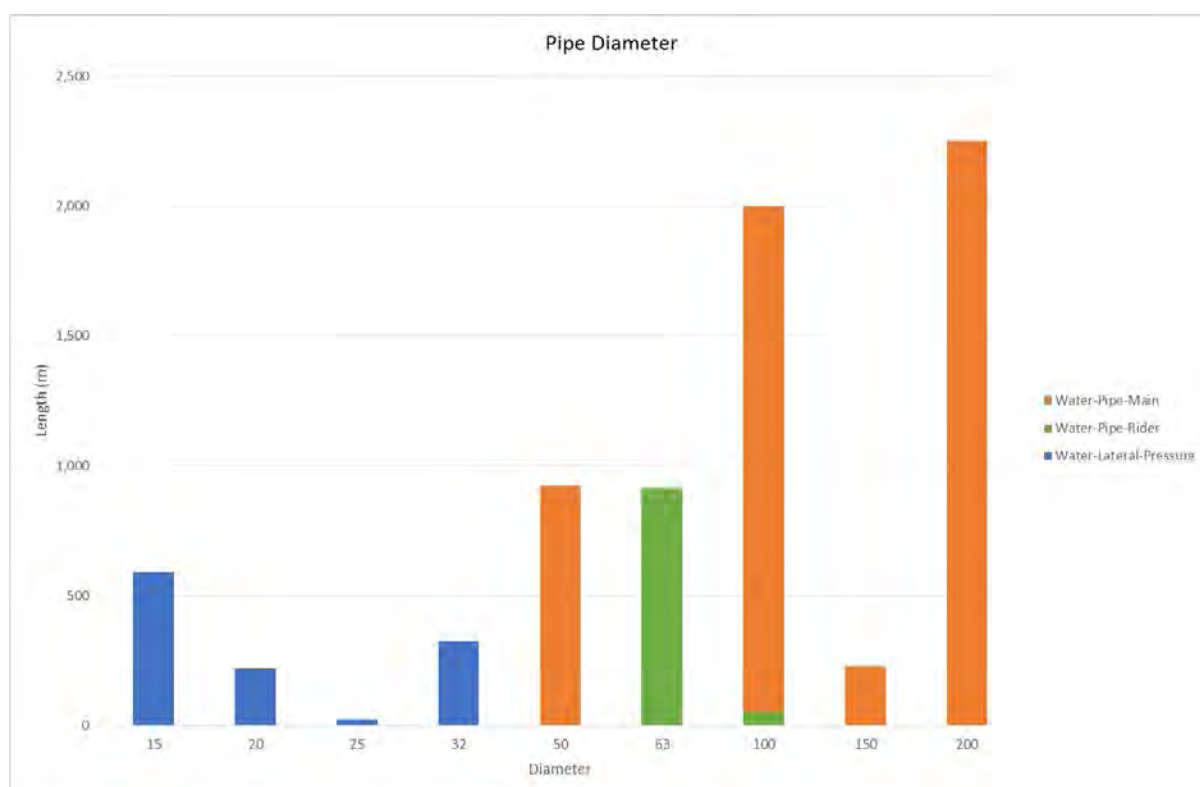


**Figure 2-5 Pipe Diameter – Castle Hill**

## 2.8 Operational Management

The water supply is operated and maintained under two maintenance contracts as follows:

- Contract 1241: Water Services Contract. Contract is with SICON Ferguson who undertakes investigations, conditions inspections, proactive and reactive maintenance and minor asset renewals; and
- Contract 1202: Parks and Reserves Contract. Contract is with SICON Ferguson who undertakes the maintenance of land scape features related to water services e.g. mowing, gardens etc.

Water quality sampling is completed under an agreement with Food and Health Ltd as required.

## 2.9 Photos of Main Assets





**Photo 1: Northern End of Intake Structure**



**Photo 2: Silt Trap (lid been replaced)**



**Photo 3: Treatment Shed**



**Photo 4: Reservoirs**

## 2.10 Risk Assessment

A risk assessment has been undertaken for the Castle Hill scheme. The key output from the risk assessment is the identification of any extreme and high risks which need to be mitigated. In order to mitigate these risks they have been included and budgeted for in the projects within this LTP. Table 2-5 outlines the risk priority rating, Table 2-7 outlines the risks and the list of key projects is found in Table 2-11.

**Table 2-5 Risk Priority Rating**

| Risk Score | Level of Risk | Risk Response                                                                                                                                             |
|------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| > 50       | Extreme       | Awareness of the event to be reported to Council.<br>Urgent action to eliminate / mitigate / manage the risk.<br><br>Document risk and action in the AMP. |
| 35-50      | Very High     | Risk to be eliminated / mitigated / managed through normal business planning processes with responsibility assigned.                                      |
| 14-35      | High          | Manage risk using routine procedures.                                                                                                                     |
| 3.5-14     | Moderate      | Monitor the risk.                                                                                                                                         |

|       |     |                                                                                                                                                                                  |
|-------|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| < 3.5 | Low | <p>Awareness of the event to be reported to Council.</p> <p>Immediate action required to eliminate / mitigate / manage the risk.</p> <p>Document risk and action in the AMP.</p> |
|-------|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

**Table 2-6 Risks – Castle Hill**

| Risk                                                                                         | Action/Project                                                                                                                       | Year Identified | 2014 Risk Rating | 2017 Risk Rating | Residual Risk Rating |
|----------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|-----------------|------------------|------------------|----------------------|
| High water use due to leaks causes additional operation costs                                | Leak detection                                                                                                                       | 2014            | 27               | 27               | 12                   |
| Insufficient monitoring of Cl2 results in treatment system over or inadequately chlorinating | Install chlorine analyser before reservoirs to check dose                                                                            | 2014            | 12               | 2.1              | 2.1                  |
| Manual operation of scheme is costly                                                         | Automate flushing to waste at reservoir site                                                                                         | 2014            | 4                | 2.1              | 2.1                  |
| No reservoir turnover and bottom filled                                                      | Upgrade pipework so that water goes through all reservoirs (connect 2 res's to the other 1). Install additional pressure transducer. | 2014            | 12               | 12               | 6                    |
| Poor tank maintenance leads to tank failure                                                  | Maintenance - re tighten covers/liners                                                                                               | 2014            | 6                | 6                | 2.1                  |
| Electrical failure due to lightning or network spikes                                        | Install surge diverters                                                                                                              | 2014            | 6                | 2.1              | 2.1                  |
| Failure to meet NES water meter standards                                                    | NES Water Meter Compliance                                                                                                           | 2014            | 20               | 6                | 6                    |
| Inability to collect income from non-metered properties                                      | Install property water meters                                                                                                        | 2014            | 27               | 27               | 2.1                  |
| Non-consented activities                                                                     | Renewal of consents                                                                                                                  | 2014            | 27               | 27               | 6                    |
| Inadequate treatment under all conditions                                                    | Water quality upgrade                                                                                                                | 2017            |                  | 45               | 3.5                  |



The list of district wide risks can be found in 5Waters Activity Management Plan: Volume 1.

## 2.11 Asset Valuation Details

The total replacement value of assets within the Castle Hill water scheme is \$2,347,905 with further details in Table 2-7 below.

**Table 2-7 Replacement Value, Castle Hill**

| Asset Class 1              | Asset Class 2 | Sum of Replacement Value |
|----------------------------|---------------|--------------------------|
| <b>Plant and Equipment</b> |               | \$1,341,124              |
| <b>Water Reticulation</b>  | Fire          | \$34,410                 |
|                            | Hydrant       | \$54,540                 |
|                            | Lateral       | \$775,781                |
|                            | Pipe          | \$114,659                |
|                            | Supply Point  | \$27,390                 |

Replacement values for these different types of assets are shown in Figure 2-6 below.



**Figure 2-6 Replacement Costs for Castle Hill**

## 2.12 Renewals

The renewal profile has been taken from the 2017 5 Waters Valuation. A graph showing the renewals for this scheme are shown by Figure 2-7 below. The majority of renewals occur in 2037/38.



**Figure 2-7 Castle Hill Water Renewal Profile**

## 2.13 Critical Assets

The criticality model for Castle Hill has been updated for the 2018 AcMP. The methodology of the criticality model can be found in 5Waters Activity Management Plan: Volume 1 and it provides details of how the criticality has been calculated for the reticulation assets. Table 2-8 and Figure 2-8 below shows the calculated criticality for all of the assets within this scheme that have a recorded known length.

**Table 2-8 Length of Assets per Criticality Level**

| Criticality Bands |             | Length (m) |
|-------------------|-------------|------------|
| 5                 | Low         | 2,398      |
| 4                 | Medium-Low  | 2,635      |
| 3                 | Medium      | 147        |
| 2                 | Medium-High | 2,410      |
| 1                 | High        | 47         |

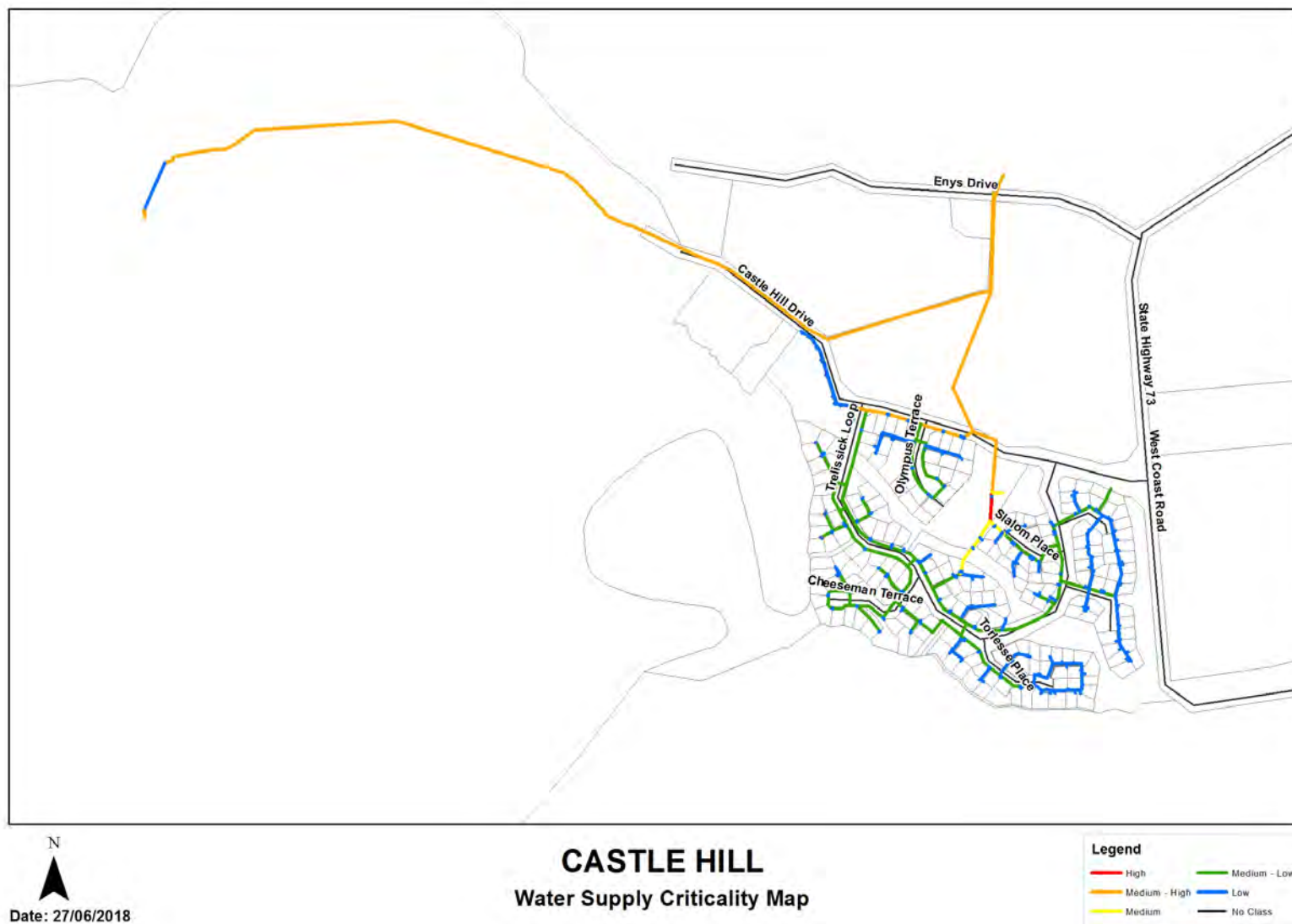


Figure 2-8 Criticality Map

## 2.14 Asset Condition

The asset condition model was run for Castle Hill in 2017. The methodology of the model can be found in 5Waters Activity Management Plan: Volume 1 which provides details of how the model has been calculated for the pipe reticulation assets. Figure 2-9 below shows the level of asset condition for these assets within this scheme that have a recorded known condition.

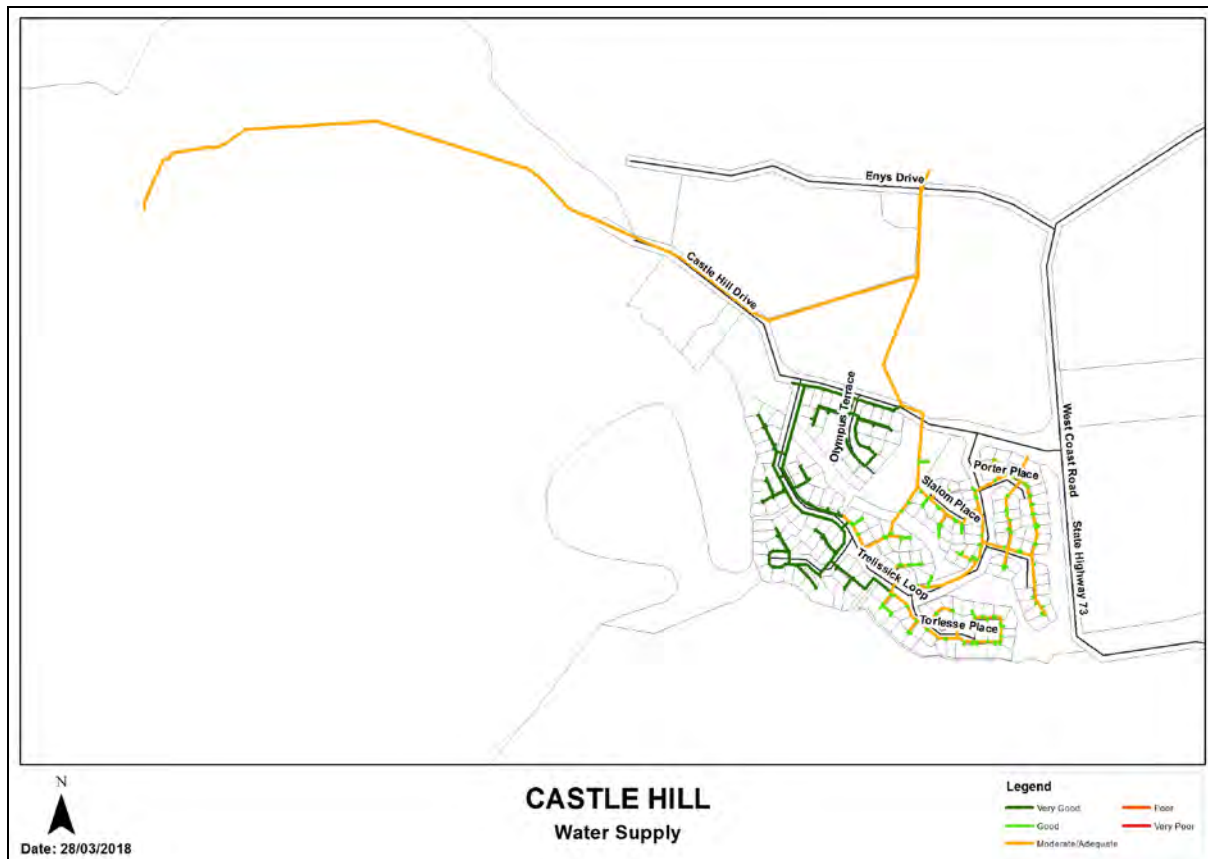


**Figure 2-9 Asset Condition – Castle Hill**

Table 2-9 provides a description of the condition rating used within the condition model.

**Table 2-9 Asset Condition Grading**

| Condition Rating | Grading   |
|------------------|-----------|
| 1.0              | Excellent |
| 2.0              | Good      |
| 3.0              | Moderate  |
| 4.0              | Poor      |
| 5.0+             | Fail      |

The number of pipe faults is also measured through the asset management system. Figure 2-10 shows the known historic pipe failures within this scheme.

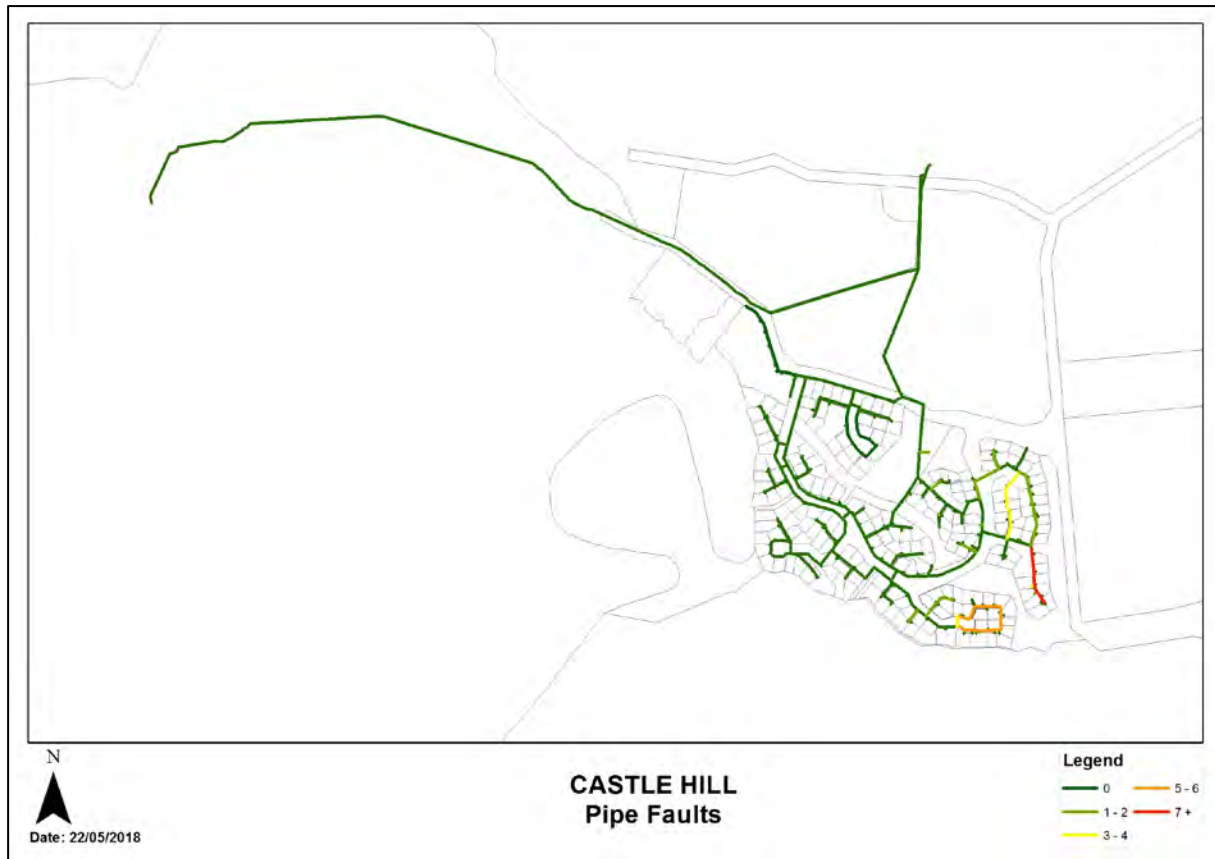


**Figure 2-10 Pipe Faults, Castle Hill**

## 2.15 Funding Program

The 10 year budgets for Castle Hill are shown by Table 2-10 and Figure 2-11. Budgets are split into expenditure, renewals, projects and capital projects.

All figures are (\$) not adjusted for CPI “inflation”. They are calculated on historical data, and population growth where relevant.

**Table 2-10 Castle Hill Budget Summary**

| Years     | Expenditure | Renewals  | Projects | Capital Projects |
|-----------|-------------|-----------|----------|------------------|
| 2018/2019 | \$62,290    | \$36,989  | \$15,000 |                  |
| 2019/2020 | \$68,290    |           |          |                  |
| 2020/2021 | \$68,290    | \$22,580  |          |                  |
| 2021/2022 | \$68,290    |           | \$15,000 | \$50,000         |
| 2022/2023 | \$68,290    | \$103,475 |          |                  |
| 2023/2024 | \$68,290    | \$24,856  |          |                  |

|           |           |           |          |          |
|-----------|-----------|-----------|----------|----------|
| 2024/2025 | \$68,290  | \$558     | \$15,000 |          |
| 2025/2026 | \$68,290  | \$3,836   |          |          |
| 2026/2027 | \$68,290  |           |          |          |
| 2027/2028 | \$68,290  | \$1,668   | \$15,000 |          |
| Total     | \$676,900 | \$193,961 | \$60,000 | \$50,000 |

An explanation of the categories within the budgets are as follows below:

- Expenditure consists of operation and maintenance costs;
- Renewals are replacement of assets which are nearing or exceeded their useful life;
- Projects are investigations, decisions and planning activities which exclude capital works; and
- Capital projects are activities involving physical works.

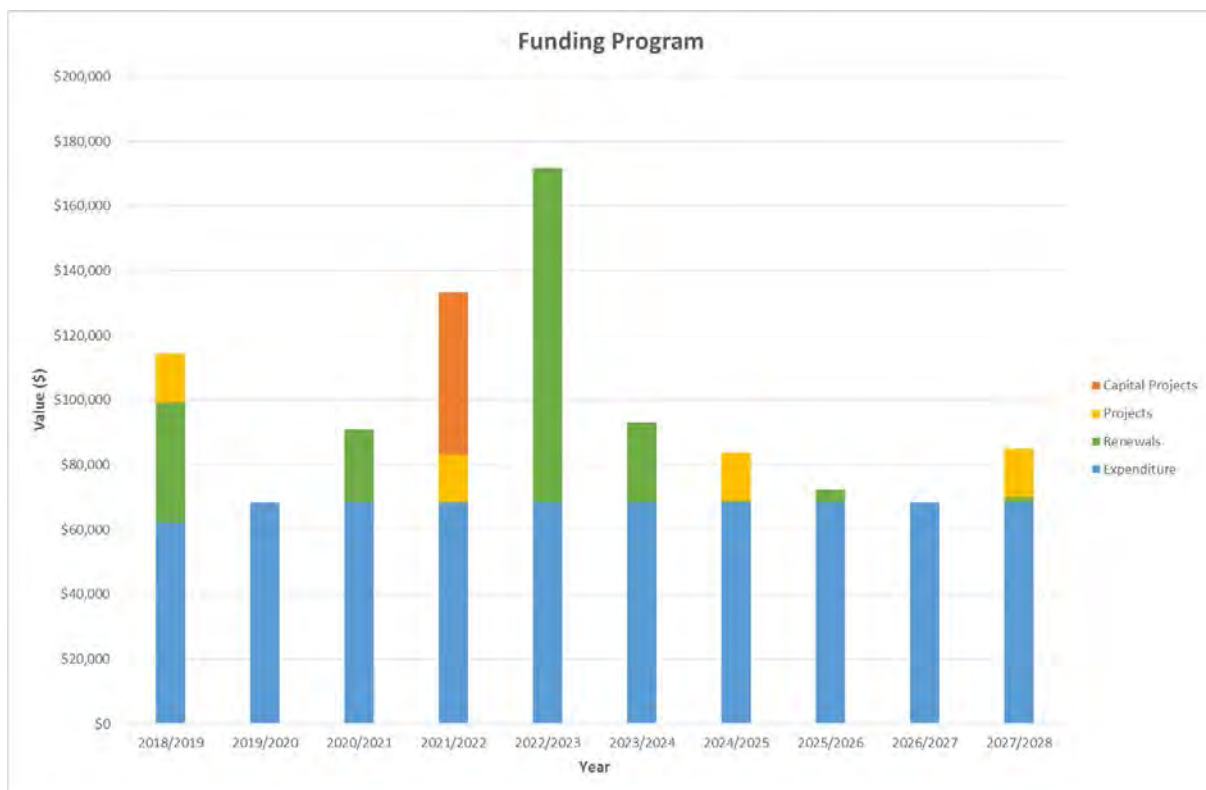


Figure 2-11 Castle Hill Funding Summary

There are two major projects for Castle Hill water scheme in the LTP budget.

**Table 2-11 Key Projects**

| Account Label    | GL        | Description                    | Year 1 (\$) | Year 2 (\$) | Year 3 (\$) | Years 4 to 10 | Funding Split <sup>1</sup> |
|------------------|-----------|--------------------------------|-------------|-------------|-------------|---------------|----------------------------|
| Projects         | 4010040   | Maintenance - re tighten cover | \$15,000    |             |             | \$45,000      | 100% LoS                   |
| Capital Projects | 401090044 | Res pipework                   |             |             |             | \$50,000      | 100% LoS                   |

The list of district wide projects can be found in 5Waters Activity Management Plan: Volume 1.

### Discussion on Projects

Projects have been determined based on their:

- Relevance to the scheme
- Requirement to be completed under legislation
- Ability to bring the scheme up to or maintain the Level of Service required under council's Asset Management Policy.

Many projects are **jointly** funded by more than one scheme and activity. Each scheme pays a pro-rata share only, equivalent to the number of connections.

### Discussion on Capital and Projects

Where relevant, Capital (Levels of Service) and Capital (Growth) projects have been included in the scheme financial details.

Levels of Service Projects and growth splits have been provided to ensure the costs of population driven works are clear.

<sup>1</sup> Where LoS refers to Level of Service and G refers to Growth



### 3.0 CLAREMONT WATER SUPPLY

#### 3.1 Scheme Summary

| Description                                   |                                   | Quantity                       |
|-----------------------------------------------|-----------------------------------|--------------------------------|
| <b>Estimated Population Served</b>            |                                   | 154                            |
| <b>Scheme Coverage</b><br>(1 Jan 2018)        | Full Charges                      | 54                             |
|                                               | Half Charges                      | 4                              |
|                                               | >1 Charges                        | 1                              |
| <b>System Components</b>                      | Bores/Intakes (No.)               | 1                              |
|                                               | Treatment/Disinfection            | None                           |
|                                               | Reservoirs (No.)                  | 1                              |
|                                               | Pump Stations (No.)               | 1                              |
|                                               | Piped (m)                         | 2687.3                         |
| <b>History</b>                                | Original scheme installation date | -                              |
| <b>Value (\$)</b>                             | Replacement Cost                  | \$670,259.21                   |
|                                               | Depreciated Replacement Cost      | \$494,110.67                   |
| <b>Financial</b>                              | 2018/2019 Estimate                | \$28,820                       |
|                                               | Annual maintenance cost           | 0.90%                          |
|                                               | % of total                        |                                |
| <b>Demand (m3)</b><br>(1 Jan – 31 Dec 2017)   | Average daily                     | 163                            |
|                                               | Peak daily                        | 616                            |
|                                               | Minimum daily                     | -                              |
|                                               | Average daily per connection      | 3                              |
| <b>Type of Supply</b>                         |                                   | High pressure and unrestricted |
| <b>Target Pressure &amp; Flow at boundary</b> | Pressure                          | >310 kPa                       |
|                                               | Flow                              | >20 L/min                      |
| <b>Sustainability</b>                         | Well Security                     | Secure                         |

#### 3.2 Key Issues

The following key issues are associated with the Claremont water supply. A list of district wide issues are located in 5Waters Activity Management Plan: Volume 1.

**Table 3-1 Claremont Scheme Issues**

| What's the Problem                                                                            | What we plan to do                                                                                                                   |
|-----------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| Confirmation of compliance with New Zealand Fire Fighting Code of Practice compliance issues. | Council will investigate and recommend the approach in relation to any New Zealand Fire Fighting Code of Practice compliance issues. |

### 3.3 Overview & History

Claremont Water Supply provides untreated groundwater to a residential subdivision is located on the south side of the Main South Road, near Templeton, between Rolleston and Christchurch (see schematics). There are 59 sections within the subdivision.

Water for the Claremont water supply is obtained from a single deep bore off Devine Drive. The bore is 200mm in diameter and 108m deep.

The scheme was designed as a high pressure, unrestricted metered supply which should comply with NZ Fire Fighting Code of Practice.

There is potential for the Claremont scheme to be connected to the Prebbleton supply (4km away) in the future if the cost of supplying water from Prebbleton becomes cheaper than operating and maintaining the current supply.

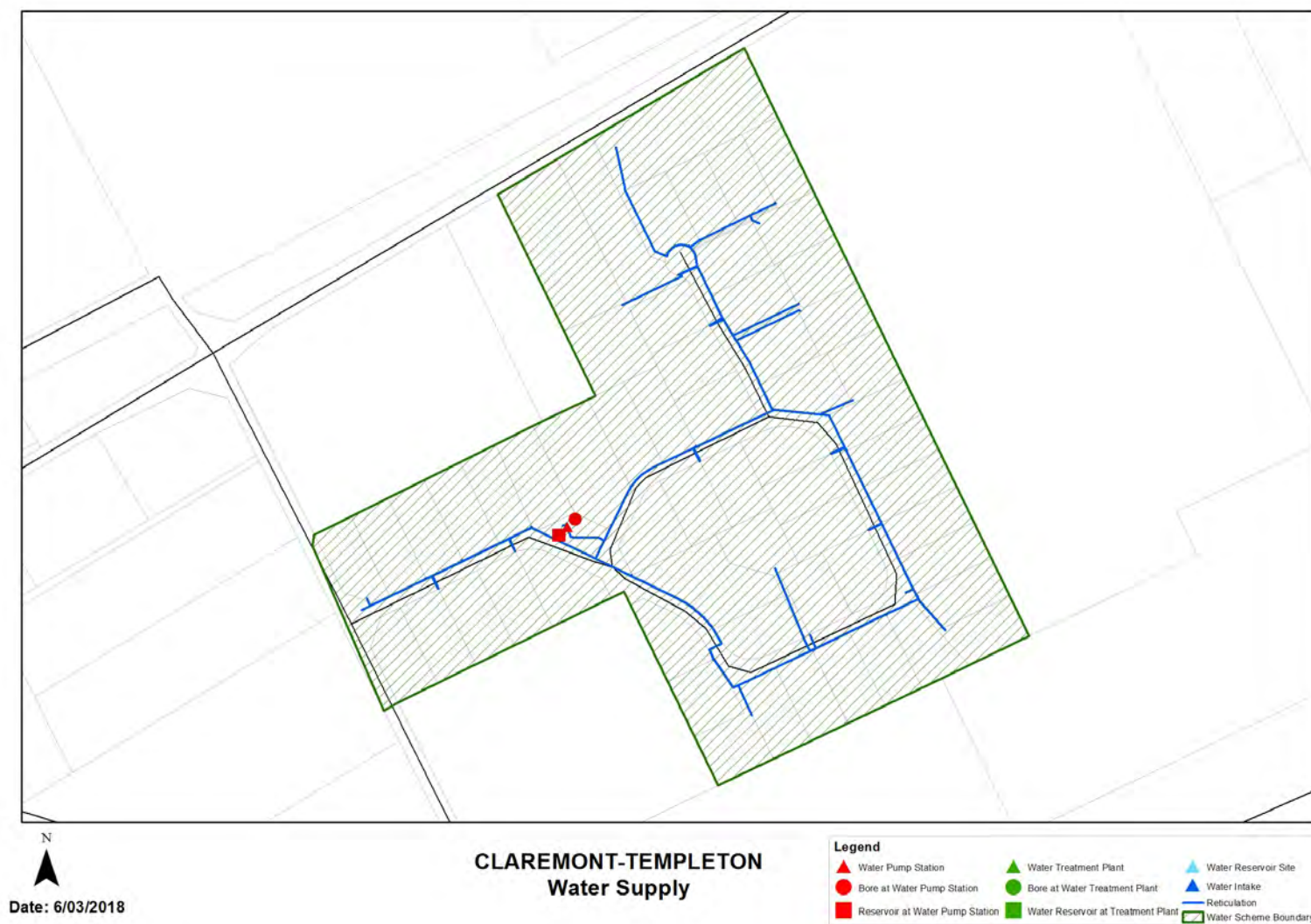


**Figure 3-1 Scheme Map**



### 3.4 System Capacity

This water supply was developed to serve the 59 lot rural residential subdivision. Most allocated connections are utilised (6 unused connections remaining) and it is not intended that this supply area be extended. The supply is able to meet current peak demands without the need for water restrictions. Any further development in this area could potentially be served by connection to the nearby Christchurch City Council water supply.

**Table 3-2 Capacity Summary**

|                                                                   | Flow Rate<br>(L/s) | Daily Volume<br>(m <sup>3</sup> ) | Annual Volume<br>(m <sup>3</sup> ) | Comments                     |
|-------------------------------------------------------------------|--------------------|-----------------------------------|------------------------------------|------------------------------|
| Abstraction Capacity                                              | 11.7               | 1010                              | -                                  | 1 x bore pump (nom capacity) |
| Consented Take                                                    | 12                 | 1037 *                            | 124,000                            |                              |
| Peak Demand                                                       | 15.7*              | 925***                            | 78,740****                         |                              |
| * inferred value<br>** 1 Feb 2015<br>*** 26 Jan 2015<br>**** 2014 |                    |                                   |                                    |                              |

### 3.5 Resource Consents

The Claremont water supply has a number of resource consents. Table 3-3 shows the water take permitted by the resource consents for this scheme.

**Table 3-3 Resource Consents**

| Consent                      | Description                                                                                                                                      | Location                   | Date Issued | Expiry Date | Consented Max Instantaneous Flow (L/s) | Consented Max Daily Volume (m <sup>3</sup> /day) |
|------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|-------------|-------------|----------------------------------------|--------------------------------------------------|
| CRC000094<br>(Issued-Active) | to take groundwater from a proposed bore, at or about map reference NZMS 260 M36:6658-3801 for the domestic supply of a residential subdivision. | Waterholes Road, TEMPLETON | 17-Nov-99   | 15-Nov-34   | 12                                     |                                                  |

This consent is currently under the developer's name. Council is working to resolve this issue.

### 3.6 Water Quality

The Claremont water supply is a secure source and is currently sampled weekly within the treatment plant and monthly within the reticulation.

The following details E. coli transgressions for the sample periods 2012 to 2017.

### Treatment

There have been no E. coli transgressions for this period in the treatment plant.

### Reticulation

There have been no E. coli transgressions for this period in the reticulation zone.

### Chemical Analysis

The following is a summary of the raw water chemical analysis carried out at the Claremont Water Supply.

**Table 3-4 Claremont Water Supply Raw Water Chemical Analysis Summary**

| Parameter                                   | Standards<br>MAV* (GV)** | Plant 2015 | Plant 2017 | Status |
|---------------------------------------------|--------------------------|------------|------------|--------|
| Total Lead (g/m3)                           | 0.01                     | 0.00017    | < 0.00011  | ✓      |
| pH (pH units)                               | 7-8.5                    | 7.8        | 7.8        | ✓      |
| Total Hardness (g/m3 as CaCO <sub>3</sub> ) | <200                     | 39         | 38.4       | ✓      |
| Total Calcium (g/m3)                        | n/v                      | 13.4       | 13.28      | ✓      |
| Total Iron (g/m3)                           | <0.2                     | <0.021     | < 0.021    | ✓      |
| Total Sodium (g/m3)                         | <200                     | 5.9        | 10.89      | ✓      |
| Nitrate - Nitrogen (g/m3)                   | 11.3                     | 1.08       | 4.00       | ✓      |

\* MAV – Maximum Acceptable Value

\*\* (GV) – Guideline Value

## 3.7 Scheme Assets

A summary of material and diameter for pipes in Claremont is shown below by Figure 3-3 and Figure 3-4.

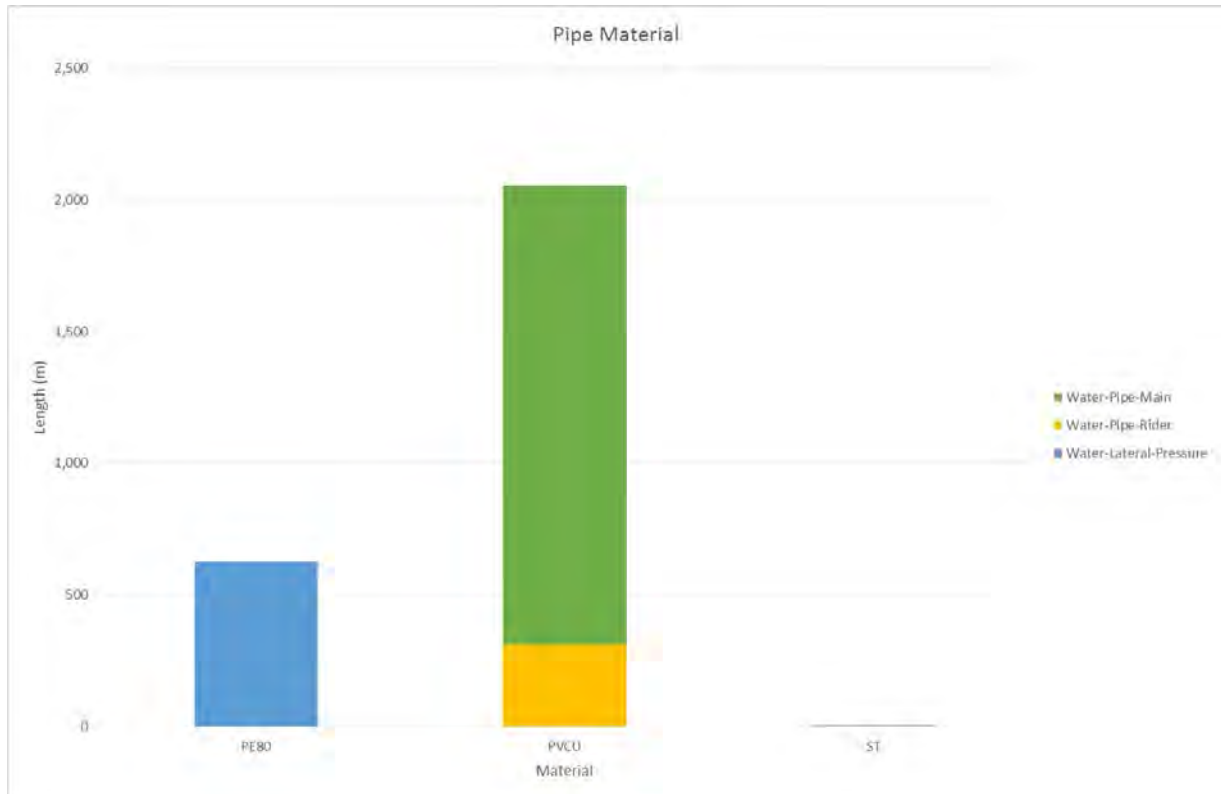


**Figure 3-3 Pipe Material – Claremont**

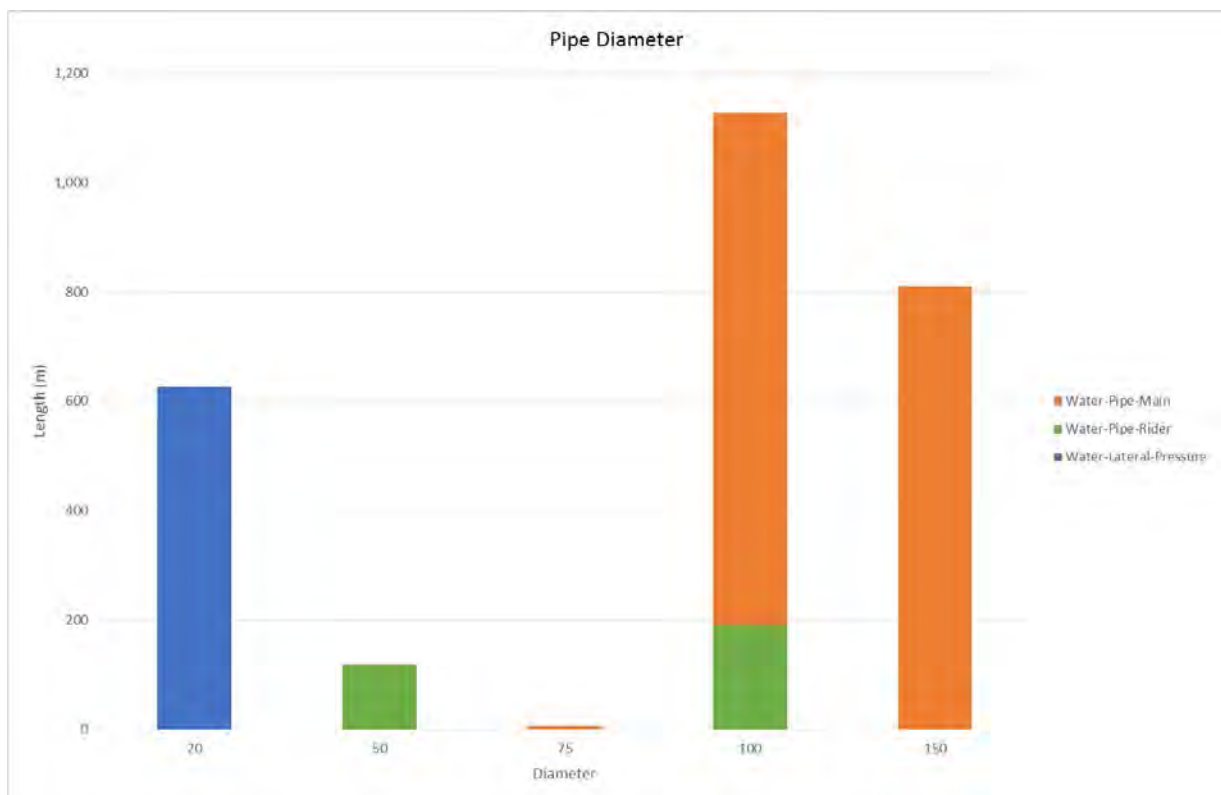


**Figure 3-4 Pipe Diameter – Claremont**



### 3.8 Operational Management

The water supply is operated and maintained under two maintenance contracts as follows:

- Contract 1241: Water Services Contract. Contract is with SICON Ferguson who undertakes investigations, conditions inspections, proactive and reactive maintenance and minor asset renewals; and
- Contract 1202: Parks and Reserves Contract. Contract is with SICON Ferguson who undertakes the maintenance of land scape features related to water services e.g. mowing, gardens etc.

Water quality sampling is completed under an agreement with Food and Health Ltd as required.

### 3.9 Photos of Main Assets



**Photo 1: Bore**



**Photo 2: Reservoir**



**Photo 3: Pump shed**

### 3.10 Risk Assessment

A risk assessment has been undertaken for the Claremont scheme. The key output from the risk assessment is the identification of any extreme and high risks which need to be mitigated. In order to mitigate these risks they have been included and budgeted for in the projects within this LTP. Table 3-5 outlines the risk priority rating, Table 3-6 outlines the risks and the list of key projects is found in Table 3-11.

**Table 3-5 Risk Priority Rating**

| Risk Score | Level of Risk | Risk Response                                                                                                                                                         |
|------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| > 50       | Extreme       | Awareness of the event to be reported to Council.<br>Urgent action to eliminate / mitigate / manage the risk.<br><br>Document risk and action in the AMP.             |
| 35-50      | Very High     | Risk to be eliminated / mitigated / managed through normal business planning processes with responsibility assigned.                                                  |
| 14-35      | High          | Manage risk using routine procedures.                                                                                                                                 |
| 3.5-14     | Moderate      | Monitor the risk.                                                                                                                                                     |
| < 3.5      | Low           | Awareness of the event to be reported to Council.<br>Immediate action required to eliminate / mitigate / manage the risk.<br><br>Document risk and action in the AMP. |

**Table 3-6 Risks – Claremont**

| Risk                                                    | Action/Project                                                                                                                       | Year Identified | 2014 Risk Rating | 2017 Risk Rating | Residual Risk Rating |
|---------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|-----------------|------------------|------------------|----------------------|
| If reservoir overflows, into control shed               | Test reservoir overflow and ensure electrical controls in nearby building is not affected. Install splash protection e.g. a curtain. | 2014            | 12               | 12               | 6                    |
| Electrical failure due to lightning or network spikes   | Install surge diverters                                                                                                              | 2014            | 6                | 6                | 6                    |
| Failure to meet NES water meter standards               | NES Water Meter Compliance                                                                                                           | 2014            | 20               | 6                | 6                    |
| Inability to collect income from non-metered properties | Install property water meters                                                                                                        | 2014            | 27               | 0.6              | 0.6                  |
| Non-compliance with the DWSNZ                           | DWSNZ - Age Testing                                                                                                                  | 2014            | 6                | 0.7              | 0.7                  |
| Non-compliance with the DWSNZ                           | DWSNZ - Bore-head security                                                                                                           | 2014            | 6                | 6                | 6                    |
| Non-consented activities                                | Renewal of consents                                                                                                                  | 2014            | 27               | 27               | 6                    |
| Overflow of tank into treatment building                | Vent building outside                                                                                                                | 2017            |                  | 6                | 0.2                  |

|                                           |                         |      |  |   |     |
|-------------------------------------------|-------------------------|------|--|---|-----|
| SCADA control for remote control of pumps | Install remote controls | 2017 |  | 4 | 0.2 |
|-------------------------------------------|-------------------------|------|--|---|-----|

The list of district wide risks can be found in 5Waters Activity Management Plan: Volume 1.

### 3.11 Asset Valuation Details

The total replacement value of assets within the Claremont water scheme is \$670,259 as detailed in Table 3-7 below.

**Table 3-7 Replacement Value, Claremont**

| Asset Class 1              | Asset Class 2 | Sum of Replacement Value |
|----------------------------|---------------|--------------------------|
| <b>Plant and Equipment</b> |               | \$326,367                |
| <b>Water Reticulation</b>  | Hydrant       | \$28,590                 |
|                            | Lateral       | \$26,923                 |
|                            | Pipe          | \$235,511                |
|                            | Supply Point  | \$41,510                 |
|                            | Valve         | \$11,358                 |

Replacement values for these different types of assets are shown in Figure 3-5 below.

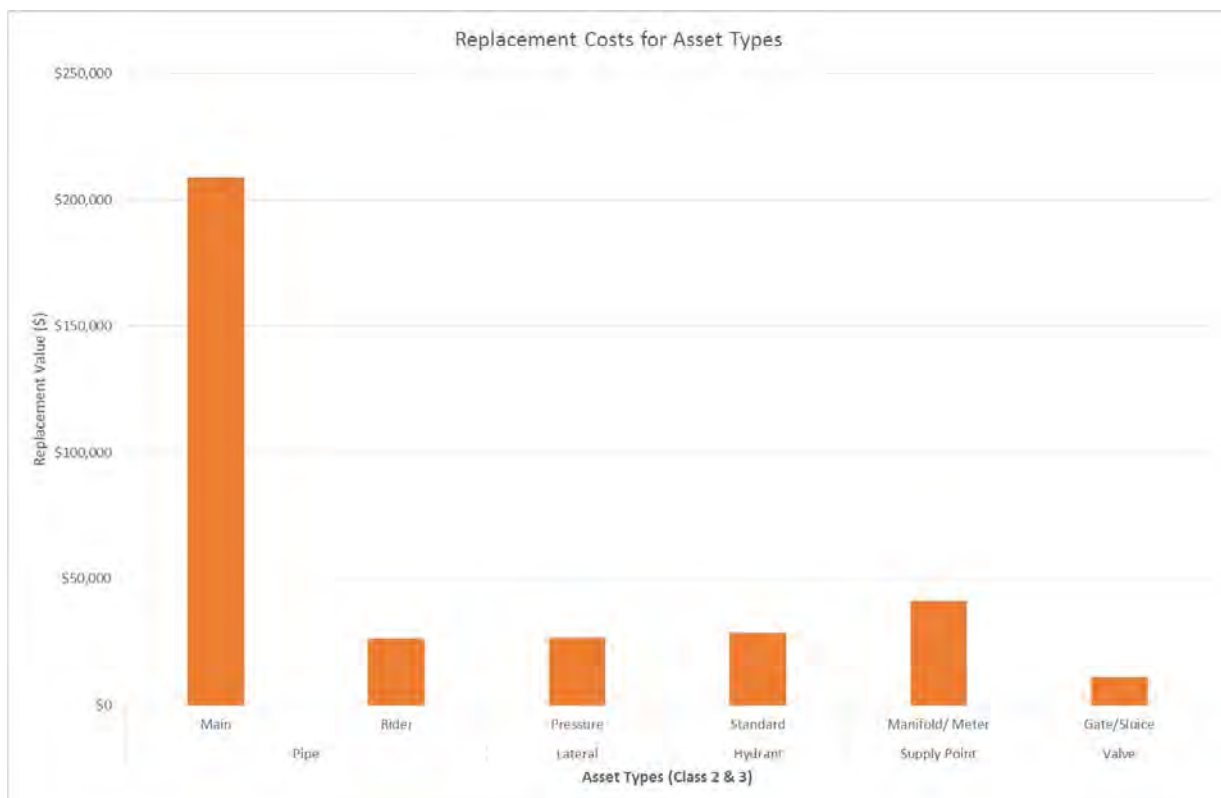


**Figure 3-5 Replacement Costs for Claremont**

### 3.12 Renewals

The renewal profile has been taken from the 2017 5 Waters Valuation. A graph showing the renewals for this scheme are shown by Figure 3-6 below. The majority of renewals occur in 2019/2020.



**Figure 3-6 Claremont Water Renewal Profile**

### 3.13 Critical Assets

The criticality model for Claremont has been updated for the 2018 AcMP. The methodology of the criticality model can be found in 5Waters Activity Management Plan: Volume 1 and it provides details of how the criticality has been calculated for the reticulation assets. Table 3-8 and Figure 3-7 below shows the calculated criticality for all of the assets within this scheme that have a recorded known length.

**Table 3-8 Length of Assets per Criticality Level**

| Criticality Bands |             | Length (m) |
|-------------------|-------------|------------|
| 5                 | Low         | 1,012      |
| 4                 | Medium-Low  | 1128       |
| 3                 | Medium      | 812        |
| 2                 | Medium-High | 0          |
| 1                 | High        | 0          |

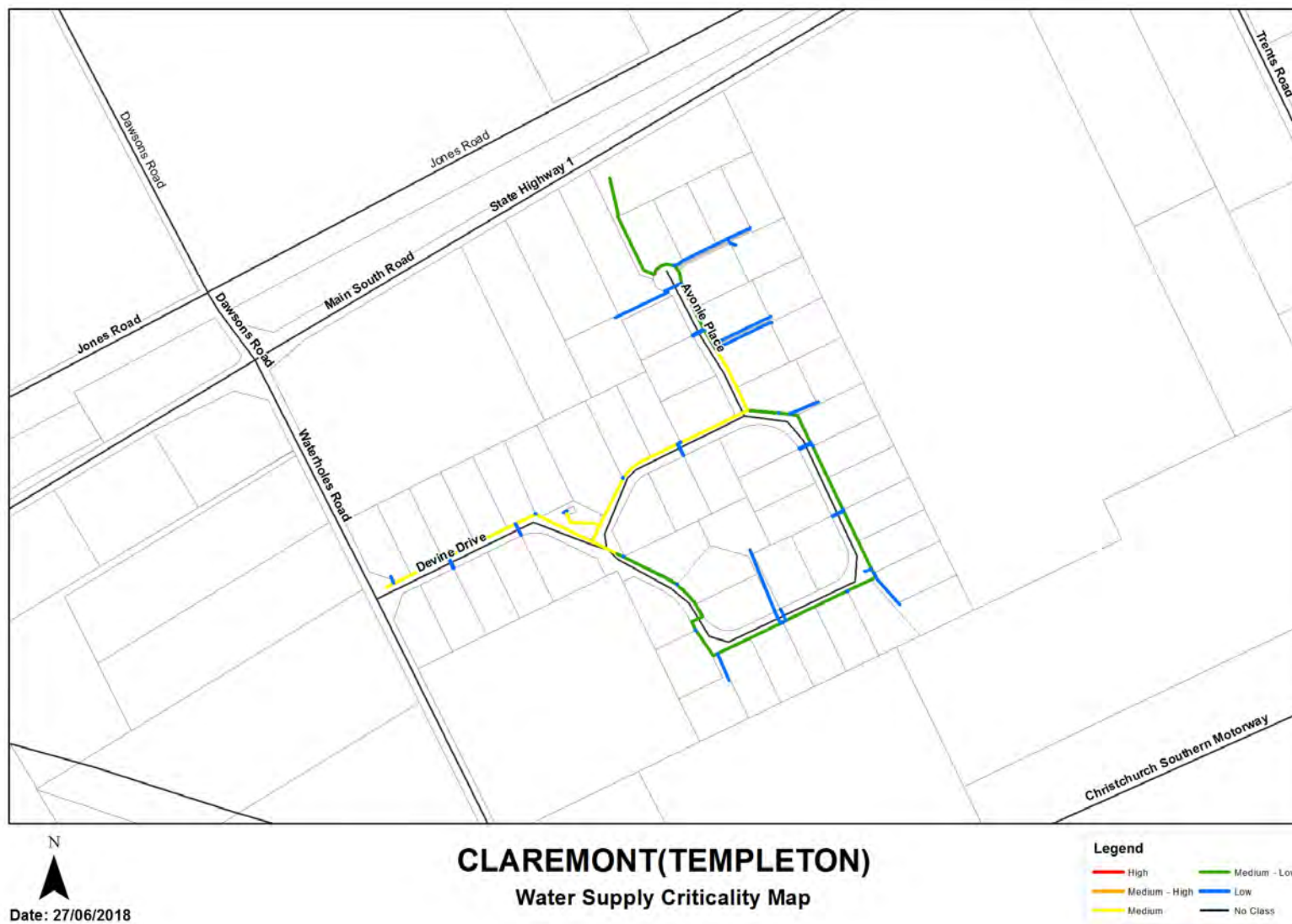


Figure 3-7 Criticality Map

### 3.14 Asset Condition

The asset condition model was run for Claremont in 2017. The methodology of the model can be found in 5Waters Activity Management Plan: Volume 1 which provides details of how the model has been calculated for the pipe reticulation assets. Figure 3-8 below shows the level of asset condition for these assets within this scheme that have a recorded known condition.

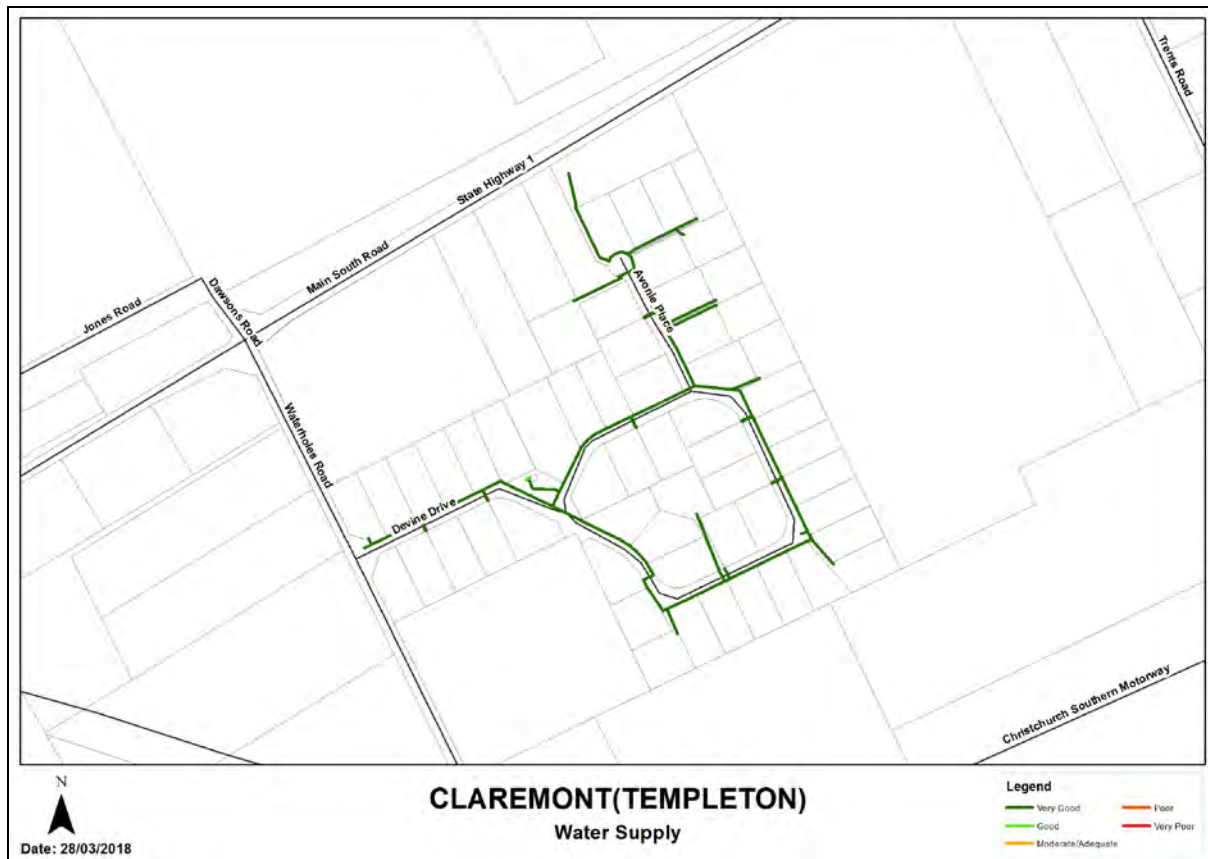


**Figure 3-8 Asset Condition – Claremont**

Table 3-10 provides a description of the condition rating used within the condition model.

**Table 3-9 Asset Condition Grading**

| Condition Rating | Grading   |
|------------------|-----------|
| 1.0              | Excellent |
| 2.0              | Good      |
| 3.0              | Moderate  |
| 4.0              | Poor      |
| 5.0+             | Fail      |



The number of pipe faults is also measured through the asset management system. Figure 3-9 shows the known historic pipe failures within this scheme.

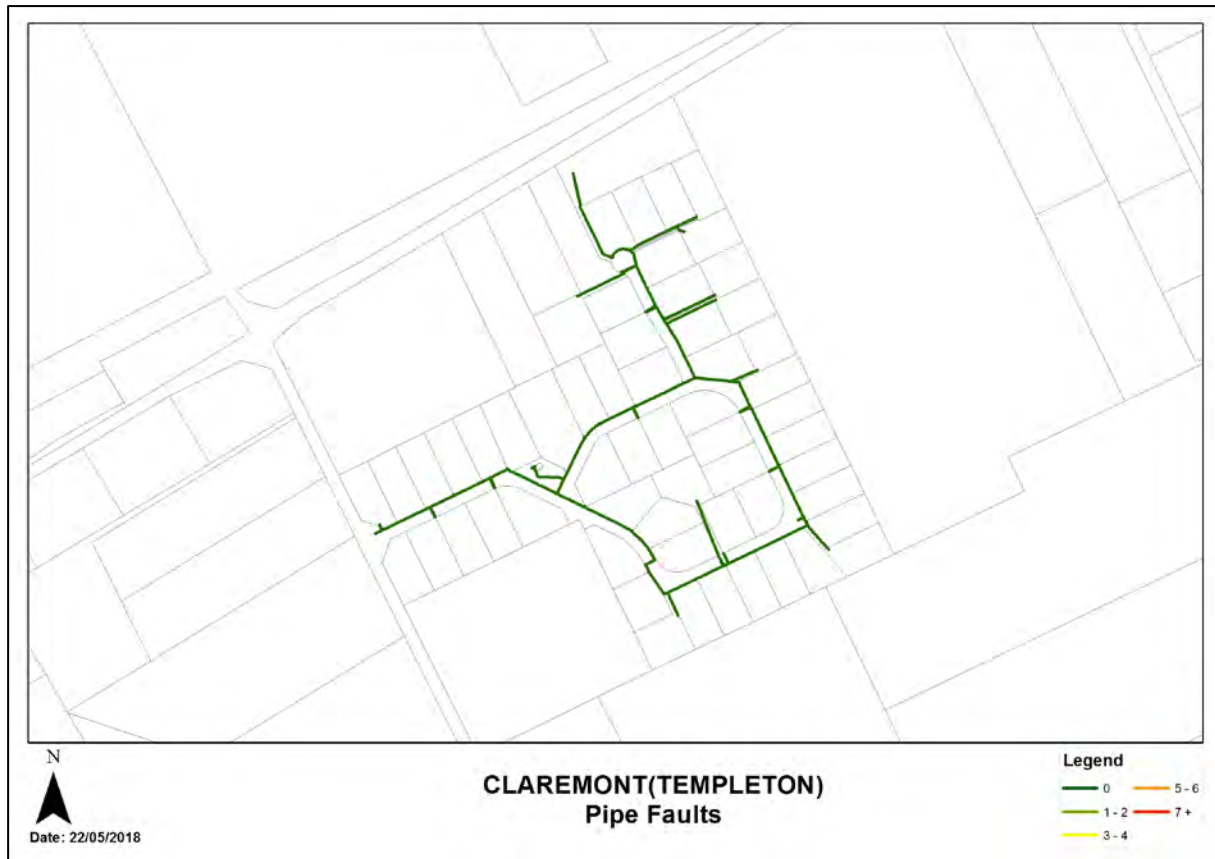


**Figure 3-9 Pipe Faults, Claremont**

### 3.15 Funding Program

The 10 year budgets for Claremont are shown by Table 3-10 and Figure 3-10. Budgets are split into expenditure, renewals, projects and capital projects.

All figures are (\$) not adjusted for CPI “inflation”. They are calculated on historical data, and population growth where relevant.

**Table 3-10 Claremont Budget Summary**

| Years     | Expenditure | Renewals | Projects | Capital Projects |
|-----------|-------------|----------|----------|------------------|
| 2018/2019 | \$28,820    |          | \$2,000  | \$233,000        |
| 2019/2020 | \$28,820    | \$48,536 |          |                  |
| 2020/2021 | \$28,820    |          |          |                  |
| 2021/2022 | \$28,820    |          |          |                  |
| 2022/2023 | \$28,820    | \$33,425 |          |                  |
| 2023/2024 | \$28,820    |          |          |                  |



|           |           |          |         |           |
|-----------|-----------|----------|---------|-----------|
| 2024/2025 | \$28,820  | \$14,564 |         |           |
| 2025/2026 | \$28,820  |          |         |           |
| 2026/2027 | \$28,820  | \$704    |         |           |
| 2027/2028 | \$28,820  |          |         |           |
| Total     | \$288,200 | \$97,228 | \$2,000 | \$233,000 |

An explanation of the categories within the budgets are as follows below:

- Expenditure consists of operation and maintenance costs;
- Renewals are replacement of assets which are nearing or exceeded their useful life;
- Projects are investigations, decisions and planning activities which exclude capital works; and
- Capital projects are activities involving physical works.

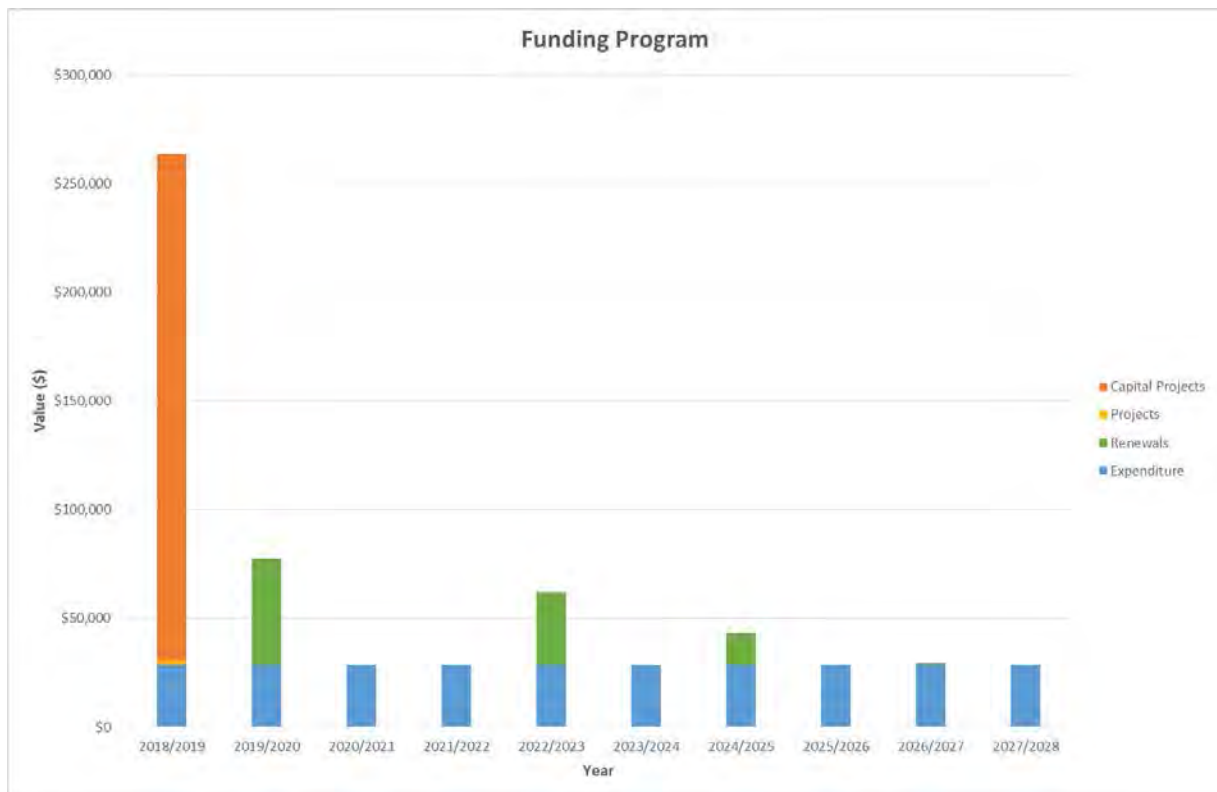


Figure 3-10 Claremont Funding Summary

There are two major projects for Claremont water scheme in the LTP budget.

**Table 3-11 Key Projects**

| Account Label    | GL        | Description             | Year 1 (\$) | Year 2 (\$) | Year 3 (\$) | Years 4 to 10 | Funding Split <sup>2</sup> |
|------------------|-----------|-------------------------|-------------|-------------|-------------|---------------|----------------------------|
| Capital Projects | 408790010 | Vent building outside   | \$5,000     |             |             |               | 100% LoS                   |
| Projects         | 4087029   | Test reservoir overflow | \$2,000     |             |             |               | 100% LoS                   |
| Capital Projects | 408790011 | Install UV              | \$228,000   |             |             |               | 100% LoS                   |

The list of district wide projects can be found in 5Waters Activity Management Plan: Volume 1.

### Discussion on Projects

Projects have been determined based on their:

- Relevance to the scheme
- Requirement to be completed under legislation
- Ability to bring the scheme up to or maintain the Level of Service required under council's Asset Management Policy.

Many projects are **jointly** funded by more than one scheme and activity. Each scheme pays a pro-rata share only, equivalent to the number of connections.

### Discussion on Capital and Projects

Where relevant, Capital (Levels of Service) and Capital (Growth) projects have been included in the scheme financial details.

Levels of Service Projects and growth splits have been provided to ensure the costs of population driven works are clear.

<sup>2</sup> Where LoS refers to Level of Service and G refers to Growth

## 4.0 DARFIELD WATER SUPPLY

### 4.1 Scheme Summary

| Description                          |                                   | Quantity                                       |                                                                                        |
|--------------------------------------|-----------------------------------|------------------------------------------------|----------------------------------------------------------------------------------------|
| Estimated Population Served          |                                   | 3559                                           |                                                                                        |
| Scheme Coverage<br>(1 Jan 2018)      | Full Charges                      | 978                                            | Includes 258 restricted connections<br>Rural A 160, 576 Units<br>Rural B 83, 194 Units |
|                                      | Half Charges                      | 148                                            |                                                                                        |
|                                      | >1 Charges                        | 292                                            |                                                                                        |
| System Components                    | Bores/Intakes (No.)               | 5                                              |                                                                                        |
|                                      | Treatment/Disinfection            | None                                           |                                                                                        |
|                                      | Reservoirs (No.)                  | 2                                              |                                                                                        |
|                                      | Pump Stations (No.)               | 2                                              |                                                                                        |
|                                      | Piped (m)                         | 164,206.57                                     |                                                                                        |
| History                              | Original scheme installation date | 1971                                           |                                                                                        |
| Value (\$)                           | Replacement Cost                  | \$20,338,133.61                                |                                                                                        |
|                                      | Depreciated Replacement Cost      | \$12,561,653.76                                |                                                                                        |
| Financial                            | 2018/2019 Estimate                | \$324,100                                      |                                                                                        |
|                                      | Annual maintenance cost           | 10.12%                                         |                                                                                        |
|                                      | % of total                        |                                                |                                                                                        |
| Demand (m3)<br>(1 Jan – 31 Dec 2017) | Average daily                     | 1,810                                          |                                                                                        |
|                                      | Peak daily                        | 4,261                                          |                                                                                        |
|                                      | Minimum daily                     | 1,056                                          |                                                                                        |
|                                      | Average daily per connection      | 1.43                                           |                                                                                        |
| Type of Supply                       |                                   | High pressure with restricted and unrestricted |                                                                                        |
| Target Pressure & Flow at boundary   | Pressure                          | >200 kPa (150 kPa restricted)                  |                                                                                        |
|                                      | Flow                              | >20 L/min (±maric restricted)                  |                                                                                        |
| Sustainability                       | Well Security                     | Secure                                         |                                                                                        |

### 4.2 Key Issues

The following key issues are associated with the Darfield water supply. A list of district wide issues are located in 5Waters Activity Management Plan: Volume 1.

**Table 4-1 Darfield Scheme Issues**

| What's the Problem                                                                                                                            | What we plan to do                                                                                                                                                                                                |
|-----------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| The water system is subject to high leakage.                                                                                                  | Council continue to monitor flows during periods of low flow to quantify estimated losses and consider options to address leakage as deep well water is costly to deliver.                                        |
| Decision to facilitate growth through provision of further water supply capacity needs to consider the associated wastewater disposal issues. | In considering growth the focus remains on providing sufficient water, however this needs to also account for wastewater management as additional loading to ground may reduce downstream water quality overtime. |

### 4.3 Overview & History

A piped water supply was installed for the township in 1971 to replace a system of water races within the township from which property owners pumped directly for their domestic use.

In about 1969 an investigation well was drilled in the Darfield Domain to a depth of 103.5m which in those days was the maximum drilling depth. No water was found and an intake was then installed on the Waimakariri River (No. 1 well). A further intake was installed in 1977 (No. 2 well) and was extended in 1988 with the installation of a 20m long gallery. The supply was further upgraded in 1995/96 with the installation of a new well (No. 3), rising main and booster pump at the reservoir.

The scheme boundary was extended in 1988 to include the then Rural A Zone surrounding the Darfield Township on a restricted supply. The supply was further expanded in 1999 to cover the Rural B area with a restricted supply.

To ascertain if the use of ground water was viable an exploratory well was drilled in 1999 to a depth of 200m adjacent to Horndon Street (eastern end). The well had a capacity of 11 litres/sec. Following public consultation in 2004 it was agreed to continue using the Waimakariri River as the supply source.

Manifolds were installed to replace existing toby valves for the township from 1995 to 2000 and metering of all unrestricted connections began in July 2002.

Several other deep bores were drilled in an effort to identify a high yielding secure groundwater source that could be utilised without treatment, as an alternative to upgrading treatment of the existing Waimakariri source. This was generally unsuccessful until a high yielding deep groundwater bore source was obtained north-west of the town (SH73 bore) and brought into service in 2011. The Waimakariri River source was retained as a backup source. Prior to November 2011 the Darfield Water Supply provided chlorinated surface water to both the Darfield Township (unrestricted supply) and two restricted supply zones in the rural area surrounding the township. Up to 3.5m<sup>3</sup>/day may be used in the Rural A zone and up to 2m<sup>3</sup>/day plus stock use is permitted in the Rural B zone (old District Plan areas). Water was pumped from wells adjacent to the Waimakariri River to the Kimberly Road reservoir from where it is conveyed to Darfield via a 250Ø AC gravity main. During peak demands a booster pump located at the reservoir operates to maintain a pressure of 35psi within the township.

The scheme was designed as a high pressure, unrestricted and restricted supply with full "Fire Fighting Capacity".

A second (plastic) bulk conveyance main was installed along Kimberly Road in 2007. This PE main increased capacity and allows for main future decommissioning of the AC.

During November 2011 the wells adjacent to the Waimakariri River were mothballed as Council connected a new deep well to the Darfield Water Supply. This first deep well was purchased in 2009 from Stanwood Holdings (Jim Brooker), becoming the primary source for Darfield. The water from this well is estimated to be 180 years old limiting concerns of nitrate intrusion with a flow of 85l/s. A second well located on Tramway Road was developed but proved to be of no yield.

A second successful deep bore source was constructed in 2013 and commissioned in 2014, along with a 1000m<sup>3</sup> reservoir and associated pumping station at the SH73 site this allowed full disconnection of the shallow Waimakariri River bore sources and associated treatment plant. The Kimberley Road reservoir has been retained.

A contamination incident occurred in 2012 when the Waimakariri River source was brought back in to service after the SH73 bore pump had failed. E. coli was detected in the water supply and illness was reported in the community. It was found that the chlorine supply had been exhausted so the water was not receiving disinfection treatment. A wide range of other contributing factors were identified in a subsequent review.

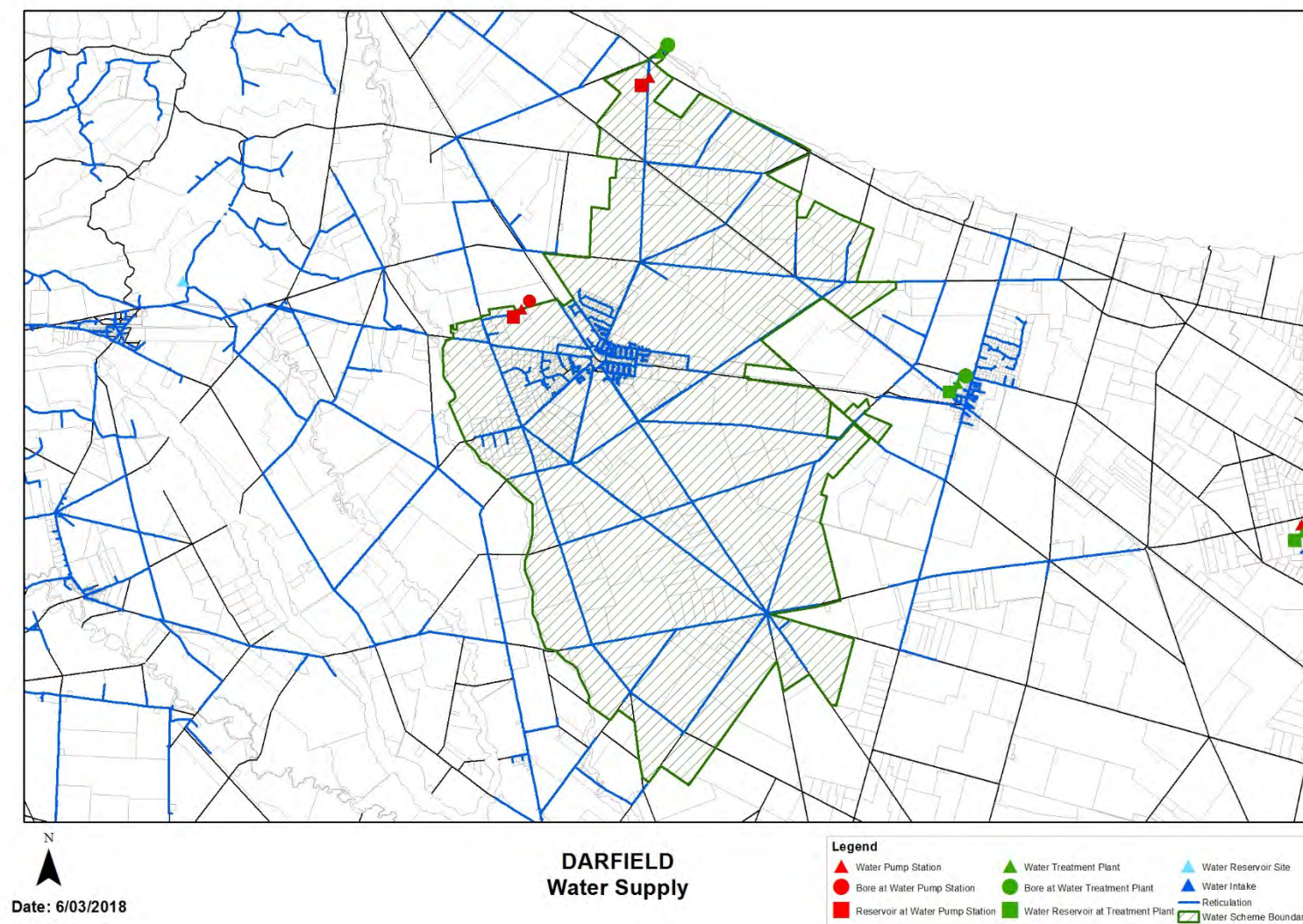


**Figure 4-1 Scheme Map**







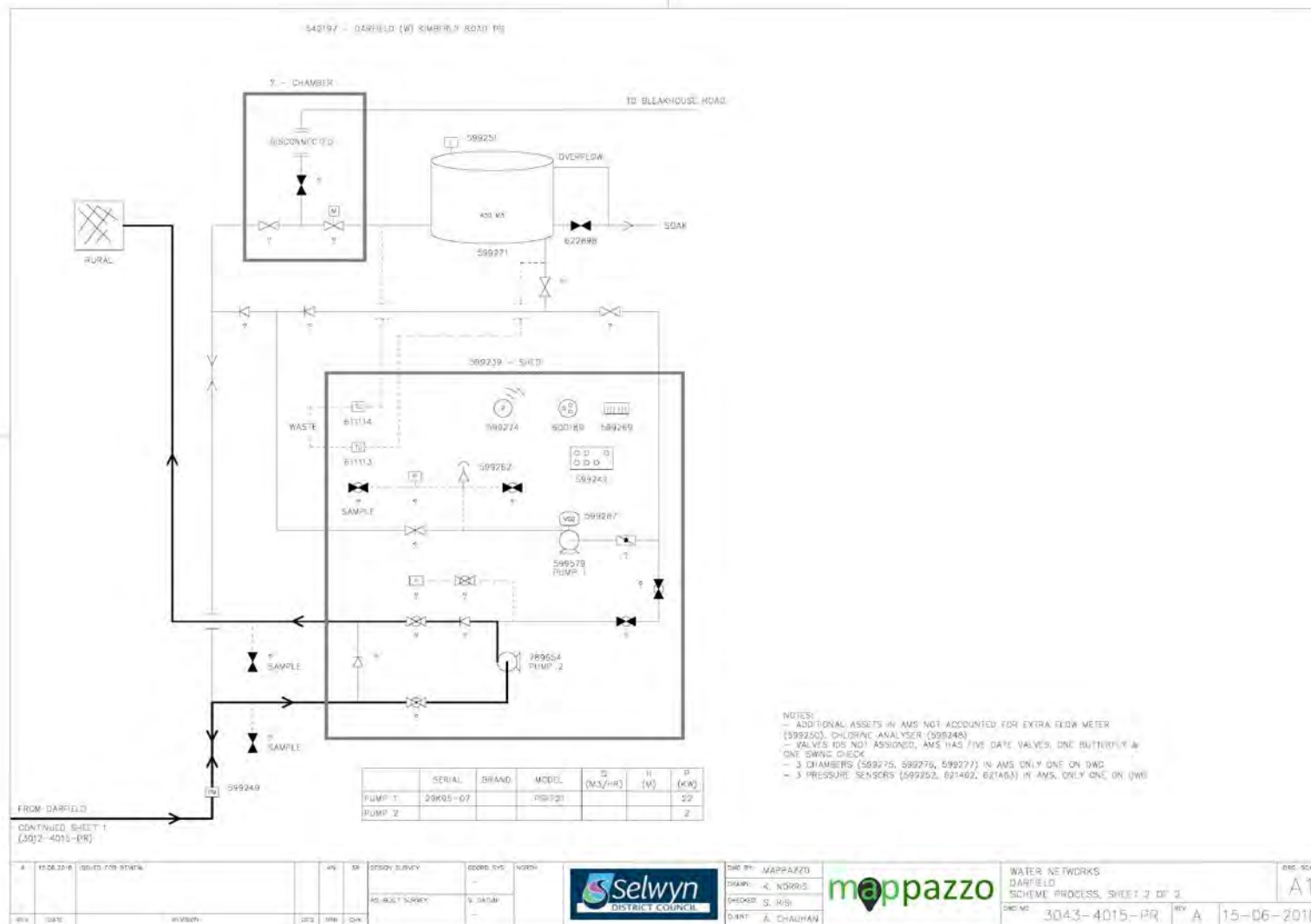


Figure 4-2 Scheme Schematic

## 4.4 System Capacity

In response to the accelerated growth within the Selwyn District hydraulic models have been used to plan future water infrastructure for a number of the water supplies. Hydraulic models have been built and calibrated to international best practice to carry out the '30-year Water Infrastructure Master Planning'.

The master planning provides an assessment of the sizing and timing of new infrastructure for new water sources (wells) and pipelines to service growth. Part of the master planning requires a water balance to be developed to forecast growth, using historical peak demand per household. The water balance forecasts the peak instantaneous flow per year versus the water resources available to determine the staging of new wells. The well staging assumes that one well is redundant for each water supply, to take into consideration maintenance of wells, planning/timing of new wells and security of supply i.e. to maintain average/peak demand.

Population projections are based on SDC 'Household Projections 2018 to 2048' and have been applied to the latest connection figures for each township.

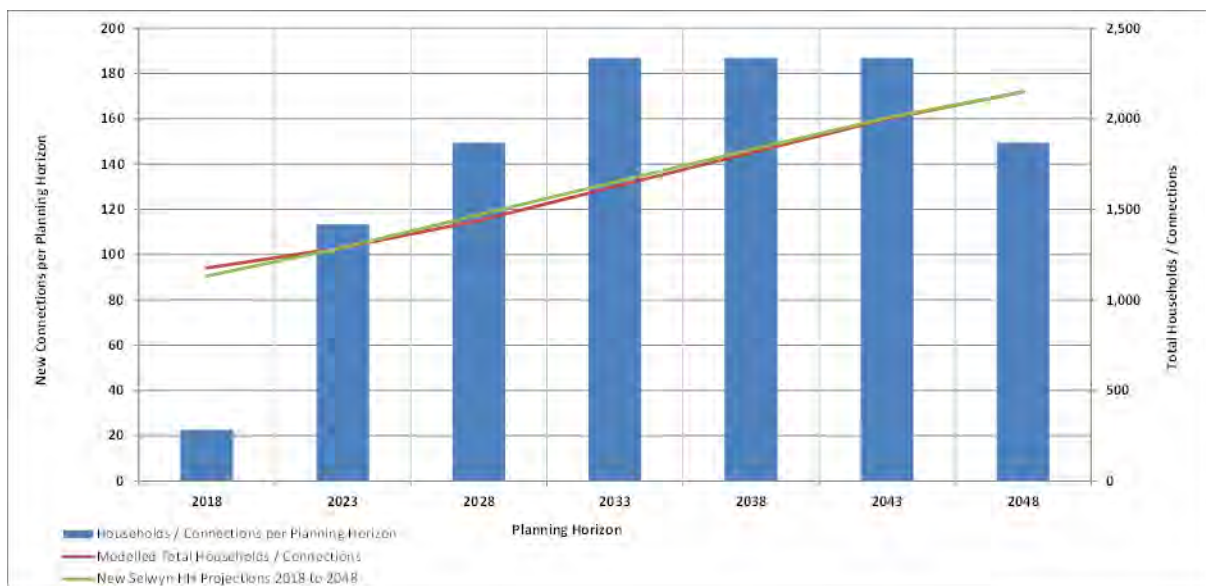


**Figure 4-3 Darfield Household Projections**

Consideration needs to be given to the future of the Kimberley reservoir which plays a vital role in meeting peak hour demand and providing security of supply in the event of loss to the SH73 well and pumps.

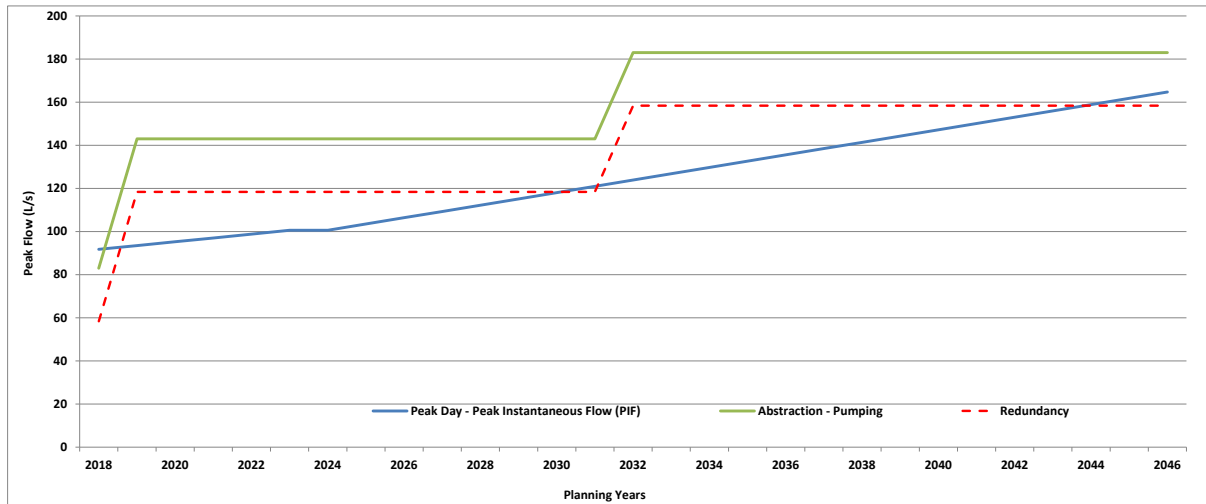


Figure 4-4 Darfield Water Demand

Table 4-2 Water Source Current Capacity

| Sites Available  | Well | Capacity (L/s) | Comments                                         |
|------------------|------|----------------|--------------------------------------------------|
| State Highway 73 | 1    | 63             | Maximum available flow 83 L/s from surface pumps |
| State Highway 73 | 2    | 71             |                                                  |

Table 4-3 Water Source Future Capacity

| New Site ID | Well/Site | Location | Planning Year | Yield (L/s) |
|-------------|-----------|----------|---------------|-------------|
| Darf1       | Well      | TBC      | 2019          | 60          |
| Darf2       | Well      | TBC      | 2032          | 40          |

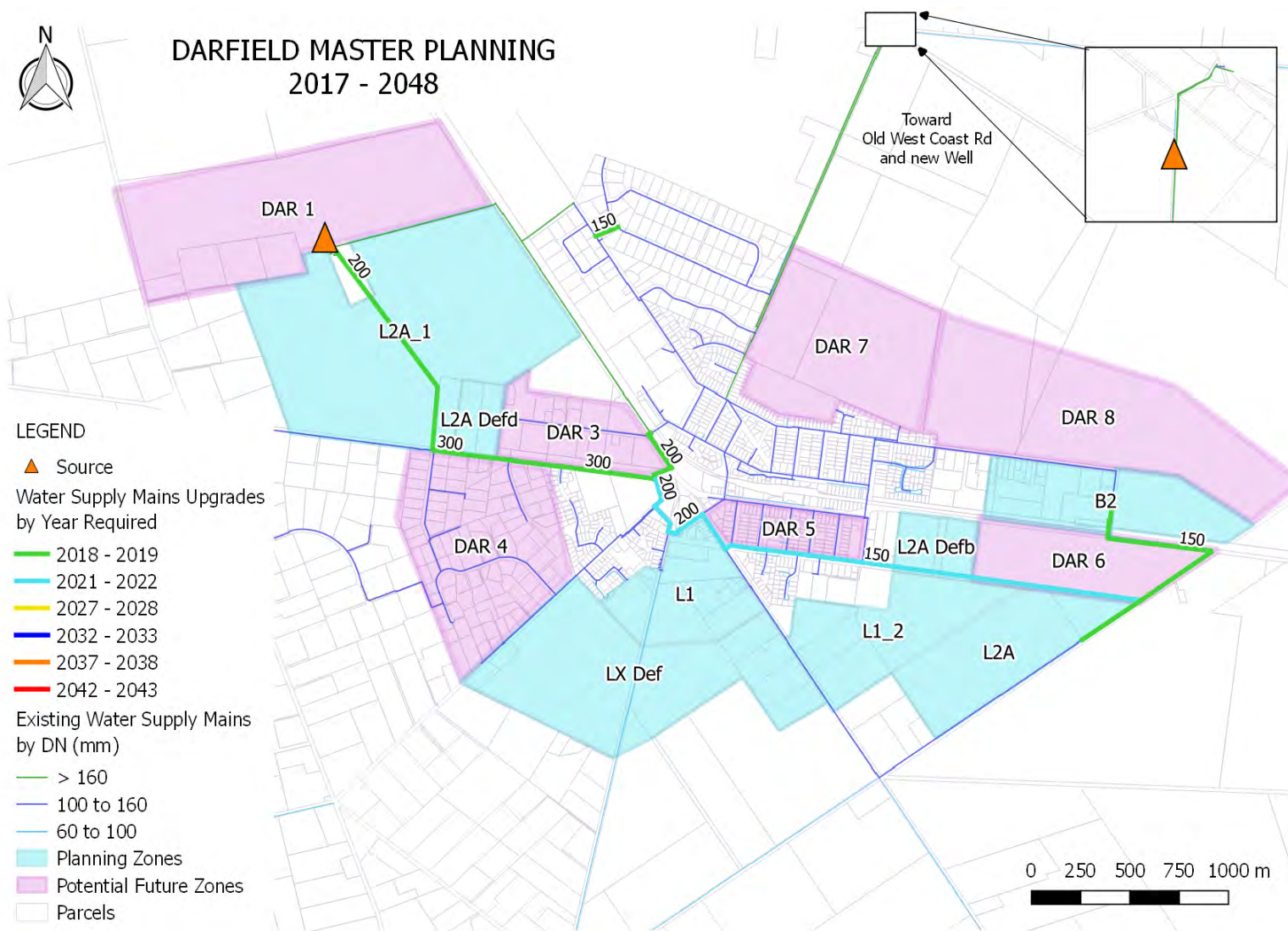


**Figure 4-5 Darfield Master Plan**

## 4.5 Resource Consents

The Darfield water supply has a number of resource consents. Table 4-4 shows the water take permitted by the resource consents for this scheme.

**Table 4-4 Resource Consents**

| Consent                                        | Description                                                       | Location                                | Date Issued | Expiry Date | Consented Max Instantaneous Flow (L/s) | Consented Max Daily Volume (m <sup>3</sup> /day) |
|------------------------------------------------|-------------------------------------------------------------------|-----------------------------------------|-------------|-------------|----------------------------------------|--------------------------------------------------|
| CRC960148.1<br><i>(Application in process)</i> | To take groundwater.                                              | Old West Coast Road, DARFIELD           |             | 29-Sep-30   |                                        | 7344                                             |
| CRC143985<br><i>(Issued-Active)</i>            | To take and use groundwater for the purposes of community supply. | Bangor Road, DARFIELD                   | 28/03/2014  | 16-Nov-45   | 83                                     | 6000                                             |
| CRC991423<br><i>(Issued-Active)</i>            | To take and use water for public supply - Waimakariri river flow  | Waimakariri River Bed, BLEAK HOUSE ROAD | 9-Sep-04    | 8-Sep-39    | 85<br><i>Depending on river flows</i>  | 5,460<br><i>Depending on river flows</i>         |
| CRC991604<br><i>(Issued-Active)</i>            | To divert water for the water supply wells at Bleak House Road    | Waimakariri River Bed, BLEAK HOUSE ROAD | 9-Sep-04    | 8-Sep-39    | <i>Combined with CRC991423</i>         | <i>Combined with CRC991423</i>                   |

## 4.6 Water Quality

The Darfield water supply is a secure source that is currently sampled monthly within the treatment plant and weekly within the reticulation. Darfield also has a back-up supply (from the river) which is only tested if used - the results below only reflect testing from the SH73 deep bores.

The following details E. coli transgressions for the sample periods 2012 to 2017.

### Treatment

There have been no E. coli treatment transgressions during this period.

### Zone

There have been two E. coli zone transgressions during this period. These occurred in August 2012 and December 2013.

### Chemical Analysis

The following is a summary of the raw water chemical analysis carried out at the Darfield Water Supply.

**Table 4-5 Summary of Raw Water Chemical Analysis Darfield Water Supply**

| Parameter                                   | Standards<br>MAV* (GV)** | Plant 2015 | Plant 2017 | Status |
|---------------------------------------------|--------------------------|------------|------------|--------|
| Total Lead (g/m3)                           | 0.01                     | 0.00132    | 0.000373   | ✓      |
| pH (pH units)                               | 7-8.5                    | 7.8        | 7.7        | ✓      |
| Total Hardness (g/m3 as CaCO <sub>3</sub> ) | <200                     | 62         | 54.5       | ✓      |
| Total Calcium (g/m3)                        | n/v                      | 21         | 18.64      | ✓      |
| Total Iron (g/m3)                           | <0.2                     | <0.021     | < 0.021    | ✓      |
| Total Sodium (g/m3)                         | <200                     | 9.8        | 9.56       | ✓      |
| Nitrate - Nitrogen (g/m3)                   | 11.3                     | 5.8        | 4.99       | ✓      |

\* MAV – Maximum Acceptable Value

\*\* (GV) – Guideline Value

## 4.7 Scheme Assets

A summary of material and diameter for pipes in Darfield is shown below by Figure 4-6 and **Figure 4-7**.

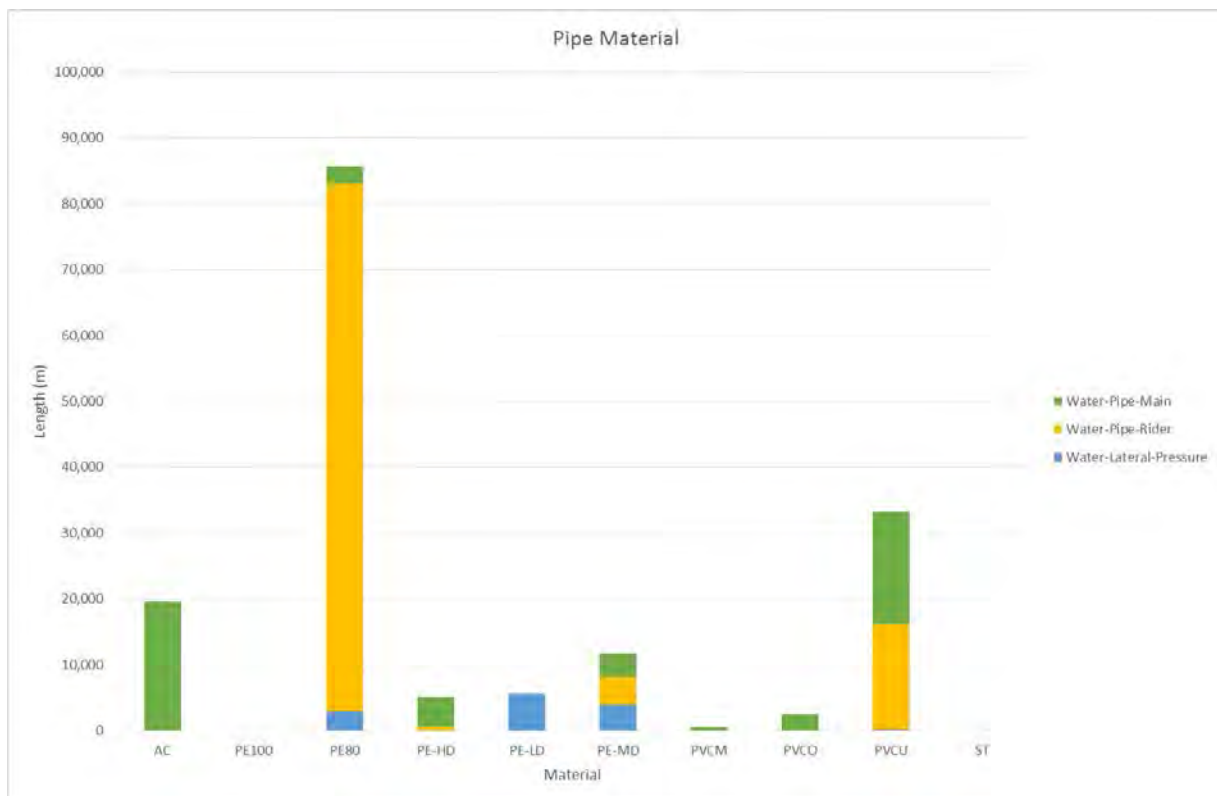


Figure 4-6 Pipe Material – Darfield

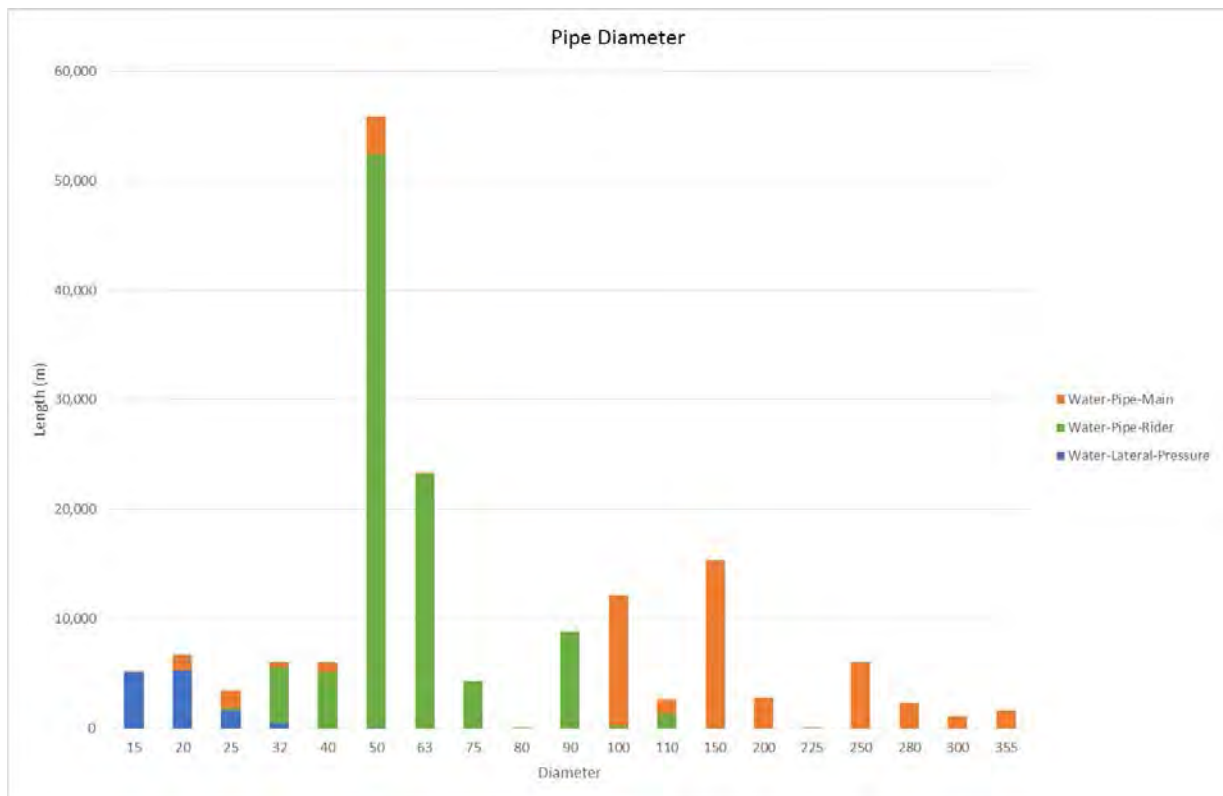


Figure 4-7 Pipe Diameter – Darfield

## 4.8 Operational Management

The water supply is operated and maintained under two maintenance contracts as follows:

- Contract 1241: Water Services Contract. Contract is with SICON Ferguson who undertakes investigations, conditions inspections, proactive and reactive maintenance and minor asset renewals; and
- Contract 1202: Parks and Reserves Contract. Contract is with SICON Ferguson who undertakes the maintenance of land scape features related to water services e.g. mowing, gardens etc.

Water quality sampling is completed under an agreement with Food and Health Ltd as required.



## 4.9 Photos of Main Assets



**Photo 1: SH73 Bore No 1**



**Photo 2: SH73 Bore No 2, Reservoir**



**Photo 3: SH73 Booster Pump Shed and Reservoir**



**Photo 4: Kimberley Road Reservoir**

## 4.10 Risk Assessment

A risk assessment has been undertaken for the Darfield scheme. The key output from the risk assessment is the identification of any extreme and high risks which need to be mitigated. In order to mitigate these risks they have been included and budgeted for in the projects within this LTP. Table 4-6 outlines the risk priority rating, Table 4-7 outlines the risks and the list of key projects is found in Table 4-12.

**Table 4-6 Risk Priority Rating**

| Risk Score | Level of Risk | Risk Response                                                                                                                                         |
|------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| > 50       | Extreme       | Awareness of the event to be reported to Council.<br>Urgent action to eliminate / mitigate / manage the risk.<br>Document risk and action in the AMP. |
| 35-50      | Very High     | Risk to be eliminated / mitigated / managed through normal business planning processes with responsibility assigned.                                  |
| 14-35      | High          | Manage risk using routine procedures.                                                                                                                 |
| 3.5-14     | Moderate      | Monitor the risk.                                                                                                                                     |

|       |     |                                                                                                                                                                       |
|-------|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| < 3.5 | Low | Awareness of the event to be reported to Council.<br>Immediate action required to eliminate / mitigate / manage the risk.<br><br>Document risk and action in the AMP. |
|-------|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|

**Table 4-7 Risks – Darfield**

| Risk                                                                                     | Action/Project                                                                                                                      | Year Identified | 2014 Risk Rating | 2017 Risk Rating | Residual Risk Rating |
|------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|-----------------|------------------|------------------|----------------------|
| Failure of single pipe connection from source to township                                | Review options to include redundancy within the reticulated network with focus on linkages between the reservoir site and township. | 2014            | 40               | 40               | 20                   |
| Failure of the main pipe from the reservoir would drain the Kimberly Rd reservoir        | Install a 300mm non-return valve as a backflow provision at SH73 on or near the Haldon Street corner                                | 2014            | 40               | 40               | 40                   |
| Lack of capacity for the growth in Darfield                                              | Install additional bores for capacity in the future                                                                                 | 2014            | 45               | 45               | 20                   |
| Lack of capacity for the growth in Darfield                                              | Investigate the pump operations, to allow both wells to run at the same time, need power cable upgrade                              | 2014            | 45               | 45               | 20                   |
| No reservoir turnover/usage at Kimberly road                                             | Review Reservoir turnover and upgrade controls including auto flushing as required                                                  | 2014            | 20               | 3.5              | 3.5                  |
| Unmarked critical water infrastructure could be damaged by others causing system failure | Install marker posts                                                                                                                | 2014            | 40               | 20               | 20                   |
| Electrical failure due to lightning or network spikes                                    | Install surge diverters                                                                                                             | 2014            | 20               | 7                | 7                    |
| Failure to meet NES water meter standards                                                | NES Water Meter Compliance                                                                                                          | 2014            | 20               | 6                | 6                    |
| Inability to collect income from non-metered properties                                  | Install property water meters                                                                                                       | 2014            | 45               | 0.6              | 0.6                  |

|                                      |                            |      |    |     |     |
|--------------------------------------|----------------------------|------|----|-----|-----|
| Non-compliance with the DWSNZ        | DWSNZ - Age Testing        | 2014 | 20 | 0.7 | 0.7 |
| Non-compliance with the DWSNZ        | DWSNZ - Bore-head security | 2014 | 20 | 20  | 20  |
| Non-consented activities             | Renewal of consents        | 2014 | 27 | 27  | 6   |
| pump failure long lead time for pump | Spare pump                 | 2017 |    | 6   | 2.1 |

The list of district wide risks can be found in 5Waters Activity Management Plan: Volume 1.

#### 4.11 Asset Valuation Details

The total replacement value of assets within the Darfield water scheme is \$20,338,134 with further details in Table 4-8 below.

**Table 4-8 Replacement Value, Darfield**

| Asset Class 1              | Asset Class 2 | Sum of Replacement Value |
|----------------------------|---------------|--------------------------|
| <b>Plant and Equipment</b> |               | \$3,860,613              |
| <b>Water Reticulation</b>  | Hydrant       | \$409,408                |
|                            | Lateral       | \$554,986                |
|                            | Pipe          | \$14,044,674             |
|                            | Supply Point  | \$1,064,206              |
|                            | Valve         | \$404,247                |

Replacement values for these different types of assets are shown in Figure 4-8 below.

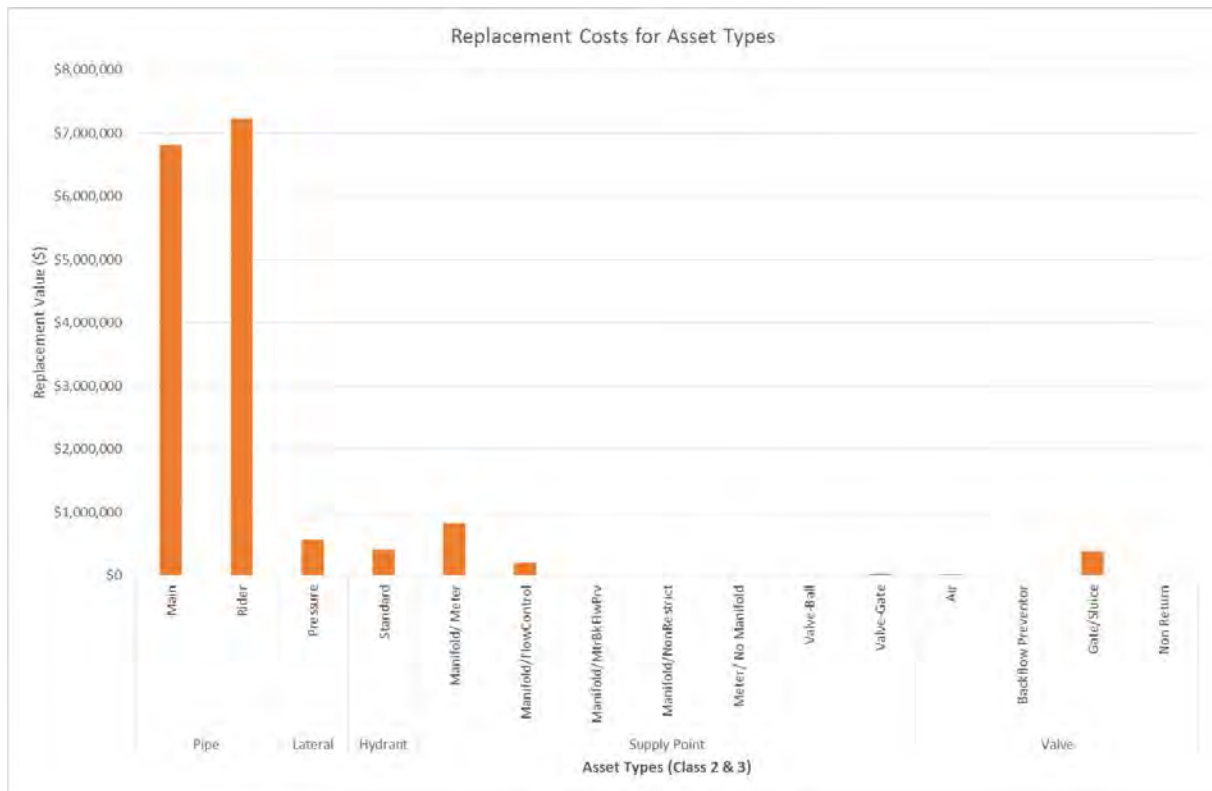


**Figure 4-8 Replacement Costs for Darfield**

## 4.12 Renewals

The renewal profile has been taken from the 2017 5 Waters Valuation. A graph showing the renewals for this scheme are shown by Figure 4-9 below. The majority of renewals occur in 2020/2021.

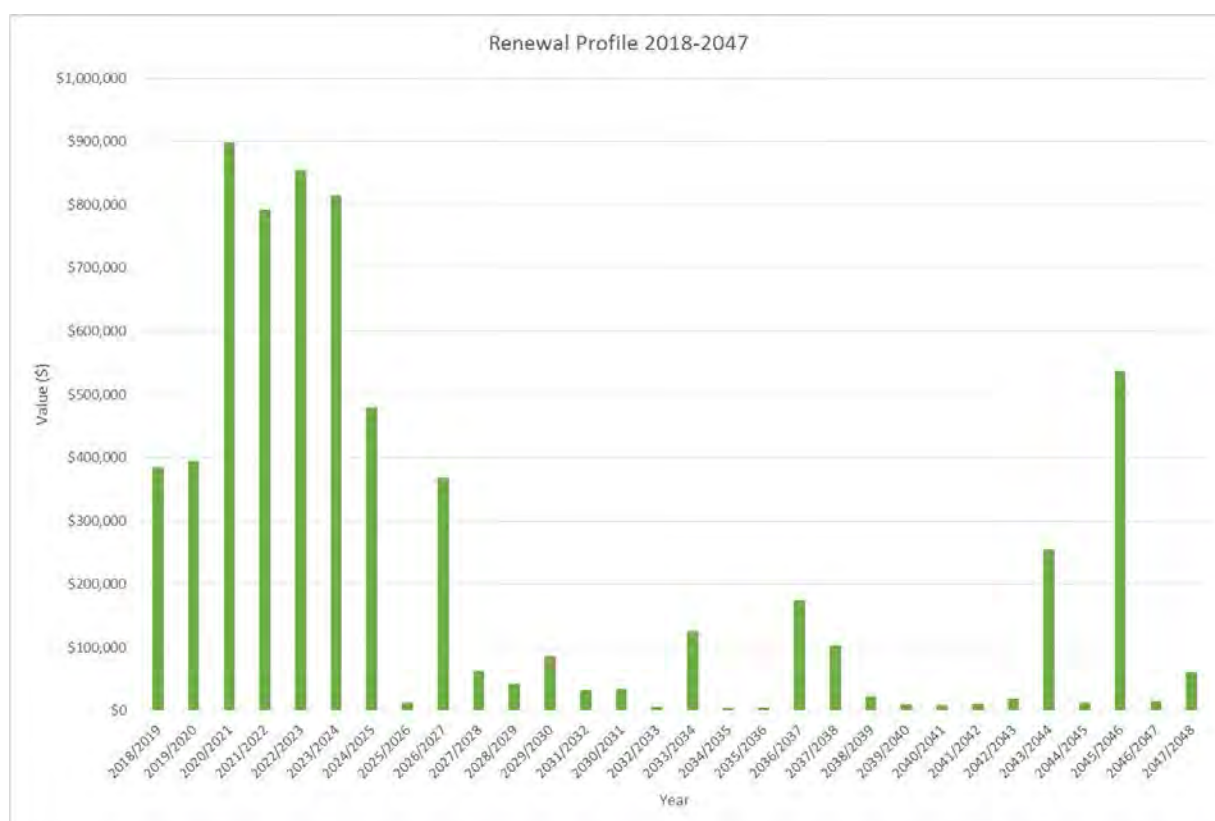


**Figure 4-9 Darfield Water Renewal Profile**

### 4.13 Critical Assets

The criticality model for Darfield has been updated for the 2018 AcMP. The methodology of the criticality model can be found in 5Waters Activity Management Plan: Volume 1 and it provides details of how the criticality has been calculated for the reticulation assets. Table 4-9 and Figure 4-10 below shows the calculated criticality for all of the assets within this scheme that have a recorded known length.

**Table 4-9 Length of Assets per Criticality Level**

| Criticality Bands |             | Length (m) |
|-------------------|-------------|------------|
| 5                 | Low         | 110,323    |
| 4                 | Medium-Low  | 26,473     |
| 3                 | Medium      | 11,857     |
| 2                 | Medium-High | 12,023     |
| 1                 | High        | 3,706      |





#### 4.14 Asset Condition

The asset condition model was run for Darfield in 2017. The methodology of the model can be found in 5Waters Activity Management Plan: Volume 1 which provides details of how the model has been calculated for the pipe reticulation assets. Figure 4-11 below shows the level of asset condition for these assets within this scheme that have a recorded known condition.

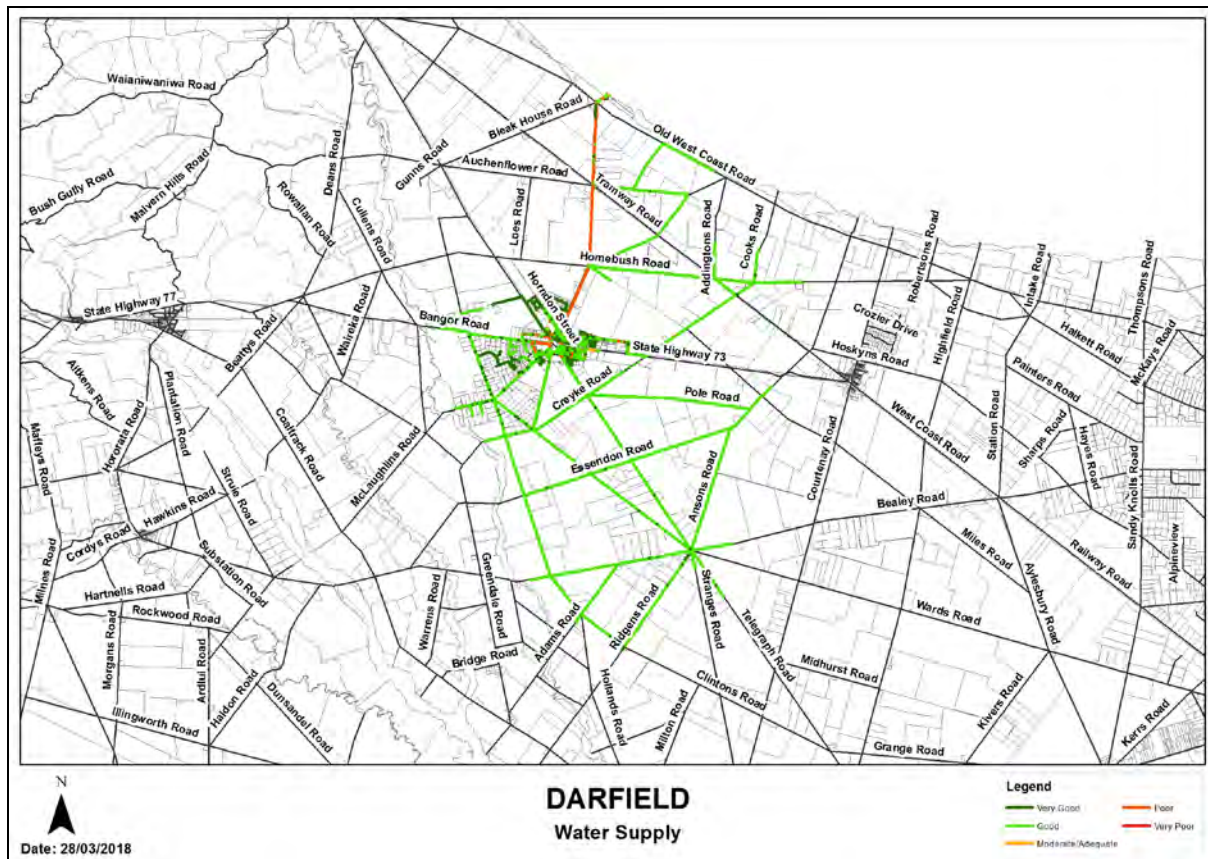


**Figure 4-11 Asset Condition – Darfield**

Table 4-11 provides a description of the condition rating used within the condition model.

**Table 4-10 Asset Condition Grading**

| Condition Rating | Grading   |
|------------------|-----------|
| 1.0              | Excellent |
| 2.0              | Good      |
| 3.0              | Moderate  |
| 4.0              | Poor      |
| 5.0+             | Fail      |



The number of pipe faults is also measured through the asset management system. Figure 4-12 shows the known historic pipe failures within this scheme.

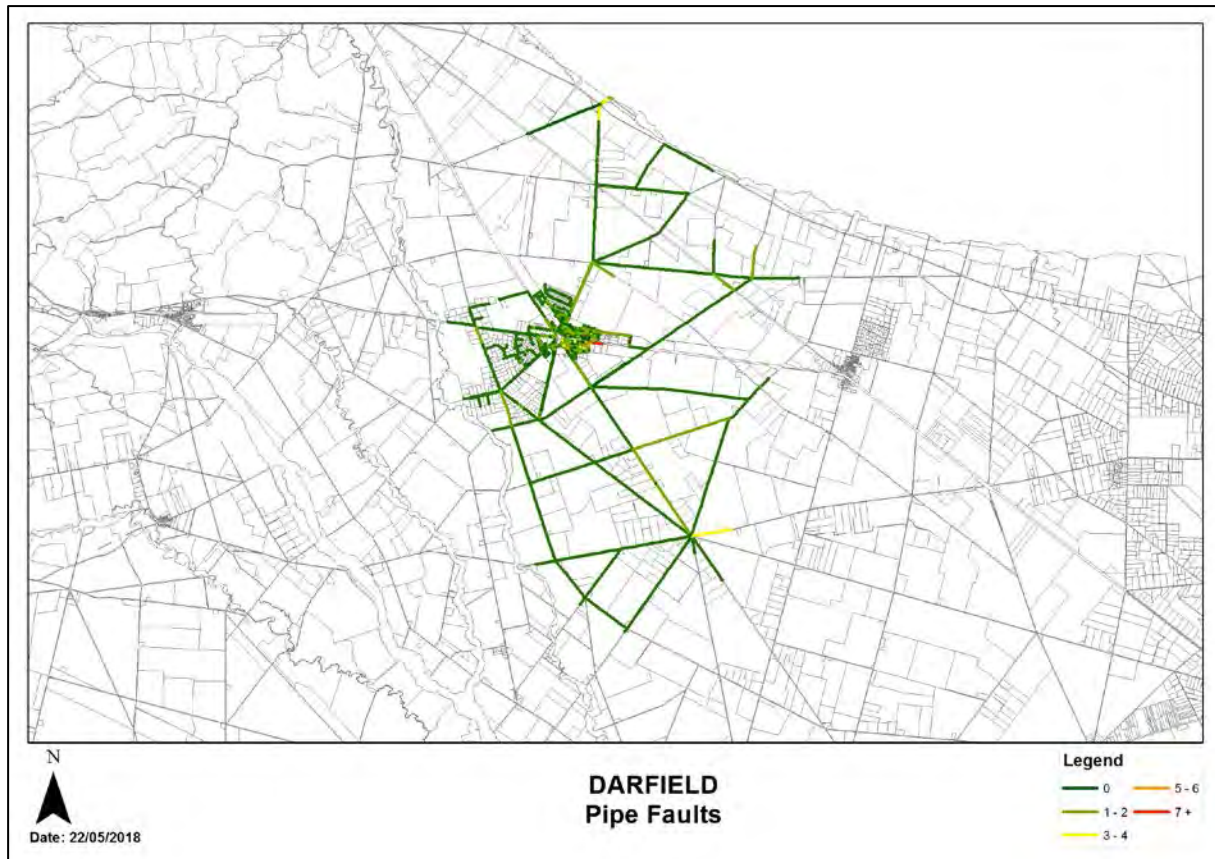


**Figure 4-12 Pipe Faults, Darfield**

#### 4.15 Funding Program

The 10 year budgets for Darfield are shown by Table 4-11 and Figure 4-13. Budgets are split into expenditure, renewals, projects and capital projects.

All figures are (\$) not adjusted for CPI “inflation”. They are calculated on historical data, and population growth where relevant.

**Table 4-11 Darfield Budget Summary**

| Years     | Expenditure | Renewals  | Projects | Capital Projects |
|-----------|-------------|-----------|----------|------------------|
| 2018/2019 | \$324,100   | \$385,875 | \$25,000 | \$1,116,000      |
| 2019/2020 | \$330,457   | \$393,806 | \$5,000  | \$683,000        |
| 2020/2021 | \$336,806   | \$898,678 |          |                  |
| 2021/2022 | \$343,148   | \$792,270 |          | \$310,000        |
| 2022/2023 | \$349,483   | \$854,499 |          |                  |
| 2023/2024 | \$357,031   | \$814,296 |          | \$310,000        |

|           |             |             |          |             |
|-----------|-------------|-------------|----------|-------------|
| 2024/2025 | \$364,569   | \$478,780   |          |             |
| 2025/2026 | \$372,099   | \$12,817    |          |             |
| 2026/2027 | \$379,620   | \$368,303   |          |             |
| 2027/2028 | \$387,133   | \$63,002    |          |             |
| Total     | \$3,544,447 | \$5,062,327 | \$30,000 | \$2,419,000 |

An explanation of the categories within the budgets are as follows below:

- Expenditure consists of operation and maintenance costs;
- Renewals are replacement of assets which are nearing or exceeded their useful life;
- Projects are investigations, decisions and planning activities which exclude capital works; and
- Capital projects are activities involving physical works.

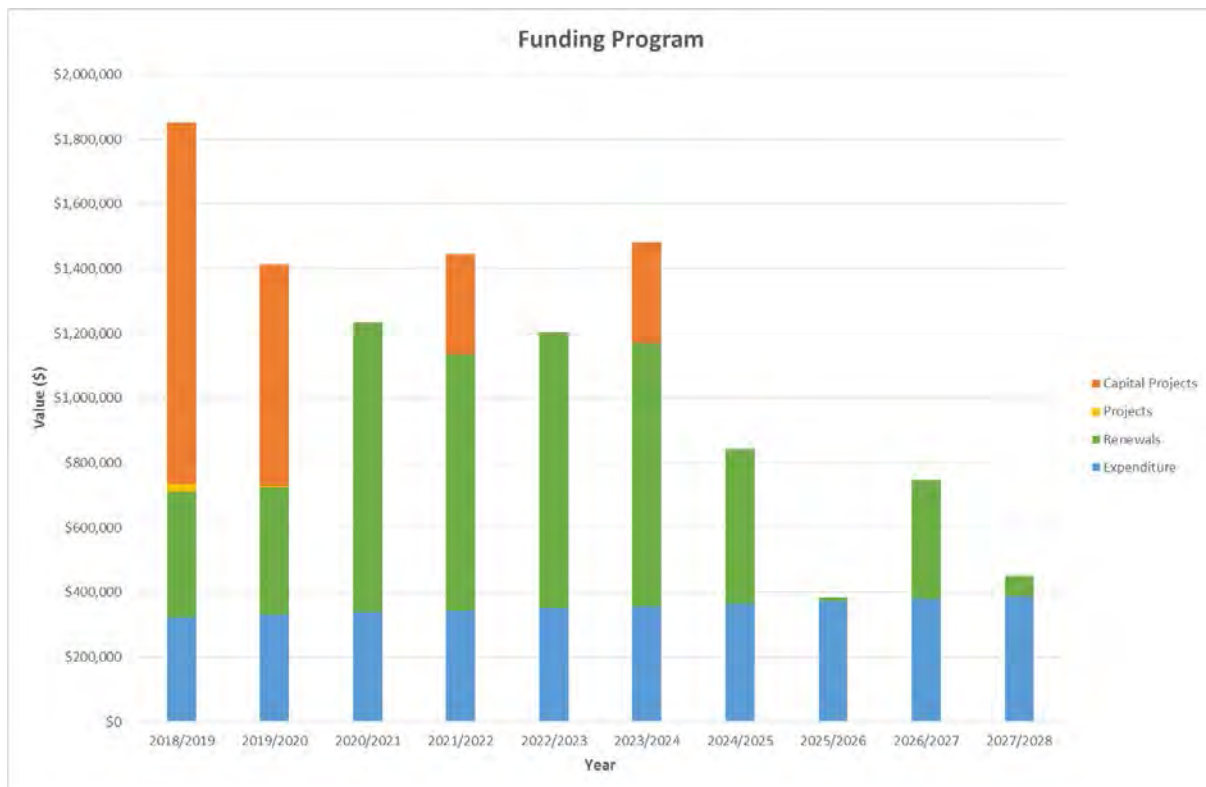


Figure 4-13 Darfield Funding Summary

There are a number of major projects for Darfield water scheme in the LTP budget.

**Table 4-12 Key Projects**

| Account Label    | GL        | Description                   | Year 1 (\$) | Year 2 (\$) | Year 3 (\$) | Years 4 to 10 | Funding Split <sup>3</sup> |
|------------------|-----------|-------------------------------|-------------|-------------|-------------|---------------|----------------------------|
| Capital Projects | 401590001 | Darfield Water Supply Upgrade | \$390,000   | \$310,000   |             | \$620,000     | 60% G                      |
| Capital Projects | 401590084 | Install additional bores for  | \$691,000   |             |             |               | 100% G                     |
| Projects         | 4015056   | Options for redundancy        |             | \$5,000     |             |               | 100% LoS                   |
| Capital Projects | 401590090 | Spare pump                    | \$35,000    |             |             |               | 100% LoS                   |
| Capital Projects | 401590091 | UV Treatment                  |             | \$373,000   |             |               | 100% LoS                   |
| Projects         | 4015058   | UV Treatment Design           | \$20,000    |             |             |               | 100% LoS                   |
| Projects         | 4015057   | Investigate pump operation    | \$5,000     |             |             |               | 100% LoS                   |

The list of district wide projects can be found in 5Waters Activity Management Plan: Volume 1.

<sup>3</sup> Where LoS refers to Level of Service and G refers to Growth

### **Discussion on Projects**

Projects have been determined based on their:

- Relevance to the scheme
- Requirement to be completed under legislation
- Ability to bring the scheme up to or maintain the Level of Service required under council's Asset Management Policy.

Many projects are **jointly** funded by more than one scheme and activity. Each scheme pays a pro-rata share only, equivalent to the number of connections.

### **Discussion on Capital and Projects**

Where relevant, Capital (Levels of Service) and Capital (Growth) projects have been included in the scheme financial details.

Levels of Service Projects and growth splits have been provided to ensure the costs of population driven works are clear.

## 5.0 DOYLESTON WATER SUPPLY

### 5.1 Scheme Summary

| Description                                   |                                   | Quantity                       |
|-----------------------------------------------|-----------------------------------|--------------------------------|
| <b>Estimated Population Served</b>            |                                   | 300                            |
| <b>Scheme Coverage</b><br>(1 Jan 2018)        | Full Charges                      | 106                            |
|                                               | Half Charges                      | 21                             |
|                                               | >1 Charges                        | 1                              |
| <b>System Components</b>                      | Bores/Intakes (No.)               | 1                              |
|                                               | Treatment/Disinfection            | None                           |
|                                               | Reservoirs (No.)                  | 5                              |
|                                               | Pump Stations (No.)               | 1                              |
|                                               | Piped (m)                         | 6837.48                        |
| <b>History</b>                                | Original scheme installation date | Unknown                        |
| <b>Value (\$)</b>                             | Replacement Cost                  | \$1,077,089.08                 |
|                                               | Depreciated Replacement Cost      | \$862,571.55                   |
| <b>Financial</b>                              | 2018/2019 Estimate                | \$22,350                       |
|                                               | Annual maintenance cost           | 0.70%                          |
|                                               | % of total                        |                                |
| <b>Demand (m3)</b><br>(1 Jan – 31 Dec 2017)   | Average daily                     | 80                             |
|                                               | Peak daily                        | 249                            |
|                                               | Minimum daily                     | 27.5                           |
|                                               | Average daily per connection      | 0.75                           |
| <b>Type of Supply</b>                         |                                   | High pressure and unrestricted |
| <b>Target Pressure &amp; Flow at boundary</b> | Pressure                          | >310 kPa                       |
|                                               | Flow                              | >20 L/min                      |
| <b>Sustainability</b>                         | Well Security                     | Unsecure                       |

### 5.2 Key Issues

The following key issues are associated with the Doyleston water supply. A list of district wide issues are located in 5Waters Activity Management Plan: Volume 1.

**Table 5-1 Doyleston Scheme Issues**

| What's the Problem            | What we plan to do                                                                                                                           |
|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| No water during power outages | Investigate means of providing water during times of power outages. Auto reservoir bypass valve has been installed to provide minimum flows. |

### 5.3 Overview & History

The Doyleston water supply is sourced from Leeston, a water supply which provides untreated groundwater to the community. The extension to the Leeston to Doyleston system was undertaken in 2006 after consultation with the Doyleston Community. The extension services the Doyleston township only (Living Zone 1 in the Proposed District Plan) and not the Business zone in the area. The design capacity for the extension was based on 124 water meter connections which allowed for future growth from the 75 (sewer) connections rated for in this township in 2005.

The Doyleston extension consists of a reticulation network, three booster pumps and three 30m<sup>3</sup> storage tanks.

In January 2015 a new connection was made linking the Leeston to Doyleston main directly into the three reservoirs.



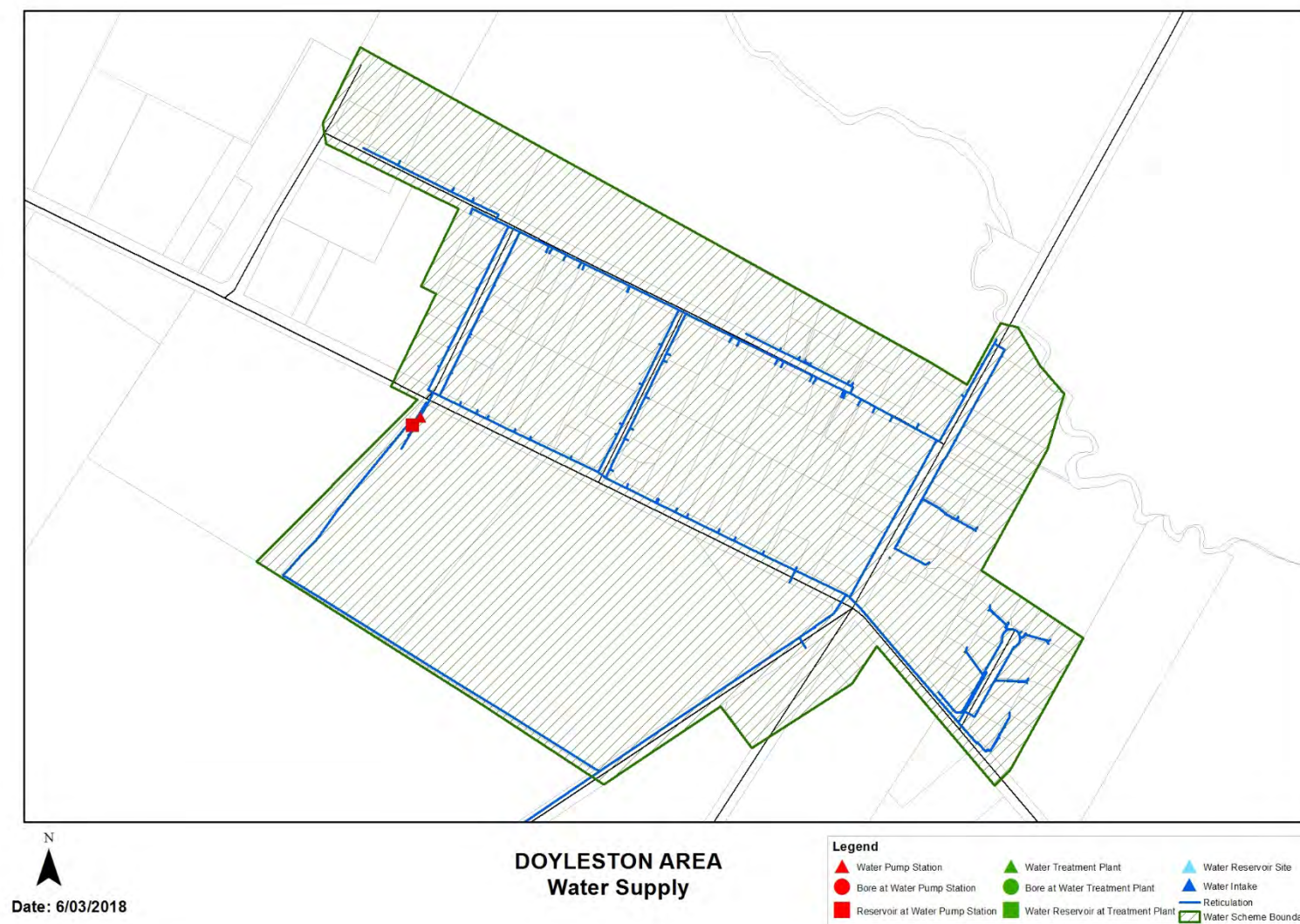
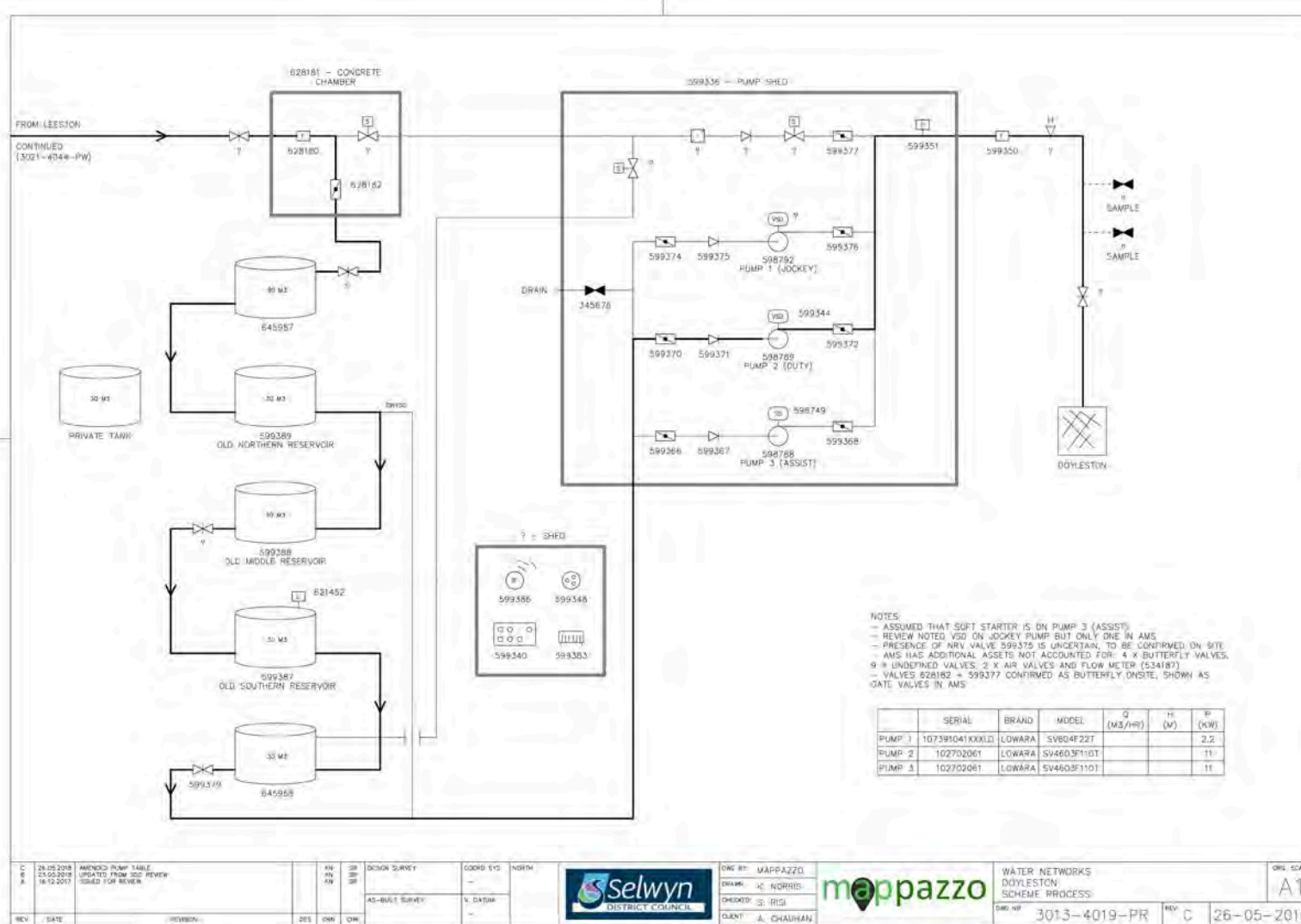


**Figure 5-1 Scheme Map**



### Figure 5-2 Scheme Schematic

## 5.4 System Capacity

The Doyleston connection was originally designed with a restricted flow. Firefighting capacity provided by 3x30m<sup>2</sup> tanks. System capacity allows 2200L/property/day which is 272m<sup>3</sup> per day. This limit is often exceeded with peak summer daily demand exceeding 296m<sup>3</sup> which historically resulted in prolonged pressure drops. In February 2015 a new connection between the 'Leeston to Doyleston line' and the reservoir was made to increase capacity. Since the upgrade the system has performed well with reservoir levels being maintained.

For more information see Leeston, Section 13.4.

## 5.5 Resource Consents

The Doyleston water supply sources water from Leeston. Refer to Section 13.5 for Leeston's resource consents relating to the water take resource consent.

## 5.6 Water Quality

Refer to Section 13.6 which details the water quality compliance for the Leeston Water Supply.

## 5.7 Scheme Assets

A summary of material and diameter for pipes in Doyleston shown by Figure 5-3 and Figure 5-4.

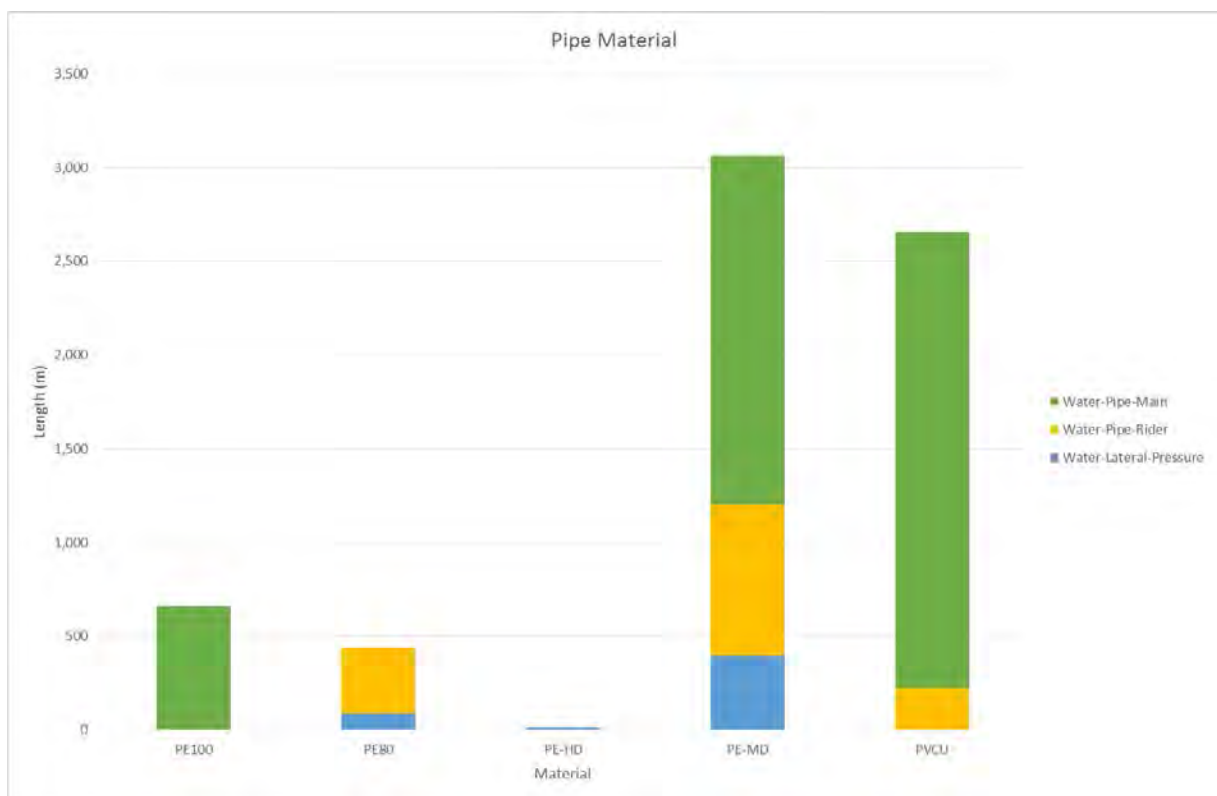


**Figure 5-3 Pipe Material – Doyleston**

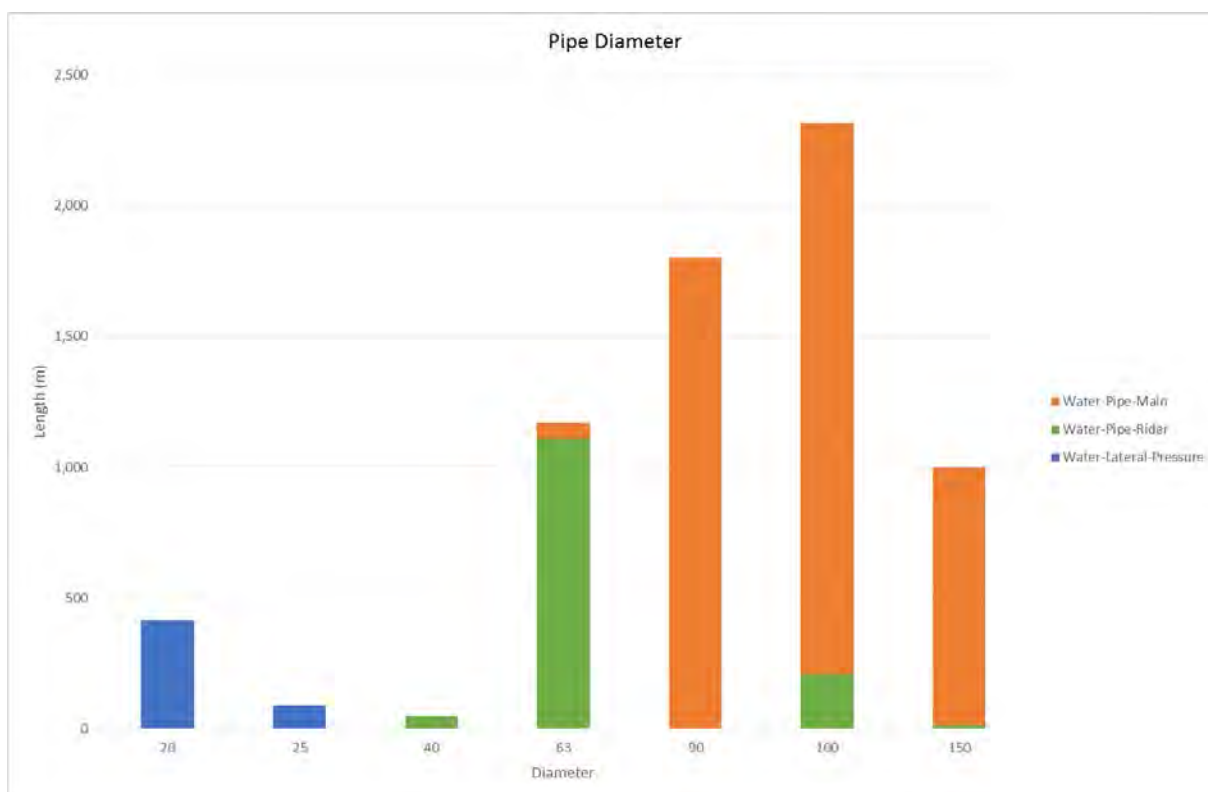


**Figure 5-4 Pipe Diameter – Doyleston**

## 5.8 Operational Management

The water supply is operated and maintained under two maintenance contracts as follows:

- Contract 1241: Water Services Contract. Contract is with SICON Ferguson who undertakes investigations, conditions inspections, proactive and reactive maintenance and minor asset renewals; and
- Contract 1202: Parks and Reserves Contract. Contract is with SICON Ferguson who undertakes the maintenance of land scape features related to water services e.g. mowing, gardens etc.

Water quality sampling is completed under an agreement with Food and Health Ltd as required.

## 5.9 Photos of Main Assets



**Photo 1: Doyleston Reservoirs**

## 5.10 Risk Assessment

A risk assessment has been undertaken for the Doyleston scheme. The key output from the risk assessment is the identification of any extreme and high risks which need to be mitigated. In order to mitigate these risks they have been included and budgeted for in the projects within this LTP. Table 5-2 outlines the risk priority rating and Table 5-3 outlines the risks for this scheme.

**Table 5-2 Risk Priority Rating**

| Risk Score | Level of Risk | Risk Response                                                                                                                                                     |
|------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| > 50       | Extreme       | Awareness of the event to be reported to Council.<br>Urgent action to eliminate / mitigate / manage the risk.<br>Document risk and action in the AMP.             |
| 35-50      | Very High     | Risk to be eliminated / mitigated / managed through normal business planning processes with responsibility assigned.                                              |
| 14-35      | High          | Manage risk using routine procedures.                                                                                                                             |
| 3.5-14     | Moderate      | Monitor the risk.                                                                                                                                                 |
| < 3.5      | Low           | Awareness of the event to be reported to Council.<br>Immediate action required to eliminate / mitigate / manage the risk.<br>Document risk and action in the AMP. |

**Table 5-3 Risks – Doyleston**

| Risk                                                                                                   | Action/Project                                        | Year Identified | 2014 Risk Rating | 2017 Risk Rating | Residual Risk Rating |
|--------------------------------------------------------------------------------------------------------|-------------------------------------------------------|-----------------|------------------|------------------|----------------------|
| Health and safety risk due to location of pumps and pipework restricting access to electrical controls | Install new control building for electrical equipment | 2014            | 27               | 2.1              | 2.1                  |

|                                                         |                                                   |      |    |     |     |
|---------------------------------------------------------|---------------------------------------------------|------|----|-----|-----|
| Inadequate system capacity during times of peak demand  | Install additional reservoir to increase capacity | 2014 | 27 | 12  | 12  |
| Undetected leaks or over-use                            | Install new flow meter at inlet to Reservoir      | 2014 | 27 | 6   | 6   |
| Electrical failure due to lightning or network spikes   | Install surge diverters                           | 2014 | 10 | 10  | 10  |
| Failure to meet NES water meter standards               | NES Water Meter Compliance                        | 2014 | 20 | 6   | 6   |
| Inability to collect income from non-metered properties | Install property water meters                     | 2014 | 27 | 0.6 | 0.6 |
| Non-compliance with the DWSNZ                           | DWSNZ - Age Testing                               | 2014 | 10 | 0.7 | 0.7 |
| Non-compliance with the DWSNZ                           | DWSNZ - Bore-head security                        | 2014 | 10 | 0.2 | 0.2 |
| Non-consented activities                                | Renewal of consents                               | 2014 | 27 | 6   | 6   |

The list of district wide risks can be found in 5Waters Activity Management Plan: Volume 1.

### 5.11 Asset Valuation Details

The total replacement value of assets within the Doyleston water scheme is \$1,077,089 with further details in Table 5-4 below.

**Table 5-4 Replacement Value, Doyleston**

| Asset Class 1              |              | Asset Class 2 | Sum of Replacement Value |
|----------------------------|--------------|---------------|--------------------------|
| <b>Plant and Equipment</b> |              |               | \$206,263                |
| <b>Water Reticulation</b>  | Hydrant      |               | \$34,922                 |
|                            | Lateral      |               | \$22,033                 |
|                            | Pipe         |               | \$685,926                |
|                            | Supply Point |               | \$92,143                 |
|                            | Valve        |               | \$35,802                 |

Replacement values for these different types of assets are shown in Figure 5-5 below.

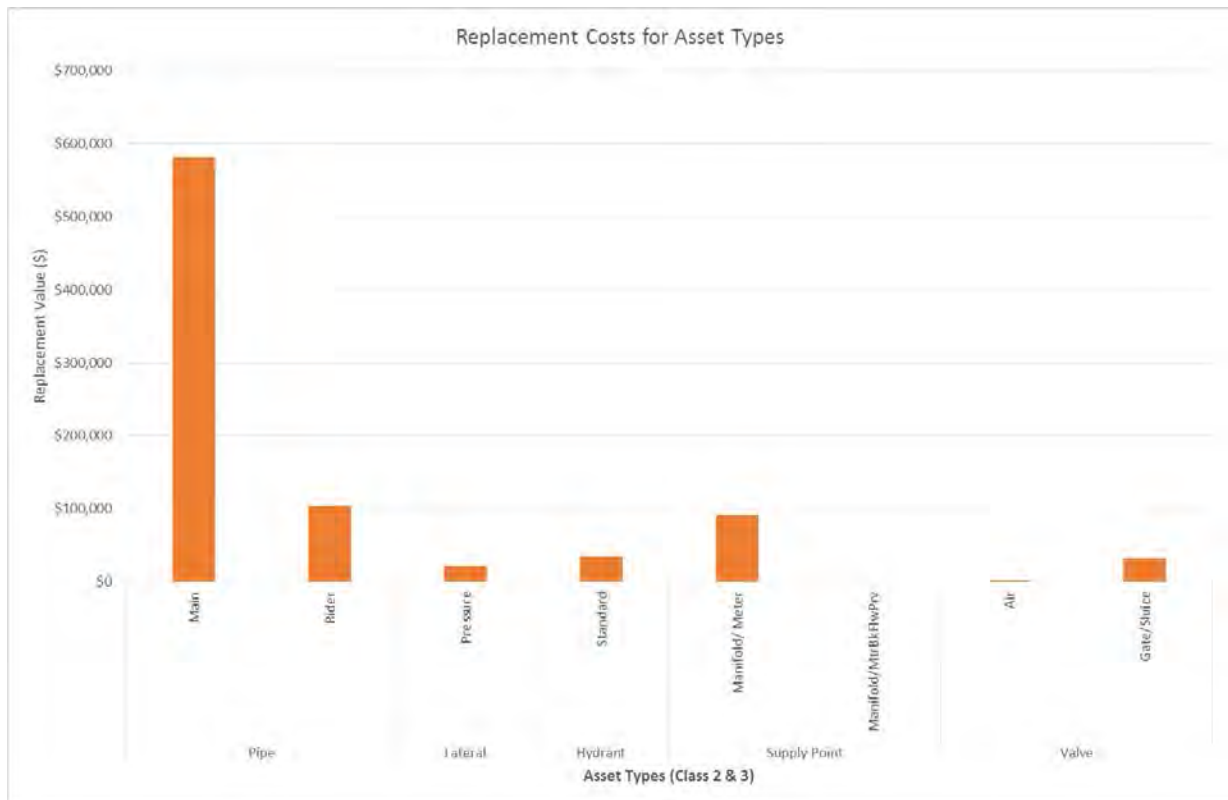


**Figure 5-5 Replacement Costs for Doyleston**

## 5.12 Renewals

The renewal profile has been taken from the 2017 5 Waters Valuation. A graph showing the renewals for this scheme are shown by Figure 5-6 below. The majority of renewals occur in 2021/2022.



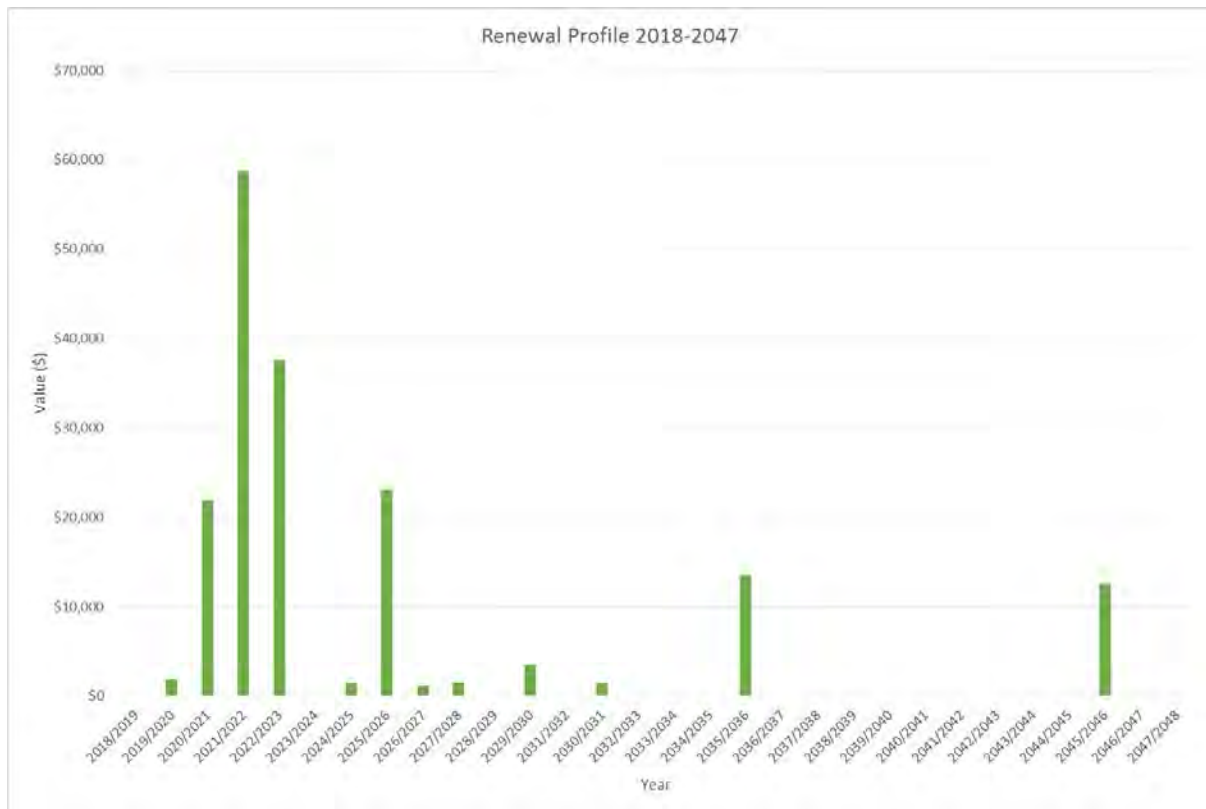


**Figure 5-6 Doyleston Water Renewal Profile**

### 5.13 Critical Assets

The criticality model for Doyleston has been updated for the 2018 AcMP. The methodology of the criticality model can be found in 5Waters Activity Management Plan: Volume 1 and it provides details of how the criticality has been calculated for the reticulation assets. Table 5-5 and Figure 5-7 below shows the calculated criticality for all of the assets within this scheme that have a recorded known length.

**Table 5-5 Length of Assets per Criticality Level**

| Criticality Bands |             | Length (m) |
|-------------------|-------------|------------|
| 5                 | Low         | 1,603      |
| 4                 | Medium-Low  | 4,518      |
| 3                 | Medium      | 289        |
| 2                 | Medium-High | 984        |
| 1                 | High        | 0          |

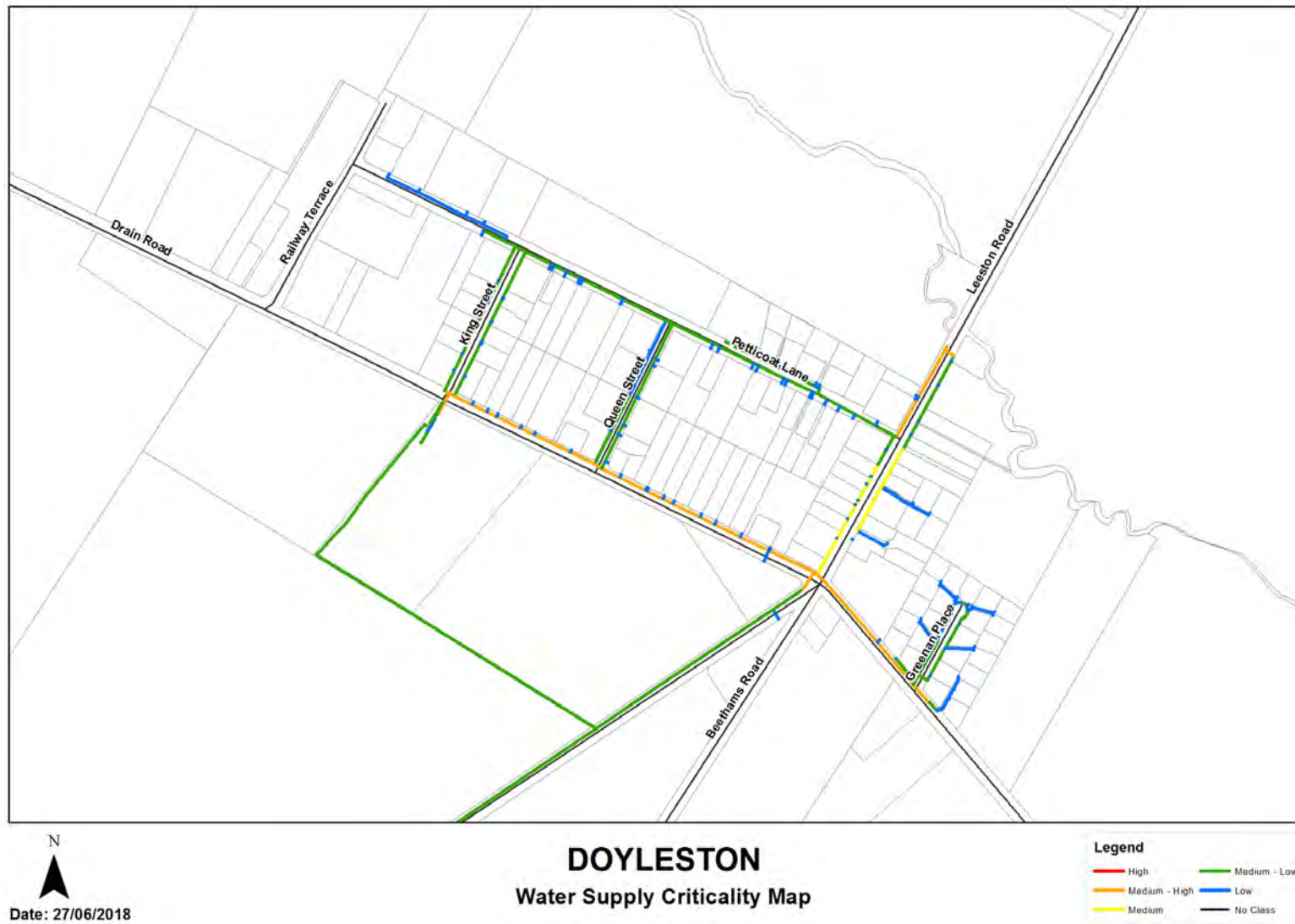


Figure 5-7 Criticality Map

## 5.14 Asset Condition

The asset condition model was run for Doyleston in 2017. The methodology of the model can be found in 5Waters Activity Management Plan: Volume 1 which provides details of how the model has been calculated for the pipe reticulation assets. Figure 5-8 below shows the level of asset condition for these assets within this scheme that have a recorded known condition.

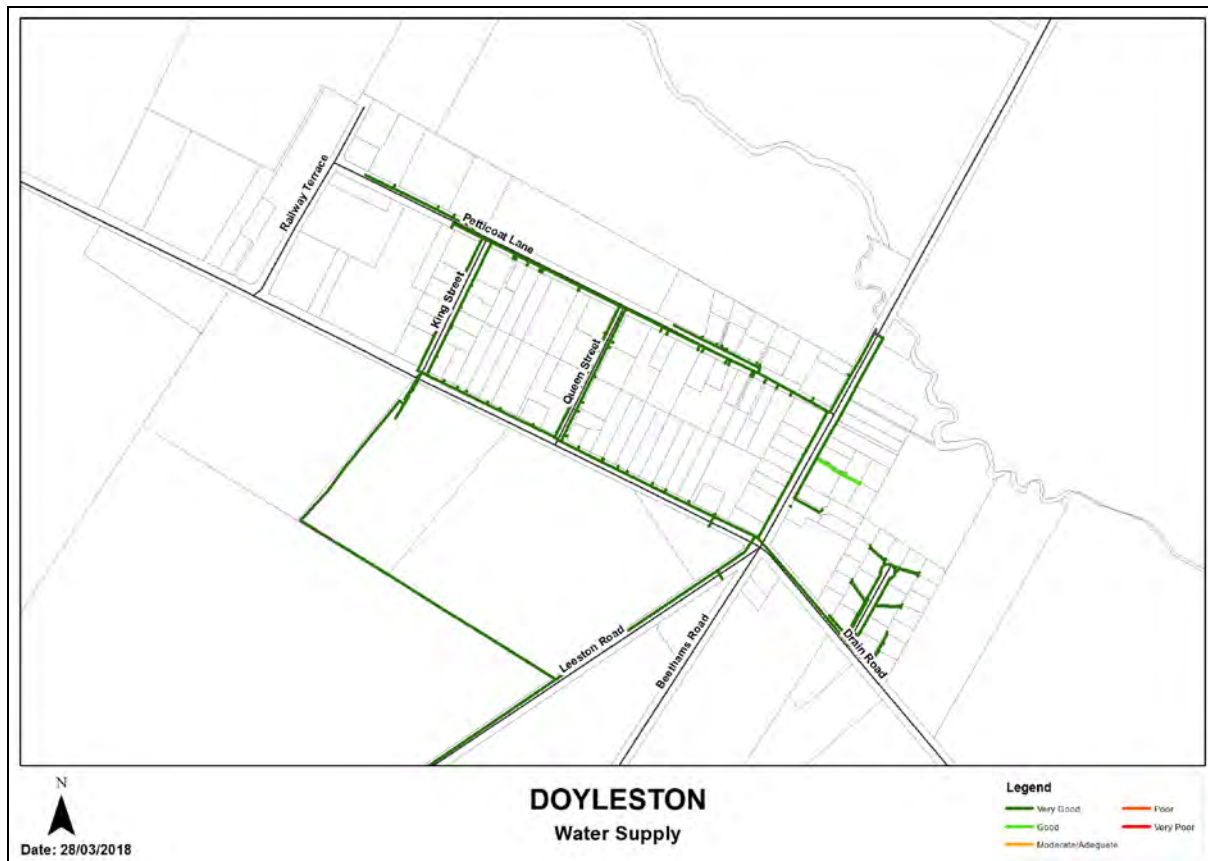


**Figure 5-8 Asset Condition – Doyleston**

Table 5-6 provides a description of the condition rating used within the condition model.

**Table 5-6 Asset Condition Grading**

| Condition Rating | Grading   |
|------------------|-----------|
| 1.0              | Excellent |
| 2.0              | Good      |
| 3.0              | Moderate  |
| 4.0              | Poor      |
| 5.0+             | Fail      |

The number of pipe faults is also measured through the asset management system. Figure 5-9 shows the known historic pipe failures within this scheme.

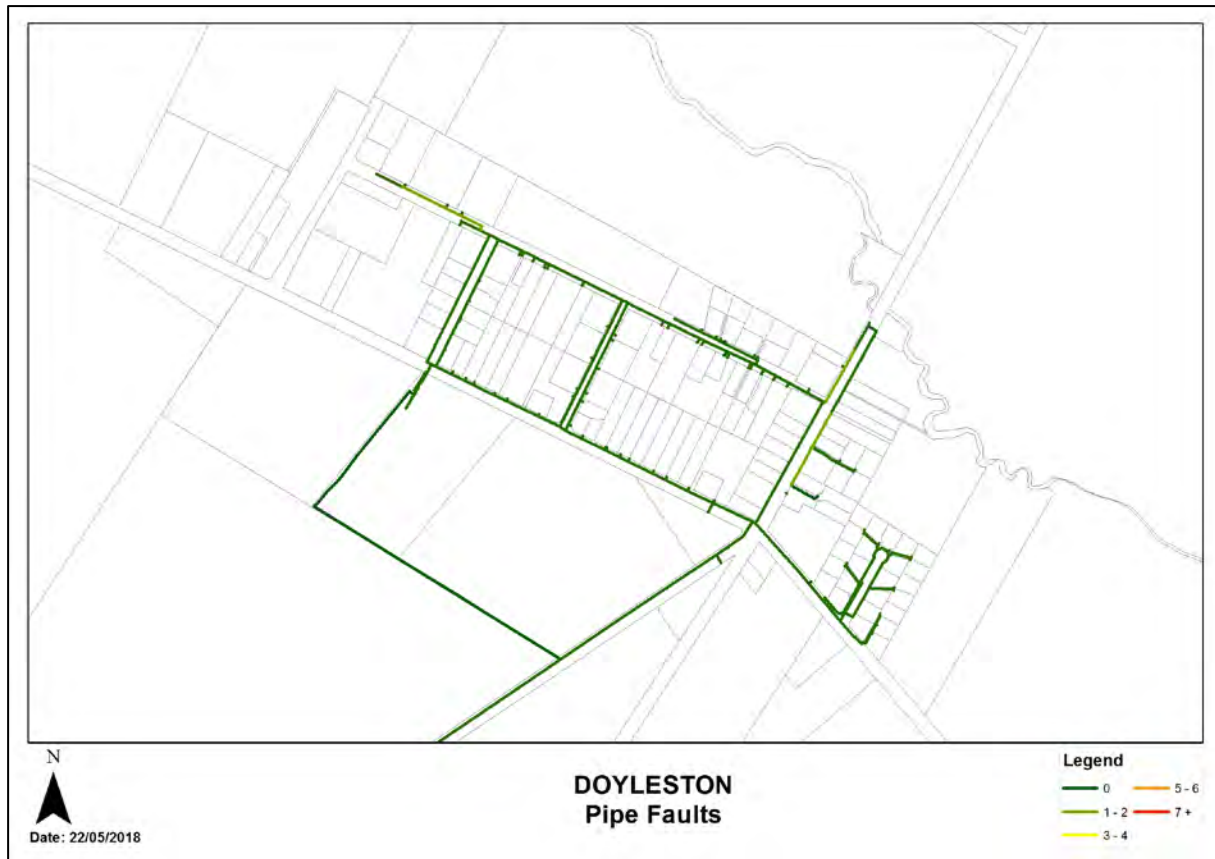


**Figure 5-9 Pipe Faults, Doyleston**

### 5.15 Funding Program

The 10 year budgets for Doyleston are shown by Table 5-7 and Figure 5-10. Budgets are split into expenditure, renewals, projects and capital projects.

All figures are (\$) not adjusted for CPI “inflation”. They are calculated on historical data, and population growth where relevant.

**Table 5-7 Doyleston Budget Summary**

| Years     | Expenditure | Renewals | Projects | Capital Projects |
|-----------|-------------|----------|----------|------------------|
| 2018/2019 | \$22,350    |          |          |                  |
| 2019/2020 | \$22,850    | \$1,891  |          |                  |
| 2020/2021 | \$23,350    | \$21,917 |          |                  |
| 2021/2022 | \$24,050    | \$58,714 |          |                  |
| 2022/2023 | \$24,050    | \$37,631 |          |                  |
| 2023/2024 | \$24,050    |          |          |                  |

|           |           |           |  |  |
|-----------|-----------|-----------|--|--|
| 2024/2025 | \$24,050  | \$1,407   |  |  |
| 2025/2026 | \$24,050  | \$23,072  |  |  |
| 2026/2027 | \$24,050  | \$1,150   |  |  |
| 2027/2028 | \$24,050  | \$1,496   |  |  |
| Total     | \$236,900 | \$147,279 |  |  |

An explanation of the categories within the budgets are as follows below:

- Expenditure consists of operation and maintenance costs;
- Renewals are replacement of assets which are nearing or exceeded their useful life;
- Projects are investigations, decisions and planning activities which exclude capital works; and
- Capital projects are activities involving physical works.

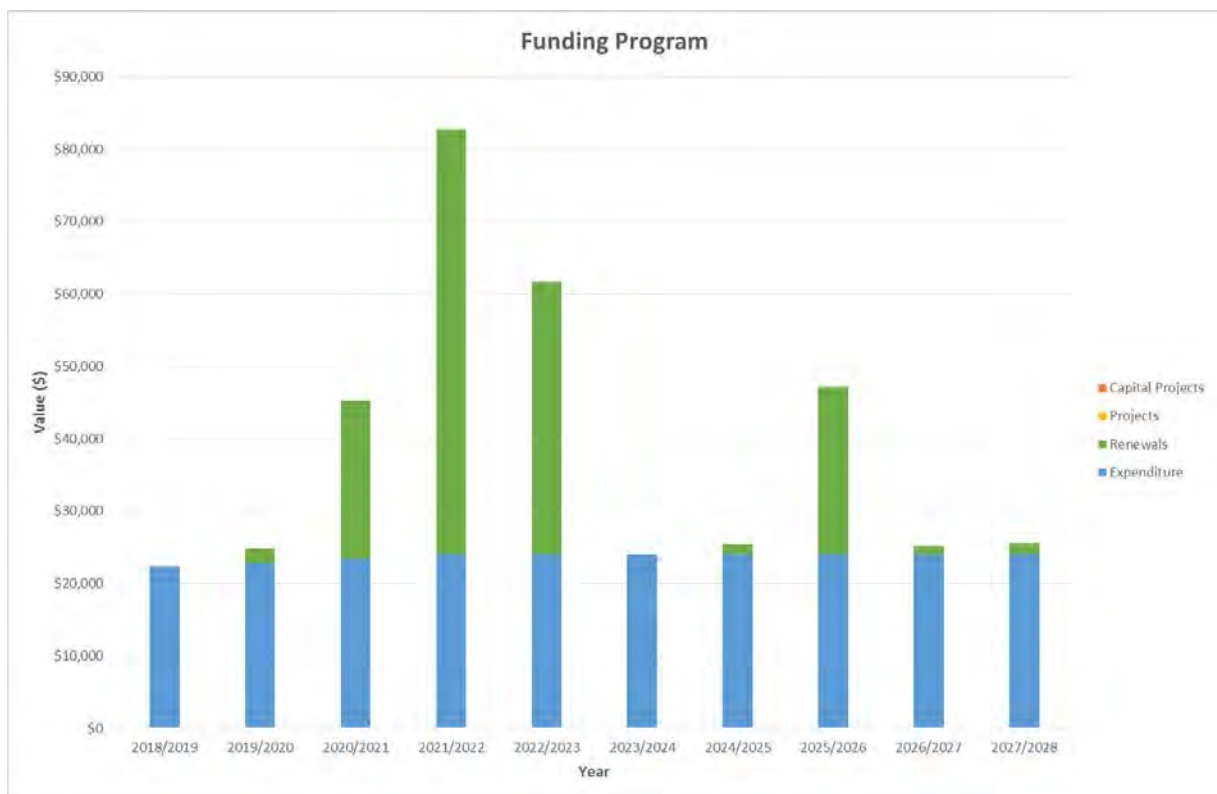


**Figure 5-10 Doyleston Funding Summary**

There are no major projects for Doyleston water scheme in the LTP budget.

The list of district wide projects can be found in 5Waters Activity Management Plan: Volume 1.

## 6.0 DUNSANDEL WATER SUPPLY

### 6.1 Scheme Summary

| Description                                   |                                   | Quantity                         |
|-----------------------------------------------|-----------------------------------|----------------------------------|
| <b>Estimated Population Served</b>            |                                   | 487                              |
| <b>Scheme Coverage</b><br>(1 Jan 2018)        | Full Charges                      | 172                              |
|                                               | Half Charges                      | 0                                |
|                                               | >1 Charges                        | 2                                |
| <b>System Components</b>                      | Bores/Intakes (No.)               | 1                                |
|                                               | Treatment/Disinfection            | UV                               |
|                                               | Reservoirs (No.)                  | 2                                |
|                                               | Pump Stations (No.)               | 0                                |
|                                               | Piped (m)                         | 9687.05                          |
| <b>History</b>                                | Original scheme installation date | 1986                             |
| <b>Value (\$)</b>                             | Replacement Cost                  | \$1,539,591.49                   |
|                                               | Depreciated Replacement Cost      | \$944,389.45                     |
| <b>Financial</b>                              | 2018/2019 Estimate                | \$61,083                         |
|                                               | Annual maintenance cost           | 1.91%                            |
|                                               | % of total                        |                                  |
| <b>Demand (m3)</b><br>(1 Jan – 31 Dec 2017)   | Average daily                     | 358                              |
|                                               | Peak daily                        | 1,072                            |
|                                               | Minimum daily                     | 112                              |
|                                               | Average daily per connection      | 2.1                              |
| <b>Type of Supply</b>                         |                                   | Medium pressure and unrestricted |
| <b>Target Pressure &amp; Flow at boundary</b> | Pressure                          | >310 kPa                         |
|                                               | Flow                              | >40 L/min                        |
| <b>Sustainability</b>                         | Well Security                     | Unsecure                         |

### 6.2 Key Issues

The following key issues are associated with the Dunsandel water supply. A list of district wide issues are located in 5Waters Activity Management Plan: Volume 1.

**Table 6-1 Dunsandel Scheme Issues**

| What's the Problem                       | What we plan to do                              |
|------------------------------------------|-------------------------------------------------|
| Supply is reliant on one source of water | Investigate an alternative site for a new bore. |

### 6.3 Overview & History

The Dunsandel Water Supply provides untreated groundwater to Dunsandel township and the adjacent 40 lot rural residential subdivision on Irvines Road (Sherwood Estate).

The current scheme was formed by combining the Dunsandel Township (installed 1986) and Sherwood Rural Residential (installed in 1991) schemes in July 1997. This allowed decommissioning of the problematic Dunsandel Well (ECan number L36/0601), and an improved cost/benefit relationship for operating both schemes.

There was also a previous subdivision on the Hororata-Dunsandel Road constructed in 1976 with a communal water scheme that was absorbed and decommissioned with the Dunsandel Township work.

The scheme was designed as a medium pressure, unrestricted metered supply complying with NZ Fire Fighting Code of Practice.

In 2009 the number of water quality transgressions rose significantly, and a combined regional, Selwyn District Council and community approach was taken to investigating the cause and recommending options to make the water safe to drink. An ultraviolet light system was installed and has eliminated bacteria (E.coli) entering the township network.



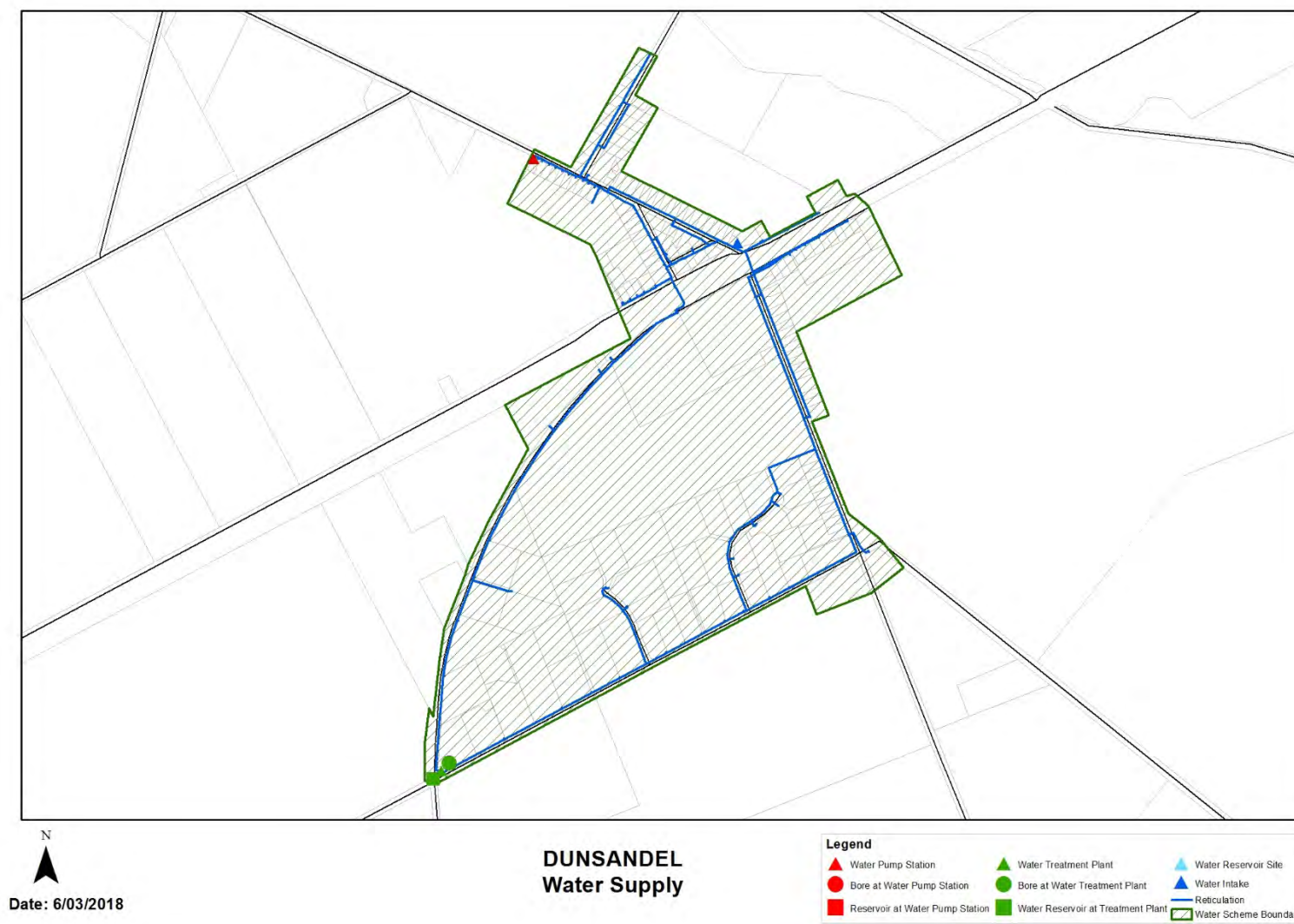
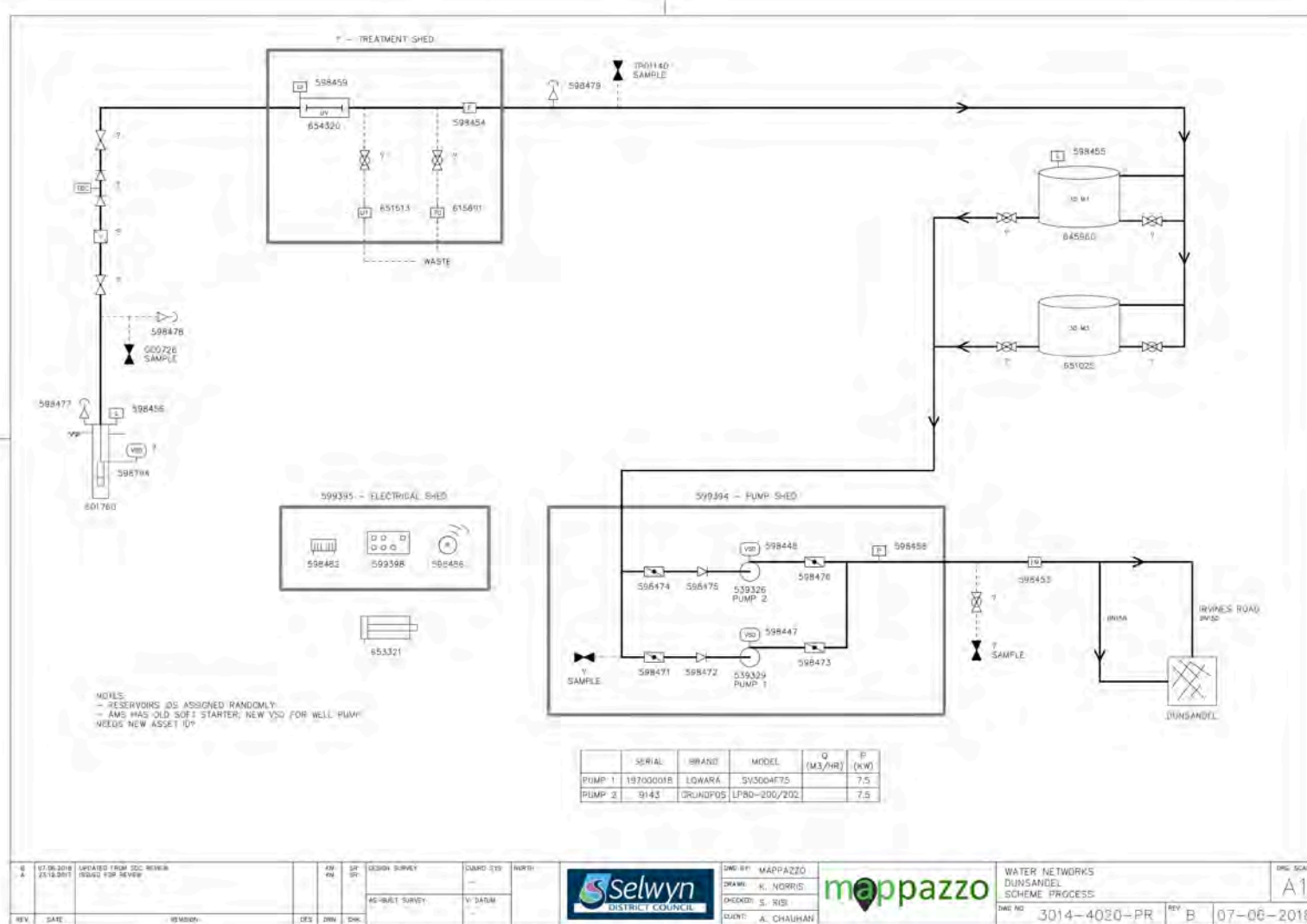


**Figure 6-1 Scheme Map**



## 6.4 System Capacity

Dunsandel has some potential for growth in terms of zoned land availability.

**Table 6-2 Capacity Summary**

|                                                                                                                                     | Flow Rate<br>(L/s)   | Daily Volume<br>(m <sup>3</sup> ) | Annual Volume<br>(m <sup>3</sup> ) | Comments                                                                                                      |
|-------------------------------------------------------------------------------------------------------------------------------------|----------------------|-----------------------------------|------------------------------------|---------------------------------------------------------------------------------------------------------------|
| Consented Take                                                                                                                      | 25                   | 1944                              | 291,600 <sup>(1)</sup>             | CRC010891.1                                                                                                   |
| Peak Demand - current                                                                                                               | 25L/s <sup>(2)</sup> | 1,380 <sup>(3)</sup>              | 215,111 <sup>(4)</sup>             |                                                                                                               |
| Abstraction capacity                                                                                                                | 24.7                 | 2134                              | -                                  | 1 bore pump                                                                                                   |
| Treatment capacity                                                                                                                  | 24.7                 | 2134                              | -                                  | Assume UV can accommodate bore pump flow rate. Note current UV is non-compliant. And upgrade programmed 2015. |
| Distribution pumping                                                                                                                | 35                   | 1944                              | 291,600                            | 2 pumps (duty/assist) from 70m <sup>3</sup> storage – can buffer peak flows but not peak days                 |
| <p>(1) inferred value</p> <p>(2) Jan 2013</p> <p>(3) 25 Jan 2015 (excluding fire fighting events)</p> <p>(4) Dec 2014- Dec 2015</p> |                      |                                   |                                    |                                                                                                               |

## 6.5 Resource Consents

The Dunsandel water supply has a number of resource consents. Table 6-3 shows the water take permitted by the resource consents for this scheme.

**Table 6-3 Resource Consents**

| Consent                        | Description                 | Location                                                                       | Date Issued | Expiry Date | Consented Max Instantaneous Flow (L/s) | Consented Max Daily Volume (m <sup>3</sup> /day) |
|--------------------------------|-----------------------------|--------------------------------------------------------------------------------|-------------|-------------|----------------------------------------|--------------------------------------------------|
| CRC010891.1<br>(Issued-Active) | To take and use groundwater | cnr Sh1 & Hororata Dundanel Roads And Cnr Tramway And, IRVINES ROADS DUNSANDEL | 12-Feb-10   | 31-Jan-35   | 22.5                                   | 1944                                             |

## 6.6 Water Quality

The Dunsandel water supply is a non-secure source and is currently sampled twice weekly at the source, treatment plant and weekly in the reticulation.

The following details the E. coli transgressions for the period 2012 to 2017.

## Source

There have been 39 E. coli source transgressions during this period.

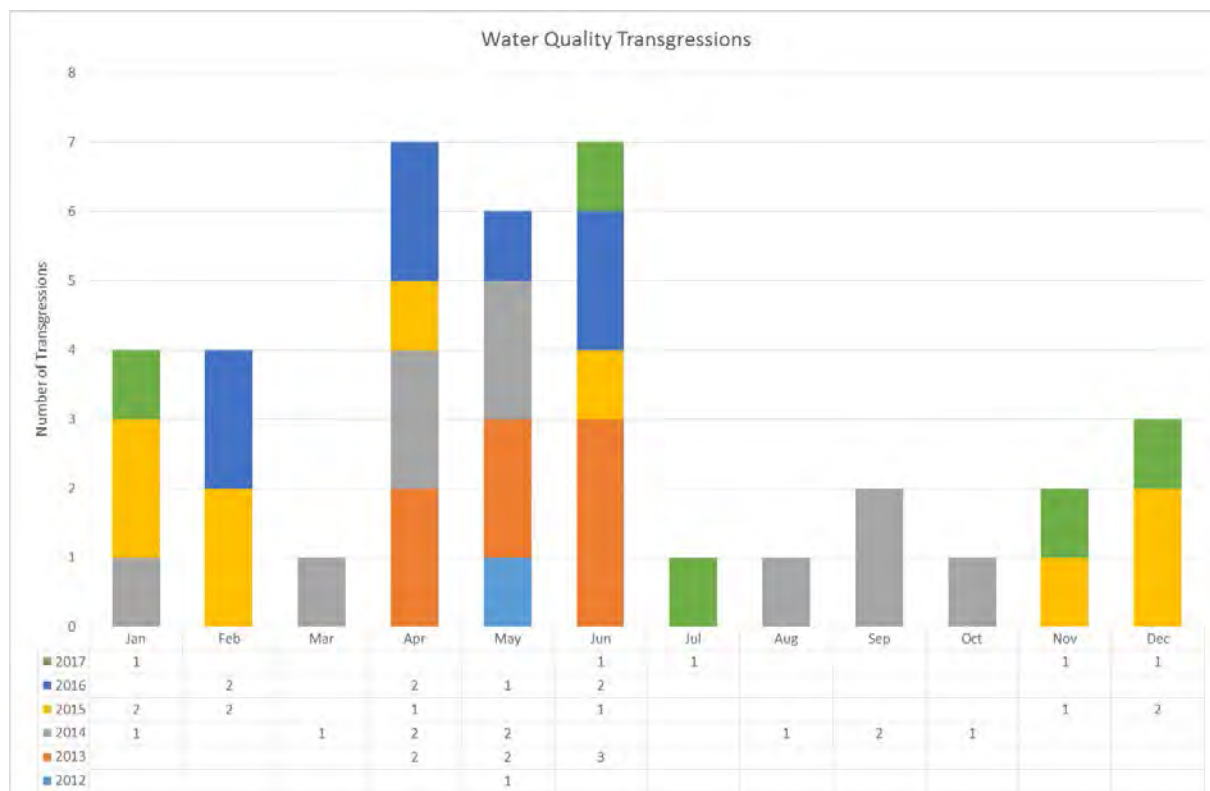


**Figure 6-3 E. coli Transgressions - Source**

## Treatment

There has been one E. coli treatment transgressions during this period which occurred in October 2014.

## Zone

There has been one E. coli transgressions during this period which occurred in January 2013.

## Chemical Analysis

The following is a summary of the raw water chemical analysis carried out at the Dunsandel Water Supply.

**Table 6-4 Dunsandel Water Supply Raw Water Chemical Analysis Summary**

| Parameter                                   | Standards<br>MAV* (GV)** | Plant 2015 | Plant 2017 | Status |
|---------------------------------------------|--------------------------|------------|------------|--------|
| Total Lead (g/m3)                           | 0.01                     | 0.0002     | < 0.00011  | ✓      |
| pH (pH units)                               | 7-8.5                    | 7.4        | 7.2        | ✓      |
| Total Hardness (g/m3 as CaCO <sub>3</sub> ) | <200                     | 67         | 63.2       | ✓      |
| Total Calcium (g/m3)                        | n/v                      | 16.8       | 16.64      | ✓      |
| Total Iron (g/m3)                           | <0.2                     | <0.021     | < 0.021    | ✓      |

|                           |      |     |      |   |
|---------------------------|------|-----|------|---|
| Total Sodium (g/m3)       | <200 | 10  | 9.86 | ✓ |
| Nitrate - Nitrogen (g/m3) | 11.3 | 3.6 | 4.5  | ✓ |

\* MAV – Maximum Acceptable Value

\*\* (GV) – Guideline Value

## 6.7 Scheme Assets

A summary of material and diameter for pipes in Dunsandel is shown by Figure 6-4 and Figure 6-5.

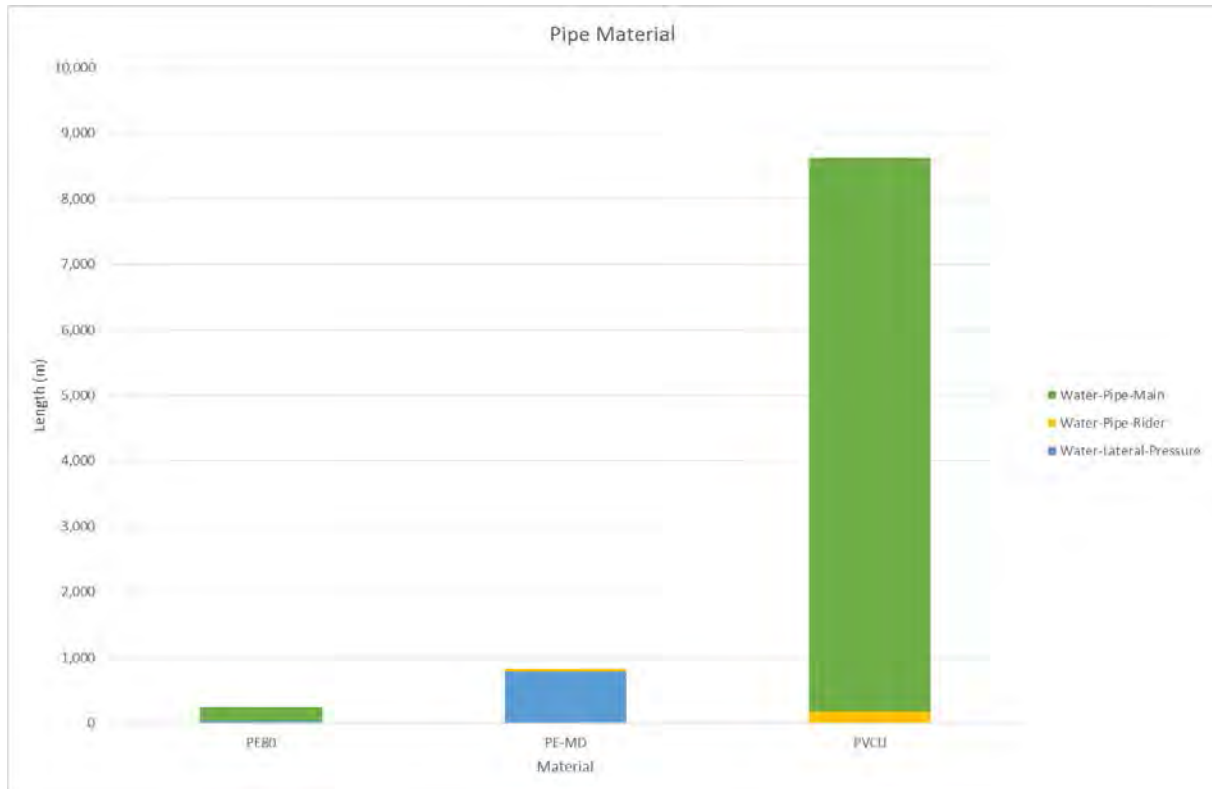


Figure 6-4 Pipe Material – Dunsandel

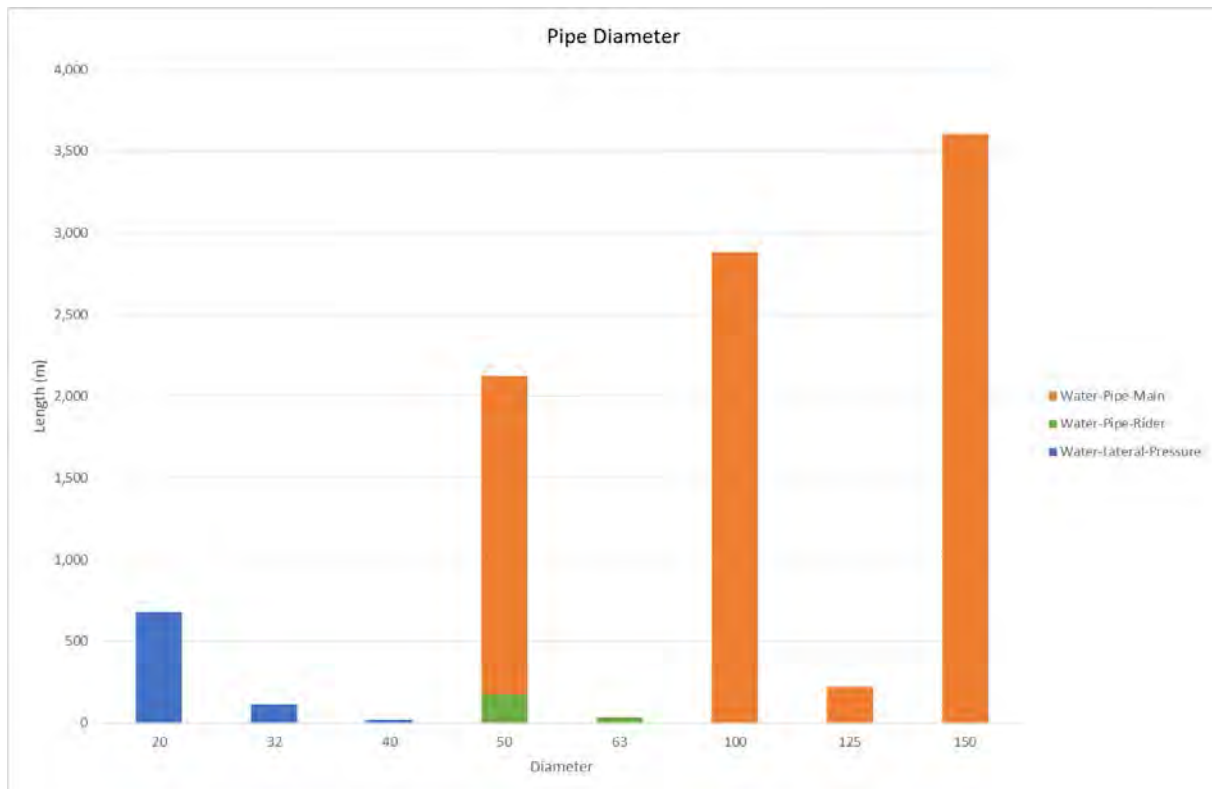


**Figure 6-5 Pipe Diameter – Dunsandel**

## 6.8 Operational Management

The water supply is operated and maintained under two maintenance contracts as follows:

- Contract 1241: Water Services Contract. Contract is with SICON Ferguson who undertakes investigations, conditions inspections, proactive and reactive maintenance and minor asset renewals; and
- Contract 1202: Parks and Reserves Contract. Contract is with SICON Ferguson who undertakes the maintenance of land scape features related to water services e.g. mowing, gardens etc.

Water quality sampling is completed under an agreement with Food and Health Ltd as required.

## 6.9 Photos of Main Assets



**Photo 1: Site Layout**

## 6.10 Risk Assessment

A risk assessment has been undertaken for the Dunsandel scheme. The key output from the risk assessment is the identification of any extreme and high risks which need to be mitigated. In order to mitigate these risks they have been included and budgeted for in the projects within this LTP. Table 6-5 outlines the risk priority rating, Table 6-6 outlines the risks and the list of key projects is found in Table 6-10.

**Table 6-5 Risk Priority Rating**

| Risk Score | Level of Risk | Risk Response                                                                                                                                                     |
|------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| > 50       | Extreme       | Awareness of the event to be reported to Council.<br>Urgent action to eliminate / mitigate / manage the risk.<br>Document risk and action in the AMP.             |
| 35-50      | Very High     | Risk to be eliminated / mitigated / managed through normal business planning processes with responsibility assigned.                                              |
| 14-35      | High          | Manage risk using routine procedures.                                                                                                                             |
| 3.5-14     | Moderate      | Monitor the risk.                                                                                                                                                 |
| < 3.5      | Low           | Awareness of the event to be reported to Council.<br>Immediate action required to eliminate / mitigate / manage the risk.<br>Document risk and action in the AMP. |

**Table 6-6 Risks – Dunsandel**

| Risk                  | Action/Project                                                 | Year Identified | 2014 Risk Rating | 2017 Risk Rating | Residual Risk Rating |
|-----------------------|----------------------------------------------------------------|-----------------|------------------|------------------|----------------------|
| Lack of water storage | Demolish the concrete tank and replace with 33m3 tanks (min 4) | 2014            | 27               | 27               | 12                   |



|                                                         |                                               |      |    |     |     |
|---------------------------------------------------------|-----------------------------------------------|------|----|-----|-----|
| Often power outages (especially when wind storms occur) | Install a generator on this scheme            | 2014 | 12 | 2.1 | 2.1 |
| Only one source of supply - risk of loss                | Investigate suitable location for second bore | 2014 | 6  | 6   | 6   |
| Electrical failure due to lightning or network spikes   | Install surge diverters                       | 2014 | 10 | 3.5 | 3.5 |
| Failure to meet NES water meter standards               | NES Water Meter Compliance                    | 2014 | 20 | 6   | 6   |
| Inability to collect income from non-metered properties | Install property water meters                 | 2014 | 27 | 0.6 | 0.6 |
| Non-compliance with the DWSNZ                           | DWSNZ - Age Testing                           | 2014 | 10 | 0.7 | 0.7 |
| Non-consented activities                                | Renewal of consents                           | 2014 | 27 | 27  | 6   |
| Inadequate treatment under all conditions               | Install filtration                            | 2017 |    | 40  | 7   |

The list of district wide risks can be found in 5Waters Activity Management Plan: Volume 1.

## 6.11 Asset Valuation Details

The total replacement value of assets within the Dunsandel water scheme is \$1,539,591 with further details in Table 6-7 below.

**Table 6-7 Replacement Value, Dunsandel**

| Asset Class 1              | Asset Class 2 | Sum of Replacement Value |
|----------------------------|---------------|--------------------------|
| <b>Plant and Equipment</b> |               | \$346,175                |
| <b>Water Reticulation</b>  | Hydrant       | \$53,918                 |
|                            | Lateral       | \$36,059                 |
|                            | Pipe          | \$953,139                |
|                            | Supply Point  | \$121,551                |
|                            | Valve         | \$28,750                 |

Replacement values for these different types of assets are shown in Figure 6-6 below.

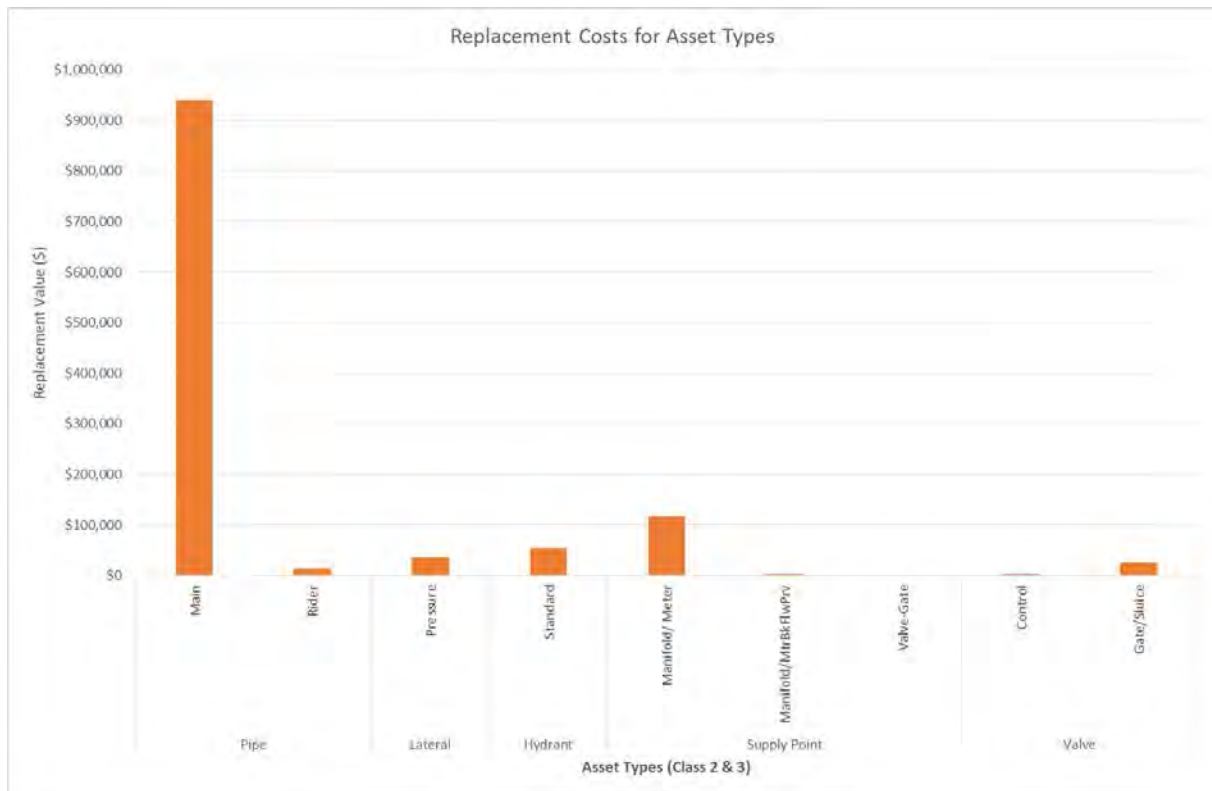


**Figure 6-6 Replacement Costs for Dunsandel**

## 6.12 Renewals

The renewal profile has been taken from the 2017 5 Waters Valuation. A graph showing the renewals for this scheme are shown by Figure 6-7 below. The majority of renewals occur in 2022/2023.



**Figure 6-7 Dunsandel Water Renewal Profile**

### 6.13 Critical Assets

The criticality model for Dunsandel has been updated for the 2018 AcMP. The methodology of the criticality model can be found in 5Waters Activity Management Plan: Volume 1 and it provides details of how the criticality has been calculated for the reticulation assets. Table 6-8 and Figure 6-8 below shows the calculated criticality for all of the assets within this scheme that have a recorded known length.

**Table 6-8 Length of Assets per Criticality Level**

| Criticality Bands |             | Length (m) |
|-------------------|-------------|------------|
| 5                 | Low         | 2,485      |
| 4                 | Medium-Low  | 3,040      |
| 3                 | Medium      | 2,127      |
| 2                 | Medium-High | 1,088      |
| 1                 | High        | 0          |

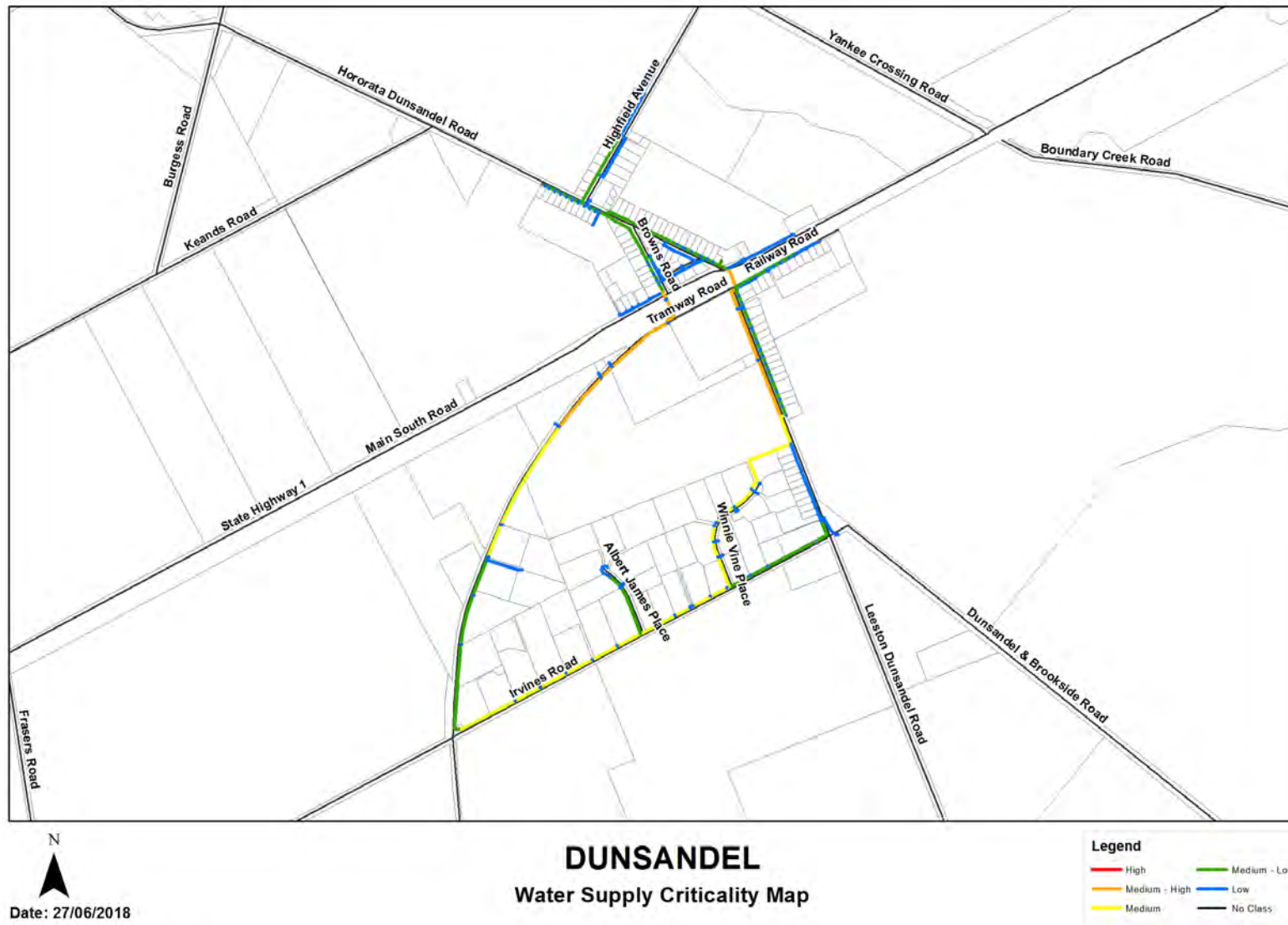


Figure 6-8 Criticality Map

## 6.14 Asset Condition

The asset condition model was run for Dunsandel in 2017. The methodology of the model can be found in 5Waters Activity Management Plan: Volume 1 which provides details of how the model has been calculated for the pipe reticulation assets. Figure 6-9 below shows the level of asset condition for these assets within this scheme that have a recorded known condition.

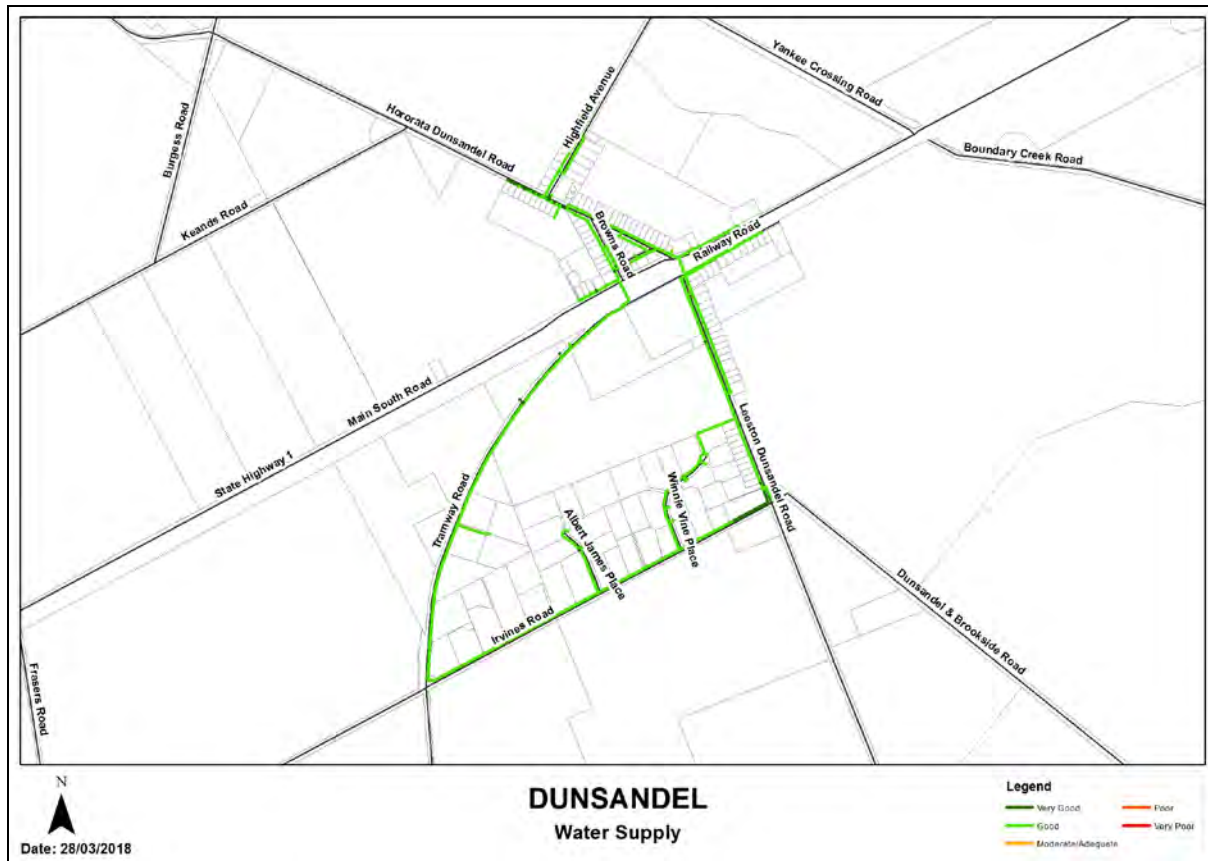


**Figure 6-9 Asset Condition – Dunsandel**

Table 6-9 provides a description of the condition rating used within the condition model.

**Table 6-9 Asset Condition Grading**

| Condition Rating | Grading   |
|------------------|-----------|
| 1.0              | Excellent |
| 2.0              | Good      |
| 3.0              | Moderate  |
| 4.0              | Poor      |
| 5.0+             | Fail      |

The number of pipe faults is also measured through the asset management system. Figure 6-10 shows the known historic pipe failures within this scheme.

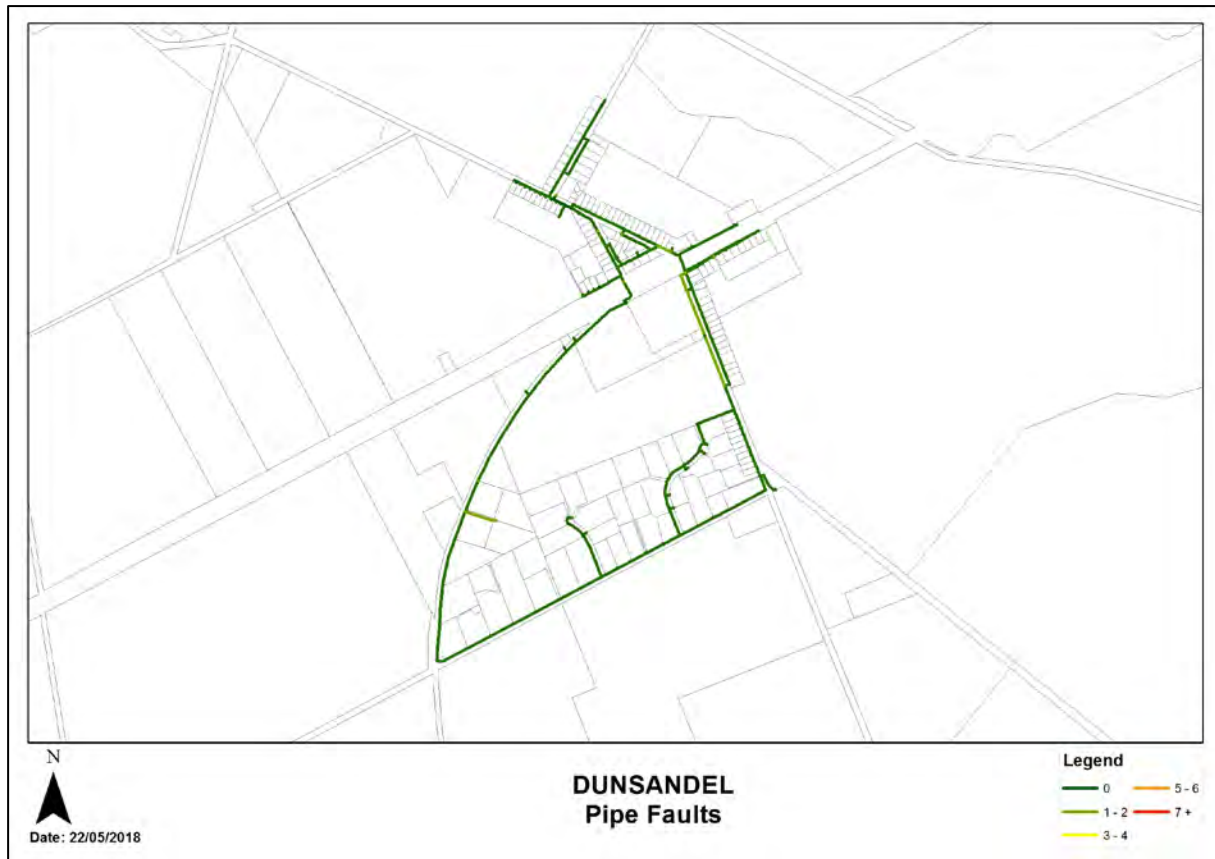


**Figure 6-10 Pipe Faults, Dunsandel**

### 6.15 Funding Program

The 10 year budgets for Dunsandel are shown by Table 6-10 and Figure 6-11. Budgets are split into expenditure, renewals, projects and capital projects.

All figures are (\$) not adjusted for CPI “inflation”. They are calculated on historical data, and population growth where relevant.

**Table 6-10 Dunsandel Budget Summary**

| Years     | Expenditure | Renewals  | Projects | Capital Projects |
|-----------|-------------|-----------|----------|------------------|
| 2018/2019 | \$61,083    | \$8,453   |          | \$10,000         |
| 2019/2020 | \$61,583    | \$20,349  |          | \$10,000         |
| 2020/2021 | \$62,083    | \$25,284  |          | \$304,000        |
| 2021/2022 | \$62,083    | \$2,111   |          |                  |
| 2022/2023 | \$62,083    | \$192,516 |          |                  |
| 2023/2024 | \$62,083    |           |          |                  |

|           |           |           |  |           |
|-----------|-----------|-----------|--|-----------|
| 2024/2025 | \$62,083  | \$9,623   |  |           |
| 2025/2026 | \$62,083  | \$7,246   |  |           |
| 2026/2027 | \$62,083  | \$3,211   |  |           |
| 2027/2028 | \$62,083  | \$704     |  |           |
| Total     | \$619,330 | \$269,496 |  | \$324,000 |

An explanation of the categories within the budgets are as follows below:

- Expenditure consists of operation and maintenance costs;
- Renewals are replacement of assets which are nearing or exceeded their useful life;
- Projects are investigations, decisions and planning activities which exclude capital works; and
- Capital projects are activities involving physical works.

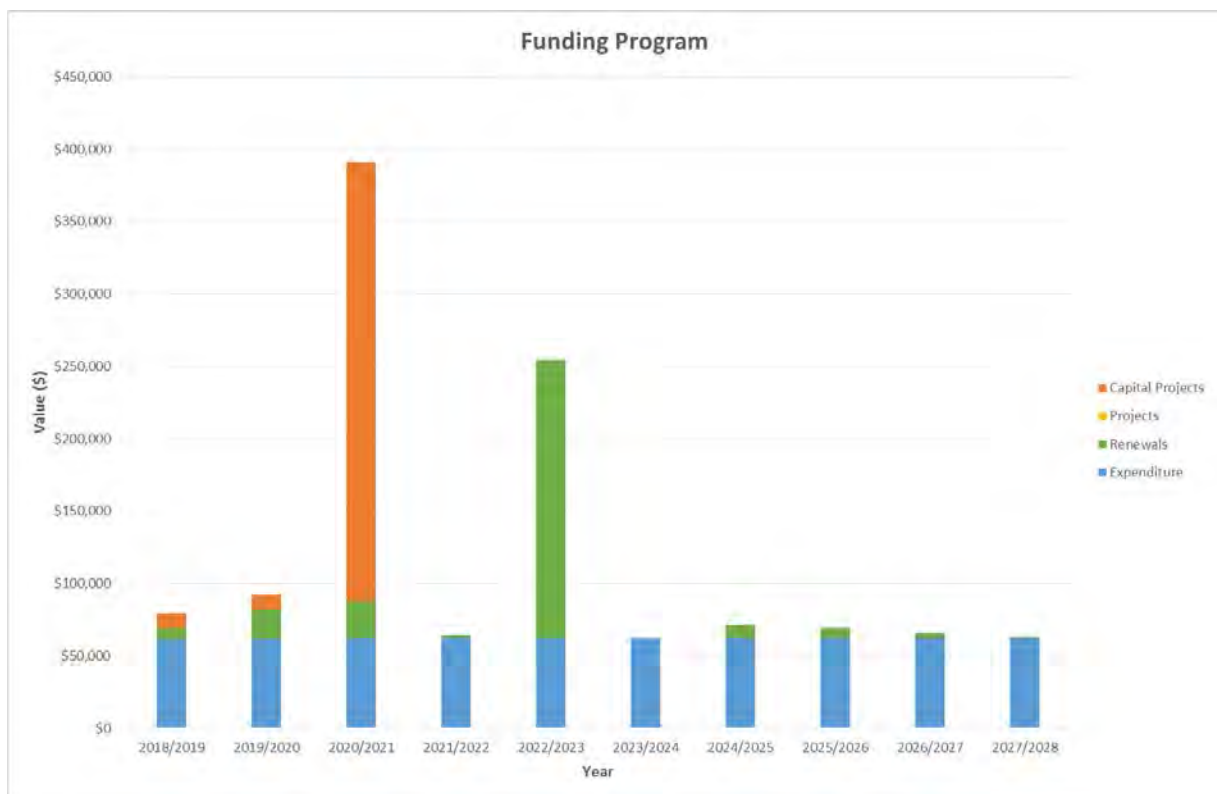


Figure 6-11 Dunsandel Funding Summary



There are two major projects for Dunsandel water scheme in the LTP budget.

**Table 6-11 Key Projects**

| Account Label    | GL        | Description                                   | Year 1 (\$) | Year 2 (\$) | Year 3 (\$) | Years 4 to 10 | Funding Split <sup>4</sup> |
|------------------|-----------|-----------------------------------------------|-------------|-------------|-------------|---------------|----------------------------|
| Capital Projects | 402090042 | Investigate suitable location for second bore | \$10,000    |             |             |               | 100% LoS                   |
| Capital Projects | 402090043 | Filtration                                    |             | \$10,000    | \$304,000   |               | 100% LoS                   |

The list of district wide projects can be found in 5Waters Activity Management Plan: Volume 1.

### Discussion on Projects

Projects have been determined based on their:

- Relevance to the scheme
- Requirement to be completed under legislation
- Ability to bring the scheme up to or maintain the Level of Service required under council's Asset Management Policy.

Many projects are **jointly** funded by more than one scheme and activity. Each scheme pays a pro-rata share only, equivalent to the number of connections.

### Discussion on Capital and Projects

Where relevant, Capital (Levels of Service) and Capital (Growth) projects have been included in the scheme financial details.

Levels of Service Projects and growth splits have been provided to ensure the costs of population driven works are clear.

<sup>4</sup> Where LoS refers to Level of Service and G refers to Growth

## 7.0 EDENDALE WATER SUPPLY

### 7.1 Scheme Summary

| Description                                   |                                   | Quantity                       |
|-----------------------------------------------|-----------------------------------|--------------------------------|
| <b>Estimated Population Served</b>            |                                   | 196                            |
| <b>Scheme Coverage</b><br>(1 Jan 2018)        | Full Charges                      | 68                             |
|                                               | Half Charges                      | 1                              |
|                                               | >1 Charges                        | 2                              |
| <b>System Components</b>                      | Bores/Intakes (No.)               | 2 (one not in use)             |
|                                               | Treatment/Disinfection            | UV                             |
|                                               | Reservoirs (No.)                  | 1                              |
|                                               | Pump Stations (No.)               | 1                              |
|                                               | Piped (m)                         | 5215.6                         |
| <b>History</b>                                | Original scheme installation date | 1989                           |
| <b>Value (\$)</b>                             | Replacement Cost                  | \$1,403,509.96                 |
|                                               | Depreciated Replacement Cost      | \$887,300.02                   |
| <b>Financial</b>                              | 2018/2019 Estimate                | \$55,143                       |
|                                               | Annual maintenance cost           | 1.72%                          |
|                                               | % of total                        |                                |
| <b>Demand (m3)</b><br>(1 Jan – 31 Dec 2017)   | Average daily                     | 148                            |
|                                               | Peak daily                        | 593                            |
|                                               | Minimum daily                     | 24                             |
|                                               | Average daily per connection      | 2.18                           |
| <b>Type of Supply</b>                         |                                   | High pressure and unrestricted |
| <b>Target Pressure &amp; Flow at boundary</b> | Pressure                          | >310 kPa                       |
|                                               | Flow                              | >40 L/min                      |
| <b>Sustainability</b>                         | Well Security                     | Secure                         |

### 7.2 Key Issues

The following key issues are associated with the Edendale water supply. A list of district wide issues are located in 5Waters Activity Management Plan: Volume 1.

**Table 7-1 Edendale Scheme Issues**

| What's the Problem                                                                                                                                                     | What we plan to do                                                                                                             |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|
| The fire hydrants in the Edendale supply do not comply with the New Zealand Fire Fighting Code of Practice and will require capital (level of service) work to comply. | Council will budget for the fire hydrants renewal.                                                                             |
| The newly installed bore provides capacity in excess of what the community requires.                                                                                   | Investigate alternative uses of the water including the connection to adjoining water supplies. Action options as appropriate. |

### 7.3 Overview & History

Edendale Water Supply provides UV treated groundwater to Edendale Rural Residential subdivision located 4km west of West Melton and adjacent to State Highway 73 and Sandy Knolls Road (see schematics).

The scheme was designed in 1989 as a high pressure metered supply with full fire fighting capacity. It was designed to supply a maximum of 750 L/hour per property, though new consent conditions have restricted this.

The water supply area was constituted on 1st July 1993 and named the Edendale Water Supply Area.

Rural residential lots varying from 0.5 to 1.1ha and 7 Rural blocks varying in size from 4.0 to 6.1ha. The scheme includes the 8 properties on the eastern side of Sandy Knolls Road (The 8 properties on the eastern side of Sandy Knolls Road were required to have a potable water supply installed as these properties were within the "plume of influence" from the septic tanks from the residential properties west of them) between SH73 and Findlays Road and 3 properties on the northern side of SH73.

The 7 Rural blocks each have an additional 50mm irrigation connections. The Council's policy for irrigation within the Edendale Supply area shall be:

- a) Separate irrigation connections are available on lots 42 to 48 inclusive.
- b) Supply shall be an extraordinary connection.
- c) Maximum allowable usage rate of 5.0 litres per second.
- d) Use of irrigation permitted only between the hours of 11 pm to 3 am.
- e) Seven day roster produced by the Engineer shall be complied with.

On the 8 November 2017 Council decided to extend the Edendale water supply area and amalgamate it with adjoining water supplies; ☐ revoke clause 2 of policy W202; and ☐ incorporate the balance of policy W202 into the Water Supply Activity Management Plan.

Edendale water is now being sourced from a 198m deep bore with an abstraction capacity of 35 litres per second (consented up to 65 litres per second). At the time of the upgrade, UV treatment was also installed. The consented daily volume of the new consent is 1987 cubic metres with this total being expressed as 13,910 cubic metres in any period of 7 consecutive days (CRC172478). The upgrades and consent variations have greatly increased the capacity of the Edendale water supply.

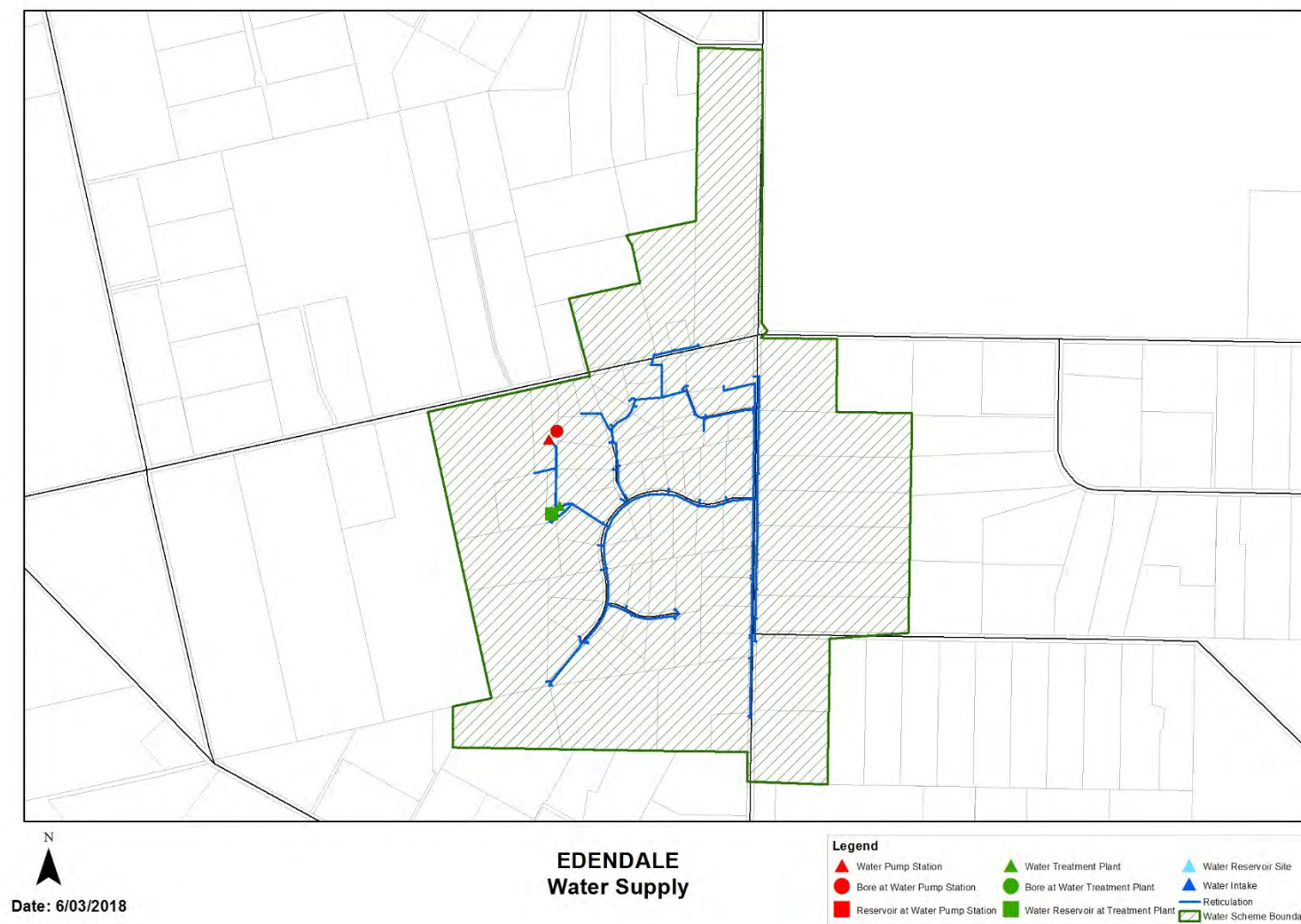


**Figure 7-1 Scheme Map**



## 7.4 System Capacity

This water supply was developed to serve rural residential subdivision including 7 irrigation connections. Most allocated connections are utilised. Existing capacity is adequate, even under level 1 consent restrictions.

**Table 7-2 Capacity Summary**

|                                                                                  | Flow Rate<br>(L/s) | Daily Volume<br>(m <sup>3</sup> ) | Annual Volume<br>(m <sup>3</sup> ) | Comments                 |
|----------------------------------------------------------------------------------|--------------------|-----------------------------------|------------------------------------|--------------------------|
| Abstraction Capacity                                                             | 38                 | 3283                              | -                                  | Bore pump (nom capacity) |
| Consented Take                                                                   | 65                 | 1987                              | 120,000 *                          | CRC172478                |
| Peak Demand                                                                      | 18.8**             | 1182***<br>638****                | 52,500 (Hist)<br>28,200*****       | Lower in recent years    |
| * inferred value<br>** 4 Feb 2015<br>*** Jan 2004<br>**** Jan 2015<br>***** 2014 |                    |                                   |                                    |                          |

## 7.5 Resource Consents

The Edendale water supply has a number of resource consents. Table 7-3 shows the water take permitted by the resource consents for this scheme.

**Table 7-3 Resource Consents**

| Consent                      | Description                 | Location                   | Date Issued | Expiry Date | Consented Max Instantaneous Flow (L/s) | Consented Max Daily Volume (m <sup>3</sup> /day) |
|------------------------------|-----------------------------|----------------------------|-------------|-------------|----------------------------------------|--------------------------------------------------|
| CRC172478<br>(Issued-Active) | To take and use groundwater | Genesis Drive, West Melton | 16-Dec-16   | 16-Feb-40   | 84                                     | 1987<br><br>(13,910 per 7 days)                  |

## 7.6 Water Quality

The Edendale water supply is non-secure and is currently sampled weekly for the source, treatment plant and monthly in the reticulation zone.

The following details E. coli transgressions for 2012 to 2017.

### Source

There have been seven E. coli source transgressions during this period.

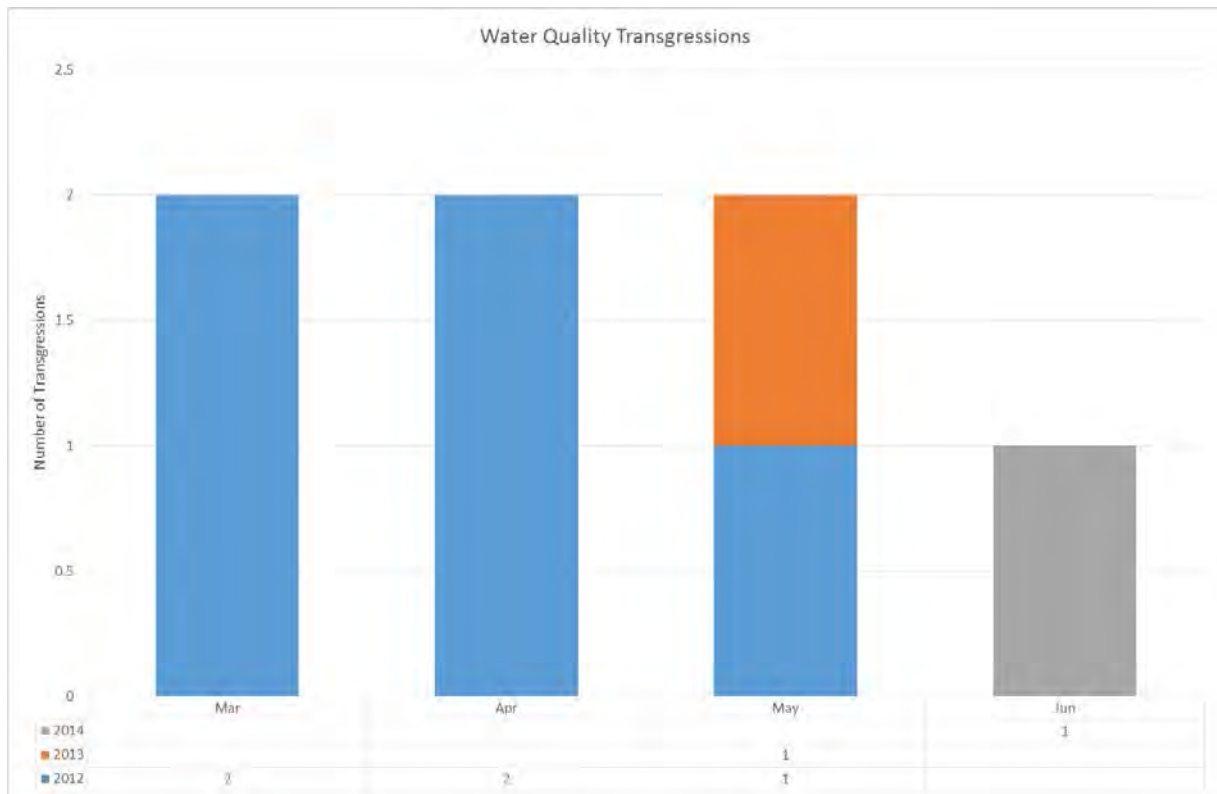


**Figure 7-3 E.coli Transgressions - Source**

#### Treatment

There have been two E. coli transgressions during this period. The transgressions occurred in July 2013 and August 2012.

#### Zone

There have been five E. coli transgressions during this period.



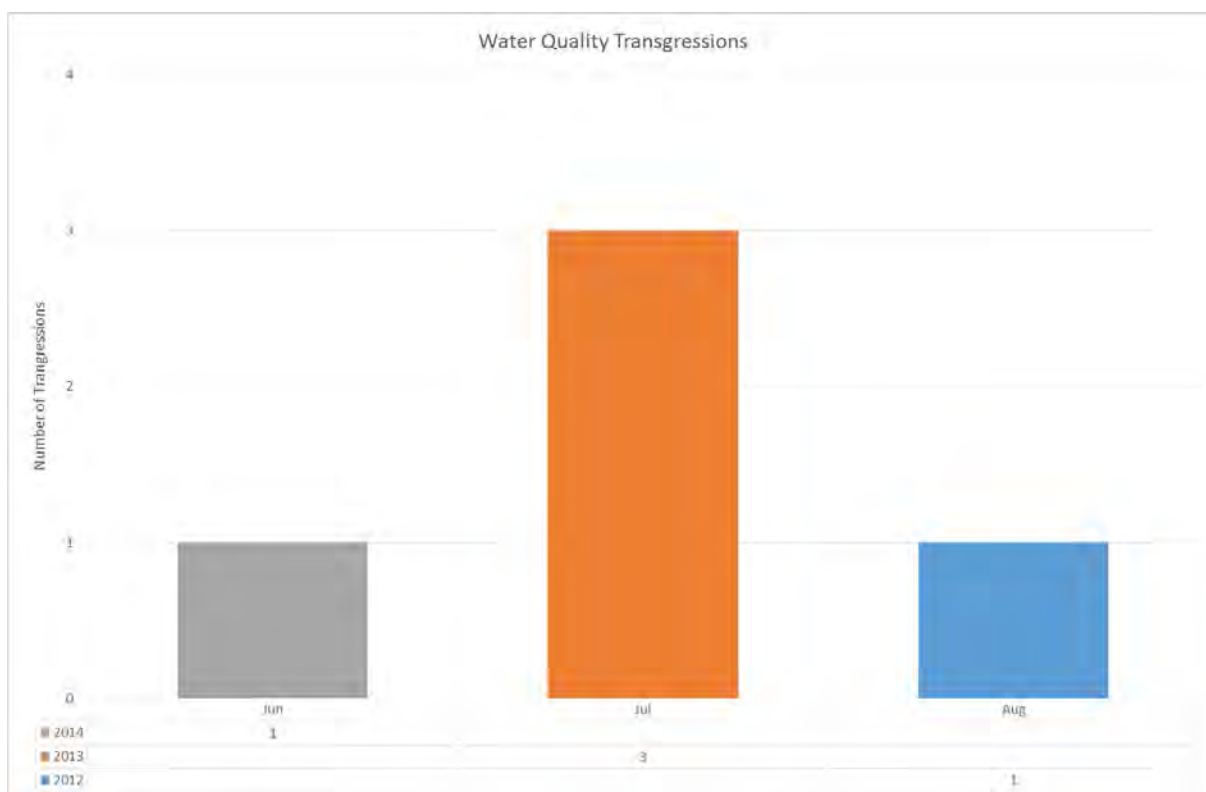


**Figure 7-4 E.coli Transgressions - Zone**

### Chemical Analysis

The following is a summary of the raw water chemical analysis carried out at the Edendale Water Supply.

**Table 7-4 Edendale Water Supply Raw water Chemical Analysis Summary**

| Parameter                                   | Standards<br>MAV* (GV)** | Plant 2015 | Plant 2017 | Status |
|---------------------------------------------|--------------------------|------------|------------|--------|
| Total Lead (g/m3)                           | 0.01                     | <0.00011   | 0.000142   | ✓      |
| pH (pH units)                               | 7-8.5                    | 7.6        | 7.6        | ✓      |
| Total Hardness (g/m3 as CaCO <sub>3</sub> ) | <200                     | 67         | 68.4       | ✓      |
| Total Calcium (g/m3)                        | n/v                      | 19.6       | 20.08      | ✓      |
| Total Iron (g/m3)                           | <0.2                     | <0.021     | 0.023      | ✓      |
| Total Sodium (g/m3)                         | <200                     | 13         | 12.22      | ✓      |
| Nitrate - Nitrogen (g/m3)                   | 11.3                     | 6.4        | 6.69       | ✓      |

\* MAV – Maximum Acceptable Value

\*\* (GV) – Guideline Value

## 7.7 Scheme Assets

A summary of material and diameter for pipes in Edendale is shown below in Figure 7-5 and Figure 7-6.

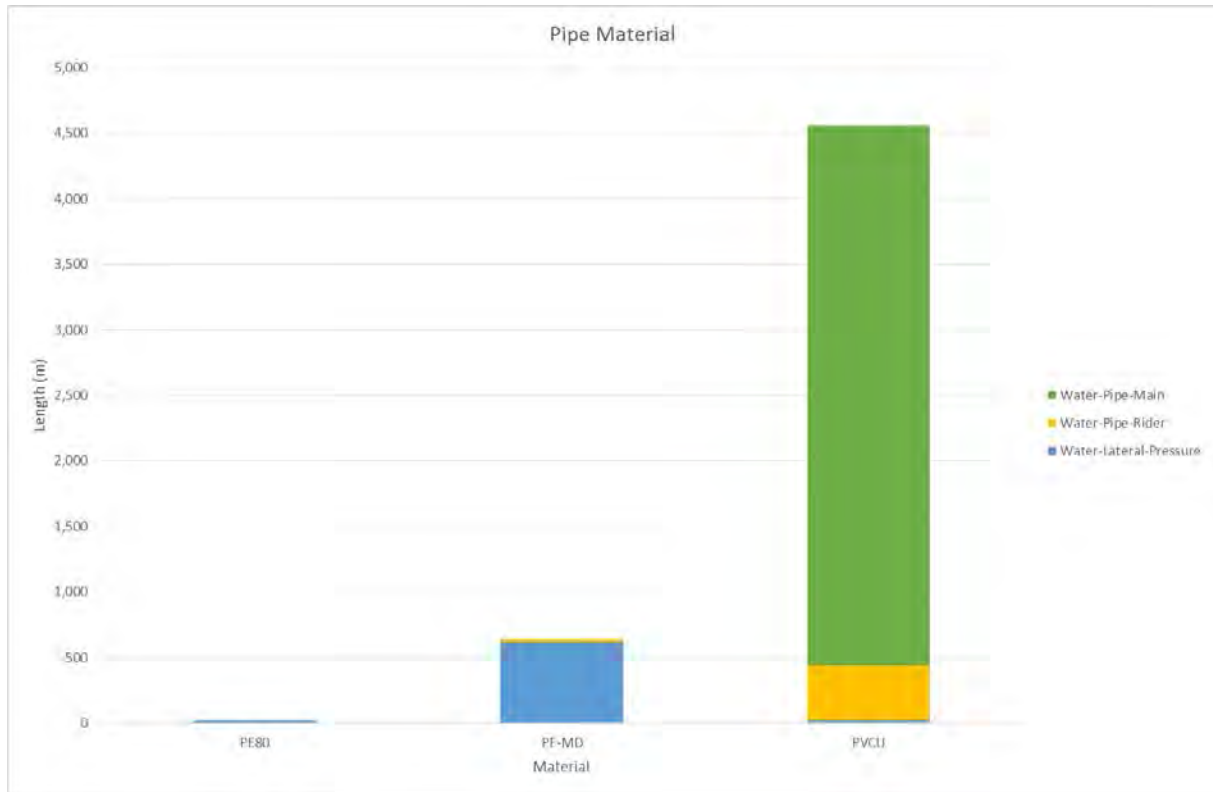


Figure 7-5 Pipe Material – Edendale

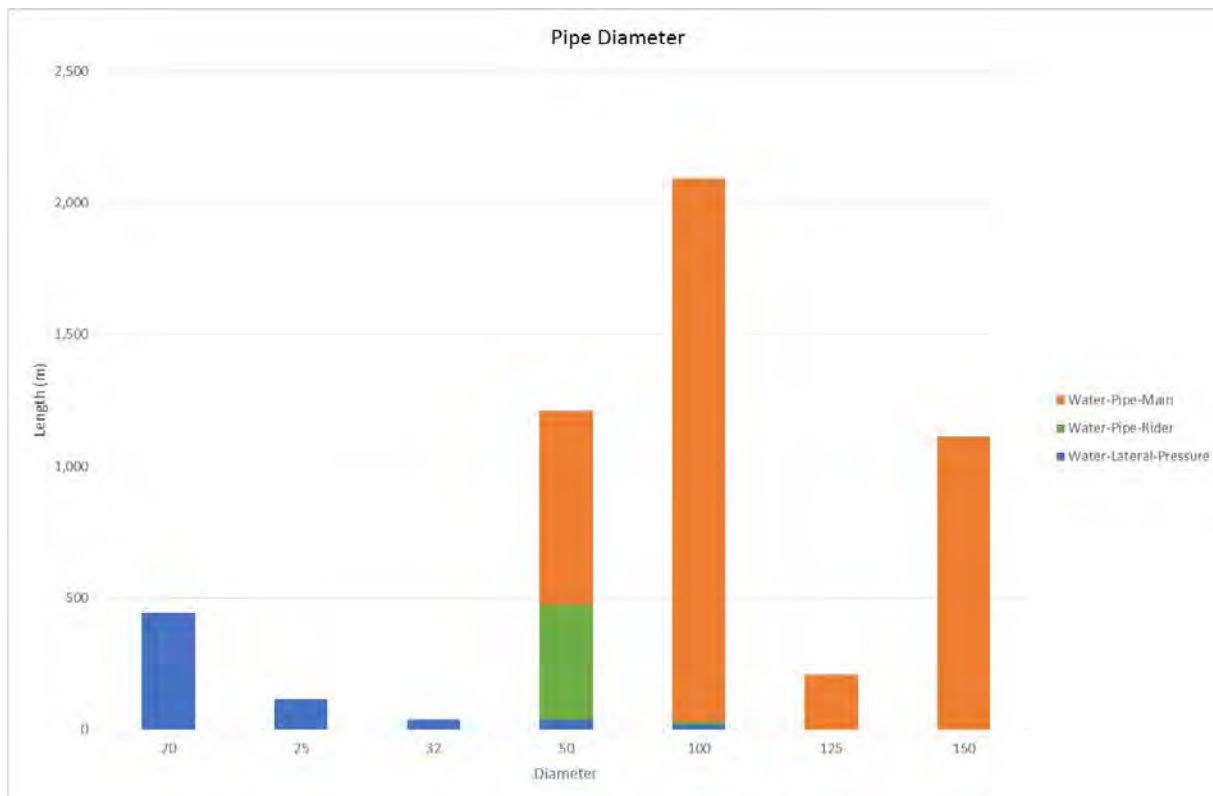


**Figure 7-6 Pipe Diameter – Edendale**

## 7.8 Operational Management

The water supply is operated and maintained under two maintenance contracts as follows:

- Contract 1241: Water Services Contract. Contract is with SICON Ferguson who undertakes investigations, conditions inspections, proactive and reactive maintenance and minor asset renewals; and
- Contract 1202: Parks and Reserves Contract. Contract is with SICON Ferguson who undertakes the maintenance of land scape features related to water services e.g. mowing, gardens etc.

Water quality sampling is completed under an agreement with Food and Health Ltd as required.

## 7.9 Photos of Main Assets

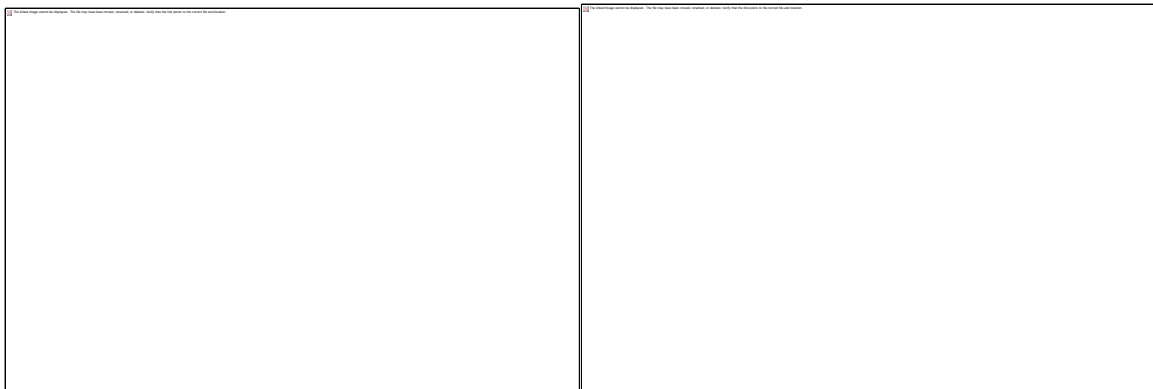


**Photo 1: Well head**

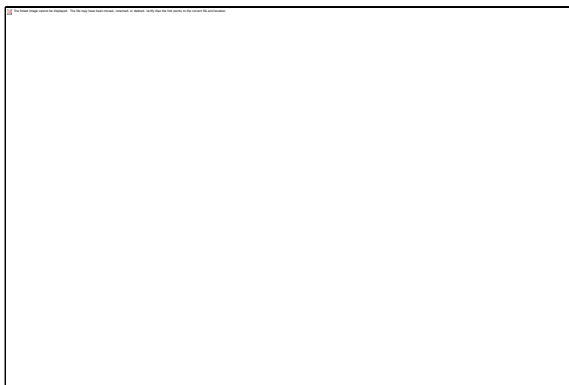


**Photo 2: Reservoir and pump/control shed**



**Photo 3:**

**Photo 4:**

## 7.10 Risk Assessment

A risk assessment has been undertaken for the Edendale scheme. The key output from the risk assessment is the identification of any extreme and high risks which need to be mitigated. In order to mitigate these risks they have been included and budgeted for in the projects within this LTP. Table

7-5 outlines the risk priority rating, Table 7-6 outlines the risks and the list of key projects is found in

| Risk Score | Level of Risk | Risk Response                                                                                                                                                     |
|------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| > 50       | Extreme       | Awareness of the event to be reported to Council.<br>Urgent action to eliminate / mitigate / manage the risk.<br>Document risk and action in the AMP.             |
| 35-50      | Very High     | Risk to be eliminated / mitigated / managed through normal business planning processes with responsibility assigned.                                              |
| 14-35      | High          | Manage risk using routine procedures.                                                                                                                             |
| 3.5-14     | Moderate      | Monitor the risk.                                                                                                                                                 |
| < 3.5      | Low           | Awareness of the event to be reported to Council.<br>Immediate action required to eliminate / mitigate / manage the risk.<br>Document risk and action in the AMP. |

Table 7-11.

**Table 7-5 Risk Priority Rating**

**Table 7-6 Risks – Edendale**

| Risk                                                    | Action/Project                       | Year Identified | 2014 Risk Rating | 2017 Risk Rating | Residual Risk Rating |
|---------------------------------------------------------|--------------------------------------|-----------------|------------------|------------------|----------------------|
| DWS compliance for protozoa                             | Install a UV unit                    | 2014            | 45               | 10               | 10                   |
| Well Head contamination                                 | Raise well head and secure bore head | 2014            | 10               | 3.5              | 3.5                  |
| Electrical failure due to lightning or network spikes   | Install surge diverters              | 2014            | 10               | 3.5              | 3.5                  |
| Failure to meet NES water meter standards               | NES Water Meter Compliance           | 2014            | 20               | 6                | 6                    |
| Inability to collect income from non-metered properties | Install property water meters        | 2014            | 27               | 0.6              | 0.6                  |
| Non-consented activities                                | Renewal of consents                  | 2014            | 27               | 27               | 6                    |
| Back up power                                           | Install generator plug               | 2017            |                  | 9                | 4                    |
| Inadequate treatment under all conditions               | Install filtration                   | 2017            |                  | 3.5              | 3.5                  |

|                         |                         |      |  |   |   |
|-------------------------|-------------------------|------|--|---|---|
| Engineer inspection res | Inspection of reservoir | 2017 |  | 9 | 2 |
|-------------------------|-------------------------|------|--|---|---|

The list of district wide risks can be found in 5Waters Activity Management Plan: Volume 1.

### 7.11 Asset Valuation Details

The total replacement value of assets within the Edendale water scheme is \$1,403,510 with further details in Table 7-7 below.

**Table 7-7 Replacement Value, Edendale**

| Asset Class 1              | Asset Class 2 | Sum of Replacement Value |
|----------------------------|---------------|--------------------------|
| <b>Plant and Equipment</b> |               | \$795,287                |
| <b>Water Reticulation</b>  | Hydrant       | \$19,572                 |
|                            | Lateral       | \$31,709                 |
|                            | Pipe          | \$484,977                |
|                            | Supply Point  | \$50,159                 |
|                            | Valve         | \$21,805                 |

Replacement values for these different types of assets are shown in Figure 7-7 below.

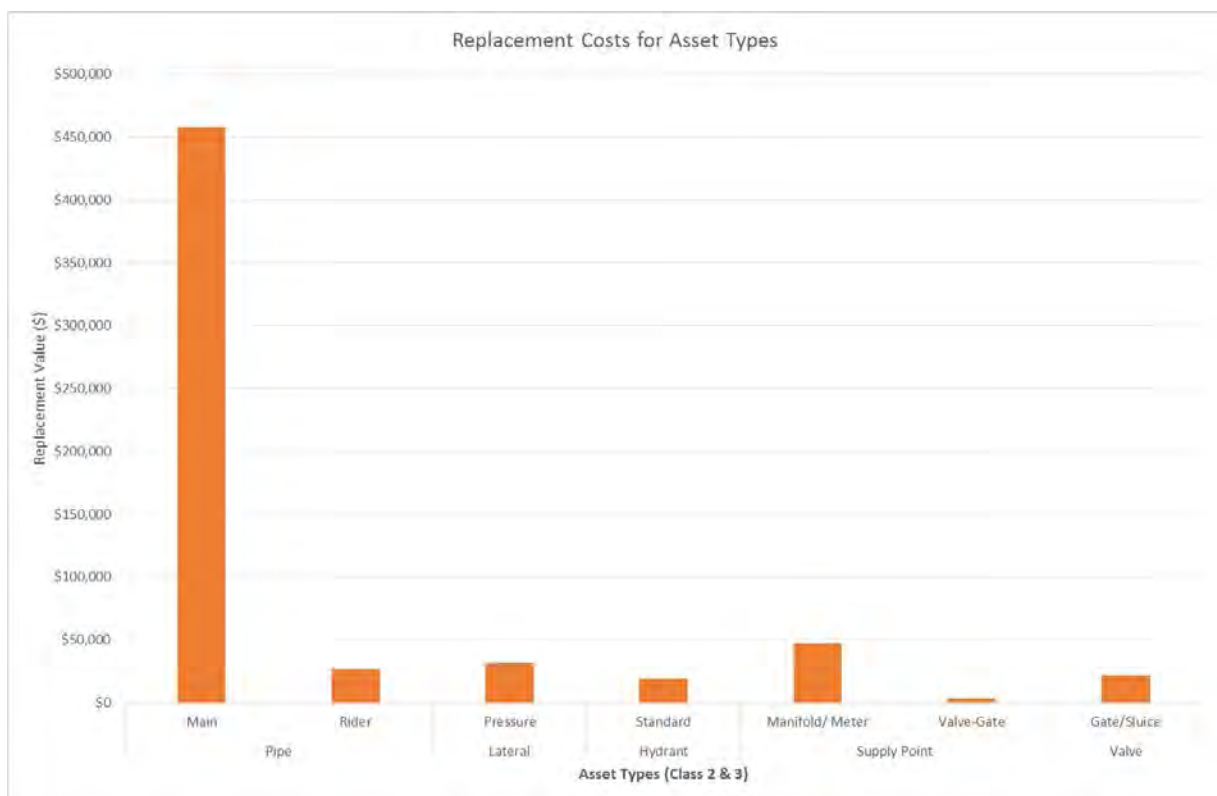


**Figure 7-7 Replacement Costs for Edendale**

## 7.12 Renewals

The renewal profile has been taken from the 2017 5 Waters Valuation. A graph showing the renewals for this scheme are shown by Figure 7-8 below. The majority of renewals occur in 2022/2023 and 2038/2039.

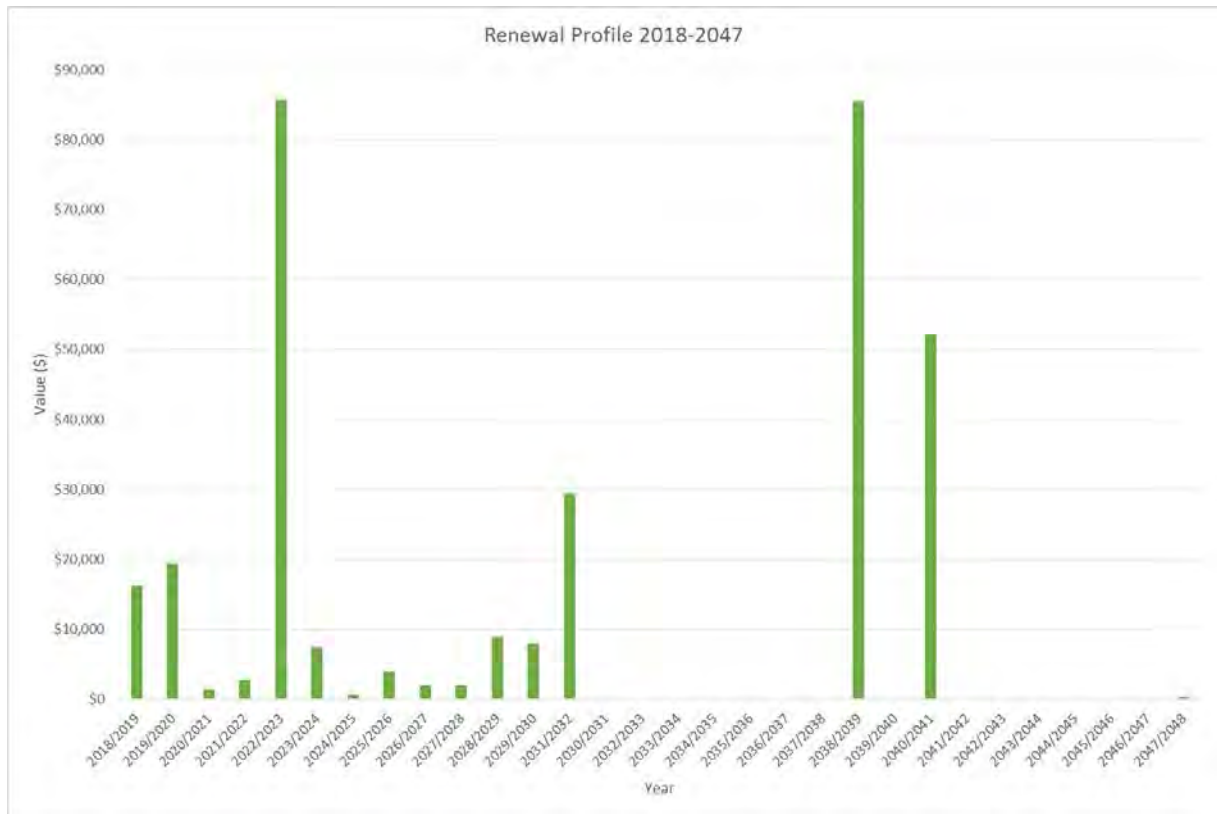


**Figure 7-8 Edendale Water Renewal Profile**

## 7.13 Critical Assets

The criticality model for Edendale has been updated for the 2018 AcMP. The methodology of the criticality model can be found in 5Waters Activity Management Plan: Volume 1 and it provides details of how the criticality has been calculated for the reticulation assets. Table 6-8 and Figure 7-9 below shows the calculated criticality for all of the assets within this scheme that have a recorded known length.

**Table 7-8 Length of Assets per Criticality Level**

| Criticality Bands |             | Length (m) |
|-------------------|-------------|------------|
| 5                 | Low         | 1,838      |
| 4                 | Medium-Low  | 2,366      |
| 3                 | Medium      | 1,113      |
| 2                 | Medium-High | 0          |
| 1                 | High        | 0          |

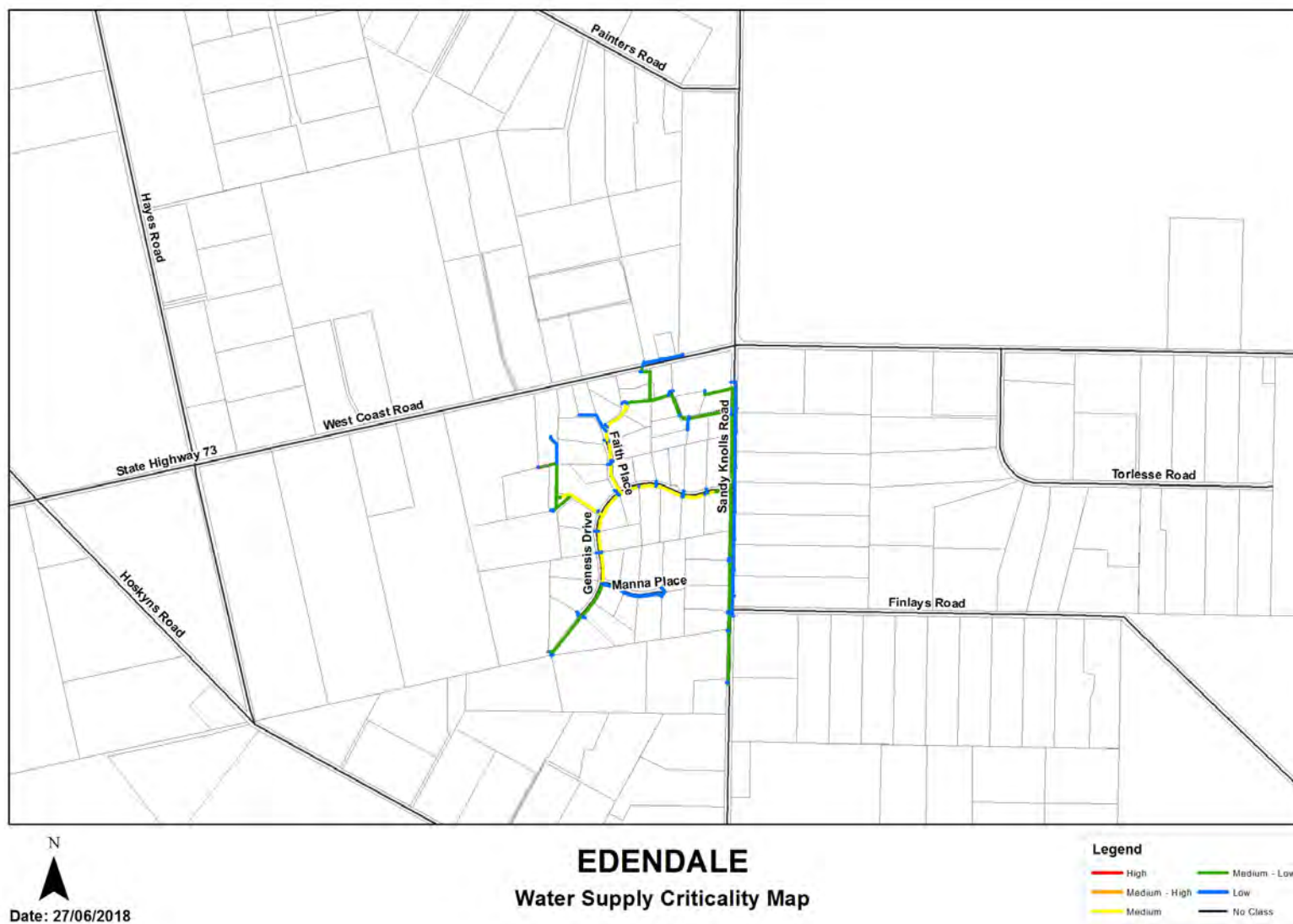


Figure 7-9 Criticality Map



## 7.14 Asset Condition

The asset condition model was run for Edendale in 2017. The methodology of the model can be found in 5Waters Activity Management Plan: Volume 1 which provides details of how the model has been calculated for the pipe reticulation assets. Figure 7-10 below shows the level of asset condition for these assets within this scheme that have a recorded known condition.

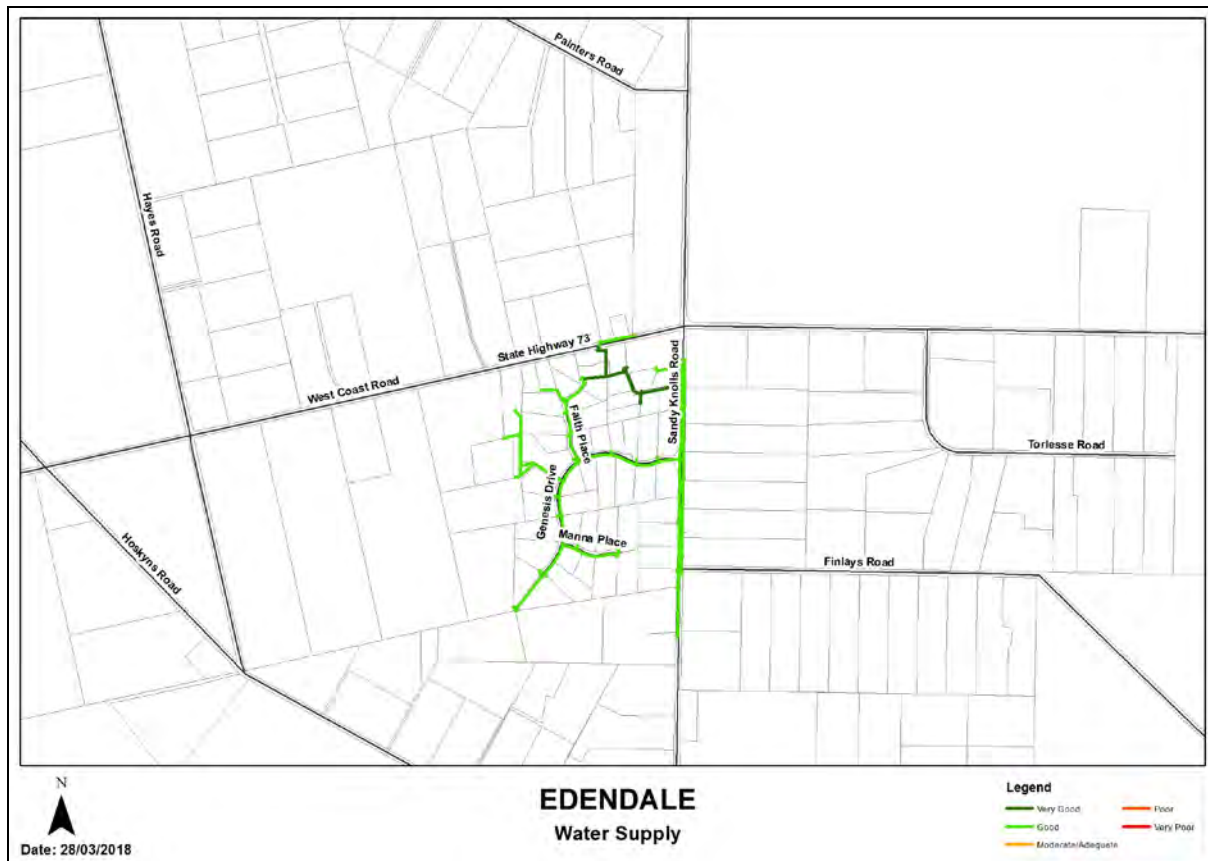


**Figure 7-10 Asset Condition – Edendale**

Table 7-9 provides a description of the condition rating used within the condition model.

**Table 7-9 Asset Condition Grading**

| Condition Rating | Grading   |
|------------------|-----------|
| 1.0              | Excellent |
| 2.0              | Good      |
| 3.0              | Moderate  |
| 4.0              | Poor      |
| 5.0+             | Fail      |

The number of pipe faults is also measured through the asset management system. Figure 7-11 shows the known historic pipe failures within this scheme.

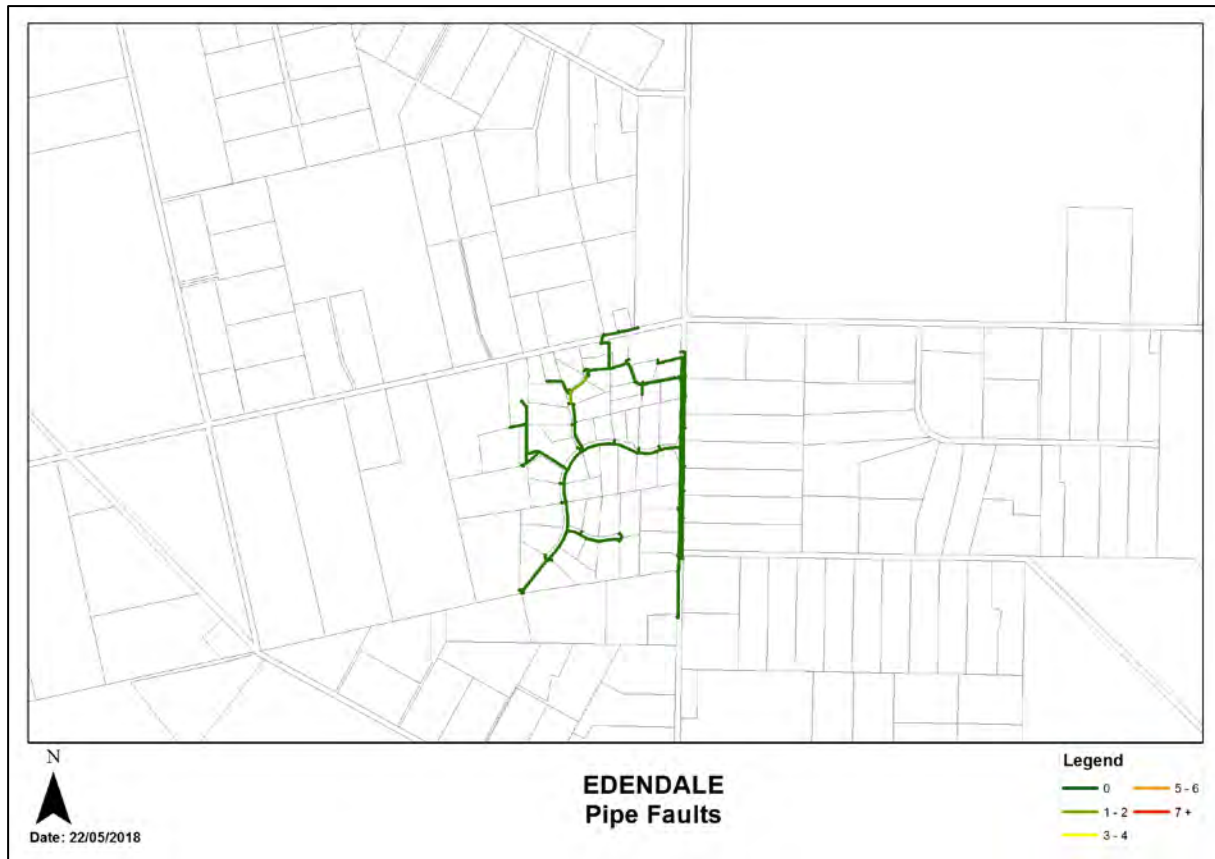


**Figure 7-11 Pipe Faults, Edendale**

### 7.15 Funding Program

The 10 year budgets for Edendale are shown by Table 7-10 and Figure 7-12. Budgets are split into expenditure, renewals, projects and capital projects.

All figures are (\$) not adjusted for CPI “inflation”. They are calculated on historical data, and population growth where relevant.

**Table 7-10 Edendale Budget Summary**

| Years     | Expenditure | Renewals | Projects | Capital Projects |
|-----------|-------------|----------|----------|------------------|
| 2018/2019 | \$55,143    | \$16,236 |          |                  |
| 2019/2020 | \$63,243    | \$19,440 |          |                  |
| 2020/2021 | \$63,243    | \$1,407  |          | \$304,000        |
| 2021/2022 | \$63,243    | \$2,814  |          |                  |
| 2022/2023 | \$63,243    | \$85,684 |          |                  |
| 2023/2024 | \$63,243    | \$7,405  |          |                  |

|           |           |           |  |           |
|-----------|-----------|-----------|--|-----------|
| 2024/2025 | \$63,243  | \$704     |  |           |
| 2025/2026 | \$63,243  | \$3,951   |  |           |
| 2026/2027 | \$63,243  | \$2,111   |  |           |
| 2027/2028 | \$63,243  | \$2,111   |  |           |
| Total     | \$624,330 | \$141,862 |  | \$304,000 |

An explanation of the categories within the budgets are as follows below:

- Expenditure consists of operation and maintenance costs;
- Renewals are replacement of assets which are nearing or exceeded their useful life;
- Projects are investigations, decisions and planning activities which exclude capital works; and
- Capital projects are activities involving physical works.

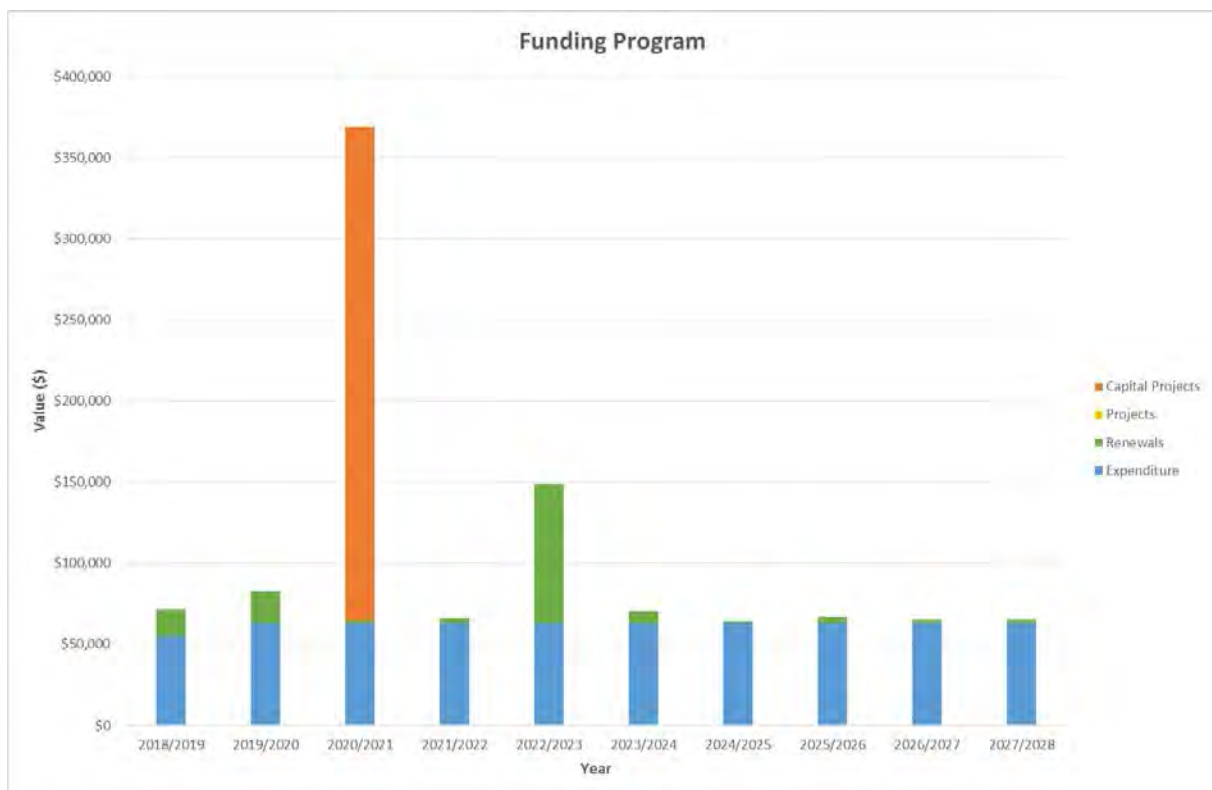


**Figure 7-12 Edendale Funding Summary**

There is one project for Edendale water scheme in the LTP budget.

**Table 7-11 Key Projects**

| Account Label    | GL        | Description    | Year 1 (\$) | Year 2 (\$) | Year 3 (\$) | Years 4 to 10 | Funding Split <sup>5</sup> |
|------------------|-----------|----------------|-------------|-------------|-------------|---------------|----------------------------|
| Capital Projects | 402290045 | install filter |             |             | \$304,000   |               | 100% LoS                   |

The list of district wide projects can be found in 5Waters Activity Management Plan: Volume 1.

### Discussion on Projects

Projects have been determined based on their:

- Relevance to the scheme
- Requirement to be completed under legislation
- Ability to bring the scheme up to or maintain the Level of Service required under council's Asset Management Policy.

Many projects are **jointly** funded by more than one scheme and activity. Each scheme pays a pro-rata share only, equivalent to the number of connections.

### Discussion on Capital and Projects

Where relevant, Capital (Levels of Service) and Capital (Growth) projects have been included in the scheme financial details.

Levels of Service Projects and growth splits have been provided to ensure the costs of population driven works are clear.

<sup>5</sup> Where LoS refers to Level of Service and G refers to Growth

## 8.0 HORORATA ACHERON WATER SUPPLY

### 8.1 Scheme Summary

| Description                                   |                                   | Quantity                                                                         |                                           |
|-----------------------------------------------|-----------------------------------|----------------------------------------------------------------------------------|-------------------------------------------|
| <b>Estimated Population Served</b>            |                                   | 966                                                                              |                                           |
| <b>Scheme Coverage</b><br>(1 Jan 2018)        | Full Charges                      | 76                                                                               | Total units sold 2,363m <sup>3</sup> /day |
|                                               | Half Charges                      | 0                                                                                | Acheron 705 m <sup>3</sup> /day           |
|                                               | >1 Charges                        | 269                                                                              | Glentunnel 1,658m <sup>3</sup> /day       |
| <b>System Components</b>                      | Bores/Intakes (No.)               | 2 Intakes (Glentunnel and Acheron)                                               |                                           |
|                                               | Treatment/Disinfection            | UV and Gas Chlorination at Glentunnel and Gas Chlorination at Acheron            |                                           |
|                                               | Reservoirs (No.)                  | Reservoir sites (2 Aitkens, 1 Harper Hills, 2 Acheron) + 3 Brake pressure tanks. |                                           |
|                                               | Pump Stations (No.)               | 1 Pump station                                                                   |                                           |
|                                               | Piped (m)                         |                                                                                  |                                           |
| <b>History</b>                                | Original scheme installation date | 1982                                                                             |                                           |
| <b>Value (\$)</b>                             | Replacement Cost                  | \$16,843,795.98                                                                  |                                           |
|                                               | Depreciated Replacement Cost      | \$11,006,047.49                                                                  |                                           |
| <b>Financial</b>                              | 2018/2019 Estimate                | \$258,215                                                                        |                                           |
|                                               | Annual maintenance cost           | 8.06%                                                                            |                                           |
|                                               | % of total                        |                                                                                  |                                           |
| <b>Demand</b><br>(1 Jan – 31 Dec 2017)        | Average daily                     |                                                                                  |                                           |
|                                               | Peak daily                        |                                                                                  |                                           |
|                                               | Minimum daily                     |                                                                                  |                                           |
|                                               | Average daily per connection      |                                                                                  |                                           |
| <b>Type of Supply</b>                         |                                   | Restricted                                                                       |                                           |
| <b>Target Pressure &amp; Flow at boundary</b> | Pressure                          | >150 kPa                                                                         |                                           |
|                                               | Flow                              | ±10% maric size                                                                  |                                           |
| <b>Sustainability</b>                         | Well Security                     | Unsecure                                                                         |                                           |

### 8.2 Key Issues

The following key issues are associated with the Hororata-Acheron water supply. A list of district wide issues are located in 5Waters Activity Management Plan: Volume 1.

**Table 8-1 Hororata-Acheron Scheme Issues**

| What's the Problem                                                                                                                                                                                                                          | What we plan to do                                                                                                                                                                                                                              |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Changing land use will increase and decrease demand depending on type of farming and location. The introduction of resort type accommodation will drive network water quality improvements, unless point of use treatment devices are used. | Council will monitor this and the impact of the Central Plains water scheme on dwelling and stockwater requirements. The impacts and trends will drive capital works. Council will provide upgrades where required to agreed levels of service. |
| Ensuring scheme capacity is not over allocated.                                                                                                                                                                                             | Council will ensure this supply is not over allocated which results in a decreased in level of service.                                                                                                                                         |
| Complying with the amendments to Health Act requirements that will require additional treatment of water at both intakes and compliance of DWSNZ.                                                                                           | Council will upgrade the water supplies to meet the DWSNZ.                                                                                                                                                                                      |
| Easement/agreements to access reticulation lines necessary given changes in farm ownership and legislation.                                                                                                                                 | Council will pursue easements/agreements to ensure access to reticulation mains and headworks is available.                                                                                                                                     |

### 8.3 Overview & History

The Hororata-Acheron water supply (previously known as the Selwyn Rural Water Supply) provides Ultraviolet and chlorine treated surface water to 23,482 hectares of rural properties.

The scheme is a restricted supply with a design of 65l/ha/day for stock use and 2m<sup>3</sup> for domestic use per 200 ha of a single title farm. There are two water sources within the scheme.

#### Hororata

The scheme was installed in 1982 to replace the unreliable Snowden and Glenroy Water Race Schemes which had been in operation for over 100 years.

The original scheme did not include the Harper Hills and Hororata township areas which were added after the main system was commissioned.

There have been some minor extensions to serve small blocks on the outskirts of the original scheme boundary along with a major extension in 1999 to serve the area from Hororata Township to the Selwyn River (covering the Selwyn water race area).

A shallow well adjacent to the Selwyn River at Glentunnel supplies Hororata township and surrounding areas and Selwyn No. 2 areas UV treatment occurs at the headworks along with continual chlorination. Note that although the water source is close to Glentunnel, the Glentunnel township water is supplied from the Malvern Hills RWS – Hartleys intake.

#### Acheron

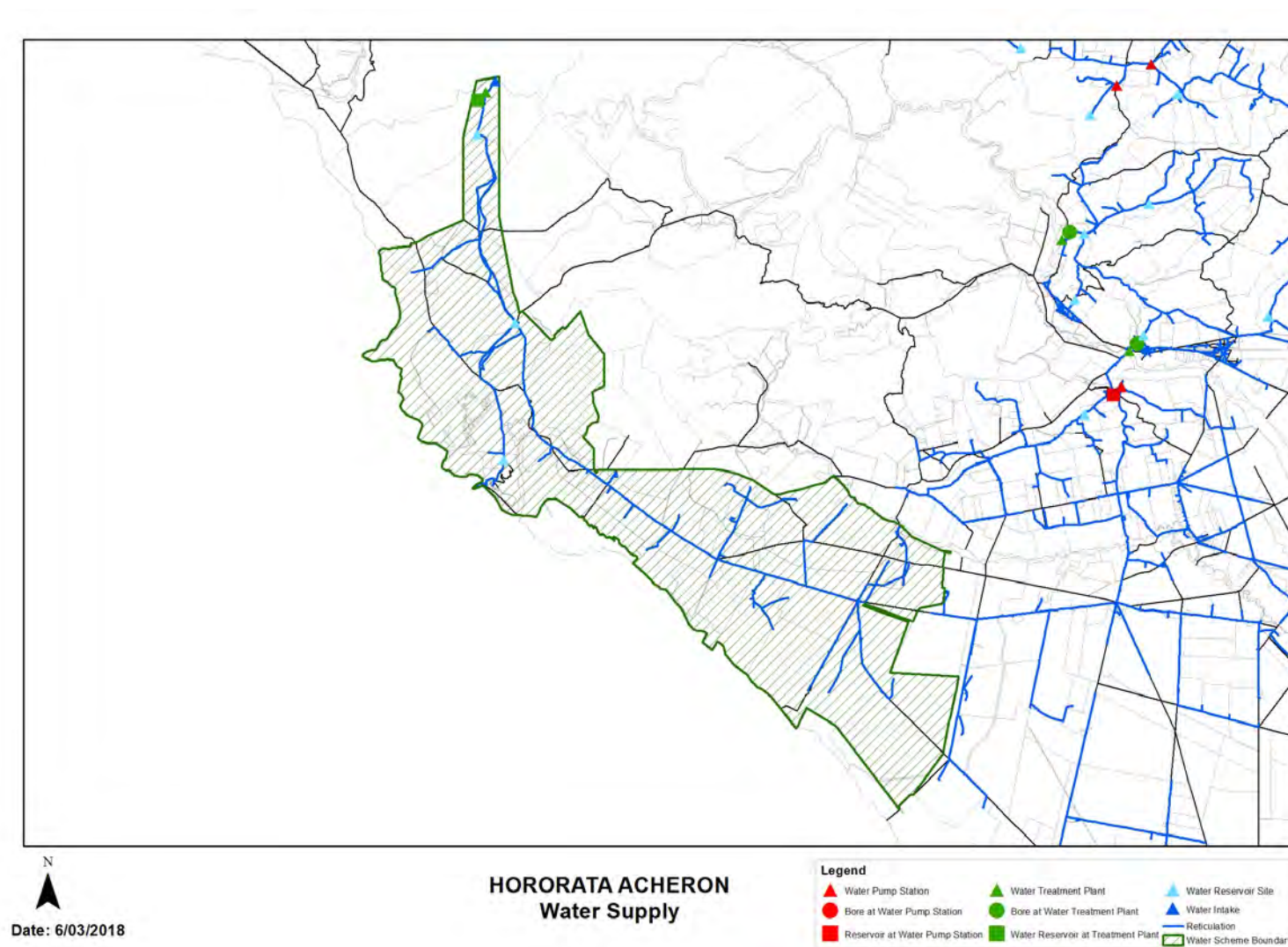
The second source is an intake on the Dry Acheron Stream. Treatment is restricted to chlorine dosing in the storage reservoir before being fed by gravity into the reticulation. Water from this source is supplied to the Terrace Downs High Country Resort, and Tui Creek resort.

The scheme was installed in 1982 to replace the unreliable Snowden and Glenroy Water Race Schemes which had been in operation for over 100 years.

The original scheme did not include Fighting Hills area which were added after the main system was commissioned. The Downs Road scheme was included in the 1990s.

A duplicate water main (100 mm diameter) was installed in the Acheron area in 2000 to serve the Terrace Downs High Country Resort and perceived additional demand.





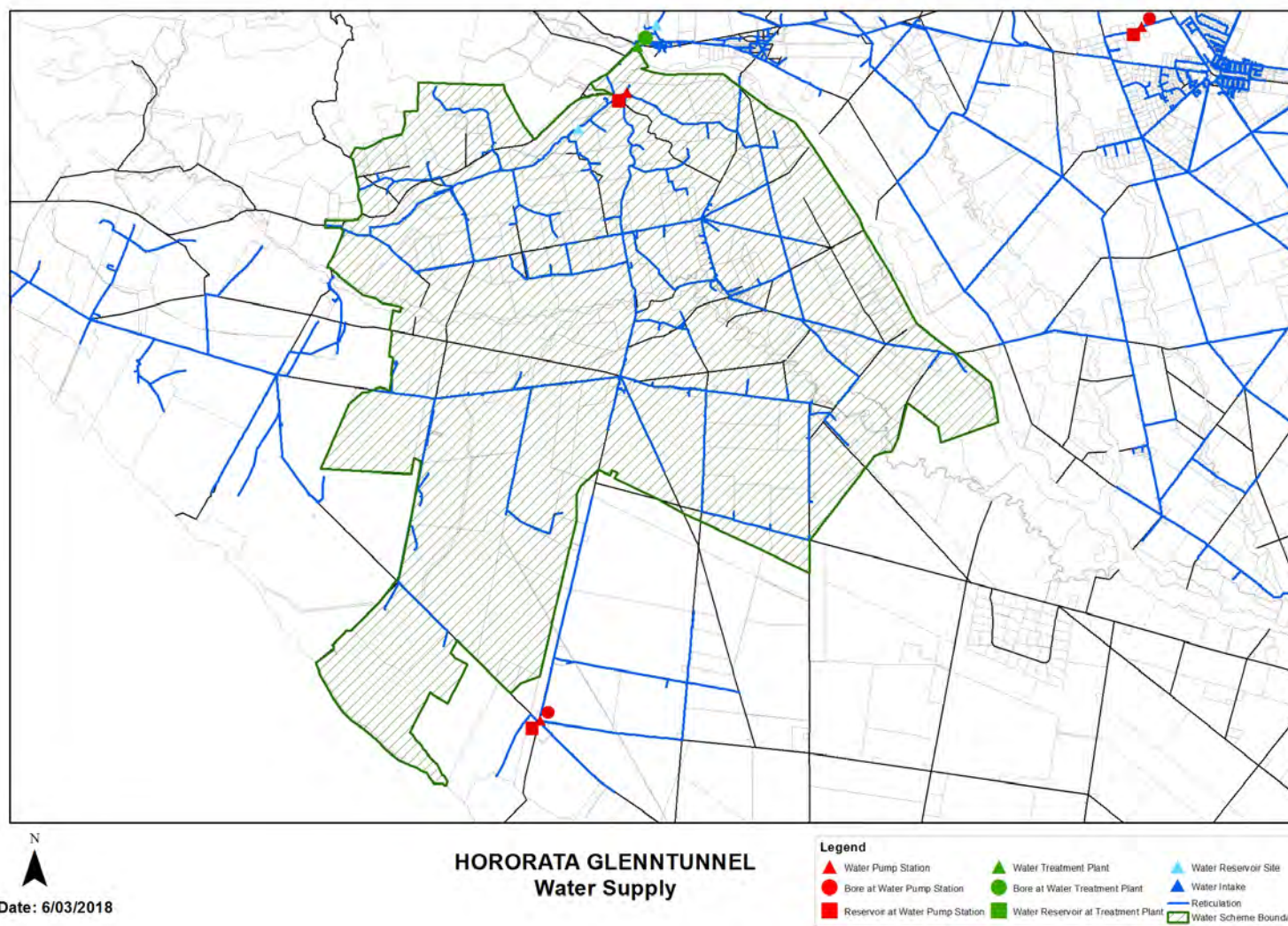


**Figure 8-1 Scheme Maps**





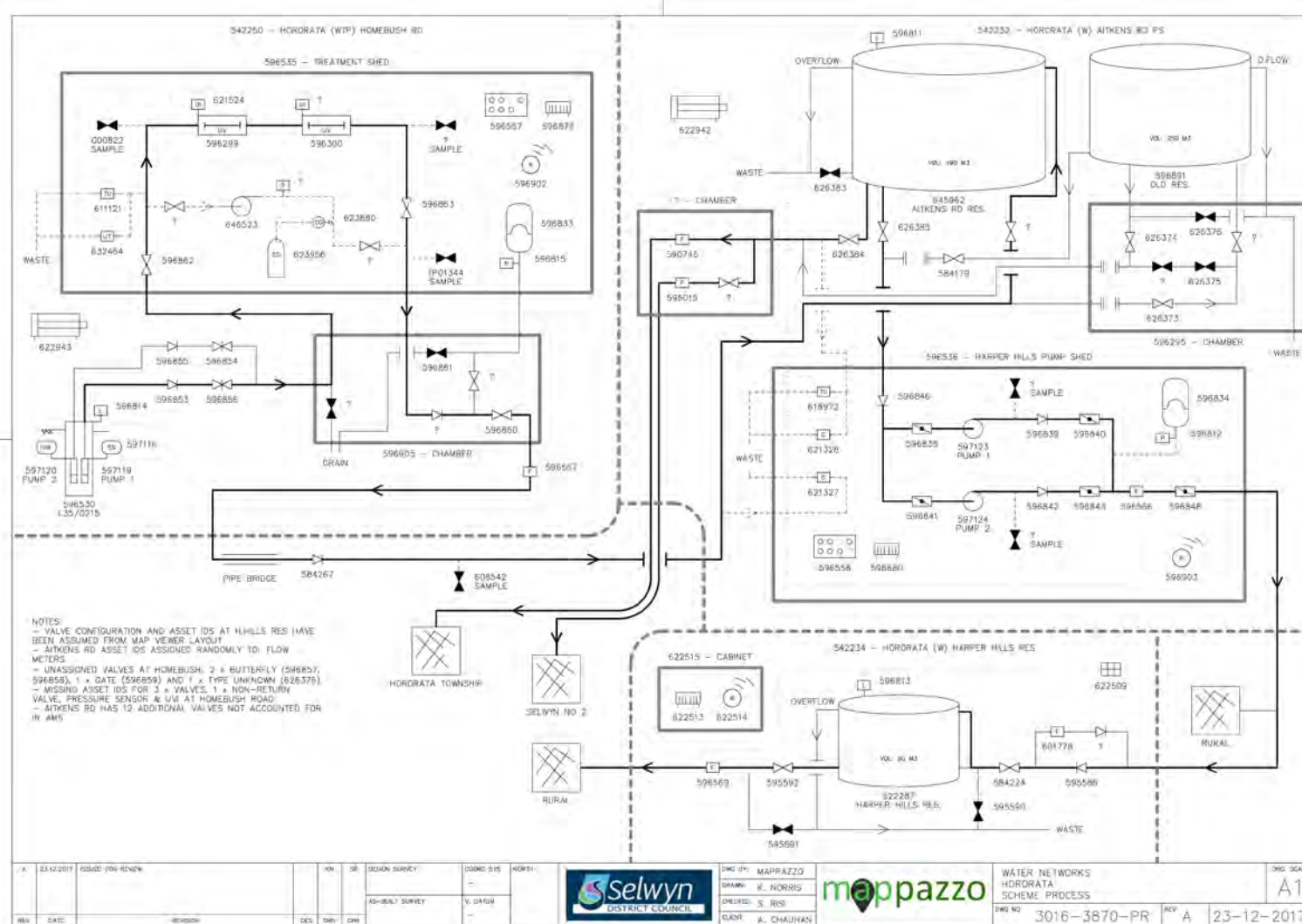


Figure 8-2 Scheme Schematic

## 8.4 System Capacity

### Acheron

The Rural Water Supply (RWS) provides water to about 100 connections across a large rural area. This is used for stock and other on-farm purposes, as well as for residential drinking water. The Terrace Downs High Country Resort and Tui Creek development also receive water from the RWS. Water is supplied to a tank at each point of supply via a flow restrictor that limits the daily volume to an agreed allocation. Peak day demand is approaching the consented abstraction limit capacity. There is some uncertainty regarding the two consents that needs to be resolved. Further investigation and analysis would be required to confirm the adequacy of source and distribution capacity if the scheme area were to be expanded.

**Table 8-2 Capacity Summary**

|                                                                                                  | Flow Rate<br>(L/s) | Daily Volume<br>(m <sup>3</sup> ) | Annual Volume<br>(m <sup>3</sup> ) | Comments               |
|--------------------------------------------------------------------------------------------------|--------------------|-----------------------------------|------------------------------------|------------------------|
| Abstraction Capacity                                                                             | 17**               |                                   |                                    | gravity                |
| Consented Take                                                                                   | 8.5<br>+3          | 734<br>+259*                      | -<br>-                             | CRC991054<br>CRC010173 |
| Peak Demand                                                                                      | 10.5***            | 845****                           | 241,660*****                       |                        |
| * inferred value<br>** Aug 2009 (TBC)<br>*** Feb 2014<br>**** 21 Nov 2014 (recent)<br>***** 2014 |                    |                                   |                                    |                        |

### Hororata

The Rural Water Supply (RWS) provides water to about 250 connections across a large rural area. This is used for stock and other on-farm purposes, as well as for residential drinking water. The town of Hororata receives water from the RWS. Water is supplied to a tank at each point of supply via a flow restrictor that limits the daily volume to an agreed allocation. Peak day demand is at the consented abstraction limit capacity. Further investigation and analysis would be required to confirm the adequacy of source and distribution capacity, and the consented take would require amendment if the scheme area were to be expanded.

|                      | Flow Rate<br>(L/s) | Daily Volume<br>(m <sup>3</sup> ) | Annual Volume<br>(m <sup>3</sup> ) | Comments        |
|----------------------|--------------------|-----------------------------------|------------------------------------|-----------------|
| Abstraction Capacity | 28.3               | 2445                              |                                    | Exceeds consent |
| Consented Take       | 16.8               | 1450                              | 400,000                            | CRC970985.1     |
| Peak Demand          | 15.6*              | 1351                              | 404,906                            |                 |
| * 2017               |                    |                                   |                                    |                 |

## 8.5 Resource Consents

The Hororata-Acheron water supply has a number of resource consents. Table 8-3 shows the water take permitted by the resource consents for this scheme.

**Table 8-3 Resource Consents**

| Consent                        | Description                                                                                                                                     | Location                                 | Date Issued | Expiry Date | Consented Max Instantaneous Flow (L/s) | Consented Max Daily Volume (m <sup>3</sup> /day) |
|--------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|-------------|-------------|----------------------------------------|--------------------------------------------------|
| CRC970985.1<br>(Issued-Active) | To take groundwater at or about map reference L35:232-468 for the purpose of providing domestic and stockwater from a piped rural water supply. | Cnr Wairiri & Homebush Roads, GLENTUNNEL | 12-Feb-10   | 11-Dec-31   | 16.8                                   | 1450                                             |
| CRC991054<br>(Issued-Active)   | To take surface water, at or about map reference NZMS 260 K35:020-557 for the Selwyn Rural Water Supply Scheme.                                 | Dry Acheron, Collieridge Road, RAKAIA    | 12-Aug-99   | 9-Feb-34    | 8.5                                    | 734                                              |
| CRC010173<br>(Issued-Active)   | To take and use surface water.                                                                                                                  | Dry Acheron, Collieridge Road, RAKAIA    | 4-Dec-00    | 30-Nov-35   | 3                                      |                                                  |

## 8.6 Water Quality

The Hororata-Acheron water supply consists of two sites (Acheron and Glentunnel/Hororata) which are non-secure.

The following details E. coli transgressions for the period 2012 to 2017.

### Source

There have been 127 E. coli source transgressions during this period in the Acheron Supply.

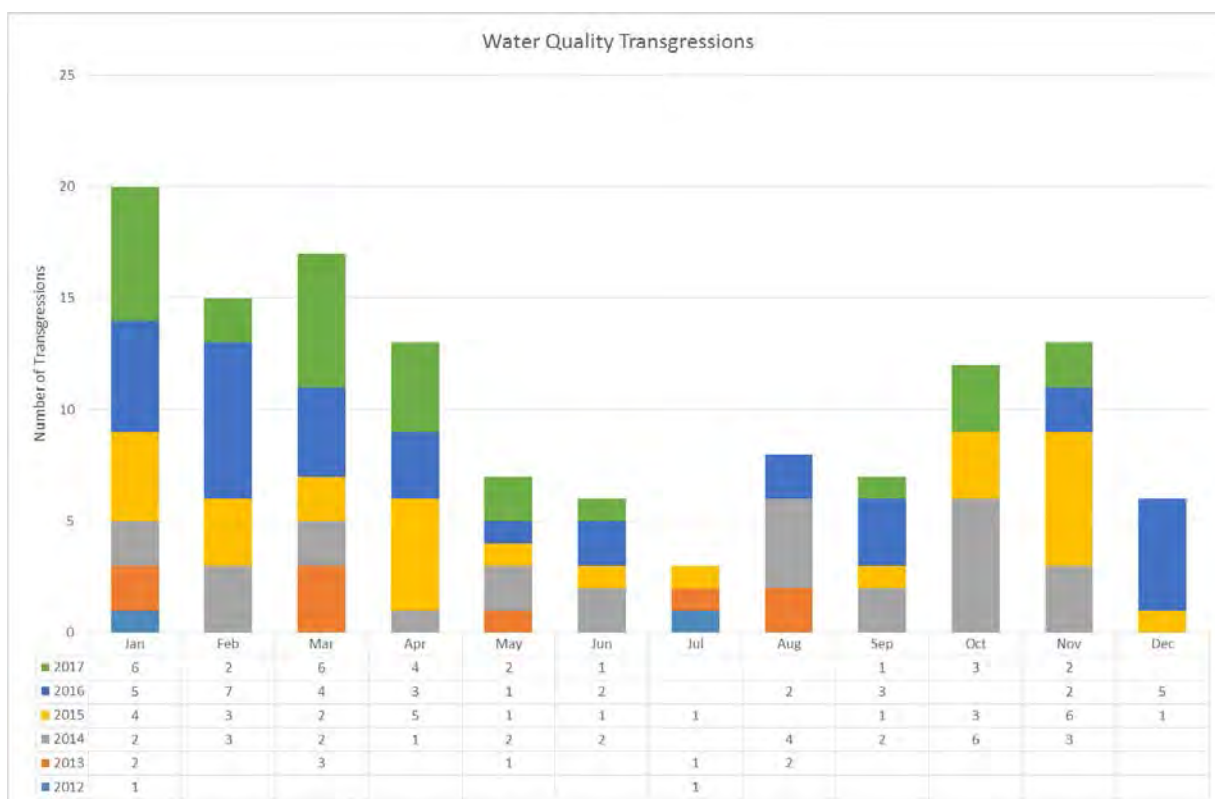


**Figure 8-3 E.coli Transgressions – Source Acheron**

There have been 282 E. coli source transgressions during this period in the Hororata Supply.

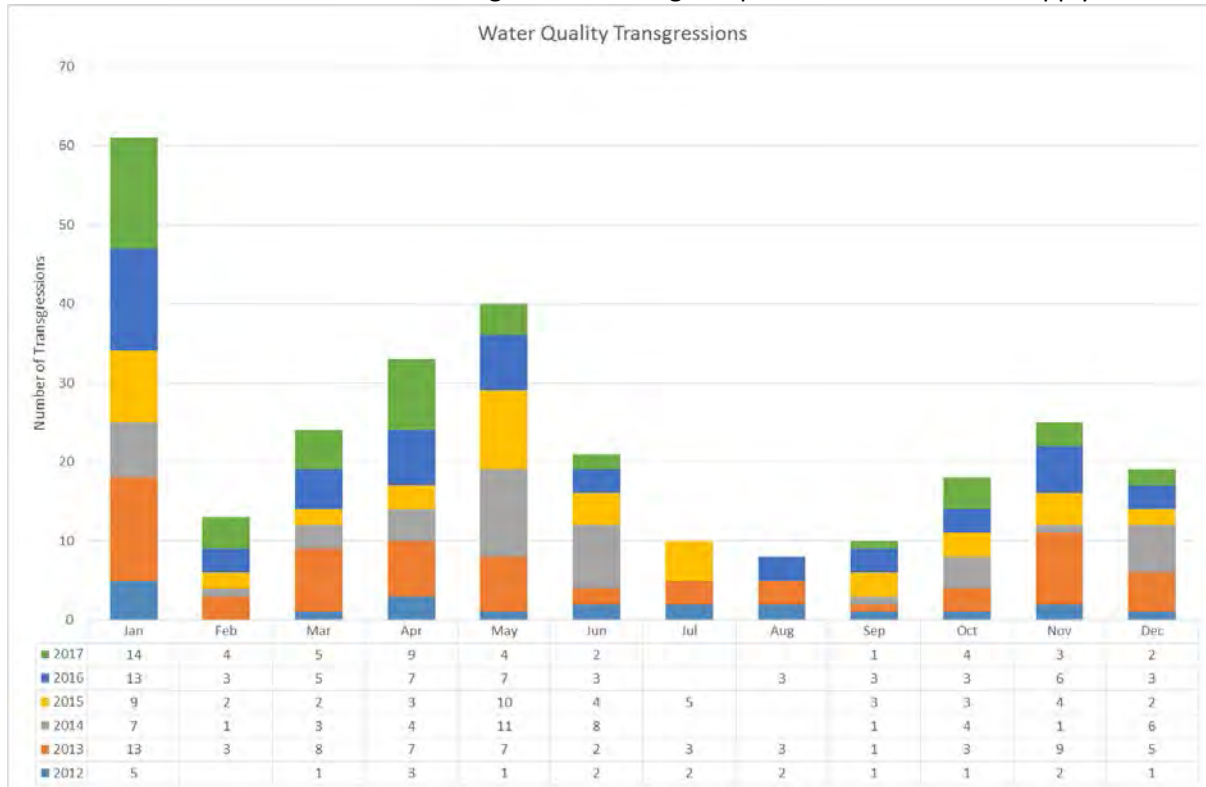


**Figure 8-4 E.coli Transgressions – Source Hororata**



## Treatment

There has been 1 E. coli treatment transgression during this period for Acheron which occurred in January 2017.

There have been 9 E. coli treatment transgressions during this period for Hororata.

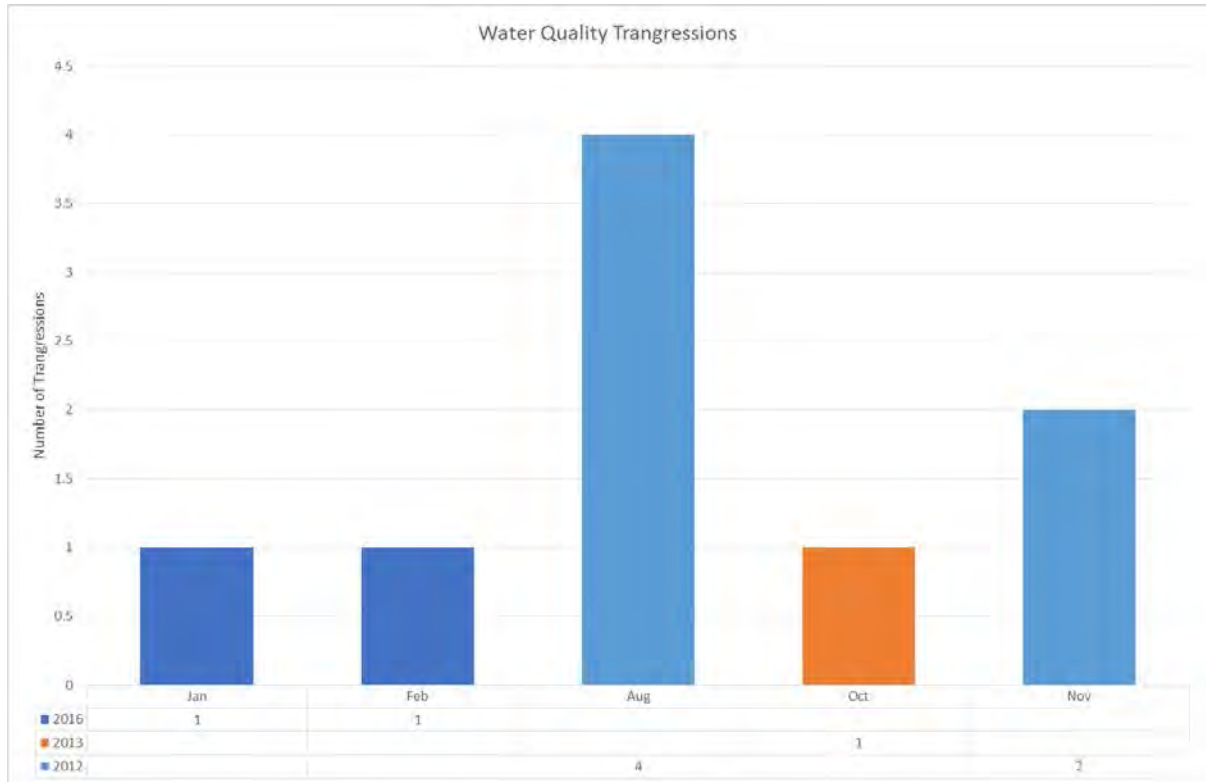


**Figure 8-5 E.coli Transgressions – Treatment Hororata**

## Zone

There have been 2 E. coli Zone transgressions during this period for the Acheron.

There have been 9 E. coli Zone transgressions during this period for Hororata.

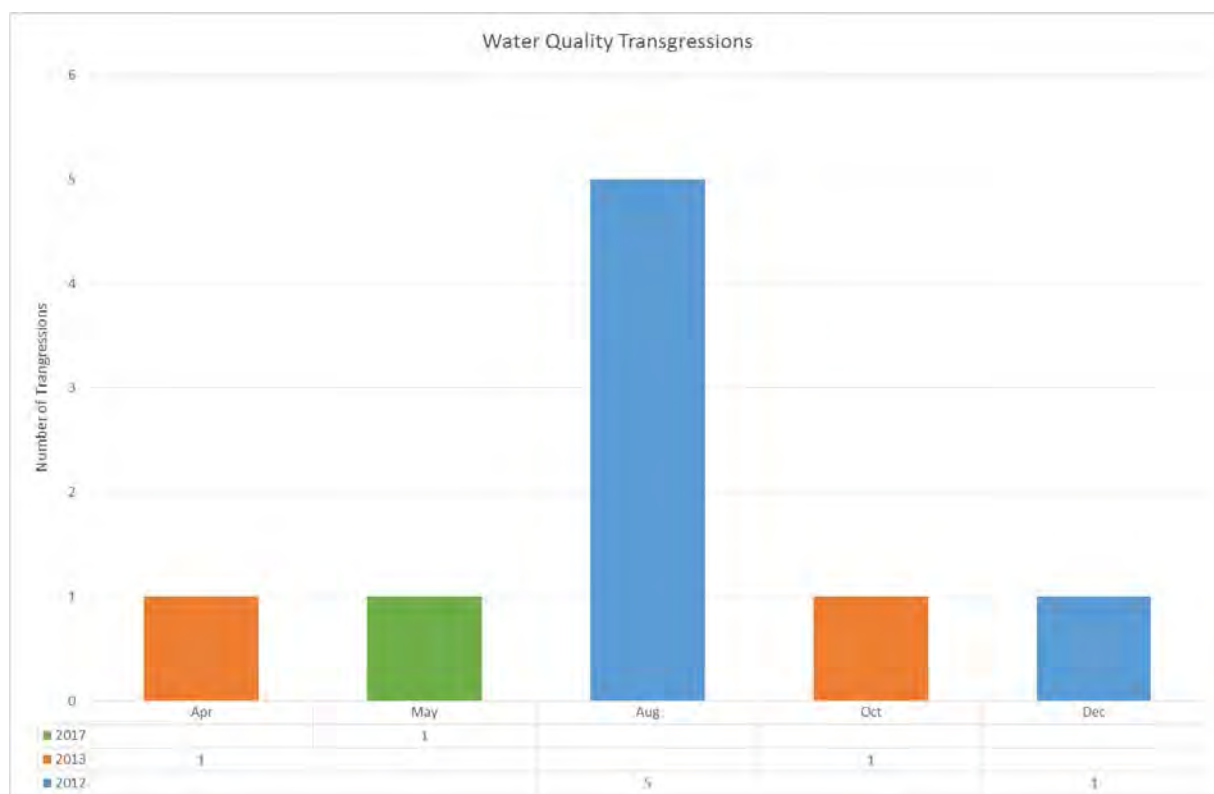


**Figure 8-6 E. coli Transgressions -Zone**

### Chemical Analysis

The following is a summary of the raw water chemical analysis carried out at the Selwyn Rural Water Supply.

**Table 8-4 Selwyn Rural Water Supply Raw Water Chemical Analysis Summary**

| Parameter                                   | Standards<br>MAV* (GV)** | Plant <sup>1</sup><br>2015 | Plant <sup>1</sup><br>2017 | Plant <sup>2</sup><br>2015 | Plant <sup>2</sup><br>2017 | Status |
|---------------------------------------------|--------------------------|----------------------------|----------------------------|----------------------------|----------------------------|--------|
| Total Lead (g/m3)                           | 0.01                     | <0.00011                   | < 0.00011                  | 0.00062                    | 0.000477                   | ✓      |
| pH (pH units)                               | 7-8.5                    | 7.7                        | 7.7                        | 7.6                        | 7.3                        | ✓      |
| Total Hardness (g/m3 as CaCO <sub>3</sub> ) | <200                     | 39                         | 36.5                       | 41                         | 41.0                       | ✓      |
| Total Calcium (g/m3)                        | n/v                      | 13.1                       | 12.40                      | 11.8                       | 12.06                      | ✓      |
| Total Iron (g/m3)                           | <0.2                     | <0.021                     | < 0.021                    | <0.021                     | < 0.021                    | ✓      |
| Total Sodium (g/m3)                         | <200                     | 2.3                        | 2.31                       | 5.2                        | 5.40                       | ✓      |
| Nitrate - Nitrogen (g/m3)                   | 11.3                     | 0.05                       | < 0.05                     | 0.15                       | 0.139                      | ✓      |

\* MAV – Maximum Acceptable Value

\*\* (GV) – Guideline Value

<sup>1</sup> Acheron

<sup>2</sup> Glentunnel/Hororata

## 8.7 Scheme Assets

A summary of material and diameter for pipes in Hororata-Acheron is shown below in Figure 8-7 and Figure 8-8.

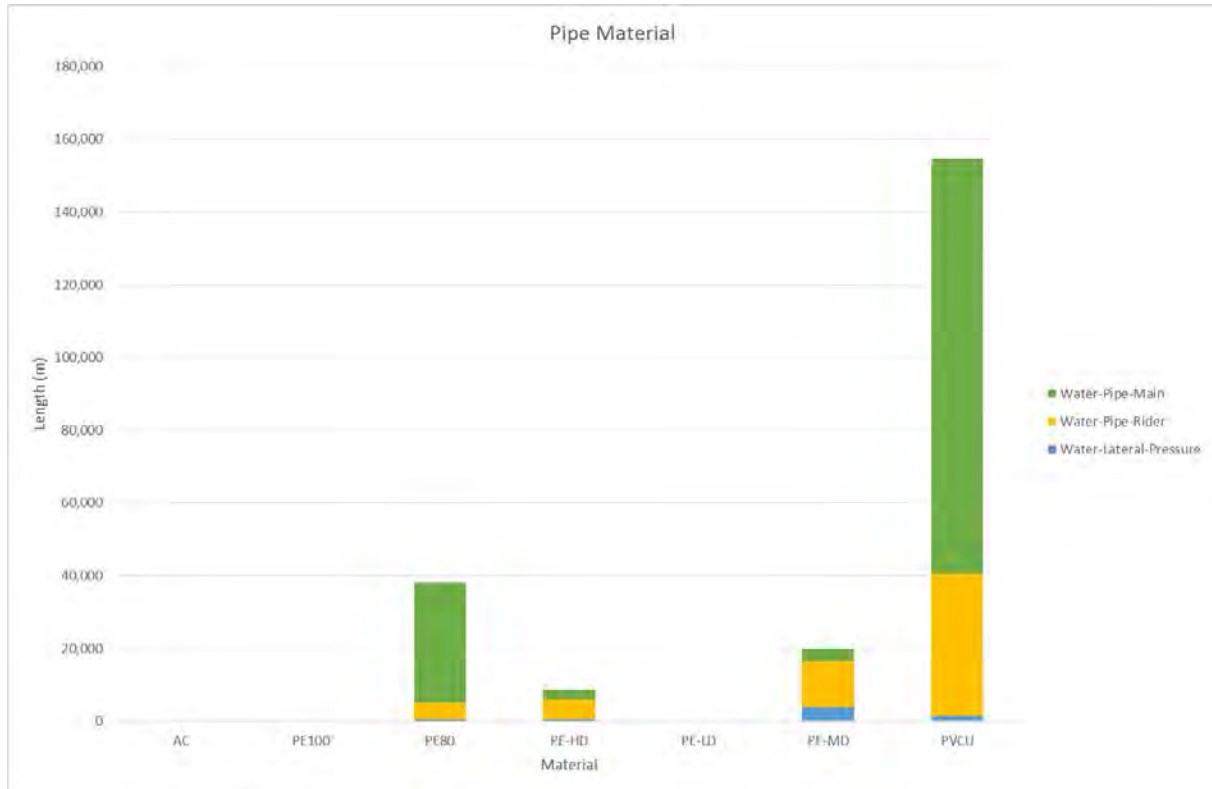


**Figure 8-7 Pipe Material – Hororata-Acheron**

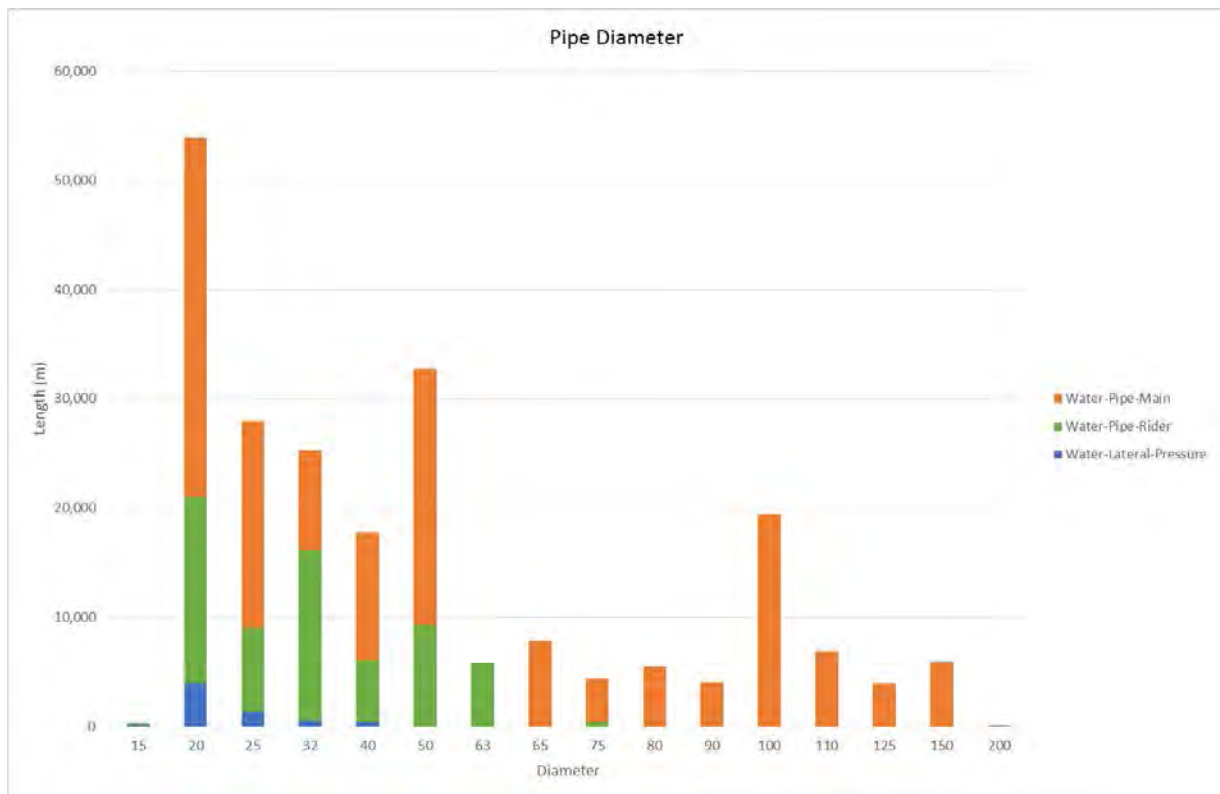


**Figure 8-8 Pipe Diameter – Hororata-Acheron**

## 8.8 Operational Management

The water supply is operated and maintained under two maintenance contracts as follows:

- Contract 1241: Water Services Contract. Contract is with SICON Ferguson who undertakes investigations, conditions inspections, proactive and reactive maintenance and minor asset renewals; and
- Contract 1202: Parks and Reserves Contract. Contract is with SICON Ferguson who undertakes the maintenance of land scape features related to water services e.g. mowing, gardens etc.

Water quality sampling is completed under an agreement with Food and Health Ltd as required.

## 8.9 Photos of Main Assets



**Photo 1: Dry Acheron weir and intake structure**



**Photo 2: Reservoirs and chlorination shed**



**Photo 3: Hororata Intake well**

## 8.10 Risk Assessment

A risk assessment has been undertaken for the Hororata-Acheron scheme. The key output from the risk assessment is the identification of any extreme and high risks which need to be mitigated. In order to mitigate these risks they have been included and budgeted for in the projects within this LTP. Table 8-5 outlines the risk priority rating, Table 8-6 outlines the risks and the list of key projects is found in Table 8-11.

**Table 8-5 Risk Priority Rating**

| Risk Score | Level of Risk | Risk Response                                                                                                                                         |
|------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| > 50       | Extreme       | Awareness of the event to be reported to Council.<br>Urgent action to eliminate / mitigate / manage the risk.<br>Document risk and action in the AMP. |
| 35-50      | Very High     | Risk to be eliminated / mitigated / managed through normal business planning processes with responsibility assigned.                                  |
| 14-35      | High          | Manage risk using routine procedures.                                                                                                                 |

|        |          |                                                                                                                                                                   |
|--------|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 3.5-14 | Moderate | Monitor the risk.                                                                                                                                                 |
| < 3.5  | Low      | Awareness of the event to be reported to Council.<br>Immediate action required to eliminate / mitigate / manage the risk.<br>Document risk and action in the AMP. |

**Table 8-6 Risks – Hororata-Acheron**

| Risk                                                  | Action/Project                        | Year Identified | 2014 Risk Rating | 2017 Risk Rating | Residual Risk Rating |
|-------------------------------------------------------|---------------------------------------|-----------------|------------------|------------------|----------------------|
| Lack information about the scheme regarding turbidity | Install a turbidity meter             | 2014            | 2                | 2                | 2                    |
| Ineffective treatment                                 | UV and filtration upgrade             | 2014            | 45               | 45               | 45                   |
| Insufficient storage capacity                         | Review storage capacity               | 2014            | 45               | 45               | 45                   |
| Electrical failure due to lightning or network spikes | Install surge diverters               | 2014            | 10               | 3.5              | 3.5                  |
| Failure to meet NES water meter standards             | NES Water Meter Compliance            | 2014            | 20               | 6                | 6                    |
| Non-consented activities                              | Renewal of consents                   | 2014            | 27               | 27               | 6                    |
| Chlorine freeze                                       | Solar upgrade and battery's at intake | 2017            |                  | 9                | 4                    |
| Protozoa compliance                                   | Install UV and filtration             | 2017            |                  | 45               | 6                    |
| Inadequate capacity into the future                   | storage                               | 2017            |                  | 27               | 6                    |

The list of district wide risks can be found in 5Waters Activity Management Plan: Volume 1.

## 8.11 Asset Valuation Details

The total replacement value of assets within the Hororata Acheron water scheme is \$16,843,796 with further details in Table 8-7 below.

**Table 8-7 Replacement Value, Hororata Acheron**

| Asset Class 1              | Asset Class 2 | Sum of Replacement Value |
|----------------------------|---------------|--------------------------|
| <b>Plant and Equipment</b> |               | \$1,863,623              |
| <b>Water Reticulation</b>  | Chamber       | \$969                    |
|                            | Hydrant       | \$10,553                 |
|                            | Lateral       | \$289,025                |
|                            | Pipe          | \$14,267,600             |

|  |              |           |
|--|--------------|-----------|
|  | Supply Point | \$300,029 |
|  | Valve        | \$111,996 |

Replacement values for these different types of assets are shown in Figure 8-9 below.

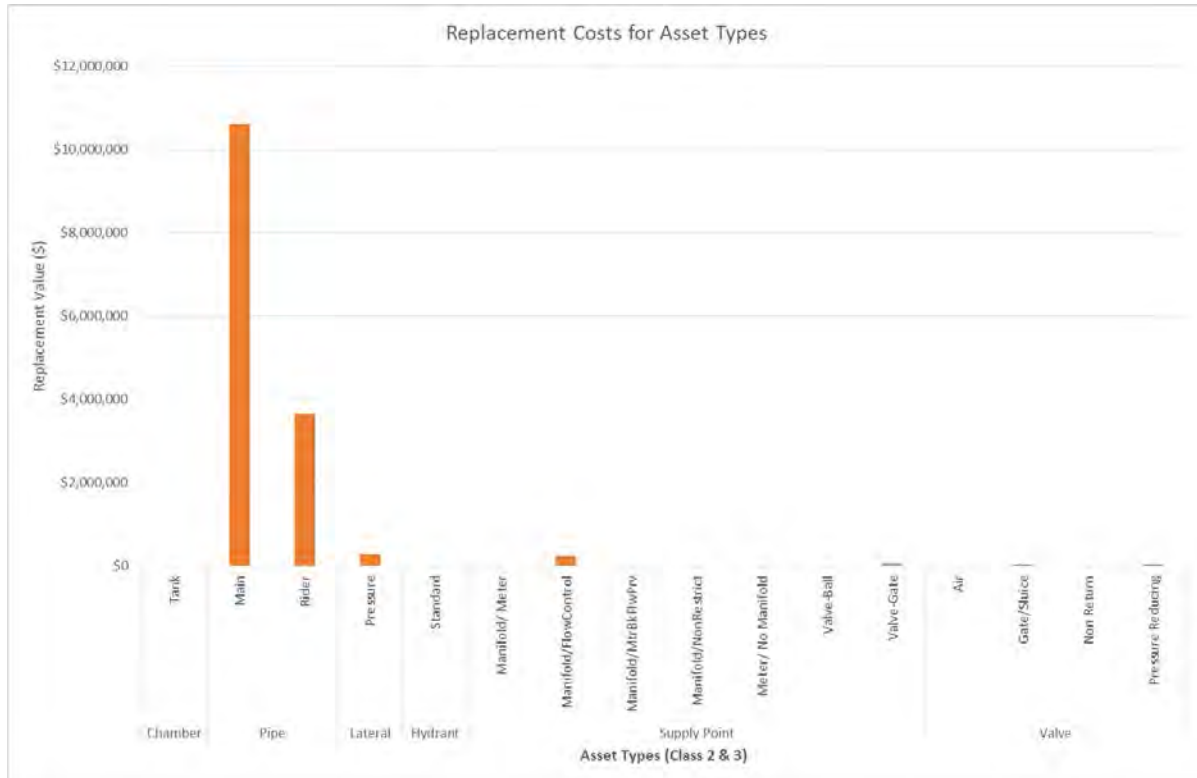


**Figure 8-9 Replacement Costs for Hororata Acheron**

## 8.12 Renewals

The renewal profile has been taken from the 2017 5 Waters Valuation. A graph showing the renewals for this scheme are shown by Figure 8-10 below. The majority renewals occur in 2022/2023.



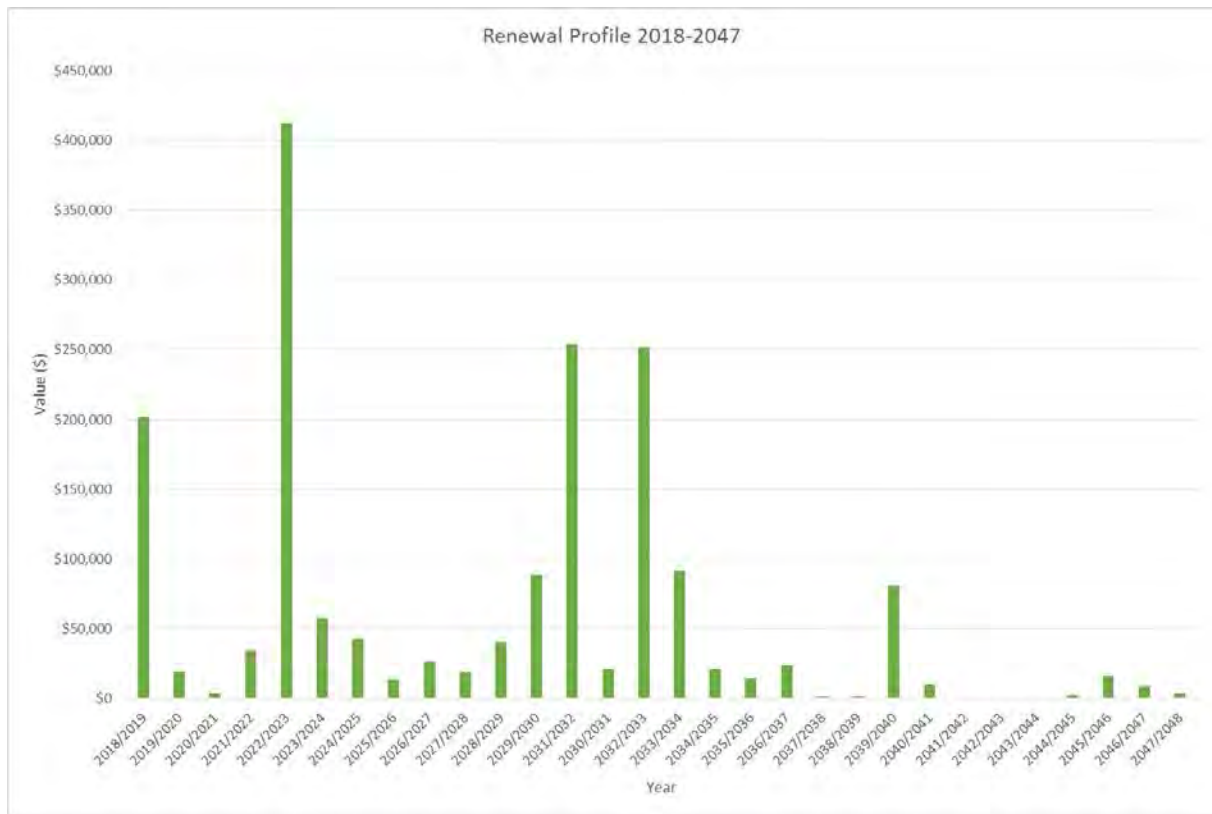


Figure 8-10 Hororata Acheron Water Renewal Profile

### 8.13 Critical Assets

The criticality model for Hororata-Acheron has been updated for the 2018 AcMP. The methodology of the criticality model can be found in 5Waters Activity Management Plan: Volume 1 and it provides details of how the criticality has been calculated for the reticulation assets. Table 8-8, Figure 8-11 and **Error! Reference source not found.** below shows the calculated criticality for all of the assets within this scheme that have a recorded known length.

Table 8-8 Length of Assets per Criticality Level

| Criticality Bands |             | Length (m) |
|-------------------|-------------|------------|
| 5                 | Low         | 170,207    |
| 4                 | Medium-Low  | 38,908     |
| 3                 | Medium      | 5,034      |
| 2                 | Medium-High | 9,661      |
| 1                 | High        | 0          |

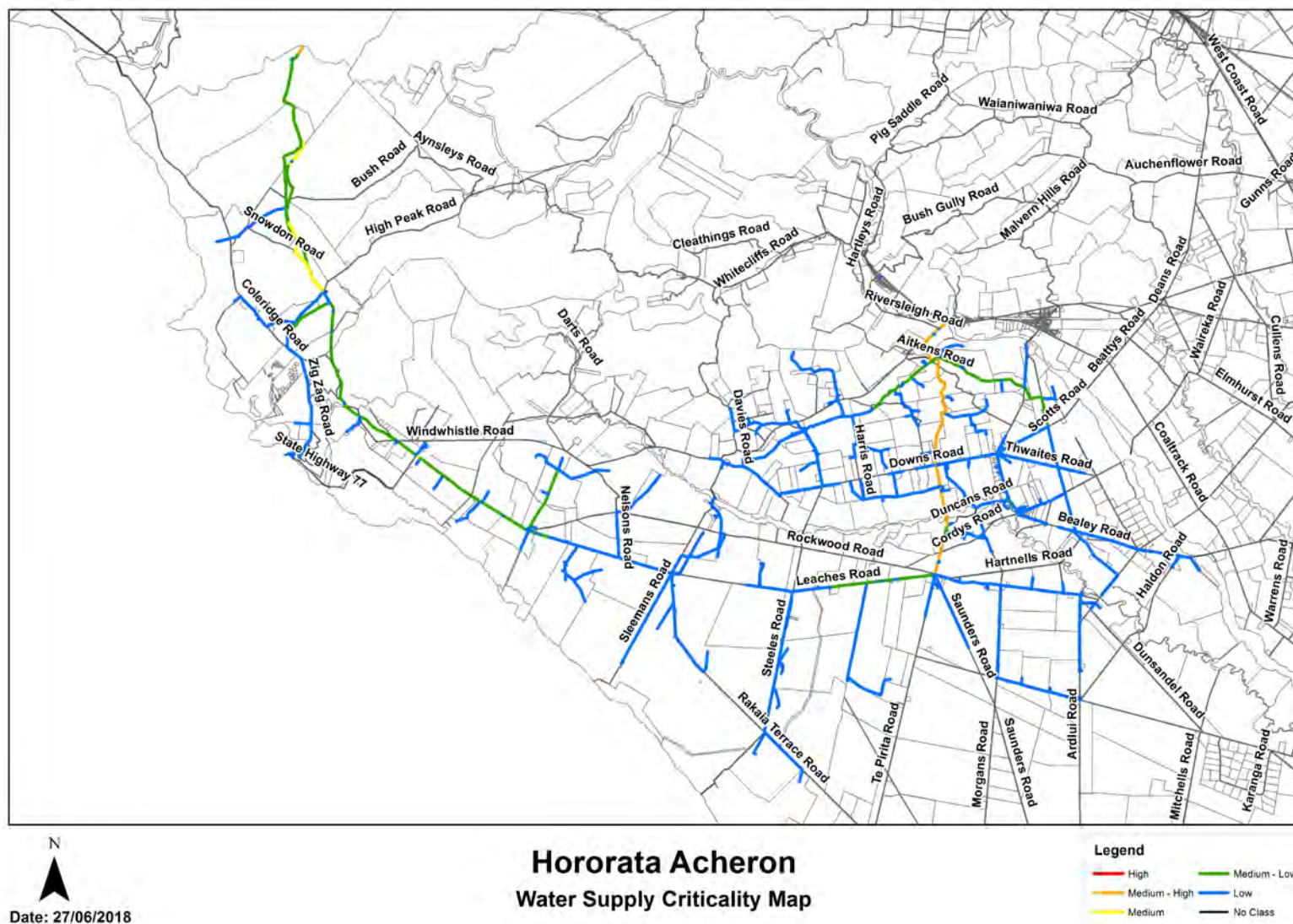


Figure 8-11 Criticality Map

## 8.14 Asset Condition

The asset condition model was run for the Hororata-Acheron in 2017. The methodology of the model can be found in 5Waters Activity Management Plan: Volume 1 which provides details of how the model has been calculated for the pipe reticulation assets. Figure 8-12 below shows the level of asset condition for these assets within this scheme that have a recorded known condition.

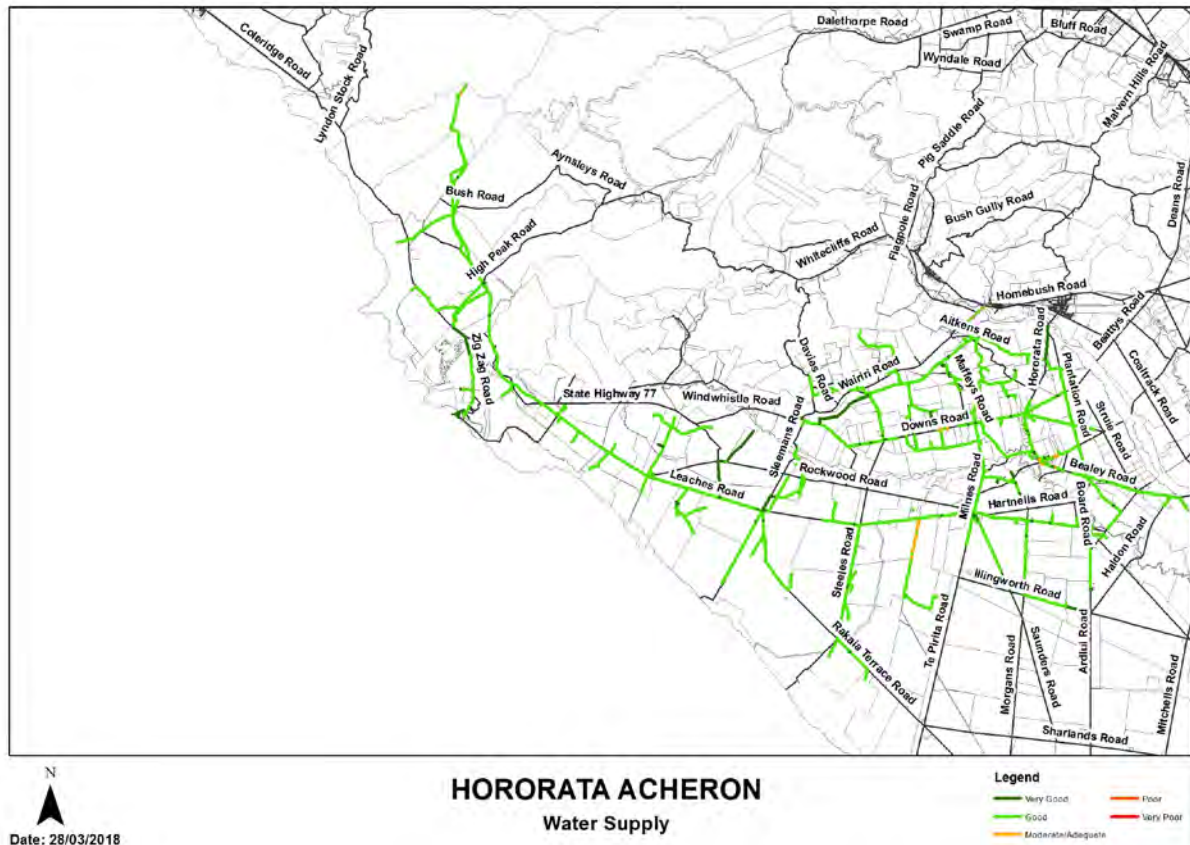


**Figure 8-12 Asset Condition – Hororata-Acheron**

Table 8-9 provides a description of the condition rating used within the condition model.

**Table 8-9 Asset Condition Grading**

| Condition Rating | Grading   |
|------------------|-----------|
| 1.0              | Excellent |
| 2.0              | Good      |
| 3.0              | Moderate  |
| 4.0              | Poor      |
| 5.0+             | Fail      |

The number of pipe faults is also measured through the asset management system. Figure 8-13 shows the known historic pipe failures within this scheme.

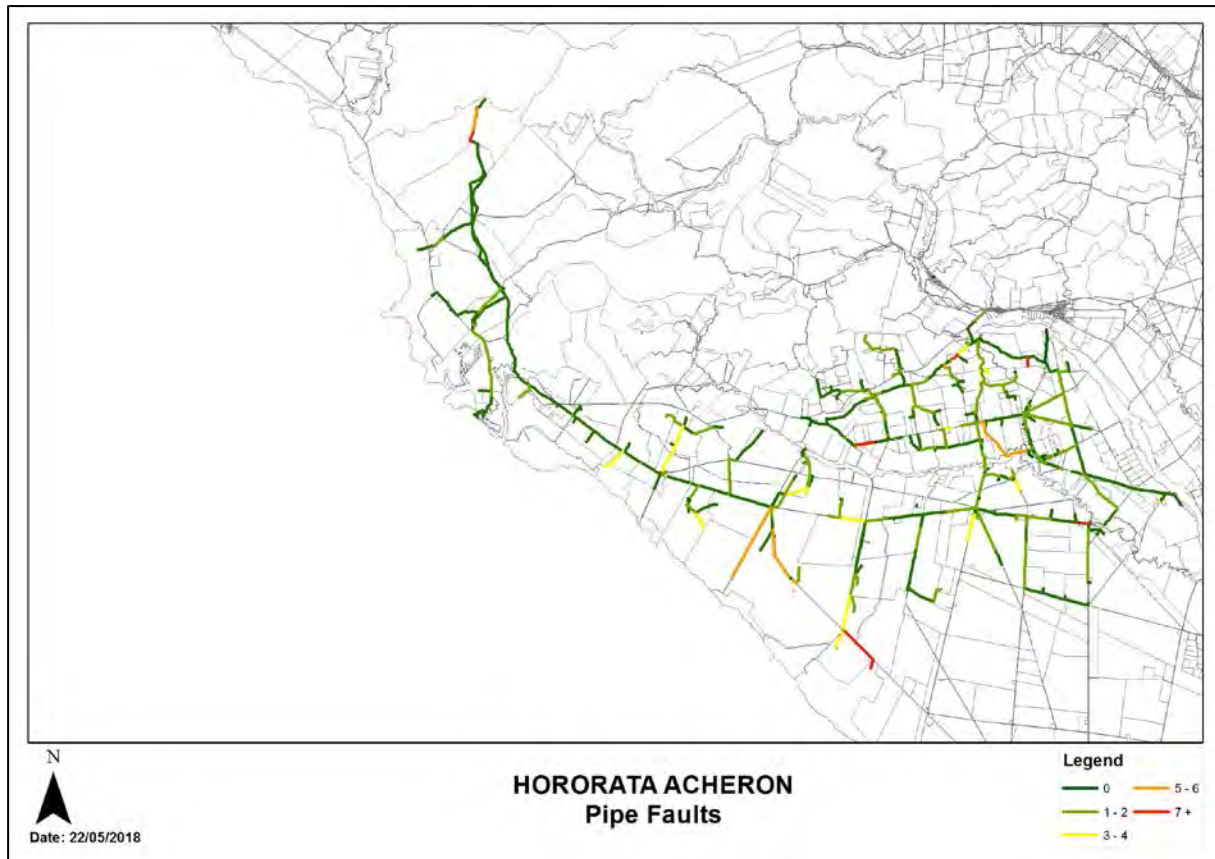


**Figure 8-13 Pipe Faults, Hororata Acheron**

### 8.15 Funding Program

The 10 year budgets for Hororata Acheron are shown by Table 8-10 and Figure 8-14. Budgets are split into expenditure, renewals, projects and capital projects.

All figures are (\$) not adjusted for CPI “inflation”. They are calculated on historical data, and population growth where relevant.

**Table 8-10 Hororata Acheron Budget Summary**

| Years     | Expenditure | Renewals  | Projects | Capital Projects |
|-----------|-------------|-----------|----------|------------------|
| 2018/2019 | \$258,215   | \$201,877 |          | \$275,001        |
| 2019/2020 | \$258,215   | \$19,683  |          | \$450,000        |
| 2020/2021 | \$258,215   | \$4,268   |          |                  |
| 2021/2022 | \$258,215   | \$34,905  |          |                  |
| 2022/2023 | \$258,215   | \$412,329 |          |                  |
| 2023/2024 | \$258,215   | \$57,851  |          |                  |



|           |             |           |  |           |
|-----------|-------------|-----------|--|-----------|
| 2024/2025 | \$258,215   | \$42,784  |  |           |
| 2025/2026 | \$258,215   | \$13,750  |  |           |
| 2026/2027 | \$258,215   | \$26,338  |  |           |
| 2027/2028 | \$258,215   | \$19,006  |  |           |
| Total     | \$2,582,150 | \$832,792 |  | \$725,001 |

An explanation of the categories within the budgets are as follows below:

- Expenditure consists of operation and maintenance costs;
- Renewals are replacement of assets which are nearing or exceeded their useful life;
- Projects are investigations, decisions and planning activities which exclude capital works; and
- Capital projects are activities involving physical works.

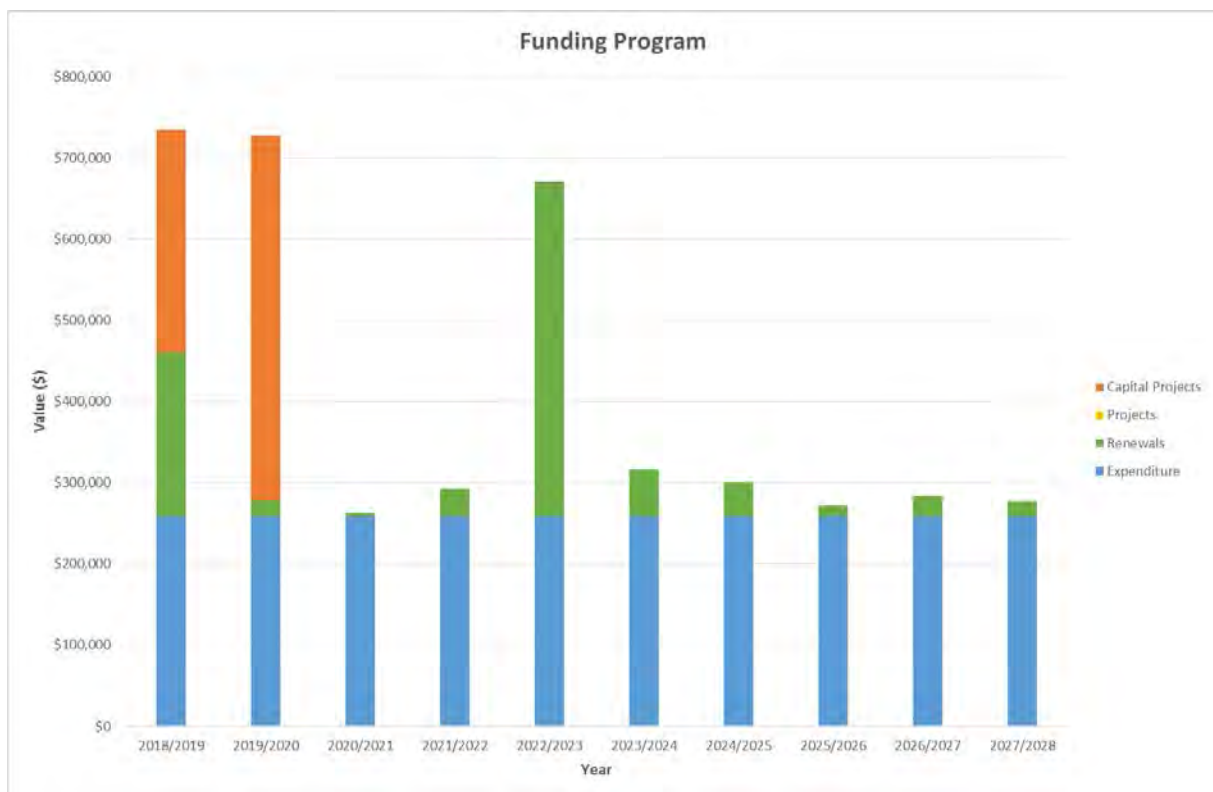


Figure 8-14 Hororata Acheron Funding Summary

There are three major projects for Hororata Acheron water scheme in the LTP budget.

**Table 8-11 Key Projects**

| Account Label    | GL         | Description                           | Year 1 (\$) | Year 2 (\$) | Year 3 (\$) | Years 4 to 10 | Funding Split <sup>6</sup> |
|------------------|------------|---------------------------------------|-------------|-------------|-------------|---------------|----------------------------|
| Capital Projects | 3870900996 | Solar upgrade and battery's at intake | \$25,000    |             |             |               | 100% LoS                   |
| Capital Projects | 3870900995 | storage                               |             | \$450,000   |             |               | 100% LoS                   |
| Capital Projects | 3870900997 | Install UV and filtration             | \$250,000   |             |             |               | 100% LoS                   |

The list of district wide projects can be found in 5Waters Activity Management Plan: Volume 1.

### Discussion on Projects

Projects have been determined based on their:

- Relevance to the scheme
- Requirement to be completed under legislation
- Ability to bring the scheme up to or maintain the Level of Service required under council's Asset Management Policy.

Many projects are **jointly** funded by more than one scheme and activity. Each scheme pays a pro-rata share only, equivalent to the number of connections.

### Discussion on Capital and Projects

Where relevant, Capital (Levels of Service) and Capital (Growth) projects have been included in the scheme financial details.

Levels of Service Projects and growth splits have been provided to ensure the costs of population driven works are clear.

<sup>6</sup> Where LoS refers to Level of Service and G refers to Growth

## 9.0 JOHNSON ROAD WATER SUPPLY

### 9.1 Scheme Summary

| Description                                   |                                   | Quantity                 |
|-----------------------------------------------|-----------------------------------|--------------------------|
| <b>Estimated Population Served</b>            |                                   | 165                      |
| <b>Scheme Coverage</b><br>(1 Jan 2018)        | Full Charges                      | 56                       |
|                                               | Half Charges                      | 2                        |
|                                               | >1 Charges                        | 3                        |
| <b>System Components</b>                      | Bores/Intakes (No.)               | 1                        |
|                                               | Treatment/Disinfection            | UV                       |
|                                               | Reservoirs (No.)                  | 2                        |
|                                               | Pump Stations (No.)               | 0                        |
|                                               | Piped (m)                         | 6329.7                   |
| <b>History</b>                                | Original scheme installation date | 1986                     |
| <b>Value (\$)</b>                             | Replacement Cost                  | \$794,963.11             |
|                                               | Depreciated Replacement Cost      | \$465,319.47             |
| <b>Financial</b>                              | 2018/2019 Estimate                | \$49,030                 |
|                                               | Annual maintenance cost           | 1.53%                    |
|                                               | % of total                        |                          |
| <b>Demand (m3)</b><br>(1 Jan – 31 Dec 2017)   | Average daily                     | 116                      |
|                                               | Peak daily                        | 373                      |
|                                               | Minimum daily                     | 28                       |
|                                               | Average daily per connection      | 2.07                     |
| <b>Type of Supply</b>                         |                                   | Unrestricted tank supply |
| <b>Target Pressure &amp; Flow at boundary</b> | Pressure                          | Timer on, pressure off   |
|                                               | Flow                              | >40 L/min                |
| <b>Sustainability</b>                         | Well Security                     | Unsecure                 |

### 9.2 Key Issues

The following key issues are associated with the Johnson Road water supply. A list of district wide issues are located in 5Waters Activity Management Plan: Volume 1.



**Table 9-1 Johnson Road Scheme Issues**

| What's the Problem                                                                                                                                                                                                   | What we plan to do                                                                                                                                                                                                                                 |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| The consent for the Johnson Road Water Supply expired in 2017. Council applied for a new consent 6 months prior to the consent expiring.                                                                             | The water supply operates under consent continuance. Council will review options for connection to other sources e.g. West Melton. Council will review and update its demand management plans to align with resource consent conditions.           |
| The fire hydrant flows/pressure does not meet the requirements of the New Zealand Fire Fighting Code of Practice.                                                                                                    | Fire fighting flows are provided via 'key' activation. The key engages high flow pumps. Review the option of providing a VSD.                                                                                                                      |
| Due to the small rating base of the Johnson Road Water Supply the water rates are high and ratepayers carry a higher burden than larger supplies for the funding of operation, maintenance and future planned works. | Its close proximity to West Melton presents the potential for connection to the West Melton system. The community will be consulted on the possibility of connecting to the West Melton network and the potential efficiencies, savings and risks. |

### 9.3 Overview & History

The Johnson Road scheme is located 2km south of West Melton Township and adjacent to Weedons Ross Road (see schematics). It provides UV treated groundwater to properties with section sizes in the Whitewood Crescent area that are approximately 0.5ha with the remaining sections varying between 1 - 1.5ha.

The water supply was originally designed and installed (1986) as a high pressure unrestricted supply but changed to an individual tank supply system when Paparua Country Council took the scheme over. Water is supplied to the individual property owner's tanks (usually 9m<sup>3</sup>). Property owners are then responsible to pump from that tank for their own domestic/gardening uses.

The scheme operates as a 'timer on, pressure off' supply.

Poor water quality (presence of E Coli) resulted in installation of UV disinfection in 1995. This has not successfully addressed the bacteriological contamination issue.

In 2002 water meters were installed on all connections to reduce water consumption and a water charging regime implemented. The scheme was added to the district water rate in 2015/16 as part of the 2015-25 LTP consultation.

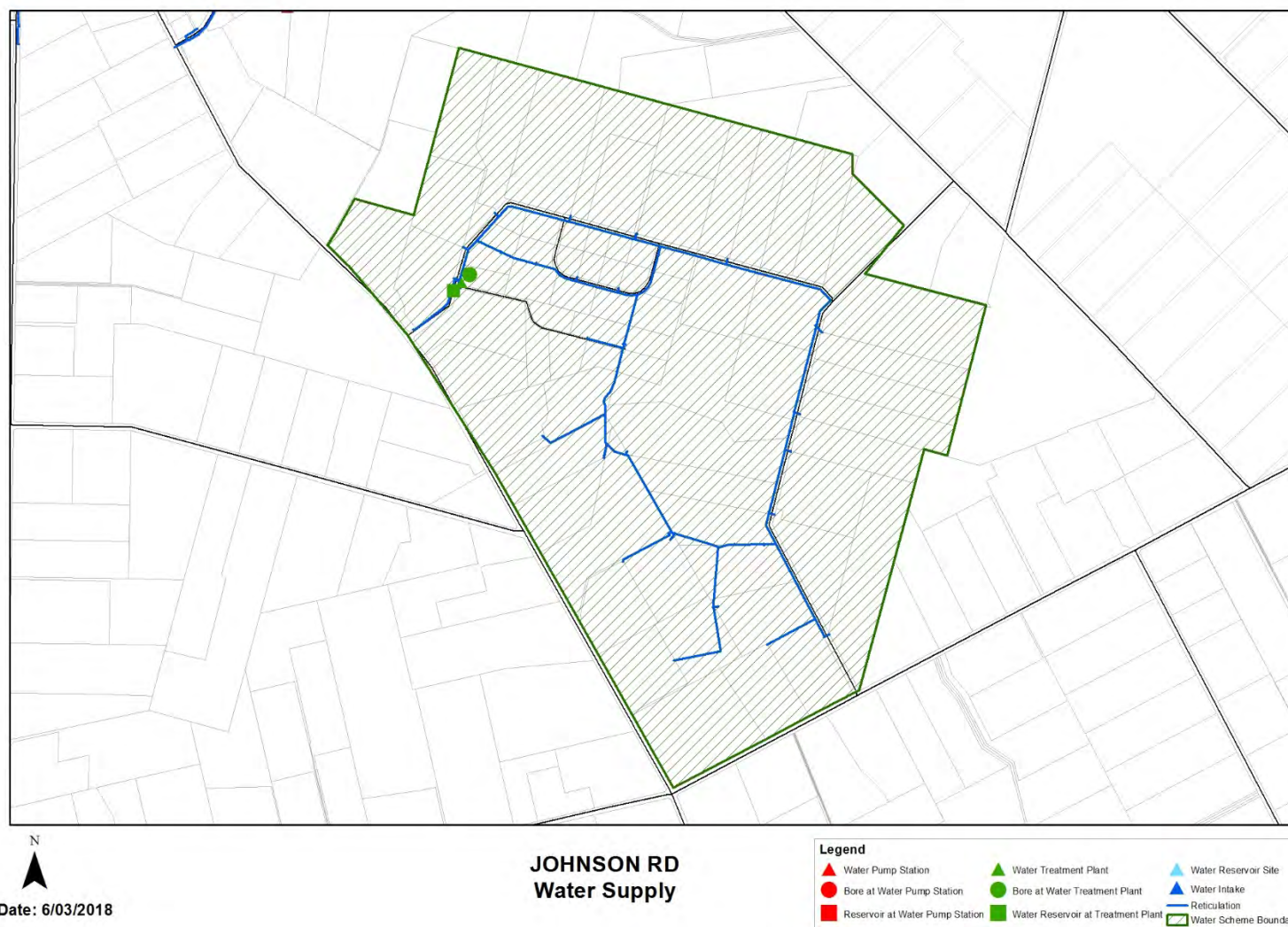
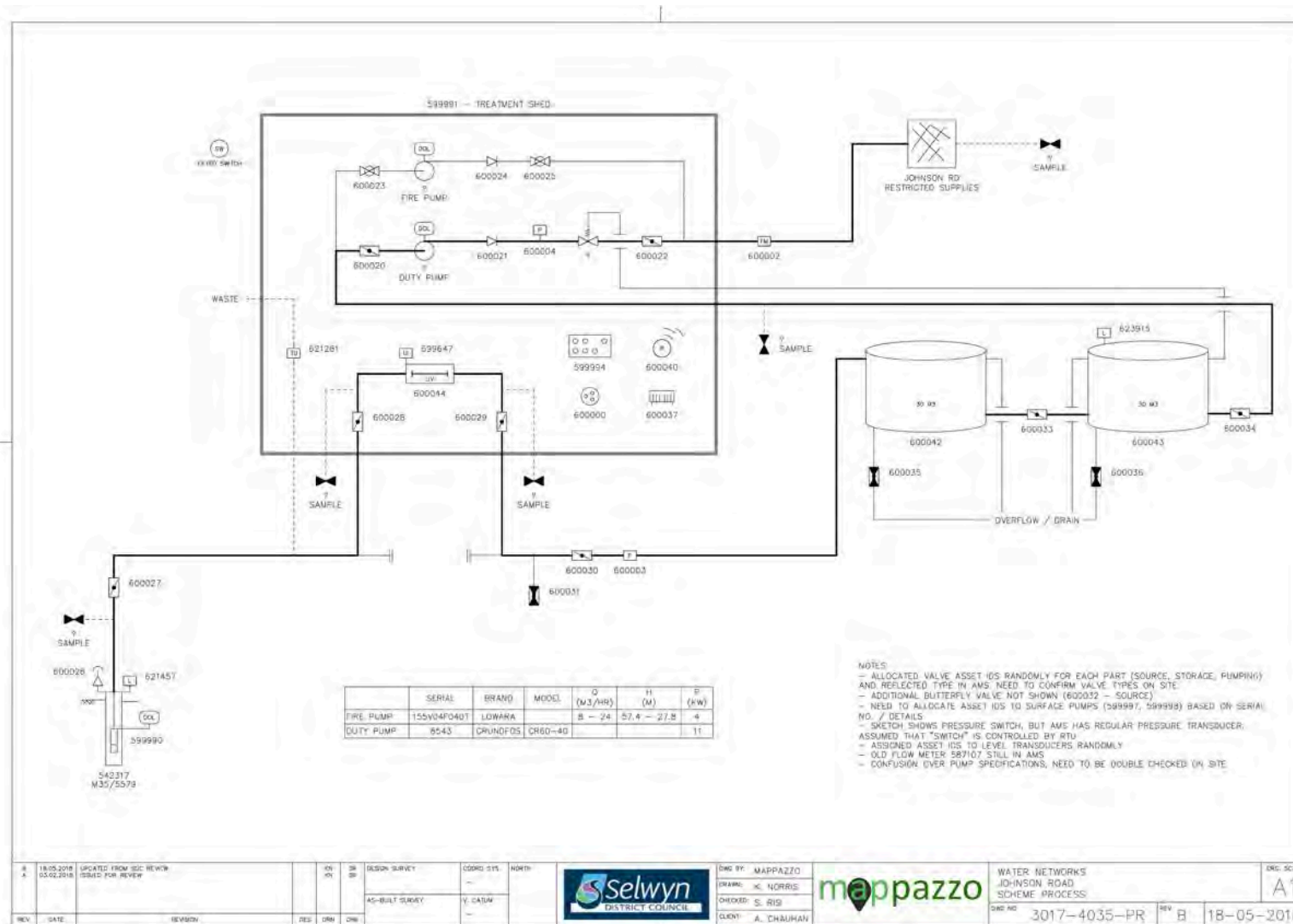


**Figure 9-1 Scheme Map**



## 9.4 System Capacity

This water supply was developed with sufficient capacity to serve the Whitewood Crescent rural residential subdivision and surrounding properties. It is not intended that this supply area be extended. Existing capacity is adequate.

**Table 9-2 Capacity Summary**

|                              | Flow Rate<br>(L/s) | Daily Volume<br>(m <sup>3</sup> ) | Annual Volume<br>(m <sup>3</sup> ) | Comments                     |
|------------------------------|--------------------|-----------------------------------|------------------------------------|------------------------------|
| Abstraction Capacity         | 14*                | 1210                              | -                                  | 1 x bore pump (nom capacity) |
| Treatment Capacity           | 10                 | -                                 | -                                  | UV (into tank)               |
| Consented Take               | 15                 | 1296                              | 194,400                            |                              |
| Peak Demand                  | -                  | 500**                             | 52,454                             |                              |
| * Aug 2013<br>** 14 Jan 2013 |                    |                                   |                                    |                              |

## 9.5 Resource Consents

The Johnson Road water supply has a number of resource consents. Table 9-3 shows the water take permitted by the resource consents for this scheme.

**Table 9-3 Resource Consents**

| Consent                           | Description           | Location                  | Date Issued | Expiry Date | Consented Max Instantaneous Flow (L/s) | Consented Max Daily Volume (m <sup>3</sup> /day) |
|-----------------------------------|-----------------------|---------------------------|-------------|-------------|----------------------------------------|--------------------------------------------------|
| CRC010886<br>(Issued-Continuance) | To take and use water | Johnson Road, WEST MELTON | 5-Feb-07    | 16-Jan-17   | 15                                     | 1296<br>(9,072 per 7 days)                       |

Consent is on continuance.

## 9.6 Water Quality

The Johnsons Road water supply is a non-secure source and is currently sampled twice weekly for the source, treatment plant and weekly for the reticulation.

The following details E. coli transgressions for the sample periods 2012 to 2017.

### Source

There have been 25 E. coli source transgressions within this period.

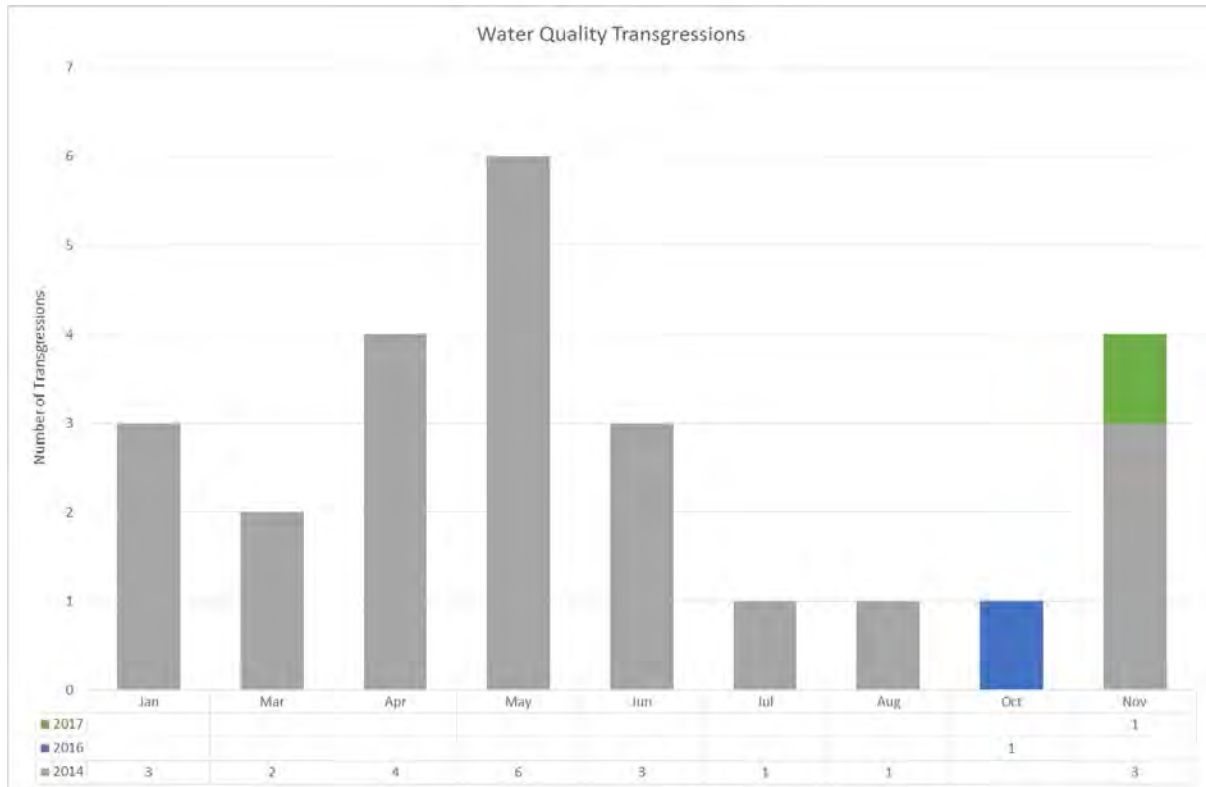


**Figure 9-3 E.coli Transgressions - Source**

#### Treatment

There have been two E. coli treatment transgressions during this period, both in April 2014.

#### Zone

There have been six E. coli transgressions during this period.

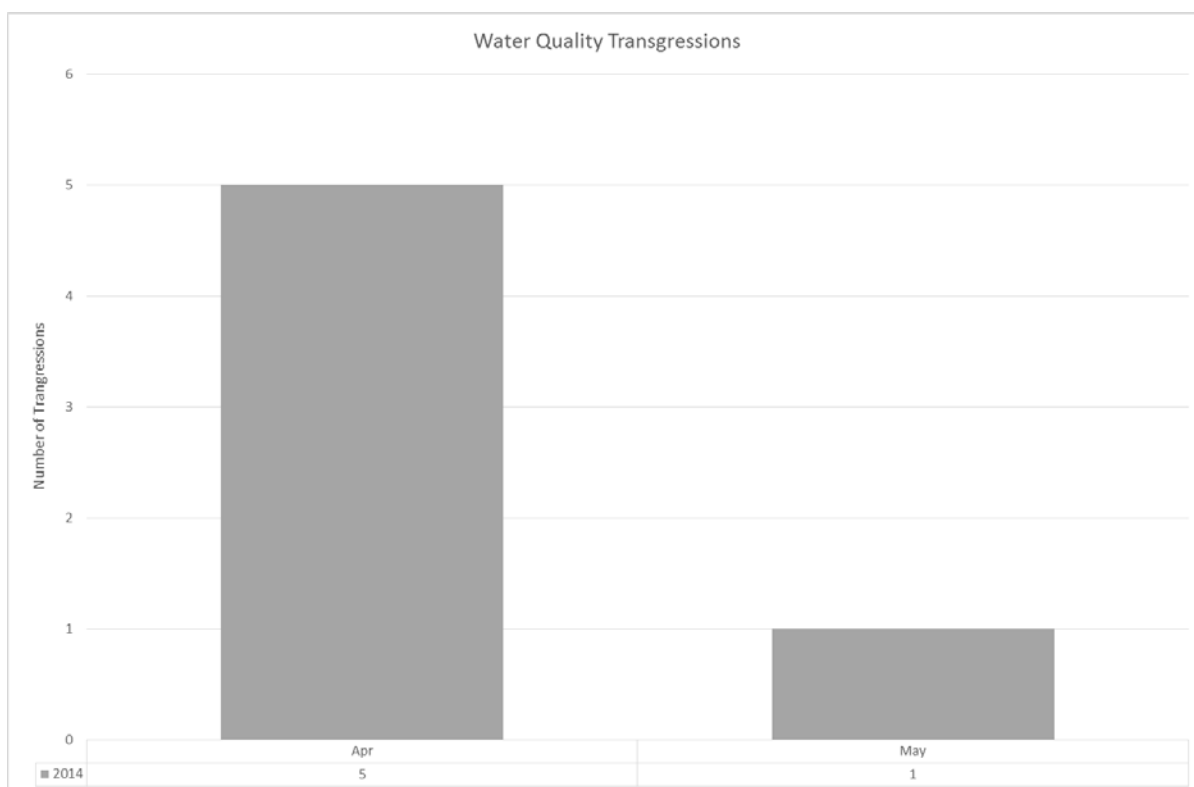


**Figure 9-4 E. coli Transgression - Zone**

### Chemical Analysis

The following is a summary of the raw water chemical analysis carried out at the Johnson Road Water Supply.

**Table 9-4 Johnson Road Water Supply Raw Water Chemical Analysis Summary**

| Parameter                                   | Standards<br>MAV* (GV)** | Plant 2015 | Plant 2017 | Status |
|---------------------------------------------|--------------------------|------------|------------|--------|
| Total Lead (g/m3)                           | 0.01                     | <0.00011   | < 0.00011  | ✓      |
| pH (pH units)                               | 7-8.5                    | 7.7        | 7.4        | ✓      |
| Total Hardness (g/m3 as CaCO <sub>3</sub> ) | <200                     | 69         | 45.8       | ✓      |
| Total Calcium (g/m3)                        | n/v                      | 23         | 15.02      | ✓      |
| Total Iron (g/m3)                           | <0.2                     | <0.021     | < 0.021    | ✓      |
| Total Sodium (g/m3)                         | <200                     | 10.4       | 5.06       | ✓      |
| Nitrate - Nitrogen (g/m3)                   | 11.3                     | 5.2        | 1.55       | ✓      |

\* MAV – Maximum Acceptable Value

\*\* (GV) – Guideline Value

## 9.7 Scheme Assets

A summary of material and diameter for pipes in Johnson Road is shown below in Figure 9-5 and Figure 9-6.

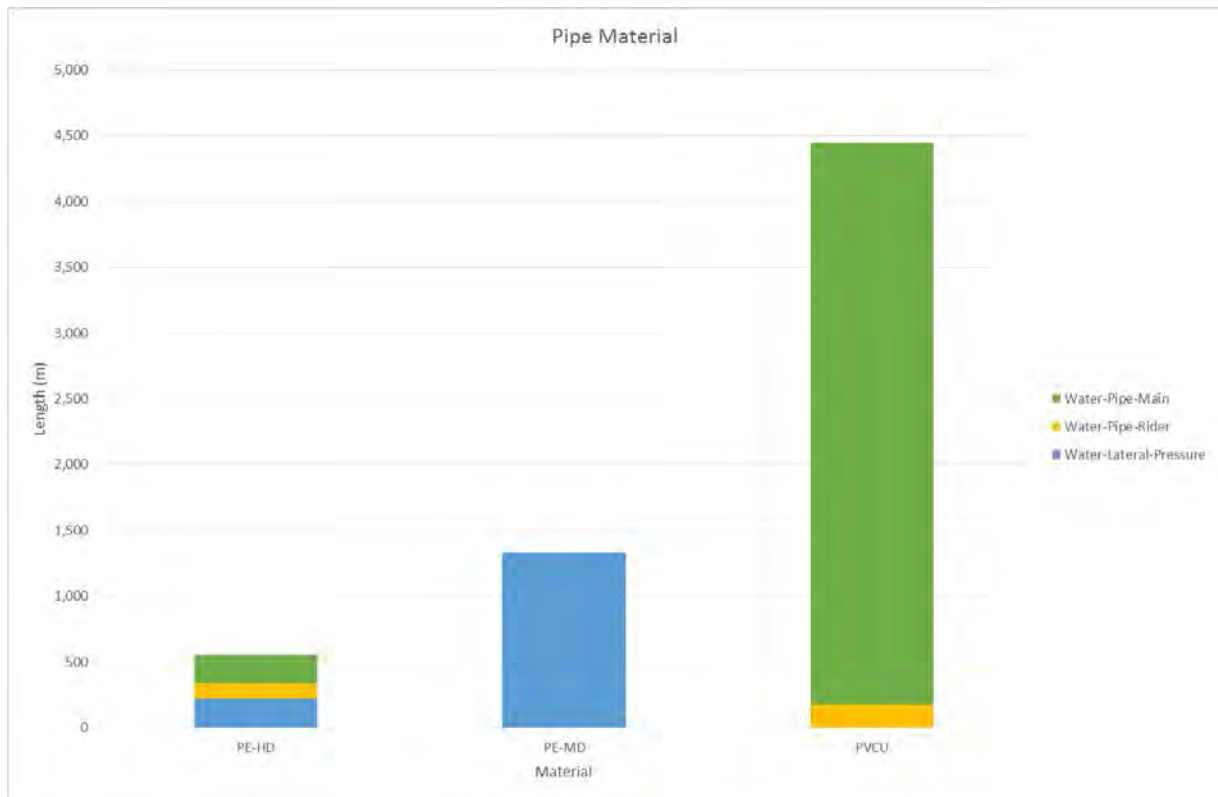


**Figure 9-5 Pipe Material – Johnson Road**



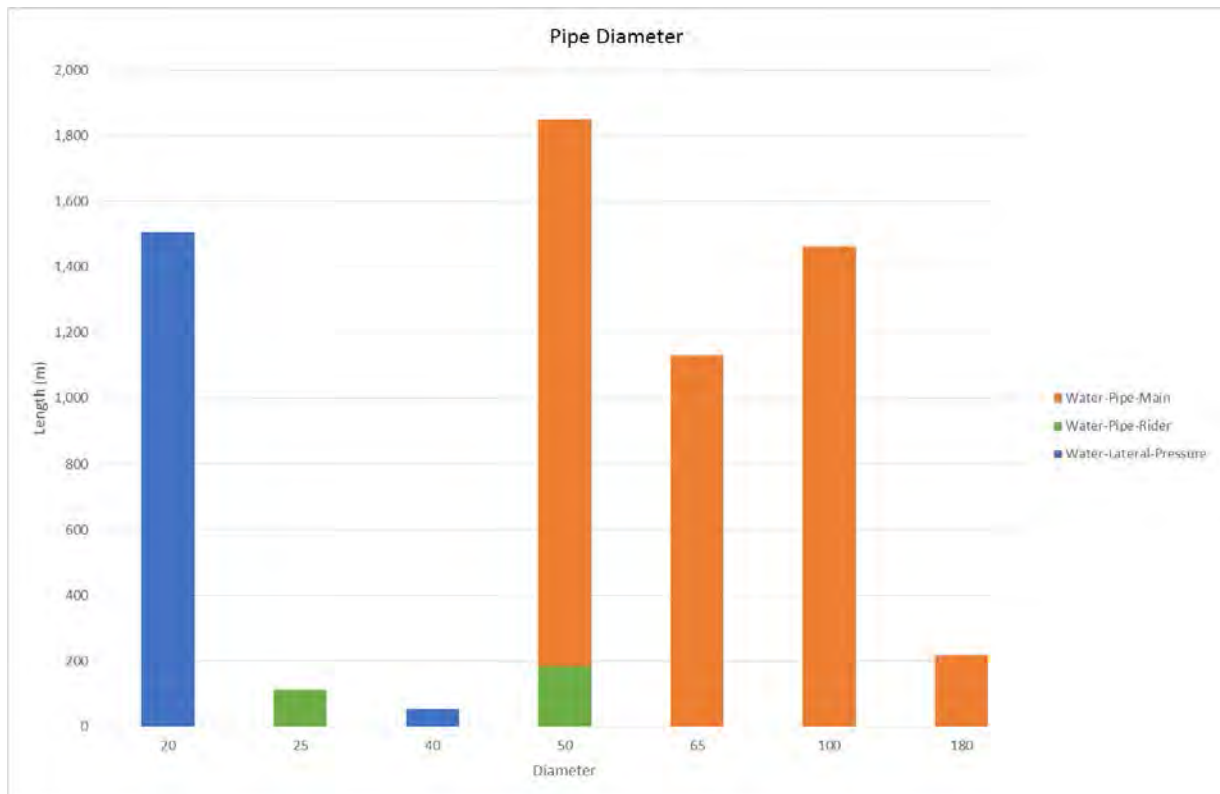


**Figure 9-6 Pipe Diameter – Johnson Road**

## 9.8 Operational Management

The water supply is operated and maintained under two maintenance contracts as follows:

- Contract 1241: Water Services Contract. Contract is with SICON Ferguson who undertakes investigations, conditions inspections, proactive and reactive maintenance and minor asset renewals; and
- Contract 1202: Parks and Reserves Contract. Contract is with SICON Ferguson who undertakes the maintenance of land scape features related to water services e.g. mowing, gardens etc.

Water quality sampling is completed under an agreement with Food and Health Ltd as required.

## 9.9 Photos of Main Assets



**Photo 1: Site Layout**

## 9.10 Risk Assessment

A risk assessment has been undertaken for the Johnson scheme. The key output from the risk assessment is the identification of any extreme and high risks which need to be mitigated. In order to mitigate these risks they have been included and budgeted for in the projects within this LTP. Table 9-5 outlines the risk priority rating and Table 9-6 outlines the risks for this scheme.

**Table 9-5 Risk Priority Rating**

| Risk Score | Level of Risk | Risk Response                                                                                                                                                         |
|------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| > 50       | Extreme       | Awareness of the event to be reported to Council.<br>Urgent action to eliminate / mitigate / manage the risk.<br><br>Document risk and action in the AMP.             |
| 35-50      | Very High     | Risk to be eliminated / mitigated / managed through normal business planning processes with responsibility assigned.                                                  |
| 14-35      | High          | Manage risk using routine procedures.                                                                                                                                 |
| 3.5-14     | Moderate      | Monitor the risk.                                                                                                                                                     |
| < 3.5      | Low           | Awareness of the event to be reported to Council.<br>Immediate action required to eliminate / mitigate / manage the risk.<br><br>Document risk and action in the AMP. |

**Table 9-6 Risks – Johnson Road**

| Risk          | Action/Project                         | Year Identified | 2014 Risk Rating | 2017 Risk Rating | Residual Risk Rating |
|---------------|----------------------------------------|-----------------|------------------|------------------|----------------------|
| Contamination | Upgrade UV unit                        | 2014            | 10               | 10               | 10                   |
| Contamination | Review option to join with West Melton | 2014            | 10               | 3.5              | 3.5                  |

|                                                         |                               |      |    |     |     |
|---------------------------------------------------------|-------------------------------|------|----|-----|-----|
| Electrical failure due to lightning or network spikes   | Install surge diverters       | 2014 | 10 | 3.5 | 3.5 |
| Failure to meet NES water meter standards               | NES Water Meter Compliance    | 2014 | 20 | 6   | 6   |
| Inability to collect income from non-metered properties | Install property water meters | 2014 | 27 | 0.6 | 0.6 |
| Non-compliance with the DWSNZ                           | DWSNZ - Bore-head security    | 2014 | 10 | 10  | 10  |
| Non-consented activities                                | Renewal of consents           | 2014 | 27 | 27  | 6   |

The list of district wide risks can be found in 5Waters Activity Management Plan: Volume 1.

### 9.11 Asset Valuation Details

The total replacement value of assets within the Johnson Road water scheme is \$764,963 with further details in Table 9-7 below.

**Table 9-7 Replacement Value, Johnson Road**

| Asset Class 1              | Asset Class 2 | Sum of Replacement Value |
|----------------------------|---------------|--------------------------|
| <b>Plant and Equipment</b> |               | \$304,425                |
| <b>Water Reticulation</b>  | Hydrant       | \$8,443                  |
|                            | Lateral       | \$67,634                 |
|                            | Pipe          | \$378,947                |
|                            | Supply Point  | \$32,428                 |
|                            | Valve         | \$3,086                  |

Replacement values for these different types of assets are shown in Figure 9-7 below.

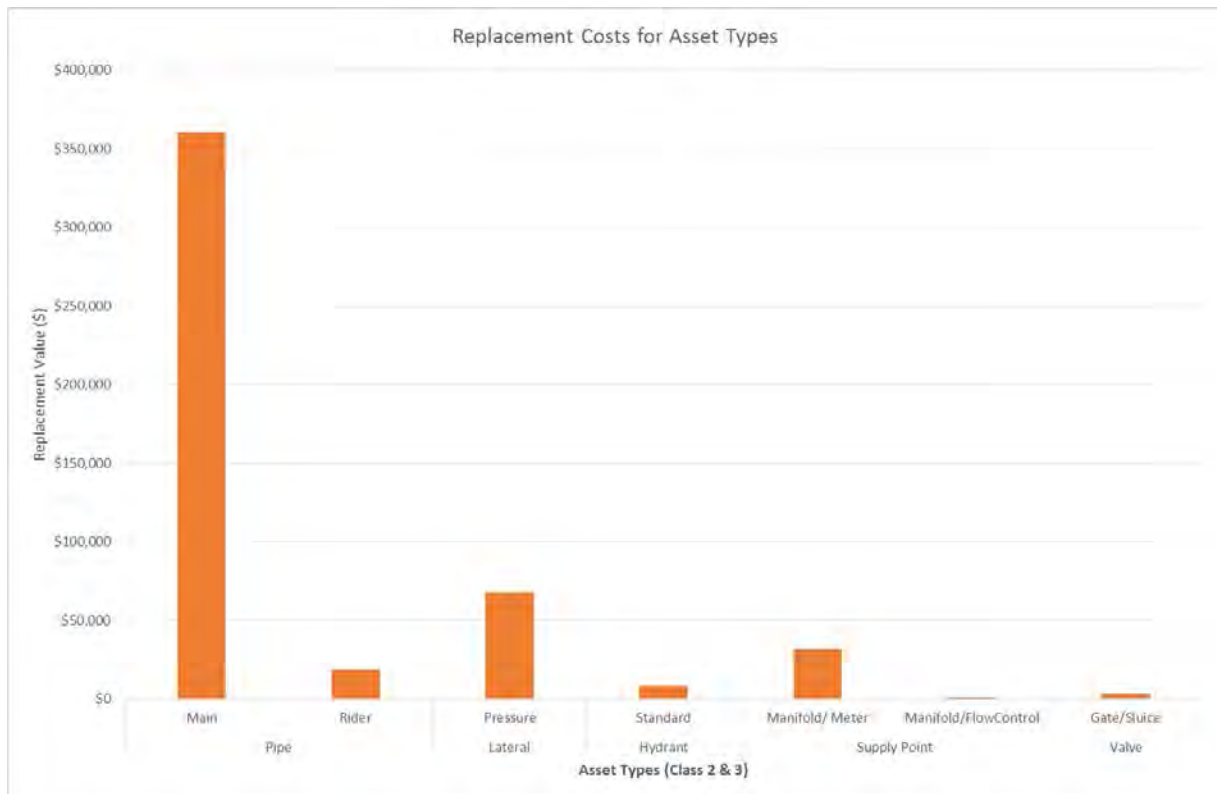


**Figure 9-7 Replacement Costs for Johnson Road**

## 9.12 Renewals

The renewal profile has been taken from the 2017 5 Waters Valuation. A graph showing the renewals for this scheme are shown by Figure 9-8 below. The majority renewals occur in 2018/2019.



**Figure 9-8 Johnson Water Renewal Profile**

### 9.13 Critical Assets

The criticality model for Johnson Road has been updated for the 2018 AcMP. The methodology of the criticality model can be found in 5Waters Activity Management Plan: Volume 1 and it provides details of how the criticality has been calculated for the reticulation assets. Table 9-8 and Figure 9-9 below shows the calculated criticality for all of the assets within this scheme that have a recorded known length.

**Table 9-8 Length of Assets per Criticality Level**

| Criticality Bands |             | Length (m) |
|-------------------|-------------|------------|
| 5                 | Low         | 4,651      |
| 4                 | Medium-Low  | 1,464      |
| 3                 | Medium      | 0          |
| 2                 | Medium-High | 220        |
| 1                 | High        | 0          |

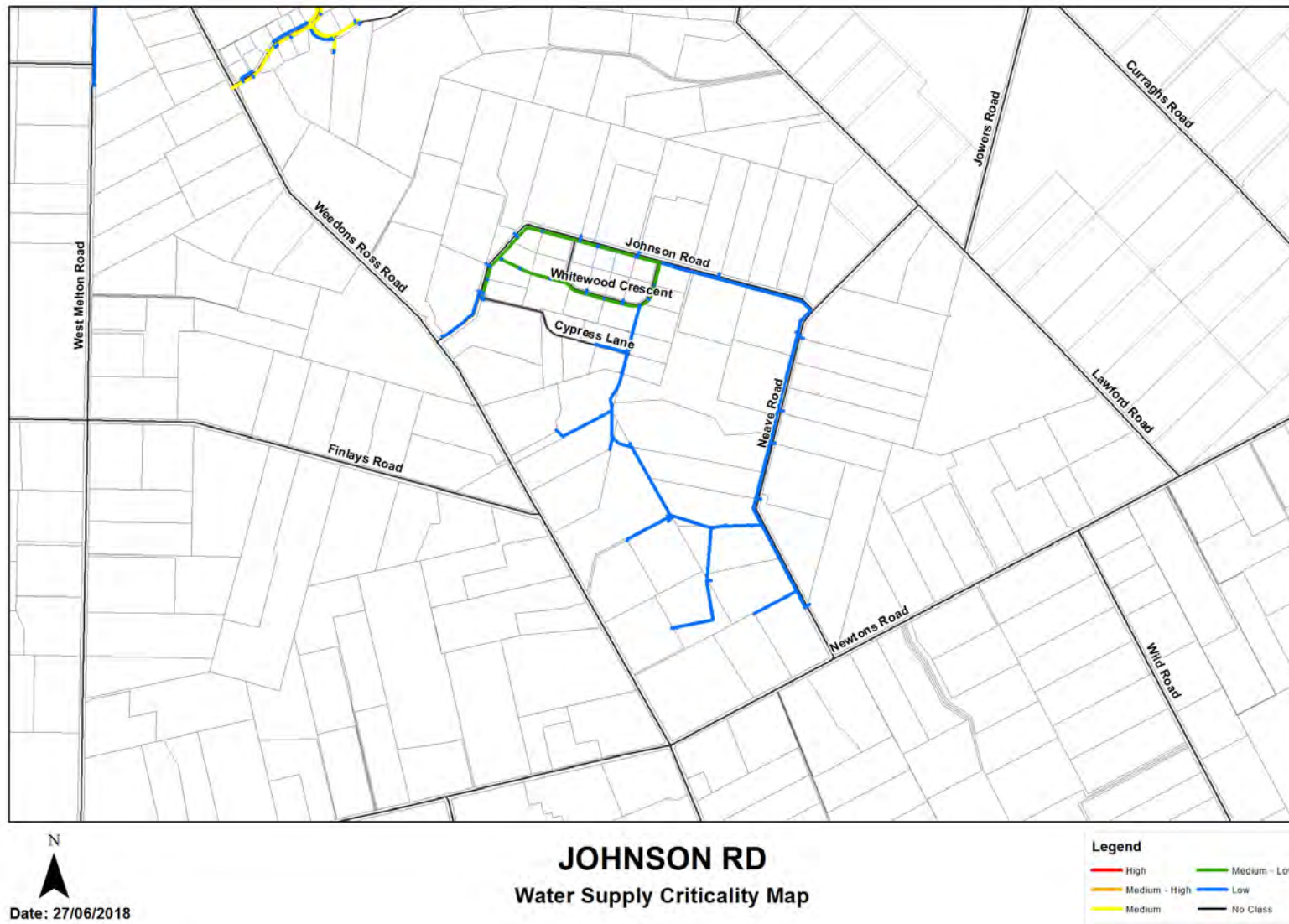


Figure 9-9 Criticality Map

## 9.14 Asset Condition

The asset condition model was run for Johnson Road in 2017. The methodology of the model can be found in 5Waters Activity Management Plan: Volume 1 which provides details of how the model has been calculated for the pipe reticulation assets. Figure 9-10 below shows the level of asset condition for these assets within this scheme that have a recorded known condition.

**Figure 9-10 Asset Condition – Johnson Road**

Table 9-9 provides a description of the condition rating used within the condition model.

**Table 9-9 Asset Condition Grading**

| Condition Rating | Grading   |
|------------------|-----------|
| 1.0              | Excellent |
| 2.0              | Good      |
| 3.0              | Moderate  |
| 4.0              | Poor      |
| 5.0+             | Fail      |

The number of pipe faults is also measured through the asset management system. Figure 9-11 shows the known historic pipe failures within this scheme.



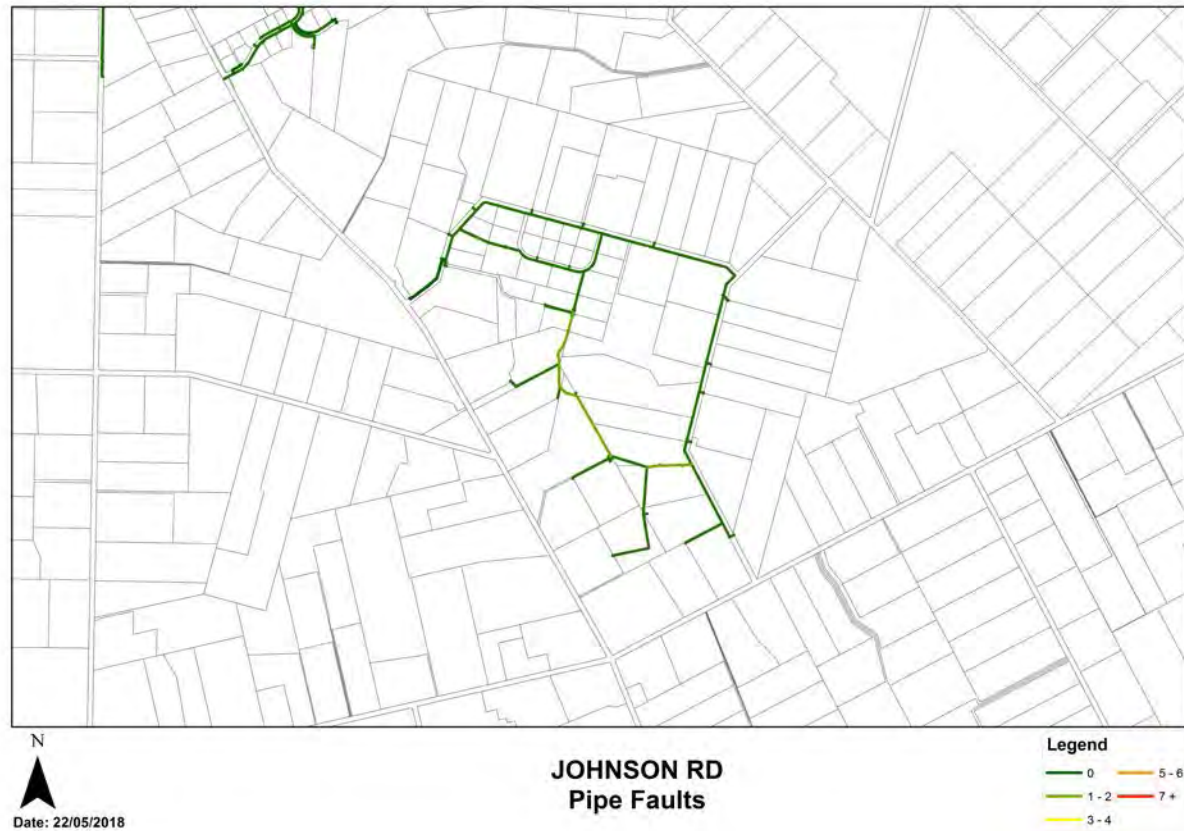


**Figure 9-11 Pipe Faults, Johnson Road**

## 9.15 Funding Program

The 10 year budgets for Johnson Road are shown by Table 9-10 and Figure 9-12. Budgets are split into expenditure, renewals, projects and capital projects.

All figures are (\$) not adjusted for CPI “inflation”. They are calculated on historical data, and population growth where relevant.

**Table 9-10 Johnson Road Budget Summary**

| Years     | Expenditure | Renewals  | Projects | Capital Projects |
|-----------|-------------|-----------|----------|------------------|
| 2018/2019 | \$49,030    | \$148,363 |          |                  |
| 2019/2020 | \$49,030    | \$2,111   |          |                  |
| 2020/2021 | \$49,030    | \$704     |          |                  |
| 2021/2022 | \$49,030    |           |          |                  |
| 2022/2023 | \$49,030    | \$23,921  |          |                  |
| 2023/2024 | \$49,030    | \$11,936  |          |                  |
| 2024/2025 | \$49,030    |           |          |                  |

|           |           |           |  |  |
|-----------|-----------|-----------|--|--|
| 2025/2026 | \$49,030  | \$1,391   |  |  |
| 2026/2027 | \$49,030  | \$2,439   |  |  |
| 2027/2028 | \$49,030  |           |  |  |
| Total     | \$490,300 | \$190,864 |  |  |

An explanation of the categories within the budgets are as follows below:

- Expenditure consists of operation and maintenance costs;
- Renewals are replacement of assets which are nearing or exceeded their useful life;
- Projects are investigations, decisions and planning activities which exclude capital works; and
- Capital projects are activities involving physical works.



**Figure 9-12 Johnson Road Funding Summary**

There are no major projects for Johnson Road water scheme in the LTP budget.

The list of district wide projects can be found in 5Waters Activity Management Plan: Volume 1.

## 10.0 JOWERS ROAD WATER SUPPLY

### 10.1 Scheme Summary

| Description                                   |                                   | Quantity                 |
|-----------------------------------------------|-----------------------------------|--------------------------|
| <b>Estimated Population Served</b>            |                                   | 50                       |
| <b>Scheme Coverage</b><br>(1 Jan 2018)        | Full Charges                      | 18                       |
|                                               | Half Charges                      | 0                        |
|                                               | >1 Charges                        | 0                        |
| <b>System Components</b>                      | Bores/Intakes (No.)               | 1                        |
|                                               | Treatment/Disinfection            | None                     |
|                                               | Reservoirs (No.)                  | 2                        |
|                                               | Pump Stations (No.)               | 1                        |
|                                               | Piped (m)                         | 646.8                    |
| <b>History</b>                                | Original scheme installation date | 1985                     |
| <b>Value (\$)</b>                             | Replacement Cost                  | \$177,836.64             |
|                                               | Depreciated Replacement Cost      | \$82,875.45              |
| <b>Financial</b>                              | 2018/2019 Estimate                | \$26,110                 |
|                                               | Annual maintenance cost           | 0.82%                    |
|                                               | % of total                        |                          |
| <b>Demand (m3)</b><br>(1 Jan – 31 Dec 2017)   | Average daily                     | -                        |
|                                               | Peak daily                        | Unknown (no SCADA)       |
|                                               | Minimum daily                     | Unknown (no SCADA)       |
|                                               | Average daily per connection      | -                        |
| <b>Type of Supply</b>                         |                                   | Unrestricted tank supply |
| <b>Target Pressure &amp; Flow at boundary</b> | Pressure                          | >150 kPA                 |
|                                               | Flow                              | >15 L/min                |
| <b>Sustainability</b>                         | Well Security                     | Unsecure                 |

### 10.2 Key Issues

The following key issues are associated with the Jowers water supply. A list of district wide issues are located in 5Waters Activity Management Plan: Volume 1.

**Table 10-1 Jowers Scheme Issues**

| What's the Problem                                                                                                                      | What we plan to do                                                                                                                                                                                                                       |
|-----------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| The consent for the Jowers Road Water Supply expired in 2017. Council applied for a new consent 6 months prior to the consent expiring. | The water supply operates under consent continuance. Council will review options for connection to other sources e.g. West Melton. Council will review and update its demand management plans to align with resource consent conditions. |
| Some properties have no reasonable onsite storage should water failure occur.                                                           | It is the owner's responsibility to provide a minimum of two days storage. Council will continue to educate consumers, including but not limited to the LIM process and property file system.                                            |
| Some connections are via other properties. This poses connection access problems and backflow associated risks.                         | Council review and confirm options for installation of backflow prevention devices and metering.                                                                                                                                         |

### 10.3 Overview & History

Jowers Road Water Supply provides untreated groundwater to an 18 section subdivision (see schematics). Although the water supply was originally designed and installed (1985) as an unrestricted supply with all property owners requiring on site storage, the requirement for onsite storage was subsequently not enforced. The scheme was designed with no fire fighting capacity. A fire hydrant located in the reticulation can only be used for flushing of mains.

A new submersible pump was installed in 2006 to address peak demand capacity issues.

In November 2017 the original header tank was removed and replaced with a surface tank and booster pump station

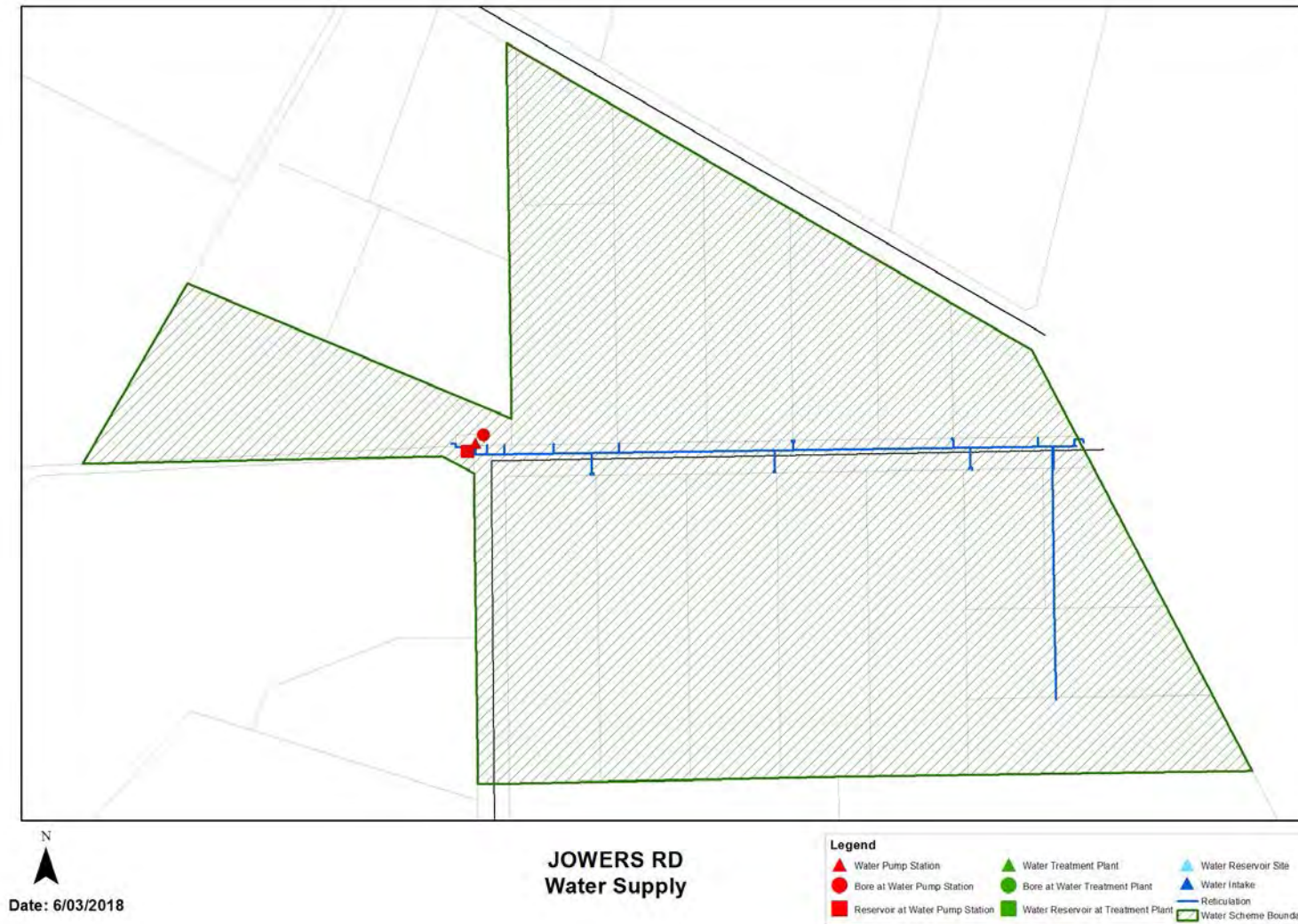


**Figure 10-1 Scheme Map**





## 10.4 System Capacity

This water supply was developed to serve the 18 lot rural residential subdivision. All connections have been allocated and are utilised. No additional connections are anticipated. The supply is able to meet current peak demands without the need for water restrictions.

**Table 10-2 Capacity Summary**

|                             | Flow Rate<br>(L/s) | Daily Volume<br>(m <sup>3</sup> ) | Annual Volume<br>(m <sup>3</sup> ) | Comments                           |
|-----------------------------|--------------------|-----------------------------------|------------------------------------|------------------------------------|
| Abstraction Capacity        | 7.5                | 648                               | -                                  | 1 x bore pump (nom capacity)       |
| Consented Take              | 7.6                | 366                               | 54,900                             |                                    |
| Peak Demand                 | -                  | -                                 | 35,900                             | Demand has reduced in recent years |
| Bulk meter is manually read |                    |                                   |                                    |                                    |

## 10.5 Resource Consents

The Jowers Road water supply has a number of resource consents. Table 10-3 shows the water take permitted by the resource consents for this scheme.

**Table 10-3 Resource Consents**

| Consent                           | Description           | Location                 | Date Issued | Expiry Date | Consented Max Instantaneous Flow (L/s) | Consented Max Daily Volume (m <sup>3</sup> /day) |
|-----------------------------------|-----------------------|--------------------------|-------------|-------------|----------------------------------------|--------------------------------------------------|
| CRC010885<br>(Issued-Continuance) | To take and use water | Jowers Road, WEST MELTON | 11-Mar-07   | 9-Jan-17    | 7.6                                    | 366<br>(2,5,62 per 7 days)                       |

Consent is on continuance.

## 10.6 Water Quality

The Jowers Road water supply is a non-secure source which is currently sampled monthly for both the reticulation and weekly for the treatment plant.

The following details E. coli transgressions for the period 2012 to 2017.

### Treatment

There has been two E. coli transgressions during this period, which occurred in April 2015 and April 2016.

### Zone

There has been no E. coli transgressions during this period.

### Chemical Analysis

The following is a summary of the raw water chemical analysis carried out at the Jowers Road Water Supply.



**Table 10-4 Jowers Road Water Supply Raw Water Chemical Analysis Summary**

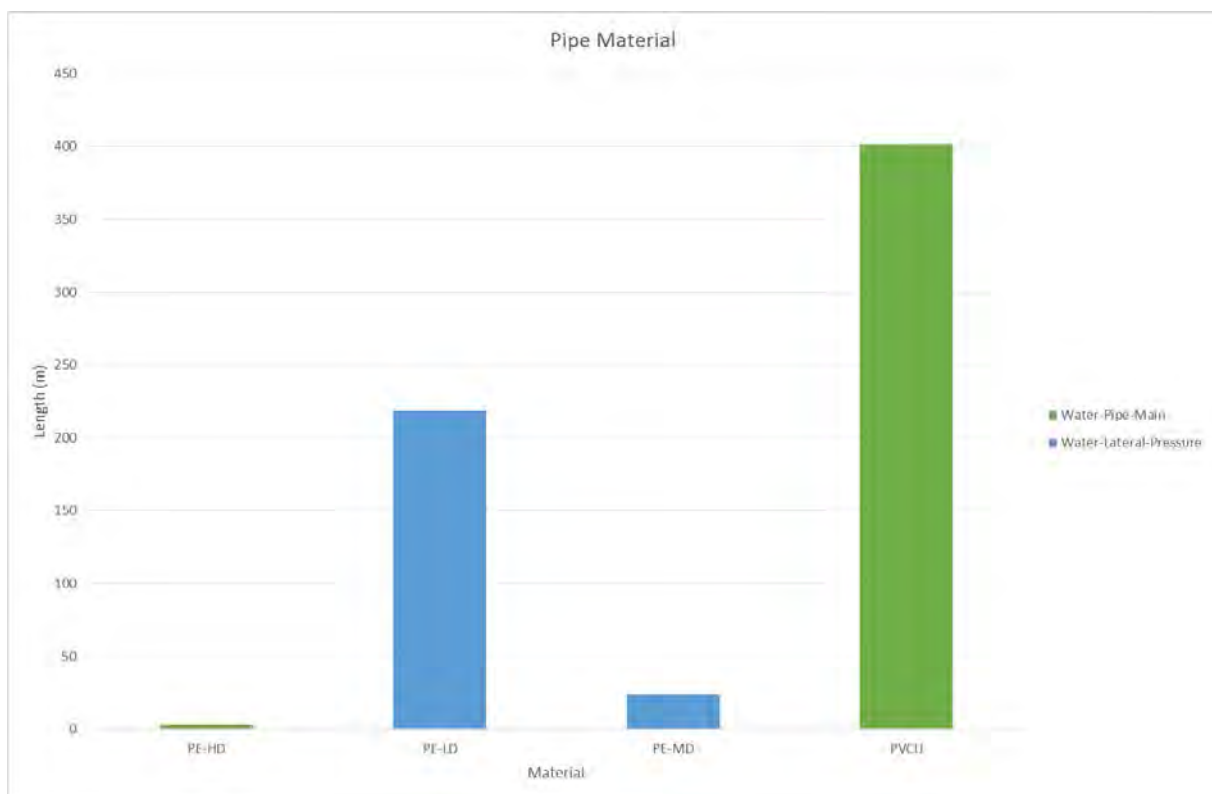
| Parameter                                   | Standards<br>MAV* (GV)** | Plant 2015 | Plant 2017 | Status |
|---------------------------------------------|--------------------------|------------|------------|--------|
| Total Lead (g/m3)                           | 0.01                     | 0.00063    | 0.000841   | ✓      |
| pH (pH units)                               | 7-8.5                    | 7.7        | 7.5        | ✓      |
| Total Hardness (g/m3 as CaCO <sub>3</sub> ) | <200                     | 67         | 61.4       | ✓      |
| Total Calcium (g/m3)                        | n/v                      | 22         | 20.21      | ✓      |
| Total Iron (g/m3)                           | <0.2                     | <0.021     | < 0.021    | ✓      |
| Total Sodium (g/m3)                         | <200                     | 6.9        | 5.97       | ✓      |
| Nitrate - Nitrogen (g/m3)                   | 11.3                     | 3          | 2.38       | ✓      |

\* MAV – Maximum Acceptable Value

\*\* (GV) – Guideline Value

## 10.7 Scheme Assets

A summary of material and diameter for pipes in Jowers Road is shown below in Figure 10-3 and Figure 10-4.


**Figure 10-3 Pipe Material – Jowers Road**

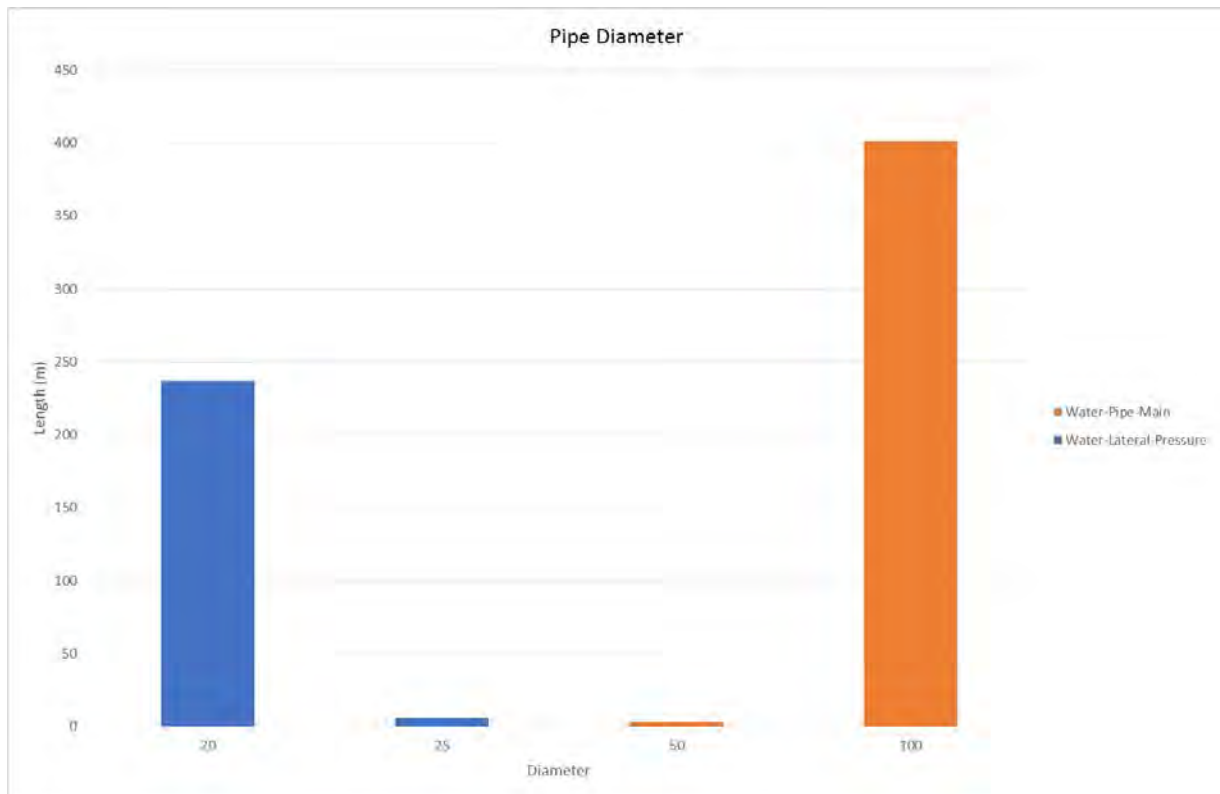


**Figure 10-4 Pipe Diameter – Jowers Road**

## 10.8 Operational Management

The water supply is operated and maintained under two maintenance contracts as follows:

- Contract 1241: Water Services Contract. Contract is with SICON Ferguson who undertakes investigations, conditions inspections, proactive and reactive maintenance and minor asset renewals; and
- Contract 1202: Parks and Reserves Contract. Contract is with SICON Ferguson who undertakes the maintenance of land scape features related to water services e.g. mowing, gardens etc.

Water quality sampling is completed under an agreement with Food and Health Ltd as required.

## 10.9 Photos of Main Assets



**Photo 1: Well head**



**Photo 2: Reservoir and booster pump shed**

## 10.10 Risk Assessment

A risk assessment has been undertaken for the Jowers Road scheme. The key output from the risk assessment is the identification of any extreme and high risks which need to be mitigated. In order to mitigate these risks they have been included and budgeted for in the projects within this LTP. Table 10-5 outlines the risk priority rating, Table 10-6 outlines the risks and the list of key projects is found in Table 10-11.

**Table 10-5 Risk Priority Rating**

| Risk Score | Level of Risk | Risk Response                                                                                                                                                     |
|------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| > 50       | Extreme       | Awareness of the event to be reported to Council.<br>Urgent action to eliminate / mitigate / manage the risk.<br>Document risk and action in the AMP.             |
| 35-50      | Very High     | Risk to be eliminated / mitigated / managed through normal business planning processes with responsibility assigned.                                              |
| 14-35      | High          | Manage risk using routine procedures.                                                                                                                             |
| 3.5-14     | Moderate      | Monitor the risk.                                                                                                                                                 |
| < 3.5      | Low           | Awareness of the event to be reported to Council.<br>Immediate action required to eliminate / mitigate / manage the risk.<br>Document risk and action in the AMP. |

**Table 10-6 Risks – Jowers Road**

| Risk | Action/Project | Year Identified | 2014 Risk Rating | 2017 Risk Rating | Residual Risk Rating |
|------|----------------|-----------------|------------------|------------------|----------------------|
|------|----------------|-----------------|------------------|------------------|----------------------|

|                                                         |                                                 |      |    |    |     |
|---------------------------------------------------------|-------------------------------------------------|------|----|----|-----|
| Compliance of DWS (Protozoa)                            | Install a UV unit                               | 2014 | 27 | 27 | 27  |
| Health and safety issues with tank stand                | New reservoir and surface booster pump required | 2014 | 45 | 45 | 2.1 |
| Electrical failure due to lightning or network spikes   | Install surge diverters                         | 2014 | 6  | 6  | 6   |
| Failure to meet NES water meter standards               | NES Water Meter Compliance                      | 2014 | 20 | 20 | 2.1 |
| Inability to collect income from non-metered properties | Install property water meters                   | 2014 | 27 | 27 | 2.1 |
| Non-consented activities                                | Renewal of consents                             | 2014 | 27 | 27 | 6   |
| Inadequate treatment under all conditions               | Install filtration                              | 2017 |    | 27 | 2.1 |

The list of district wide risks can be found in 5Waters Activity Management Plan: Volume 1.

### 10.11 Asset Valuation Details

The total replacement value of assets within the Jowers Road water scheme is \$177,837 with further details in Table 10-7 below.

**Table 10-7 Replacement Value, Jowers Road**

| Asset Class 1              |              | Asset Class 2 | Sum of Replacement Value |
|----------------------------|--------------|---------------|--------------------------|
| <b>Plant and Equipment</b> |              |               | \$113,103                |
| <b>Water Reticulation</b>  | Hydrant      |               | \$4,221                  |
|                            | Lateral      |               | \$10,440                 |
|                            | Pipe         |               | \$39,662                 |
|                            | Supply Point |               | \$9,830                  |
|                            | Valve        |               | \$581                    |

Replacement values for these different types of assets are shown in Figure 10-5 below.

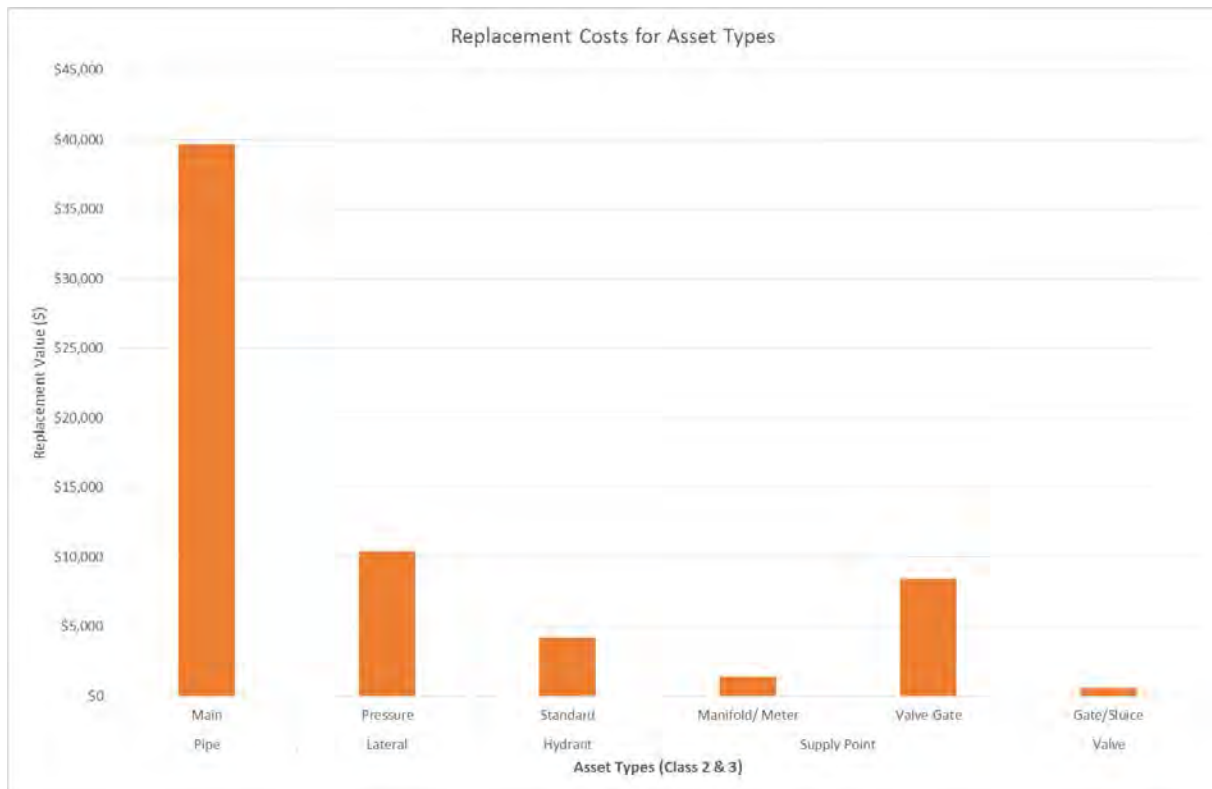


**Figure 10-5 Replacement Costs for Jowers Road**

## 10.12 Renewals

The renewal profile has been taken from the 2017 5 Waters Valuation. A graph showing the renewals for this scheme are shown by Figure 10-6 below. The majority renewals occur in 2022/2023.



**Figure 10-6 Jowers Water Renewal Profile**

### 10.13 Critical Assets

The criticality model for Jowers Road has been updated for the 2018 AcMP. The methodology of the criticality model can be found in 5Waters Activity Management Plan: Volume 1 and it provides details of how the criticality has been calculated for the reticulation assets. Table 10-8 and Figure 10-7 below shows the calculated criticality for all of the assets within this scheme that have a recorded known length.

**Table 10-8 Length of Assets per Criticality Level**

| Criticality Bands |             | Length (m) |
|-------------------|-------------|------------|
| 5                 | Low         | 295        |
| 4                 | Medium-Low  | 402        |
| 3                 | Medium      | 0          |
| 2                 | Medium-High | 0          |
| 1                 | High        | 0          |



**Figure 10-7 Criticality Map**



## 10.14 Asset Condition

The asset condition model was run for Jowers Road in 2017. The methodology of the model can be found in 5Waters Activity Management Plan: Volume 1 which provides details of how the model has been calculated for the pipe reticulation assets. Figure 10-8 below shows the level of asset condition for these assets within this scheme that have a recorded known condition.

### Figure 10-8 Asset Condition – Jowers Road

Table 10-9 provides a description of the condition rating used within the condition model.

**Table 10-9 Asset Condition Grading**

| Condition Rating | Grading   |
|------------------|-----------|
| 1.0              | Excellent |
| 2.0              | Good      |
| 3.0              | Moderate  |
| 4.0              | Poor      |
| 5.0+             | Fail      |

The number of pipe faults is also measured through the asset management system. Figure 10-9 shows the known historic pipe failures within this scheme.

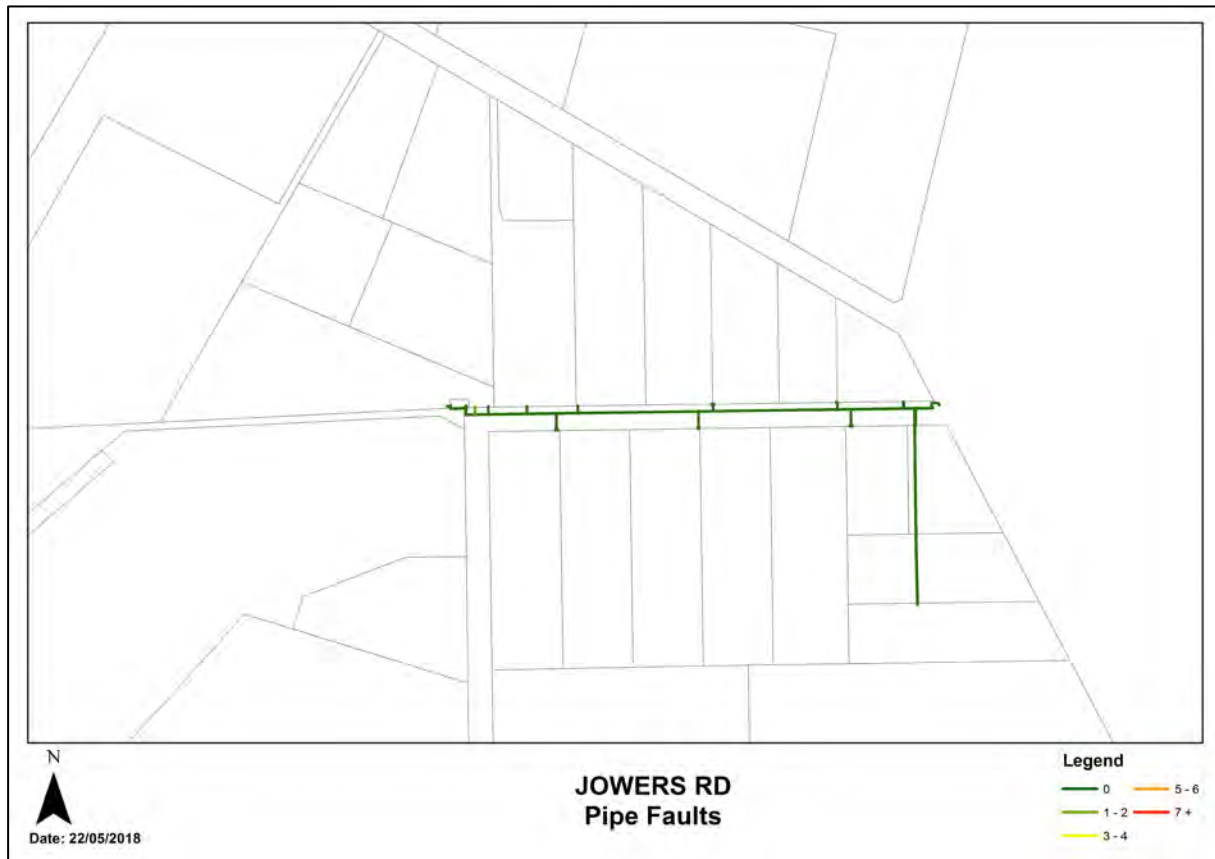


**Figure 10-9 Pipe Faults, Jowers Rd**

### 10.15 Funding Program

The 10 year budgets for Jowers Road are shown by Table 10-10 and Figure 10-10. Budgets are split into expenditure, renewals, projects and capital projects.

All figures are (\$) not adjusted for CPI “inflation”. They are calculated on historical data, and population growth where relevant.

**Table 10-10 Jowers Road Budget Summary**

| Years     | Expenditure | Renewals | Projects | Capital Projects |
|-----------|-------------|----------|----------|------------------|
| 2018/2019 | \$26,110    |          |          |                  |
| 2019/2020 | \$26,110    |          |          |                  |
| 2020/2021 | \$26,110    |          |          |                  |
| 2021/2022 | \$26,110    | \$704    |          |                  |
| 2022/2023 | \$26,110    | \$25,855 |          |                  |
| 2023/2024 | \$26,110    | \$687    |          |                  |
| 2024/2025 | \$26,110    | \$3,159  |          |                  |

|           |           |          |  |          |
|-----------|-----------|----------|--|----------|
| 2025/2026 | \$26,110  |          |  |          |
| 2026/2027 | \$26,110  |          |  |          |
| 2027/2028 | \$26,110  |          |  | \$60,000 |
| Total     | \$261,100 | \$30,404 |  | \$60,000 |

An explanation of the categories within the budgets are as follows below:

- Expenditure consists of operation and maintenance costs;
- Renewals are replacement of assets which are nearing or exceeded their useful life;
- Projects are investigations, decisions and planning activities which exclude capital works; and
- Capital projects are activities involving physical works.

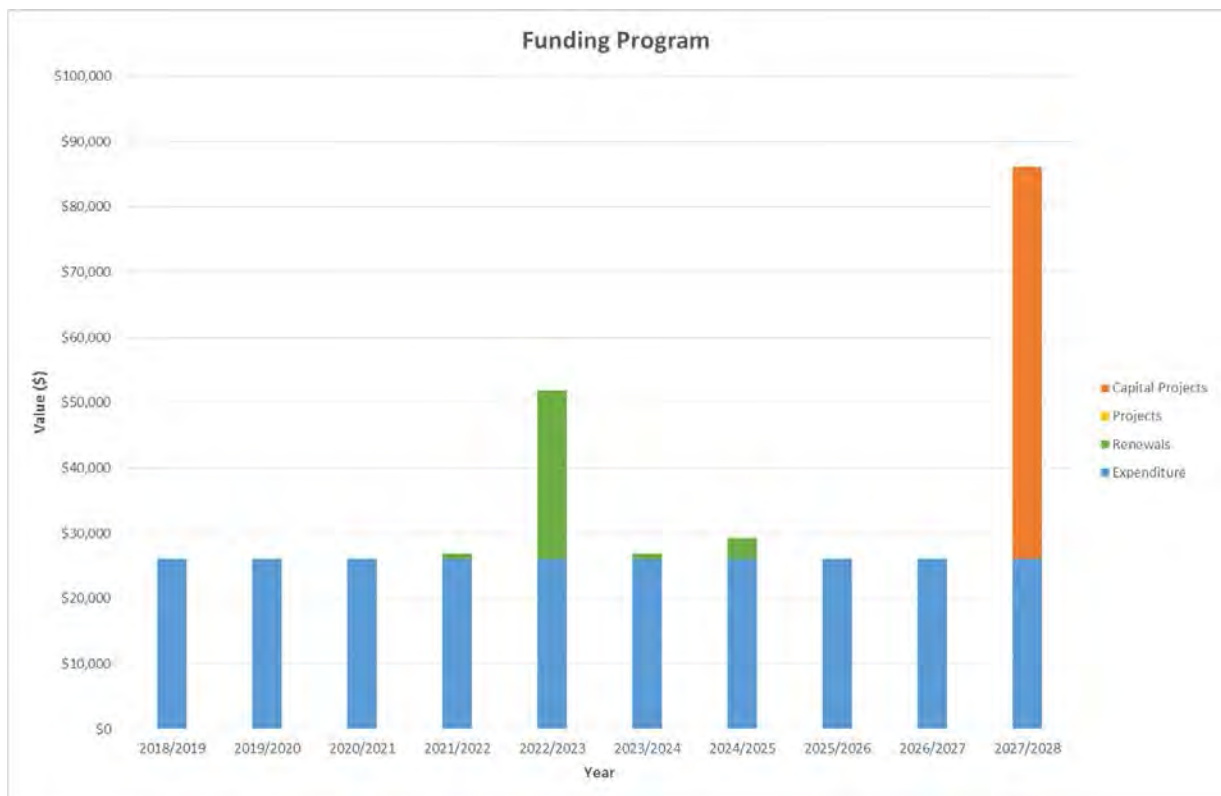


**Figure 10-10 Jowers Road Funding Summary**

There is one major project for Jowers Road water scheme in the LTP budget.

**Table 10-11 Key Projects**

| Account Label    | GL        | Description | Year 1 (\$) | Year 2 (\$) | Year 3 (\$) | Years 4 to 10 | Funding Split <sup>7</sup> |
|------------------|-----------|-------------|-------------|-------------|-------------|---------------|----------------------------|
| Capital Projects | 403690037 | Filtration  |             |             |             | \$60,000      | 100% LoS                   |

The list of district wide projects can be found in 5Waters Activity Management Plan: Volume 1.

### Discussion on Projects

Projects have been determined based on their:

- Relevance to the scheme
- Requirement to be completed under legislation
- Ability to bring the scheme up to or maintain the Level of Service required under council's Asset Management Policy.

Many projects are **jointly** funded by more than one scheme and activity. Each scheme pays a pro-rata share only, equivalent to the number of connections.

### Discussion on Capital and Projects

Where relevant, Capital (Levels of Service) and Capital (Growth) projects have been included in the scheme financial details.

Levels of Service Projects and growth splits have been provided to ensure the costs of population driven works are clear.

<sup>7</sup> Where LoS refers to Level of Service and G refers to Growth

## 11.0 KIRWEE WATER SUPPLY

### 11.1 Scheme Summary

| Description                                   |                                   | Quantity                                    |
|-----------------------------------------------|-----------------------------------|---------------------------------------------|
| <b>Estimated Population Served</b>            |                                   | 1218                                        |
| <b>Scheme Coverage</b><br>(1 Jan 2018)        | Full Charges                      | 343                                         |
|                                               | Half Charges                      | 0                                           |
|                                               | >1 Charges                        | 92 (88 restricted)                          |
| <b>System Components</b>                      | Bores/Intakes (No.)               | 1                                           |
|                                               | Treatment/Disinfection            | UV Treatment                                |
|                                               | Reservoirs (No.)                  | 1                                           |
|                                               | Pump Stations (No.)               | 0                                           |
|                                               | Piped (m)                         | 47051                                       |
| <b>History</b>                                | Original scheme installation date | 1981                                        |
| <b>Value (\$)</b>                             | Replacement Cost                  | \$5,430,070.01                              |
|                                               | Depreciated Replacement Cost      | \$3,591,160.79                              |
| <b>Financial</b>                              | 2018/2019 Estimate                | \$94,080                                    |
|                                               | Annual maintenance cost           | 2.94%                                       |
|                                               | % of total                        |                                             |
| <b>Demand (m3)</b><br>(1 Jan – 31 Dec 2017)   | Average daily                     | 620                                         |
|                                               | Peak daily                        | 2,016                                       |
|                                               | Minimum daily                     | 223                                         |
|                                               | Average daily per connection      | 1.8                                         |
| <b>Type of Supply</b>                         |                                   | Medium pressure restricted and unrestricted |
| <b>Target Pressure &amp; Flow at boundary</b> | Pressure                          | >310kPa (150kPa restricted)                 |
|                                               | Flow                              | >20 L/min (±10% maric restricted)           |
| <b>Sustainability</b>                         | Well Security                     | Secure                                      |

### 11.2 Key Issues

The following key issues are associated with the Kirwee water supply. A list of district wide issues are located in 5Waters Activity Management Plan: Volume 1.

**Table 11-1 Kirwee Scheme Issues**

| What's the Problem                                                              | What we plan to do                                                                                                                                                                                                                                                                                |
|---------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Due to the significant growth of Kirwee, new wells are required to meet demand. | Council will continue to review the water infrastructure plan on an annual basis while considering actual and predicted growth. Infrastructure will be provided as and when required in consideration of the urban/industrial split. Detailed network modelling supports the infrastructure plan. |

### 11.3 Overview & History

Kirwee water supply provides untreated groundwater from a deep well to both the Kirwee Township (unrestricted supply) and a restricted supply to rural properties surrounding the township.

The water supply was installed in 1981 to replace individual supplies from roof tanks and water races. The township area was designed as a medium pressure, unrestricted supply, with restricted connections in the rural area for domestic use only (2m<sup>3</sup>/day per connection). The township zone scheme has full "Fire Fighting Capacity".

The pumping and control system was upgraded in 1997 with additional pumps installed in both 2005/06 and 2009/10.

During the 2015-28 LTP period UV treatment and a backup generator was added to the scheme.

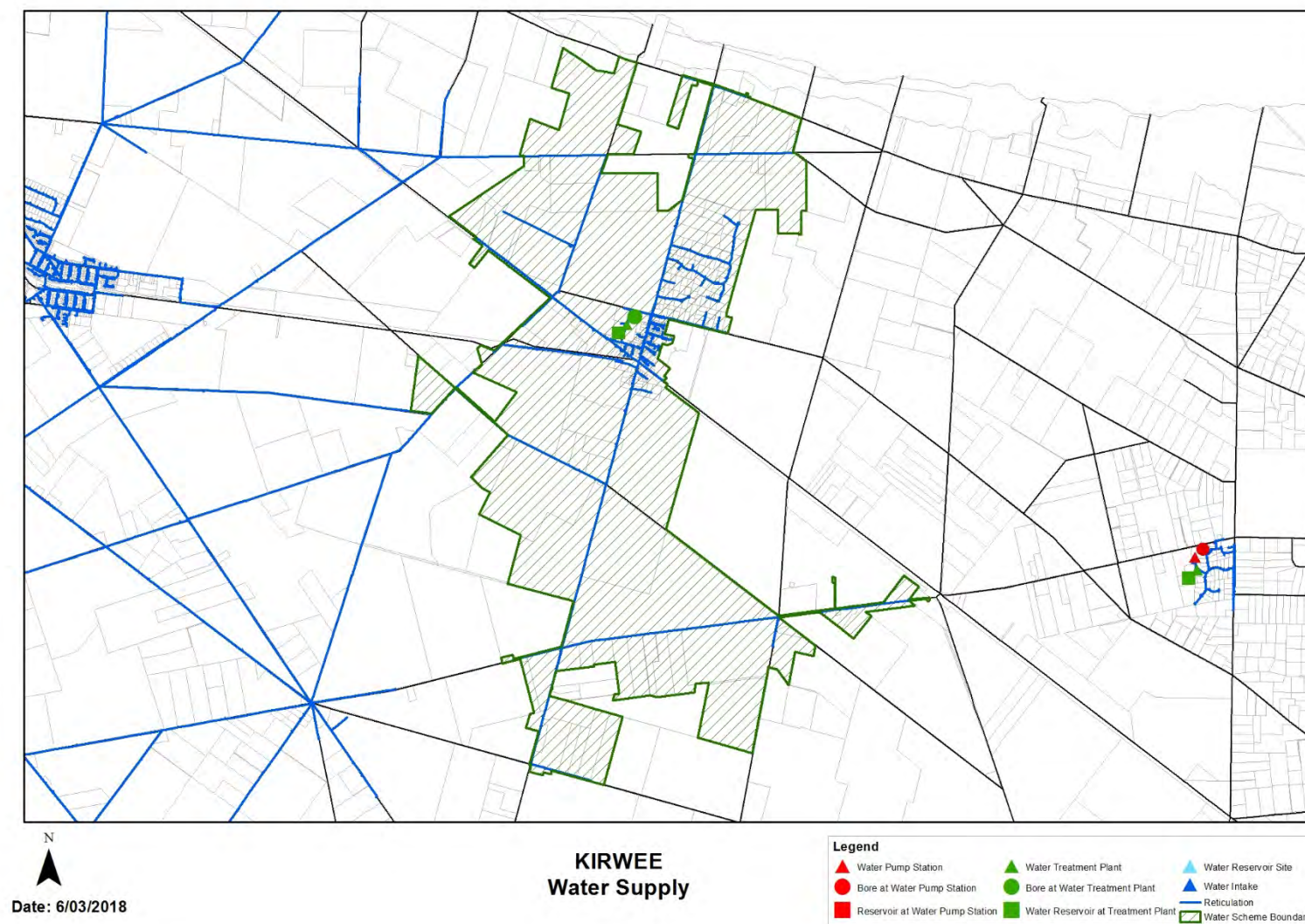


**Figure 11-1 Scheme Map**



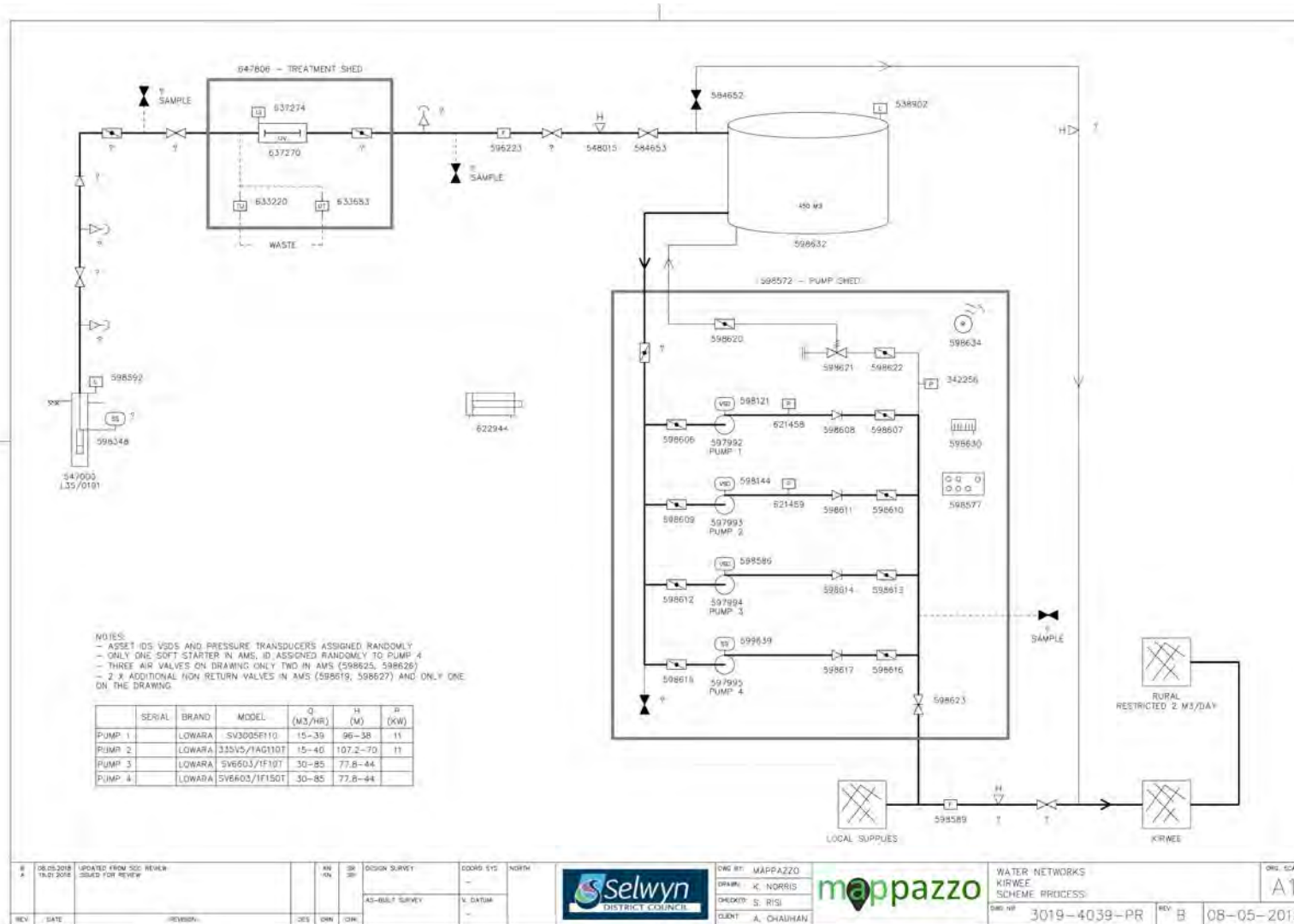


Figure 11-2 Scheme Schematic

## 11.4 System Capacity

Kirwee has potential for growth in terms of zoned land availability and projections suggest growth over the next 30 years. The Kirwee supply also delivers a restricted supply to a small proportion (<10%) of properties. On-demand (town) connections typically use less water but generate a higher peak flow rate, while restricted (rural) connections require more water but this is trickle fed at a low flow rate. The restricted connections are not metered separately so this capacity assessment considers the supply as a whole.

**Table 11-2 Capacity**

|                                                                                   | Flow Rate<br>(L/s) | Daily Volume<br>(m <sup>3</sup> ) | Annual Volume<br>(m <sup>3</sup> ) | Comments                                                                                             |
|-----------------------------------------------------------------------------------|--------------------|-----------------------------------|------------------------------------|------------------------------------------------------------------------------------------------------|
| Consented Take                                                                    | 45                 | 3110                              | 396,450                            | CRC158020                                                                                            |
| Peak Demand - current                                                             | 38L/s              | 2400 <sup>1</sup>                 | 245,000 <sup>2</sup>               |                                                                                                      |
| Abstraction capacity                                                              | 36                 | 3110                              | -                                  | One bore pump<br>Capacity limited by consent                                                         |
| Distribution pumping                                                              | 53.2               | -                                 | -                                  | 4 pumps (duty/assist) from<br>450m <sup>3</sup> storage – can buffer<br>peak flows but not peak days |
| * inferred value; <sup>1</sup> 15 January 2013; <sup>2</sup> July 2012-June 2013; |                    |                                   |                                    |                                                                                                      |

The water take consent limits the maximum rate of take to 45 L/s. This is greater than the installed pump capacity. There is 450 m<sup>3</sup> of reservoir storage and a booster pumping system so the maximum flow rate that can be supplied to the community is 53 L/s.

The water take consent limits the maximum daily take to 3110 m<sup>3</sup> (21,770 in any 7 day period)

The water supply is operating at its limit in terms of peak day demand and it is probable that water restrictions will need to be imposed from time to time to keep demand within the capacity of the infrastructure and the consented daily abstraction limit. Peak summer demands are very high relative to average winter demand (8x greater), suggesting considerable scope for demand management. Growth related infrastructure upgrades will be required. Council is trailing demand management measures which include reduced pressure management (reduced pressure 590KPA to 420KPA) and low level water restrictions.

In response to the accelerated growth within the Selwyn District hydraulic models have been used to plan future water infrastructure for a number of the water supplies. Hydraulic models have been built and calibrated to international best practice to carry out the '30-year Water Infrastructure Master Planning'.

The master planning provides an assessment of the sizing and timing of new infrastructure for new water sources (wells) and pipelines to service growth. Part of the master planning requires a water balance to be developed to forecast growth, using historical peak demand per household. The water balance forecasts the peak instantaneous flow per year versus the water resources available to determine the staging of new wells. The well staging assumes that one well is redundant for each water supply, to take into consideration maintenance of wells, planning/timing of new wells and security of supply i.e. to maintain average/peak demand.

Population projections are based on SDC 'Household Projections 2018 to 2048' and have been applied to the latest connection figures for each township.

Figure 11-3 shows the projected growth for Rolleston to 2048 per planning horizon (5 years intervals) in accordance with the latest House Projections.

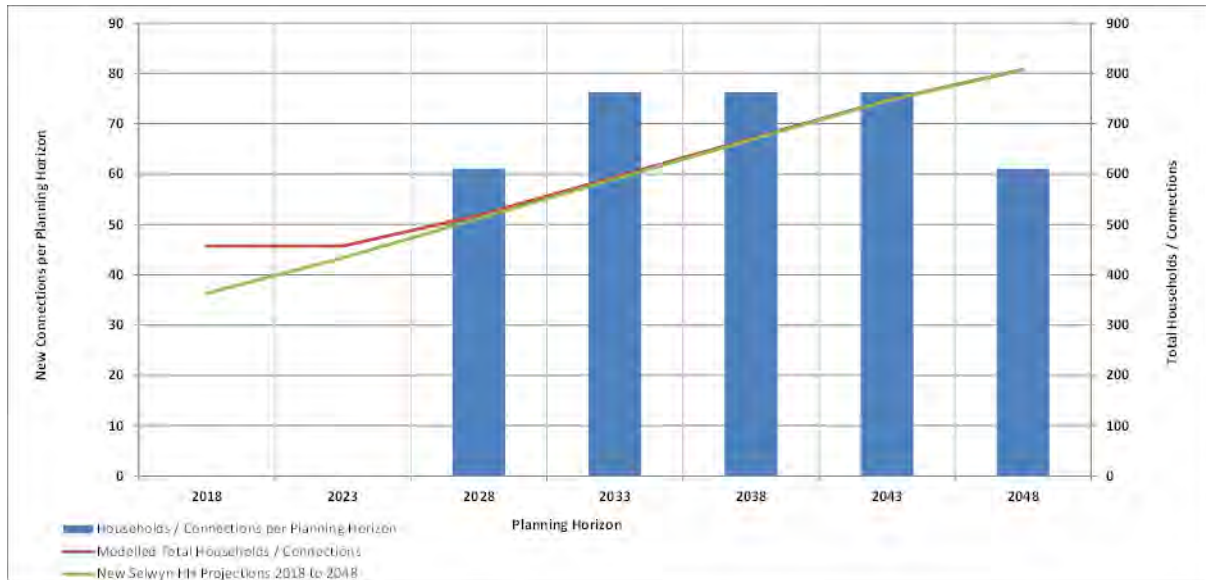


**Figure 11-3 Kirwee Household Projects**

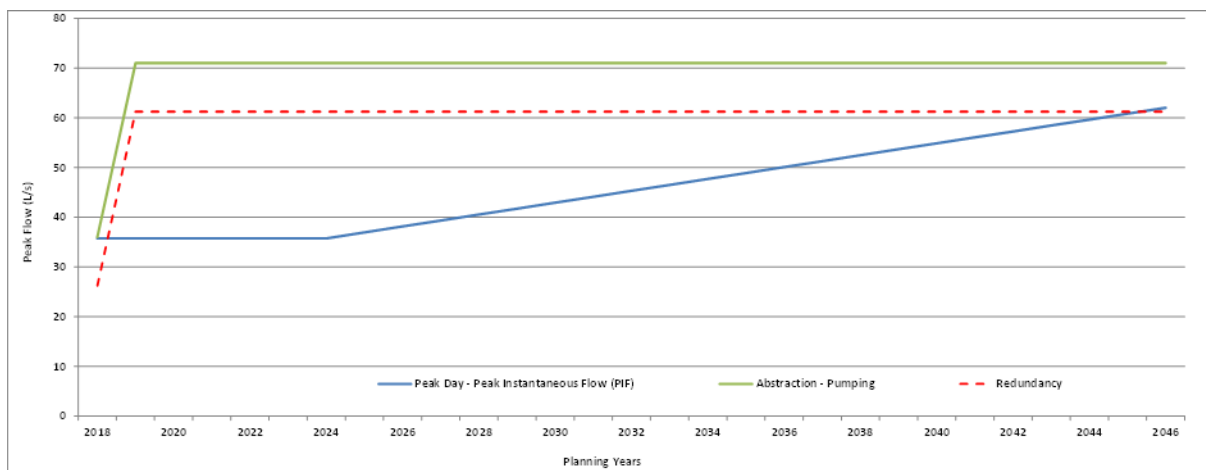


**Figure 11-4 Kirwee Water Demand**

**Table 11-3 Water Source Current Capacity**

| Sites Available | Well | Capacity (L/s) |
|-----------------|------|----------------|
| High Street     | 1    | 36             |

**Table 11-4 Water Source Future Capacity**

| New Site ID | Well/Site | Location                           | Planning Year | Yield (L/s) |
|-------------|-----------|------------------------------------|---------------|-------------|
| Kirw1       | Well      | New Site (nr. Kirwee Model School) | 2019          | 35          |

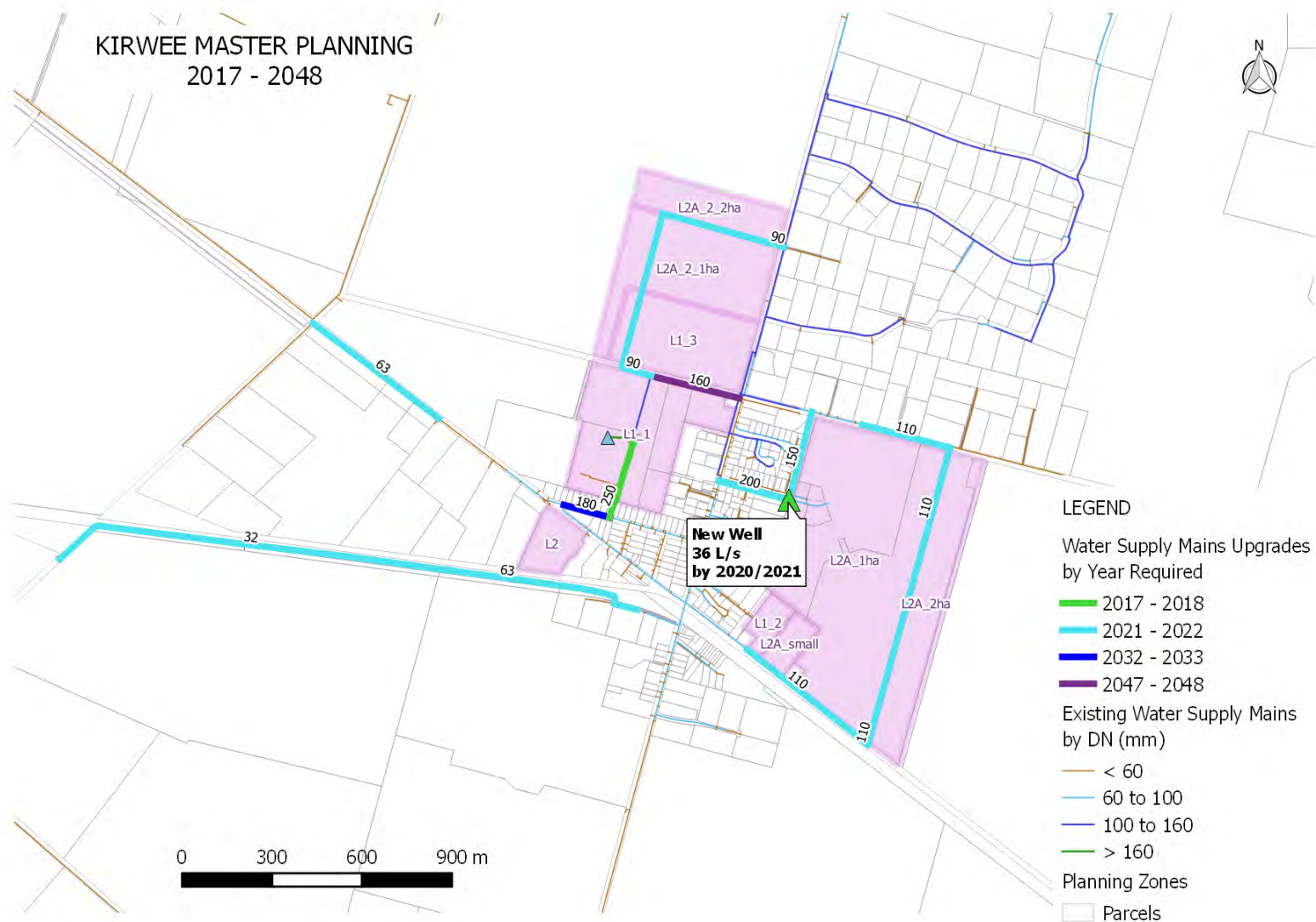


**Figure 11-5 Kirwee Master Plan**

## 11.5 Resource Consents

The Kirwee water supply has a number of resource consents. Table 11-5 shows the water take permitted by the resource consents for this scheme.

**Table 11-5 Resource Consents**

| Consent                      | Description                  | Location                    | Date Issued | Expiry Date | Consented Max Instantaneous Flow (L/s) | Consented Max Daily Volume (m <sup>3</sup> /day) |
|------------------------------|------------------------------|-----------------------------|-------------|-------------|----------------------------------------|--------------------------------------------------|
| CRC158020<br>(Issued-Active) | To take and use groundwater. | Hoskyns Road, KIRWEE DOMAIN | 11-Sep-01   | 31-Jan-35   | 45                                     | 3110<br>(21,770 per 7 days)                      |

## 11.6 Water Quality

The Kirwee water supply is a secure source and is currently sampled twice weekly at the treatment plant and weekly in the reticulation zone.

The following details E. coli transgressions for the period 2012 to 2017.

### Treatment

There have been two E. coli Treatment transgressions during this period which occurred in September 2013 and June 2017.

### Zone

There have been five E. coli treatment transgressions during this period. These transgressions have been attributed to the reservoir which has been upgraded.

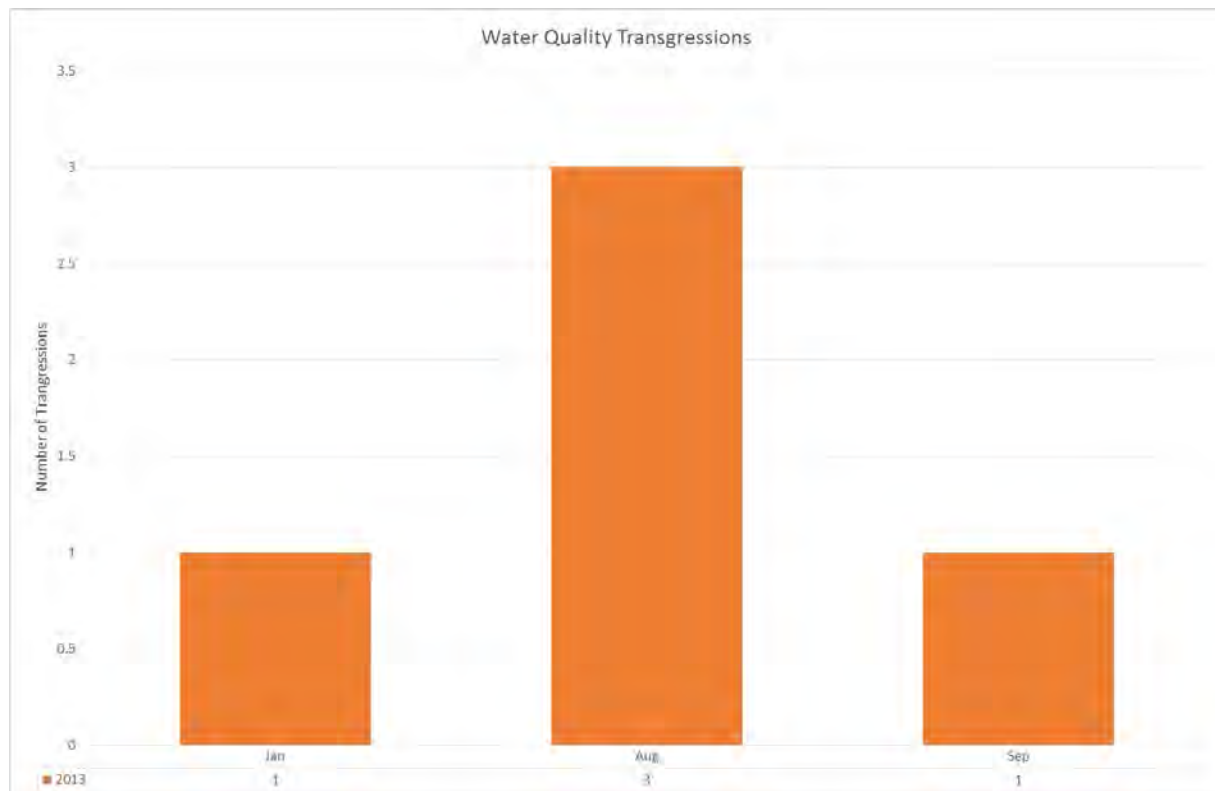


**Figure 11-6 E.coli Transgressions - Zone**

### Chemical Analysis

The following is a summary of the raw water chemical analysis carried out at the Kirwee Water Supply.

**Table 11-6 Kirwee Water Supply Raw Water Chemical Analysis Summary**

| Parameter                                   | Standards<br>MAV* (GV)** | Plant 2015 | Plant 2017 | Status |
|---------------------------------------------|--------------------------|------------|------------|--------|
| Total Lead (g/m3)                           | 0.01                     | <0.00011   | 0.000114   | ✓      |
| pH (pH units)                               | 7-8.5                    | 7.8        | 7.7        | ✓      |
| Total Hardness (g/m3 as CaCO <sub>3</sub> ) | <200                     | 54         | 49.3       | ✓      |
| Total Calcium (g/m3)                        | n/v                      | 18.6       | 16.98      | ✓      |
| Total Iron (g/m3)                           | <0.2                     | <0.021     | < 0.021    | ✓      |
| Total Sodium (g/m3)                         | <200                     | 8.4        | 7.94       | ✓      |
| Nitrate - Nitrogen (g/m3)                   | 11.3                     | 4.8        | 4.32       | ✓      |

\* MAV – Maximum Acceptable Value

\*\* (GV) – Guideline Value

## 11.7 Scheme Assets

A summary of material and diameter for pipes in Kirwee is shown in

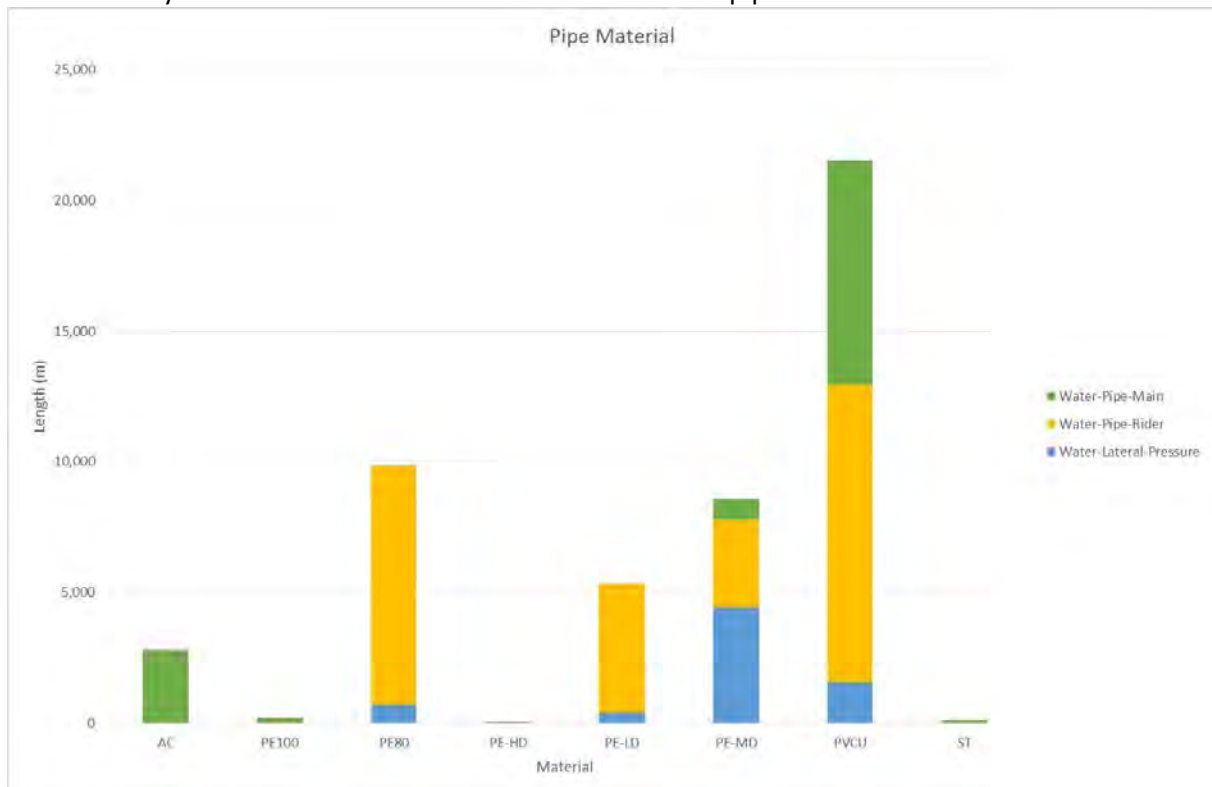


**Figure 11-7 and Figure 11-8.**



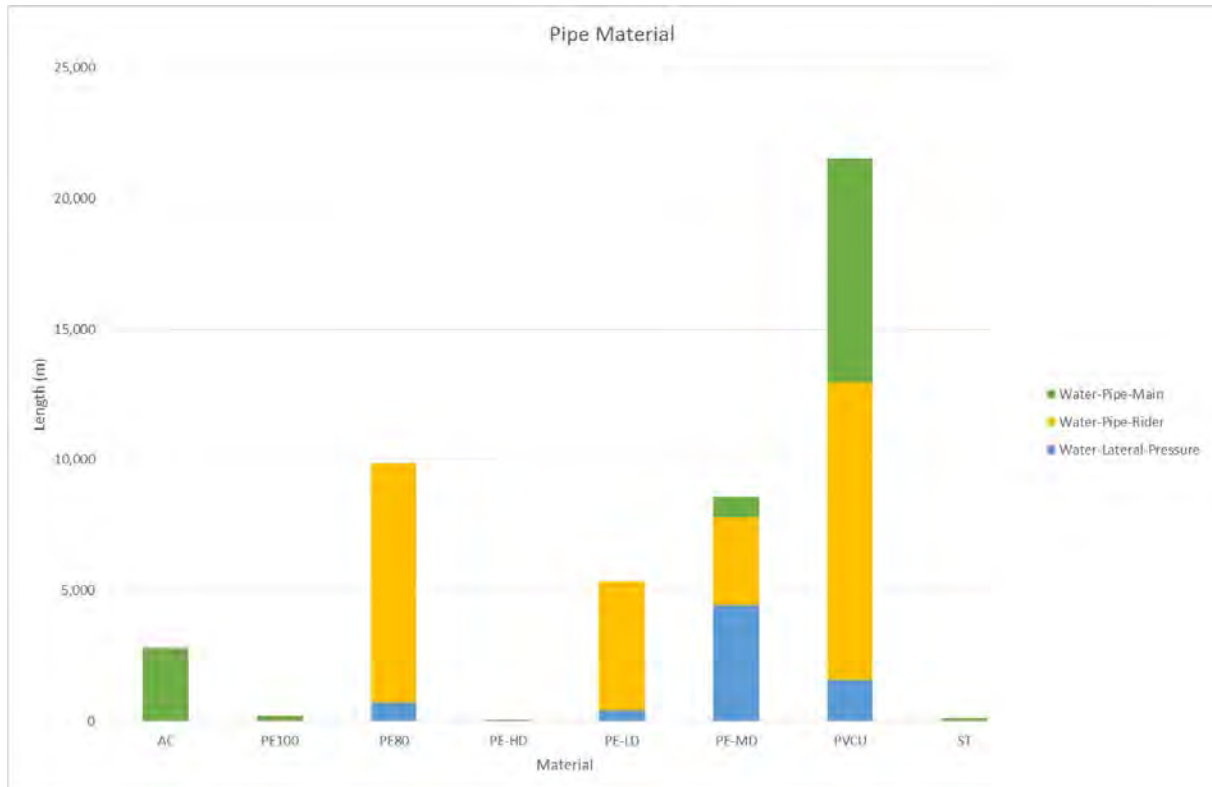


**Figure 11-7 Pipe Material – Kirwee**

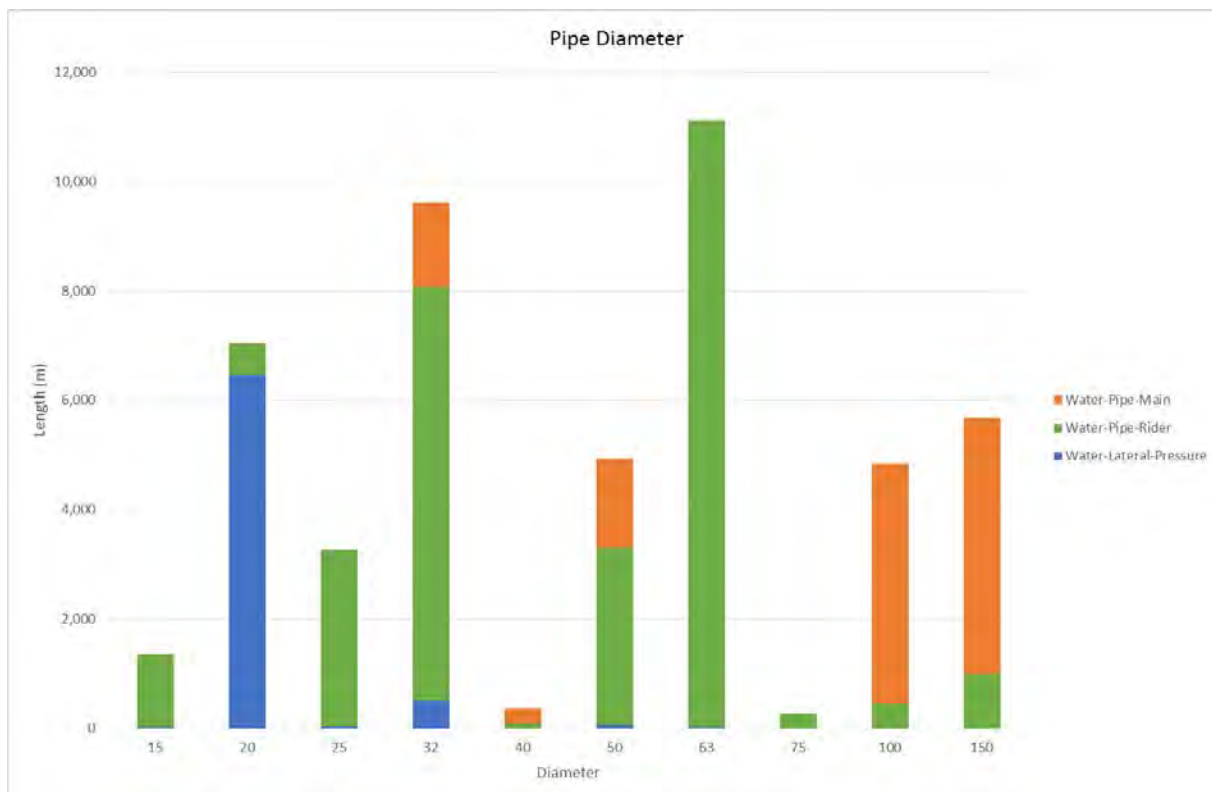


**Figure 11-8 Pipe Diameter – Kirwee**

## 11.8 Operational Management

The water supply is operated and maintained under two maintenance contracts as follows:

- Contract 1241: Water Services Contract. Contract is with SICON Ferguson who undertakes investigations, conditions inspections, proactive and reactive maintenance and minor asset renewals; and
- Contract 1202: Parks and Reserves Contract. Contract is with SICON Ferguson who undertakes the maintenance of land scape features related to water services e.g. mowing, gardens etc.

Water quality sampling is completed under an agreement with Food and Health Ltd as required.

## 11.9 Photos of Main Assets



Photo 1: Well head



Photo 2: Reservoir and Pump Shed

### 11.10 Risk Assessment

A risk assessment has been undertaken for the Kirwee scheme. The key output from the risk assessment is the identification of any extreme and high risks which need to be mitigated. In order to mitigate these risks they have been included and budgeted for in the projects within this LTP. Table 11-7 outlines the risk priority rating, Table 11-8 outlines the risks and the list of key projects is found in Table 11-13.

Table 11-7 Risk Priority Rating

| Risk Score | Level of Risk | Risk Response                                                                                                                                             |
|------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| > 50       | Extreme       | Awareness of the event to be reported to Council.<br>Urgent action to eliminate / mitigate / manage the risk.<br><br>Document risk and action in the AMP. |
| 35-50      | Very High     | Risk to be eliminated / mitigated / managed through normal business planning processes with responsibility assigned.                                      |
| 14-35      | High          | Manage risk using routine procedures.                                                                                                                     |
| 3.5-14     | Moderate      | Monitor the risk.                                                                                                                                         |

|       |     |                                                                                                                                                                       |
|-------|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| < 3.5 | Low | Awareness of the event to be reported to Council.<br>Immediate action required to eliminate / mitigate / manage the risk.<br><br>Document risk and action in the AMP. |
|-------|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|

**Table 11-8 Risks – Kirwee**

| Risk                                                    | Action/Project                                                            | Year Identified | 2014 Risk Rating | 2017 Risk Rating | Residual Risk Rating |
|---------------------------------------------------------|---------------------------------------------------------------------------|-----------------|------------------|------------------|----------------------|
| Single source of supply - risk of supply interruption   | Commission and connect abandoned Darfield well or add alternative source. | 2014            | 40               | 40               | 20                   |
| Electrical failure due to lightning or network spikes   | Install surge diverters                                                   | 2014            | 20               | 7                | 7                    |
| Failure to meet NES water meter standards               | NES Water Meter Compliance                                                | 2014            | 20               | 6                | 6                    |
| Inability to collect income from non-metered properties | Install property water meters                                             | 2014            | 27               | 0.6              | 0.6                  |
| Non-compliance with the DWSNZ                           | DWSNZ - Age Testing                                                       | 2014            | 20               | 0.7              | 0.7                  |
| Non-compliance with the DWSNZ                           | DWSNZ - Bore-head security                                                | 2014            | 20               | 20               | 20                   |
| Non-consented activities                                | Renewal of consents                                                       | 2014            | 27               | 27               | 6                    |
| Backflow at treatment building                          | Install backflow                                                          | 2017            |                  | 10               | 2                    |
| Ground chamber flooding                                 | New soakhole to drain chamber                                             | 2017            |                  | 20               | 7                    |

The list of district wide risks can be found in 5Waters Activity Management Plan: Volume 1.

### 11.11 Asset Valuation Details

The total replacement value of assets within the Kirwee water scheme is \$5,430,070 with further details in Table 11-9 below.

**Table 11-9 Replacement Value, Kirwee**

| Asset Class 1              | Asset Class 2 | Sum of Replacement Value |
|----------------------------|---------------|--------------------------|
| <b>Plant and Equipment</b> |               | \$1,137,719              |
| <b>Water Reticulation</b>  | Hydrant       | \$143,910                |
|                            | Lateral       | \$253,668                |
|                            | Pipe          | \$3,470,353              |

|  |              |           |
|--|--------------|-----------|
|  | Supply Point | \$331,019 |
|  | Valve        | \$93,401  |

Replacement values for these different types of assets are shown in Figure 11-9 below.

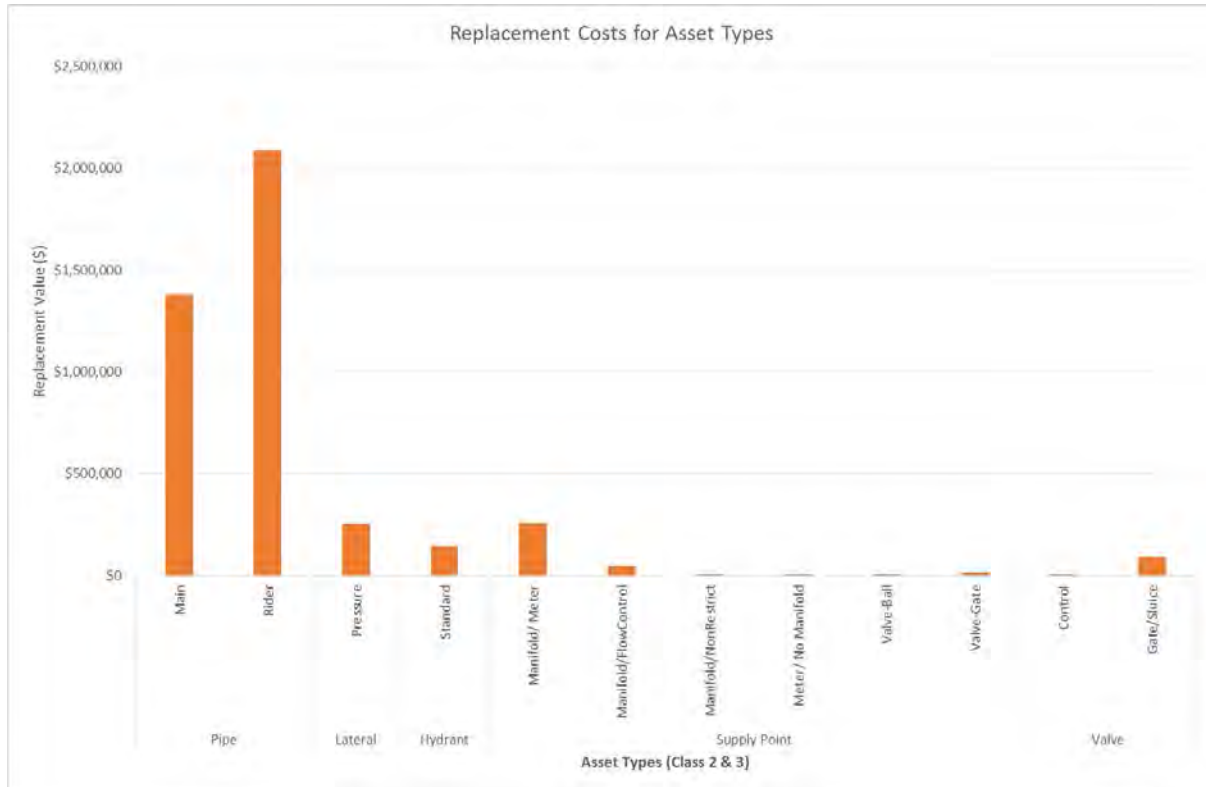


**Figure 11-9 Replacement Costs for Kirwee**

## 11.12 Renewals

The renewal profile has been taken from the 2017 5 Waters Valuation. A graph showing the renewals for this scheme are shown by Figure 11-10 below. The majority renewals occur in 2029/2030.

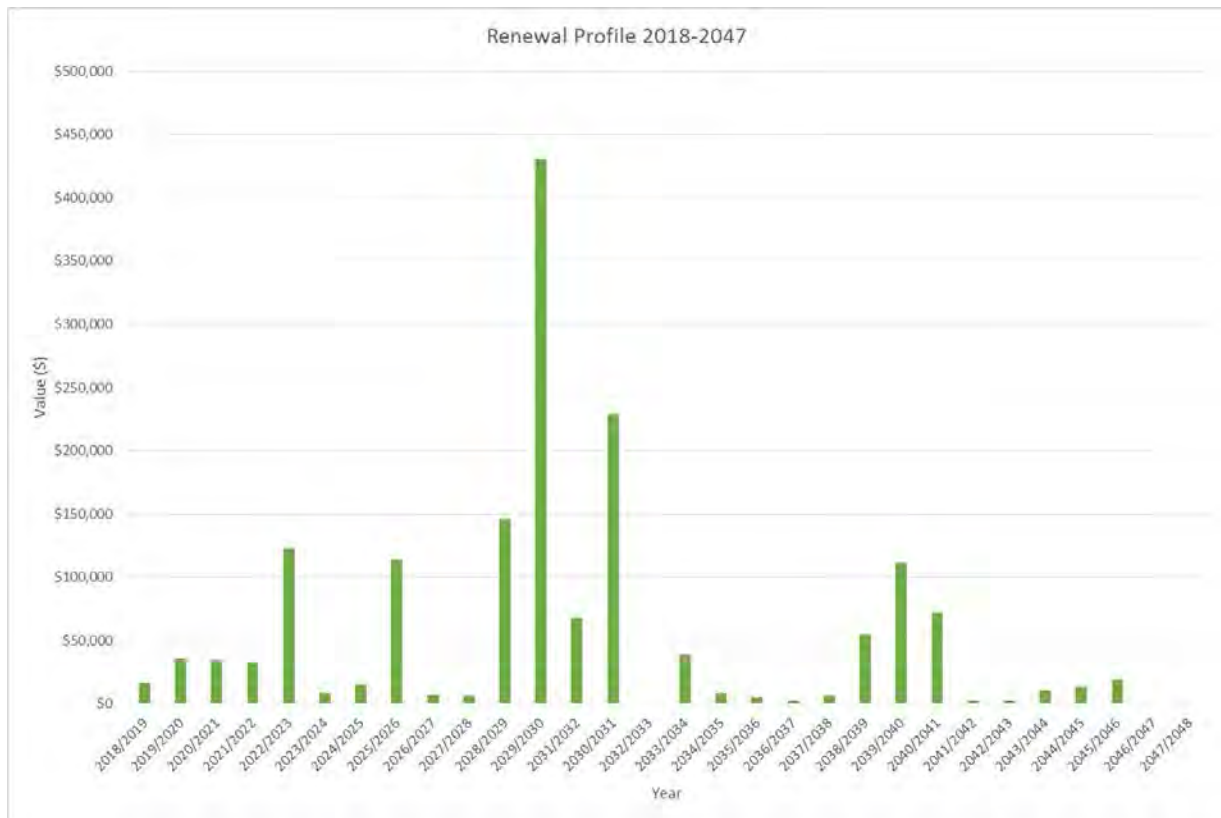


**Figure 11-10 Kirwee Water Renewal Profile**

### 11.13 Critical Assets

The criticality model for Kirwee has been updated for the 2018 AcMP. The methodology of the criticality model can be found in 5Waters Activity Management Plan: Volume 1 and it provides details of how the criticality has been calculated for the reticulation assets. Table 11-10 and Figure 11-11 below shows the calculated criticality for all of the assets within this scheme that have a recorded known length.

**Table 11-10 Length of Assets per Criticality Level**

| Criticality Bands |             | Length (m) |
|-------------------|-------------|------------|
| 5                 | Low         | 37,584     |
| 4                 | Medium-Low  | 4,022      |
| 3                 | Medium      | 5,742      |
| 2                 | Medium-High | 458        |
| 1                 | High        | 0          |



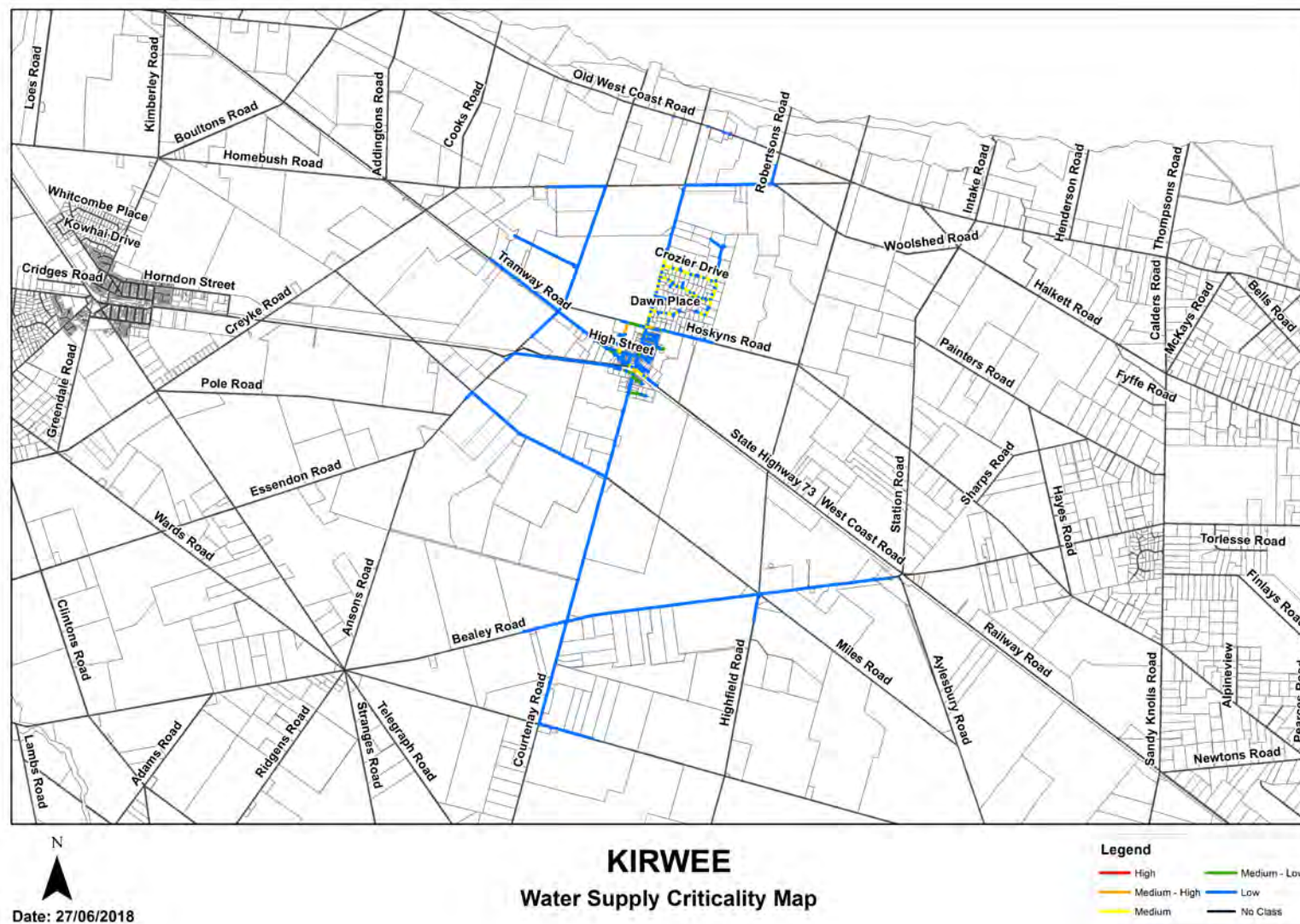


Figure 11-11 Criticality Map

## 11.14 Asset Condition

The asset condition model was run for Kirwee in 2018. The methodology of the model can be found in 5Waters Activity Management Plan: Volume 1 which provides details of how the model has been calculated for the pipe reticulation assets. Figure 11-12 below shows the level of asset condition for these assets within this scheme that have a recorded known condition.

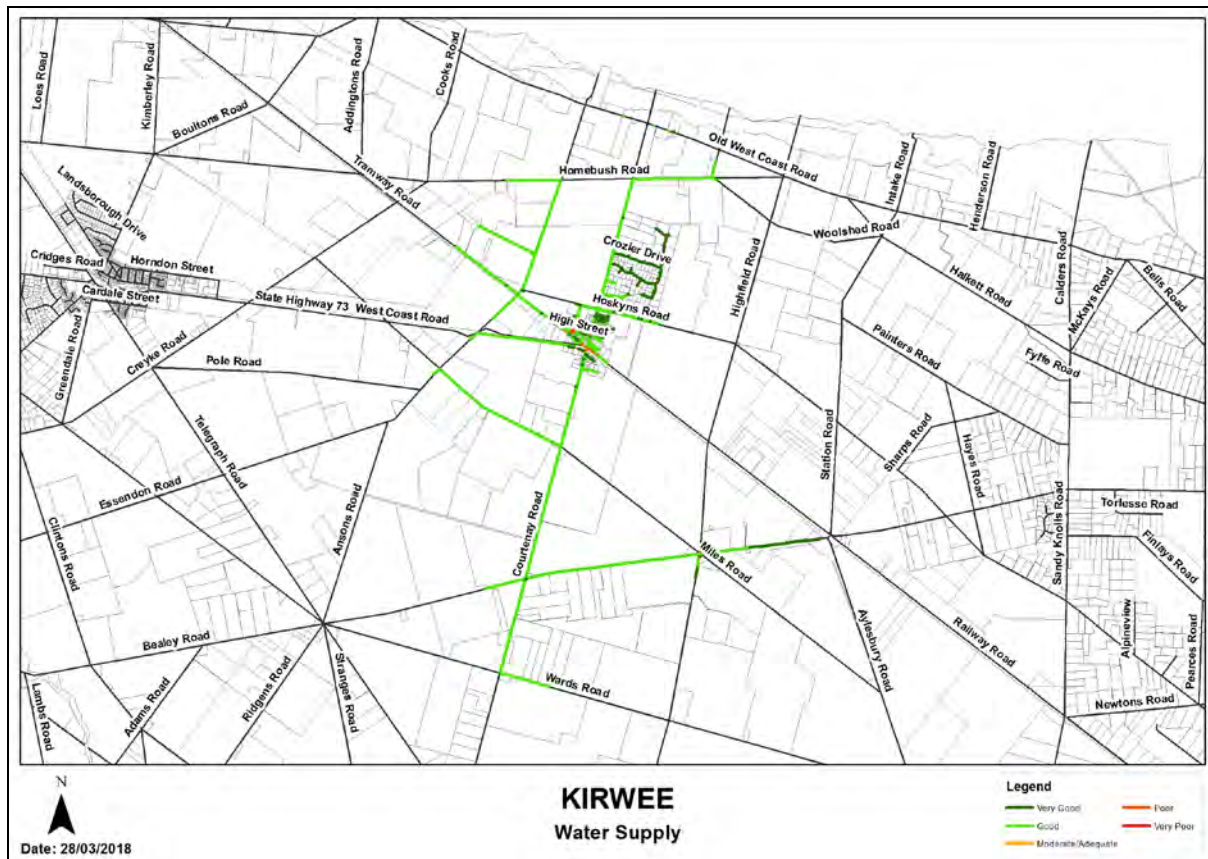


**Figure 11-12 Asset Condition – Kirwee**

Table 11-11 provides a description of the condition rating used within the condition model.

**Table 11-11 Asset Condition Grading**

| Condition Rating | Grading   |
|------------------|-----------|
| 1.0              | Excellent |
| 2.0              | Good      |
| 3.0              | Moderate  |
| 4.0              | Poor      |
| 5.0+             | Fail      |



The number of pipe faults is also measured through the asset management system. Figure 11-13 shows the known historic pipe failures within this scheme.

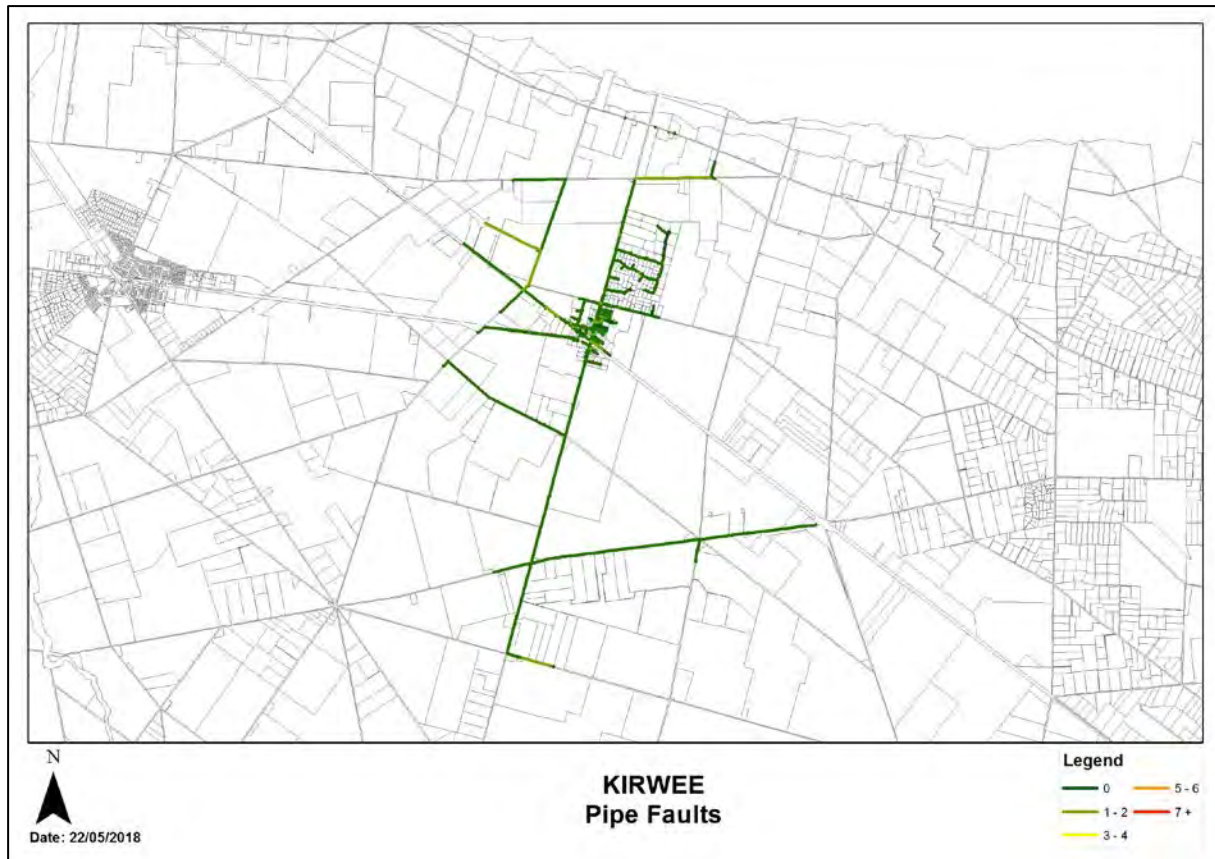


**Figure 11-13 Pipe Faults, Kirwee**

### 11.15 Funding Program

The 10 year budgets for Kirwee are shown by Table 11-12 and Figure 11-14. Budgets are split into expenditure, renewals, projects and capital projects.

All figures are (\$) not adjusted for CPI “inflation”. They are calculated on historical data, and population growth where relevant.

**Table 11-12 Kirwee Budget Summary**

| Years     | Expenditure | Renewals  | Projects | Capital Projects |
|-----------|-------------|-----------|----------|------------------|
| 2018/2019 | \$94,080    | \$16,342  |          | \$70,000         |
| 2019/2020 | \$95,412    | \$35,889  |          | \$807,000        |
| 2020/2021 | \$96,743    | \$34,850  |          |                  |
| 2021/2022 | \$98,075    | \$33,067  |          | \$109,000        |
| 2022/2023 | \$99,407    | \$123,276 |          |                  |
| 2023/2024 | \$100,919   | \$8,607   |          |                  |

|           |             |           |  |           |
|-----------|-------------|-----------|--|-----------|
| 2024/2025 | \$102,431   | \$15,417  |  |           |
| 2025/2026 | \$103,944   | \$113,992 |  |           |
| 2026/2027 | \$105,456   | \$6,748   |  |           |
| 2027/2028 | \$106,969   | \$6,524   |  |           |
| Total     | \$1,003,436 | \$394,712 |  | \$986,000 |

An explanation of the categories within the budgets are as follows below:

- Expenditure consists of operation and maintenance costs;
- Renewals are replacement of assets which are nearing or exceeded their useful life;
- Projects are investigations, decisions and planning activities which exclude capital works; and
- Capital projects are activities involving physical works.

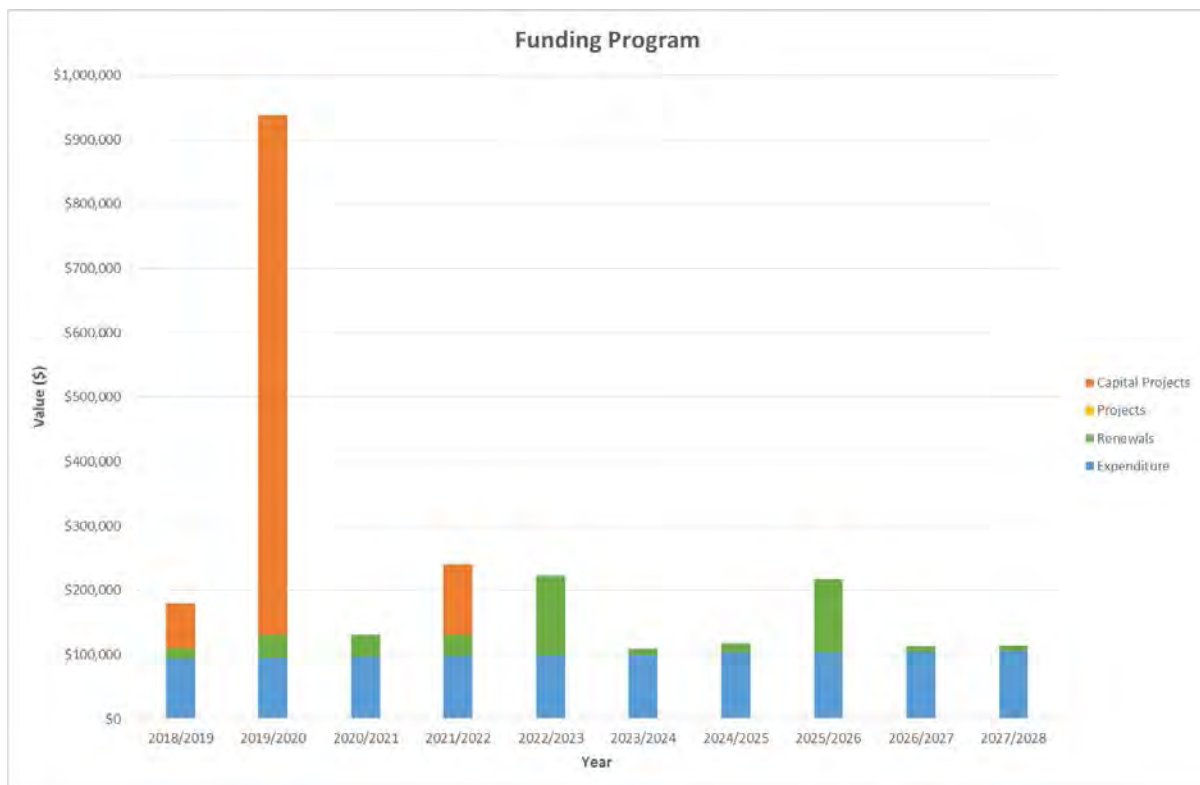


Figure 11-14 Kirwee Funding Summary

There are three major projects for Kirwee water scheme in the LTP budget.

**Table 11-13 Key Projects**

| Account Label    | GL        | Description                           | Year 1 (\$) | Year 2 (\$) | Year 3 (\$) | Years 4 to 10 | Funding Split <sup>8</sup> |
|------------------|-----------|---------------------------------------|-------------|-------------|-------------|---------------|----------------------------|
| Capital Projects | 403990042 | Bore capacity                         |             | \$807,000   |             |               | 100% G                     |
| Capital Projects | 403990043 | Well backflow                         | \$40,000    |             |             |               | 100% LoS                   |
| Capital Projects | 403990044 | Soakhole to drain chamber+flood alarm | \$30,000    |             |             |               | 100% LoS                   |

The list of district wide projects can be found in 5Waters Activity Management Plan: Volume 1.

### Discussion on Projects

Projects have been determined based on their:

- Relevance to the scheme
- Requirement to be completed under legislation
- Ability to bring the scheme up to or maintain the Level of Service required under council's Asset Management Policy.

Many projects are **jointly** funded by more than one scheme and activity. Each scheme pays a pro-rata share only, equivalent to the number of connections.

### Discussion on Capital and Projects

Where relevant, Capital (Levels of Service) and Capital (Growth) projects have been included in the scheme financial details.

Levels of Service Projects and growth splits have been provided to ensure the costs of population driven works are clear.

<sup>8</sup> Where LoS refers to Level of Service and G refers to Growth

## 12.0 LAKE COLERIDGE WATER SUPPLY

### 12.1 Scheme Summary

| Description                                   |                                   | Quantity                          |
|-----------------------------------------------|-----------------------------------|-----------------------------------|
| <b>Estimated Population Served</b>            |                                   | 160                               |
| <b>Scheme Coverage</b><br>(1 Jan 2018)        | Full Charges                      | 56                                |
|                                               | Half Charges                      | 12                                |
|                                               | >1 Charges                        | 1                                 |
| <b>System Components</b>                      | Bores/Intakes (No.)               | Sourced from Trust Power          |
|                                               | Treatment/Disinfection            | UV                                |
|                                               | Reservoirs (No.)                  | Storage tank owned by Trust Power |
|                                               | Pump Stations (No.)               | N/A                               |
|                                               | Piped (m)                         | 4827.79                           |
| <b>History</b>                                | Original scheme installation date | 1920's                            |
| <b>Value (\$)</b>                             | Replacement Cost                  | \$675,897.93                      |
|                                               | Depreciated Replacement Cost      | \$371,385.01                      |
| <b>Financial</b>                              | 2018/2019 Estimate                | \$46,310                          |
|                                               | Annual maintenance cost           | 1.45%                             |
|                                               | % of total                        |                                   |
| <b>Demand</b><br>(1 Jan – 31 Dec 2017)        | Average daily                     | 41                                |
|                                               | Peak daily                        | 123                               |
|                                               | Minimum daily                     | 11                                |
|                                               | Average daily per connection      | 0.73                              |
| <b>Type of Supply</b>                         |                                   | On demand/unrestricted            |
| <b>Target Pressure &amp; Flow at boundary</b> | Pressure                          | >310kPa                           |
|                                               | Flow                              | >20L/min                          |
| <b>Sustainability</b>                         | Well Security                     | Unsecure                          |

### 12.2 Key Issues

The following key issues are associated with the Lake Coleridge water supply. A list of district wide issues are located in 5Waters Activity Management Plan: Volume 1.

**Table 12-1 Lake Coleridge Scheme Issues**

| What's the Problem                                                                                                                                                                                                                       | What we plan to do                                                                                                                                                                                                                                       |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Due to Lake Coleridge's isolated location and distance from the maintenance contractor's base the cost of operation and maintenance is high. The rating base is small and there are also limited skills available within Lake Coleridge. | Council will investigate the potential for enhanced remote monitoring. Council plan to investigate optimisation of maintenance and renewals to ensure costs stay at a minimum.                                                                           |
| Additional treatment of the raw water will be required for compliance with DWSNZ.                                                                                                                                                        | Council will identify options for improved water treatment (protozoa & turbidity) in accordance with the DWSNZ requirements and implement required upgrades. Council will also identify any demand management options work in conjunction with renewals. |

### 12.3 Overview & History

The water supply was installed to serve Electricorp's Township when the Lake Coleridge power station was built in the 1920's. Significant upgrade works occurred in 1994. On completion of these works to reticulation and treatment the Selwyn District Council took over the operation and maintenance of the scheme during 1994.

Water for the former hydro-electric power project village is drawn from the power station penstocks, ie by gravity directly from Lake Coleridge, an unprotected catchment. Water is treated (UV) but doesn't comply with DWSNZ. Customer supply pressure varies depending on the individual property elevation, but is reliable.

There is a small residential population but little commercial activity in the village. Recent subdivision developments in the Lake Coleridge basin including Terrace Downs Resort which is supplied from the Selwyn Rural Scheme.

In November 2011 a variation to the Rakaia River Water Conservation Order was made by Trust Power Ltd. Council staff had a number of concerns which they were submitted. An agreement was signed dated 11 July 2012 between the Council and TrustPower which stated:

*"TrustPower will not, through the Coleridge Project, adversely affect the existing assets held and operated by the Council for the purposes of taking and conveying water from the Rakaia River for the purposes of stock water".*

The community is located within the alpine fault line, and is expected to incur significant damage to its water infrastructure resulting from a 76MMI event.

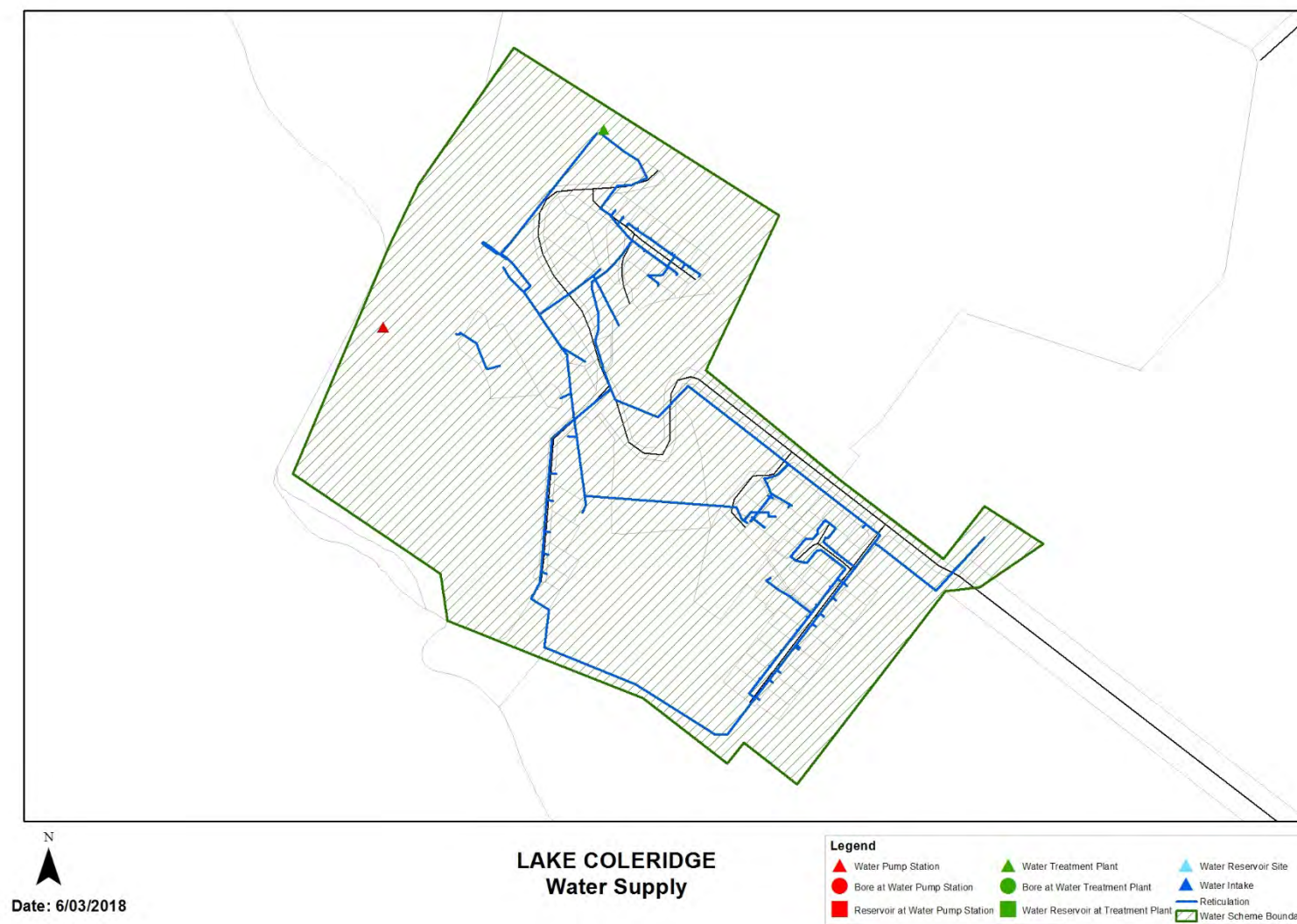


**Figure 12-1 Scheme Map**







## 12.4 System Capacity

The water supply infrastructure provides sufficient capacity for the current level of development in Lake Coleridge Village and will be sufficient to meet some increased demand from allocated connections that are not presently in use. Further development of the village is subject to planning constraints and would require a Plan Change. Planning for growth related capacity upgrades will not be necessary until such time that a Plan Change is considered.

Access to water is governed by an agreement with TrustPower who hold the necessary resource consent.

**Table 12-2 Capacity Summary**

|                                                                    | Flow Rate<br>(L/s) | Daily Volume<br>(m <sup>3</sup> ) | Annual Volume<br>(m <sup>3</sup> ) | Comments                   |
|--------------------------------------------------------------------|--------------------|-----------------------------------|------------------------------------|----------------------------|
| Abstraction Capacity                                               | > treatment        | -                                 | -                                  | TrustPower penstock intake |
| Treatment Capacity                                                 | Unknown            | -                                 | -                                  | UV to be renewed           |
| Consented Take                                                     | na                 | 500                               | na                                 |                            |
| Peak Demand                                                        | 13*<br>4.3**       | 205***                            | 22,700<br>12,860****               |                            |
| * Short duration<br>** 24 Jan 2015<br>*** 18 Jan 2015<br>**** 2014 |                    |                                   |                                    |                            |

The 2013/14 peak day volume is much less (half) than the peak reported previously (after spurious data eliminated). Annual volume data from 2013/14 is incorrect – missing record.

## 12.5 Resource Consents

The Lake Coleridge water supply has a number of resource consents. Table 12-3 shows the water take permitted by the resource consents for this scheme.

**Table 12-3 Resource Consents**

| Consent                      | Description                                                                                                                                   | Location                                             | Date Issued | Expiry Date | Consented Max Instantaneous Flow (L/s) | Consented Max Daily Volume (m <sup>3</sup> /day) |
|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------|-------------|-------------|----------------------------------------|--------------------------------------------------|
| CRC991051<br>(Issued-Active) | To take groundwater via bore K35/0005 at or about map reference NZMS 260 K35:906-588 for reserve public water supply and transformer cooling. | Lake Coleridge Township Water Supply, LAKE COLERIDGE | 15-Jan-99   | 13-Jan-34   | 3.5                                    | 101                                              |

## 12.6 Water Quality

The Lake Coleridge water supply is a non-secure source and is currently sampled weekly at the source, treatment plant and monthly in the reticulation zone.

The following details E. coli transgressions for the period 2012 to 2017

### Source

There have been 15 E. coli source transgressions during this period.

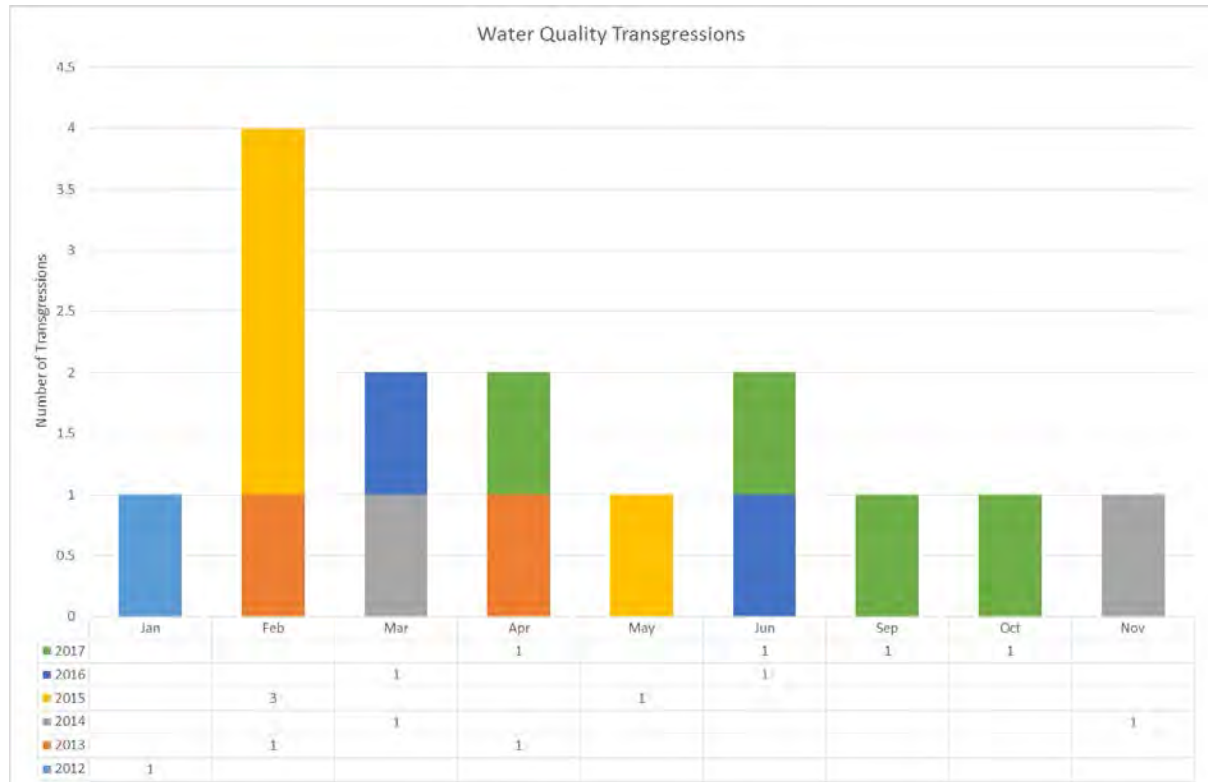


**Figure 12-3 E. coli Transgressions - Source**

### Treatment

There have been no E. coli transgression during this period.

### Zone

There have been no E. coli zone transgressions during this period.

### Chemical Analysis

The following is a summary of the raw water chemical analysis carried out at the Lake Coleridge Water Supply.

**Table 12-4 Lake Coleridge Water Supply Raw Water Chemical Analysis Summary**

| Parameter         | Standards<br>MAV* (GV)** | Plant 2015 | Plant 2017 | Status |
|-------------------|--------------------------|------------|------------|--------|
| Total Lead (g/m3) | 0.01                     | 0.00021    | 0.000266   | ✓      |
| pH (pH units)     | 7-8.5                    | 7.6        | 7.6        | ✓      |

|                                             |      |        |         |   |
|---------------------------------------------|------|--------|---------|---|
| Total Hardness (g/m3 as CaCO <sub>3</sub> ) | <200 | 26     | 24.51   | ✓ |
| Total Calcium (g/m3)                        | n/v  | 9.2    | 8.72    | ✓ |
| Total Iron (g/m3)                           | <0.2 | <0.021 | < 0.021 | ✓ |
| Total Sodium (g/m3)                         | <200 | 2.1    | 1.94    | ✓ |
| Nitrate - Nitrogen (g/m3)                   | 11.3 | <0.05  | < 0.05  | ✓ |

\* MAV – Maximum Acceptable Value

\*\* (GV) – Guideline Value

## 12.7 Scheme Assets

A summary of material and diameter for pipes in Lake Coleridge is shown in Figure 12-4 and Figure 12-5.

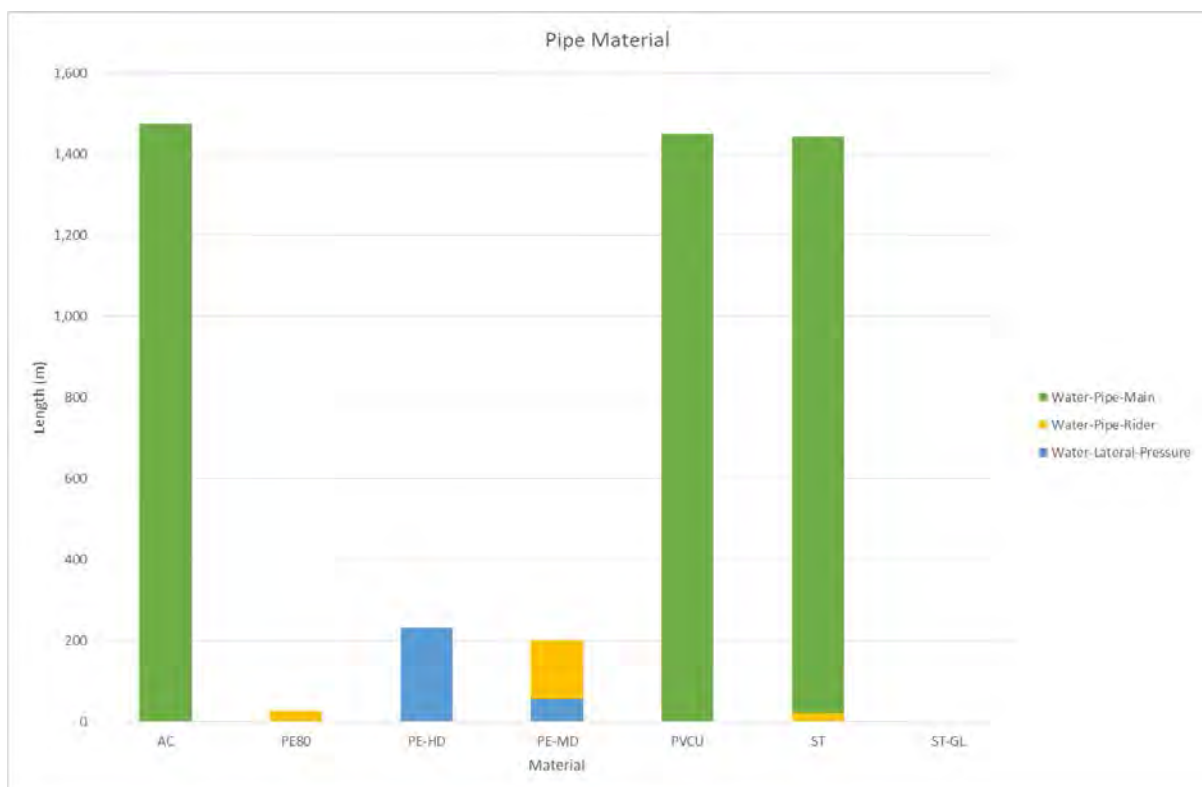


Figure 12-4 Pipe Material – Lake Coleridge

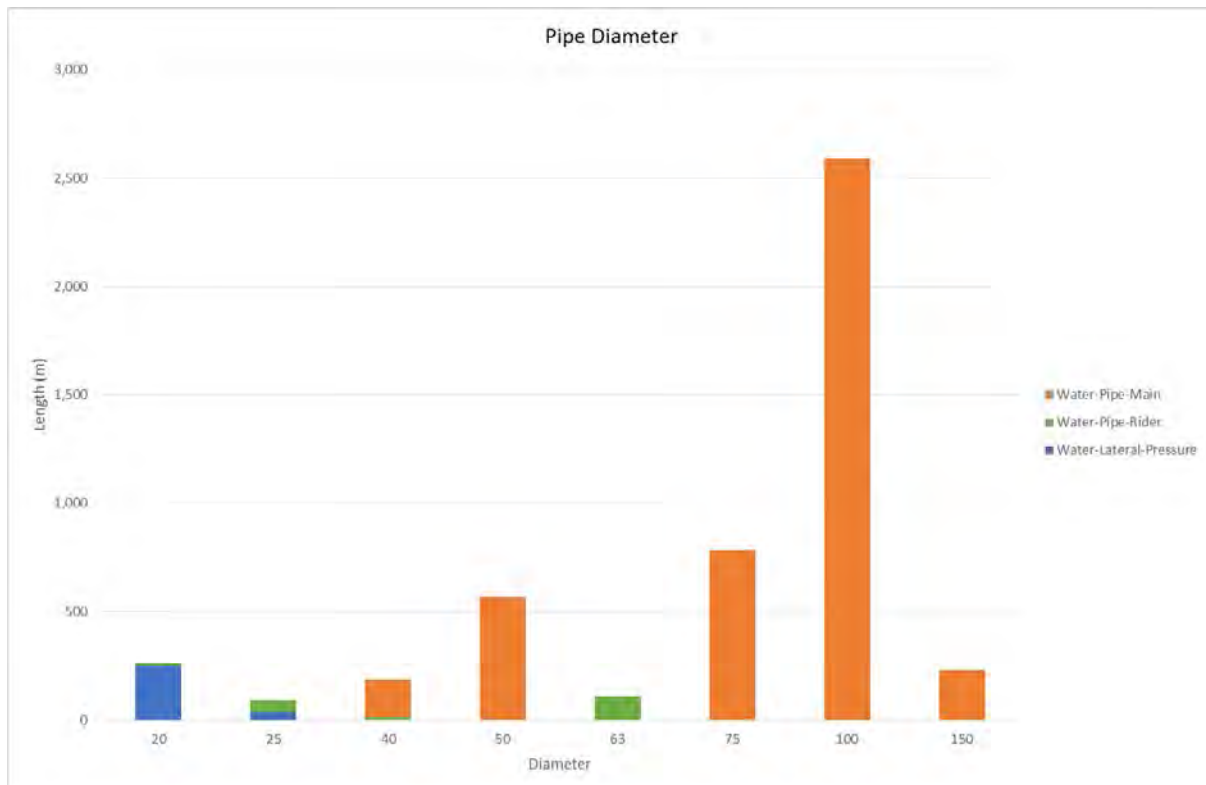


**Figure 12-5 Pipe Diameter – Lake Coleridge**

## 12.8 Operational Management

The water supply is operated and maintained under two maintenance contracts as follows:

- Contract 1241: Water Services Contract. Contract is with SICON Ferguson who undertakes investigations, conditions inspections, proactive and reactive maintenance and minor asset renewals; and
- Contract 1202: Parks and Reserves Contract. Contract is with SICON Ferguson who undertakes the maintenance of land scape features related to water services e.g. mowing, gardens etc.

Water quality sampling is completed under an agreement with Food and Health Ltd as required.

## 12.9 Photos of Main Assets



**Photo 1: Treatment Shed**

## 12.10 Risk Assessment

A risk assessment has been undertaken for the Lake Coleridge scheme. The key output from the risk assessment is the identification of any extreme and high risks which need to be mitigated. In order to mitigate these risks they have been included and budgeted for in the projects within this LTP. Table 12-5 outlines the risk priority rating, Table 12-6 outlines the risks and the list of key projects is found in Table 12-11.

**Table 12-5 Risk Priority Rating**

| Risk Score | Level of Risk | Risk Response                                                                                                                                                         |
|------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| > 50       | Extreme       | Awareness of the event to be reported to Council.<br>Urgent action to eliminate / mitigate / manage the risk.<br><br>Document risk and action in the AMP.             |
| 35-50      | Very High     | Risk to be eliminated / mitigated / managed through normal business planning processes with responsibility assigned.                                                  |
| 14-35      | High          | Manage risk using routine procedures.                                                                                                                                 |
| 3.5-14     | Moderate      | Monitor the risk.                                                                                                                                                     |
| < 3.5      | Low           | Awareness of the event to be reported to Council.<br>Immediate action required to eliminate / mitigate / manage the risk.<br><br>Document risk and action in the AMP. |

**Table 12-6 Risks – Lake Coleridge**

| Risk                                       | Action/Project                            | Year Identified | 2014 Risk Rating | 2017 Risk Rating | Residual Risk Rating |
|--------------------------------------------|-------------------------------------------|-----------------|------------------|------------------|----------------------|
| Loss of power results in loss of treatment | Review options for a back up power source | 2014            | 45               | 45               | 45                   |

|                                                                                                   |                                    |      |    |    |     |
|---------------------------------------------------------------------------------------------------|------------------------------------|------|----|----|-----|
| No water when water is turned off in shed as there is no storage (break pressure tank but no res) | Review option of emergency storage | 2014 | 20 | 20 | 45  |
| Electrical failure due to lightning or network spikes                                             | Install surge diverters            | 2014 | 10 | 10 | 10  |
| Failure to meet NES water meter standards                                                         | NES Water Meter Compliance         | 2014 | 20 | 6  | 6   |
| Inability to collect income from non-metered properties                                           | Install property water meters      | 2014 | 27 | 27 | 2.1 |
| Non-consented activities                                                                          | Renewal of consents                | 2014 | 27 | 27 | 6   |
| Inadequate treatment under all conditions                                                         | Install filtration                 | 2017 |    | 45 | 3.5 |

The list of district wide risks can be found in 5Waters Activity Management Plan: Volume 1.

## 12.11 Asset Valuation Details

The total replacement value of assets within the Lake Coleridge water scheme is \$675,898 with details in Table 12-7 below.

**Table 12-7 Replacement Value, Lake Coleridge**

| Asset Class 1              |              | Asset Class 2 | Sum of Replacement Value |
|----------------------------|--------------|---------------|--------------------------|
| <b>Plant and Equipment</b> |              |               | \$133,537                |
| <b>Water Reticulation</b>  | Hydrant      |               | \$27,439                 |
|                            | Lateral      |               | \$12,506                 |
|                            | Pipe         |               | \$451,056                |
|                            | Supply Point |               | \$19,915                 |
|                            | Valve        |               | \$31,445                 |

Replacement values for these different types of assets are shown in Figure 12-6 below.

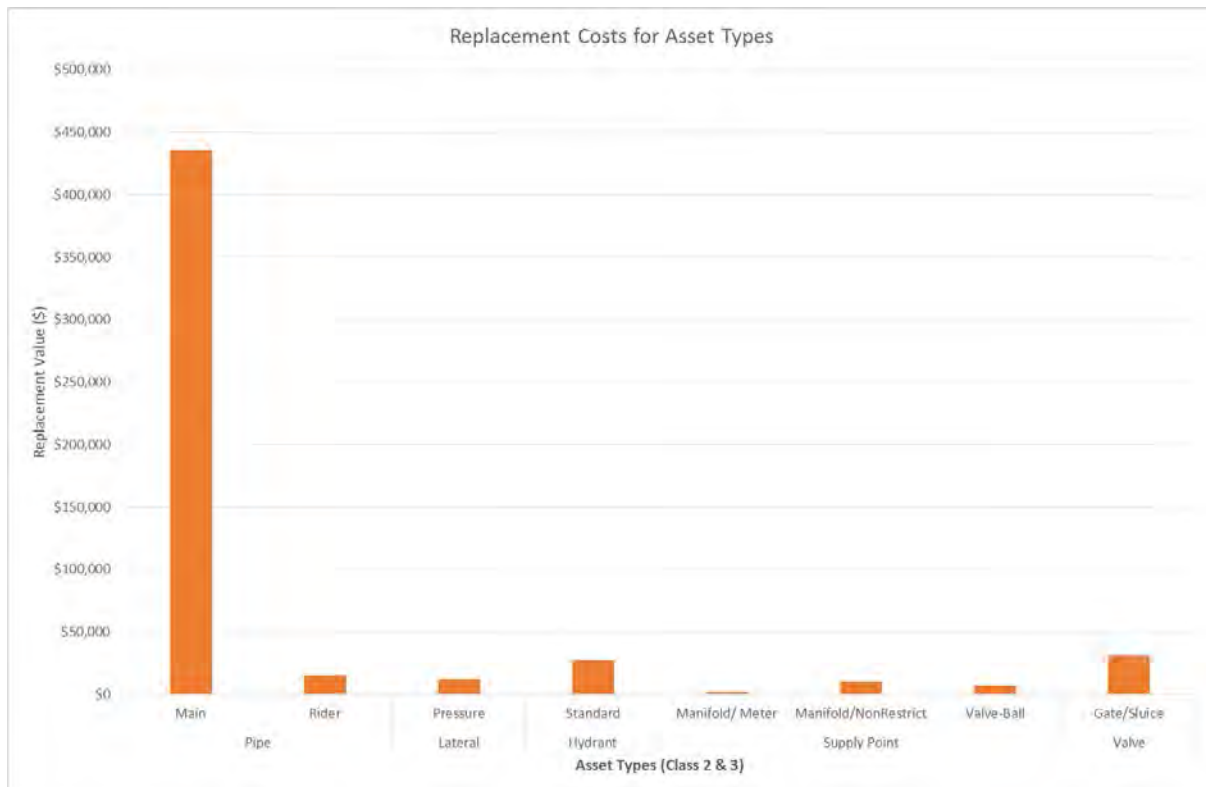


**Figure 12-6 Replacement Costs for Lake Coleridge**

## 12.12 Renewals

The renewal profile has been taken from the 2017 5 Waters Valuation. A graph showing the renewals for this scheme are shown by Figure 12-7 below. The majority renewals occur in 2037/2038.



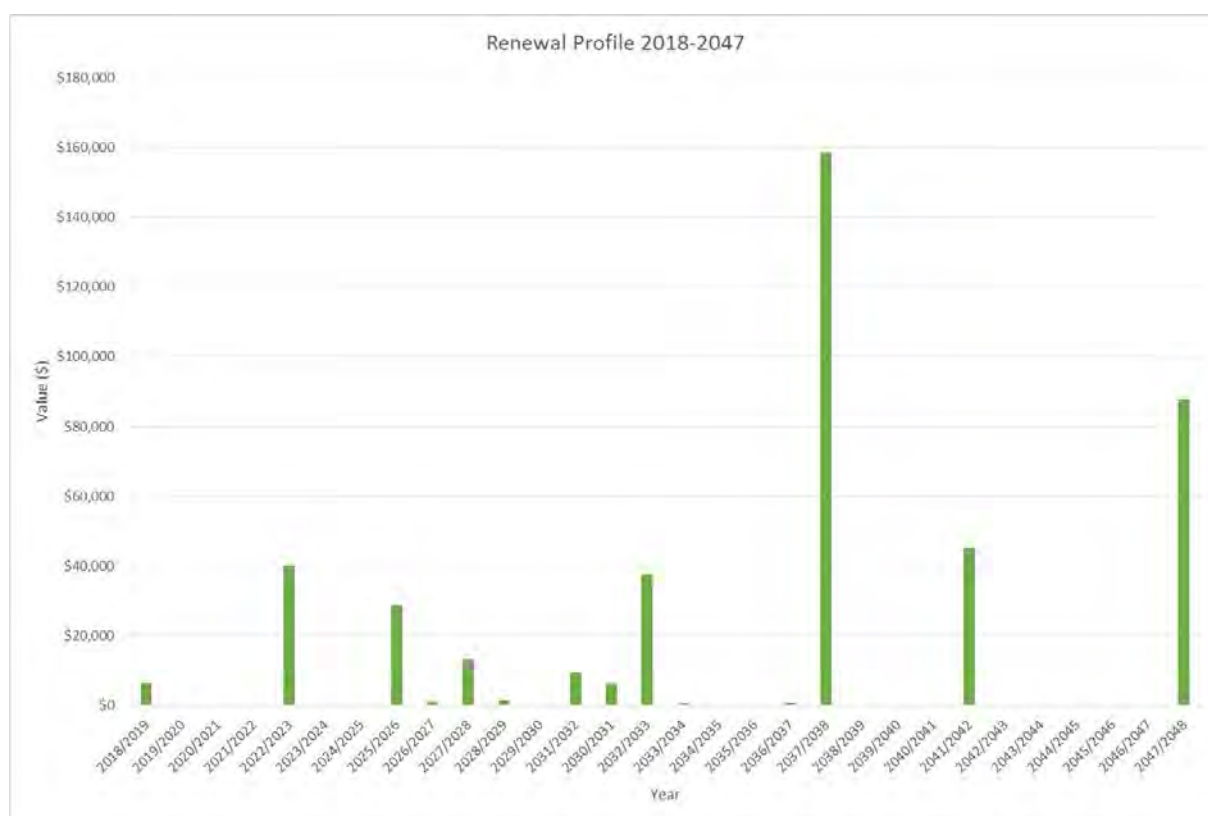


**Figure 12-7 Lake Coleridge Water Renewal Profile**

### 12.13 Critical Assets

The criticality model for Lake Coleridge has been updated for the 2018 AcMP. The methodology of the criticality model can be found in 5Waters Activity Management Plan: Volume 1 and it provides details of how the criticality has been calculated for the reticulation assets. Table 12-8 and Figure 12-8 below shows the calculated criticality for all of the assets within this scheme that have a recorded known length.

**Table 12-8 Length of Assets per Criticality Level**

| Criticality Bands |             | Length (m) |
|-------------------|-------------|------------|
| 5                 | Low         | 1,446      |
| 4                 | Medium-Low  | 2,923      |
| 3                 | Medium      | 509        |
| 2                 | Medium-High | 233        |
| 1                 | High        | 0          |

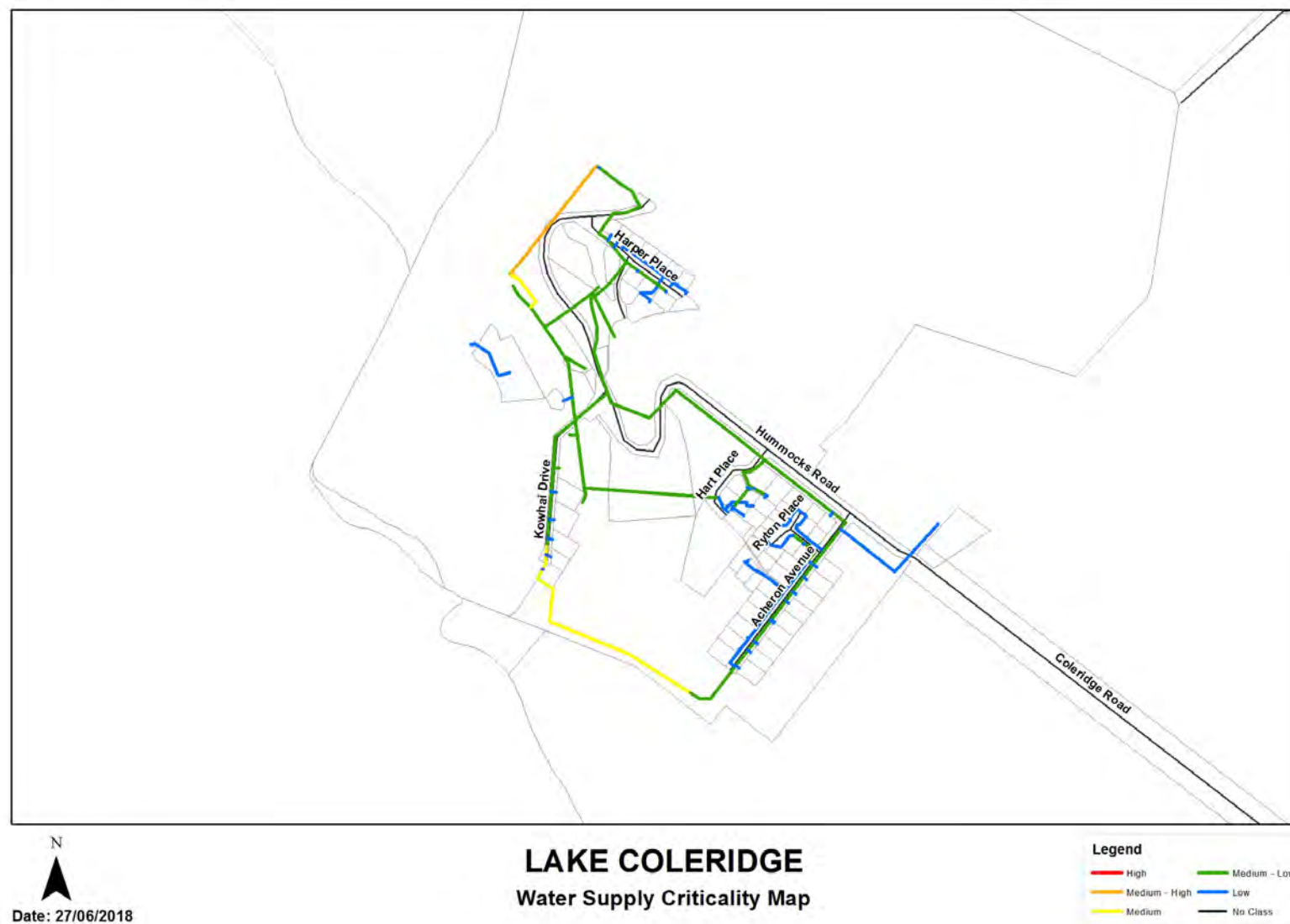


Figure 12-8 Criticality Map

## 12.14 Asset Condition

The asset condition model was run for Lake Coleridge in 2017. The methodology of the model can be found in 5Waters Activity Management Plan: Volume 1 which provides details of how the model has been calculated for the pipe reticulation assets. Figure 12-9 below shows the level of asset condition for these assets within this scheme that have a recorded known condition.

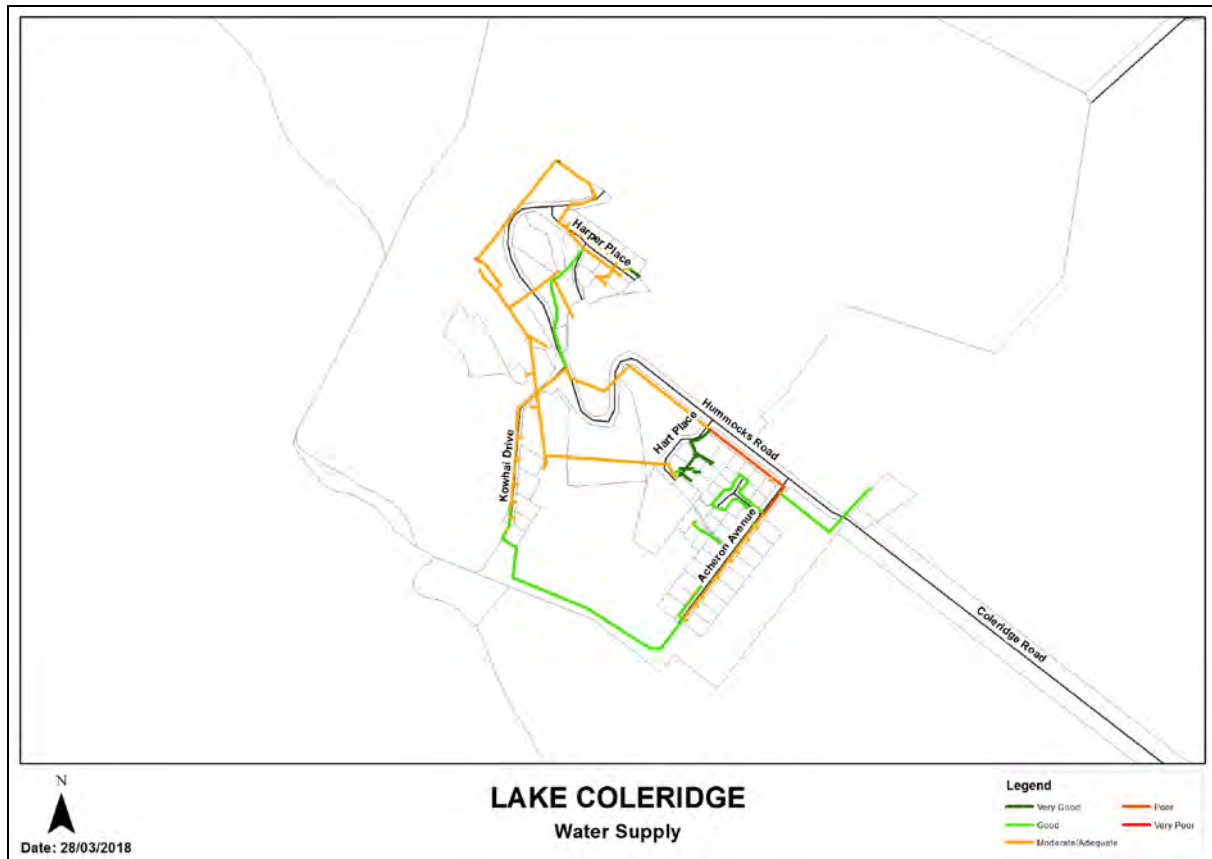


**Figure 12-9 Asset Condition – Lake Coleridge**

Table 12-9 provides a description of the condition rating used within the condition model.

**Table 12-9 Asset Condition Grading**

| Condition Rating | Grading   |
|------------------|-----------|
| 1.0              | Excellent |
| 2.0              | Good      |
| 3.0              | Moderate  |
| 4.0              | Poor      |
| 5.0+             | Fail      |

The number of pipe faults is also measured through the asset management system. Figure 12-10 shows the known historic pipe failures within this scheme.

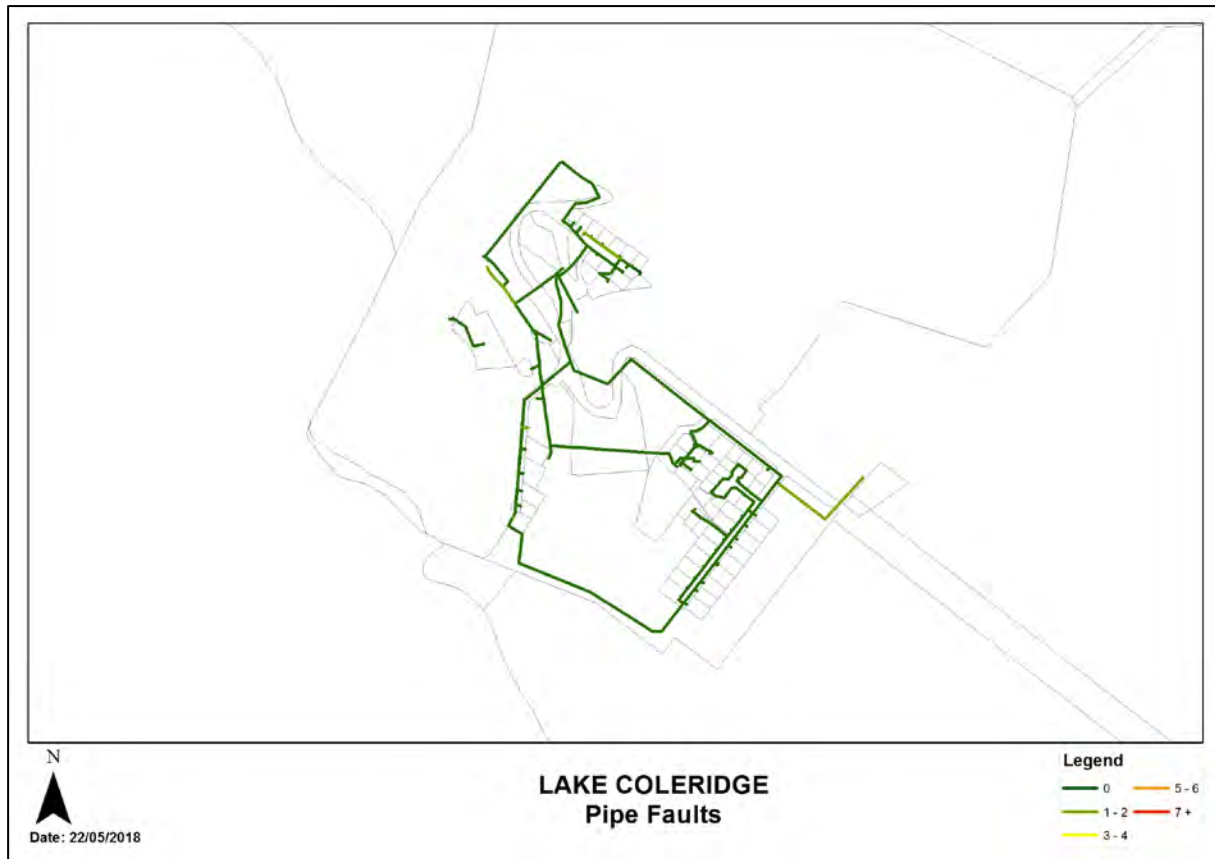


**Figure 12-10 Pipe Faults, Lake Coleridge**

### 12.15 Funding Program

The 10 year budgets for Lake Coleridge are shown by Table 12-10 and Figure 12-11. Budgets are split into expenditure, renewals, projects and capital projects.

All figures are (\$) not adjusted for CPI “inflation”. They are calculated on historical data, and population growth where relevant.

**Table 12-10 Lake Coleridge Budget Summary**

| Years     | Expenditure | Renewals | Projects | Capital Projects |
|-----------|-------------|----------|----------|------------------|
| 2018/2019 | \$46,310    | \$6,413  |          | \$278,000        |
| 2019/2020 | \$46,310    |          |          |                  |
| 2020/2021 | \$46,310    |          |          |                  |
| 2021/2022 | \$46,310    |          |          |                  |
| 2022/2023 | \$46,310    | \$40,178 |          |                  |
| 2023/2024 | \$46,310    |          |          |                  |

|           |           |          |  |           |
|-----------|-----------|----------|--|-----------|
| 2024/2025 | \$46,310  |          |  |           |
| 2025/2026 | \$46,310  | \$28,671 |  |           |
| 2026/2027 | \$46,310  | \$1,080  |  |           |
| 2027/2028 | \$46,310  | \$13,198 |  |           |
| Total     | \$463,100 | \$89,540 |  | \$278,000 |

An explanation of the categories within the budgets are as follows below:

- Expenditure consists of operation and maintenance costs;
- Renewals are replacement of assets which are nearing or exceeded their useful life;
- Projects are investigations, decisions and planning activities which exclude capital works; and
- Capital projects are activities involving physical works.

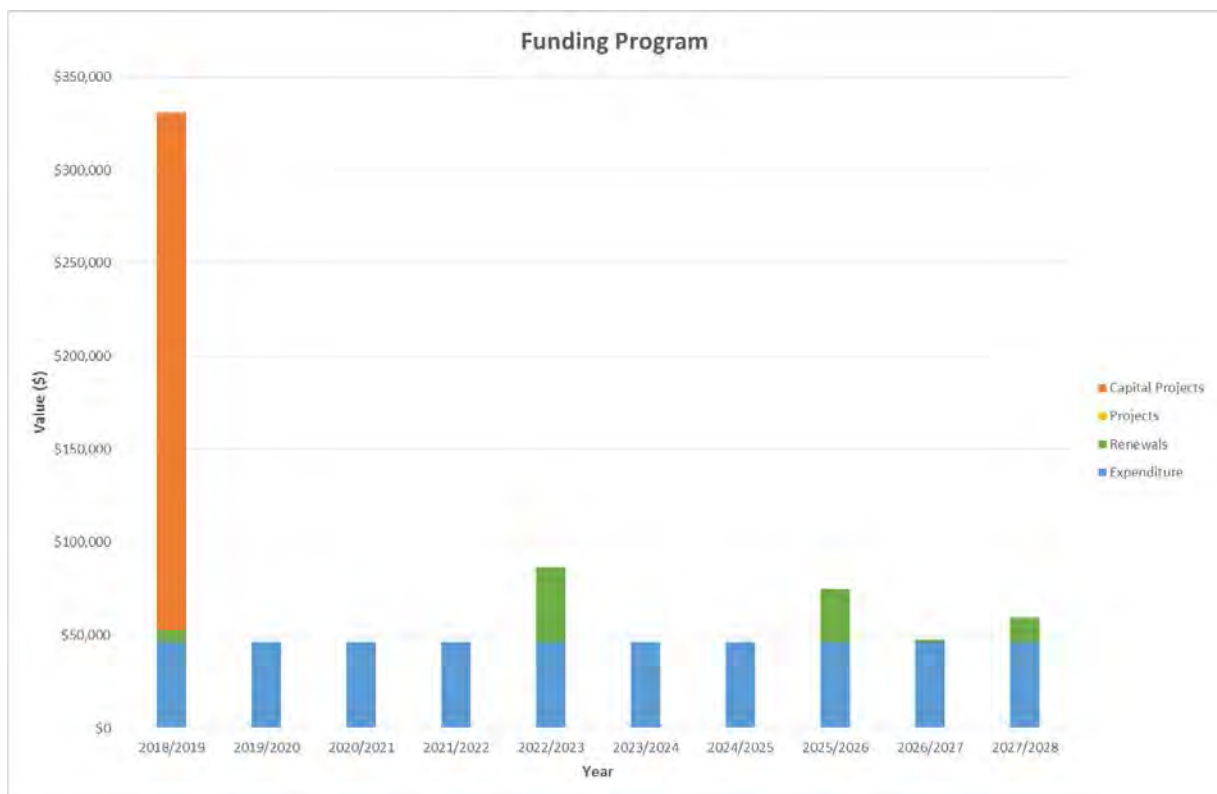


**Figure 12-11 Lake Coleridge Funding Summary**

There is one major project for Lake Coleridge water scheme in the LTP budget.

**Table 12-11 Key Projects**

| Account Label    | GL        | Description                      | Year 1 (\$) | Year 2 (\$) | Year 3 (\$) | Years 4 to 10 | Funding Split <sup>9</sup> |
|------------------|-----------|----------------------------------|-------------|-------------|-------------|---------------|----------------------------|
| Capital Projects | 404190025 | Filtration and treatment upgrade | \$278,000   |             |             |               | 100% LoS                   |

The list of district wide projects can be found in 5Waters Activity Management Plan: Volume 1.

### Discussion on Projects

Projects have been determined based on their:

- Relevance to the scheme
- Requirement to be completed under legislation
- Ability to bring the scheme up to or maintain the Level of Service required under council's Asset Management Policy.

Many projects are **jointly** funded by more than one scheme and activity. Each scheme pays a pro-rata share only, equivalent to the number of connections.

### Discussion on Capital and Projects

Where relevant, Capital (Levels of Service) and Capital (Growth) projects have been included in the scheme financial details.

Levels of Service Projects and growth splits have been provided to ensure the costs of population driven works are clear.

<sup>9</sup> Where LoS refers to Level of Service and G refers to Growth

## 13.0 LEESTON WATER SUPPLY

### 13.1 Scheme Summary

| Description                                   |                                   | Quantity                       |
|-----------------------------------------------|-----------------------------------|--------------------------------|
| <b>Estimated Population Served</b>            |                                   | 2545                           |
| <b>Scheme Coverage</b><br>(1 Jan 2018)        | Full Charges                      | 900                            |
|                                               | Half Charges                      | 63                             |
|                                               | >1 Charges                        | 9                              |
| <b>System Components</b>                      | Bores/Intakes (No.)               | 25                             |
|                                               | Treatment/Disinfection            | None                           |
|                                               | Reservoirs (No.)                  | 1                              |
|                                               | Pump Stations (No.)               | 2                              |
|                                               | Piped (m)                         | 31023.4                        |
| <b>History</b>                                | Original scheme installation date | 1975-78                        |
| <b>Value (\$)</b>                             | Replacement Cost                  | \$4,312,391.60                 |
|                                               | Depreciated Replacement Cost      | \$2,598,038.25                 |
| <b>Financial</b>                              | 2018/2019 Estimate                | \$106,900                      |
|                                               | Annual maintenance cost           | 3.34%                          |
|                                               | % of total                        |                                |
| <b>Demand</b><br>(1 Jan – 31 Dec 2017)        | Average daily                     | 1,200                          |
|                                               | Peak daily                        | 3,176                          |
|                                               | Minimum daily                     | 627                            |
|                                               | Average daily per connection      | 1.3                            |
| <b>Type of Supply</b>                         |                                   | High pressure and unrestricted |
| <b>Target Pressure &amp; Flow at boundary</b> | Pressure                          | >310kPa                        |
|                                               | Flow                              | >20L/min                       |
| <b>Sustainability</b>                         | Well Security                     | Secure                         |

### 13.2 Key Issues

The following key issues are associated with the Leeston water supply. A list of district wide issues are located in 5Waters Activity Management Plan: Volume 1.



**Table 13-1 Leeston Scheme Issues**

| What's the Problem                                                   | What we plan to do                                                                                                                                                                                                                                                                                |
|----------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Due to the growth of Leeston, new wells are required to meet demand. | Council will continue to review the water infrastructure plan on an annual basis while considering actual and predicted growth. Infrastructure will be provided as and when required in consideration of the urban/industrial split. Detailed network modelling supports the infrastructure plan. |

### 13.3 Overview & History

The Leeston Water Supply provides untreated groundwater to both the Leeston and Doyleston townships.

Water is sourced from three wells, two located on Gallipoli Street with a third on Lake Road which is used to supplement supply in peak periods. Two previously used wells, one in Pound Road and the other in Market Street, were capped in 1994/95.

The Leeston scheme was designed as an unrestricted supply complying with the NZ Fire Fighting Code of Practice. In late 1999 a mobile standby generator was installed at Gallipoli Street pump station with automatic start up on power failure. This unit is also used to supply the Leeston Service Centre. As the unit is mobile it can be used for other water and sewage pump stations in the eastern area.

In 2006 the Leeston Water Supply was extended in order to service the Doyleston community located approximately 3km north-east of the Leeston township. Refer to Section 5.0 Doyleston Water Supply.

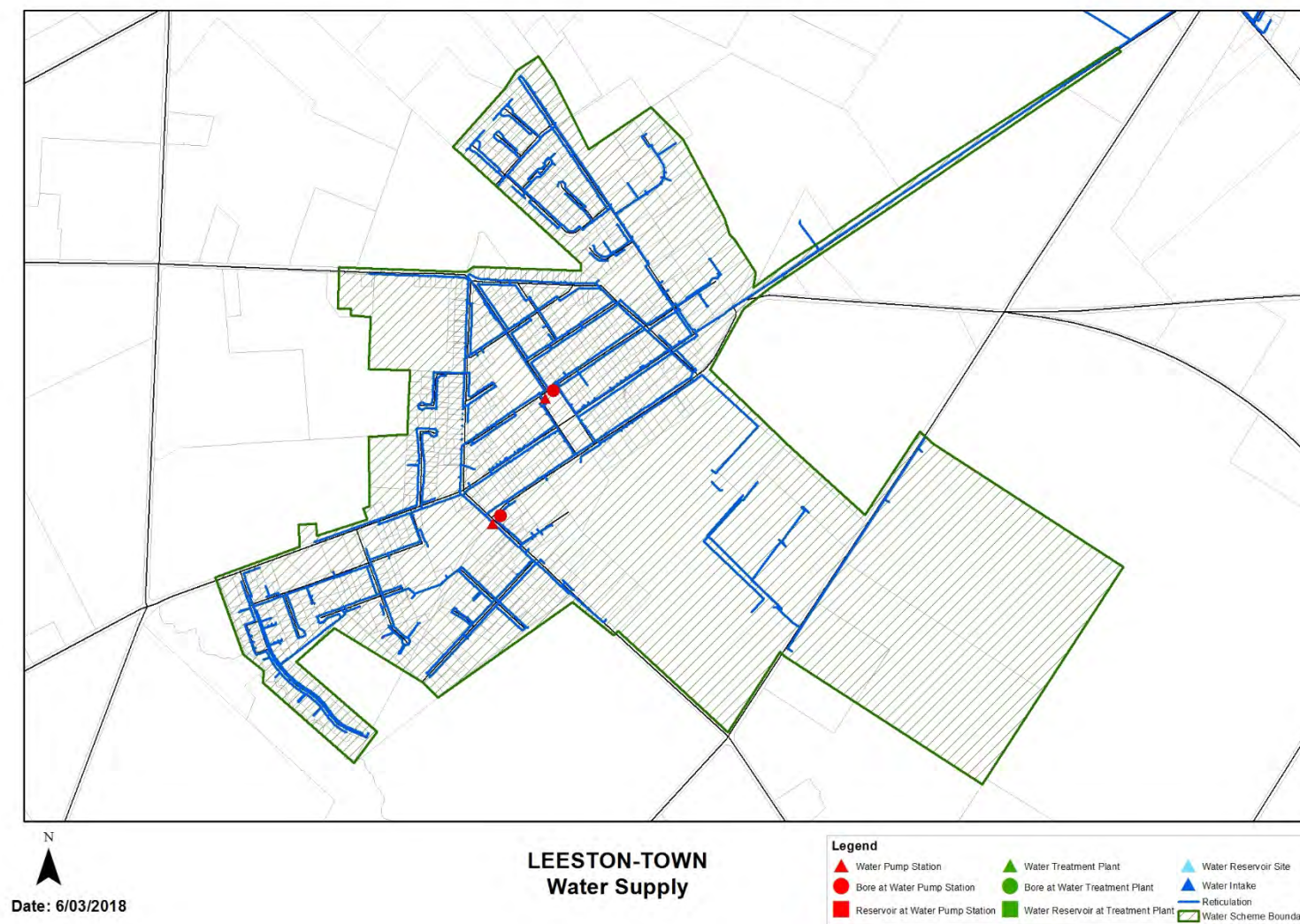


**Figure 13-1 Scheme Map**

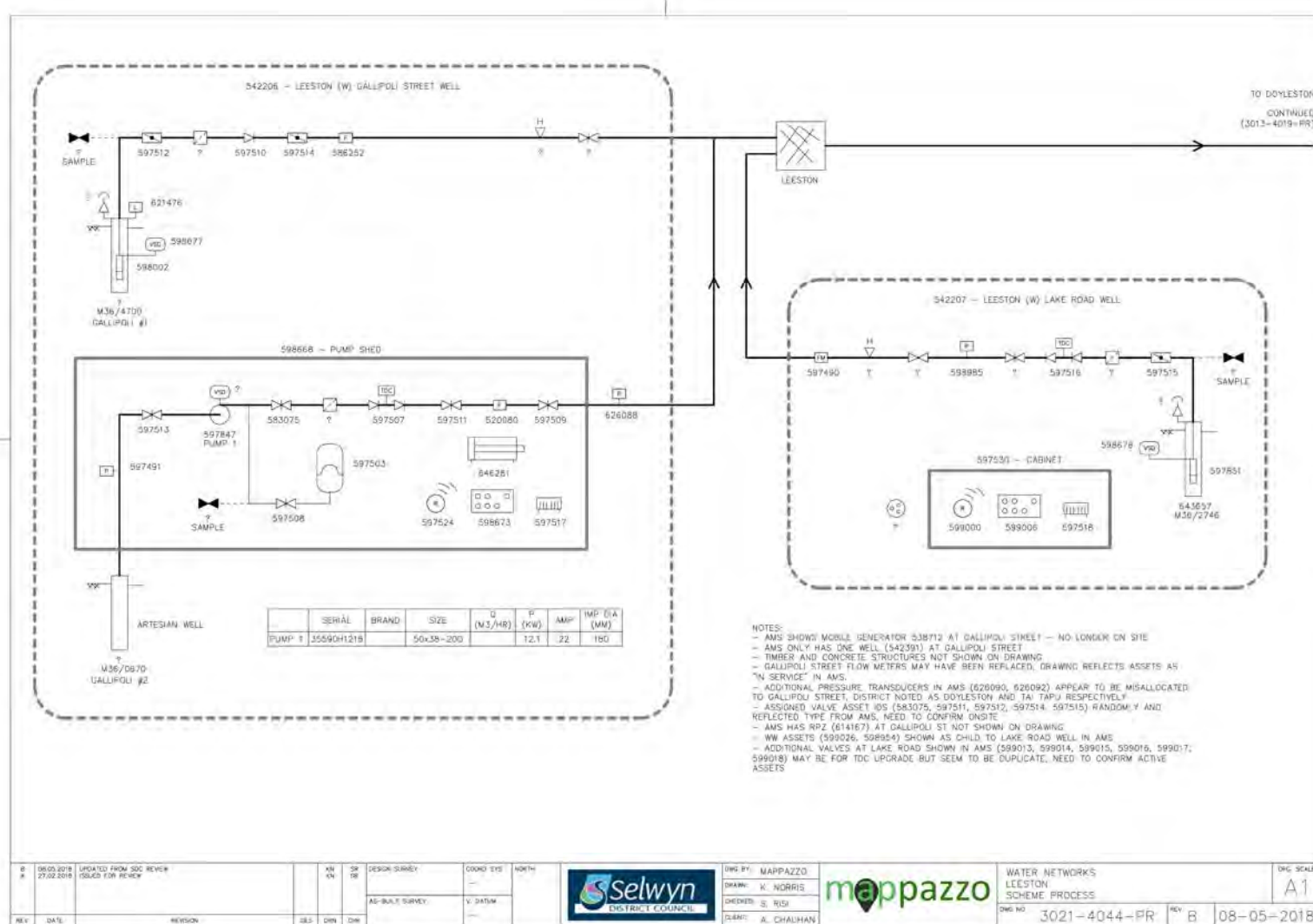


Figure 13-2 Scheme Schematic

### 13.4 System Capacity

In response to the accelerated growth within the Selwyn District hydraulic models have been used to plan future water infrastructure for a number of the water supplies. Hydraulic models have been built and calibrated to international best practice to carry out the '30-year Water Infrastructure Master Planning'.

The master planning provides an assessment of the sizing and timing of new infrastructure for new water sources (wells) and pipelines to service growth. Part of the master planning requires a water balance to be developed to forecast growth, using historical peak demand per household. The water balance forecasts the peak instantaneous flow per year versus the water resources available to determine the staging of new wells. The well staging assumes that one well is redundant for each water supply, to take into consideration maintenance of wells, planning/timing of new wells and security of supply i.e. to maintain average/peak demand.

Population projections are based on SDC 'Household Projections 2018 to 2048' and have been applied to the latest connection figures for each township.

Figure 13-3 shows the projected growth for Leeston and Doyleston to 2048 per planning horizon (5 years intervals) in accordance with the latest House Projections.

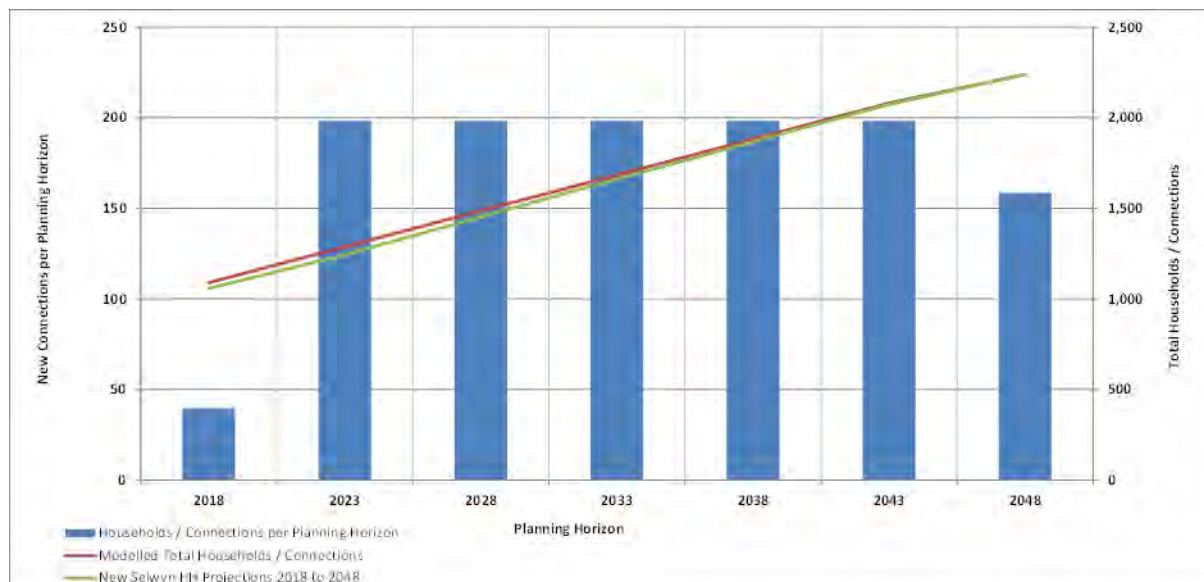


**Figure 13-3 Leeston and Doyleston Household Projections**

The Leeston and Doyleston water supply has a resource consent limit of 76 L/s. The current (2014) peak instantaneous flow for Leeston and Doyleston is 54 L/s and therefore the water supply has headroom available of approximately 22 L/s. Peak demand is not expected to exceed the current consent until 2024 based on the expected rate of growth, as shown in .

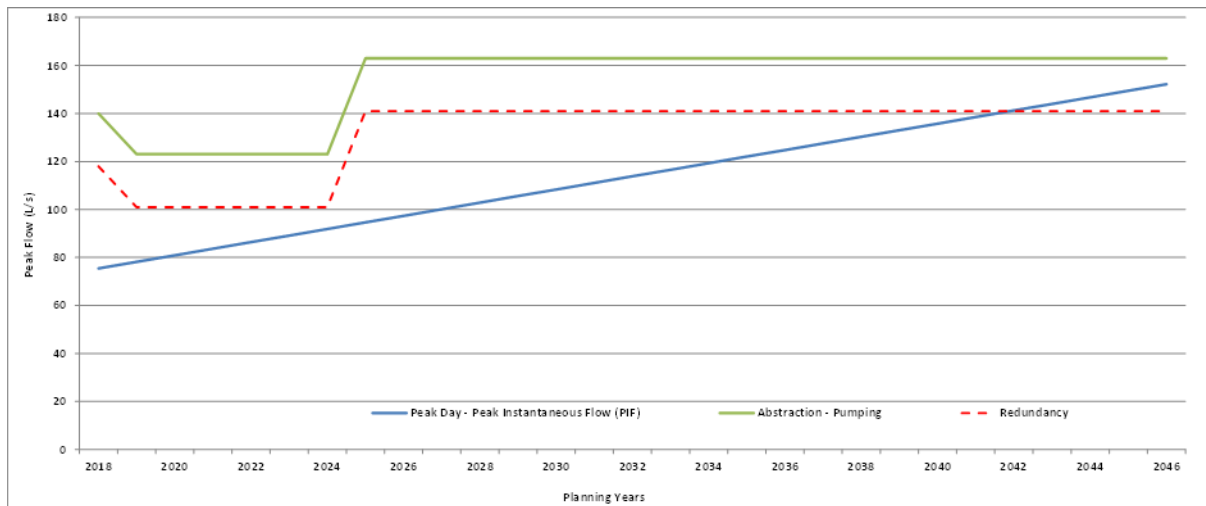


Figure 13-4.

Two new wells or developing more capacity from existing wells (20 L/s) are required to service future growth, with the first well/upgraded required in 2018 as shown in Figure 13-4 with a second well not required until 2025/26.

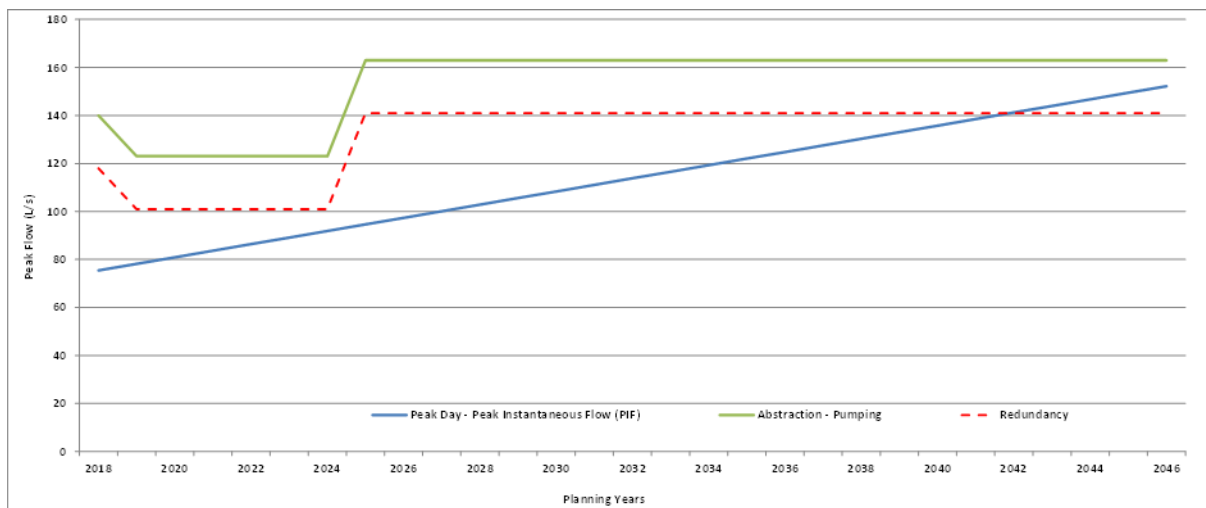


Figure 13-4: Leeston and Doyleston Water Demand

Table 13-2 Water Source Current Capacity

| Sites Available  | Well | Capacity (L/s) |
|------------------|------|----------------|
| Gallipoli well 1 | 1    | 18             |
| Gallipoli well 2 | 1    | 36             |
| Lake Street well | 1    | 17             |

**Table 13-3 Water Source Future Capacity**

| New Site ID | Well/Site | Location                    | Planning Year | Yield (L/s) |
|-------------|-----------|-----------------------------|---------------|-------------|
| Lee1        | Well      | Near Leeston Dunsandel Rd   | 2018          | 70          |
| Lee2        | Well      | Lake Well Rd - Decommission | 2019          | -17         |
| Lee3        | Well      | Near Leeston Dunsandel Rd   | 2025          | 40          |



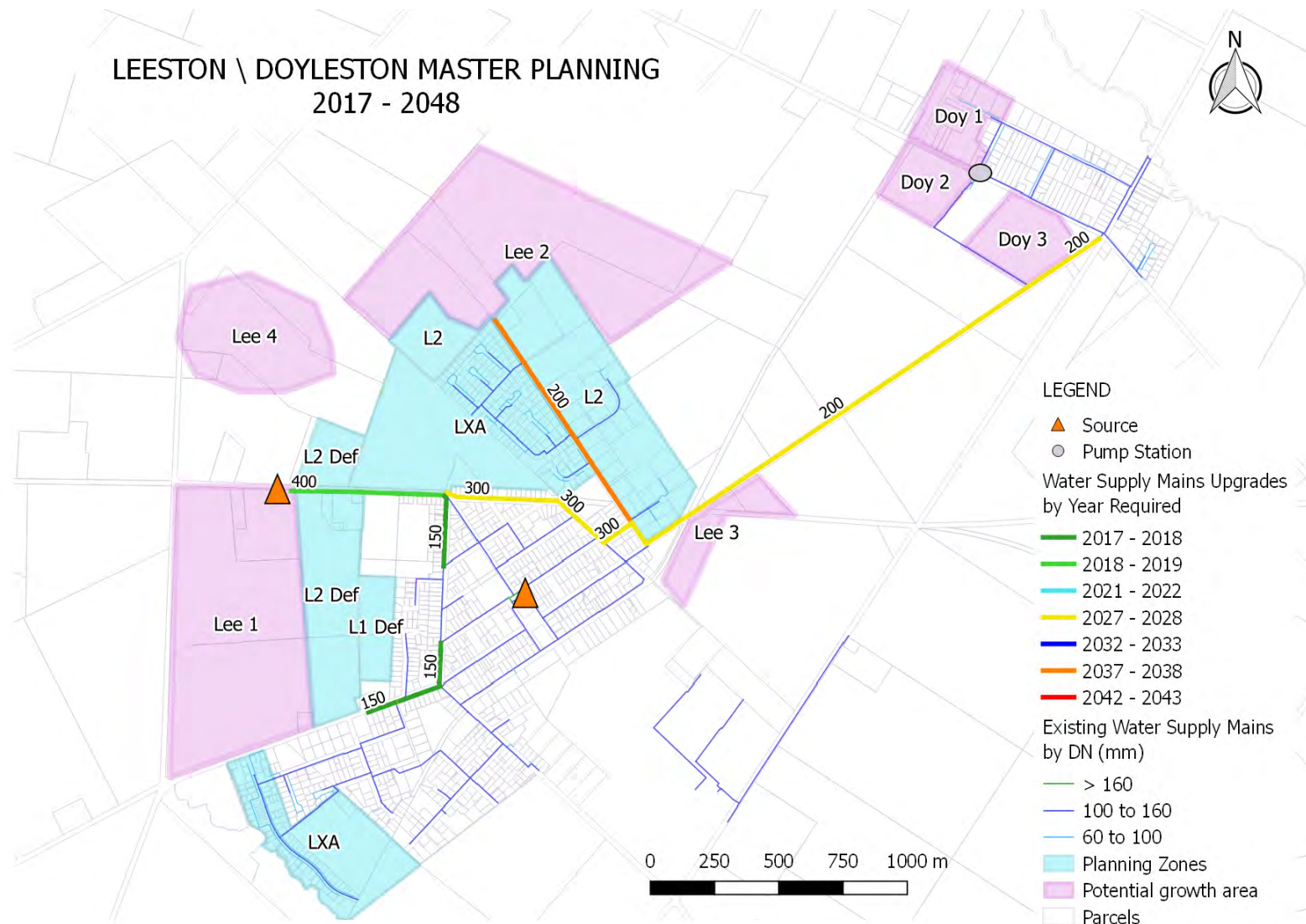


**Figure 13-5 Leeston Master Plan**



### 13.5 Resource Consents

The Leeston water supply has a number of resource consents. Table 13-4 shows the water take permitted by the resource consents for this scheme.

**Table 13-4 Resource Consents**

| Consent                        | Description                                                                      | Location                                             | Date Issued | Expiry Date | Consented Max Instantaneous Flow (L/s) | Consented Max Daily Volume (m <sup>3</sup> /day) |
|--------------------------------|----------------------------------------------------------------------------------|------------------------------------------------------|-------------|-------------|----------------------------------------|--------------------------------------------------|
| CRC950937.1<br>(Issued-Active) | To take groundwater at or about map reference M36:53550-16049 for public supply. | Gallipoli Street, LEESTON                            | 12-Feb-10   | 22-Feb-30   | 40                                     | 2016                                             |
| CRC160101<br>(Issued-Active)   | To take and use groundwater - from bore M36/0670                                 | Gallipoli Street And Leeston And Lake Roads, LEESTON | 12-Feb-10   | 31-Jan-35   | 36.7                                   | 2140                                             |

### 13.6 Water Quality

The Leeston water supply made up of three wells which are secure. At the treatment plant, two wells are sampled weekly and the other is sampled quarterly. In the reticulation zone the sample is taken weekly.

The following details E. coli transgressions for the period 2012 to 2017.

#### Treatment

There have been no E. coli treatment transgressions during this period.

#### Zone

There has been two E. coli transgression during this period both in February 2014.

#### Chemical Analysis

The following is a summary of the raw water chemical analysis carried out at the Leeston Water Supply.

**Table 13-5 Leeston Water Supply Raw Water Chemical Analysis Summary**

| Parameter         | Standards MAV* (GV)** | Plant <sup>1</sup> 2015 | Plant <sup>1</sup> 2017 | Plant <sup>2</sup> 2011 | Plant <sup>2</sup> 2017 | Plant <sup>3</sup> 2011 | Plant <sup>3</sup> 2017 | Status |
|-------------------|-----------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|--------|
| Total Lead (g/m3) | 0.01                  | <0.00011                | < 0.00011               | 0.00071                 | < 0.00011               |                         | < 0.00011               | ✓      |
| pH (pH units)     | 7-8.5                 | 7.9                     | 7.8                     | 8.8                     | 7.8                     | 7.7                     | 7.7                     | X      |
| Total Hardness    | <200                  | 41                      | 37.8                    | 31                      | 41.5                    | 38                      | 44                      | ✓      |

| (g/m <sup>3</sup> as CaCO <sub>3</sub> ) |      |        |         |      |       |        |         |   |
|------------------------------------------|------|--------|---------|------|-------|--------|---------|---|
| Total Calcium (g/m <sup>3</sup> )        | n/v  | 11.9   | 11.13   | 8.8  | 12.03 | 11.4   | 12.90   | ✓ |
| Total Iron (g/m <sup>3</sup> )           | <0.2 | <0.021 | < 0.021 | 0.18 | 0.027 | <0.021 | < 0.021 | ✓ |
| Total Sodium (g/m <sup>3</sup> )         | <200 | 6.3    | 6.17    | 6.6  | 7.21  | 5.9    | 6.5     | ✓ |
| Nitrate - Nitrogen (g/m <sup>3</sup> )   | 11.3 | 0.73   | 0.790   | 0.09 | 1.130 | 0.77   | 1.08    | ✓ |

\* MAV – Maximum Acceptable Value

\*\* (GV) – Guideline Value

<sup>1</sup> Gallipoli 1

<sup>2</sup> Gallipoli 2

<sup>3</sup> Lake Road

## 13.7 Scheme Assets

A summary of material and diameter for pipes in Leeston is shown below in Figure 13-6 and Figure 13-7.

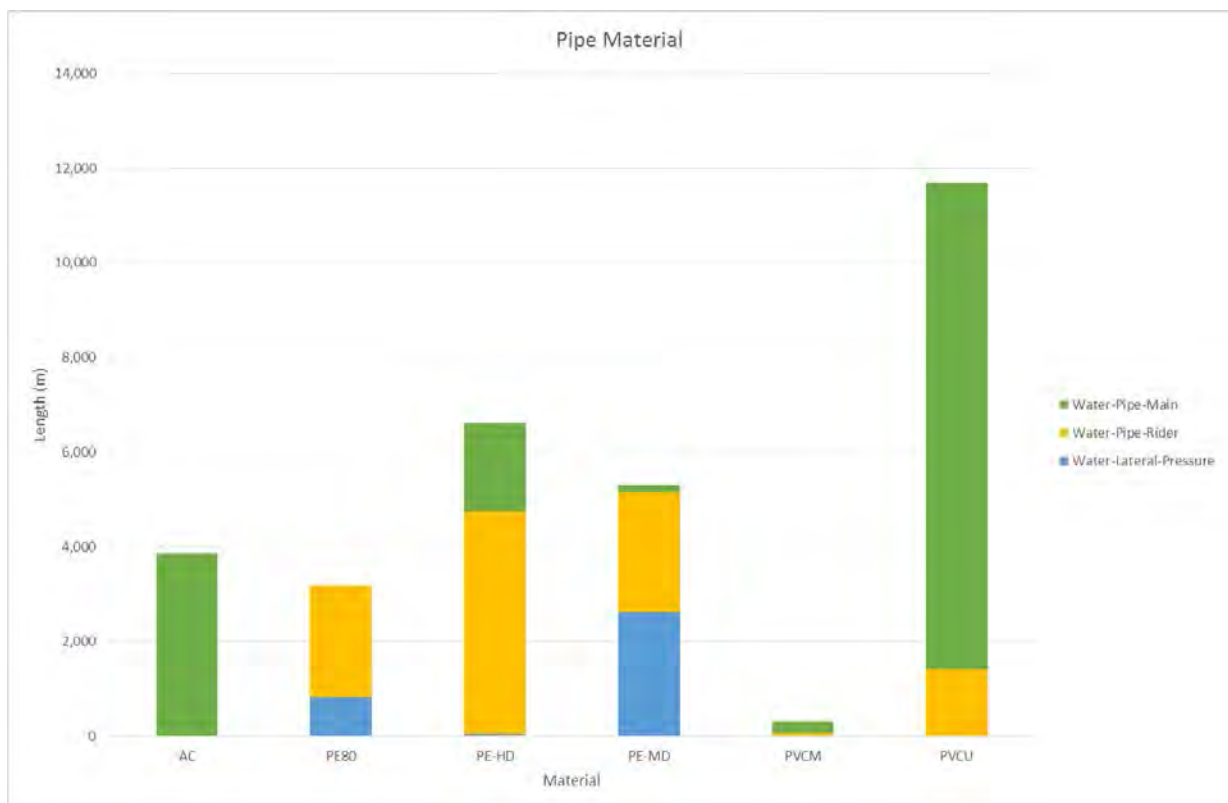


**Figure 13-6 Pipe Material – Leeston**

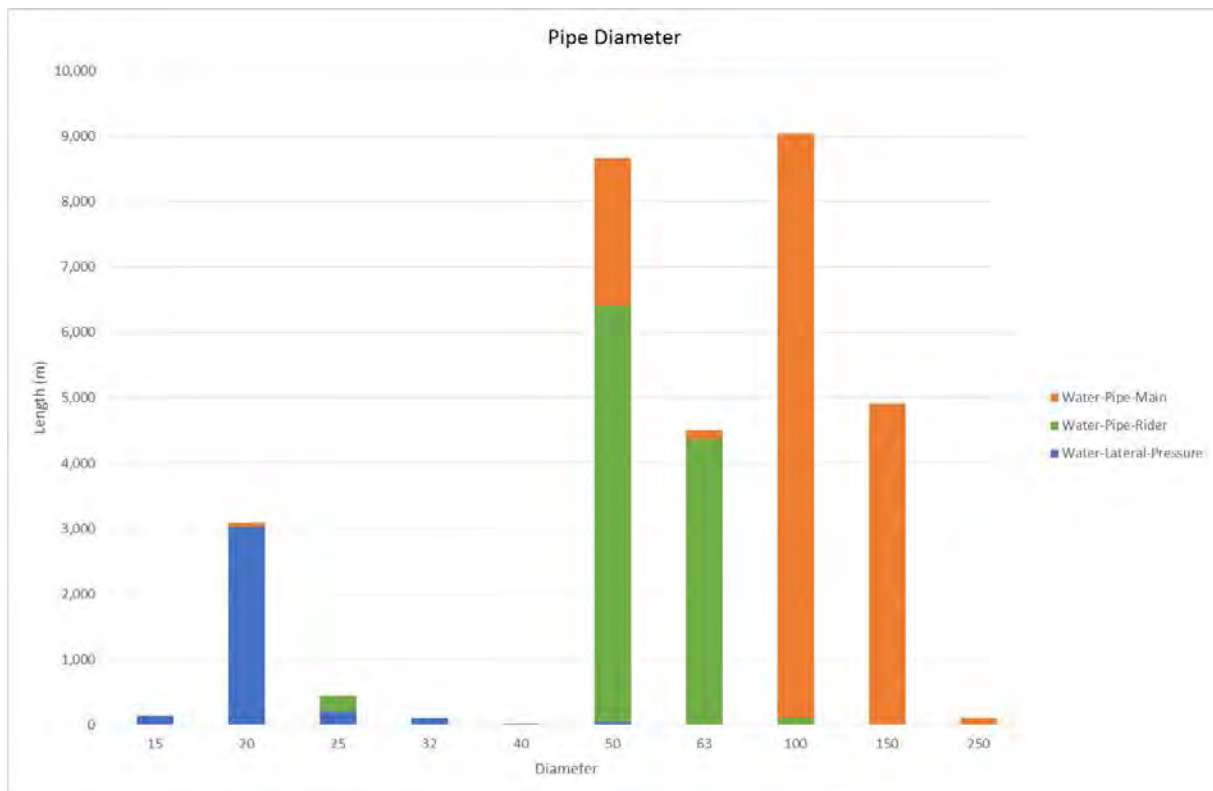


**Figure 13-7 Pipe Diameter – Leeston**

### 13.8 Operational Management

The water supply is operated and maintained under two maintenance contracts as follows:

- Contract 1241: Water Services Contract. Contract is with SICON Ferguson who undertakes investigations, conditions inspections, proactive and reactive maintenance and minor asset renewals; and
- Contract 1202: Parks and Reserves Contract. Contract is with SICON Ferguson who undertakes the maintenance of land scape features related to water services e.g. mowing, gardens etc.

Water quality sampling is completed under an agreement with Food and Health Ltd as required.

### 13.9 Photos of Main Assets



**Photo 1: Gallipoli Street Well Head**

### 13.10 Risk Assessment

A risk assessment has been undertaken for the Leeston scheme. The key output from the risk assessment is the identification of any extreme and high risks which need to be mitigated. In order to mitigate these risks they have been included and budgeted for in the projects within this LTP. Table 13-6 outlines the risk priority rating, Table 13-7 outlines the risks and the list of key projects is found in Table 13-12.

**Table 13-6 Risk Priority Rating**

| Risk Score | Level of Risk | Risk Response                                                                                                                                                     |
|------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| > 50       | Extreme       | Awareness of the event to be reported to Council.<br>Urgent action to eliminate / mitigate / manage the risk.<br>Document risk and action in the AMP.             |
| 35-50      | Very High     | Risk to be eliminated / mitigated / managed through normal business planning processes with responsibility assigned.                                              |
| 14-35      | High          | Manage risk using routine procedures.                                                                                                                             |
| 3.5-14     | Moderate      | Monitor the risk.                                                                                                                                                 |
| < 3.5      | Low           | Awareness of the event to be reported to Council.<br>Immediate action required to eliminate / mitigate / manage the risk.<br>Document risk and action in the AMP. |

**Table 13-7 Risks – Leeston**

| Risk | Action/Project | Year Identified | 2014 Risk Rating | 2017 Risk Rating | Residual Risk Rating |
|------|----------------|-----------------|------------------|------------------|----------------------|
|------|----------------|-----------------|------------------|------------------|----------------------|

|                                                                  |                                        |      |    |    |     |
|------------------------------------------------------------------|----------------------------------------|------|----|----|-----|
| Leeston pressure is artificially high - risk of leaks and breaks | Review operational pressure set points | 2014 | 45 | 45 | 12  |
| System not operating at optimum                                  | Review operation of Gallopli 2 Well    | 2014 | 20 | 20 | 6   |
| Power failure and loss of supply capability                      | Mobile generator, swap for a fixed one | 2014 | 40 | 7  | 7   |
| Electrical failure due to lightning or network spikes            | Install surge diverters                | 2014 | 20 | 7  | 7   |
| Failure to meet NES water meter standards                        | NES Water Meter Compliance             | 2014 | 20 | 6  | 6   |
| Inability to collect income from non-metered properties          | Install property water meters          | 2014 | 27 | 27 | 2.1 |
| Non-consented activities                                         | Renewal of consents                    | 2014 | 27 | 27 | 6   |
| Inadequate treatment under all conditions                        | Install UV treatment                   | 2017 |    | 2  | 2   |
| Inadequate capacity into the future                              | Additional bore                        | 2017 |    | 45 | 6   |

The list of district wide risks can be found in 5Waters Activity Management Plan: Volume 1.

### 13.11 Asset Valuation Details

The total replacement value of assets within the Leeston water scheme is \$4,312,392 with further details in Table 13-8 below.

**Table 13-8 Replacement Value, Leeston**

| Asset Class 1              |              | Asset Class 2 | Sum of Replacement Value |
|----------------------------|--------------|---------------|--------------------------|
| <b>Plant and Equipment</b> |              |               | \$454,194                |
| <b>Water Reticulation</b>  | Hydrant      |               | \$284,110                |
|                            | Lateral      |               | \$152,499                |
|                            | Pipe         |               | \$2,646,373              |
|                            | Supply Point |               | \$612,683                |
|                            | Valve        |               | \$162,532                |

Replacement values for these different types of assets are shown in Table 13-11 below.

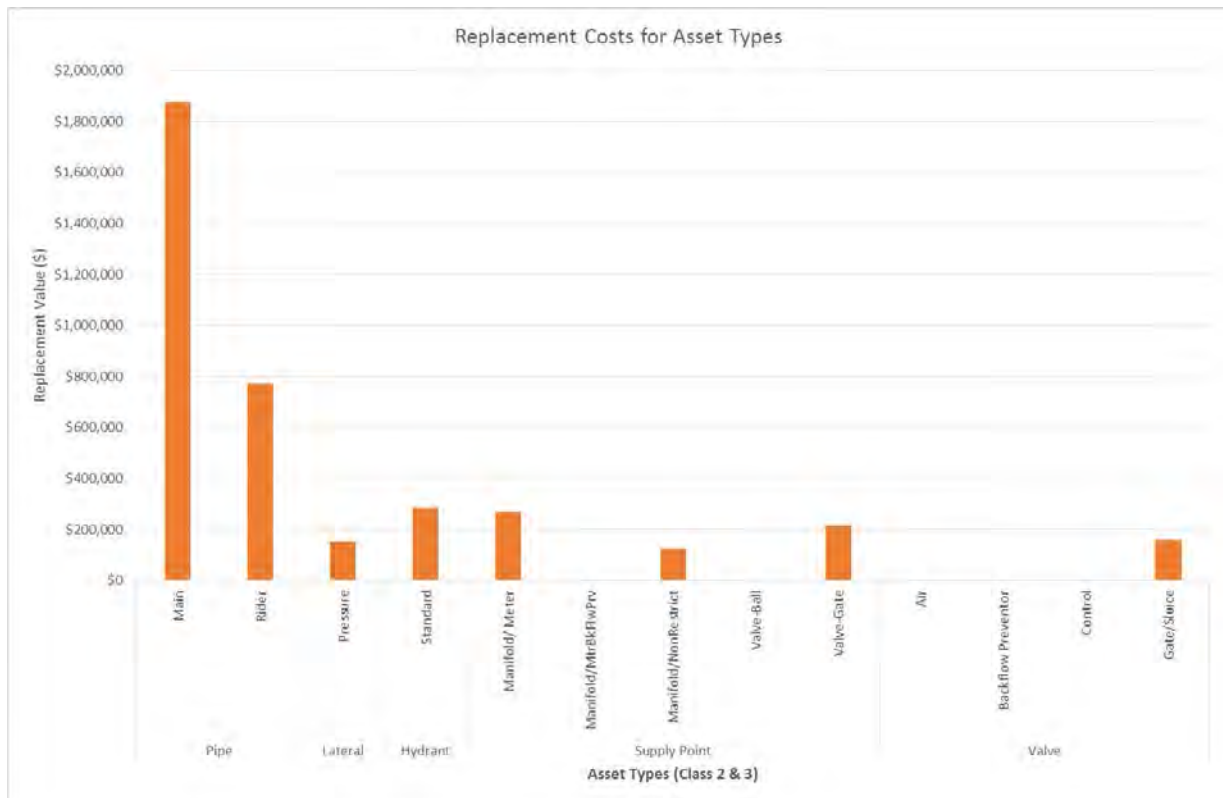


**Figure 13-8 Replacement Costs for Leeston**

## 13.12 Renewals

The renewal profile has been taken from the 2017 5 Waters Valuation. A graph showing the renewals for this scheme are shown by Figure 13-9 below. The majority renewals occur in 2022/2023.

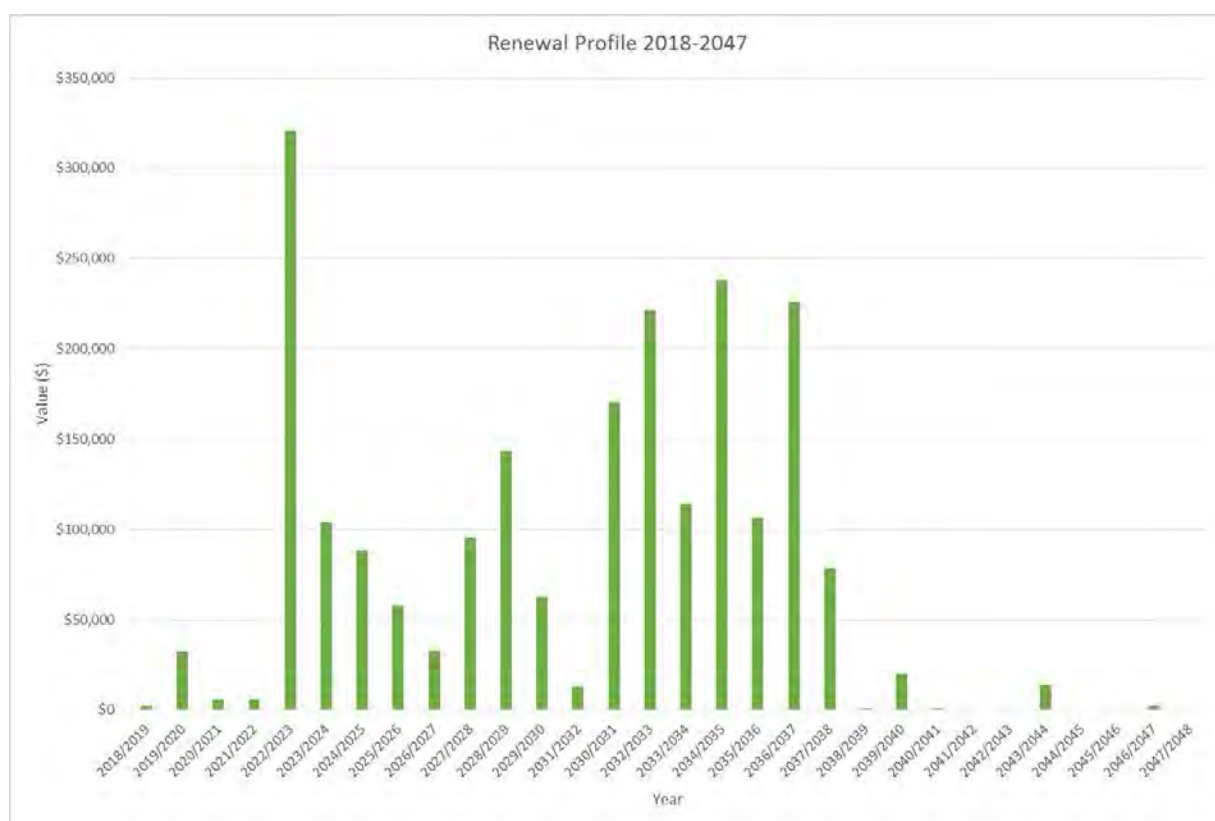


**Figure 13-9 Leeston Water Renewal Profile**

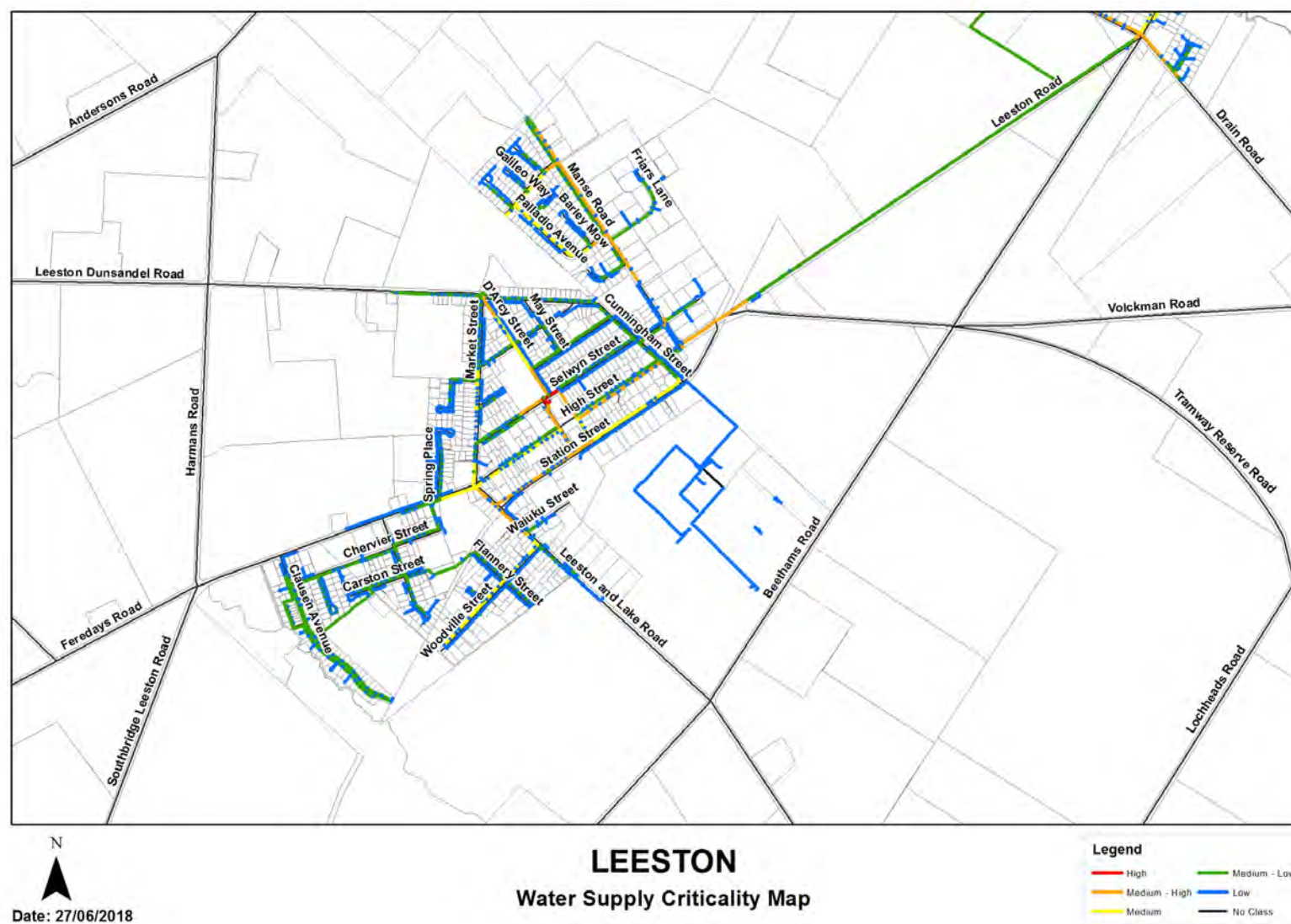
### 13.13 Critical Assets

The criticality model for Leeston has been updated for the 2018 AcMP. The methodology of the criticality model can be found in 5Waters Activity Management Plan: Volume 1 and it provides details of how the criticality has been calculated for the reticulation assets. Table 13-9 and Figure 13-10 below shows the calculated criticality for all of the assets within this scheme that have a recorded known length.

**Table 13-9 Length of Assets per Criticality Level**

| Criticality Bands |             | Length (m) |
|-------------------|-------------|------------|
| 5                 | Low         | 15,720     |
| 4                 | Medium-Low  | 11,193     |
| 3                 | Medium      | 2,768      |
| 2                 | Medium-High | 3,079      |
| 1                 | High        | 1061       |





### Figure 13-10 Criticality Map

### 13.14 Asset Condition

The asset condition model was run for Leeston in 2017. The methodology of the model can be found in 5Waters Activity Management Plan: Volume 1 which provides details of how the model has been calculated for the pipe reticulation assets. Figure 13-11 below shows the level of asset condition for these assets within this scheme that have a recorded known condition.

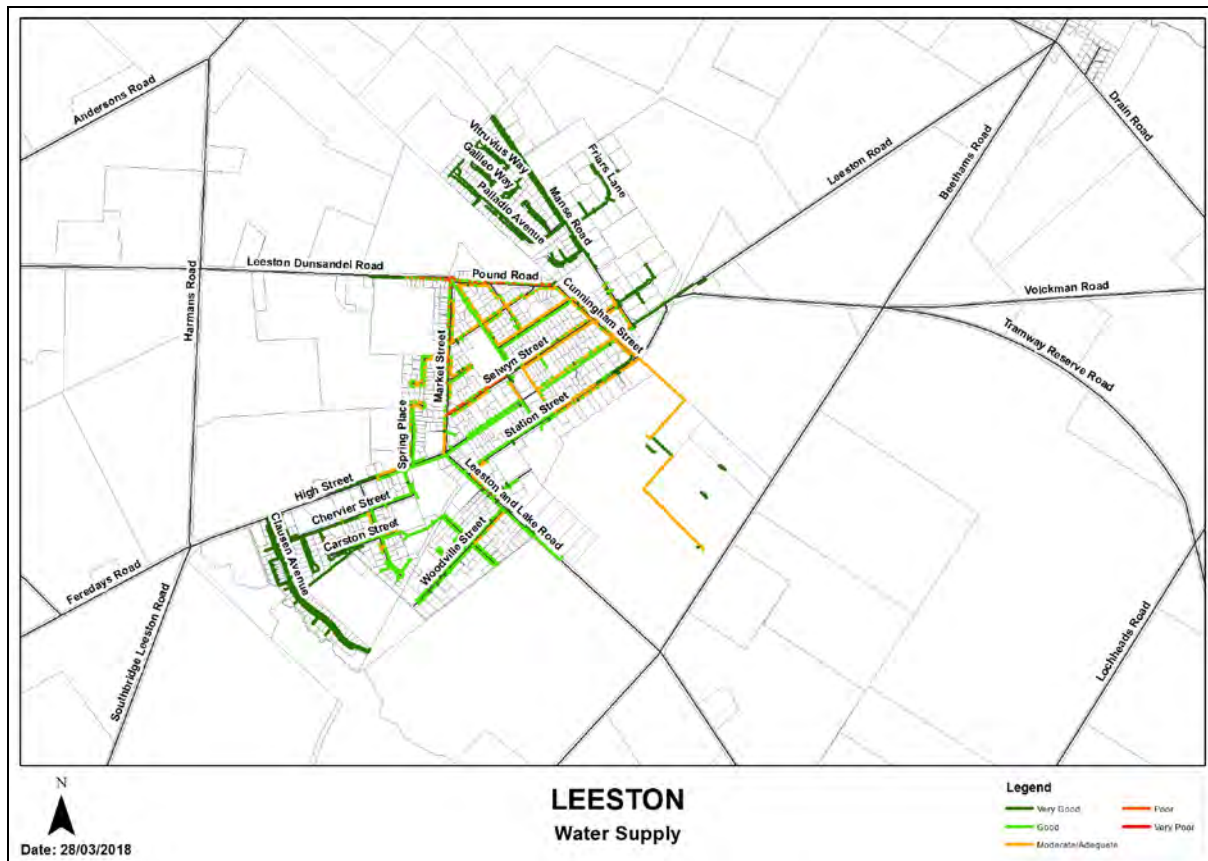


**Figure 13-11 Asset Condition – Leeston**

Table 13-10 provides a description of the condition rating used within the condition model.

**Table 13-10 Asset Condition Grading**

| Condition Rating | Grading   |
|------------------|-----------|
| 1.0              | Excellent |
| 2.0              | Good      |
| 3.0              | Moderate  |
| 4.0              | Poor      |
| 5.0+             | Fail      |

The number of pipe faults is also measured through the asset management system. Figure 13-12 shows the known historic pipe failures within this scheme.

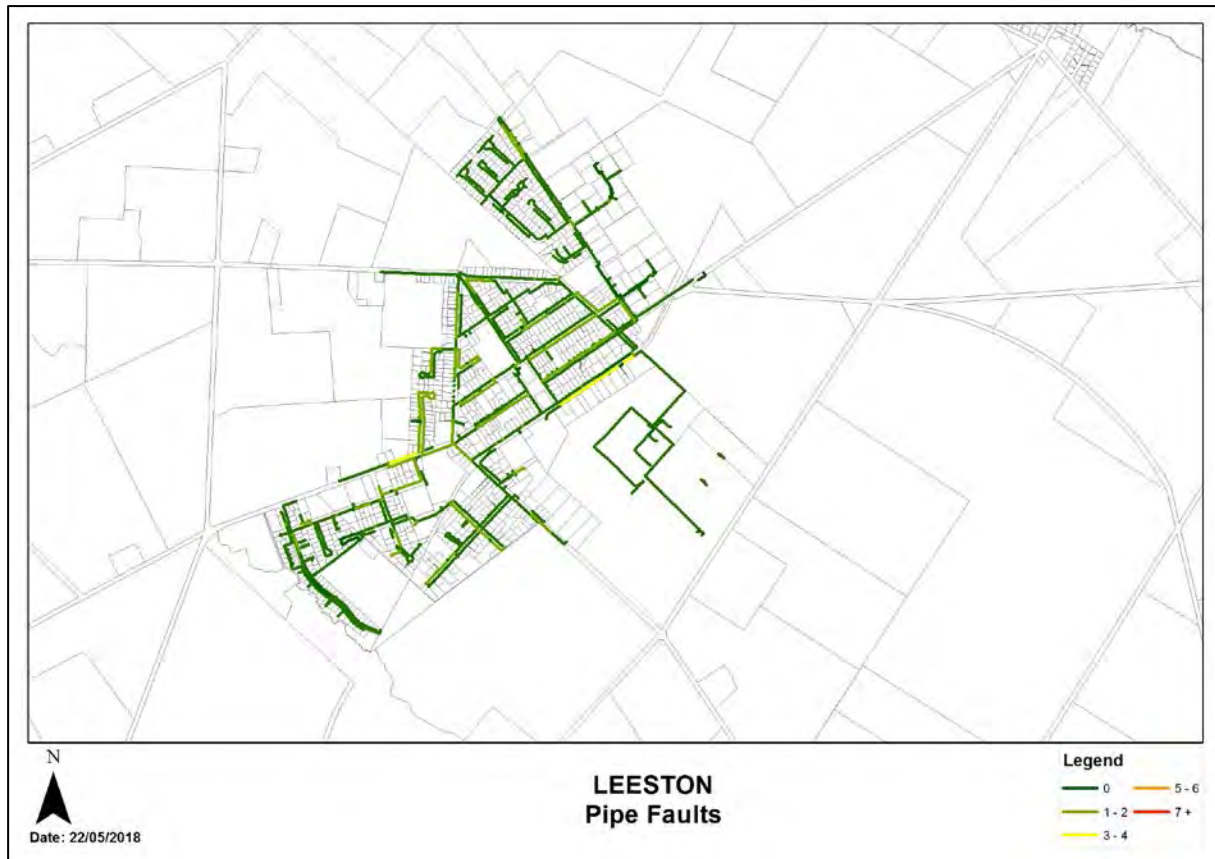


**Figure 13-12 Pipe Faults, Leeston**

### 13.15 Funding Program

The 10 year budgets for Leeston are shown by Table 13-11 and Figure 13-13. Budgets are split into expenditure, renewals, projects and capital projects.

All figures are (\$) not adjusted for CPI “inflation”. They are calculated on historical data, and population growth where relevant.

**Table 13-11 Leeston Budget Summary**

| Years     | Expenditure | Renewals  | Projects | Capital Projects |
|-----------|-------------|-----------|----------|------------------|
| 2018/2019 | \$106,900   | \$2,283   |          | \$1,120,900      |
| 2019/2020 | \$112,122   | \$32,639  |          | \$355,000        |
| 2020/2021 | \$113,342   | \$5,956   |          |                  |
| 2021/2022 | \$114,559   | \$5,628   |          |                  |
| 2022/2023 | \$115,775   | \$320,770 |          |                  |
| 2023/2024 | \$117,187   | \$104,199 |          |                  |

|           |             |           |  |             |
|-----------|-------------|-----------|--|-------------|
| 2024/2025 | \$118,596   | \$88,285  |  |             |
| 2025/2026 | \$120,003   | \$57,510  |  | \$186,500   |
| 2026/2027 | \$121,407   | \$33,106  |  |             |
| 2027/2028 | \$122,810   | \$95,660  |  | \$674,636   |
| Total     | \$1,162,702 | \$746,037 |  | \$2,337,036 |

An explanation of the categories within the budgets are as follows below:

- Expenditure consists of operation and maintenance costs;
- Renewals are replacement of assets which are nearing or exceeded their useful life;
- Projects are investigations, decisions and planning activities which exclude capital works; and
- Capital projects are activities involving physical works.

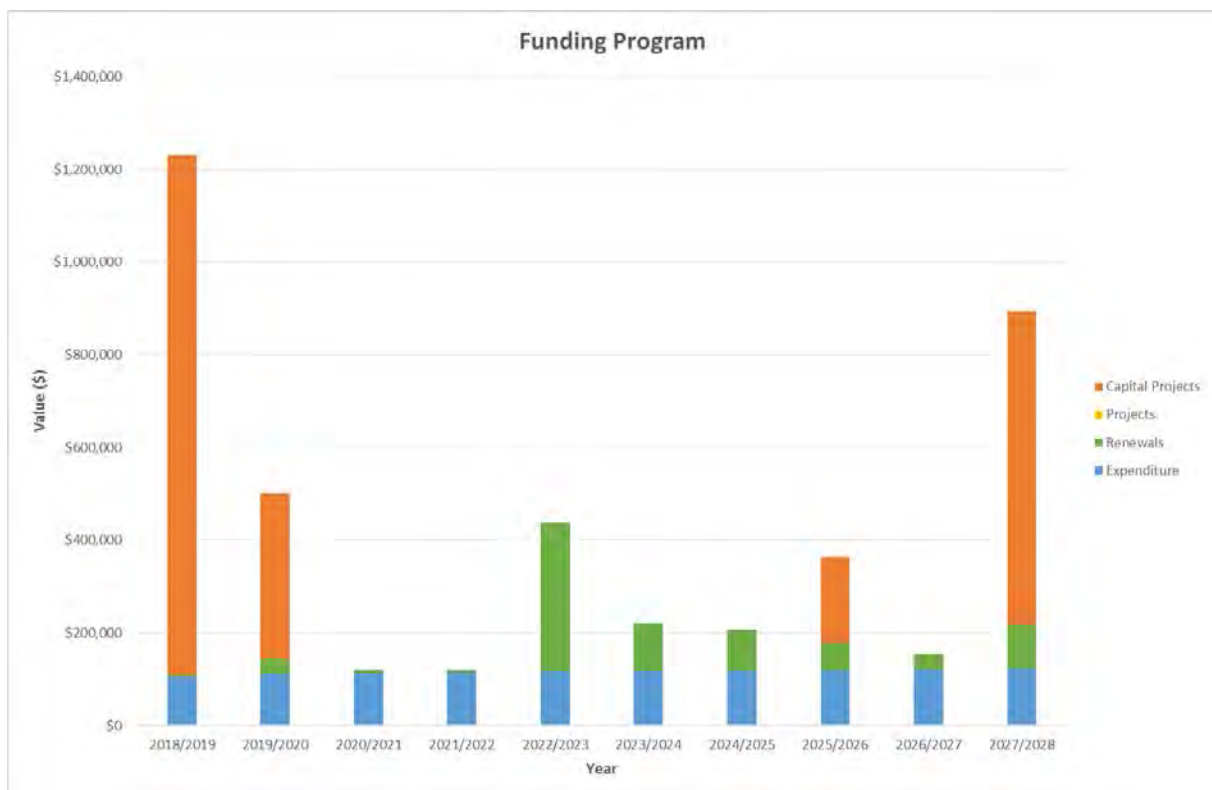


Figure 13-13 Leeston Funding Summary

There are three major projects for Leeston water scheme in the LTP budget.

**Table 13-12 Key Projects**

| Account Label    | GL        | Description               | Year 1 (\$) | Year 2 (\$) | Year 3 (\$) | Years 4 to 10 | Funding Split <sup>10</sup> |
|------------------|-----------|---------------------------|-------------|-------------|-------------|---------------|-----------------------------|
| Capital Projects | 404490031 | Well and Pipework Upgrade | \$786,500   |             |             | \$186,500     | 100% G                      |
| Capital Projects | 404490035 | UV treatment              | \$20,000    | \$355,000   |             |               | 100% LoS                    |
| Capital Projects | 404490036 | Pipeline Extensions       | \$314,400   |             |             | \$674,636     | 100% G                      |

The list of district wide projects can be found in 5Waters Activity Management Plan: Volume 1.

### Discussion on Projects

Projects have been determined based on their:

- Relevance to the scheme
- Requirement to be completed under legislation
- Ability to bring the scheme up to or maintain the Level of Service required under council's Asset Management Policy.

Many projects are **jointly** funded by more than one scheme and activity. Each scheme pays a pro-rata share only, equivalent to the number of connections.

### Discussion on Capital and Projects

Where relevant, Capital (Levels of Service) and Capital (Growth) projects have been included in the scheme financial details.

Levels of Service Projects and growth splits have been provided to ensure the costs of population driven works are clear.

<sup>10</sup> Where LoS refers to Level of Service and G refers to Growth

## 14.0 LINCOLN WATER SUPPLY

### 14.1 Scheme Summary

| Description                                   |                                   | Quantity                       |
|-----------------------------------------------|-----------------------------------|--------------------------------|
| <b>Estimated Population Served</b>            |                                   | 5575                           |
| <b>Scheme Coverage</b><br>(1 Jan 2018)        | Full Charges                      | 1974                           |
|                                               | Half Charges                      | 504                            |
|                                               | >1 Charges                        | 17                             |
| <b>System Components</b>                      | Bores/Intakes (No.)               | 11                             |
|                                               | Treatment/Disinfection            | None                           |
|                                               | Reservoirs (No.)                  | 3                              |
|                                               | Pump Stations (No.)               | 4                              |
|                                               | Piped (m)                         | 70105.29                       |
| <b>History</b>                                | Original scheme installation date | 1983                           |
| <b>Value (\$)</b>                             | Replacement Cost                  | \$10,087,019.67                |
|                                               | Depreciated Replacement Cost      | \$7,998,583.40                 |
| <b>Financial</b>                              | 2018/2019 Estimate                | \$145,150                      |
|                                               | Annual maintenance cost           | 4.53%                          |
|                                               | % of total                        |                                |
| <b>Demand (m3)</b><br>(1 Jan – 31 Dec 2017)   | Average daily                     | 1,870                          |
|                                               | Peak daily                        | 5,345                          |
|                                               | Minimum daily                     | 324                            |
|                                               | Average daily per connection      | 0.95                           |
| <b>Type of Supply</b>                         |                                   | High pressure and unrestricted |
| <b>Target Pressure &amp; Flow at boundary</b> | Pressure                          | >310kPa                        |
|                                               | Flow                              | >20L/min                       |
| <b>Sustainability</b>                         | Well Security                     | Secure                         |

### 14.2 Key Issues

The following key issues are associated with the Lincoln water supply. A list of district wide issues are located in 5Waters Activity Management Plan: Volume 1.



**Table 14-1 Lincoln Scheme Issues**

| What's the Problem                                                                                                               | What we plan to do                                                                                                                                                                                                                                                           |
|----------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| The Lincoln Water Supply will require additional source capacity as population and associated demand increases.                  | The source capacity will be managed by Council, but generally onsite pipe works will be undertaken by developers as part of their subdivision work. Council will monitor growth and demand and initiate increased capacity upgrades through the schemes Infrastructure Plan. |
| The Kildare Terrace pumps are nearing the end of their economic life and pump renewals is expected within the life of this plan. | Council will monitor the pump condition and develop and implement a renewal programme, subject to new wells replacing the need for this well.                                                                                                                                |

### 14.3 Overview & History

The township was originally supplied water by individual bores on each property. Individual water supplies were established for the Murray Place and Cole Street (now named Millstream Drive) subdivisions in 1975/76. A community supply was installed in 1983 after nitrogen levels in the groundwater became elevated. The Murray Place bore was abandoned and the Millstream Drive bore incorporated to the new system. A new bore was drilled at Kildare Terrace utilising surface pumps to provide the bulk of the demand. By 1988 groundwater levels had dropped due to peak summer demand and the surface pumps at Kildare Terrace were replaced with a single bore pump. A third bore was drilled at West Belt in 1998 to accommodate the increasing population, and a standby generator was installed at Kildare Terrace the following year to ensure continuity of supply.

The township is now supplied with untreated groundwater from four bores: Millstream Drive, Kildare Terrace, West Belt and Eastfield (see schematics).



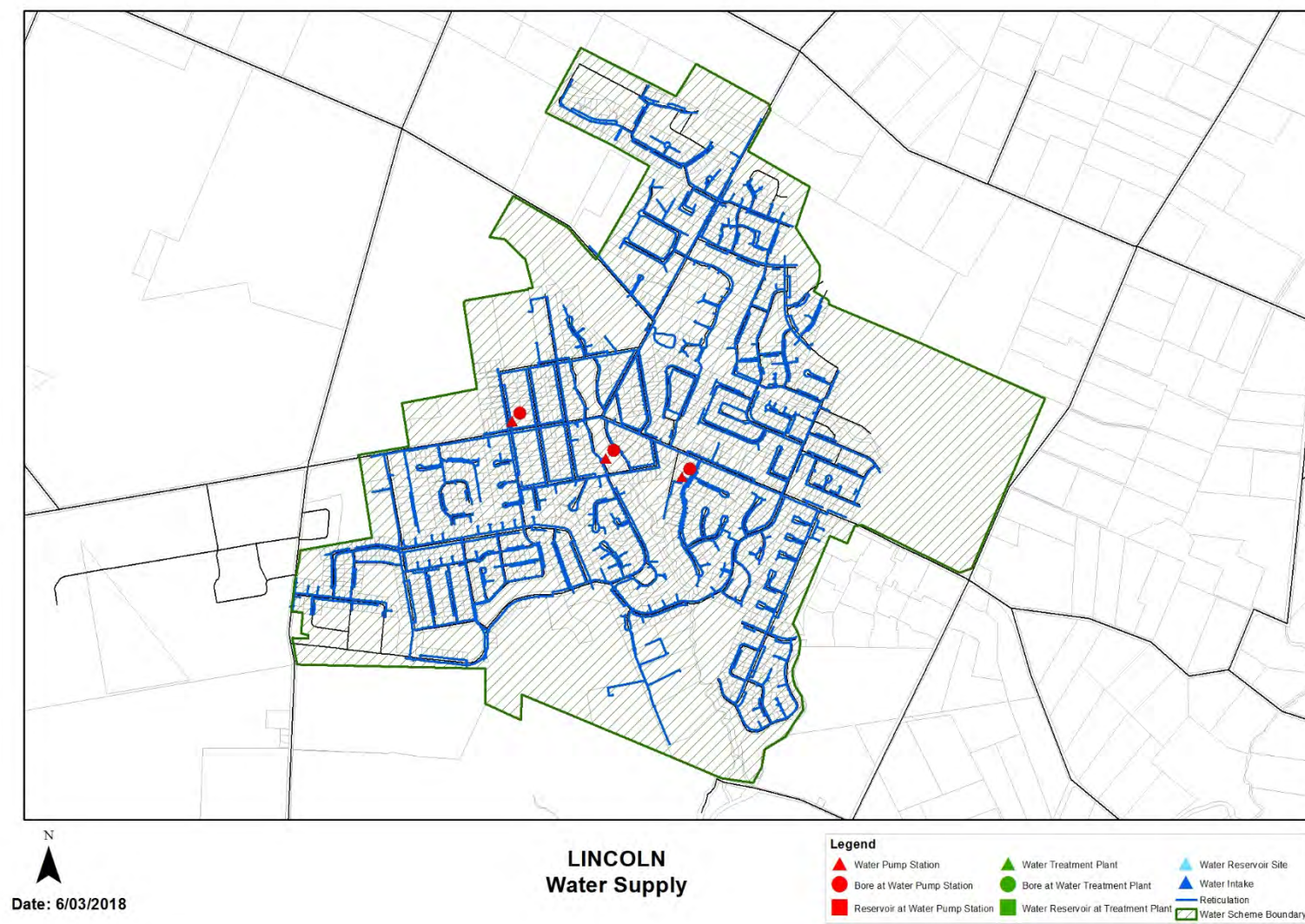


**Figure 14-1 Scheme Map**



## 14.4 System Capacity

In response to the accelerated growth within the Selwyn District hydraulic models have been used to plan future water infrastructure for a number of the water supplies. Hydraulic models have been built and calibrated to international best practice to carry out the '30-year Water Infrastructure Master Planning'.

The master planning provides an assessment of the sizing and timing of new infrastructure for new water sources (wells) and pipelines to service growth. Part of the master planning requires a water balance to be developed to forecast growth, using historical peak demand per household. The water balance forecasts the peak instantaneous flow per year versus the water resources available to determine the staging of new wells. The well staging assumes that one well is redundant for each water supply, to take into consideration maintenance of wells, planning/timing of new wells and security of supply i.e. to maintain average/peak demand.

Population projections are based on SDC 'Household Projections 2018 to 2048' and have been applied to the latest connection figures for each township.

Lincoln is planned to experience significant growth over the next 30-years. Figure 14-3 shows the projected growth for Lincoln to 2048 per planning horizon (5 years intervals) in accordance with the latest House Projections.

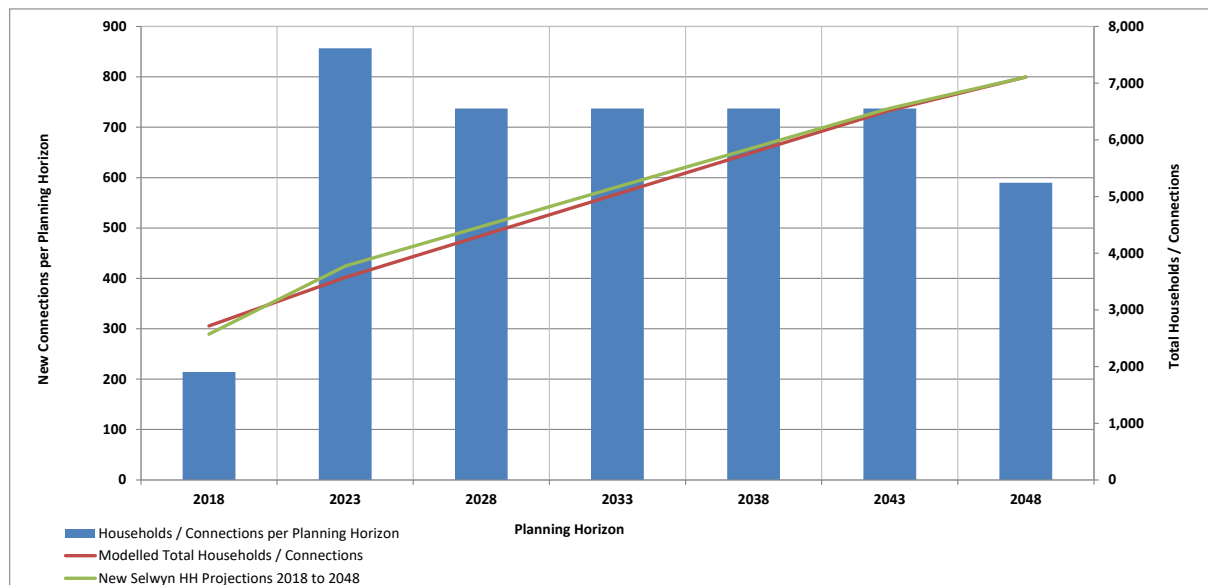


**Figure 14-3 Lincoln Household Projections**

The use of reservoir storage in Lincoln in the future, depending on the capacity may reduce the total number of wells required and/or defer the timing of new wells.

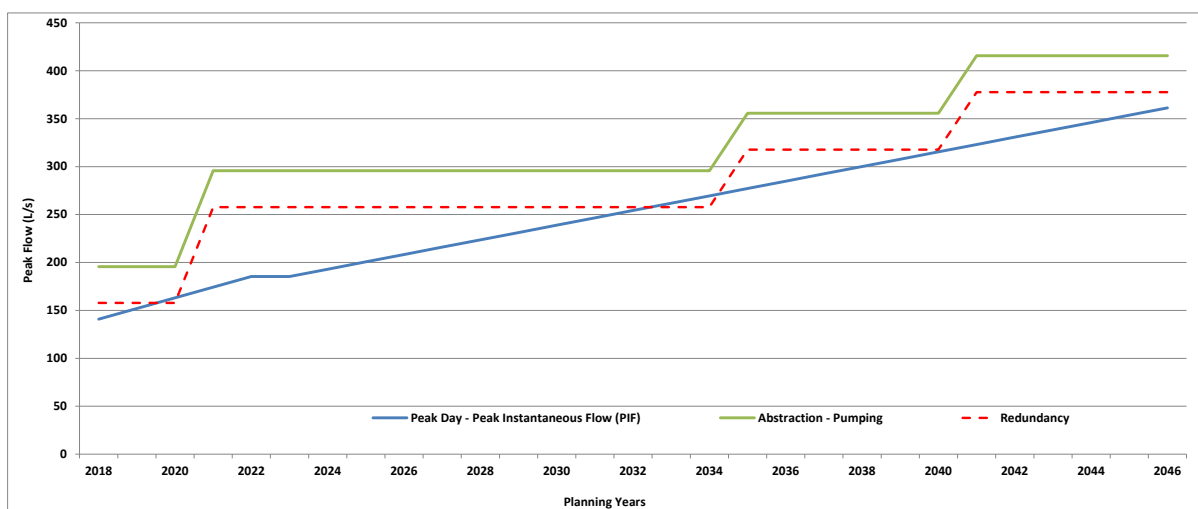


Figure 14-4: Lincoln Water Demand

Table 14-2 Existing Water Source Capacity

| Sites Available  | Well | Capacity (L/s) | Notes                |
|------------------|------|----------------|----------------------|
| Kildare Tce      | 1    | 36             | Decommissioned 17/18 |
| Millstream Drive | 1    | 10             | Decommissioned 17/18 |
| West Belt        | 1    | 35             |                      |
| Eastfield Drive  | 1    | 60             | New 2017             |

Table 14-3 Future Water Source Capacity

| New Site ID | Well/Site | Location                      | Planning Year          | Yield (L/s) |
|-------------|-----------|-------------------------------|------------------------|-------------|
| Linc1       | Well      | New World                     | 2017/18                | 100         |
| Linc2       | Well      | Decommission Kildare Terrace  | 2018/19                | -35         |
| Linc3       | Well      | Decommission Millstream       | 2018/19                | -10         |
| Linc4       | Reservoir | New World 800m <sup>3</sup>   | 2018/19                |             |
| Linc5       | Well      | NE Carnaveron Drive           | 2018/19<br>2022 latest | 100         |
| Linc6       | Reservoir | NE Carnaveron Drive Reservoir | 2023/24                |             |
| Linc7       | Well      | ODP6 (site TBC)               | 2036/37                | 60          |
| Linc8       | Well      | ODP1 / ODP6 (site TBC)        | 2041/42                | 60          |



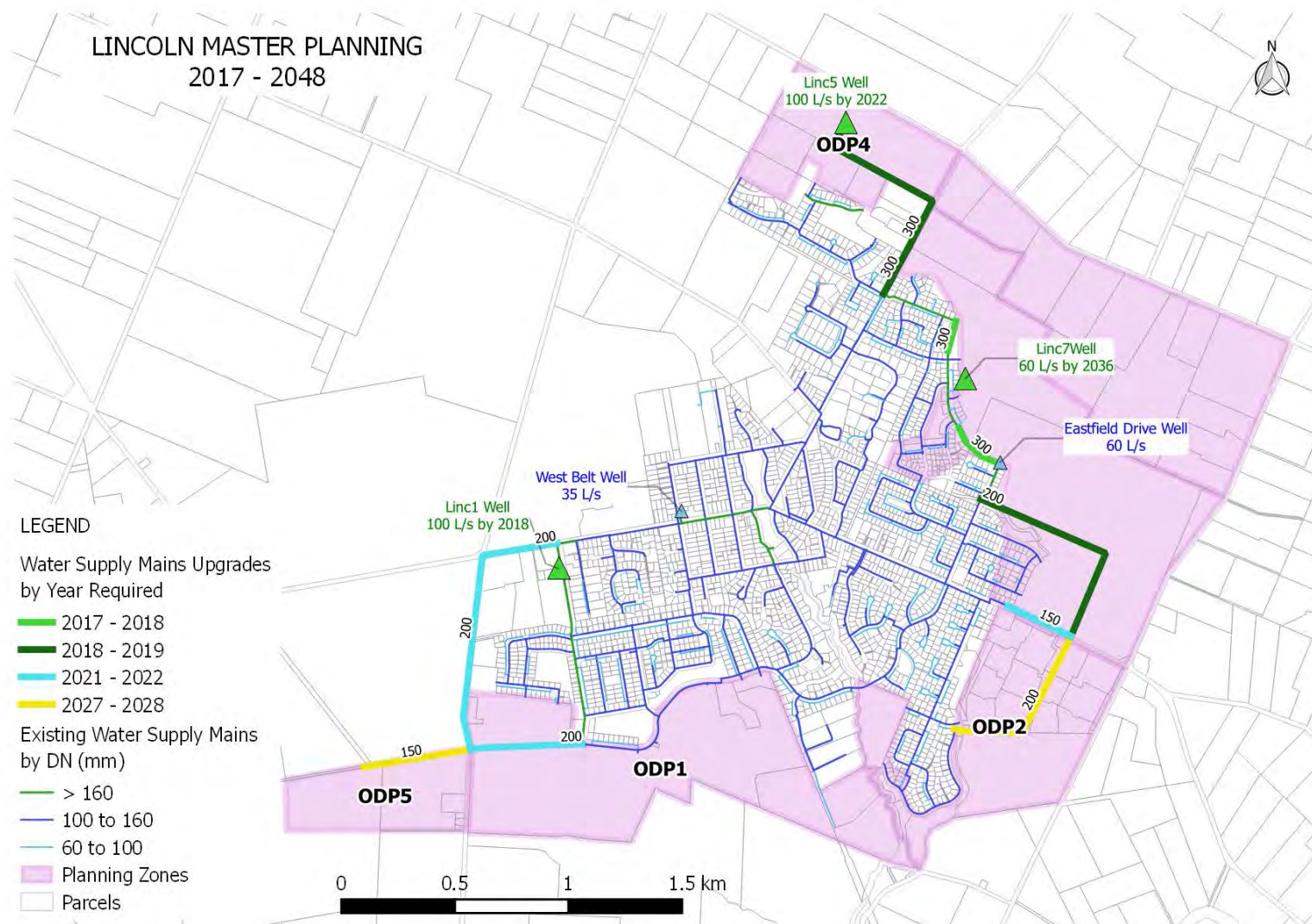


**Figure 14-5 Lincoln Master Plan**

## 14.5 Resource Consents

The Lincoln water supply has a number of resource consents. Table 14-4 shows the water take permitted by the resource consents for this scheme.

**Table 14-4 Resource Consents**

| Consent                      | Description                                                                                          | Location                                       | Date Issued | Expiry Date | Consented Max Instantaneous Flow (L/s) | Consented Max Daily Volume (m <sup>3</sup> /day) |
|------------------------------|------------------------------------------------------------------------------------------------------|------------------------------------------------|-------------|-------------|----------------------------------------|--------------------------------------------------|
| CRC981830<br>(Issued-Active) | To take groundwater at or about map reference M36:6816-2957 for community supply for 800 households. | Gerald Street, LINCOLN                         | 22-May-98   | 20-May-33   | 35                                     | 3024                                             |
| CRC161472<br>(Issued-Active) | To take and use groundwater                                                                          | Liffey Domain, Coles Street, Eastfield LINCOLN | 14-Feb-02   | 31-Jan-35   | 168.9                                  |                                                  |

## 14.6 Water Quality

The Lincoln water supply is made up of four wells; Kildare Terrace, Milstream Drive, West Belt and Eastfield Drive. Three of the wells are sampled twice weekly and one is sampled quarterly. The reticulation is sampled weekly.

The following details E. coli transgressions for the period 2012 to 2017.

### Treatment

There have been no E. coli treatment transgressions during this period.

### Zone

There have been no E. coli transgressions during this period.

### Chemical Analysis

The following is a summary of the raw water chemical analysis carried out at the Lincoln Water Supply.

**Table 14-5 Lincoln Water Supply Raw Water Chemical Analysis Summary**

| Parameter                                   | Standards MAV* (GV)** | Plant <sup>1</sup> 2015 | Plant <sup>1</sup> 2017 | Plant <sup>2</sup> 2015 | Plant <sup>2</sup> 2017 | Status |
|---------------------------------------------|-----------------------|-------------------------|-------------------------|-------------------------|-------------------------|--------|
| Total Lead (g/m3)                           | 0.01                  | 0.00026                 | 0.00020                 | 0.0023                  | 0.000153                | ✓      |
| pH (pH units)                               | 7-8.5                 | 7.9                     | 8.2                     | 7.8                     | 7.8                     | ✓      |
| Total Hardness (g/m3 as CaCO <sub>3</sub> ) | <200                  | 50                      | 29                      | 52                      | 48.7                    | ✓      |
| Total Calcium (g/m3)                        | n/v                   | 16.5                    | 10.0                    | 17.7                    | 16.68                   | ✓      |

|                           |      |      |        |        |       |   |
|---------------------------|------|------|--------|--------|-------|---|
| Total Iron (g/m3)         | <0.2 | 0.52 | 0.57   | <0.021 | 0.046 | X |
| Total Sodium (g/m3)       | <200 | 9.4  | 8.8    | 9.1    | 9.0   | ✓ |
| Nitrate - Nitrogen (g/m3) | 11.3 | 1.24 | < 0.05 | 1.57   | 1.65  | ✓ |

\* MAV – Maximum Acceptable Value

\*\* (GV) – Guideline Value

<sup>1</sup> Kildare Terrace

<sup>2</sup> Milstream Drive

| Parameter                                   | Standards<br>MAV* (GV)** | Plant <sup>3</sup><br>2011 | Plant <sup>3</sup><br>2017 | Plant <sup>4</sup><br>2017 | Status |
|---------------------------------------------|--------------------------|----------------------------|----------------------------|----------------------------|--------|
| Total Lead (g/m3)                           | 0.01                     | <0.00011                   | < 0.00011                  | 0.000125                   | ✓      |
| pH (pH units)                               | 7-8.5                    | 7.9                        | 7.8                        | 7.9                        | ✓      |
| Total Hardness (g/m3 as CaCO <sub>3</sub> ) | <200                     | 57                         | 51.8                       | 48.8                       | ✓      |
| Total Calcium (g/m3)                        | n/v                      | 18.2                       | 16.91                      | 16.56                      | ✓      |
| Total Iron (g/m3)                           | <0.2                     | <0.021                     | < 0.021                    | < 0.021                    | X      |
| Total Sodium (g/m3)                         | <200                     | 10.6                       | 9.75                       | 8.71                       | ✓      |
| Nitrate - Nitrogen (g/m3)                   | 11.3                     | 1.63                       | 1.63                       | 1.100                      | ✓      |

\* MAV – Maximum Acceptable Value

\*\* (GV) – Guideline Value

<sup>3</sup> West Belt

<sup>4</sup> Eastfield Drive



## 14.7 Scheme Assets

A summary of material and diameter for pipes in Lincoln is shown by

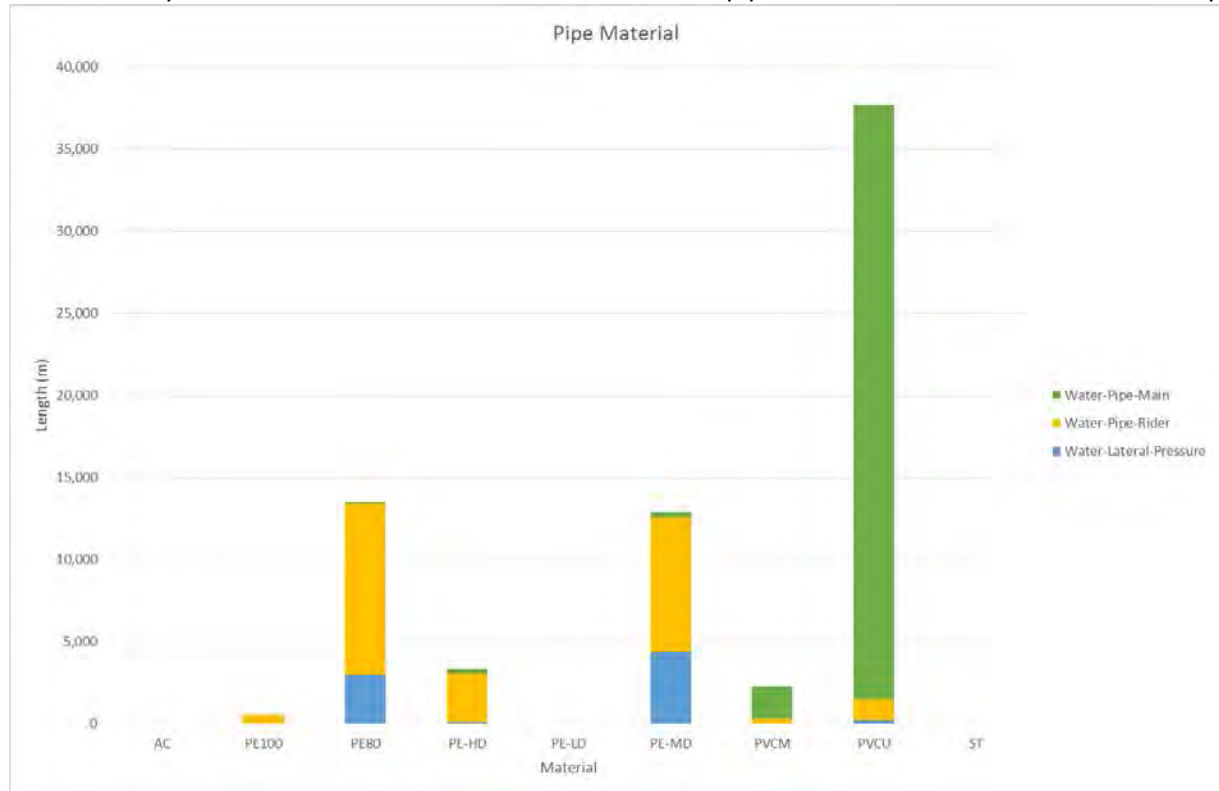


Figure 14-6 and Figure 14-7.

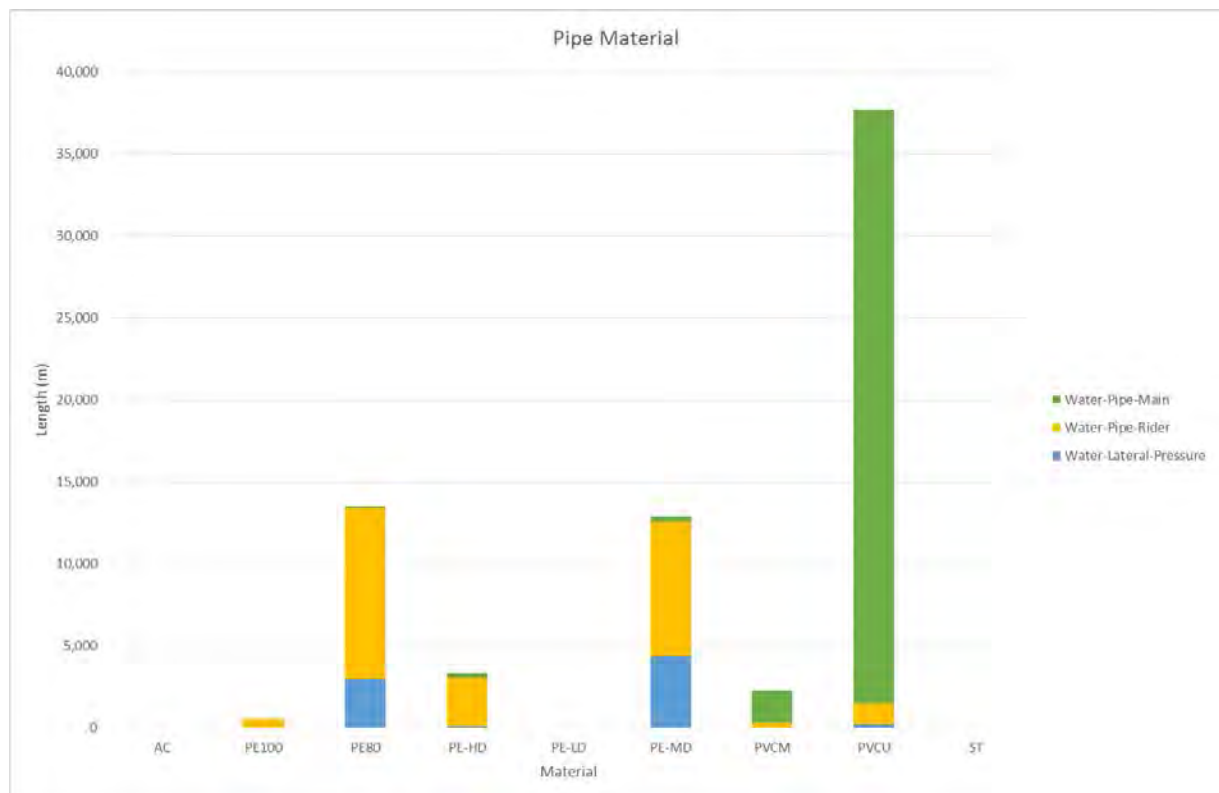


Figure 14-6 Pipe Material – Lincoln

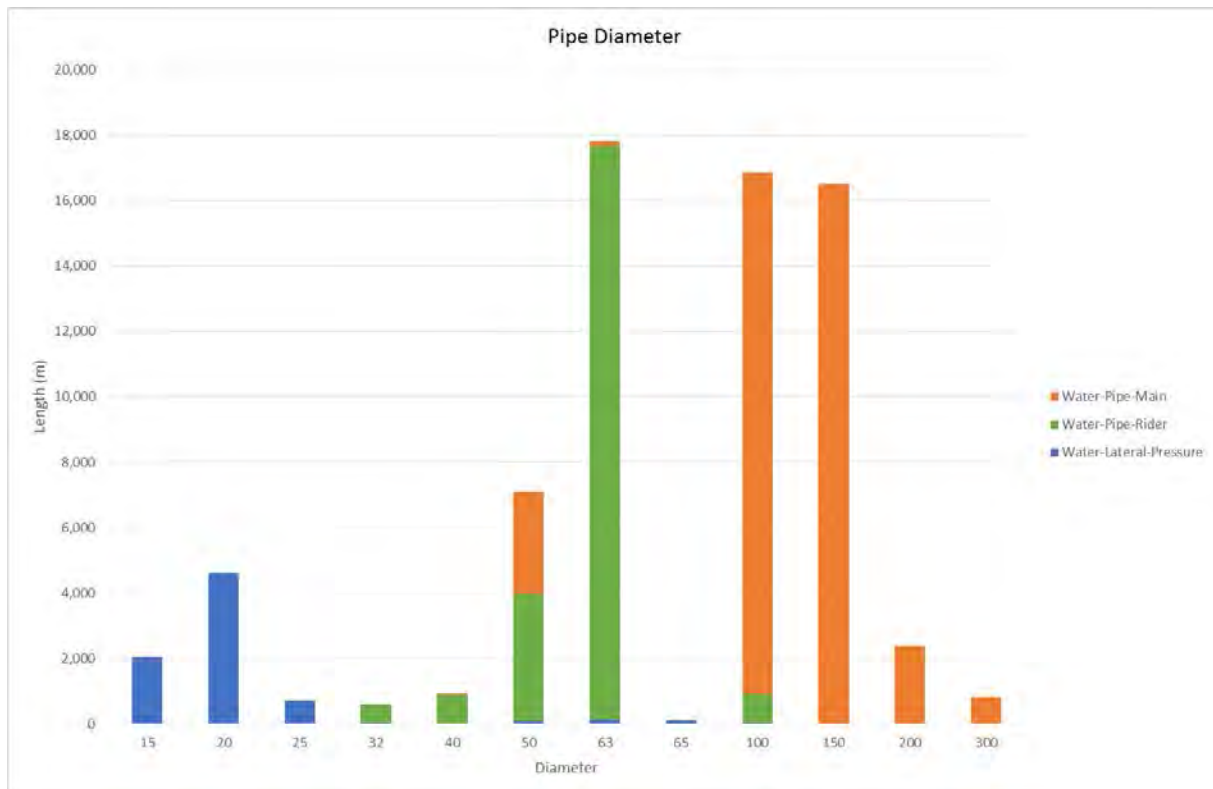


**Figure 14-7 Pipe Diameter – Lincoln**

## 14.8 Operational Management

The water supply is operated and maintained under two maintenance contracts as follows:

- Contract 1241: Water Services Contract. Contract is with SICON Ferguson who undertakes investigations, conditions inspections, proactive and reactive maintenance and minor asset renewals; and
- Contract 1202: Parks and Reserves Contract. Contract is with SICON Ferguson who undertakes the maintenance of land scape features related to water services e.g. mowing, gardens etc.

Water quality sampling is completed under an agreement with Food and Health Ltd as required.

## 14.9 Photos of Main Assets

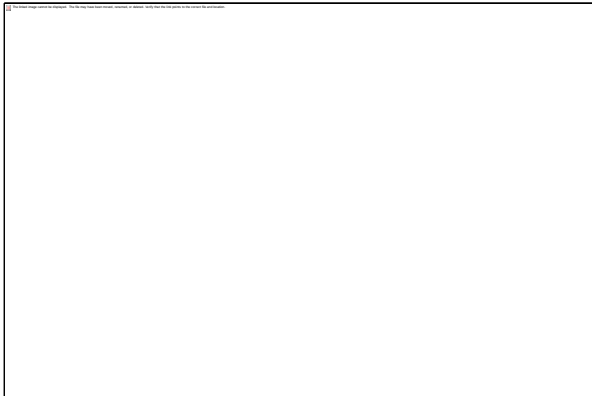


**Photo 1: Kildare Terrace plant building**



**Photo 2: Millstream pump shed**



**Photo 3: West Belt bore headworks**

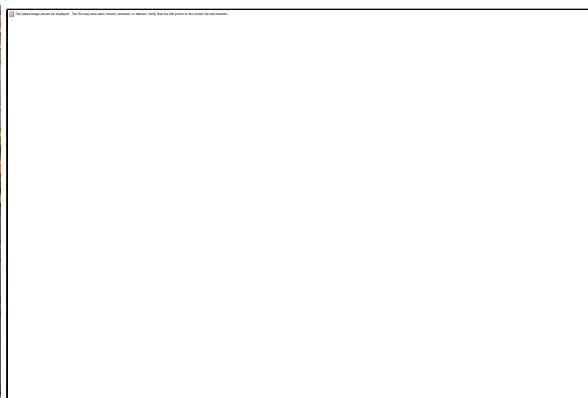


**Photo 4: Lincoln Eastfield Drive**

## 14.10 Risk Assessment

A risk assessment has been undertaken for the Lincoln scheme. The key output from the risk assessment is the identification of any extreme and high risks which need to be mitigated. In order to mitigate these risks they have been included and budgeted for in the projects within this LTP. Table 14-6 outlines the risk priority rating, Table 14-7 outlines the risks and the list of key projects is found in Table 14-12.

**Table 14-6 Risk Priority Rating**

| Risk Score | Level of Risk | Risk Response                                                                                                                                         |
|------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| > 50       | Extreme       | Awareness of the event to be reported to Council.<br>Urgent action to eliminate / mitigate / manage the risk.<br>Document risk and action in the AMP. |
| 35-50      | Very High     | Risk to be eliminated / mitigated / managed through normal business planning processes with responsibility assigned.                                  |
| 14-35      | High          | Manage risk using routine procedures.                                                                                                                 |
| 3.5-14     | Moderate      | Monitor the risk.                                                                                                                                     |

|       |     |                                                                                                                                                                       |
|-------|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| < 3.5 | Low | Awareness of the event to be reported to Council.<br>Immediate action required to eliminate / mitigate / manage the risk.<br><br>Document risk and action in the AMP. |
|-------|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|

**Table 14-7 Risks – Lincoln**

| Risk                                                    | Action/Project                                                       | Year Identified | 2014 Risk Rating | 2017 Risk Rating | Residual Risk Rating |
|---------------------------------------------------------|----------------------------------------------------------------------|-----------------|------------------|------------------|----------------------|
| Insufficient water supply capacity for growth           | Design reservoir and bore, site behind Lincoln New World Supermarket | 2014            | 90               | 90               | 27                   |
| Insufficient water supply capacity for growth           | Construct bore and reservoir                                         | 2014            | 90               | 90               | 27                   |
| Electrical failure due to lightning or network spikes   | Install surge diverters                                              | 2014            | 20               | 20               | 20                   |
| Failure to meet NES water meter standards               | NES Water Meter Compliance                                           | 2014            | 20               | 6                | 6                    |
| Inability to collect income from non-metered properties | Install property water meters                                        | 2014            | 45               | 45               | 3.5                  |
| Non-compliance with the DWSNZ                           | DWSNZ - Age Testing                                                  | 2014            | 20               | 0.7              | 0.7                  |
| Non-compliance with the DWSNZ                           | DWSNZ - Bore-head security                                           | 2014            | 20               | 20               | 20                   |
| Non-consented activities                                | Renewal of consents                                                  | 2014            | 27               | 27               | 6                    |
| Inadequate treatment under all conditions               | UV treatment                                                         | 2017            |                  | 5                | 5                    |
| Inadequate capacity into the future                     |                                                                      | 2017            |                  | 45               | 10                   |

The list of district wide risks can be found in 5Waters Activity Management Plan: Volume 1.

### 14.11 Asset Valuation Details

The total replacement value of assets within the Lincoln water scheme is \$10,087,020 with further details in Table 14-8 below.

**Table 14-8 Replacement Value, Lincoln**

| Asset Class 1 | Asset Class 2 | Sum of Replacement Value |
|---------------|---------------|--------------------------|
|---------------|---------------|--------------------------|

|                            |              |             |
|----------------------------|--------------|-------------|
| <b>Plant and Equipment</b> |              | \$460,838   |
| <b>Water Reticulation</b>  | Hydrant      | \$651,816   |
|                            | Lateral      | \$344,009   |
|                            | Pipe         | \$6,476,618 |
|                            | Supply Point | \$1,470,836 |
|                            | Valve        | \$682,901   |

Replacement values for these different types of assets are shown in Figure 14-8 below.

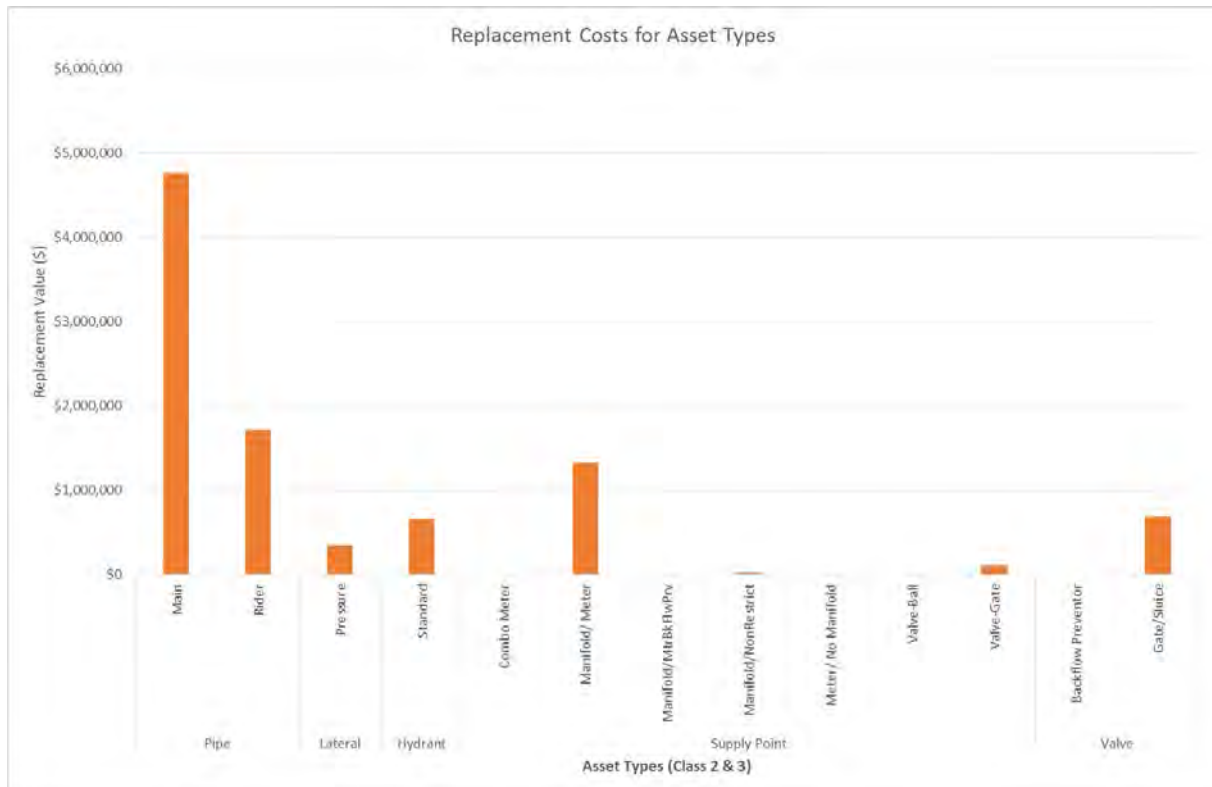


Figure 14-8 Replacement Costs for Lincoln

## 14.12 Renewals

The renewal profile has been taken from the 2017 5 Waters Valuation. A graph showing the renewals for this scheme are shown by Figure 14-9 below. The majority renewals occur in 2033/2034.

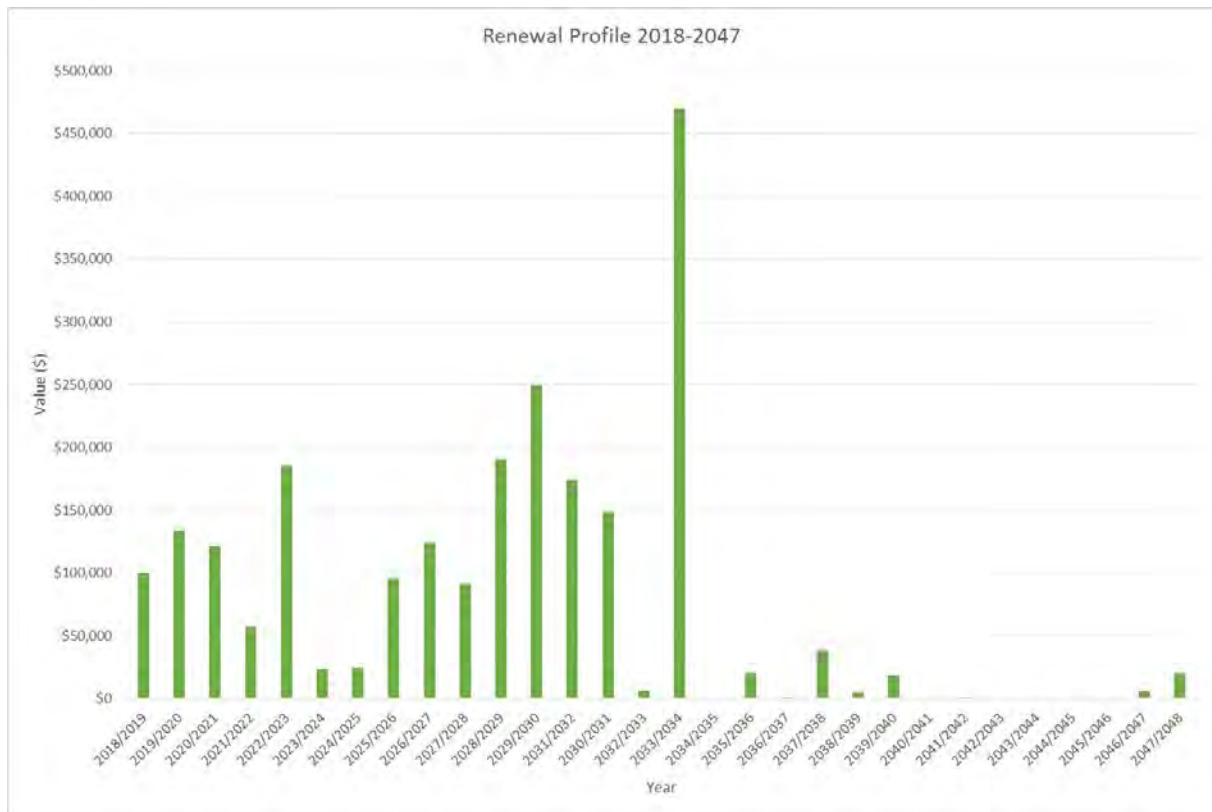


**Figure 14-9 Lincoln Water Renewal Profile**

### 14.13 Critical Assets

The criticality model for Lincoln has been updated for the 2018 AcMP. The methodology of the criticality model can be found in 5Waters Activity Management Plan: Volume 1 and it provides details of how the criticality has been calculated for the reticulation assets. Table 14-9 and Figure 14-10 below shows the calculated criticality for all of the assets within this scheme that have a recorded known length.

**Table 14-9 Length of Assets per Criticality Level**

| Criticality Bands |             | Length (m) |
|-------------------|-------------|------------|
| 5                 | Low         | 34,113     |
| 4                 | Medium-Low  | 22,245     |
| 3                 | Medium      | 10,967     |
| 2                 | Medium-High | 9,118      |
| 1                 | High        | 660        |



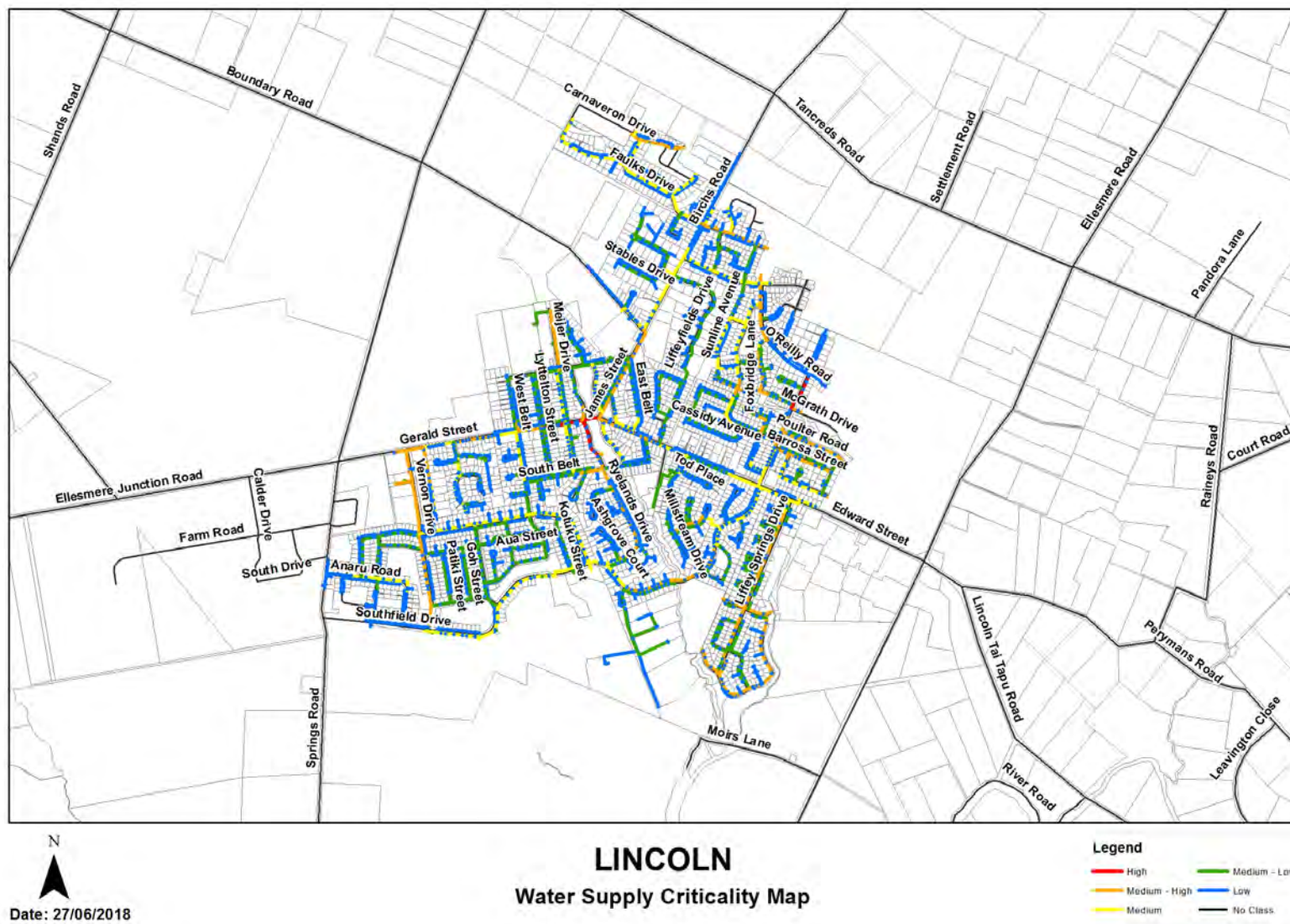


Figure 14-10 Criticality Map



## 14.14 Asset Condition

The asset condition model was run for Lincoln in 2017. The methodology of the model can be found in 5Waters Activity Management Plan: Volume 1 which provides details of how the model has been calculated for the pipe reticulation assets. Figure 14-11 below shows the level of asset condition for these assets within this scheme that have a recorded known condition.

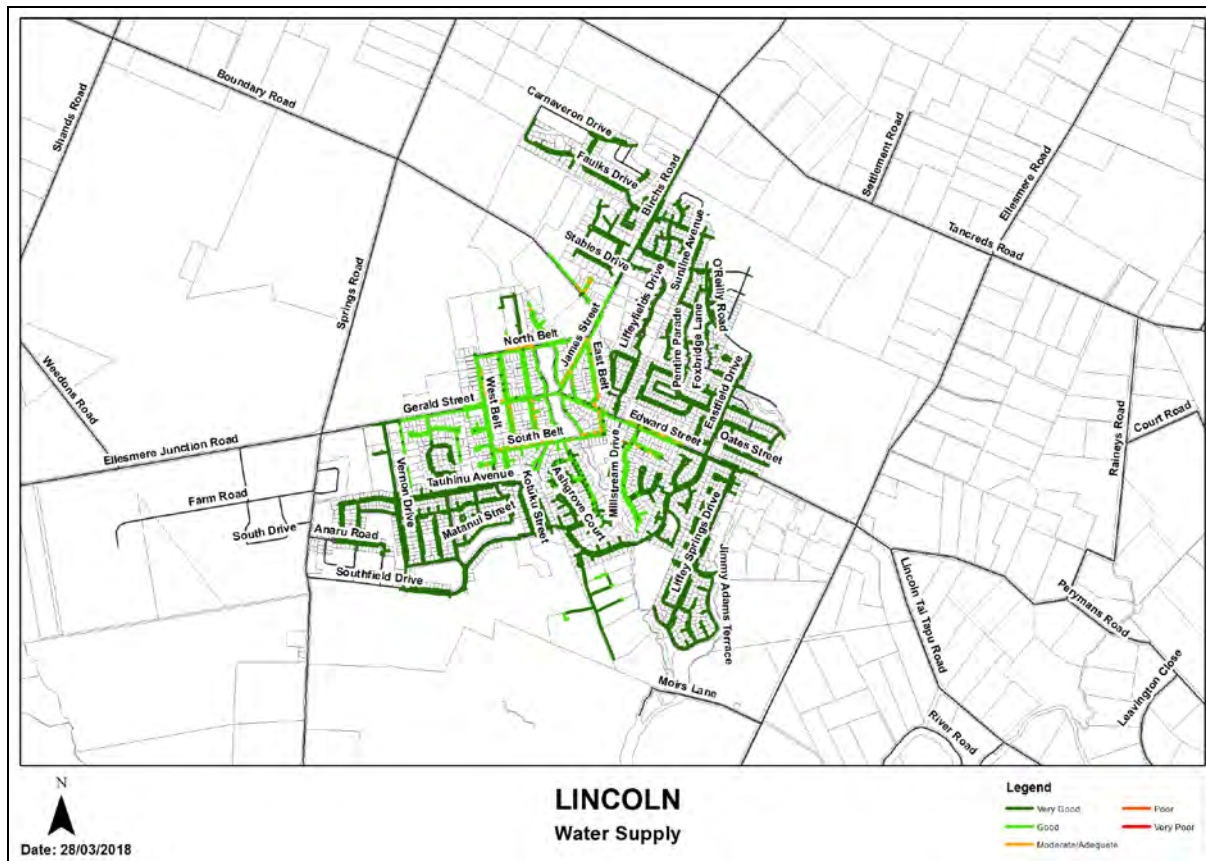


**Figure 14-11 Asset Condition – Lincoln**

Table 14-10 provides a description of the condition rating used within the condition model.

**Table 14-10 Asset Condition Grading**

| Condition Rating | Grading   |
|------------------|-----------|
| 1.0              | Excellent |
| 2.0              | Good      |
| 3.0              | Moderate  |
| 4.0              | Poor      |
| 5.0+             | Fail      |

The number of pipe faults is also measured through the asset management system. Figure 14-12 shows the known historic pipe failures within this scheme.

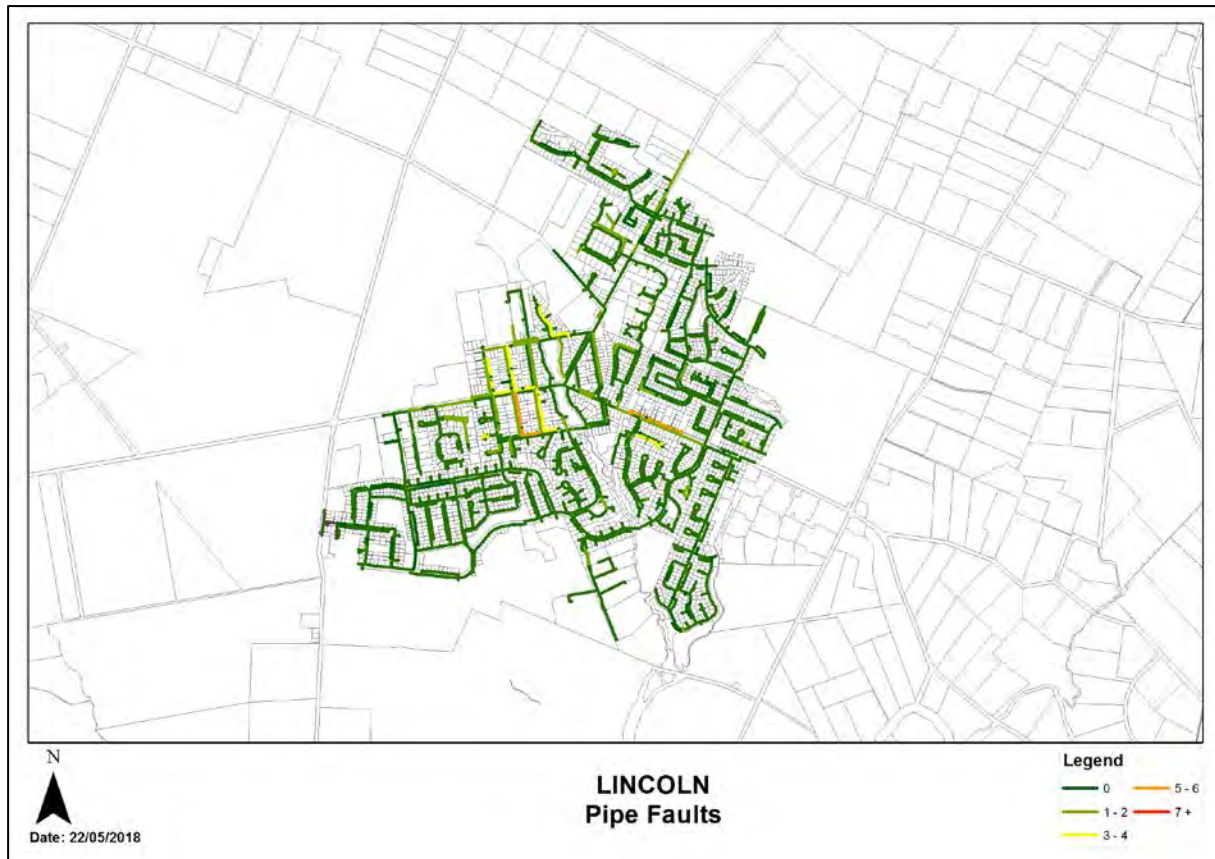


**Figure 14-12 Pipe Faults, Lincoln**

### 14.15 Funding Program

The 10 year budgets for Lincoln are shown by Table 14-11 and Figure 14-13. Budgets are split into expenditure, renewals, projects and capital projects.

All figures are (\$) not adjusted for CPI “inflation”. They are calculated on historical data, and population growth where relevant.

**Table 14-11 Lincoln Budget Summary**

| Years     | Expenditure | Renewals  | Projects | Capital Projects |
|-----------|-------------|-----------|----------|------------------|
| 2018/2019 | \$145,150   | \$100,458 |          | \$2,711,500      |
| 2019/2020 | \$159,570   | \$134,242 |          | \$100,000        |
| 2020/2021 | \$165,928   | \$122,044 |          | \$100,000        |
| 2021/2022 | \$172,259   | \$57,010  |          | \$331,500        |
| 2022/2023 | \$178,566   | \$185,759 |          |                  |
| 2023/2024 | \$181,888   | \$23,896  |          | \$2,500,000      |

|           |             |           |  |             |
|-----------|-------------|-----------|--|-------------|
| 2024/2025 | \$185,204   | \$24,162  |  |             |
| 2025/2026 | \$188,516   | \$96,102  |  |             |
| 2026/2027 | \$191,823   | \$124,609 |  |             |
| 2027/2028 | \$195,126   | \$91,581  |  | \$104,000   |
| Total     | \$1,764,031 | \$959,862 |  | \$5,847,000 |

An explanation of the categories within the budgets are as follows below:

- Expenditure consists of operation and maintenance costs;
- Renewals are replacement of assets which are nearing or exceeded their useful life;
- Projects are investigations, decisions and planning activities which exclude capital works; and
- Capital projects are activities involving physical works.

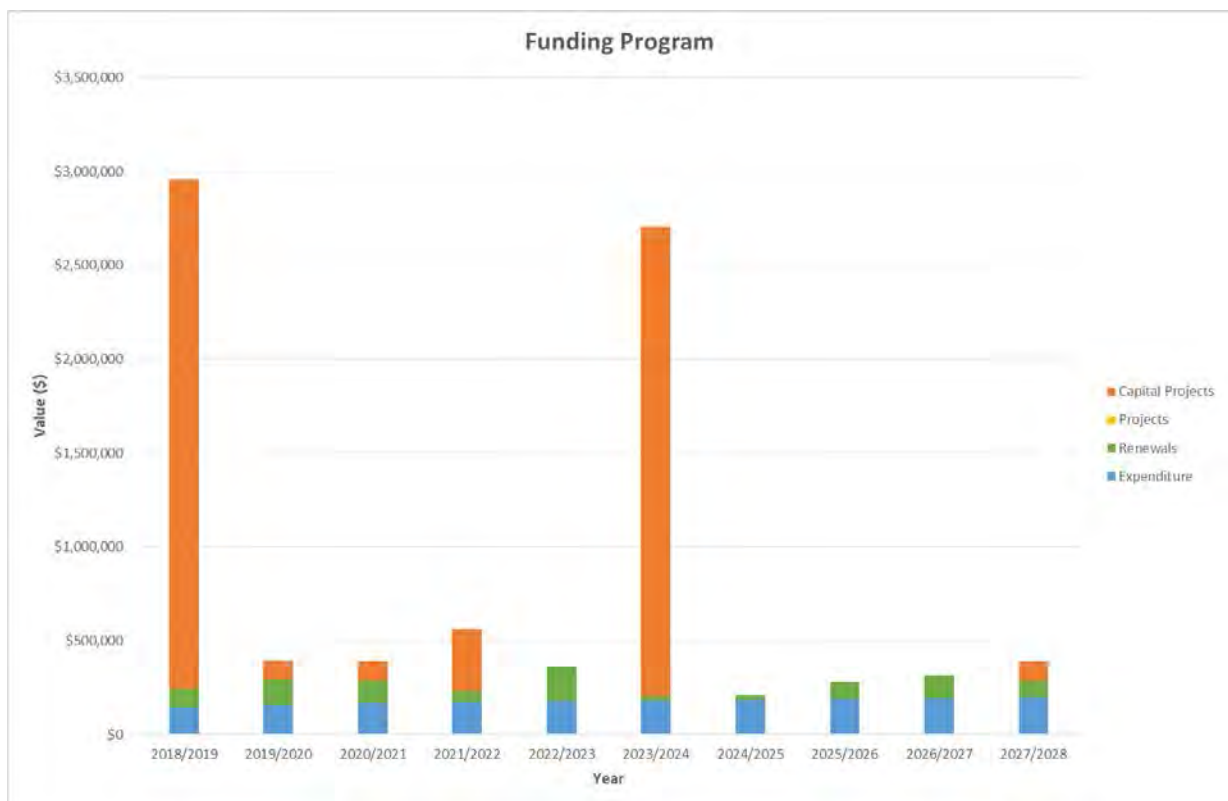


**Figure 14-13 Lincoln Funding Summary**

There are four major projects for Lincoln water scheme in the LTP budget.

**Table 14-12 Key Projects**

| Account Label    | GL        | Description                    | Year 1 (\$) | Year 2 (\$) | Year 3 (\$) | Years 4 to 10 | Funding Split <sup>11</sup> |
|------------------|-----------|--------------------------------|-------------|-------------|-------------|---------------|-----------------------------|
| Capital Projects | 404790013 | New Well and Headworks         | \$836,500   |             |             |               | 100% G                      |
| Capital Projects | 404790032 | Construct reservoir and pump s | \$1,022,000 |             |             | \$2,500,000   | 90% G                       |
| Capital Projects | 404790035 | Pipeline Extensions            | \$480,000   | \$100,000   | \$100,000   | \$435,500     | 100% G                      |
| Capital Projects | 404790037 | UV treatment                   | \$373,000   |             |             |               | 100% LoS                    |

The list of district wide projects can be found in 5Waters Activity Management Plan: Volume 1.

### Discussion on Projects

Projects have been determined based on their:

- Relevance to the scheme
- Requirement to be completed under legislation
- Ability to bring the scheme up to or maintain the Level of Service required under council's Asset Management Policy.

Many projects are **jointly** funded by more than one scheme and activity. Each scheme pays a pro-rata share only, equivalent to the number of connections.

### Discussion on Capital and Projects

Where relevant, Capital (Levels of Service) and Capital (Growth) projects have been included in the scheme financial details.

Levels of Service Projects and growth splits have been provided to ensure the costs of population driven works are clear.

<sup>11</sup> Where LoS refers to Level of Service and G refers to Growth

## 15.0 MALVERN HILLS RURAL WATER SUPPLY

### 15.1 Scheme Summary

| Description                                   |                                   | Quantity                                                                                                                                                                                                                                                                                                 |                                            |
|-----------------------------------------------|-----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|
| <b>Estimated Population Served</b>            |                                   | 1672                                                                                                                                                                                                                                                                                                     |                                            |
| <b>Scheme Coverage</b><br>(1 Jan 2018)        | Full Charges                      | 333                                                                                                                                                                                                                                                                                                      | Total Units Sold: 1,498m <sup>3</sup> /day |
|                                               | Half Charges                      | 0                                                                                                                                                                                                                                                                                                        | Dalethorpe 405 m <sup>3</sup> /day         |
|                                               | >1 Charges                        | 264                                                                                                                                                                                                                                                                                                      | Hartleys Road 1,093 m <sup>3</sup> /day    |
| <b>System Components</b>                      | Bores/Intakes (No.)               | 2 Intakes (Hartleys Road and Dalethorpe)                                                                                                                                                                                                                                                                 |                                            |
|                                               | Treatment/Disinfection            | UV + Chlorine backup at Dalethorpe<br>Filtration + UV at Hartleys Road                                                                                                                                                                                                                                   |                                            |
|                                               | Reservoirs (No.)                  | Dalethorpe – 6 plastic tanks, Springfield Rd – 1 plastic tank, Bluff Rd – 1 Concrete tank, Wyndale No 1, Pigsaddle Rd – 1 plastic tank, Hartleys Rd – 2 concrete reservoirs, Cairn Hill – 1 plastic tank, Whitecliffs – 1 plastic tank, Glentunnel – Coalgate – 1 plastic tank, Waireka – 1 Plastic tank |                                            |
|                                               | Pump Stations (No.)               | 5 Pump Stations                                                                                                                                                                                                                                                                                          |                                            |
|                                               | Piped (m)                         | 199,170                                                                                                                                                                                                                                                                                                  |                                            |
| <b>History</b>                                | Original scheme installation date | 1974-78                                                                                                                                                                                                                                                                                                  |                                            |
| <b>Value (\$)</b>                             | Replacement Cost                  |                                                                                                                                                                                                                                                                                                          |                                            |
|                                               | Depreciated Replacement Cost      |                                                                                                                                                                                                                                                                                                          |                                            |
| <b>Financial</b>                              | 2018/2019 Estimate                | \$328,700                                                                                                                                                                                                                                                                                                |                                            |
|                                               | Annual maintenance cost           | 10.26%                                                                                                                                                                                                                                                                                                   |                                            |
|                                               | % of total                        |                                                                                                                                                                                                                                                                                                          |                                            |
| <b>Demand (m3)</b><br>(1 Jan – 31 Dec 2014)   | Average daily                     | 1200                                                                                                                                                                                                                                                                                                     |                                            |
|                                               | Peak daily                        | 1884                                                                                                                                                                                                                                                                                                     |                                            |
|                                               | Minimum daily                     |                                                                                                                                                                                                                                                                                                          |                                            |
|                                               | Average daily per connection      |                                                                                                                                                                                                                                                                                                          |                                            |
| <b>Type of Supply</b>                         |                                   | Restricted                                                                                                                                                                                                                                                                                               |                                            |
| <b>Target Pressure &amp; Flow at boundary</b> | Pressure                          | >150kPa                                                                                                                                                                                                                                                                                                  |                                            |
|                                               | Flow                              | ±10% maric size                                                                                                                                                                                                                                                                                          |                                            |
| <b>Sustainability</b>                         | Well Security                     | Unsecure                                                                                                                                                                                                                                                                                                 |                                            |

## 15.2 Key Issues

The following key issues are associated with the Malvern Hills water supply. A list of district wide issues are located in 5Waters Activity Management Plan: Volume 1.

**Table 15-1 Malvern Hills Scheme Issues**

| What's the Problem                                                                                                                                                                                                                                                                | What we plan to do                                                                                                                                                                                             |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Achieving compliance with the Health Act and amendments will require additional treatment at both Malvern Hills RWS intakes including chlorination.                                                                                                                               | Council will confirm the requirements for the Rural Agricultural Water Supplies from 2016. This will include consideration of the Whitecliffs/Glentunnel/Coalgate township split and headworks supply options. |
| Over allocation in selected areas has had a significant effect on levels of service. Modelling has confirmed under supply in some sections of the reticulation. Future renewals and replacements must be carried out in a manner that ensures levels of service are not affected. | Council will implement capital works plan to provide water treatment upgrades to meet the DWSNZ,                                                                                                               |
| The condition assessment and renewal programme for AC main replacement to ensure sufficient funding is available when replacement is required.                                                                                                                                    | Ongoing inspections and sampling of pipes at time of repair.                                                                                                                                                   |
| Council require easements/agreements to ensure access to reticulation mains.                                                                                                                                                                                                      | Council will identify critical assets requiring easements/agreements and acquire these at time of upgrade works.                                                                                               |

## 15.3 Overview & History

Malvern Hills Rural Water Scheme (MHRWS) was installed from 1974 to 1978 for stock and domestic use for the area from Russell's Flat to the Selwyn River, but was extended to serve the townships of Whitecliffs, Glentunnel and Coalgate. The scheme was designed as a restricted supply with flow rates of about 90L/ha/day including domestic use. Water is provided at low pressure and flow to the customer's storage tanks.

The MHRWS comprises two independent systems each having its own intake, treatment facilities and distribution zone. The Northern and Southern supply area covers approximately 6320ha in total. The northern intake is located adjacent to the Hawkins River (northern area) near Dalethorpe Road. The Southern supply area with intake (known as the Hartley Road pump station) is located 2km north of Whitecliffs adjacent to the Selwyn River. Water from both supply areas is treated by a UV disinfection system.

### ***Hartley's Road Treatment (Southern Scheme)***

The water treatment plant was upgraded with 1 micron (0.001mm) filtration (installed mid 2017) followed by a new UV treatment system (installed 2015-16). This upgrade has been successful with no transgressions (contamination) at the treatment plant being detected. The subsequent stage to this upgrade will be the addition of permanent chlorination. Chlorination is a critical part of the upgrade

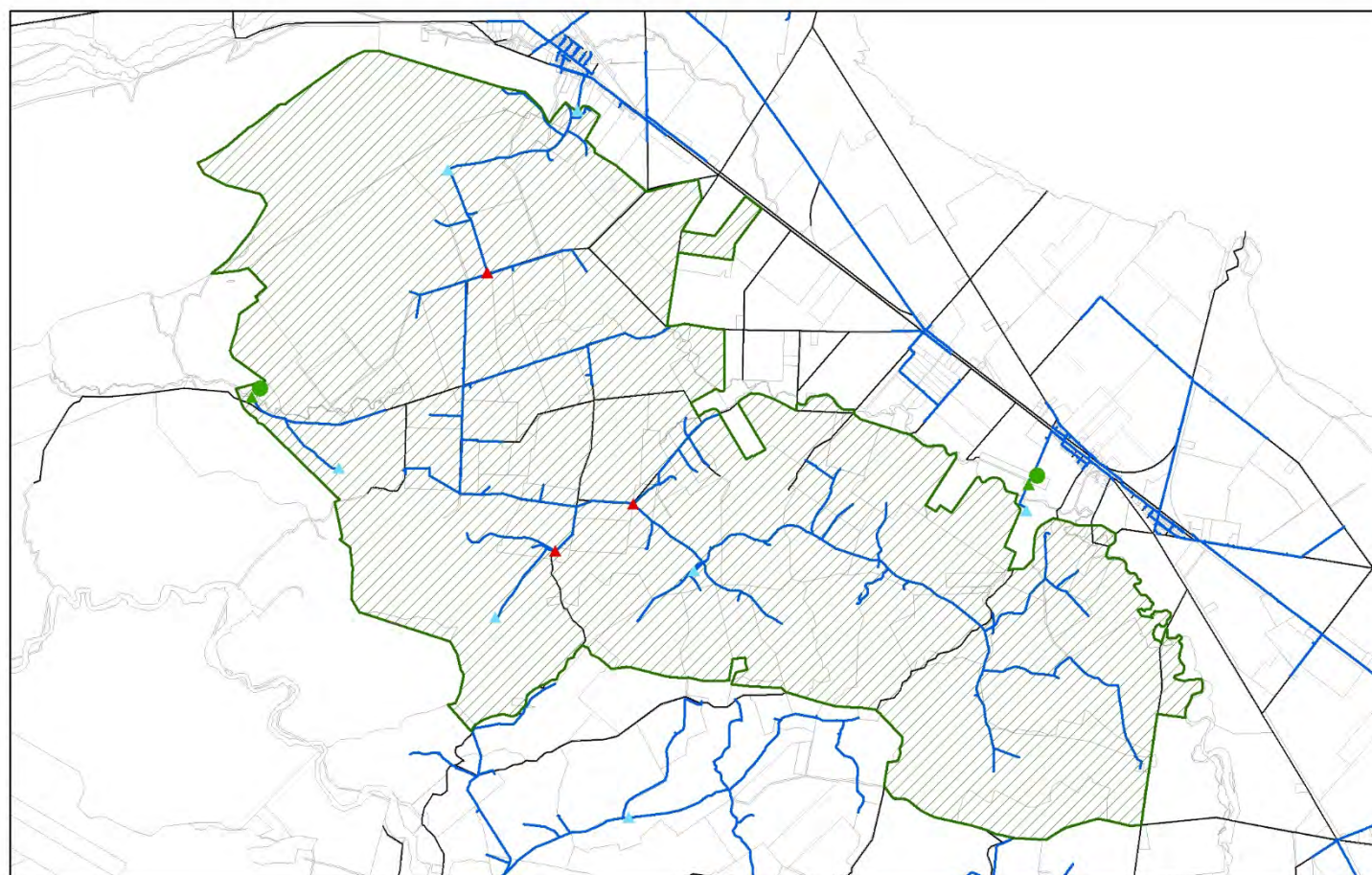
and will provide a residual disinfectant in the distribution system, to minimise the impact of any regrowth or contamination that could potentially enter the distribution system post treatment. Chlorination of this supply will significantly reduce the likelihood of boil water notices and/or emergency chlorine dosing in the future.

***Dalethorpe Treatment (Northern Scheme)***

Chlorine was originally used as the primary form of water treatment for this scheme. In 1986 a decision was made to remove chlorination. This occurred in 1987 with the addition of UV treatment. Chlorine was used as required mainly during times of high turbidity.

In 2016 a UV treatment upgrade occurred at the Dalethorpe scheme. At this time Gas chlorination was introduced replacing the temperamental liquid chlorination system.





N  
Date: 6/03/2018

### MALVERN HILLS DALETHORPE Water Supply

| Legend                            |                                      |                         |
|-----------------------------------|--------------------------------------|-------------------------|
| ▲ Water Pump Station              | ▲ Water Treatment Plant              | ▲ Water Reservoir Site  |
| ● Bore at Water Pump Station      | ● Bore at Water Treatment Plant      | ▲ Water Intake          |
| ■ Reservoir at Water Pump Station | ■ Water Reservoir at Treatment Plant | — Reticulation          |
|                                   |                                      | □ Water Scheme Boundary |

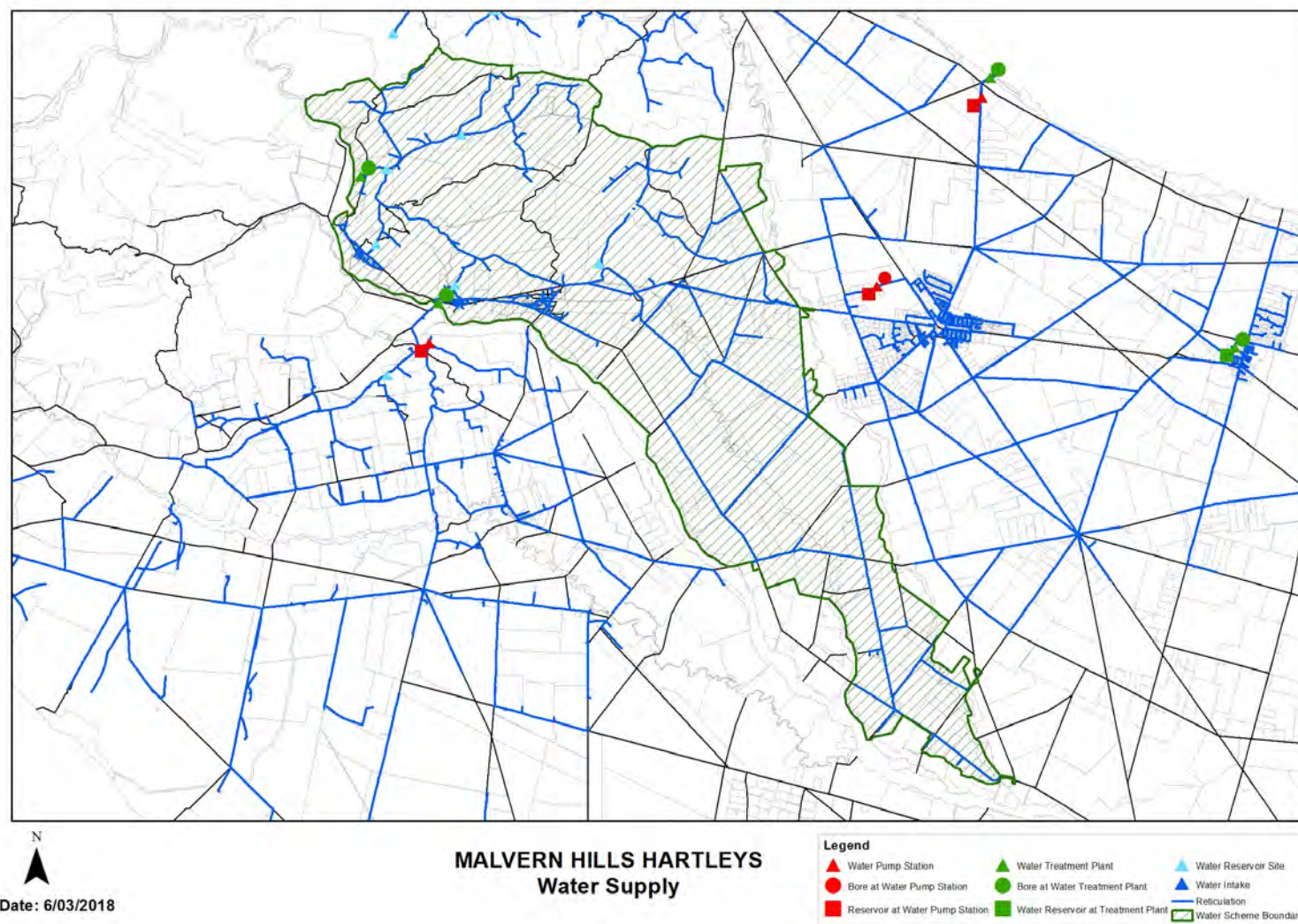
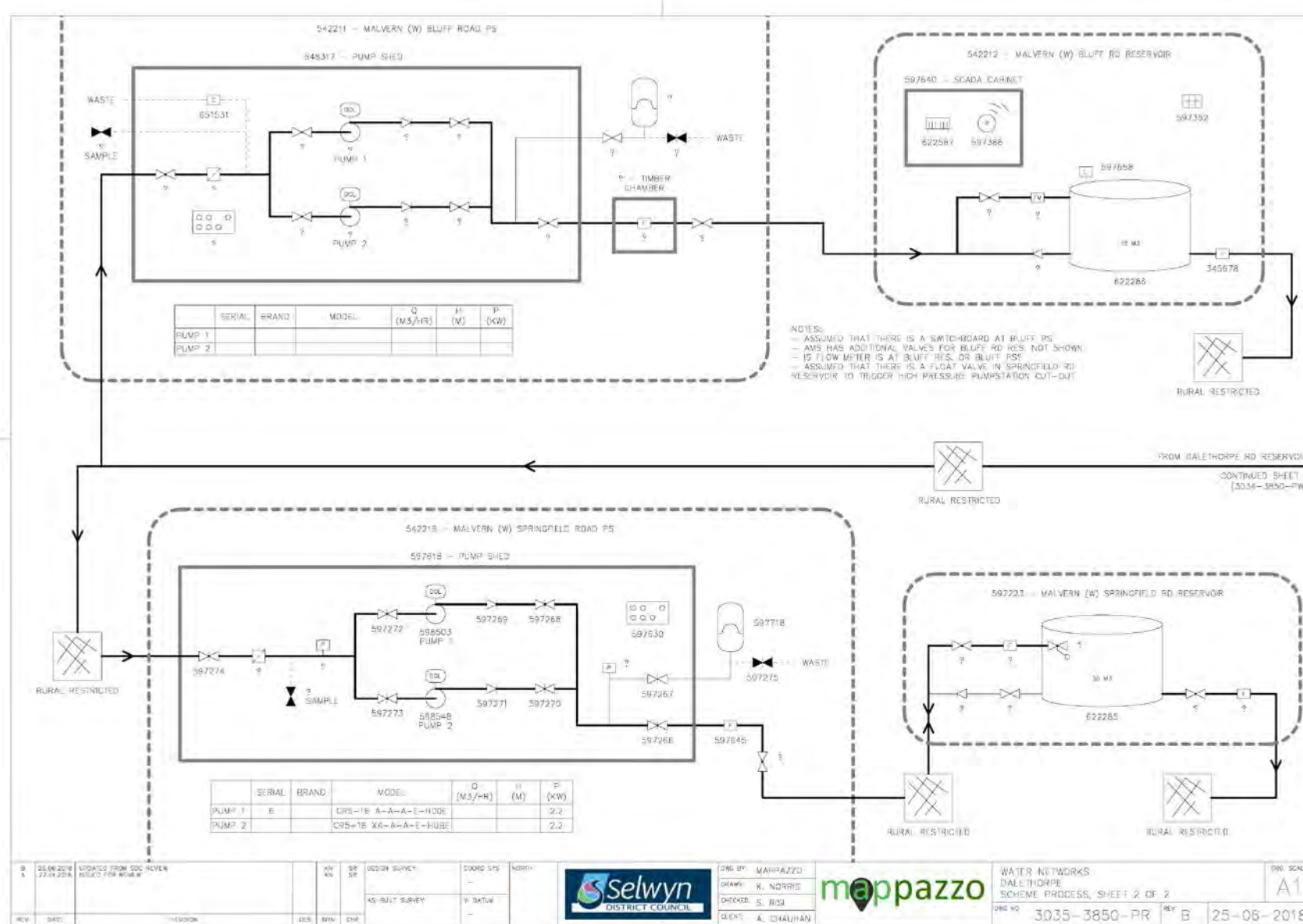
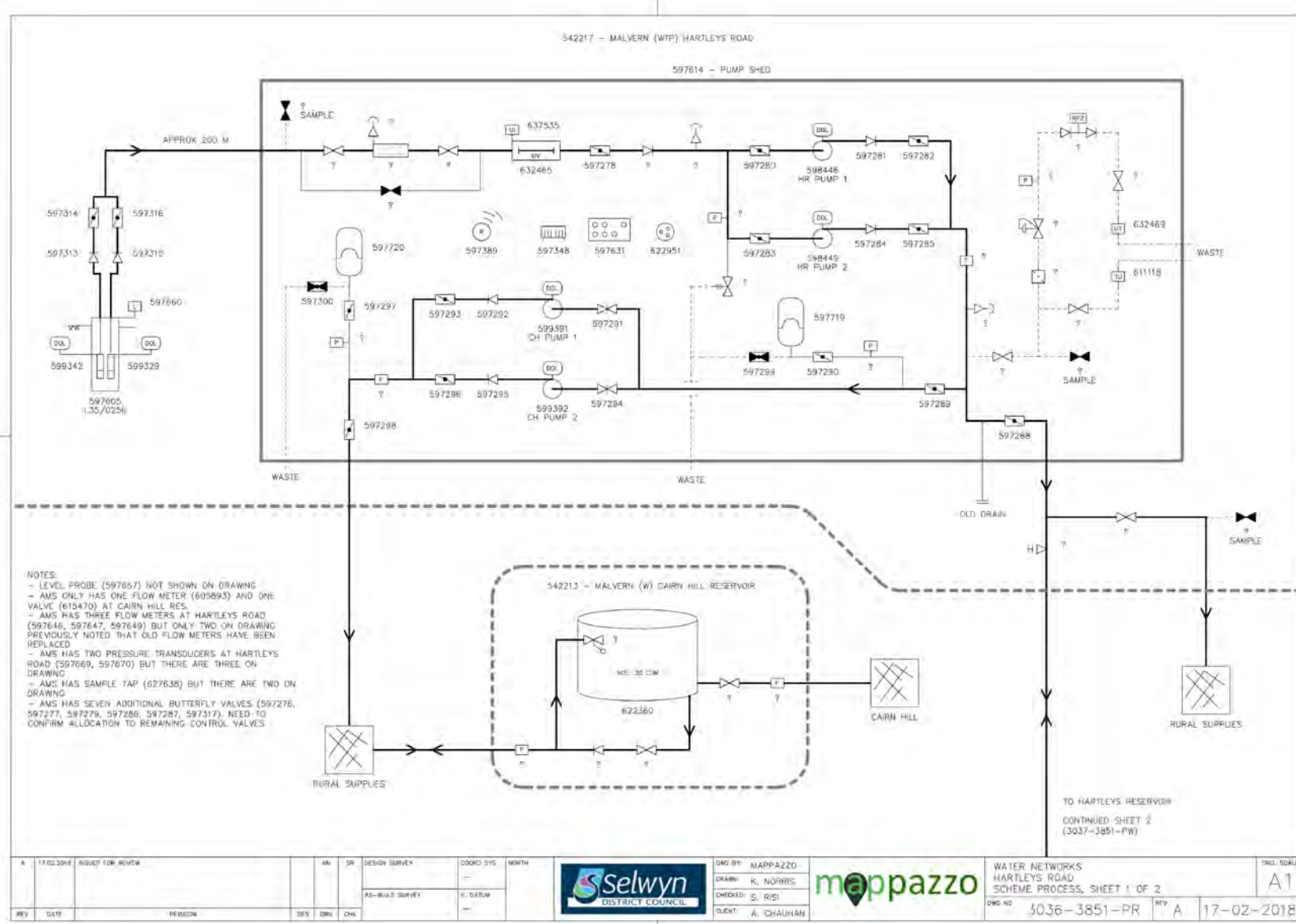


**Figure 15-1 Scheme Map**









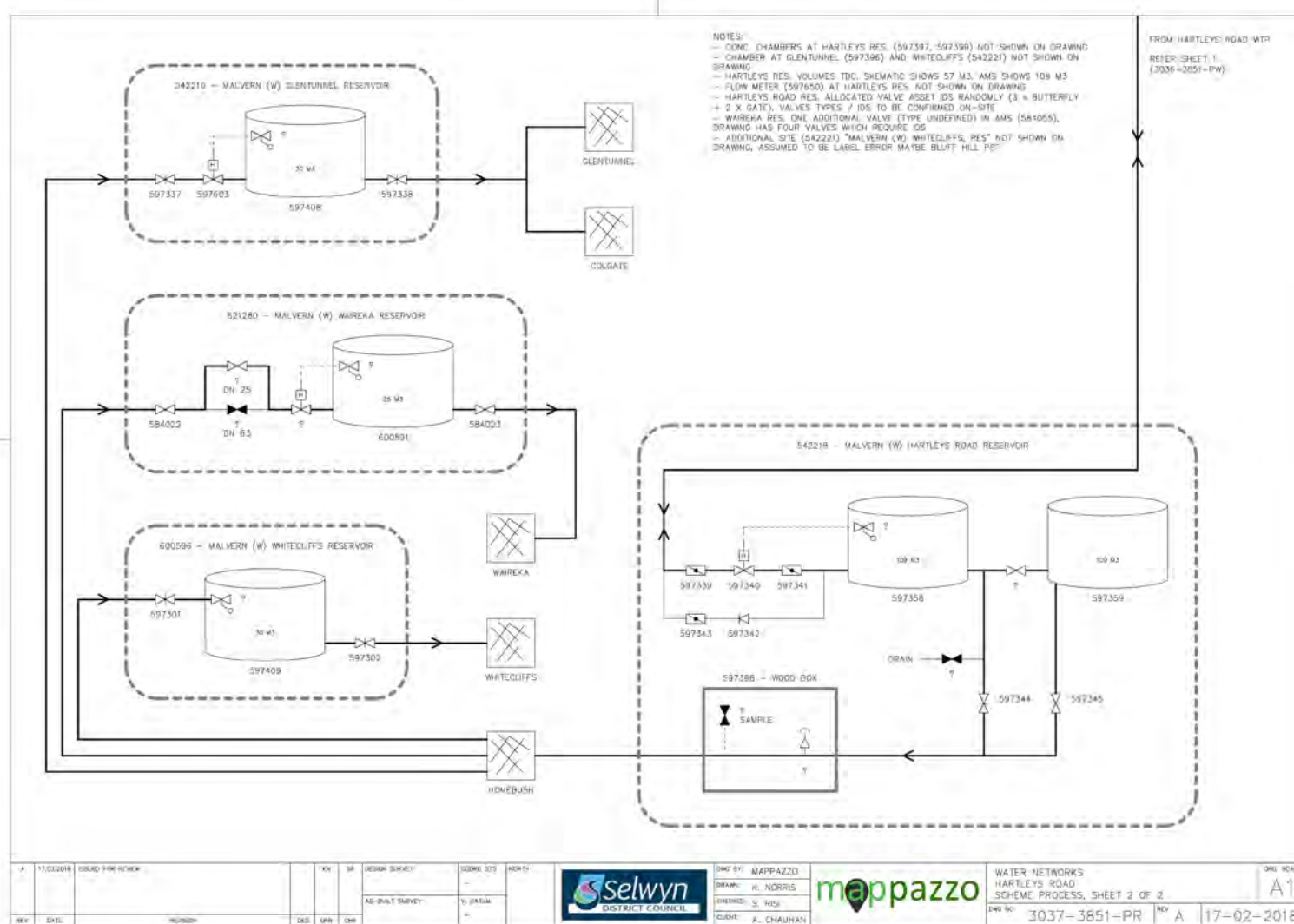


Figure 15-2 Scheme Schematic

## 15.4 System Capacity

### Malvern Hills North - Dalethorpe

The Rural Water Supply (RWS) provides water to a large rural area. This is used for stock and other on-farm purposes, as well as for residential drinking water. There are no towns connected to this RWS. Water is supplied to a tank at each point of supply via a flow restrictor that limits the daily volume to an agreed allocation (2000L/day per dwelling plus 65 L/day/ha). Peak day demand is approaching current abstraction capacity. Further investigation and analysis would be required to confirm the adequacy of source and distribution capacity if the scheme area were to be expanded.

**Table 15-2 Capacity Summary**

|                                             | Flow Rate<br>(L/s) | Daily Volume<br>(m <sup>3</sup> ) | Annual Volume<br>(m <sup>3</sup> ) | Comments                 |
|---------------------------------------------|--------------------|-----------------------------------|------------------------------------|--------------------------|
| Abstraction Capacity                        | 6.9                | 596                               |                                    | 2 x pumps (duty/standby) |
| Consented Take                              | 7.2                | 624                               | 140,000*                           | CRC010903                |
| Peak Demand                                 | 7.2**              | 620                               | 148,640***                         |                          |
| * inferred value<br>**Pump flow<br>*** 2014 |                    |                                   |                                    |                          |

### Malvern Hills South – Hartleys Road

The Rural Water Supply (RWS) provides water to a large rural area. This is used for stock and other on-farm purposes, as well as for residential drinking water. The towns of Whitecliffs, Glentunnel and Coalgate receive water from the RWS. Water is supplied to a tank at each point of supply via a flow restrictor that limits the daily volume to an agreed allocation (2000L/day per dwelling plus 65 L/day/ha). Peak day demand is well within current abstraction capacity. Further investigation and analysis would be required to confirm the adequacy of distribution capacity if the scheme area were to be expanded.

**Table 15-3 Capacity Summary**

|                      | Flow Rate<br>(L/s) | Daily Volume<br>(m <sup>3</sup> ) | Annual Volume<br>(m <sup>3</sup> ) | Comments                 |
|----------------------|--------------------|-----------------------------------|------------------------------------|--------------------------|
| Abstraction Capacity | 18.9               | 1633                              |                                    | 2 x pumps (duty/standby) |
| Consented Take       | 18.9               | 1625                              | 390,000                            | CRC010904                |
| Peak Demand          | Unknown            | 1,404*                            | 347,171                            |                          |
| *2017                |                    |                                   |                                    |                          |

## 15.5 Resource Consents

The Malvern Hills water supply has a number of resource consents. Table 15-4 shows the water take permitted by the resource consents for this scheme.



Table 15-4 Resource Consents

| Consent                        | Description            | Location                      | Date Issued         | Expiry Date | Consented Max Instantaneous Flow (L/s) | Consented Max Daily Volume (m <sup>3</sup> /day) |
|--------------------------------|------------------------|-------------------------------|---------------------|-------------|----------------------------------------|--------------------------------------------------|
| CRC173785<br>(Issued - Active) | To take and use water  | Dalethorpe Road,<br>SHEFFIELD | Lodged<br>31-Oct-00 | 4-May-36    | 7.2                                    | 624                                              |
| CRC010904<br>(Issued-Active)   | To take and use water. | Hartleys Road,<br>WHITECLIFFS | 25-Nov-09           | 19-Nov-44   | 18.9                                   | 1625                                             |

## 15.6 Water Quality

The Malvern Hills rural water supply consists of two separate supplies; Dalethorpe and Hartleys Road. Both of these sources are non-secure. At Dalethorpe the source, treatment plant and reticulation zone are sampled twice weekly. At Hartleys Road the source, treatment plant and reticulation is sampled weekly.

The following details E. coli transgressions for the period 2012 to 2017.

### Source

There have been 152 E. coli source transgressions during this period for Dalethorpe.

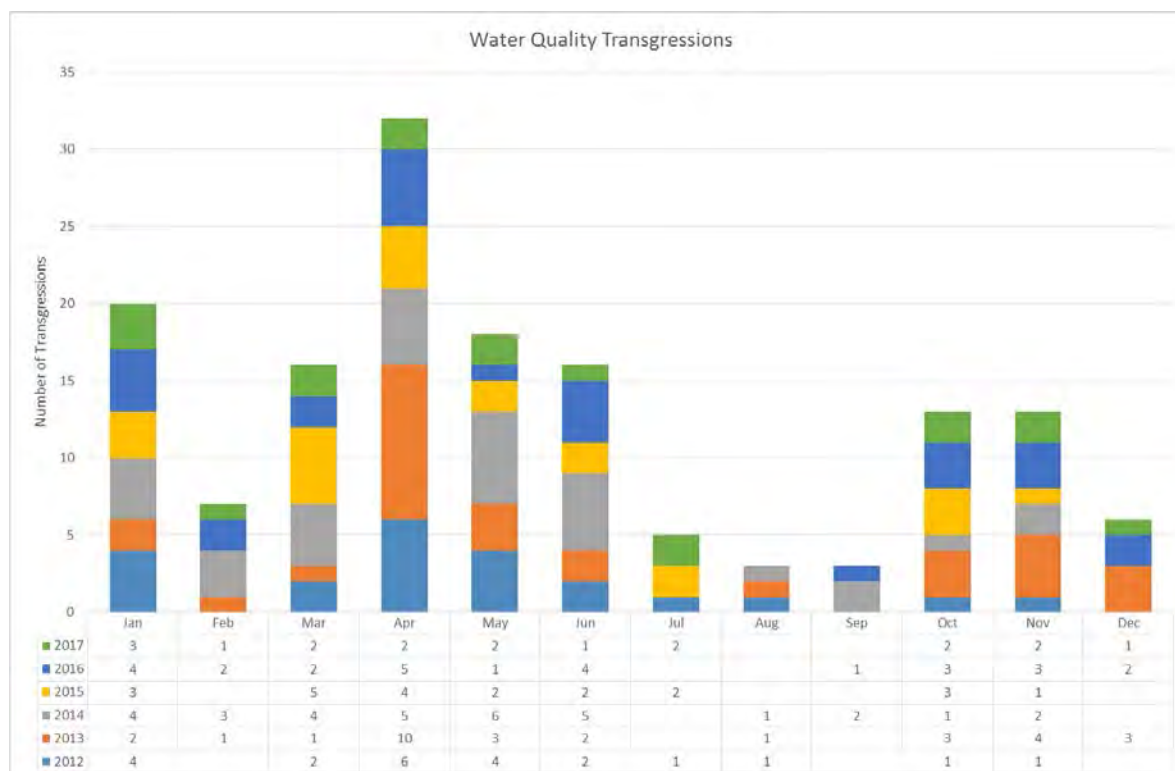


**Figure 15-3 E. coli Transgressions – Source Dalethorpe**

There have been 51 E. coli source transgressions during this period for Hartleys Road.

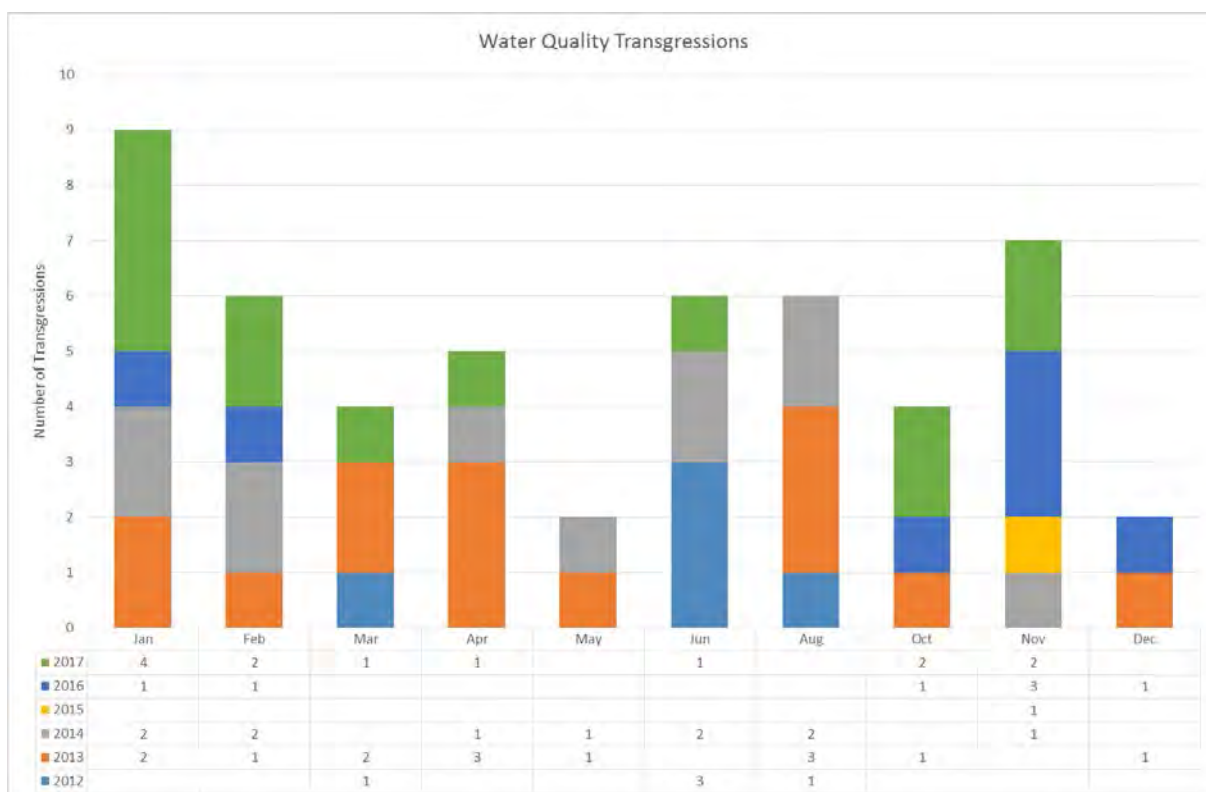


**Figure 15-4 E. coli Transgressions – Source Hartleys Road**

#### Treatment

There have been six E. coli treatment transgressions during this period for Dalethorpe.

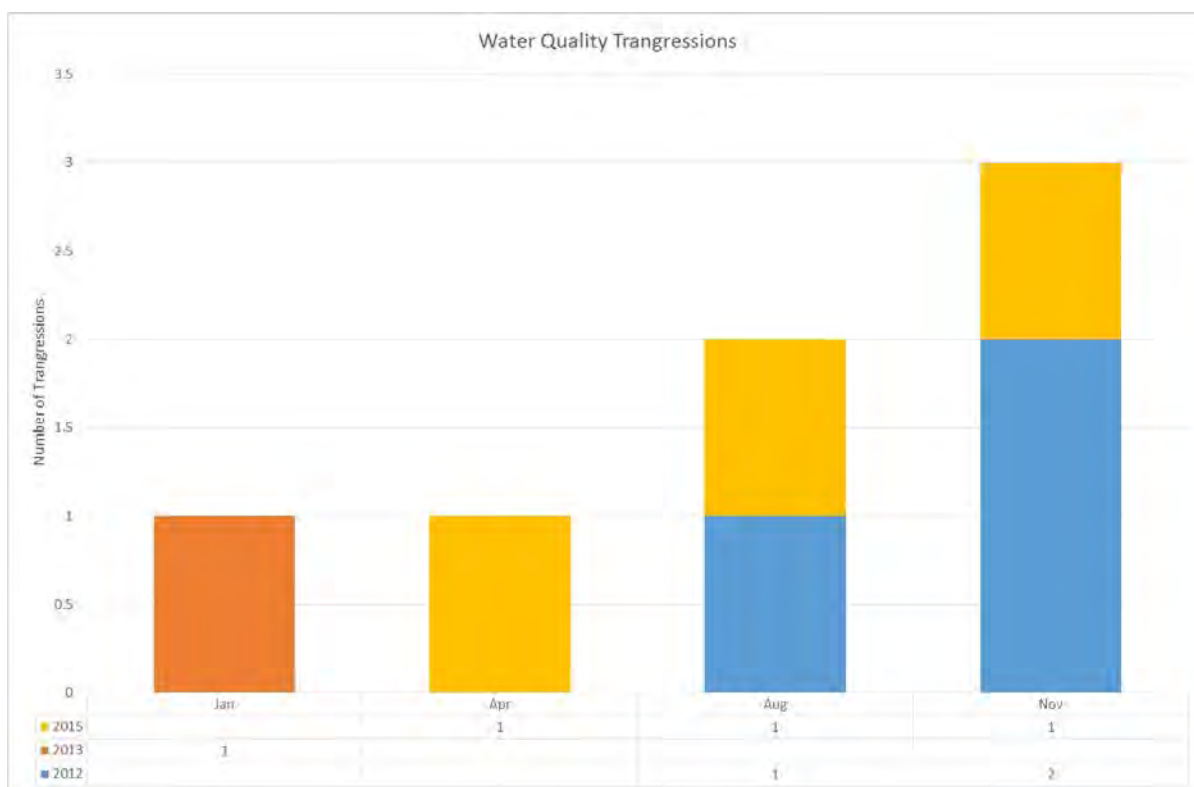


**Figure 15-5 E.coli Transgressions – Treatment Dalethorpe**

There was one E. coli treatment transgression during this period for Hartleys Road in August 2015.

### Zone

There have been four transgressions during this period for Dalethorpe, two in November 2012 and two in Jan 2013.

There have been two transgressions during this period for Hartleys Road, one in November 2013 and one in Jan 2017.

### Chemical Analysis

The following is a summary of the raw water chemical analysis carried out at the Malvern Hills Rural Water Supply.

**Table 15-5 Malvern Hills Rural Water Supply Raw Water Chemical Summary**

| Parameter                                      | Standards<br>MAV*<br>(GV)** | Plant <sup>1</sup><br>2011 | Plant <sup>1</sup><br>2017 | Plant <sup>2</sup><br>2015 | Plant <sup>2</sup><br>2017 | Status |
|------------------------------------------------|-----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|--------|
| Total Lead (g/m3)                              | 0.01                        | 0.00014                    | 0.000266                   | 0.00016                    | < 0.00011                  | ✓      |
| pH (pH units)                                  | 7-8.5                       | 7.4                        | 7.3                        | 7.4                        | 7.1                        | ✓      |
| Total Hardness<br>(g/m3 as CaCO <sub>3</sub> ) | <200                        | 43                         | 40.2                       | 39                         | 43.0                       | ✓      |
| Total Calcium<br>(g/m3)                        | n/v                         | 11.4                       | 10.70                      | 11.3                       | 12.80                      | ✓      |
| Total Iron (g/m3)                              | <0.2                        | 0.029                      | < 0.021                    | <0.021                     | < 0.021                    | ✓      |
| Total Sodium<br>(g/m3)                         | <200                        | 7.4                        | 5.98                       | 4.8                        | 5.15                       | ✓      |
| Nitrate - Nitrogen<br>(g/m3)                   | 11.3                        | 0.27                       | 0.318                      | 0.25                       | 0.468                      | ✓      |

\* MAV – Maximum Acceptable Value

\*\* (GV) – Guideline Value

<sup>1</sup> Dalethorpe

<sup>2</sup> Hartleys Road

## 15.7 Scheme Assets

A summary of material and diameter for pipes in Malvern Hills is shown by

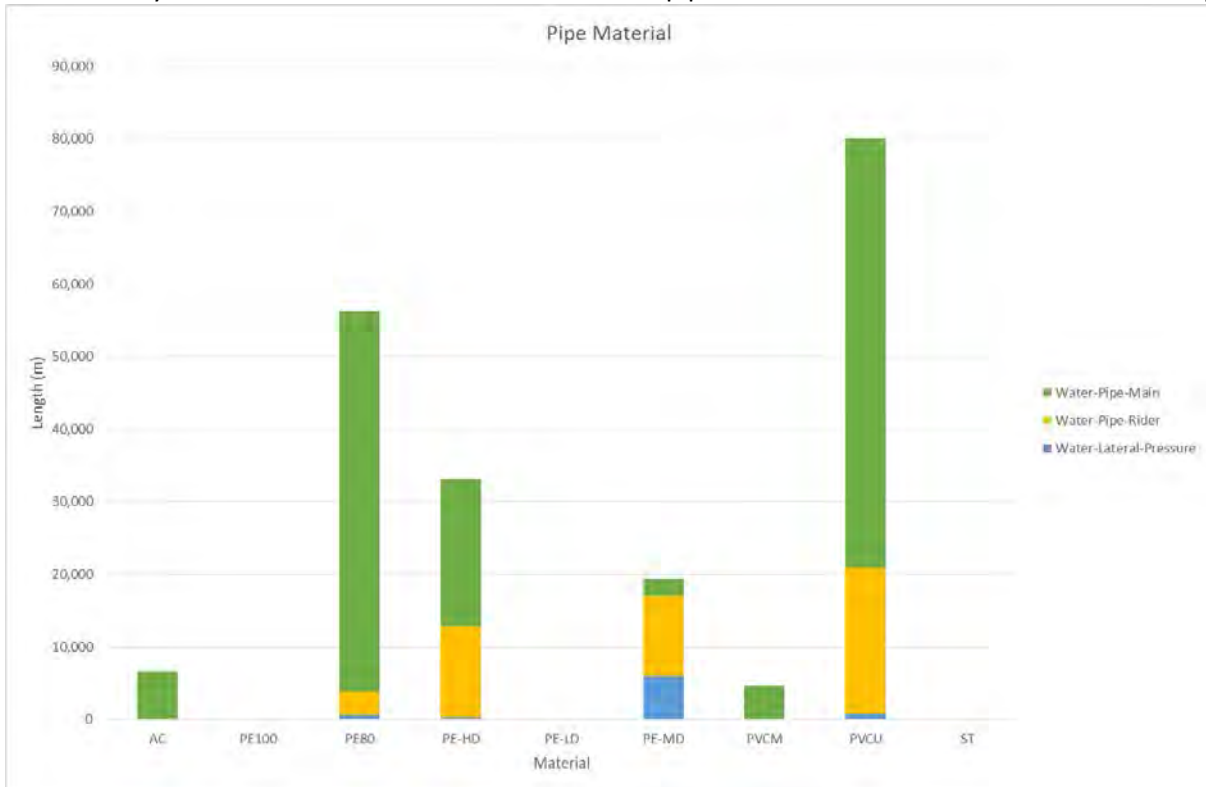


Figure 15-6 and Figure 15-7.

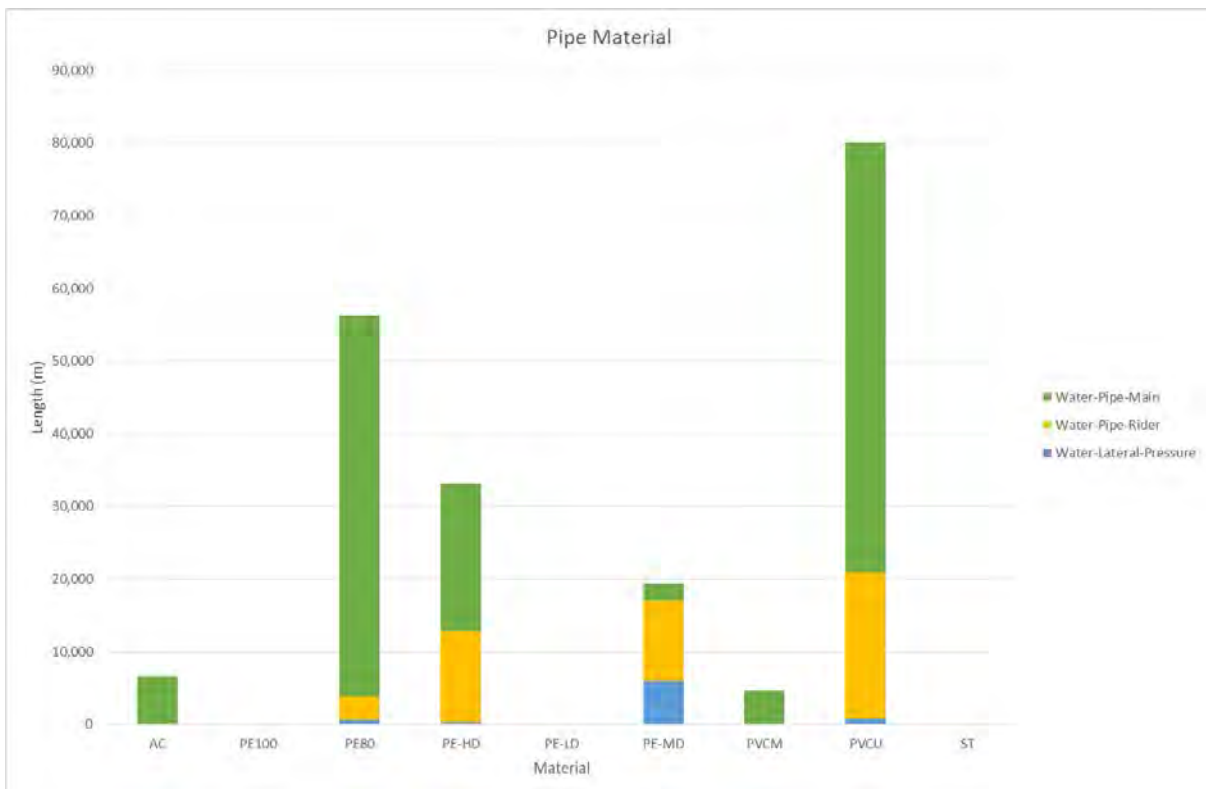


Figure 15-6 Pipe Material – Malvern Hills

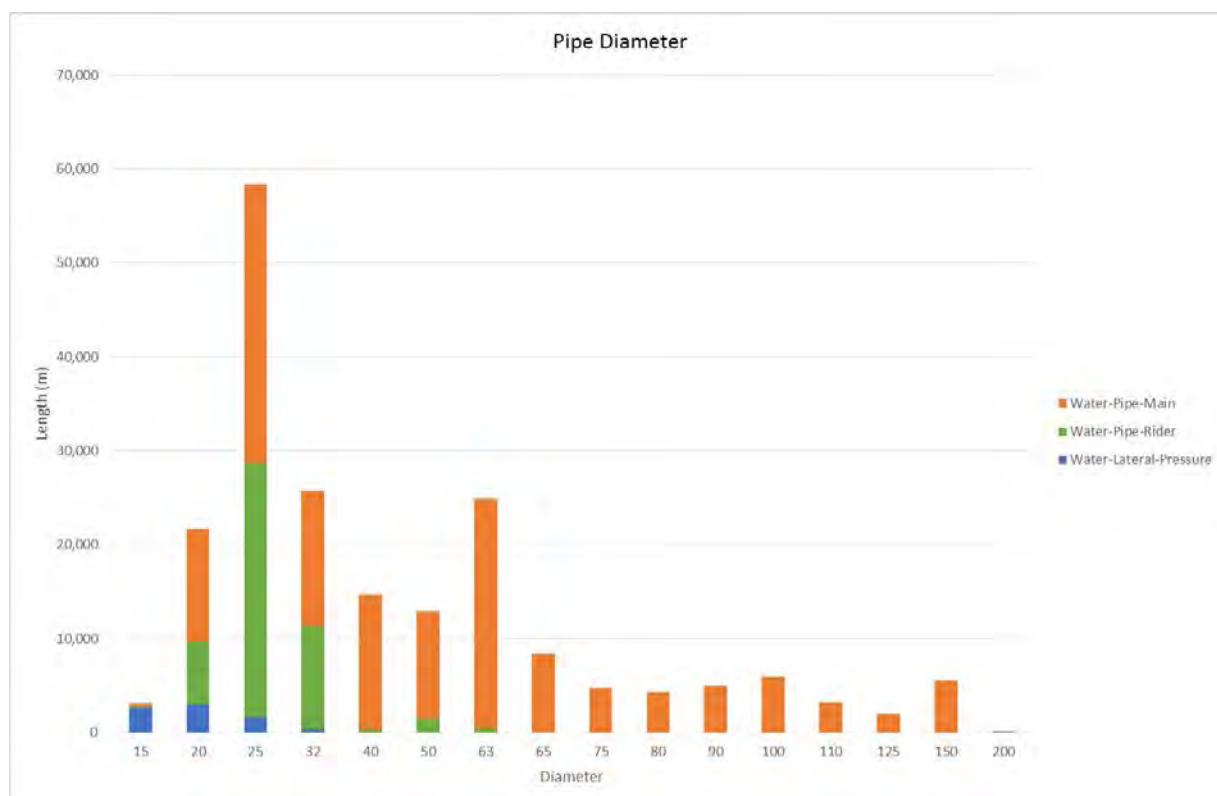


**Figure 15-7 Pipe Diameter – Malvern Hills**

## 15.8 Operational Management

The water supply is operated and maintained under two maintenance contracts as follows:

- Contract 1241: Water Services Contract. Contract is with SICON Ferguson who undertakes investigations, conditions inspections, proactive and reactive maintenance and minor asset renewals; and
- Contract 1202: Parks and Reserves Contract. Contract is with SICON Ferguson who undertakes the maintenance of land scape features related to water services e.g. mowing, gardens etc.

Water quality sampling is completed under an agreement with Food and Health Ltd as required.

## 15.9 Photos of Main Assets



**Photo 1: Dalethorpe Treatment Building**





**Photo 2: View of Dalethorpe treated water storage reservoirs**



**Photo 3: Bluff Road Res**



**Photo 4: View of Hartleys Rd shallow well intake**



**Photo 5: Hartleys Rd booster PS**



**Photo 6: View of Hartleys Rd high-level storage reservoirs**

## 15.10 Risk Assessment

A risk assessment has been undertaken for the Malvern Hills scheme. The key output from the risk assessment is the identification of any extreme and high risks which need to be mitigated. In order to mitigate these risks they have been included and budgeted for in the projects within this LTP. Table 15-6 outlines the risk priority rating, Table 15-7 outlines the risks and the list of key projects is found in Table 15-12.

**Table 15-6 Risk Priority Rating**

| Risk Score | Level of Risk | Risk Response                                                                                                                                         |
|------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| > 50       | Extreme       | Awareness of the event to be reported to Council.<br>Urgent action to eliminate / mitigate / manage the risk.<br>Document risk and action in the AMP. |
| 35-50      | Very High     | Risk to be eliminated / mitigated / managed through normal business planning processes with responsibility assigned.                                  |
| 14-35      | High          | Manage risk using routine procedures.                                                                                                                 |



|        |          |                                                                                                                                                                   |
|--------|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 3.5-14 | Moderate | Monitor the risk.                                                                                                                                                 |
| < 3.5  | Low      | Awareness of the event to be reported to Council.<br>Immediate action required to eliminate / mitigate / manage the risk.<br>Document risk and action in the AMP. |

**Table 15-7 Risks – Malvern Hills**

| Risk                                                  | Action/Project                                                             | Year Identified | 2014 Risk Rating | 2017 Risk Rating | Residual Risk Rating |
|-------------------------------------------------------|----------------------------------------------------------------------------|-----------------|------------------|------------------|----------------------|
| Cl2 does not have adequate contact time               | Reconfigure tanks at Dalethorpe to allow effective chlorination            | 2014            | 27               | 27               | 12                   |
| Contamination within reticulation                     | Investigate Chlorination                                                   | 2014            | 12               | 2.1              | 2.1                  |
| Lack of SCADA results in undetected failures          | Put SCADA at the other reservoir (Springfield Road) or/and Bluff Road shed | 2014            | 6                | 2.1              | 2.1                  |
| Contamination within reticulation                     | Investigate Chlorination                                                   | 2014            | 12               | 12               | 12                   |
| Lack of SCADA results in undetected failures          | Install additional SCADA sites - Cairn Hill                                | 2014            | 20               | 3.5              | 3.5                  |
| Land Owner Access                                     |                                                                            | 2014            | 9                | 9                | 12                   |
| Contamination                                         | Backflow preventer needed well head to be brought above ground             | 2014            | 12               | 12               | 12                   |
| Electrical failure due to lightning or network spikes | Install surge diverters                                                    | 2014            | 6                | 2.1              | 2.1                  |
| Failure to meet NES water meter standards             | NES Water Meter Compliance                                                 | 2014            | 20               | 6                | 6                    |
| Non-consented activities                              | Renewal of consents                                                        | 2014            | 27               | 27               | 6                    |
| Inadequate treatment under all conditions             | Install filtration                                                         | 2017            |                  | 20               | 3.5                  |
| Scheme impacted by poor water quality                 | auto flush                                                                 | 2017            |                  | 45               | 20                   |
| Inadequate capacity into the future                   | Dalthorpe Wyndale Road cnr to Springfield Road PS                          | 2017            |                  | 12               | 2                    |

The list of district wide risks can be found in 5Waters Activity Management Plan: Volume 1.

## 15.11 Asset Valuation Details

The total replacement value of assets within the Malvern Hills water scheme is \$113,727,654 with further details in Table 15-8 below.

**Table 15-8 Replacement Value, Malvern Hills**

| Asset Class 1              | Asset Class 2 | Sum of Replacement Value |
|----------------------------|---------------|--------------------------|
| <b>Plant and Equipment</b> |               | \$1,193,383              |
| <b>Water Reticulation</b>  | Chamber       | \$1,938                  |
|                            | Fire          | \$38,819                 |
|                            | Hydrant       | \$17,269                 |
|                            | Lateral       | \$331,232                |
|                            | Pipe          | \$11,653,112             |
|                            | Supply Point  | \$376,547                |
|                            | Valve         | \$115,353                |

Replacement values for these different types of assets are shown in Figure 15-8 below.

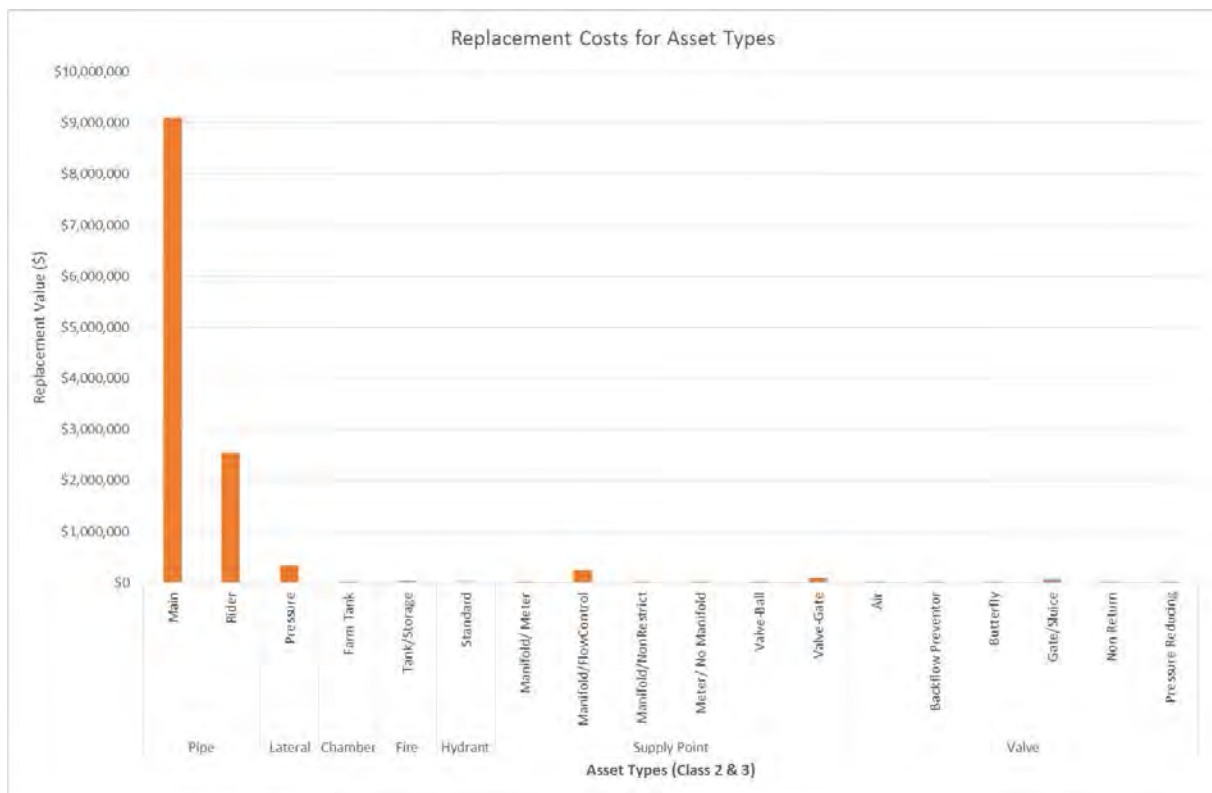


**Figure 15-8 Replacement Costs for Malvern Hills**

## 15.12 Renewals

The renewal profile has been taken from the 2017 5 Waters Valuation. A graph showing the renewals for this scheme are shown by Figure 15-9 below. The majority renewals occur in the first ten years.

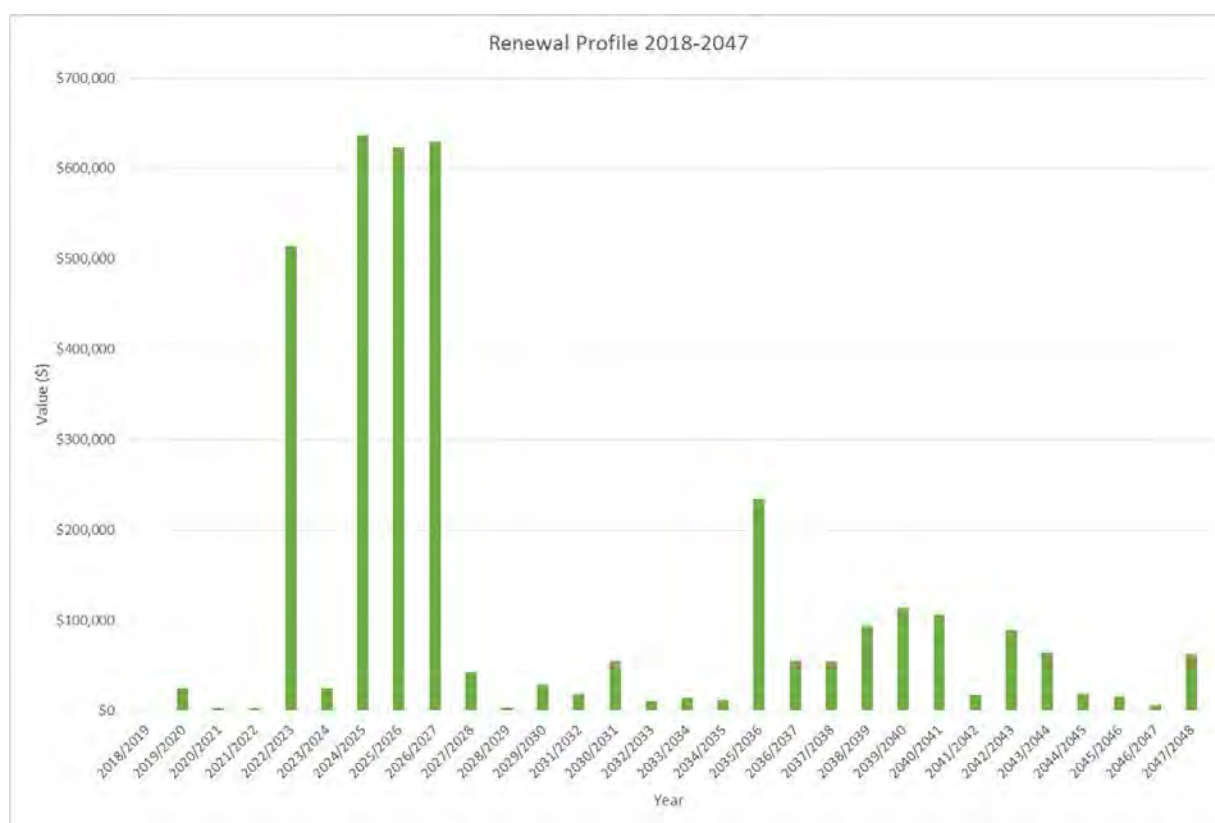


**Figure 15-9 Malvern Hills Water Renewal Profile**

### 15.13 Critical Assets

The criticality model for Malvern Hills has been updated for the 2018 AcMP. The methodology of the criticality model can be found in 5Waters Activity Management Plan: Volume 1 and it provides details of how the criticality has been calculated for the reticulation assets. Table 15-9, Figure 15-10 and Figure 15-11 below shows the calculated criticality for all of the assets within this scheme that have a recorded known length.

**Table 15-9 Length of Assets per Criticality Level**

| Criticality Bands |             | Length (m) |
|-------------------|-------------|------------|
| 5                 | Low         | 156,878    |
| 4                 | Medium-Low  | 30,715     |
| 3                 | Medium      | 4,703      |
| 2                 | Medium-High | 5,418      |
| 1                 | High        | 0          |

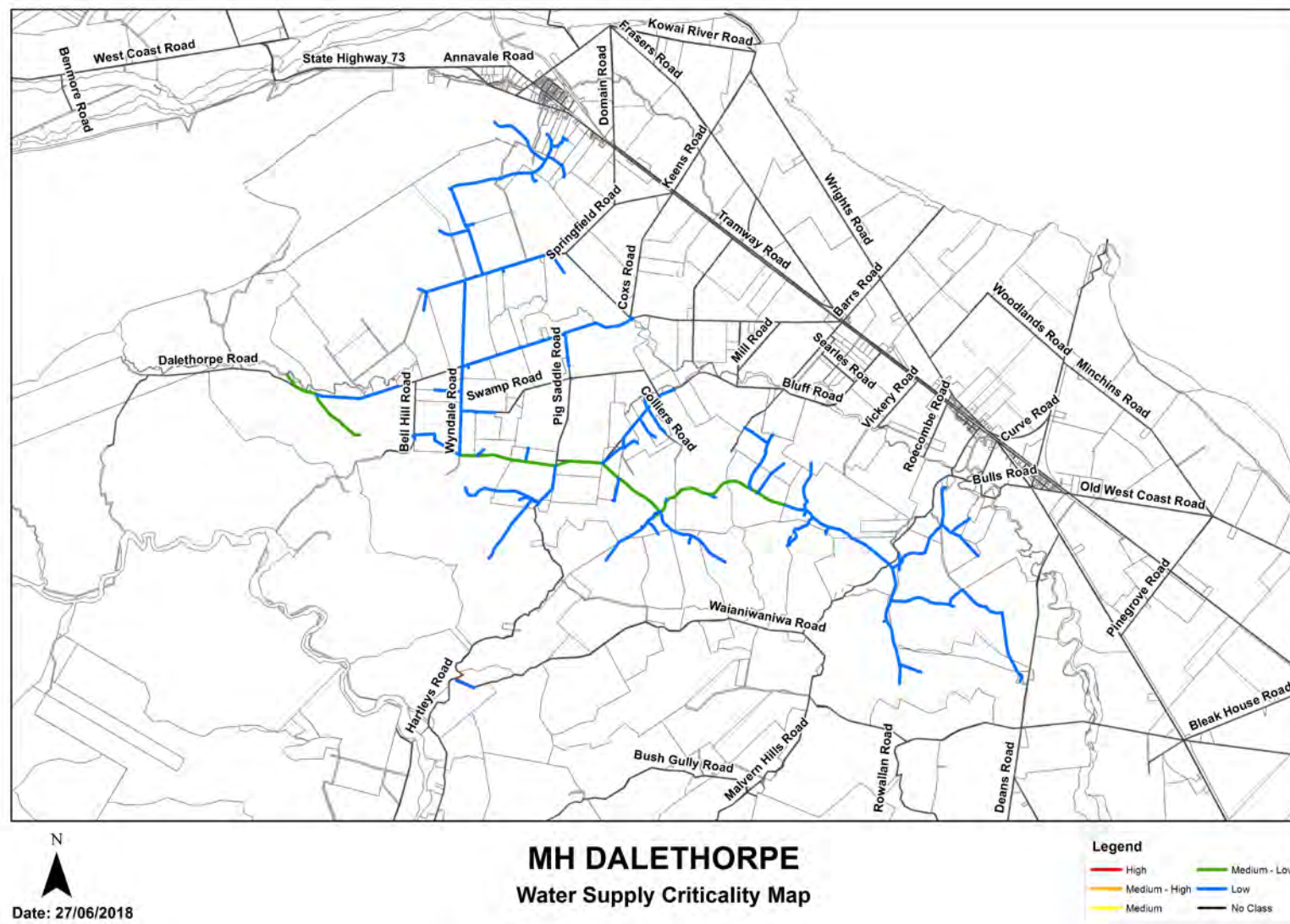


Figure 15-10 Criticality Map 1



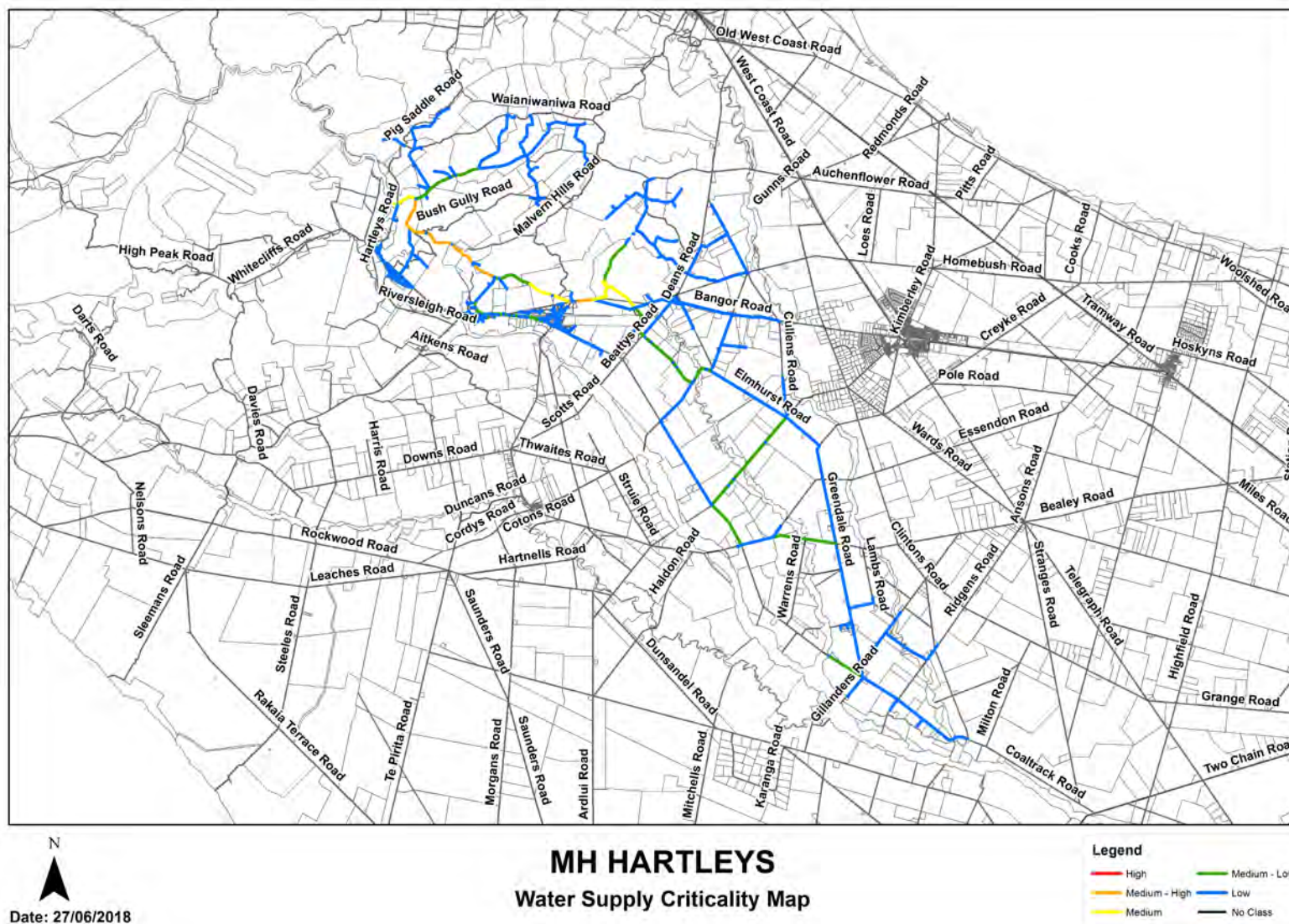


Figure 15-11 Criticality Map 2

## **15.14 Asset Condition**

The asset condition model was run for Malvern Hills in 2017. The methodology of the model can be found in 5Waters Activity Management Plan: Volume 1 which provides details of how the model has been calculated for the pipe reticulation assets. Figure 15-12 below shows the level of asset condition for these assets within this scheme that have a recorded known condition.



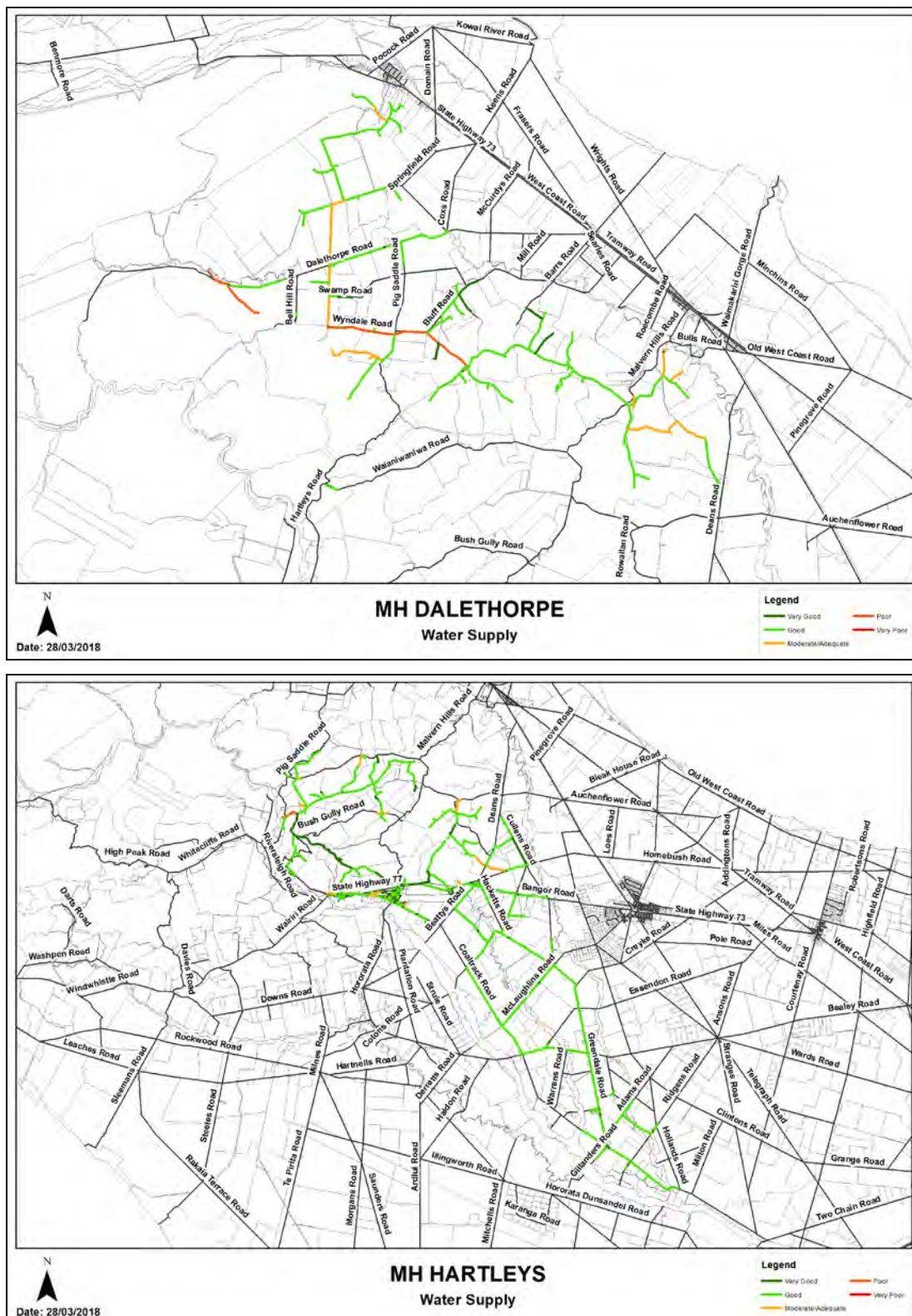


**Figure 15-12 Asset Condition – Malvern Hills (Dalethorpe and Hartleys Road)**

Table 15-10 provides a description of the condition rating used within the condition model.

**Table 15-10 Asset Condition Grading**

| Condition Rating | Grading   |
|------------------|-----------|
| 1.0              | Excellent |
| 2.0              | Good      |
| 3.0              | Moderate  |
| 4.0              | Poor      |
| 5.0+             | Fail      |

The number of pipe faults is also measured through the asset management system. Figure 15-13 shows the known historic pipe failures within this scheme.

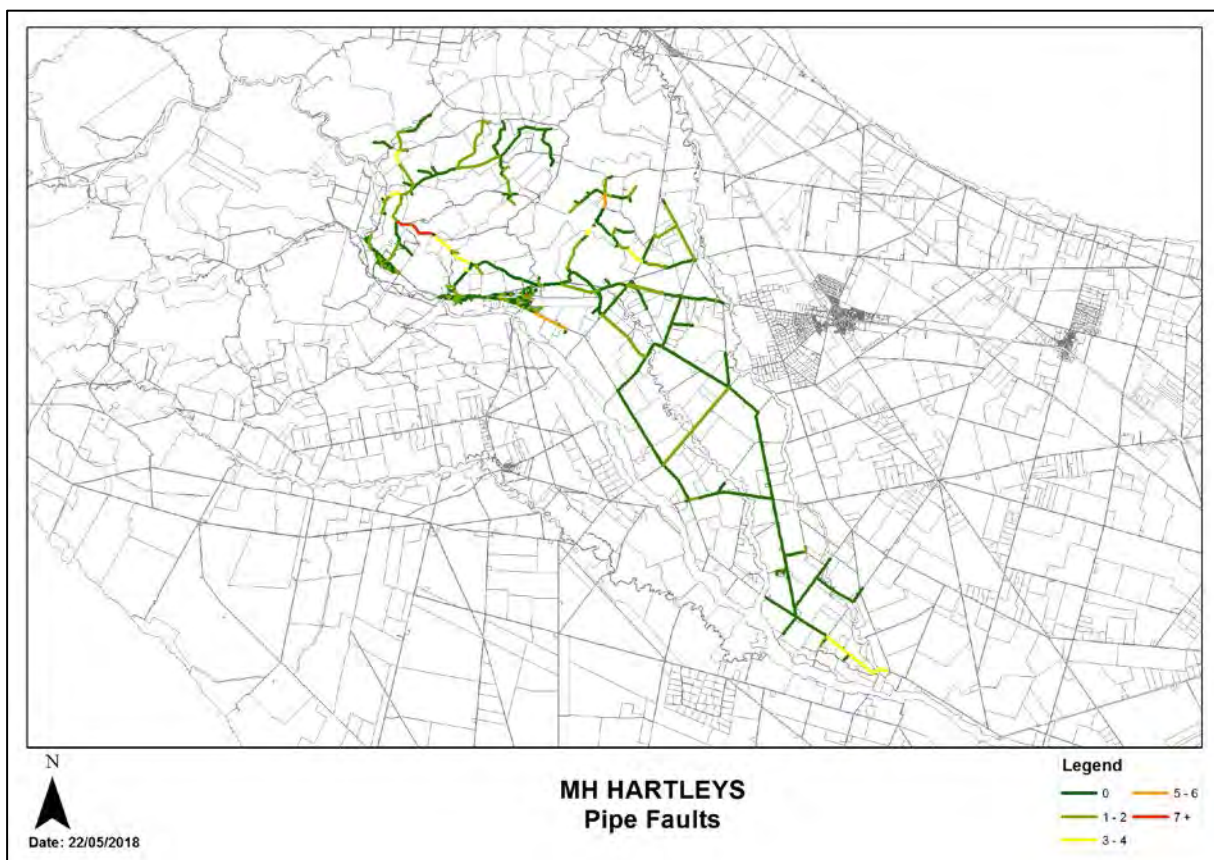
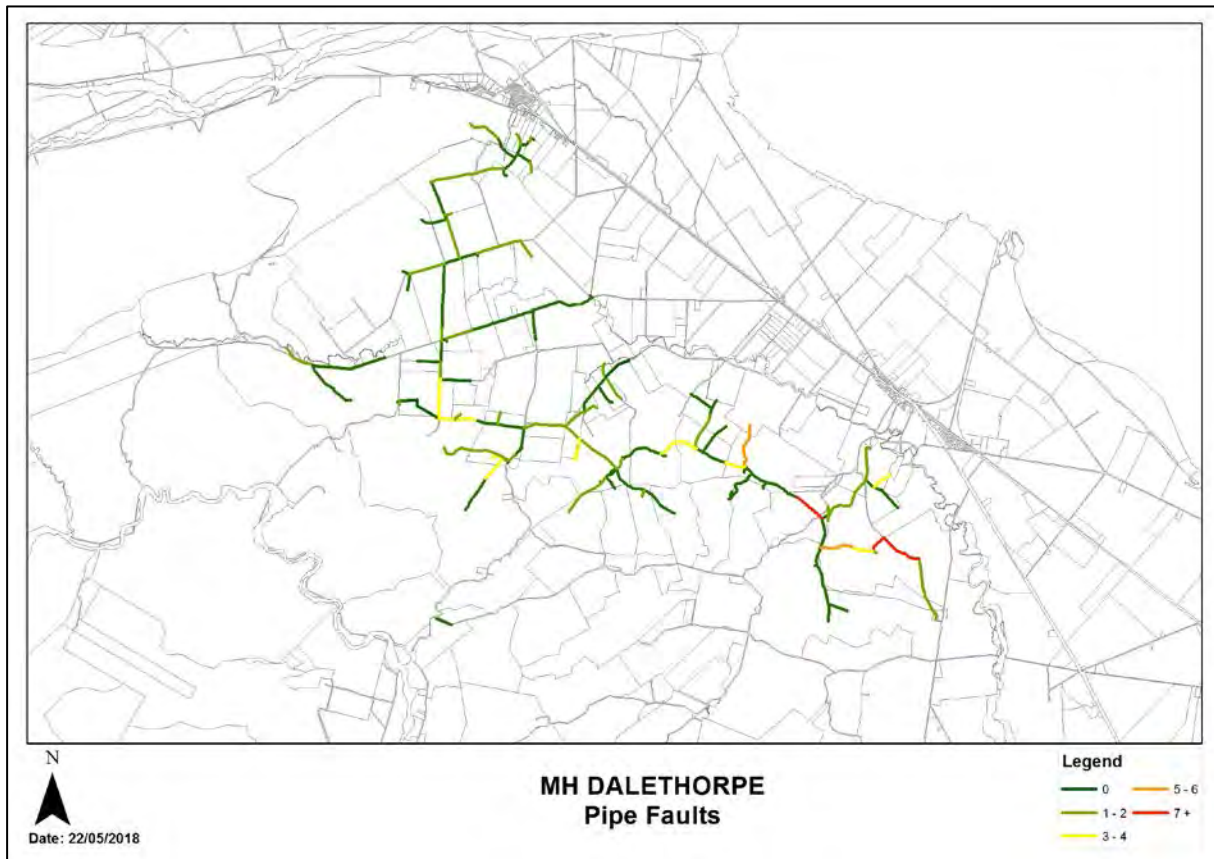


**Figure 15-13 Pipe Faults, Malvern Hills**

### 15.15 Funding Program

The 10 year budgets for Malvern Hills are shown by Table 15-11 and Figure 15-14. Budgets are split into expenditure, renewals, projects and capital projects.

All figures are (\$) not adjusted for CPI “inflation”. They are calculated on historical data, and population growth where relevant.

**Table 15-11 Malvern Hills Budget Summary**

| Years     | Expenditure | Renewals    | Projects | Capital Projects |
|-----------|-------------|-------------|----------|------------------|
| 2018/2019 | \$328,700   |             | \$10,000 | \$384,000        |
| 2019/2020 | \$328,700   | \$25,573    |          |                  |
| 2020/2021 | \$328,700   | \$2,834     |          |                  |
| 2021/2022 | \$328,700   | \$3,028     |          |                  |
| 2022/2023 | \$328,700   | \$514,499   |          |                  |
| 2023/2024 | \$328,700   | \$24,730    |          |                  |
| 2024/2025 | \$328,700   | \$636,833   |          |                  |
| 2025/2026 | \$328,700   | \$623,000   |          |                  |
| 2026/2027 | \$328,700   | \$629,671   |          |                  |
| 2027/2028 | \$328,700   | \$42,504    |          |                  |
| Total     | \$3,287,000 | \$2,502,673 | \$10,000 | \$384,000        |

An explanation of the categories within the budgets are as follows below:

- Expenditure consists of operation and maintenance costs;
- Renewals are replacement of assets which are nearing or exceeded their useful life;
- Projects are investigations, decisions and planning activities which exclude capital works; and
- Capital projects are activities involving physical works.



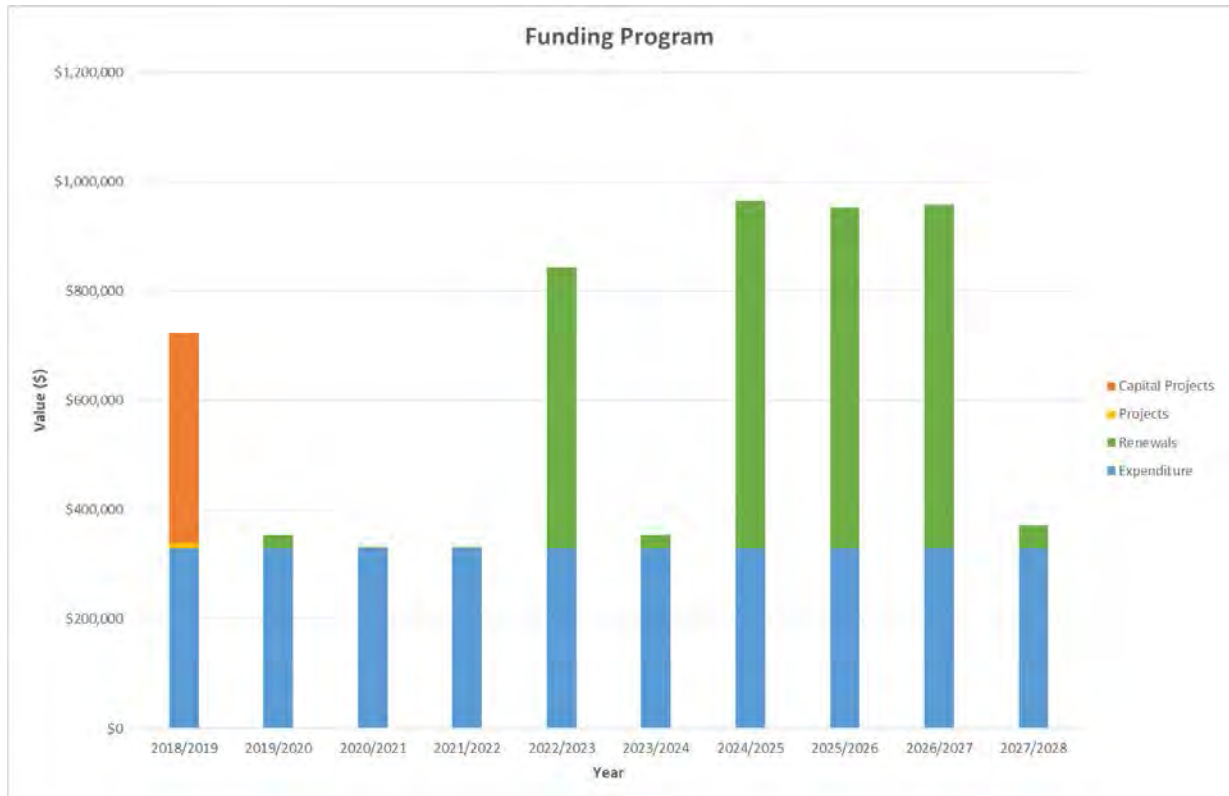


**Figure 15-14 Malvern Hills Funding Summary**

There are four major projects for Malvern Hills water scheme in the LTP budget.

**Table 15-12 Key Projects**

| Account Label    | GL        | Description                 | Year 1 (\$) | Year 2 (\$) | Year 3 (\$) | Years 4 to 10 | Funding Split <sup>12</sup> |
|------------------|-----------|-----------------------------|-------------|-------------|-------------|---------------|-----------------------------|
| Capital Projects | 385090080 | Hartleys Well Upgrade       | \$30,000    |             |             |               | 100% LoS                    |
| Capital Projects | 385090081 | Dalethorpe filtration       | \$304,000   |             |             |               | 100% LoS                    |
| Capital Projects | 385090082 | Dalethorpe autoflush        | \$50,000    |             |             |               | 100% LoS                    |
| Projects         | 3951097   | Dalethorpe autoflush design | \$10,000    |             |             |               | 100% LoS                    |

The list of district wide projects can be found in 5Waters Activity Management Plan: Volume 1.

### Discussion on Projects

Projects have been determined based on their:

- Relevance to the scheme
- Requirement to be completed under legislation
- Ability to bring the scheme up to or maintain the Level of Service required under council's Asset Management Policy.

Many projects are **jointly** funded by more than one scheme and activity. Each scheme pays a pro-rata share only, equivalent to the number of connections.

### Discussion on Capital and Projects

Where relevant, Capital (Levels of Service) and Capital (Growth) projects have been included in the scheme financial details.

Levels of Service Projects and growth splits have been provided to ensure the costs of population driven works are clear.

<sup>12</sup> Where LoS refers to Level of Service and G refers to Growth



## 16.0 PREBBLETON WATER SUPPLY

### 16.1 Scheme Summary

| Description                                   |                                   | Quantity                       |
|-----------------------------------------------|-----------------------------------|--------------------------------|
| <b>Estimated Population Served</b>            |                                   | 4007                           |
| <b>Scheme Coverage</b><br>(1 Jan 2018)        | Full Charges                      | 1422                           |
|                                               | Half Charges                      | 0                              |
|                                               | >1 Charges                        | 9 (+ restricted connections)   |
| <b>System Components</b>                      | Bores/Intakes (No.)               | 4                              |
|                                               | Treatment/Disinfection            | None                           |
|                                               | Reservoirs (No.)                  | 0                              |
|                                               | Pump Stations (No.)               | 2 Sites                        |
|                                               | Piped (m)                         | 58249                          |
| <b>History</b>                                | Original scheme installation date | 1965                           |
| <b>Value (\$)</b>                             | Replacement Cost                  | \$8,561,246.36                 |
|                                               | Depreciated Replacement Cost      | \$6,488,166.68                 |
| <b>Financial</b>                              | 2018/2019 Estimate                | \$164,100                      |
|                                               | Annual maintenance cost           | 5.12%                          |
|                                               | % of total                        |                                |
| <b>Demand (m3)</b><br>(1 Jan – 31 Dec 2017)   | Average daily                     | 1,846                          |
|                                               | Peak daily                        | 5,352                          |
|                                               | Minimum daily                     | 767                            |
|                                               | Average daily per connection      | 1.3                            |
| <b>Type of Supply</b>                         |                                   | High pressure and unrestricted |
| <b>Target Pressure &amp; Flow at boundary</b> | Pressure                          | >310kPa                        |
|                                               | Flow                              | >20L/min                       |
| <b>Sustainability</b>                         | Well Security                     | Secure                         |

### 16.2 Key Issues

The following key issues are associated with the Prebbleton water supply. A list of district wide issues are located in 5Waters Activity Management Plan: Volume 1.

**Table 16-1 Prebbleton Scheme Issues**

| What's the Problem                                                                                                                                                                                                                                     | What we plan to do                                                                                                                 |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|
| The high sand/silt component that was prevalent when the St Patricks well was first installed has been resolved by installation of turbidity (monitoring and flow control) meter in 2005/06 and stepped increase in peak demand over subsequent years. | Council will continue to monitor turbidity and manage a slow increase in water take to reduce the potential for turbid waters.     |
| The Prebbleton Water Supply has a very high average yearly usage per property                                                                                                                                                                          | Council has installed water meters on this scheme and will monitor water use of the first 3 years of this plan.                    |
| Based on projected growth the Prebbleton Water Supply will require additional supply capacity.                                                                                                                                                         | Council will monitor growth and associated demand to trigger installation of an additional source through the infrastructure plan. |

### 16.3 Overview & History

The original Prebbleton water supply was installed in 1965 and is one of the older water supply systems within the District. Untreated groundwater is provided from four bores. Two of the bores are at the sites of the two original wells that were deepened because of elevated nitrate levels.

Prebbleton has undergone significant development over the last 12 years with a reticulated sewerage scheme installed from 1998. The population has increased from 610 persons in 1996 to 4,007 persons in 2017 (connected to water supply). To service the increased population a new well was installed in 2003 (St Patricks Well) and additional reticulation installed to “ring main” the township. In 2017 a new deep bore was drilled at the location of the existing two original bores at the Tosswell Rd site.

The scheme has been developed to meet FFCoP requirements.

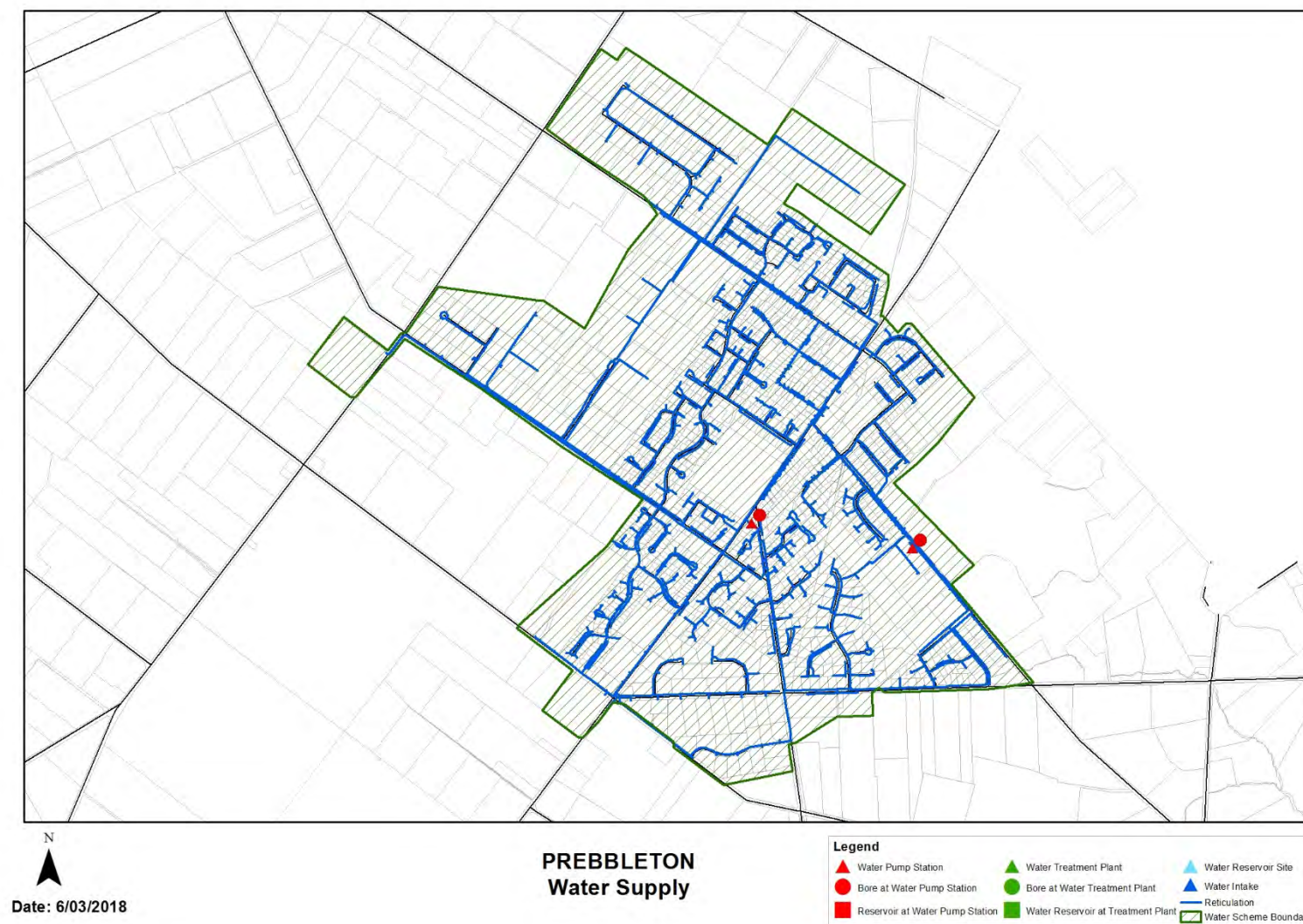


**Figure 16-1 Scheme Map**



## 16.4 System Capacity

In response to the accelerated growth within the Selwyn District hydraulic models have been used to plan future water infrastructure for a number of the water supplies. Hydraulic models have been built and calibrated to international best practice to carry out the '30-year Water Infrastructure Master Planning'.

The master planning provides an assessment of the sizing and timing of new infrastructure for new water sources (wells) and pipelines to service growth. Part of the master planning requires a water balance to be developed to forecast growth, using historical peak demand per household. The water balance forecasts the peak instantaneous flow per year versus the water resources available to determine the staging of new wells. The well staging assumes that one well is redundant for each water supply, to take into consideration maintenance of wells, planning/timing of new wells and security of supply i.e. to maintain average/peak demand.

Population projections are based on SDC 'Household Projections 2018 to 2048' and have been applied to the latest connection figures for each township.

Prebbleton is expected to experience significant growth over the next 30-years.

Figure 16-3 shows the projected growth for Prebbleton to 2048 per planning horizon (5 years intervals) in accordance with the latest House Projections.

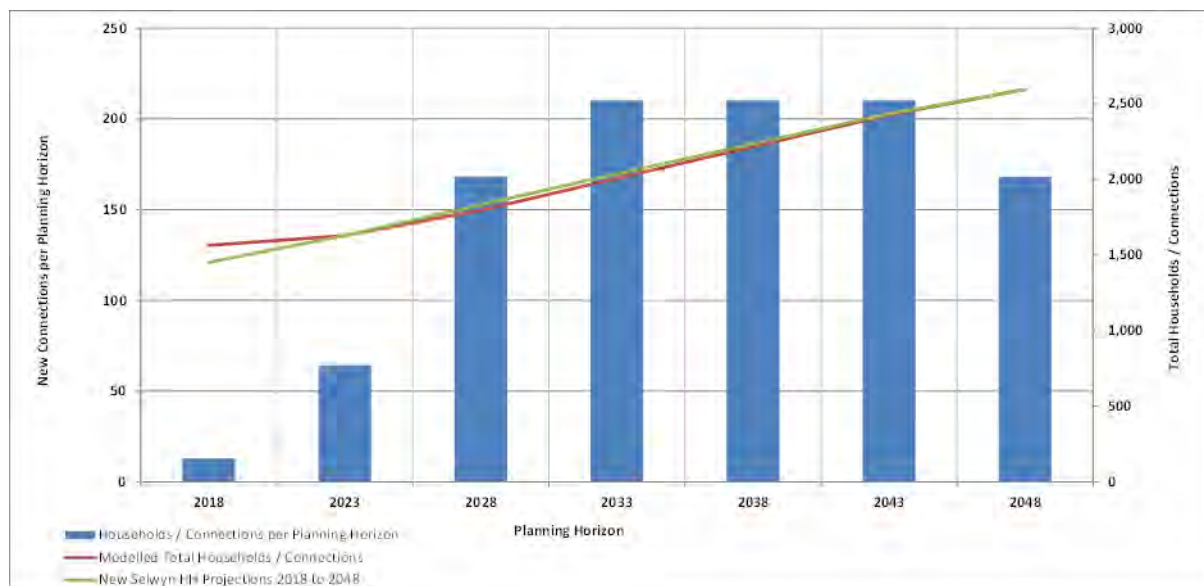
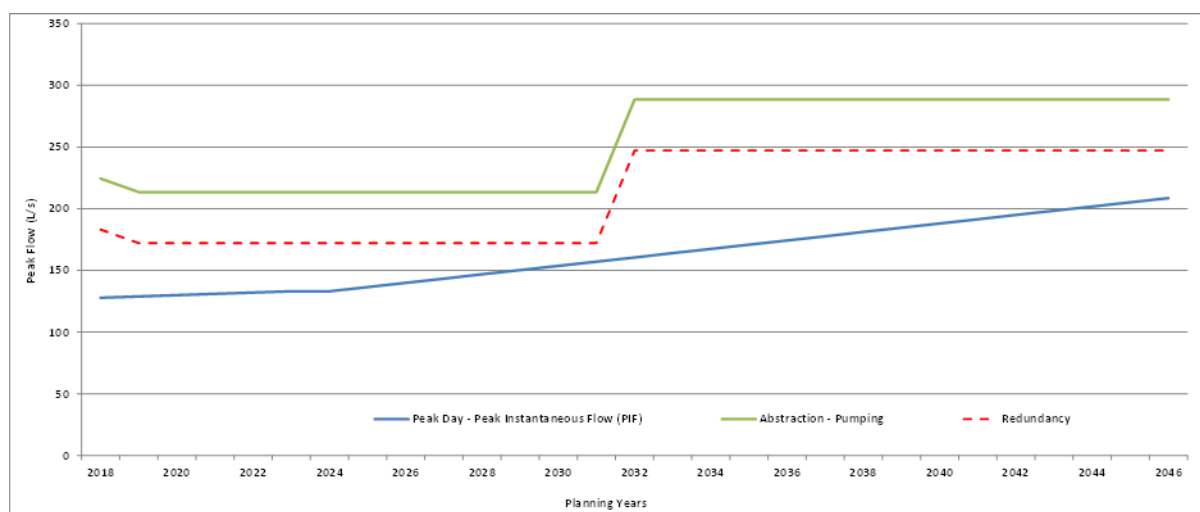


**Figure 16-3: Prebbleton Household Projections**

**Figure 16-4: Prebbleton Water Demand**
**Table 16-2 Water Source Existing Capacity**

| Sites Available | Well | Capacity (L/s) | Notes             |
|-----------------|------|----------------|-------------------|
| St Pats         | 1    | 50             | Decommission 2019 |
| Toswill Rd      | 1    | 18.5           | Decommission 2019 |
|                 | 2    | 18.5           |                   |
|                 | 3    | 50             | New 2017          |

**Table 16-3 Water Source Future Capacity**

| New Site ID | Well/Site | Location                                | Planning Year | Yield (L/s)        |
|-------------|-----------|-----------------------------------------|---------------|--------------------|
| Preb1       | Well      | Near Aberdeen Road 1                    | 2017/2018     | 75                 |
| Preb2       | Well      | Near Aberdeen Road 2                    | 2019          | 75                 |
| Preb3       | Reservoir | Near Aberdeen Road Reservoir 1000m3     | 2019          | -                  |
| Preb4       | Well      | Decommission Toswill Road wells 1 and 2 | 2019          | -26 (combined TBC) |
| Preb5       | Well      | Decommission St Pats                    | 2019          | -50 (TBC)          |
| Preb6       | Well      | Near Aberdeen Road 2                    | 2032          | 75 (TBC)           |



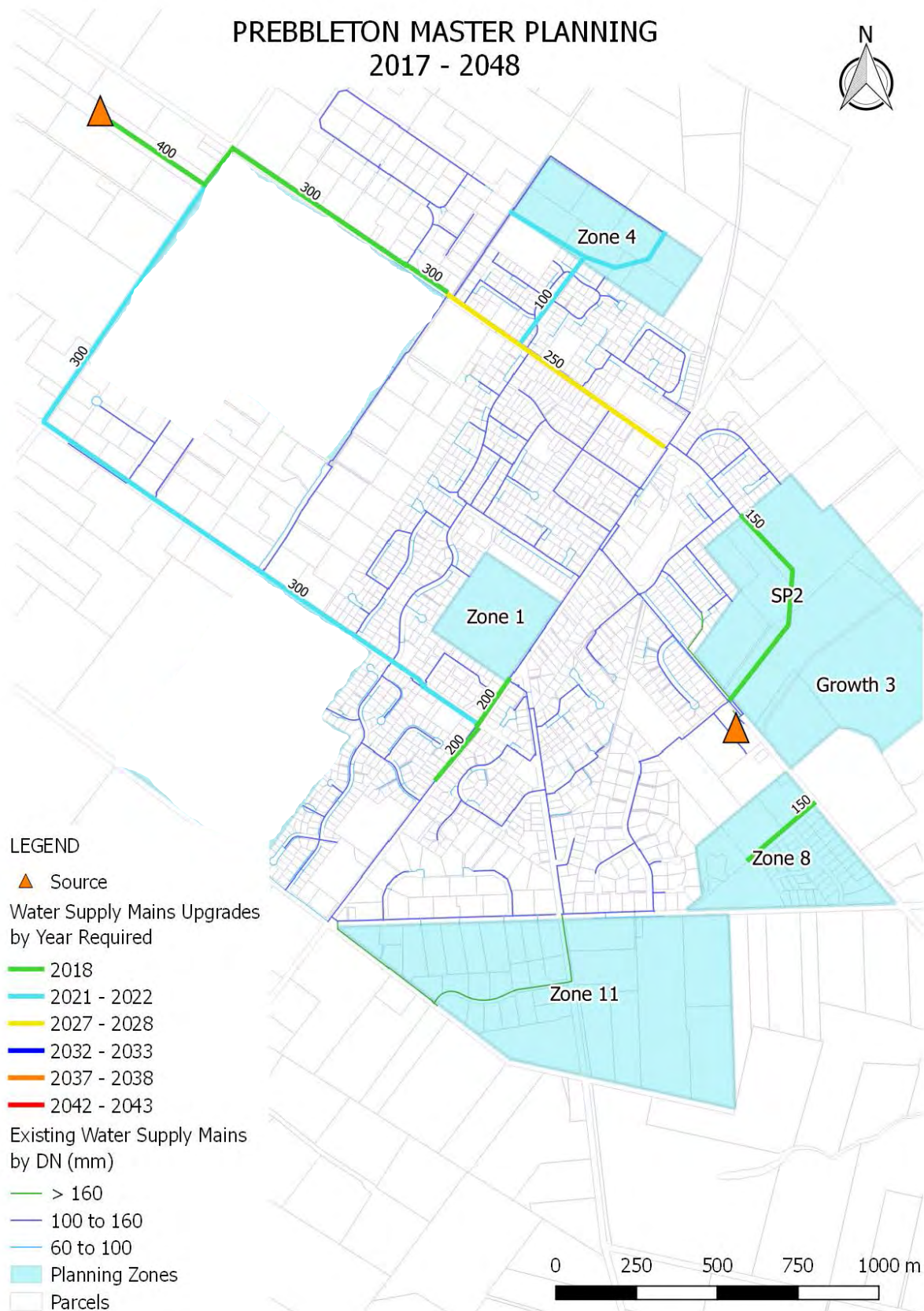


**Figure 16-5 Prebbleton Master Plan**

## 16.5 Resource Consents

The Prebbleton water supply has a number of resource consents. Table 16-4 shows the water take permitted by the resource consents for this scheme.

**Table 16-4 Resource Consents**

| Consent                      | Description                                                                            | Location                              | Date Issued | Expiry Date | Consented Max Instantaneous Flow (L/s) | Consented Max Daily Volume (m <sup>3</sup> /day) |
|------------------------------|----------------------------------------------------------------------------------------|---------------------------------------|-------------|-------------|----------------------------------------|--------------------------------------------------|
| CRC010900<br>(Issued-Active) | To take and use groundwater - from bore M36/0870 & M36/4795                            | Tosswill Road, PREBBLETON             | 14-Feb-02   | 31-Jan-35   | 50                                     |                                                  |
| CRC161101<br>(Issued-Active) | To take and use water from bores M36/7504, M36/70504, M36/0870, M36/4795 and BX23/0421 | The Triangle Chanel Place, PREBBLETON | 2-Dec-10    | 2-Aug-40    | 175                                    | (1576800 per yr)                                 |

## 16.6 Water Quality

The Prebbleton water supply is a secure source, made up of four wells and is currently sampled twice weekly at all wells except St Patricks which is sampled monthly. The reticulation is sampled weekly.

The following details E. coli transgressions for the period 2012 to 2017.

### Treatment

There have been no E. coli treatment transgressions during this period.

### Zone

There have been no E. coli transgressions during this period.

### Chemical Analysis

The following is a summary of the raw water chemical analysis carried out at the Prebbleton Water Supply.

**Table 16-5 Prebbleton Raw Water Chemical Analysis Summary**

| Parameter                                   | Standards MAV* (GV)** | Plant <sup>1</sup> 2015 | Plant <sup>1</sup> 2017 | Plant <sup>2</sup> 2015 | Plant <sup>2</sup> 2017 | Status |
|---------------------------------------------|-----------------------|-------------------------|-------------------------|-------------------------|-------------------------|--------|
| Total Lead (g/m3)                           | 0.01                  | <0.00011                | 0.001470                | <0.00011                | 0.001360                | ✓      |
| pH (pH units)                               | 7-8.5                 | 7.9                     | 8.5                     | 7.9                     | 7.9                     | ✓      |
| Total Hardness (g/m3 as CaCO <sub>3</sub> ) | <200                  | 45                      | 43.4                    | 43                      | 39.1                    | ✓      |
| Total Calcium (g/m3)                        | n/v                   | 15.4                    | 16.00                   | 14.7                    | 13.41                   | ✓      |
| Total Iron (g/m3)                           | <0.2                  | <0.021                  | 1.60                    | <0.021                  | 0.71                    | X      |
| Total Sodium (g/m3)                         | <200                  | 7.1                     | 7.07                    | 7.1                     | 7.17                    | ✓      |

|                           |      |      |       |      |       |   |
|---------------------------|------|------|-------|------|-------|---|
| Nitrate - Nitrogen (g/m3) | 11.3 | 0.54 | 0.534 | 0.61 | 0.540 | ✓ |
|---------------------------|------|------|-------|------|-------|---|

\* MAV – Maximum Acceptable Value

\*\* (GV) – Guideline Value

<sup>1</sup> Prebbleton Plant 1

<sup>2</sup> Prebbleton Plant 2

| Parameter                                   | Standards<br>MAV* (GV)** | Plant3<br>2017 | Plant <sup>4</sup><br>2015 | Plant4<br>2017 | Status |
|---------------------------------------------|--------------------------|----------------|----------------------------|----------------|--------|
| Total Lead (g/m3)                           | 0.01                     | < 0.00011      | <0.00011                   | < 0.00011      | ✓      |
| pH (pH units)                               | 7-8.5                    | 7.9            | 7.9                        | 7.9            | ✓      |
| Total Hardness (g/m3 as CaCO <sub>3</sub> ) | <200                     | 44.0           | 48                         | 47.0           | ✓      |
| Total Calcium (g/m3)                        | n/v                      | 15.31          | 16.3                       | 15.75          | ✓      |
| Total Iron (g/m3)                           | <0.2                     | < 0.021        | <0.021                     | < 0.021        | X      |
| Total Sodium (g/m3)                         | <200                     | 7.29           | 8.3                        | 7.86           | ✓      |
| Nitrate - Nitrogen (g/m3)                   | 11.3                     | 0.570          | 0.56                       | 0.520          | ✓      |

\* MAV – Maximum Acceptable Value

\*\* (GV) – Guideline Value

<sup>3</sup> Prebbleton Plant 3

<sup>4</sup> St Patricks Well

## 16.7 Scheme Assets

A summary of material and diameter for pipes in Prebbleton is shown by Figure 16-6 and Figure 16-7.

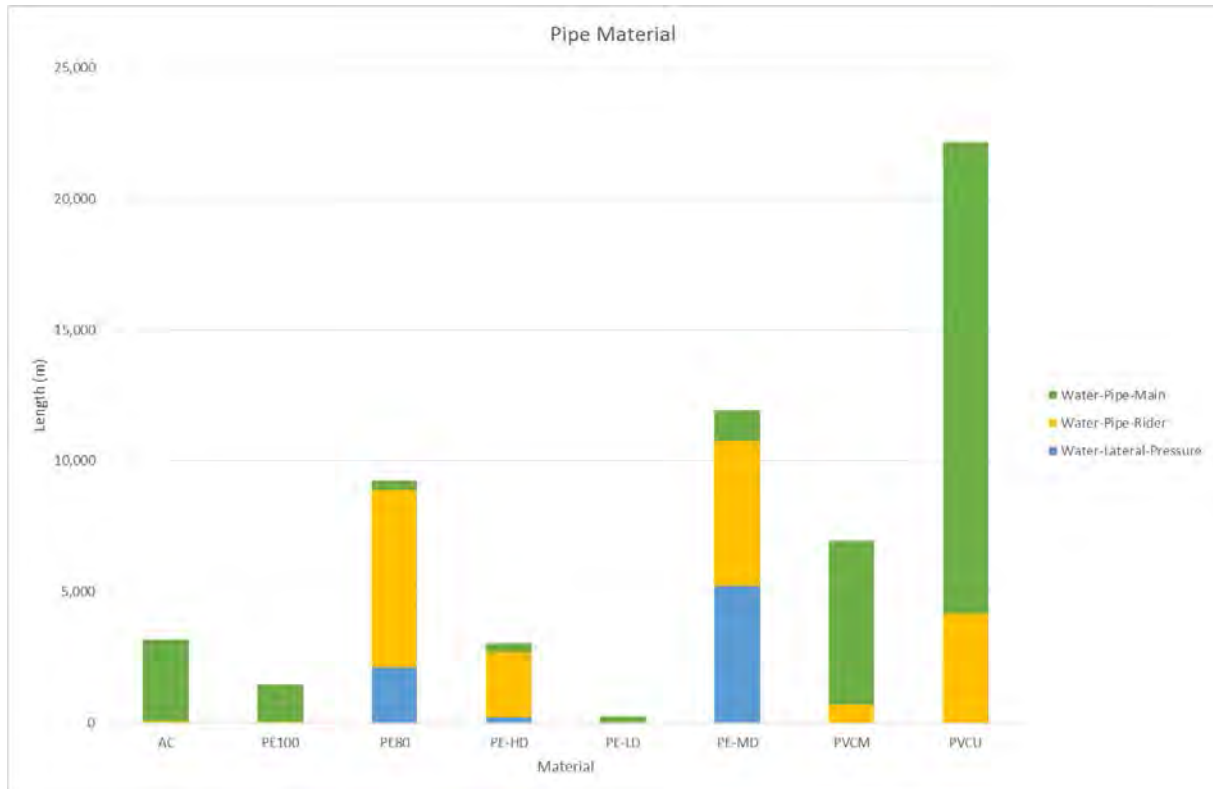


**Figure 16-6 Pipe Material – Prebbleton**

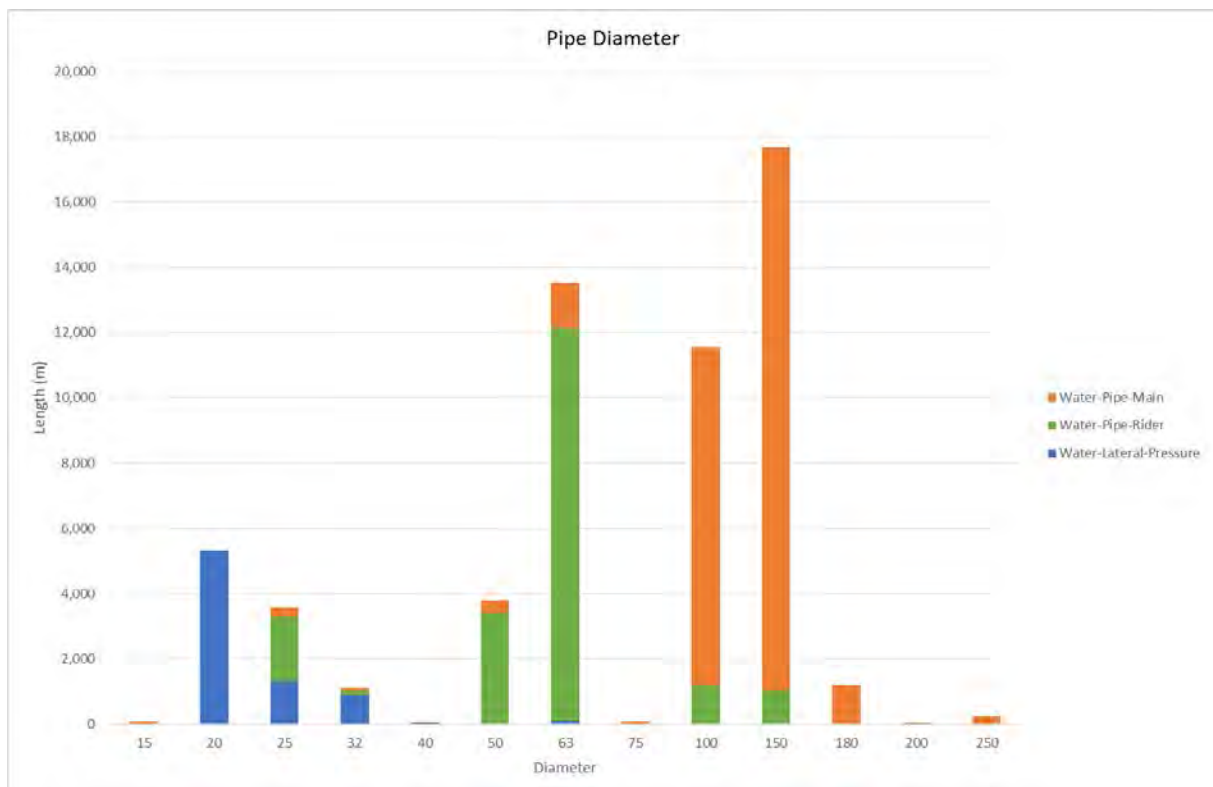




**Figure 16-7 Pipe Diameter – Prebbleton**

## 16.8 Operational Management

The water supply is operated and maintained under two maintenance contracts as follows:

- Contract 1241: Water Services Contract. Contract is with SICON Ferguson who undertakes investigations, conditions inspections, proactive and reactive maintenance and minor asset renewals; and
- Contract 1202: Parks and Reserves Contract. Contract is with SICON Ferguson who undertakes the maintenance of land scape features related to water services e.g. mowing, gardens etc.

Water quality sampling is completed under an agreement with Food and Health Ltd as required.

## 16.9 Photos of Main Assets



**Photo 1: Prebbleton Well No 1**



**Photo 2: Prebbleton Well No 2**



**Photo 3: Prebbleton Wells control shed**



**Photo 4: St Patricks bore and control cabinets**



**Photo 5: Prebbleton Well No 3**

## 16.10 Risk Assessment

A risk assessment has been undertaken for the Prebbleton scheme. The key output from the risk assessment is the identification of any extreme and high risks which need to be mitigated. In order to mitigate these risks they have been included and budgeted for in the projects within this LTP. Table 16-6 outlines the risk priority rating, Table 16-7 outlines the risks and the list of key projects is found in Table 16-12.

**Table 16-6 Risk Priority Rating**

| Risk Score | Level of Risk | Risk Response                                                                                                                                                         |
|------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| > 50       | Extreme       | Awareness of the event to be reported to Council.<br>Urgent action to eliminate / mitigate / manage the risk.<br><br>Document risk and action in the AMP.             |
| 35-50      | Very High     | Risk to be eliminated / mitigated / managed through normal business planning processes with responsibility assigned.                                                  |
| 14-35      | High          | Manage risk using routine procedures.                                                                                                                                 |
| 3.5-14     | Moderate      | Monitor the risk.                                                                                                                                                     |
| < 3.5      | Low           | Awareness of the event to be reported to Council.<br>Immediate action required to eliminate / mitigate / manage the risk.<br><br>Document risk and action in the AMP. |

**Table 16-7 Risks – Prebbleton**

| Risk                                                  | Action/Project                      | Year Identified | 2014 Risk Rating | 2017 Risk Rating | Residual Risk Rating |
|-------------------------------------------------------|-------------------------------------|-----------------|------------------|------------------|----------------------|
| Inadequate capacity to meet growth                    | Design second well and reservoir    | 2014            | 40               | 40               | 27                   |
| Inadequate capacity to meet growth                    | Construct second well and reservoir | 2014            | 40               | 40               | 27                   |
| Electrical failure due to lightning or network spikes | Install surge diverters             | 2014            | 20               | 20               | 20                   |



|                                                         |                               |      |    |     |     |
|---------------------------------------------------------|-------------------------------|------|----|-----|-----|
| Failure to meet NES water meter standards               | NES Water Meter Compliance    | 2014 | 20 | 6   | 6   |
| Inability to collect income from non-metered properties | Install property water meters | 2014 | 27 | 0.6 | 0.6 |
| Non-compliance with the DWSNZ                           | DWSNZ - Age Testing           | 2014 | 20 | 0.7 | 0.7 |
| Non-compliance with the DWSNZ                           | DWSNZ - Bore-head security    | 2014 | 20 | 20  | 20  |
| Non-consented activities                                | Renewal of consents           | 2014 | 27 | 27  | 6   |
| Inadequate treatment under all conditions               | UV treatment + Filtration     | 2017 |    | 2   | 2   |

The list of district wide risks can be found in 5Waters Activity Management Plan: Volume 1.

### 16.11 Asset Valuation Details

The total replacement value of assets within the Prebbleton water scheme is \$8,561,246 as detailed in Table 16-8 below.

**Table 16-8 Replacement Value, Prebbleton**

| Asset Class 1              |              | Asset Class 2 | Sum of Replacement Value |
|----------------------------|--------------|---------------|--------------------------|
| <b>Plant and Equipment</b> |              |               | \$811,314                |
| <b>Water Reticulation</b>  | Hydrant      |               | \$511,360                |
|                            | Lateral      |               | \$330,273                |
|                            | Pipe         |               | \$5,415,549              |
|                            | Supply Point |               | \$1,070,128              |
|                            | Valve        |               | \$422,622                |

Replacement values for these different types of assets are shown in Figure 16-8 below.

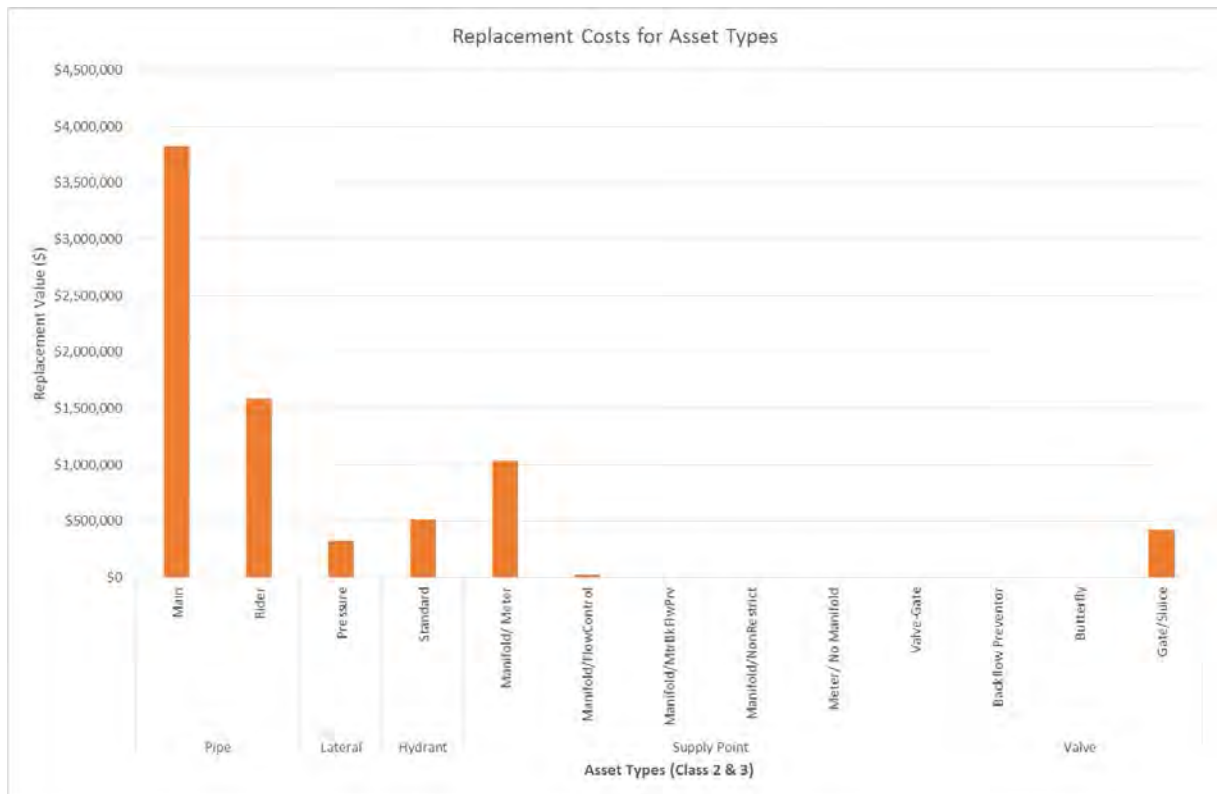


**Figure 16-8 Replacement Costs for Prebbleton**

## 16.12 Renewals

The renewal profile has been taken from the 2017 5 Waters Valuation. A graph showing the renewals for this scheme are shown by Figure 16-9 below. The majority renewals occur in first ten years.

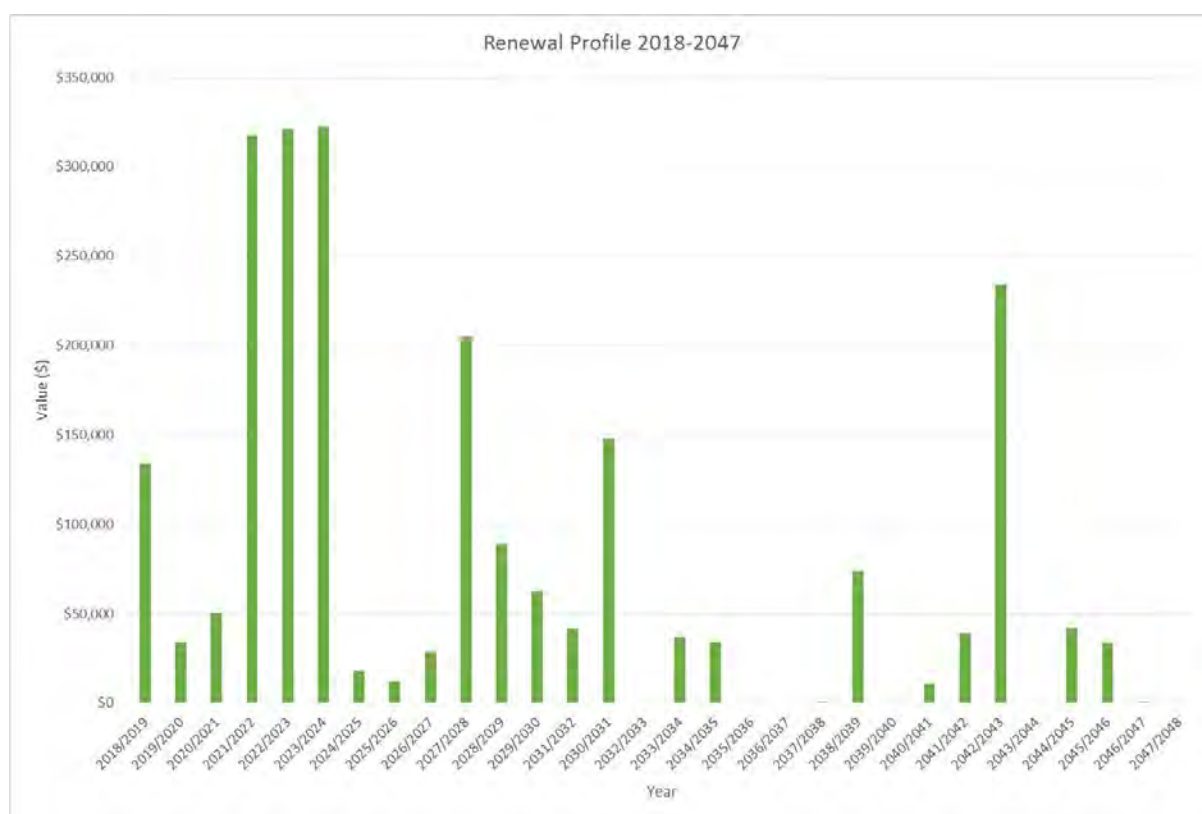


**Figure 16-9 Prebbleton Water Renewal Profile**

### 16.13 Critical Assets

The criticality model for Prebbleton has been updated for the 2018 AcMP. The methodology of the criticality model can be found in 5Waters Activity Management Plan: Volume 1 and it provides details of how the criticality has been calculated for the reticulation assets. Table 16-9 and Figure 16-10 below shows the calculated criticality for all of the assets within this scheme that have a recorded known length.

**Table 16-9 Length of Assets per Criticality Level**

| Criticality Bands |             | Length (m) |
|-------------------|-------------|------------|
| 5                 | Low         | 38,857     |
| 4                 | Medium-Low  | 10,789     |
| 3                 | Medium      | 15,101     |
| 2                 | Medium-High | 2,301      |
| 1                 | High        | 239        |

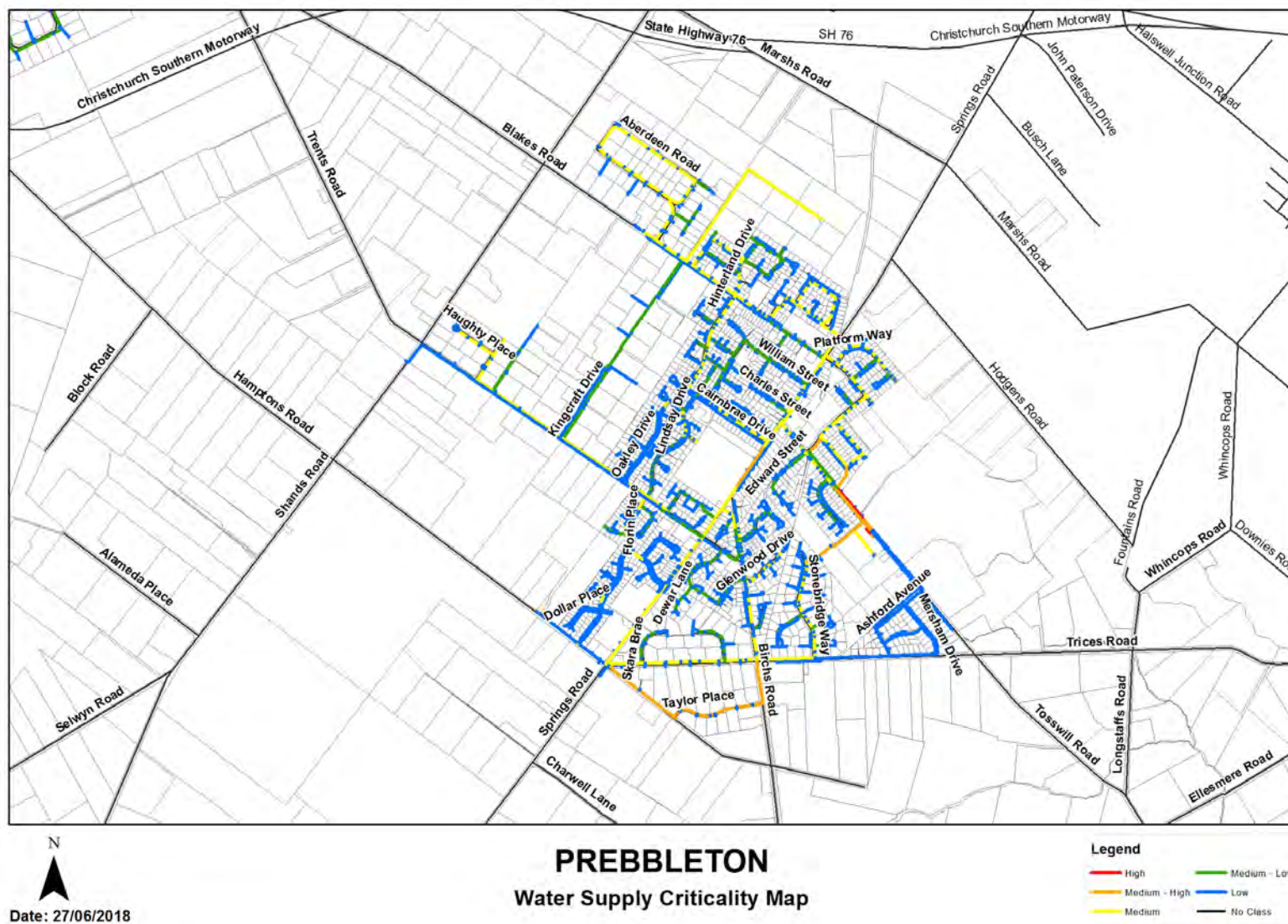


Figure 16-10 Criticality Map

## 16.14 Asset Condition

The asset condition model was run for Prebbleton in 2017. The methodology of the model can be found in 5Waters Activity Management Plan: Volume 1 which provides details of how the model has been calculated for the pipe reticulation assets. Figure 16-11 below shows the level of asset condition for these assets within this scheme that have a recorded known condition.

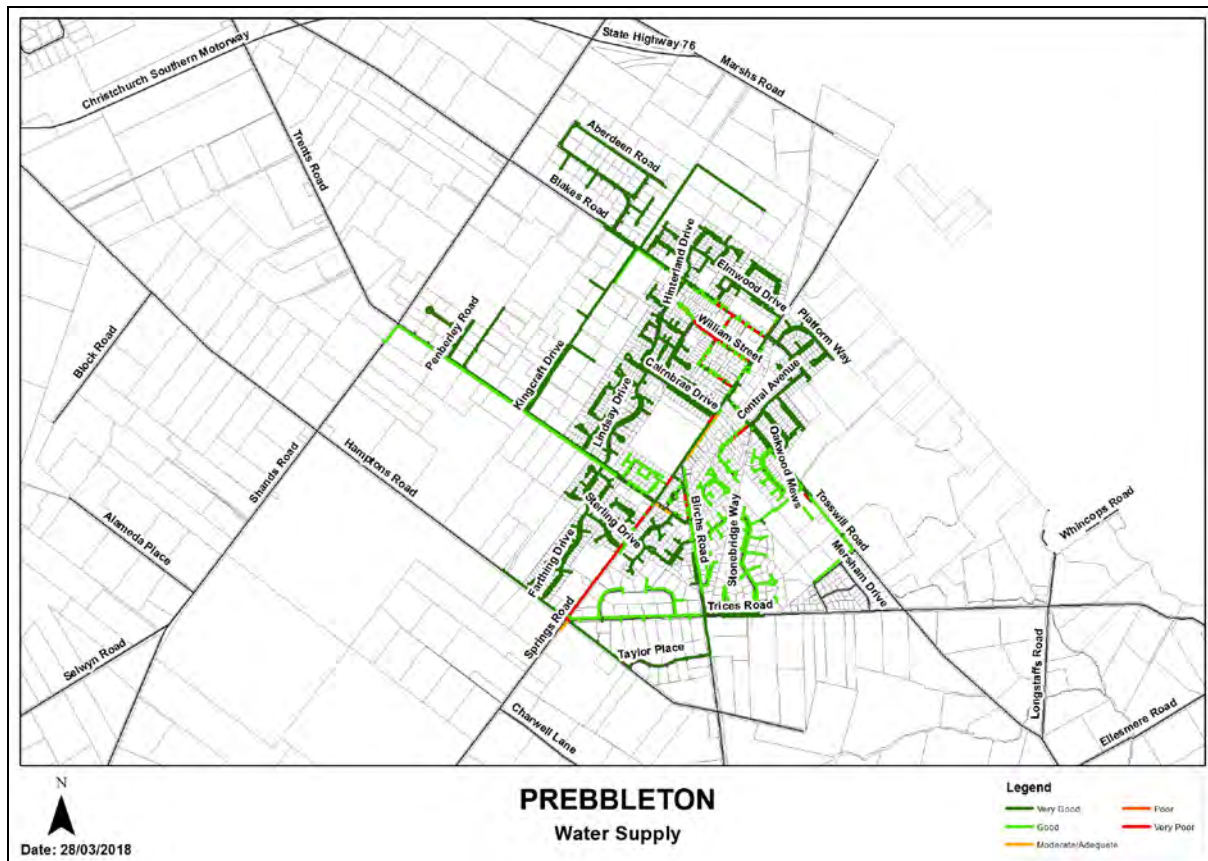


**Figure 16-11 Asset Condition – Prebbleton**

Table 16-10 provides a description of the condition rating used within the condition model.

### Table 16-10 Asset Condition Grading

| Condition Rating | Grading   |
|------------------|-----------|
| 1.0              | Excellent |
| 2.0              | Good      |
| 3.0              | Moderate  |
| 4.0              | Poor      |
| 5.0+             | Fail      |



The number of pipe faults is also measured through the asset management system. Figure 16-12 shows the known historic pipe failures within this scheme.

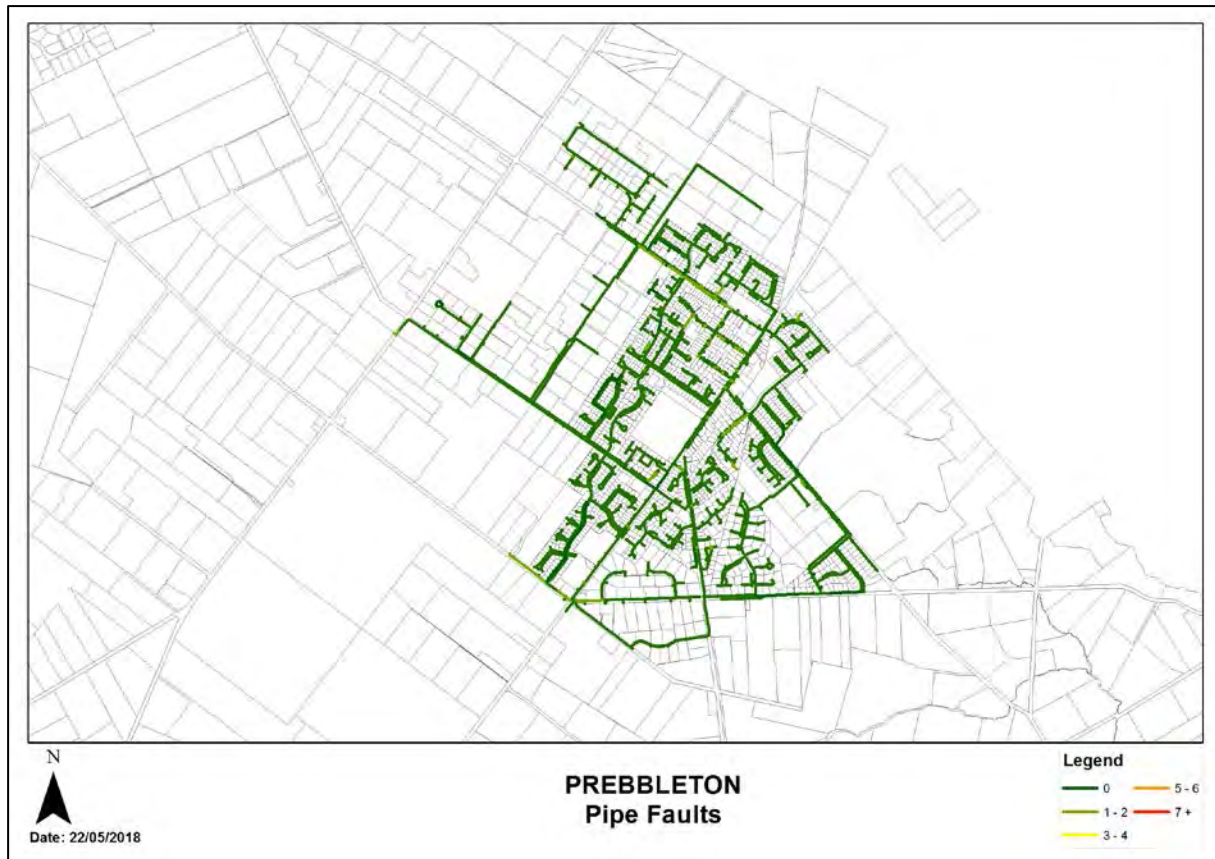


**Figure 16-12 Pipe Faults, Prebbleton**

### 16.15 Funding Program

The 10 year budgets for Prebbleton are shown by Table 16-11 and Figure 16-13. Budgets are split into expenditure, renewals, projects and capital projects.

All figures are (\$) not adjusted for CPI “inflation”. They are calculated on historical data, and population growth where relevant.

**Table 16-11 Prebbleton Budget Summary**

| Years     | Expenditure | Renewals  | Projects | Capital Projects |
|-----------|-------------|-----------|----------|------------------|
| 2018/2019 | \$164,100   | \$133,980 |          | \$492,265        |
| 2019/2020 | \$174,292   | \$34,410  |          | \$2,959,500      |
| 2020/2021 | \$175,985   | \$50,656  | \$10,000 |                  |
| 2021/2022 | \$177,677   | \$317,500 |          | \$715,511        |
| 2022/2023 | \$179,370   | \$321,214 |          |                  |
| 2023/2024 | \$181,398   | \$322,385 |          |                  |



|           |             |             |          |             |
|-----------|-------------|-------------|----------|-------------|
| 2024/2025 | \$183,426   | \$17,807    |          |             |
| 2025/2026 | \$185,454   | \$12,279    |          |             |
| 2026/2027 | \$187,482   | \$28,872    |          |             |
| 2027/2028 | \$189,510   | \$205,315   |          | \$240,240   |
| Total     | \$1,798,692 | \$1,444,418 | \$10,000 | \$4,407,516 |

An explanation of the categories within the budgets are as follows below:

- Expenditure consists of operation and maintenance costs;
- Renewals are replacement of assets which are nearing or exceeded their useful life;
- Projects are investigations, decisions and planning activities which exclude capital works; and
- Capital projects are activities involving physical works.

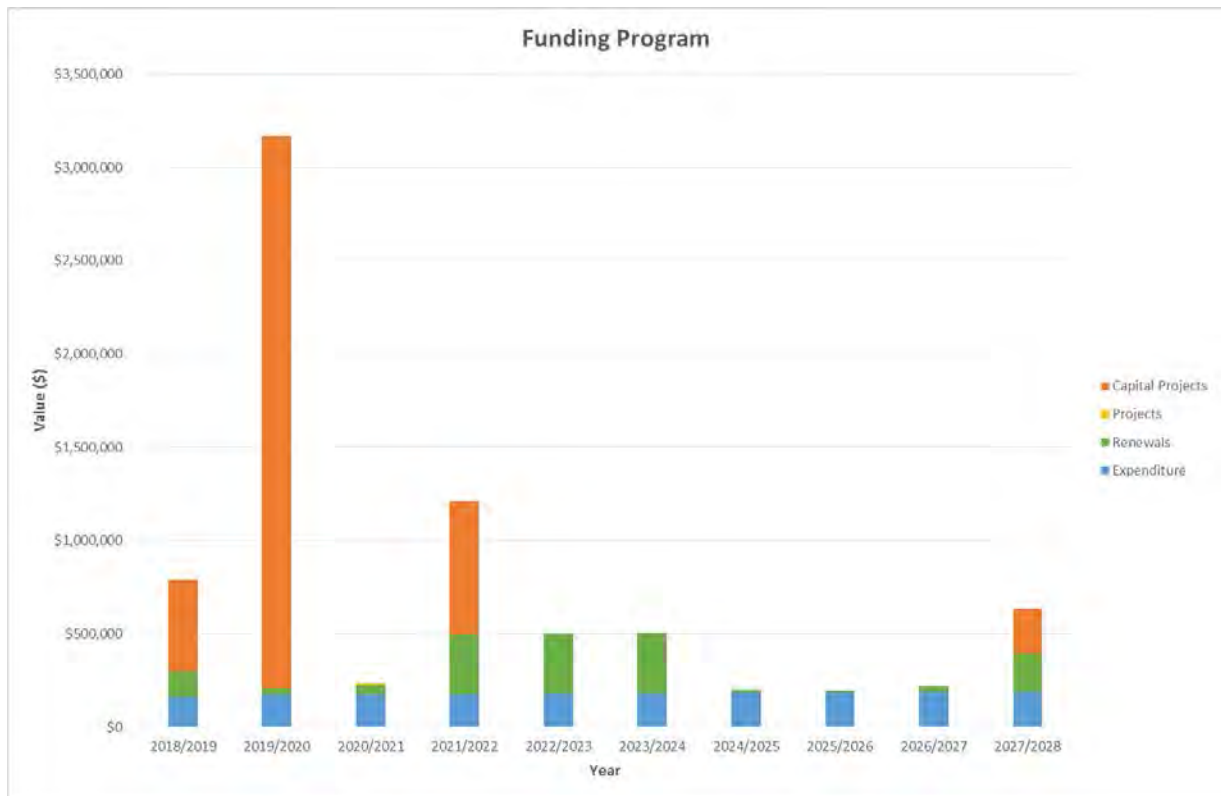


**Figure 16-13 Prebleton Funding Summary**

There are a number of major projects for Prebbleton water scheme in the LTP budget.

**Table 16-12 Key Projects**

| Account Label    | GL        | Description                   | Year 1 (\$) | Year 2 (\$) | Year 3 (\$) | Years 4 to 10 | Funding Split <sup>13</sup> |
|------------------|-----------|-------------------------------|-------------|-------------|-------------|---------------|-----------------------------|
| Capital Projects | 405590034 | Reservoir                     |             | \$2,500,000 |             |               | 90% G                       |
| Capital Projects | 405590037 | Prebbleton Water Source Impro |             | \$86,500    |             |               | 100% G                      |
| Capital Projects | 405590038 | UV treatment                  |             | \$373,000   |             |               | 100% LoS                    |
| Projects         | 4055044   | UV treatment design           |             |             | \$10,000    |               | 100% LoS                    |
| Capital Projects | 405590039 | Pipeline Extensions           | \$492,265   |             |             | \$955,751     | 100% LoS                    |

The list of district wide projects can be found in 5Waters Activity Management Plan: Volume 1.

### Discussion on Projects

Projects have been determined based on their:

- Relevance to the scheme
- Requirement to be completed under legislation
- Ability to bring the scheme up to or maintain the Level of Service required under council's Asset Management Policy.

Many projects are **jointly** funded by more than one scheme and activity. Each scheme pays a pro-rata share only, equivalent to the number of connections.

### Discussion on Capital and Projects

Where relevant, Capital (Levels of Service) and Capital (Growth) projects have been included in the scheme financial details.

Levels of Service Projects and growth splits have been provided to ensure the costs of population driven works are clear.

<sup>13</sup> Where LoS refers to Level of Service and G refers to Growth

## 17.0 RAKAIA HUTS WATER SUPPLY

### 17.1 Scheme Summary

| Description                                   |                                   | Quantity                       |
|-----------------------------------------------|-----------------------------------|--------------------------------|
| <b>Estimated Population Served</b>            |                                   | 319                            |
| <b>Scheme Coverage</b><br>(1 Jan 2018)        | Full Charges                      | 113                            |
|                                               | Half Charges                      | 1                              |
|                                               | >1 Charges                        | 1                              |
| <b>System Components</b>                      | Bores/Intakes (No.)               | 1                              |
|                                               | Treatment/Disinfection            | None                           |
|                                               | Reservoirs (No.)                  | 1                              |
|                                               | Pump Stations (No.)               | 1                              |
|                                               | Piped (m)                         | 2659                           |
| <b>History</b>                                | Original scheme installation date | 1965                           |
| <b>Value (\$)</b>                             | Replacement Cost                  | \$471,130.72                   |
|                                               | Depreciated Replacement Cost      | \$234,970.36                   |
| <b>Financial</b>                              | 2018/2019 Estimate                | \$29,755                       |
|                                               | Annual maintenance cost           | 0.93%                          |
|                                               | % of total                        |                                |
| <b>Demand (m3)</b><br>(1 Jan – 31 Dec 2017)   | Average daily                     | 55                             |
|                                               | Peak daily                        | 162                            |
|                                               | Minimum daily                     | 16.5                           |
|                                               | Average daily per connection      | 0.49                           |
| <b>Type of Supply</b>                         |                                   | High pressure and unrestricted |
| <b>Target Pressure &amp; Flow at boundary</b> | Pressure                          | >310kPa                        |
|                                               | Flow                              | >40L/Min                       |
| <b>Sustainability</b>                         | Well Security                     | Secure                         |

### 17.2 Key Issues

The following key issues are associated with the Rakaia Huts water supply. A list of district wide issues are located in 5Waters Activity Management Plan: Volume 1.

**Table 17-1 Rakaia Huts Scheme Issues**

| What's the Problem                                                                                                                                     | What we plan to do                                                     |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------|
| Due to the Rakaia Huts relatively isolated location and distance from the maintenance contractor's base the cost of operation and maintenance is high. | Council will investigate the potential for enhanced remote monitoring. |
| Shallow bore                                                                                                                                           | Provide additional treatment barriers                                  |

### 17.3 Overview & History

The Rakaia Huts Water Supply provides untreated groundwater from a confined aquifer to the Rakaia Huts community on the eastern bank at the mouth of the Rakaia River.

A piped water supply was requested for the township by the North Canterbury Catchment Board (now Environment Canterbury) in 1986, as the Board has stated that it was unlikely to grant water right applications for septic tank effluent without a reticulated community supply. Households at that time obtained their water from shallow wells that were contaminated.

The scheme was designed as an unrestricted supply with a low level of compliance with the NZ Fire Fighting Code of Practice and installed during 1989.

In 2007/08 land transfers between Council and residents occurred to reflect actual property/reserve boundaries.

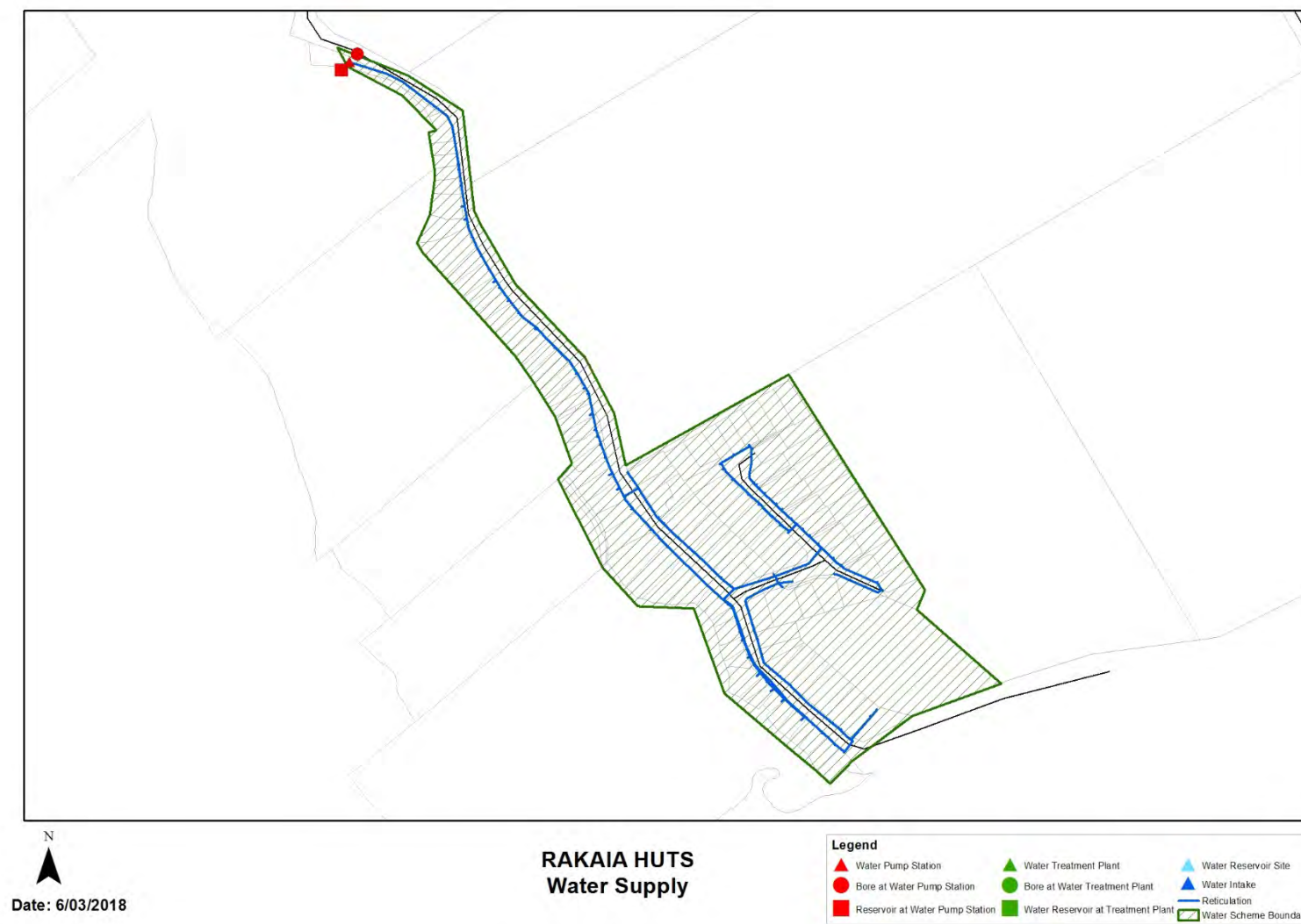


**Figure 17-1 Scheme Map**

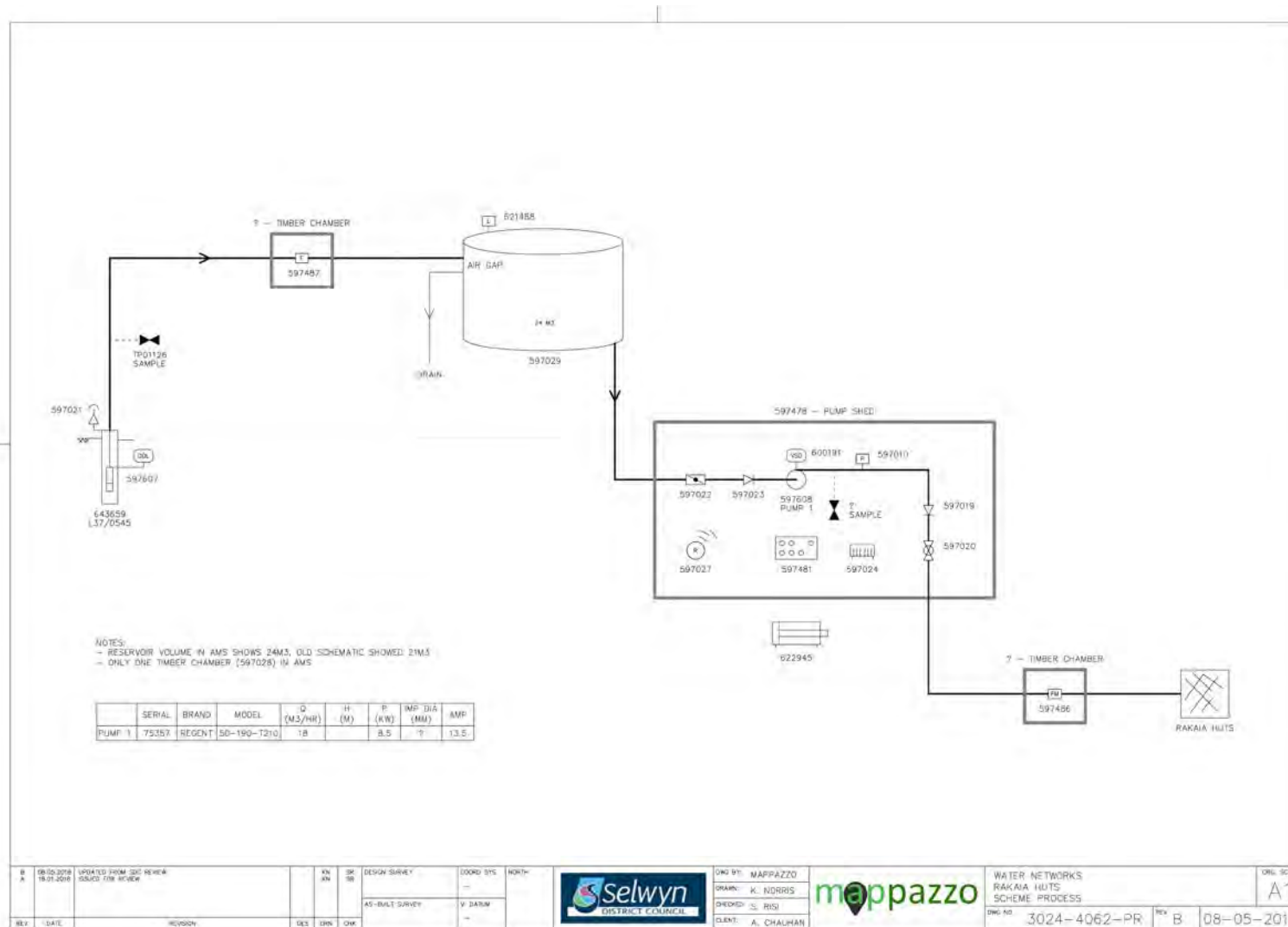


Figure 17-2 Scheme Schematic



## 17.4 System Capacity

This water supply was developed with sufficient capacity to serve the subdivision. All connections have been allocated and are utilised. Most allocated connections are utilised and it is not intended that this supply area be extended. Existing capacity is adequate.

**Table 17-2 Capacity Summary**

|                      | Flow Rate<br>(L/s) | Daily Volume<br>(m <sup>3</sup> ) | Annual Volume<br>(m <sup>3</sup> ) | Comments                     |
|----------------------|--------------------|-----------------------------------|------------------------------------|------------------------------|
| Abstraction Capacity | 11.9               | 1028                              | -                                  | 1 x bore pump (nom capacity) |
| Consented Take       | 12                 | 1037 *                            | 77,786                             | -                            |
| Peak Demand          | 5.1**              | 187                               | 18,400                             | -                            |
| * inferred value     |                    |                                   |                                    |                              |
| **Feb 2015           |                    |                                   |                                    |                              |

## 17.5 Resource Consents

The Rakaia Huts water supply has a number of resource consents. Table 17-3 shows the water take permitted by the resource consents for this scheme.

**Table 17-3 Resource Consents**

| Consent                        | Description                                                                                                       | Location                | Date Issued | Expiry Date | Consented Max Instantaneous Flow (L/s) | Consented Max Daily Volume (m <sup>3</sup> /day) |
|--------------------------------|-------------------------------------------------------------------------------------------------------------------|-------------------------|-------------|-------------|----------------------------------------|--------------------------------------------------|
| CRC991055.1<br>(Issued-Active) | To take groundwater via bore L37/0545 at or about map reference NZMS 260 L37:48288-02682 for public water supply. | Jollies Rd, RAKAIA HUTS | 12-Feb-10   | 27-Jan-34   | 12                                     | 518<br><br>(7260 per fortnight)                  |

## 17.6 Water Quality

The Rakaia Huts water supply is a secure supply which is sampled quarterly at the treatment plant and reticulation point.

The following details E. coli transgressions for the period 2012 to 2017.

### Source

There have been no E. coli source transgressions during this period.

### Treatment

There have been no E. coli treatment transgressions during this period.

### Zone

There have been no E. coli Zone transgressions during this period.

### Chemical Analysis

The following is a summary of the raw water chemical analysis carried out at the Rakaia Huts Water Supply.

**Table 17-4 Rakaia Huts Water Supply Raw Water Chemical Analysis Summary**

| Parameter                                   | Standards<br>MAV* (GV)** | Plant 2015 | Plant 2017 | Status |
|---------------------------------------------|--------------------------|------------|------------|--------|
| Total Lead (g/m3)                           | 0.01                     | <0.00011   | 0.000130   | ✓      |
| pH (pH units)                               | 7-8.5                    | 7.8        | 7.7        | ✓      |
| Total Hardness (g/m3 as CaCO <sub>3</sub> ) | <200                     | 40         | 39.0       | ✓      |
| Total Calcium (g/m3)                        | n/v                      | 13.9       | 13.8       | ✓      |
| Total Iron (g/m3)                           | <0.2                     | <0.021     | < 0.021    | ✓      |
| Total Sodium (g/m3)                         | <200                     | 4.3        | 4.1        | ✓      |
| Nitrate - Nitrogen (g/m3)                   | 11.3                     | 0.77       | 0.77       | ✓      |

\* MAV – Maximum Acceptable Value

\*\* (GV) – Guideline Value

## 17.7 Scheme Assets

A summary of material and diameter for pipes in Rakaia Huts is shown below in Figure 17-3 and Figure 17-4.

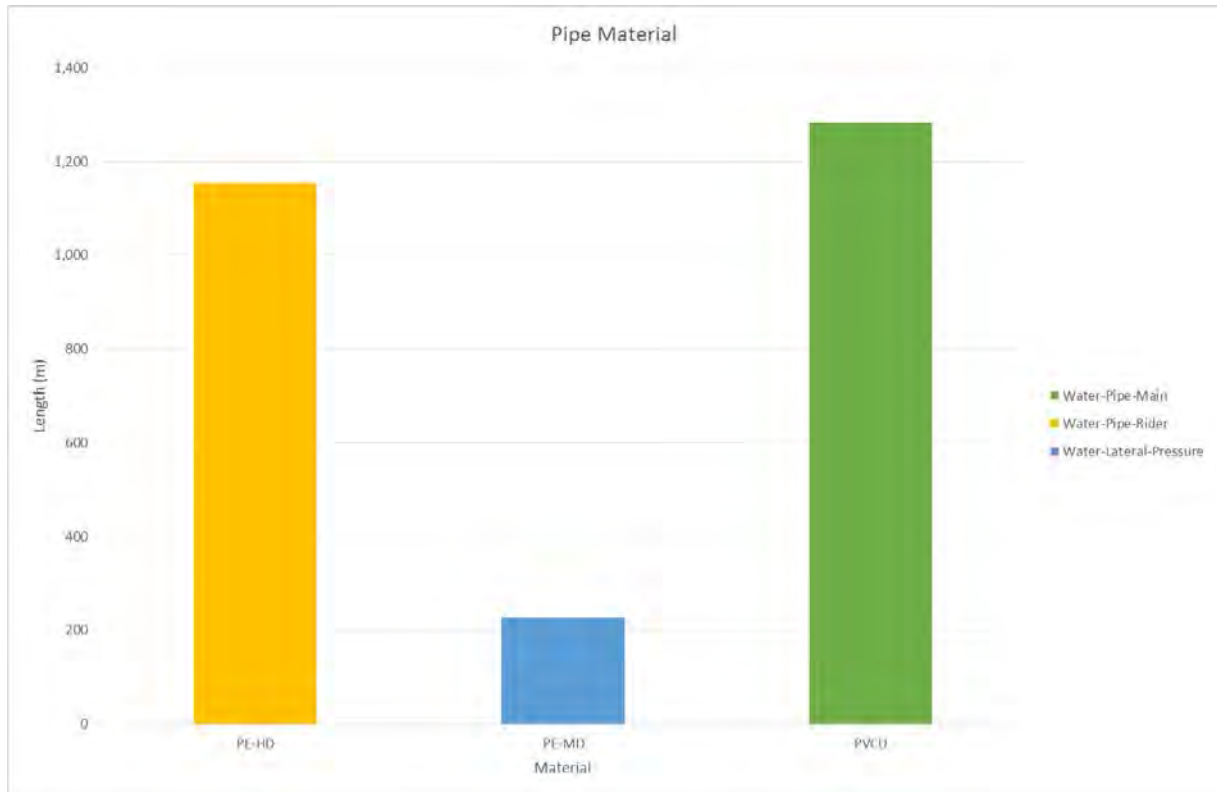


**Figure 17-3 Pipe Material – Rakaia Huts**

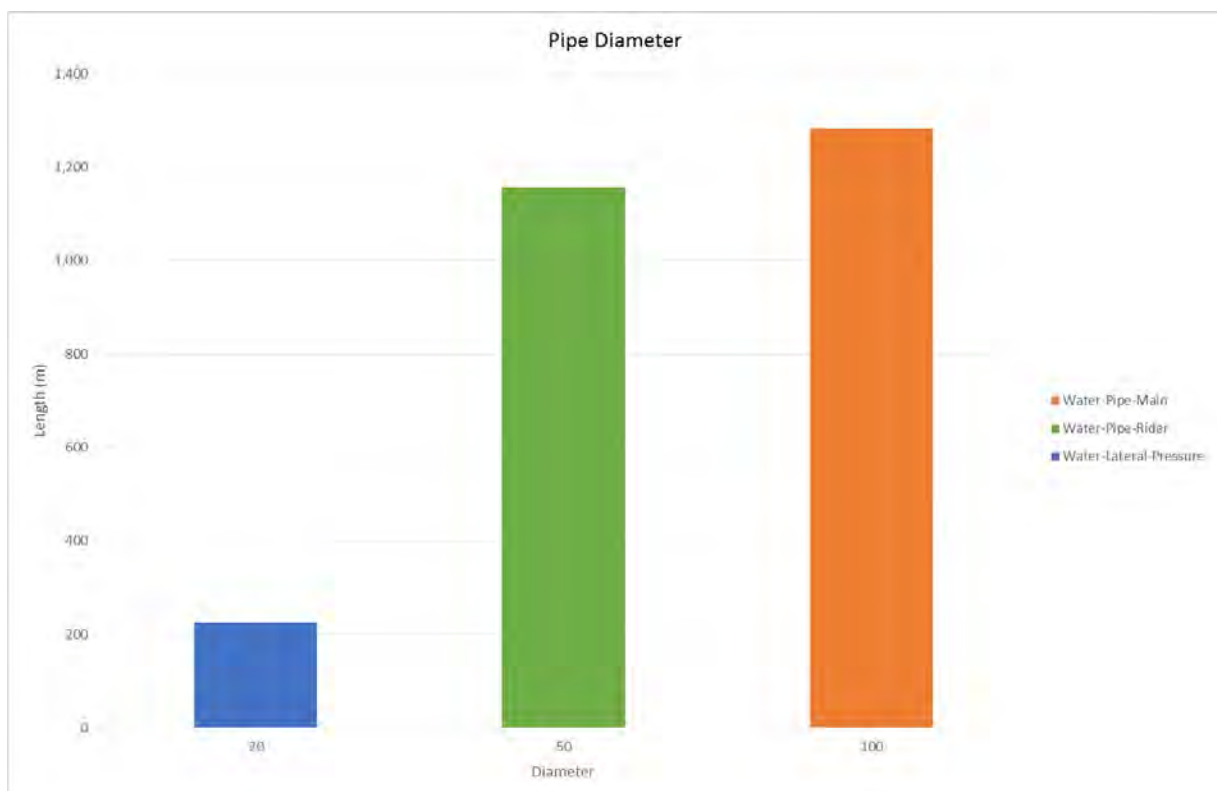


**Figure 17-4 Pipe Diameter – Rakaia Huts**

## 17.8 Operational Management

The water supply is operated and maintained under two maintenance contracts as follows:

- Contract 1241: Water Services Contract. Contract is with SICON Ferguson who undertakes investigations, conditions inspections, proactive and reactive maintenance and minor asset renewals; and
- Contract 1202: Parks and Reserves Contract. Contract is with SICON Ferguson who undertakes the maintenance of land scape features related to water services e.g. mowing, gardens etc.

Water quality sampling is completed under an agreement with Food and Health Ltd as required.

## 17.9 Photos of Main Assets



**Photo 1: Pump Shed and reservoir**

## 17.10 Risk Assessment

A risk assessment has been undertaken for the Rakaia Huts scheme. The key output from the risk assessment is the identification of any extreme and high risks which need to be mitigated. In order to mitigate these risks they have been included and budgeted for in the projects within this LTP. Table 17-5 details the risk priority rating, Table 17-6 outlines the risks and the list of key projects is found in Table 17-11.

**Table 17-5 Risk Priority Rating**

| Risk Score | Level of Risk | Risk Response                                                                                                                                         |
|------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| > 50       | Extreme       | Awareness of the event to be reported to Council.<br>Urgent action to eliminate / mitigate / manage the risk.<br>Document risk and action in the AMP. |
| 35-50      | Very High     | Risk to be eliminated / mitigated / managed through normal business planning processes with responsibility assigned.                                  |
| 14-35      | High          | Manage risk using routine procedures.                                                                                                                 |
| 3.5-14     | Moderate      | Monitor the risk.                                                                                                                                     |
| < 3.5      | Low           | Awareness of the event to be reported to Council.<br>Immediate action required to eliminate / mitigate / manage the risk.                             |

|  |  |                                      |
|--|--|--------------------------------------|
|  |  | Document risk and action in the AMP. |
|--|--|--------------------------------------|

**Table 17-6 Risks – Rakaia Huts**

| Risk                                                    | Action/Project                | Year Identified | 2014 Risk Rating | 2017 Risk Rating | Residual Risk Rating |
|---------------------------------------------------------|-------------------------------|-----------------|------------------|------------------|----------------------|
| Electrical failure due to lightning or network spikes   | Install surge diverters       | 2014            | 6                | 6                | 6                    |
| Failure to meet NES water meter standards               | NES Water Meter Compliance    | 2014            | 20               | 6                | 6                    |
| Inability to collect income from non-metered properties | Install property water meters | 2014            | 27               | 27               | 2.1                  |
| Non-compliance with the DWSNZ                           | DWSNZ - Age Testing           | 2014            | 10               | 0.7              | 0.7                  |
| Non-compliance with the DWSNZ                           | DWSNZ - Bore-head security    | 2014            | 10               | 10               | 10                   |
| Non-consented activities                                | Renewal of consents           | 2014            | 27               | 27               | 6                    |
| Inadequate treatment under all conditions               | UV treatment                  | 2017            |                  | 1                | 1                    |

The list of district wide risks can be found in 5Waters Activity Management Plan: Volume 1.

### 17.11 Asset Valuation Details

The total replacement value of assets within the Rakaia Huts water scheme is \$471,131 with further details in Table 17-7 below.

**Table 17-7 Replacement Value, Rakaia Huts**

| Asset Class 1              | Asset Class 2 | Sum of Replacement Value |
|----------------------------|---------------|--------------------------|
| <b>Plant and Equipment</b> |               | \$159,193                |
| <b>Water Reticulation</b>  | Hydrant       | \$21,107                 |
|                            | Lateral       | \$9,607                  |
|                            | Pipe          | \$206,486                |
|                            | Supply Point  | \$65,419                 |
|                            | Valve         | \$9,320                  |

Replacement values for these different types of assets are shown in Figure 17-5 below.

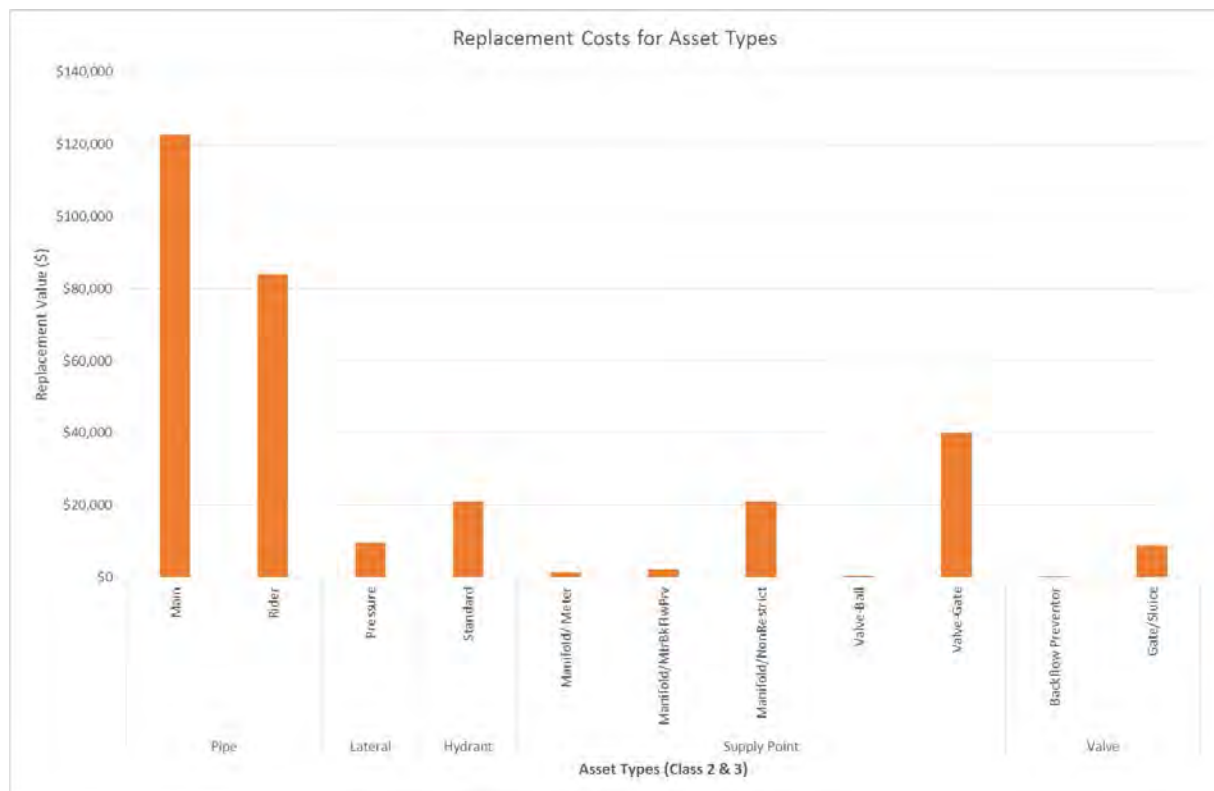


**Figure 17-5 Replacement Costs for Rakaia Huts**

## 17.12 Renewals

The renewal profile has been taken from the 2017 5 Waters Valuation. A graph showing the renewals for this scheme are shown by Figure 17-6 below. The majority renewals occur in 2022/2023 and 2036/2037.



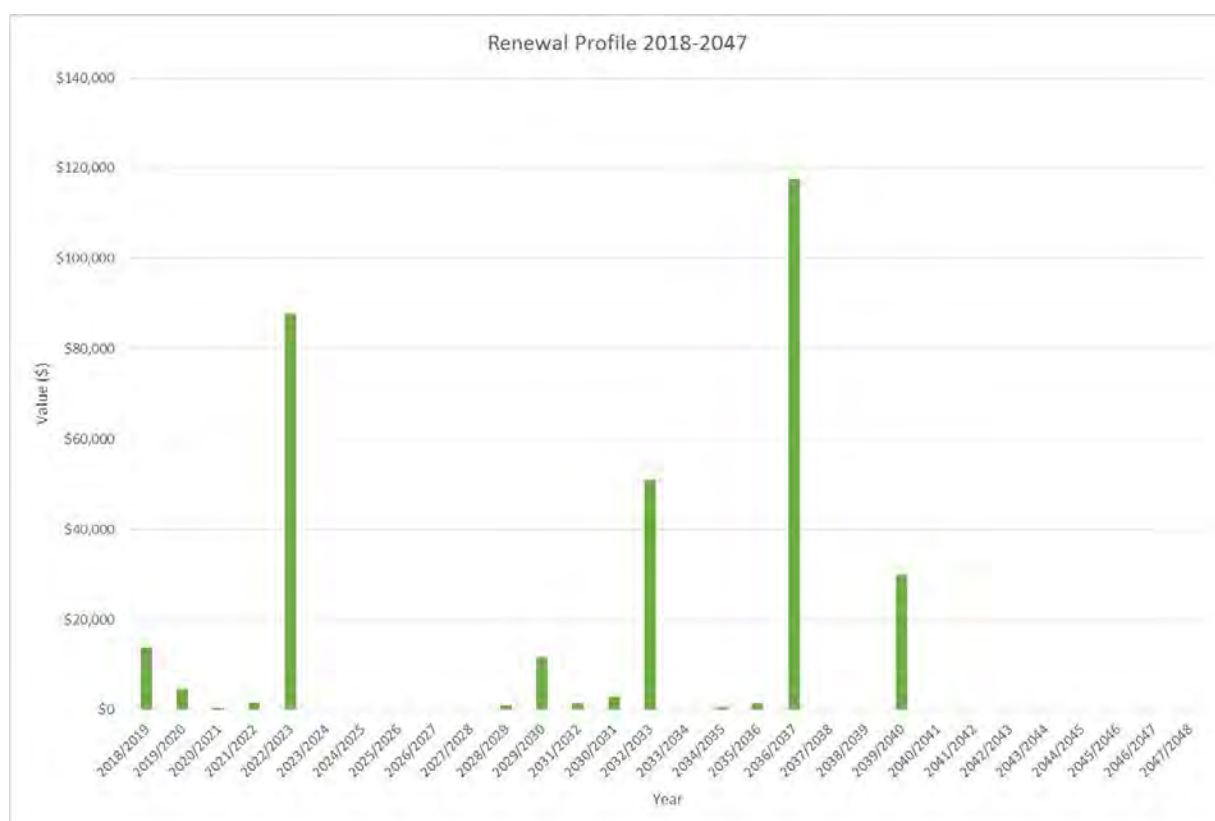


**Figure 17-6 Rakaia Huts Water Renewal Profile**

### 17.13 Critical Assets

The criticality model for Rakaia Huts has been updated for the 2018 AcMP. The methodology of the criticality model can be found in 5Waters Activity Management Plan: Volume 1 and it provides details of how the criticality has been calculated for the reticulation assets. Table 17-8 and Figure 17-7 below shows the calculated criticality for all of the assets within this scheme that have a recorded known length.

**Table 17-8 Length of Assets per Criticality Level**

| Criticality Bands |             | Length (m) |
|-------------------|-------------|------------|
| 5                 | Low         | 1,328      |
| 4                 | Medium-Low  | 1,333      |
| 3                 | Medium      | 0          |
| 2                 | Medium-High | 0          |
| 1                 | High        | 0          |

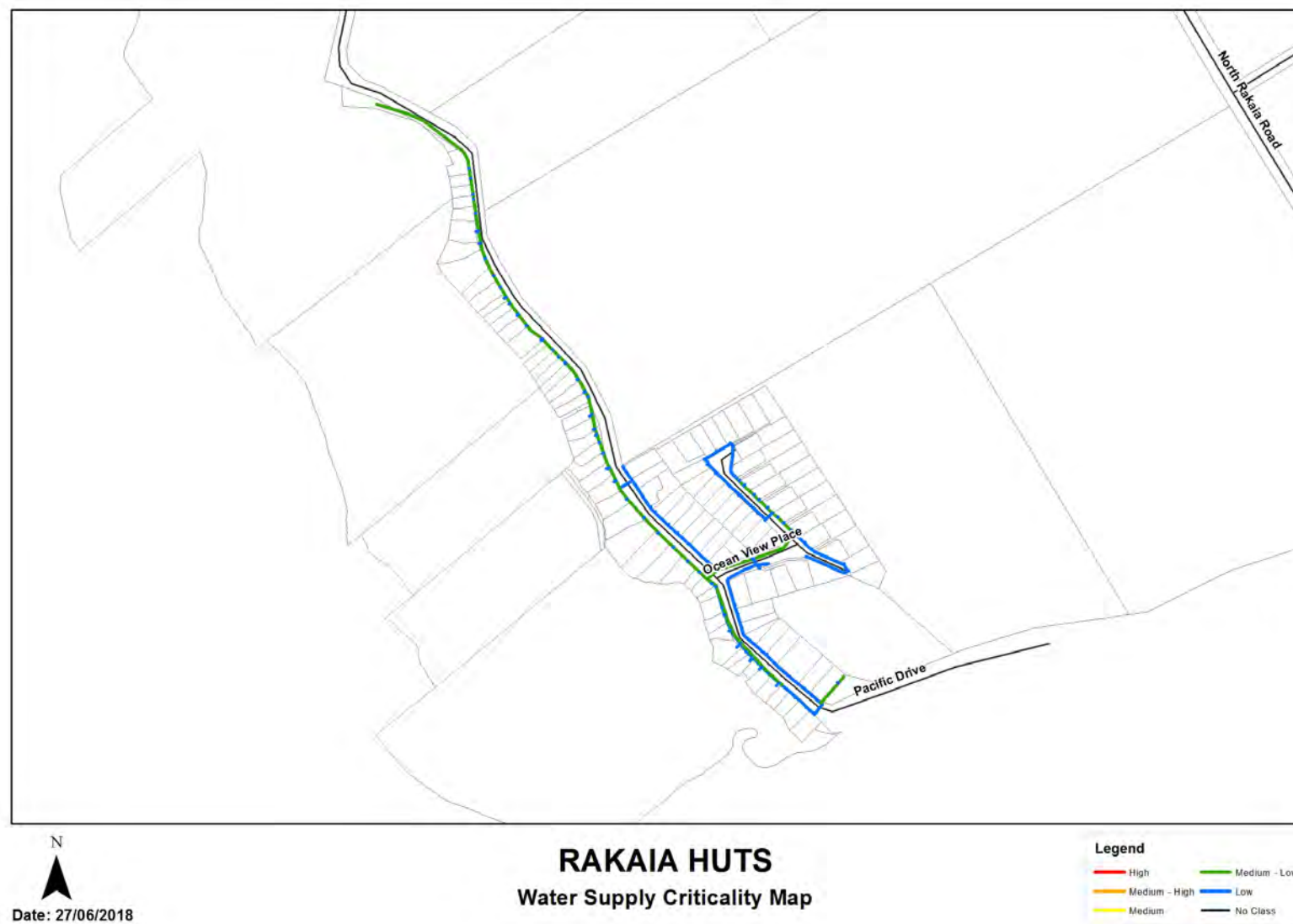


Figure 17-7 Criticality Map

## 17.14 Asset Condition

The asset condition model was run for Rakaia Huts in 2017. The methodology of the model can be found in 5Waters Activity Management Plan: Volume 1 which provides details of how the model has been calculated for the pipe reticulation assets. Figure 17-8 below shows the level of asset condition for these assets within this scheme that have a recorded known condition.

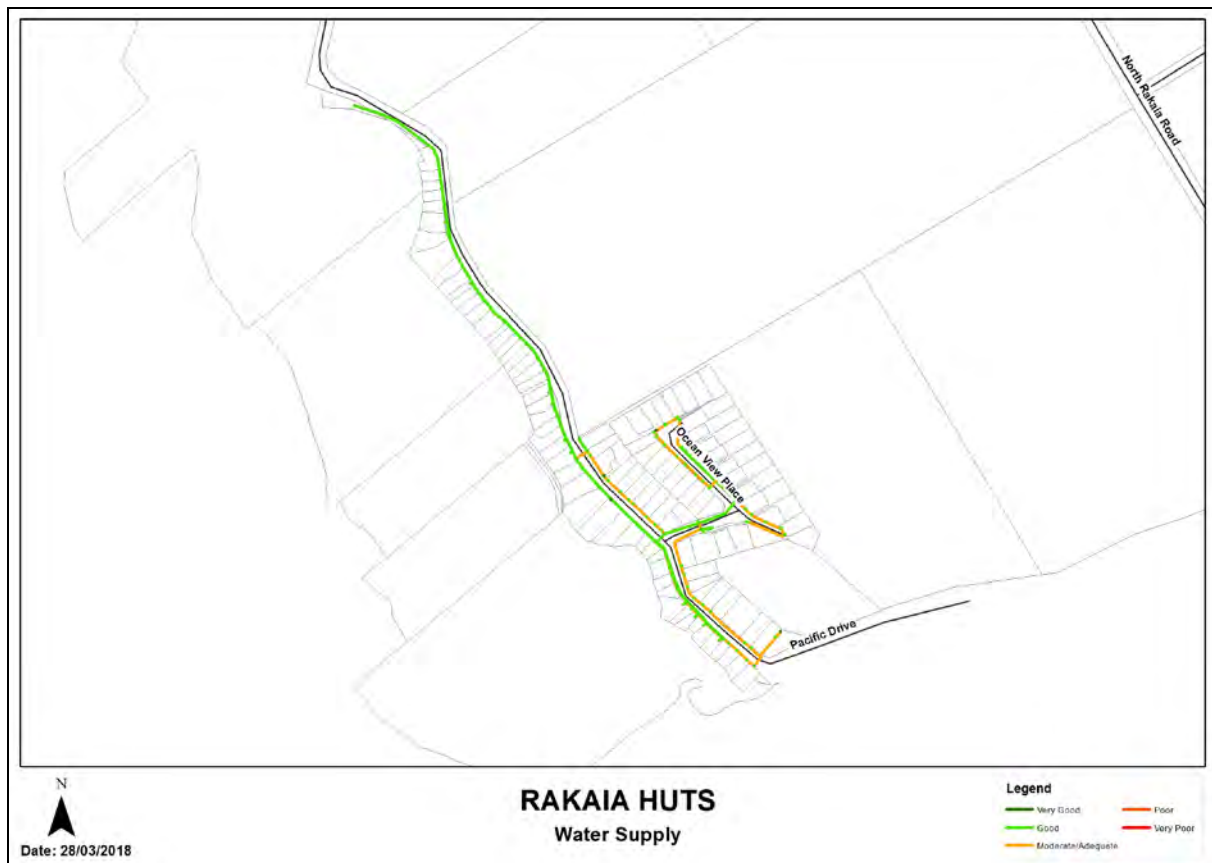


**Figure 17-8 Asset Condition – Rakaia Huts**

Table 15-10 provides a description of the condition rating used within the condition model.

**Table 17-9 Asset Condition Grading**

| Condition Rating | Grading   |
|------------------|-----------|
| 1.0              | Excellent |
| 2.0              | Good      |
| 3.0              | Moderate  |
| 4.0              | Poor      |
| 5.0+             | Fail      |

The number of pipe faults is also measured through the asset management system. Figure 17-9 shows the known historic pipe failures within this scheme.

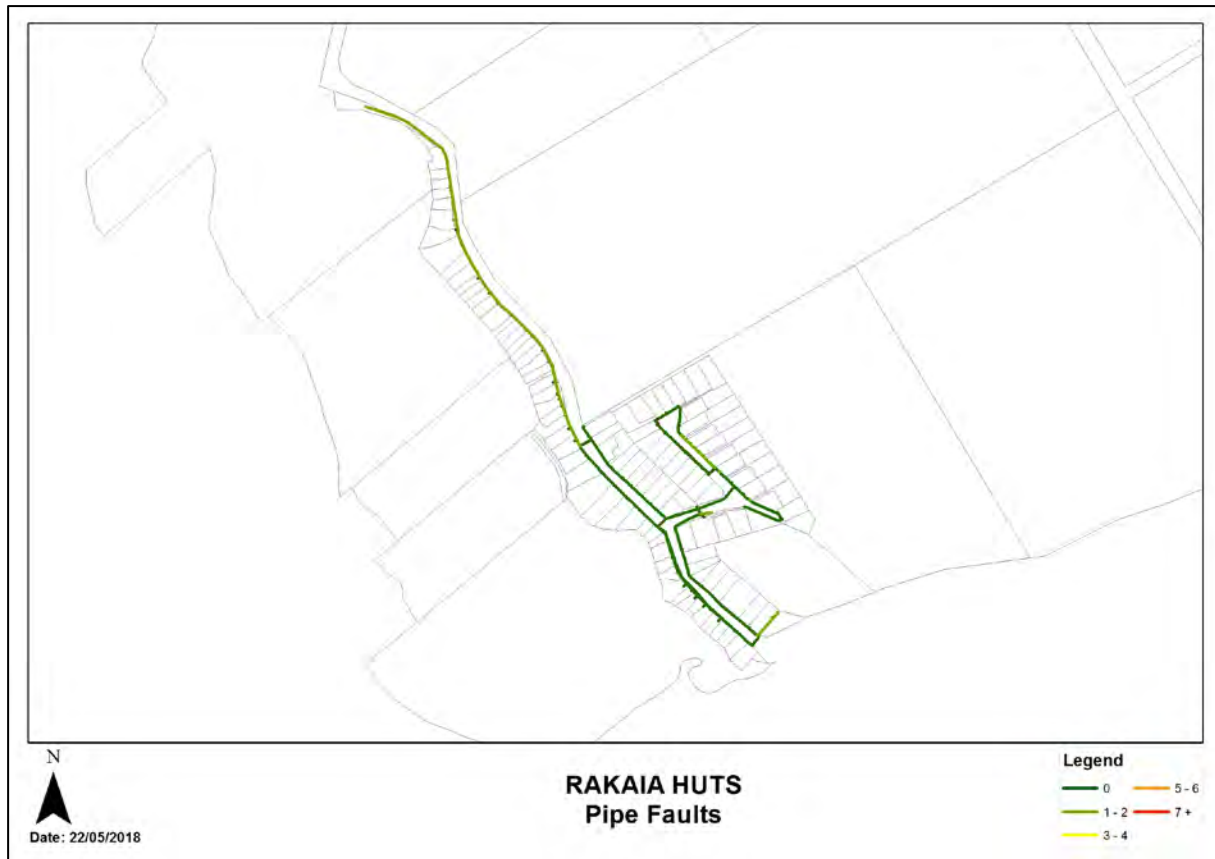


**Figure 17-9 Pipe Faults, Rakaia Huts**

### 17.15 Funding Program

The 10 year budgets for Rakaia Huts are shown by Table 17-10 and Figure 17-10. Budgets are split into expenditure, renewals, projects and capital projects.

All figures are (\$) not adjusted for CPI “inflation”. They are calculated on historical data, and population growth where relevant.

**Table 17-10 Rakaia Huts Budget Summary**

| Years     | Expenditure | Renewals | Projects | Capital Projects |
|-----------|-------------|----------|----------|------------------|
| 2018/2019 | \$29,755    | \$13,854 | \$10,000 | \$228,000        |
| 2019/2020 | \$34,205    | \$4,604  |          |                  |
| 2020/2021 | \$34,205    | \$446    |          |                  |
| 2021/2022 | \$34,205    | \$1,668  |          |                  |
| 2022/2023 | \$34,205    | \$87,708 |          |                  |
| 2023/2024 | \$34,205    |          |          |                  |

|           |           |           |          |           |
|-----------|-----------|-----------|----------|-----------|
| 2024/2025 | \$34,205  |           |          |           |
| 2025/2026 | \$34,205  |           |          |           |
| 2026/2027 | \$34,205  |           |          |           |
| 2027/2028 | \$34,205  |           |          |           |
| Total     | \$337,600 | \$108,280 | \$10,000 | \$228,000 |

An explanation of the categories within the budgets are as follows below:

- Expenditure consists of operation and maintenance costs;
- Renewals are replacement of assets which are nearing or exceeded their useful life;
- Projects are investigations, decisions and planning activities which exclude capital works; and
- Capital projects are activities involving physical works.

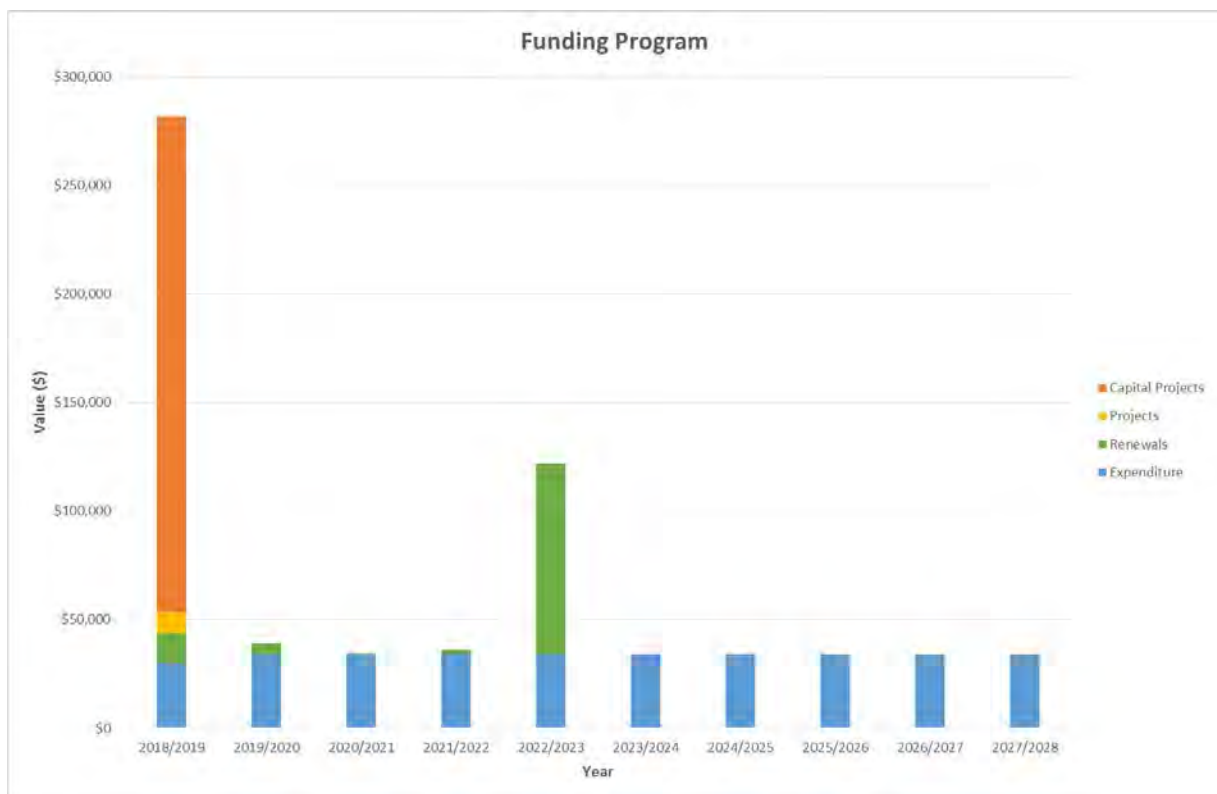


**Figure 17-10 Rakaia Huts Funding Summary**

There are two major projects for Rakaia Huts water scheme in the LTP budget.

**Table 17-11 Key Projects**

| Account Label    | GL        | Description         | Year 1 (\$) | Year 2 (\$) | Year 3 (\$) | Years 4 to 10 | Funding Split <sup>14</sup> |
|------------------|-----------|---------------------|-------------|-------------|-------------|---------------|-----------------------------|
| Capital Projects | 406290035 | UV treatment        | \$228,000   |             |             |               | 100% LoS                    |
| Projects         | 4062010   | Design UV treatment | \$10,000    |             |             |               | 100% LoS                    |

The list of district wide projects can be found in 5Waters Activity Management Plan: Volume 1.

### Discussion on Projects

Projects have been determined based on their:

- Relevance to the scheme
- Requirement to be completed under legislation
- Ability to bring the scheme up to or maintain the Level of Service required under council's Asset Management Policy.

Many projects are **jointly** funded by more than one scheme and activity. Each scheme pays a pro-rata share only, equivalent to the number of connections.

### Discussion on Capital and Projects

Where relevant, Capital (Levels of Service) and Capital (Growth) projects have been included in the scheme financial details.

Levels of Service Projects and growth splits have been provided to ensure the costs of population driven works are clear.

<sup>14</sup> Where LoS refers to Level of Service and G refers to Growth



## 18.0 RAVEN DRIVE WATER SUPPLY

### 18.1 Scheme Summary

| Description                                   |                                   | Quantity                 |
|-----------------------------------------------|-----------------------------------|--------------------------|
| <b>Estimated Population Served</b>            |                                   | 34                       |
| <b>Scheme Coverage</b><br>(1 Jan 2018)        | Full Charges                      | 12                       |
|                                               | Half Charges                      | 0                        |
|                                               | >1 Charges                        | 0                        |
| <b>System Components</b>                      | Bores/Intakes (No.)               | 1                        |
|                                               | Treatment/Disinfection            | None                     |
|                                               | Reservoirs (No.)                  | 1                        |
|                                               | Pump Stations (No.)               | 1                        |
|                                               | Piped (m)                         | 853.9                    |
| <b>History</b>                                | Original scheme installation date | 1995                     |
| <b>Value (\$)</b>                             | Replacement Cost                  | \$337,211.31             |
|                                               | Depreciated Replacement Cost      | \$194,174.82             |
| <b>Financial</b>                              | 2018/2019 Estimate                | \$20,100                 |
|                                               | Annual maintenance cost           | 0.63%                    |
|                                               | % of total                        |                          |
| <b>Demand (m3)</b><br>(1 Jan – 31 Dec 2017)   | Average daily                     | 13.2                     |
|                                               | Peak daily                        | 43.8                     |
|                                               | Minimum daily                     | 4.5                      |
|                                               | Average daily per connection      | 1.1                      |
| <b>Type of Supply</b>                         |                                   | Unrestricted tank supply |
| <b>Target Pressure &amp; Flow at boundary</b> | Pressure                          | Timer on, Pressure off   |
|                                               | Flow                              | >40L/min                 |
| <b>Sustainability</b>                         | Well Security                     | Secure                   |

### 18.2 Key Issues

The following key issues are associated with the Raven Drive water supply. A list of district wide issues are located in 5Waters Activity Management Plan: Volume 1.

**Table 18-1 Raven Drive Scheme Issues**

| What's the Problem                                                                                                                                                             | What we plan to do                                                                                                                                                                                                                                                                          |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Due to the Raven Drive's distance from the maintenance contractor's base the cost of operation and maintenance is high.                                                        | Council will investigate the potential for enhanced remote monitoring.                                                                                                                                                                                                                      |
| To provide adequate fire fighting storage. Four in ground tanks (22.7m <sup>3</sup> each) were installed in the Raven Drive Water Supply, however these need to be maintained. | Council will assess the condition of the tanks and develop scheduled maintenance tasks to ensure the tanks remain in good repair and water quality is not compromised. Council will also ensure that the tanks are fitted with easy accessible couplings to NZ Fire Service specifications. |
| Bore near agriculture land use                                                                                                                                                 | Provide additional treatment barriers                                                                                                                                                                                                                                                       |

### 18.3 Overview & History

The Raven Drive water supply was installed in 1995, the same the year the subdivision was developed. Council took over the operation and administration of the scheme in 1996.

The system originally had a dionisation system with filters, a backwash reservoir and a pump. The system was removed in March 2008 as it had not been used for a number of years and the iron levels had consistently been lower for some time. The backwash reservoir remains but is not in use.

Raven Drive Water Supply provides untreated groundwater to a subdivision located adjacent to Gould's Road and 1.5km east of Springston-Rolleston Road (see schematics). There are 13 sections varying from 1.5ha to 3ha and in general land is used as a "lifestyle" and not as a farm related business.

The scheme was designed and operates as an unrestricted, metered tank supply. Each property must have a storage tank (minimum of 2m<sup>3</sup>) to receive the Council water supply. The owner is then responsible for pumping the water from the tank for property use.



**Figure 18-1 Scheme Map**

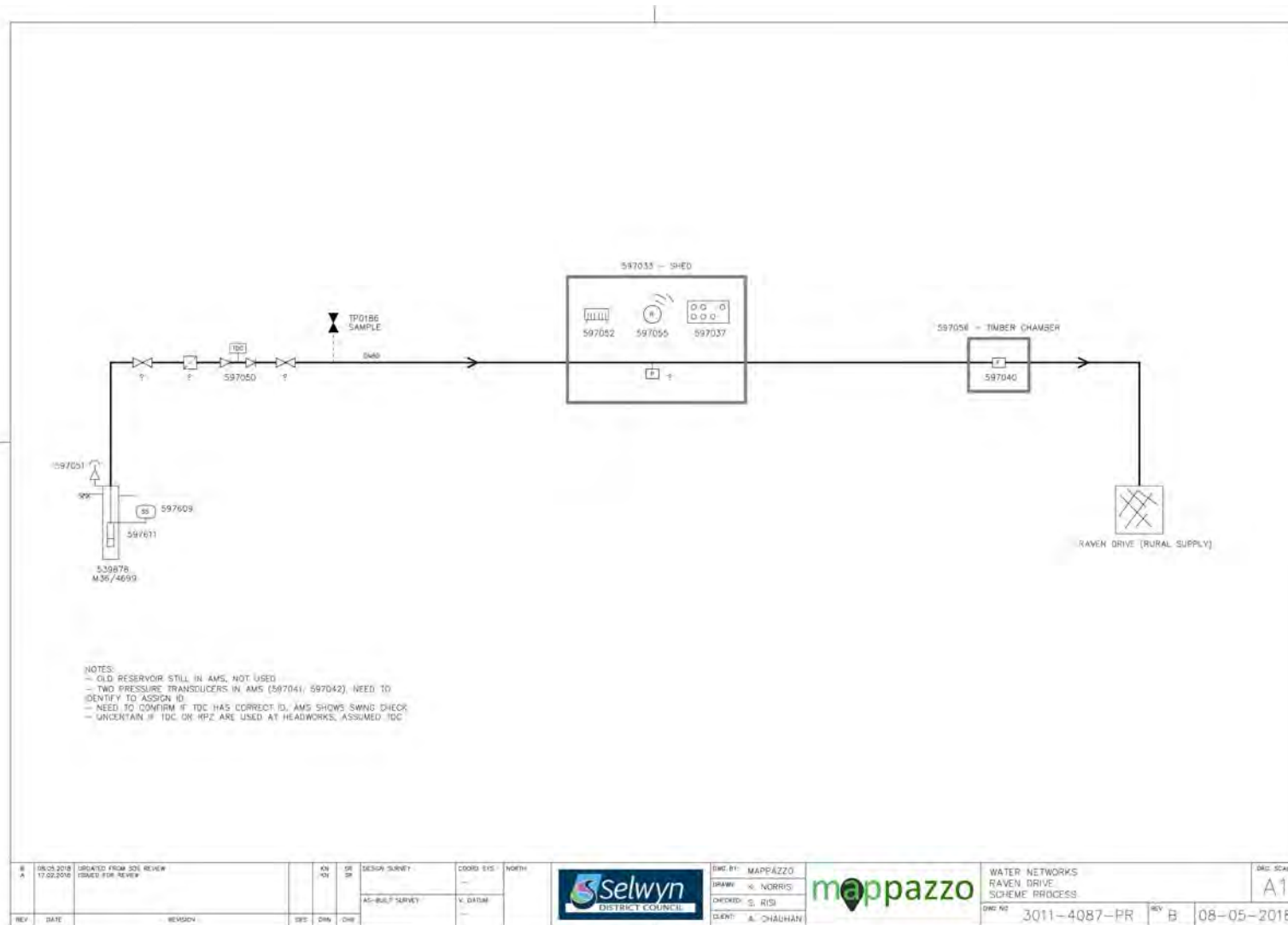


Figure 18-2 Scheme Schematic

## 18.4 System Capacity

This water supply was developed to serve the 13 lot rural residential subdivision. All connections have been allocated and are utilised. No additional connections are anticipated. Existing capacity is adequate.

**Table 18-2 Capacity Summary**

|                                                       | Flow Rate<br>(L/s) | Daily Volume<br>(m <sup>3</sup> ) | Annual Volume<br>(m <sup>3</sup> ) | Comments      |
|-------------------------------------------------------|--------------------|-----------------------------------|------------------------------------|---------------|
| Abstraction Capacity                                  | 1.2                | 104                               | -                                  | 1 x bore pump |
| Consented Take                                        | 25                 | 600                               | 90,000 *                           |               |
| Peak Demand                                           | 6**                | 52***                             | 4,900                              |               |
| * inferred value<br>** 15 Dec 2012<br>*** 10 Jan 2013 |                    |                                   |                                    |               |

## 18.5 Resource Consents

The Raven Drive water supply has a number of resource consents. Table 18-3 shows the water take permitted by the resource consents for this scheme.

**Table 18-3 Resource Consents**

| Consent                      | Description                  | Location                            | Date Issued | Expiry Date | Consented Max Instantaneous Flow (L/s) | Consented Max Daily Volume (m <sup>3</sup> /day) |
|------------------------------|------------------------------|-------------------------------------|-------------|-------------|----------------------------------------|--------------------------------------------------|
| CRC010905<br>(Issued-Active) | To take and use groundwater. | Raven Drive Goulds Road, SPRINGSTON | 1-Jul-02    | 31-Jan-35   | 25                                     | 600                                              |

## 18.6 Water Quality

The Raven Drive water supply is a secure water supply and is currently sampled weekly at the source and monthly in the reticulation.

The following details E. coli transgressions for the period 2012 to 2017.

### Treatment

There has been no E. coli treatment transgressions during this period.

### Zone

There have been no E. coli transgressions during this period.

### Chemical Analysis

The following is a summary of the raw water chemical analysis carried out at the Raven Drive Water Supply.

**Table 18-4 Raven Drive Water Supply Raw Water Chemical Analysis Summary**

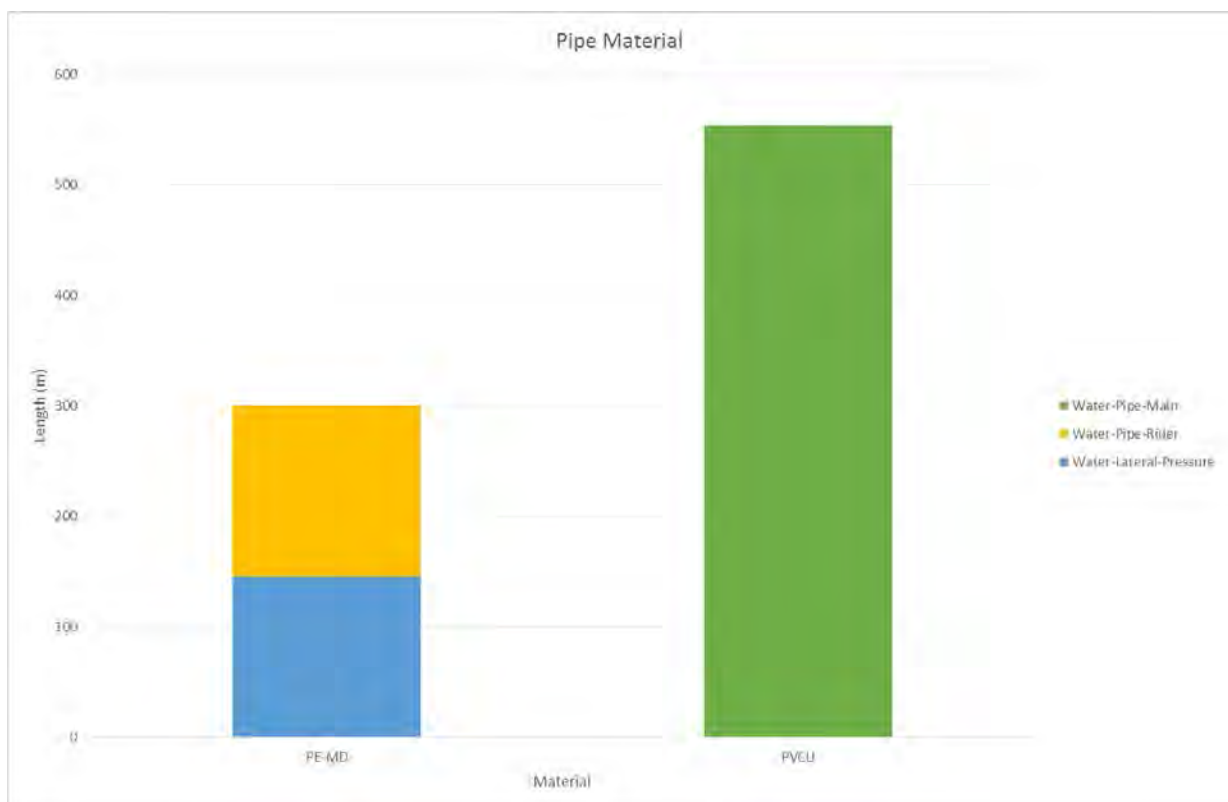
| Parameter                                   | Standards<br>MAV* (GV)** | Plant 2015 | Plant 2017 | Status |
|---------------------------------------------|--------------------------|------------|------------|--------|
| Total Lead (g/m3)                           | 0.01                     | 0.00034    | < 0.00011  | ✓      |
| pH (pH units)                               | 7-8.5                    | 7.9        | 7.8        | ✓      |
| Total Hardness (g/m3 as CaCO <sub>3</sub> ) | <200                     | 54         | 51.5       | ✓      |
| Total Calcium (g/m3)                        | n/v                      | 17.9       | 17.08      | ✓      |
| Total Iron (g/m3)                           | <0.2                     | 0.058      | 0.032      | ✓      |
| Total Sodium (g/m3)                         | <200                     | 10.3       | 9.49       | ✓      |
| Nitrate - Nitrogen (g/m3)                   | 11.3                     | 0.92       | 1.064      | ✓      |

\* MAV – Maximum Acceptable Value

\*\* (GV) – Guideline Value

## 18.7 Scheme Assets

A summary of material and diameter for pipes in Raven Drive is shown below by Figure 18-3 and Figure 18-4.


**Figure 18-3 Pipe Material – Raven Drive**



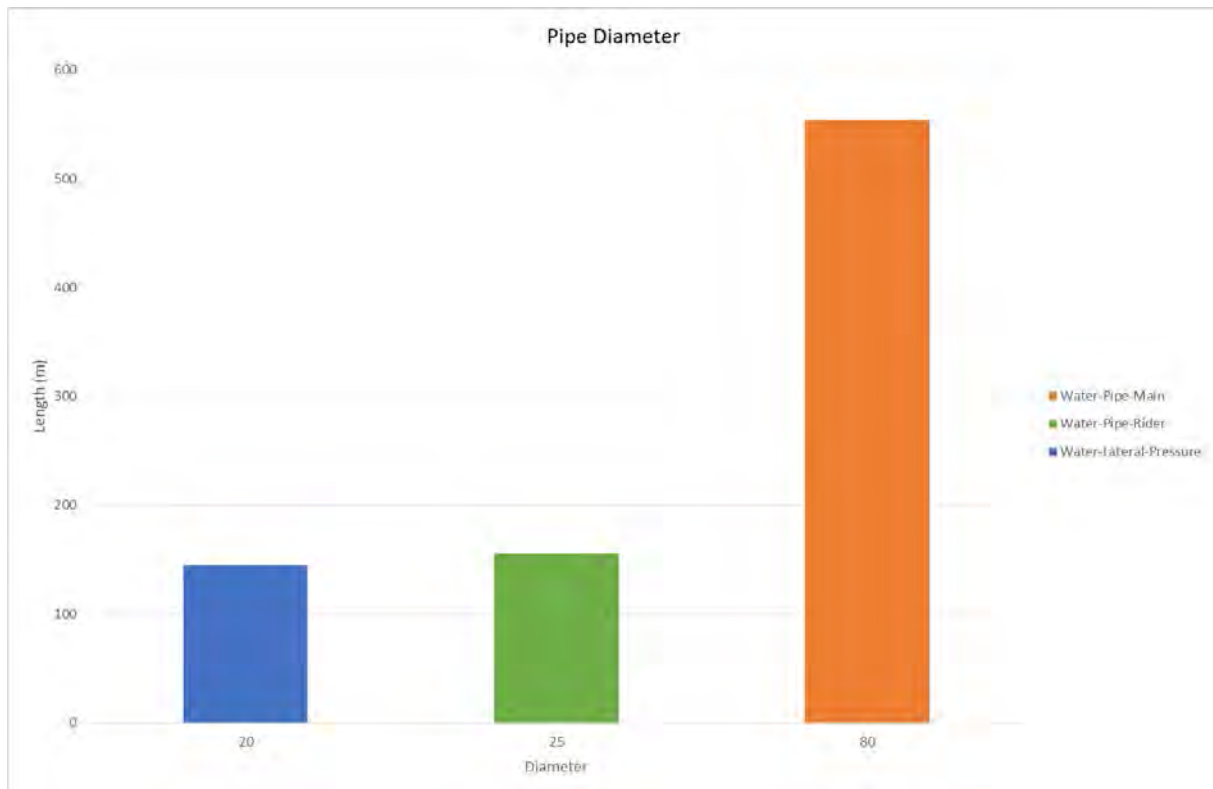


**Figure 18-4 Pipe Diameter – Raven Drive**

## 18.8 Operational Management

The water supply is operated and maintained under two maintenance contracts as follows:

- Contract 1241: Water Services Contract. Contract is with SICON Ferguson who undertakes investigations, conditions inspections, proactive and reactive maintenance and minor asset renewals; and
- Contract 1202: Parks and Reserves Contract. Contract is with SICON Ferguson who undertakes the maintenance of land scape features related to water services e.g. mowing, gardens etc.

Water quality sampling is completed under an agreement with Food and Health Ltd as required.

## 18.9 Photos of Main Assets



**Photo 1: Well head**



**Photo 2: Control building**

## 18.10 Risk Assessment

A risk assessment has been undertaken for the Raven Drive scheme. The key output from the risk assessment is the identification of any extreme and high risks which need to be mitigated. In order to mitigate these risks they have been included and budgeted for in the projects within this LTP. Table 18-6 details the risk priority rating, Table 18-6 outlines the risks and the list of key projects is found in Table 18-11.

**Table 18-5 Risk Priority Rating**

| Risk Score | Level of Risk | Risk Response                                                                                                                                                     |
|------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| > 50       | Extreme       | Awareness of the event to be reported to Council.<br>Urgent action to eliminate / mitigate / manage the risk.<br>Document risk and action in the AMP.             |
| 35-50      | Very High     | Risk to be eliminated / mitigated / managed through normal business planning processes with responsibility assigned.                                              |
| 14-35      | High          | Manage risk using routine procedures.                                                                                                                             |
| 3.5-14     | Moderate      | Monitor the risk.                                                                                                                                                 |
| < 3.5      | Low           | Awareness of the event to be reported to Council.<br>Immediate action required to eliminate / mitigate / manage the risk.<br>Document risk and action in the AMP. |

**Table 18-6 Risks – Raven Drive**

| Risk                                                  | Action/Project              | Year Identified | 2014 Risk Rating | 2017 Risk Rating | Residual Risk Rating |
|-------------------------------------------------------|-----------------------------|-----------------|------------------|------------------|----------------------|
| Fire fighting capacity                                | Review use of storage tanks | 2014            | 12               | 6                | 6                    |
| Electrical failure due to lightning or network spikes | Install surge diverters     | 2014            | 6                | 6                | 6                    |

|                                                         |                                          |      |    |     |     |
|---------------------------------------------------------|------------------------------------------|------|----|-----|-----|
| Failure to meet NES water meter standards               | NES Water Meter Compliance               | 2014 | 20 | 6   | 6   |
| Inability to collect income from non-metered properties | Install property water meters            | 2014 | 27 | 0.6 | 0.6 |
| Non-compliance with the DWSNZ                           | DWSNZ - Age Testing                      | 2014 | 6  | 0.7 | 0.7 |
| Non-compliance with the DWSNZ                           | DWSNZ - Bore-head security               | 2014 | 6  | 6   | 6   |
| Non-consented activities                                | Renewal of consents                      | 2014 | 27 | 27  | 6   |
| Scheme efficiency / redundancy                          | Review connect to Rolleston / Springston | 2017 |    | 2.1 | 2.1 |

The list of district wide risks can be found in 5Waters Activity Management Plan: Volume 1.

### 18.11 Asset Valuation Details

The total replacement value of assets within the Raven Drive water scheme is \$337,211 with further details in Table 18-7 below.

**Table 18-7 Replacement Value, Raven Drive**

| Asset Class 1              | Asset Class 2 | Sum of Replacement Value |
|----------------------------|---------------|--------------------------|
| <b>Plant and Equipment</b> |               | \$233,014                |
| <b>Water Reticulation</b>  | Fire          | \$38,819                 |
|                            | Lateral       | \$6,247                  |
|                            | Pipe          | \$51,198                 |
|                            | Supply Point  | \$5,628                  |
|                            | Valve         | \$2,305                  |

Replacement values for these different types of assets are shown in Figure 18-5 below.

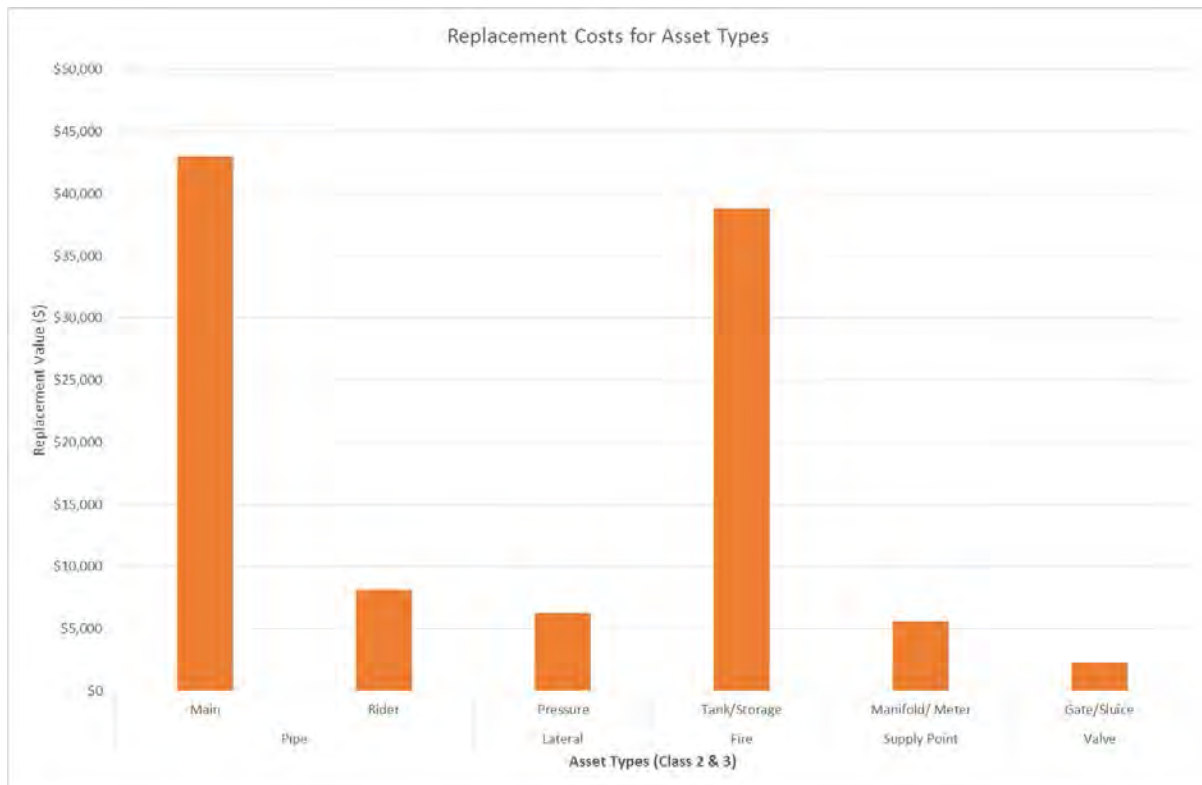


**Figure 18-5 Replacement Costs for Raven Drive**

## 18.12 Renewals

The renewal profile has been taken from the 2017 5 Waters Valuation. A graph showing the renewals for this scheme are shown by Figure 18-6 below. The majority renewals occur in 2044/2045.

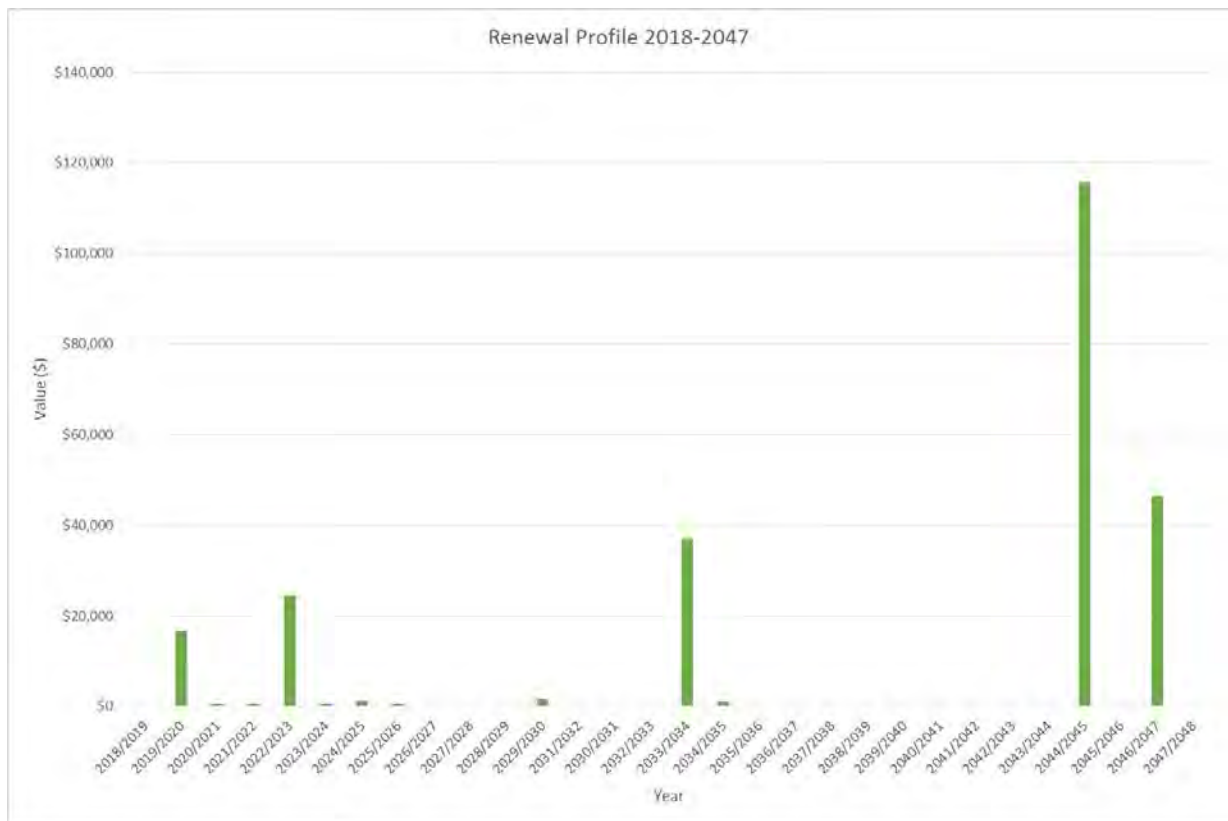


**Figure 18-6 Raven Drive Water Renewal Profile**

### 18.13 Critical Assets

The criticality model for Raven Drive has been updated for the 2018 AcMP. The methodology of the criticality model can be found in 5Waters Activity Management Plan: Volume 1 and it provides details of how the criticality has been calculated for the reticulation assets. Table 18-8 and Figure 18-7 Criticality Maps below shows the calculated criticality for all of the assets within this scheme that have a recorded known length.

**Table 18-8 Length of Assets per Criticality Level**

| Criticality Bands |             | Length (m) |
|-------------------|-------------|------------|
| 5                 | Low         | 301        |
| 4                 | Medium-Low  | 554        |
| 3                 | Medium      | 0          |
| 2                 | Medium-High | 0          |
| 1                 | High        | 0          |

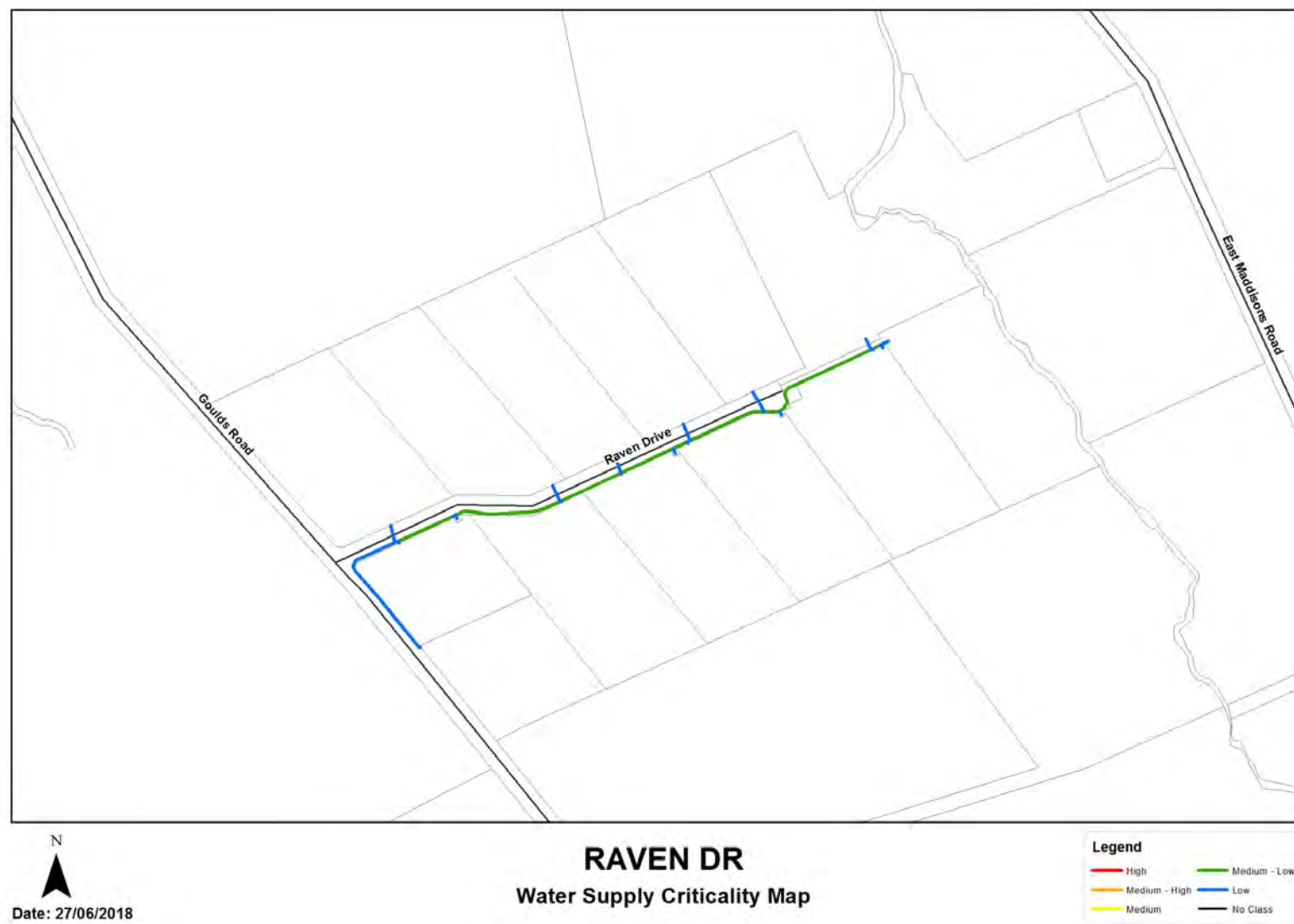


Figure 18-7 Criticality Maps



## 18.14 Asset Condition

The asset condition model was run for Raven Drive in 2017. The methodology of the model can be found in 5Waters Activity Management Plan: Volume 1 which provides details of how the model has been calculated for the pipe reticulation assets. Figure 18-8 below shows the level of asset condition for these assets within this scheme that have a recorded known condition.

### Figure 18-8 Asset Condition – Raven Drive

Table 18-9 provides a description of the condition rating used within the condition model.

**Table 18-9 Asset Condition Grading**

| Condition Rating | Grading   |
|------------------|-----------|
| 1.0              | Excellent |
| 2.0              | Good      |
| 3.0              | Moderate  |
| 4.0              | Poor      |
| 5.0+             | Fail      |

The number of pipe faults is also measured through the asset management system. Figure 18-9 shows the known historic pipe failures within this scheme.

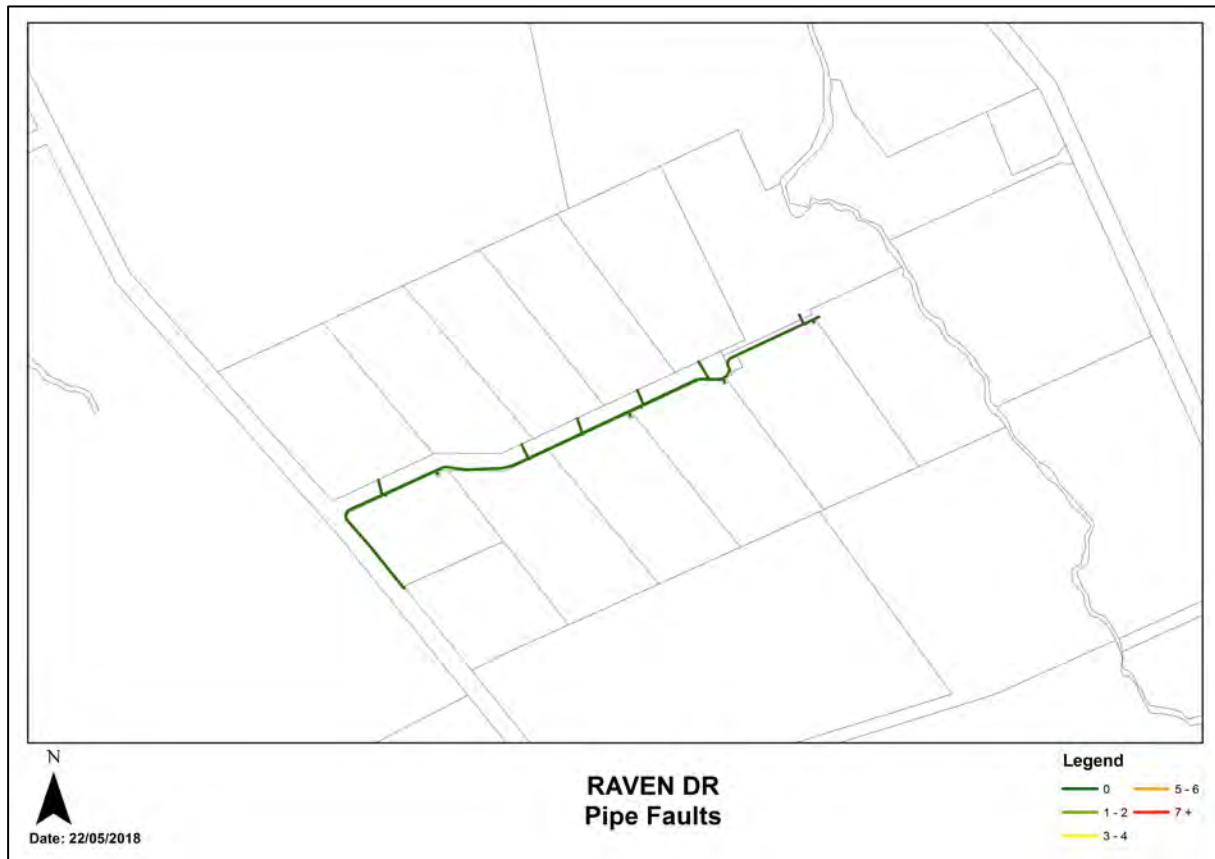


**Figure 18-9 Pipe Faults, Raven Drive**

### 18.15 Funding Program

The 10 year budgets for Raven Drive are shown by Table 18-10 and Figure 18-10. Budgets are split into expenditure, renewals, projects and capital projects.

All figures are (\$) not adjusted for CPI “inflation”. They are calculated on historical data, and population growth where relevant.

**Table 18-10 Raven Drive Budget Summary**

| Years     | Expenditure | Renewals | Projects | Capital Projects |
|-----------|-------------|----------|----------|------------------|
| 2018/2019 | \$20,100    |          | \$5,000  |                  |
| 2019/2020 | \$20,600    | \$16,761 |          | \$30,000         |
| 2020/2021 | \$21,100    | \$704    |          |                  |
| 2021/2022 | \$21,600    | \$704    |          |                  |
| 2022/2023 | \$21,600    | \$24,605 |          |                  |
| 2023/2024 | \$21,600    | \$704    |          |                  |
| 2024/2025 | \$21,600    | \$1,196  |          |                  |

|           |           |          |          |          |
|-----------|-----------|----------|----------|----------|
| 2025/2026 | \$21,600  | \$704    |          |          |
| 2026/2027 | \$21,600  |          | \$10,000 |          |
| 2027/2028 | \$21,600  |          |          |          |
| Total     | \$213,000 | \$45,375 | \$15,000 | \$30,000 |

An explanation of the categories within the budgets are as follows below:

- Expenditure consists of operation and maintenance costs;
- Renewals are replacement of assets which are nearing or exceeded their useful life;
- Projects are investigations, decisions and planning activities which exclude capital works; and
- Capital projects are activities involving physical works.

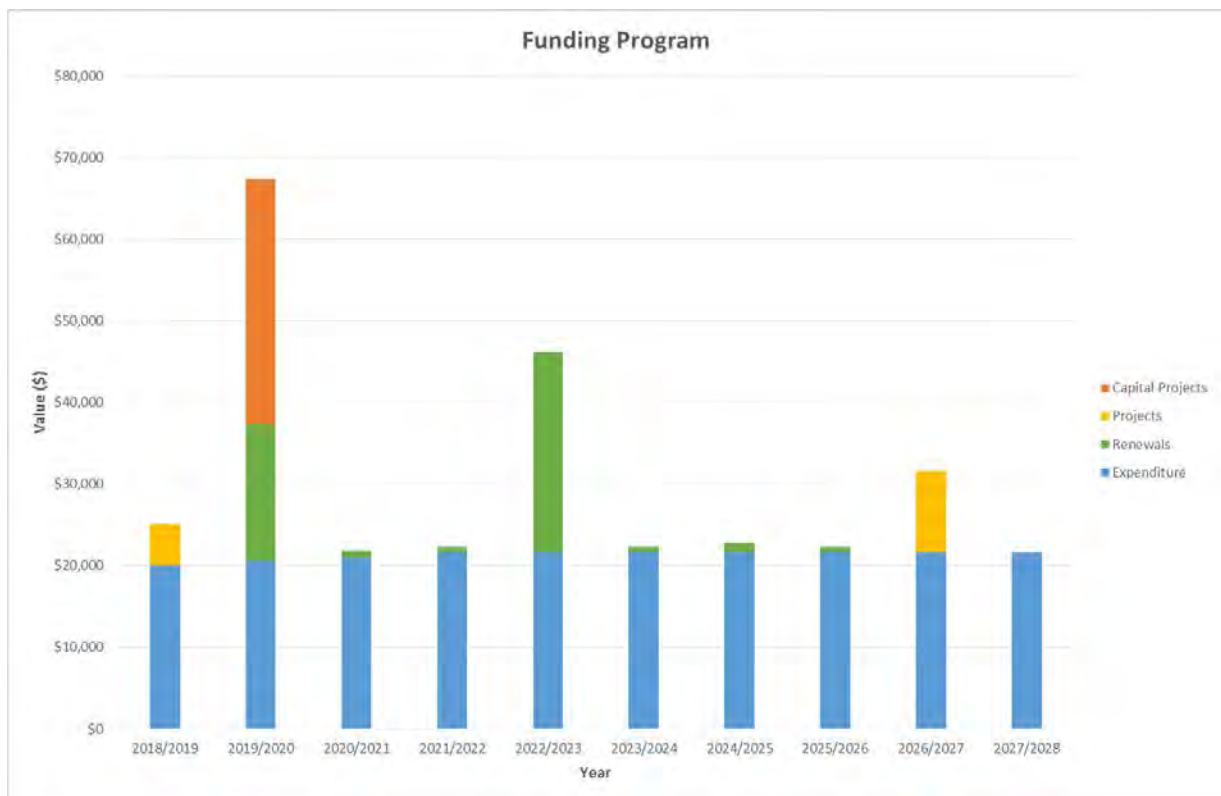


**Figure 18-10 Raven Drive Funding Summary**

There are three major projects for Raven Drive water scheme in the LTP budget.

**Table 18-11 Key Projects**

| Account Label    | GL        | Description                    | Year 1 (\$) | Year 2 (\$) | Year 3 (\$) | Years 4 to 10 | Funding Split <sup>15</sup> |
|------------------|-----------|--------------------------------|-------------|-------------|-------------|---------------|-----------------------------|
| Projects         | 4060008   | Design to connect to Rolleston |             |             |             | \$10,000      | 100% LoS                    |
| Capital Projects | 406090009 | UV treatment                   |             | \$30,000    |             |               | 100% LoS                    |
| Projects         | 4060009   | UV treatment Design            | \$5,000     |             |             |               | 100% LoS                    |

The list of district wide projects can be found in 5Waters Activity Management Plan: Volume 1.

### Discussion on Projects

Projects have been determined based on their:

- Relevance to the scheme
- Requirement to be completed under legislation
- Ability to bring the scheme up to or maintain the Level of Service required under council's Asset Management Policy.

Many projects are **jointly** funded by more than one scheme and activity. Each scheme pays a pro-rata share only, equivalent to the number of connections.

### Discussion on Capital and Projects

Where relevant, Capital (Levels of Service) and Capital (Growth) projects have been included in the scheme financial details.

Levels of Service Projects and growth splits have been provided to ensure the costs of population driven works are clear.

<sup>15</sup> Where LoS refers to Level of Service and G refers to Growth

## 19.0 ROLLESTON WATER SUPPLY

### 19.1 Scheme Summary

| Description                                   |                                   | Quantity                       |
|-----------------------------------------------|-----------------------------------|--------------------------------|
| <b>Estimated Population Served</b>            |                                   | 15,400                         |
| <b>Scheme Coverage</b><br>(1 Jan 2018)        | Full Charges                      | 5451                           |
|                                               | Half Charges                      | 793                            |
|                                               | >1 Charges                        | 49 (1 restricted)              |
| <b>System Components</b>                      | Bores/Intakes (No.)               | 8                              |
|                                               | Treatment/Disinfection            | UV                             |
|                                               | Reservoirs (No.)                  | 2                              |
|                                               | Pump Stations (No.)               | 2                              |
|                                               | Piped (m)                         | 226,350.9                      |
| <b>History</b>                                | Original scheme installation date | 1960s                          |
| <b>Value (\$)</b>                             | Replacement Cost                  | \$37,548,865                   |
|                                               | Depreciated Replacement Cost      |                                |
| <b>Financial</b>                              | 2018/2019 Estimate                | \$632,000                      |
|                                               | Annual Expenditure cost           | 19.74%                         |
|                                               | % of total                        |                                |
| <b>Demand (m3)</b><br>(1 Jan – 31 Dec 2017)   | Average daily                     | 7,300                          |
|                                               | Peak daily                        | 18,480                         |
|                                               | Minimum daily                     | 3,641                          |
|                                               | Average daily per connection      | 1.3                            |
| <b>Type of Supply</b>                         |                                   | High pressure and unrestricted |
| <b>Target Pressure &amp; Flow at boundary</b> | Pressure                          | >310KPa                        |
|                                               | Flow                              | >20 Lts/min                    |
| <b>Sustainability</b>                         | Well Security                     | Secure                         |

### 19.2 Key Issues

The following key issues are associated with the Rolleston water supply. A list of district wide issues are located in 5Waters Activity Management Plan: Volume 1.

Table 19-1 Rolleston Scheme Issues

| What's the Problem                                                                                       | What we plan to do                                                                                                                                                                                                                                                                                |
|----------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Due to the significant growth of Rolleston, new wells are required to meet demand.                       | Council will continue to review the water infrastructure plan on an annual basis while considering actual and predicted growth. Infrastructure will be provided as and when required in consideration of the urban/industrial split. Detailed network modelling supports the infrastructure plan. |
| Due to the significant growth demand management is required to ensure demand is within consented limits. | Council will continue to monitor demand and employ demand management initiatives to ensure peak water consumption does not limit future growth. Demand management initiatives may include but are not limited to development of water zones for pressure management and public education.         |

### 19.3 Overview & History

Untreated groundwater is provided from five bores. Development of the water supply has been progressive to accommodate population growth and business development.

In 1961 the Canterbury Tractor Company installed a well to supply water to properties in the close vicinity. The Council purchased elements of the original supply in 1968 (excluding the original bore) and current water scheme developed over several decades with the George St bore drilled in 1971 and the Moore St bore in 1988.

In 1996 the town water supply reticulation was extended to serve the Plan Change 10 scheme area (designed for 4200 people). The extension included a total revamp of the low level pumping system with the inclusion of a deep well in Karangi Apple Orchard, decommission of reservoir at George Street and increasing operating pressure to 35m (50psi). The new scheme came into operation in June 1997. Universal metering has been in place since 1997.

Further development has included a major pump station (now the main control centre) in Izone Drive (2003), a major reservoir (2003), a new well (Izone Drive, 2004) and a new trunk main (2005/2006).

A water supply master plan has been developed to provide for the future needs of Rolleston as the town continues to grow. This planning work is ongoing. A programme of capital works has been developed to accommodate future needs. Further wells are planned with consents in place to allow this.

#### Rolleston Water Supply Extensions

The **Branthwaite Drive** water supply was connected to the Rolleston supply in 2014.

The **Burnham** water supply was connected to the Rolleston supply in July 2015. The Burnham system was installed by the Ministry of Defence as a result of a condition imposed by the then North Canterbury Catchment Board (now Environment Canterbury) on the water right issued for the disposal of treated sewage effluent from the Burnham Camp Oxidation Ponds.

The **Armack Drive** water supply was connected to the Rolleston supply in July 2017. The water supply for the subdivision was commissioned in 1985. The scheme was designed as a high pressure, unrestricted supply with "Fire Fighting Capacity". Water meters were installed in 1993 to help reduce peak water consumption and operating costs. Water usage prior to 1993 was extremely high (40,000m<sup>3</sup>/year) but with water meters installed this reduced to between 10,000 and 20,000 m<sup>3</sup>/year.



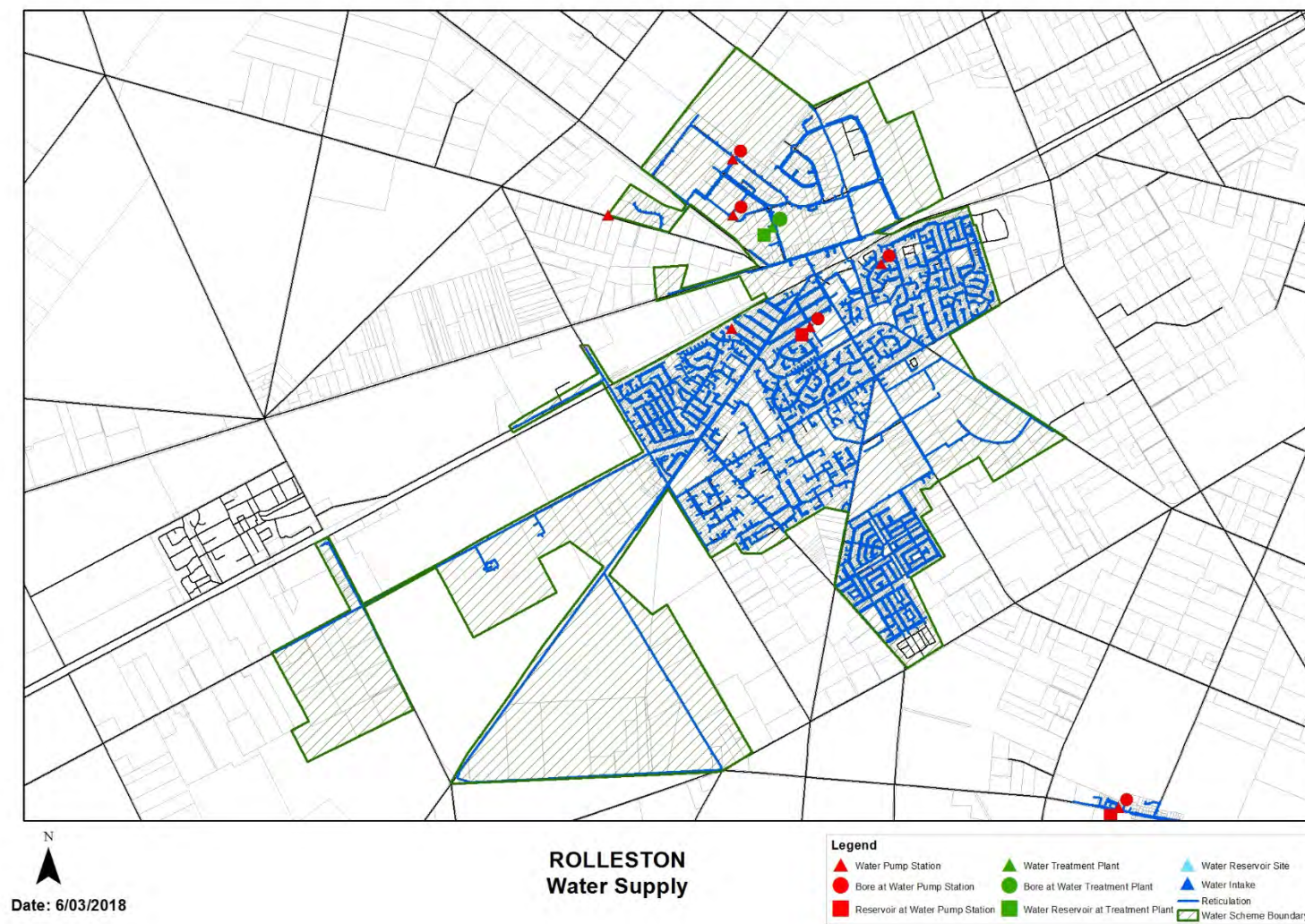
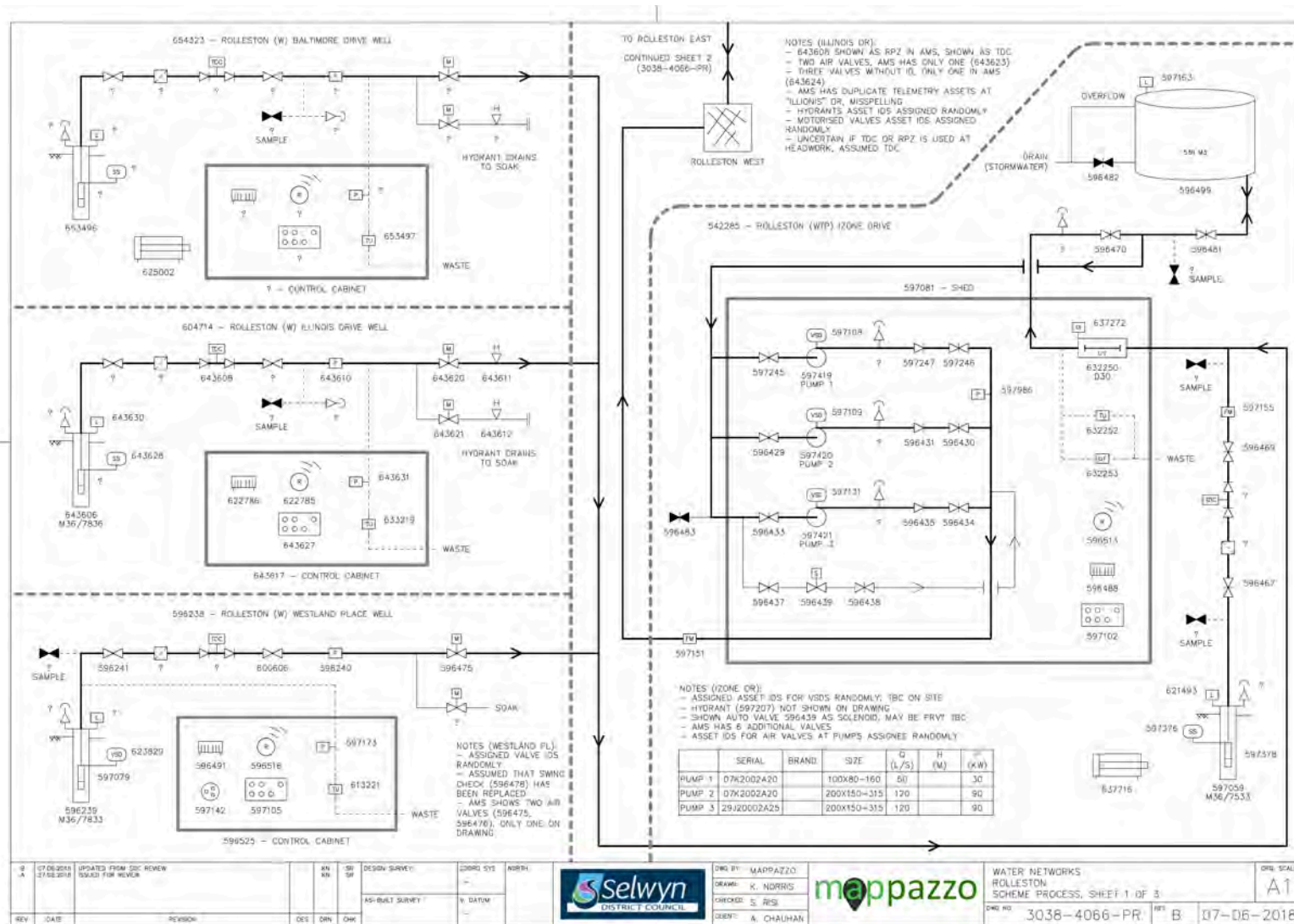


**Figure 19-1 Scheme Map**







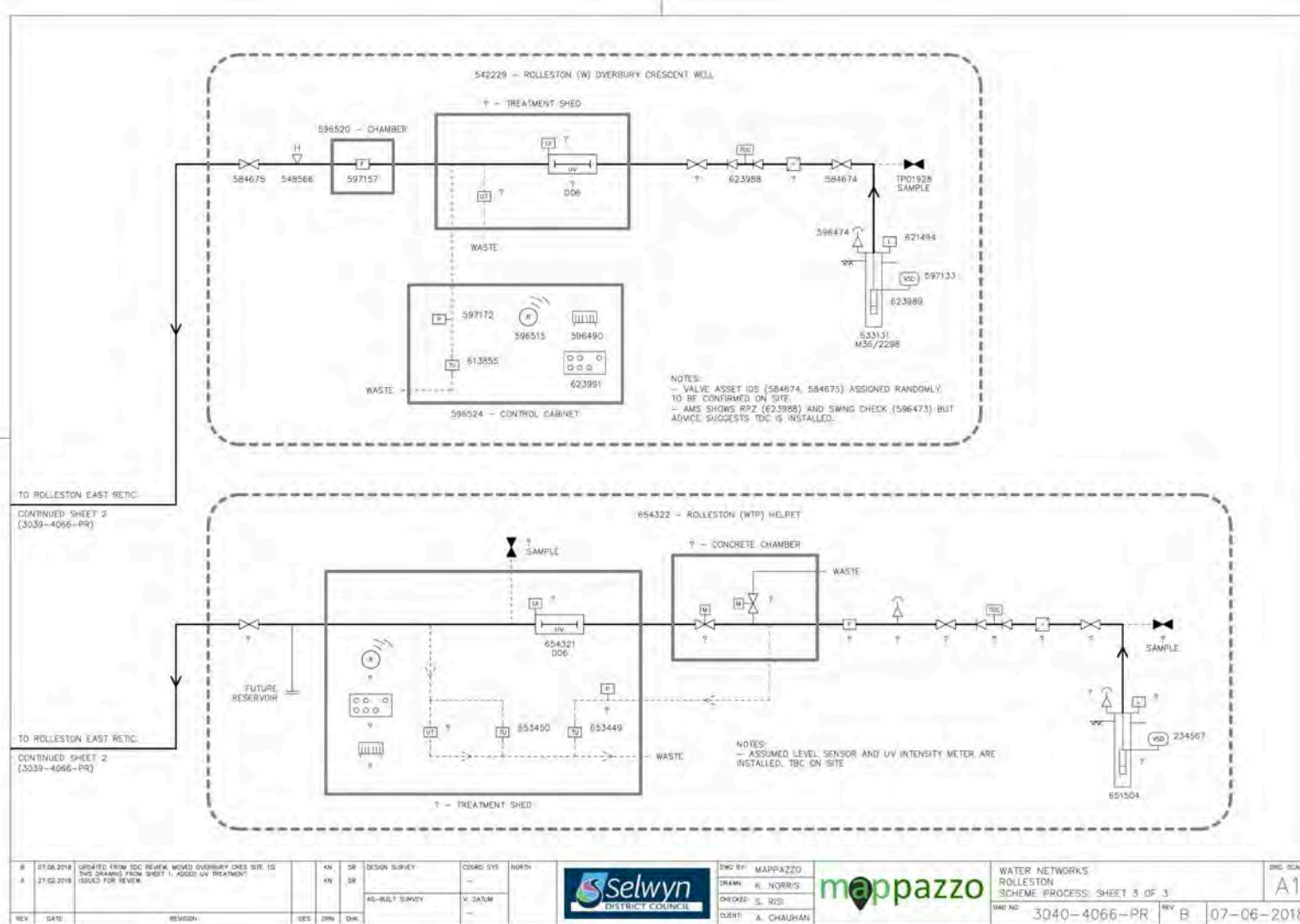


Figure 19-2 Scheme Schematic

## 19.4 System Capacity

In response to the accelerated growth within the Selwyn District hydraulic models have been used to plan future water infrastructure for a number of the water supplies. Hydraulic models have been built and calibrated to international best practice to carry out the '30-year Water Infrastructure Master Planning'.

The master planning provides an assessment of the sizing and timing of new infrastructure for new water sources (wells) and pipelines to service growth. Part of the master planning requires a water balance to be developed to forecast growth, using historical peak demand per household. The water balance forecasts the peak instantaneous flow per year versus the water resources available to determine the staging of new wells. The well staging assumes that one well is redundant for each water supply, to take into consideration maintenance of wells, planning/timing of new wells and security of supply i.e. to maintain average/peak demand.

Population projections are based on SDC 'Household Projections 2018 to 2048' and have been applied to the latest connection figures for each township.

Rolleston is currently experiencing rapid growth with a high number of sub-divisions recently established and a number of new developments set to start within the next 5 years. Figure 19-3 shows the projected growth for Rolleston to 2048 per planning horizon (5 years intervals) in accordance with the latest House Projections.

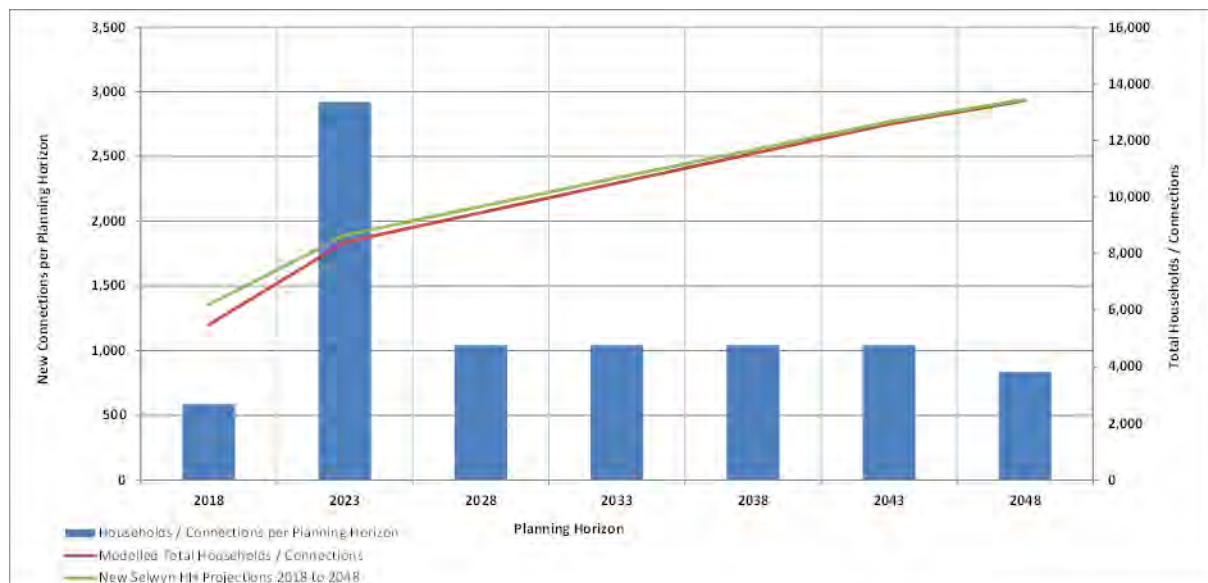


**Figure 19-3: Rolleston Household Projections**

The use of existing and additional reservoir storage in Rolleston in the future, depending on the capacity may reduce the total number of wells required and/or defer the timing of new wells

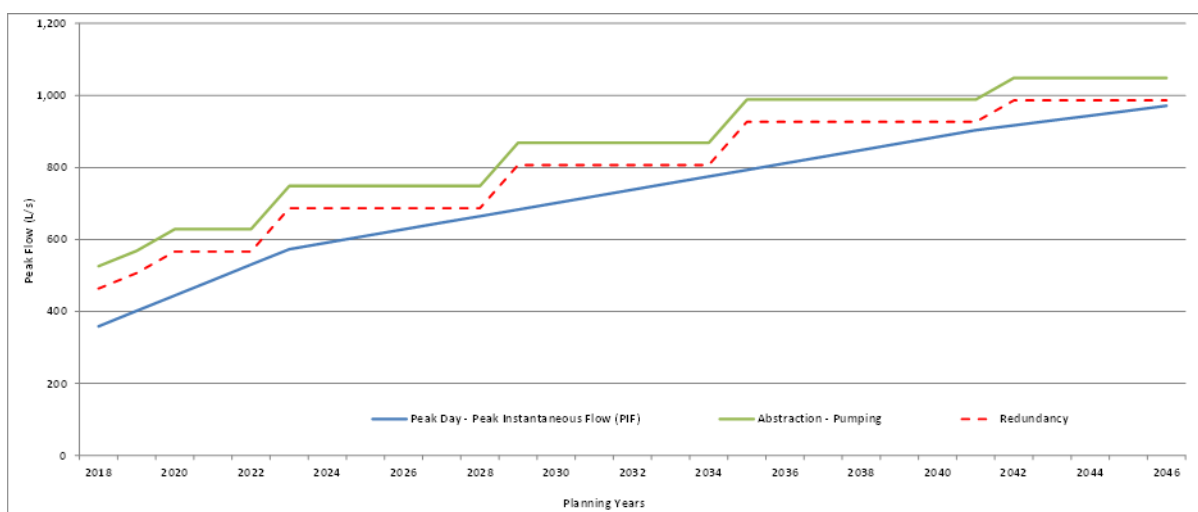


**Figure 19-4: Rolleston Water Demand**

**Table 19-2 Existing Water Source Capacity**

| Sites Available   | Well | Capacity (L/s) |
|-------------------|------|----------------|
| Izone             | 1    | 76             |
|                   | 2    | 55 (throttled) |
|                   | 3    | 60             |
| Moore St          | 1    | 55             |
|                   | 2    | 50             |
| Overbury Crescent | 1    | 42             |
| Helpet            | 1    | 60             |

Assumptions:

- Izone demand 115 ha @ 0.4 L/s = 46 L/s Design Flow
- Iport demand 178 ha @ 0.4 L/s = 71 L/s Design Flow

**Table 19-3 Future Water Source Capacity**

| New Site ID | Well / Site | Location                   | Year    | Yield (L/S) |
|-------------|-------------|----------------------------|---------|-------------|
| Roll1       | Well        | Izone 4                    | 2017/18 | 60          |
| Roll2       | Well        | Helpet Park 2              | 2018/19 | 60          |
| Roll3       | Well        | Decommission Overbury      | 2018    | -42         |
| Roll4       | Well        | Overbury 1 new well        | 2018/19 | 60          |
| Roll5       | Reservoir   | Moore St 500m <sup>3</sup> | 2019/20 | -           |
| Roll6       | Well        | Maddison 1                 | 2019/20 | 60          |
| Roll7       | Well        | Helpet Park 3              | 2020/21 | 60          |
| Roll8       | Well        | Iport 1                    | 2023/24 | 60          |
| Roll9       | Reservoir   | Iport 500m <sup>3</sup>    | 2023/24 | -           |



|        |           |                                |         |    |
|--------|-----------|--------------------------------|---------|----|
| Roll10 | Well      | Maddison 2                     | 2023/24 | 60 |
| Roll11 | Well      | Helpet Park 4                  | 2029/30 | 60 |
| Roll12 | Well      | Overbury 2 new well            | 2029/30 | 60 |
| Roll13 | Reservoir | Maddisons Rd 500m <sup>3</sup> | 2029/30 | -  |
| Roll14 | Well      | Iport 2                        | 2035/36 | 60 |
| Roll15 | Well      | Levi Rd 1                      | 2035/36 | 60 |
| Roll16 | Well      | Levi Rd 2                      | 2042/43 | 60 |
| Roll17 | Reservoir | Levi Rd 1000m <sup>3</sup>     | 2043    | -  |

## ROLLESTON MASTER PLANNING 2017 - 2048

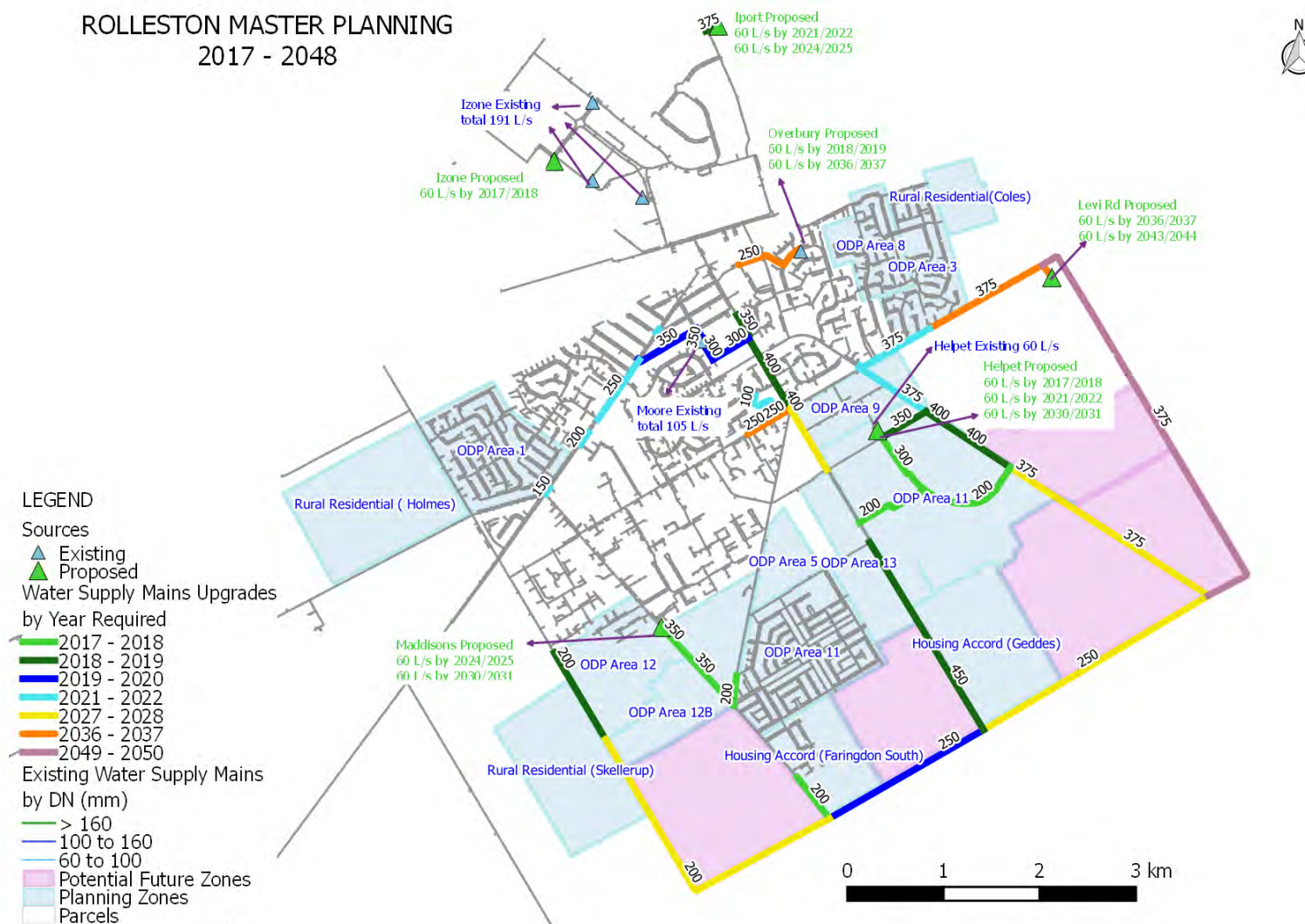


**Figure 19-5 Rolleston Master Plan**

### 19.4.1 Fire Fighting Capacity

Izone reservoir site designed for 130 years @ 100kPA for fire fighting.

## 19.5 Resource Consents

The Rolleston water supply has a number of resource consents. Table 19-4 shows the water take permitted by the resource consents for this scheme.

**Table 19-4 Resource Consents**

| Consent                      | Description                                                                          | Location                              | Date Issued | Expiry Date | Consented Max Instantaneous Flow (L/s) | Consented Max Daily Volume (m <sup>3</sup> /day) |
|------------------------------|--------------------------------------------------------------------------------------|---------------------------------------|-------------|-------------|----------------------------------------|--------------------------------------------------|
| CRC962217<br>(Issued-Active) | To take groundwater at or about map reference M36:5981-3441 for public water supply. | Moore Street, ROLLESTON               | 2-Sep-96    | 28-Aug-31   | 55.6                                   | 4800                                             |
| CRC172760<br>(Issued-Active) | To take and use groundwater.                                                         | Bracken Common, ROLLESTON             | 20-Feb-17   | 19-Jan-29   | 122.8                                  | (739,500 per year)                               |
| CRC160628<br>(Issued-Active) | To take and use groundwater.                                                         | George Street and Moore St, ROLLESTON | 26-Aug-02   | 31-Jan-35   | 119                                    | (246,240 per year)                               |
| CRC175045<br>(Issued-Active) | To replace bore.                                                                     | Izone Drive, ROLLESTON                | 13-Apr-17   | 2-Aug-40    | 300                                    | (4,445,700 per year)                             |

## 19.6 Water Quality

The Rolleston water supply has six wells, one is non-secure (Moore Street 2). The wells are sampled daily and the reticulation zone is sampled 23 times each month.

The following details E. coli transgressions for the period 2012 to 2017.

### Treatment

There have been ten E. coli treatment transgressions during this period.

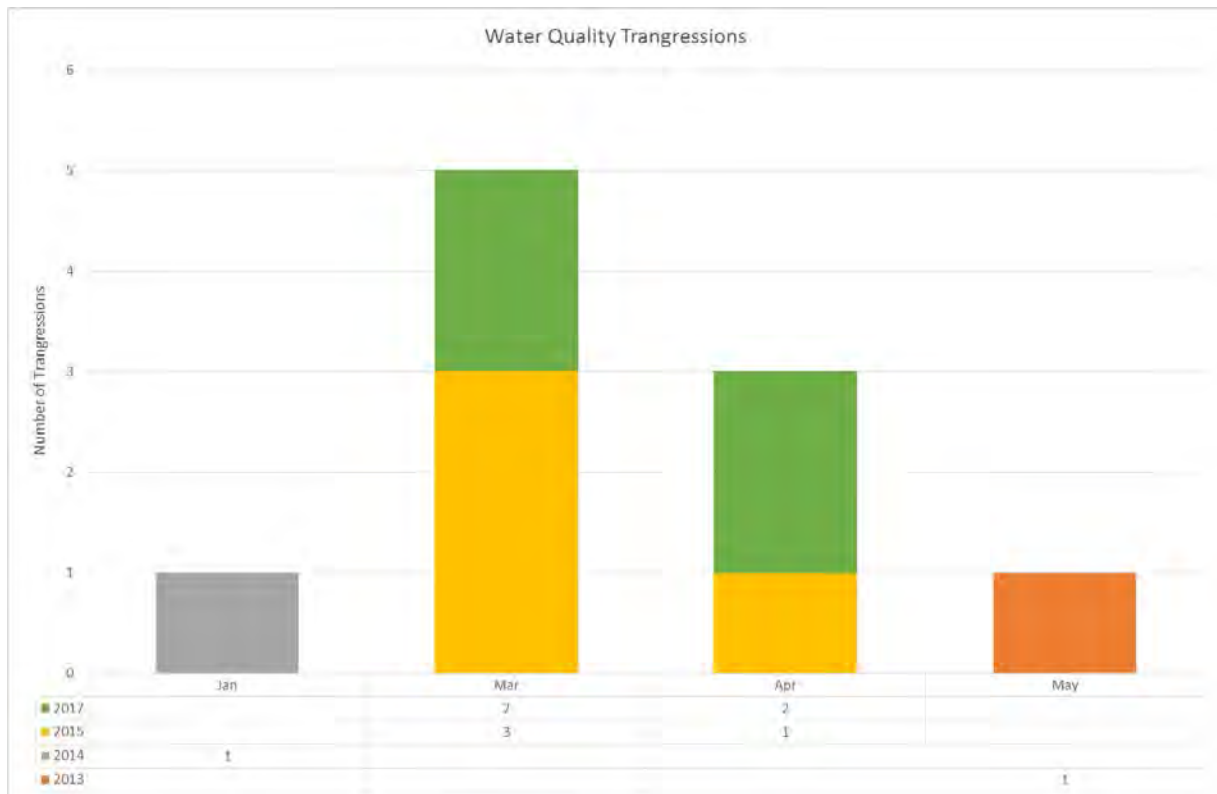


**Figure 19-6 E. coli Transgressions - Treatment**

### Zone

There have been four E. coli transgressions during this period.

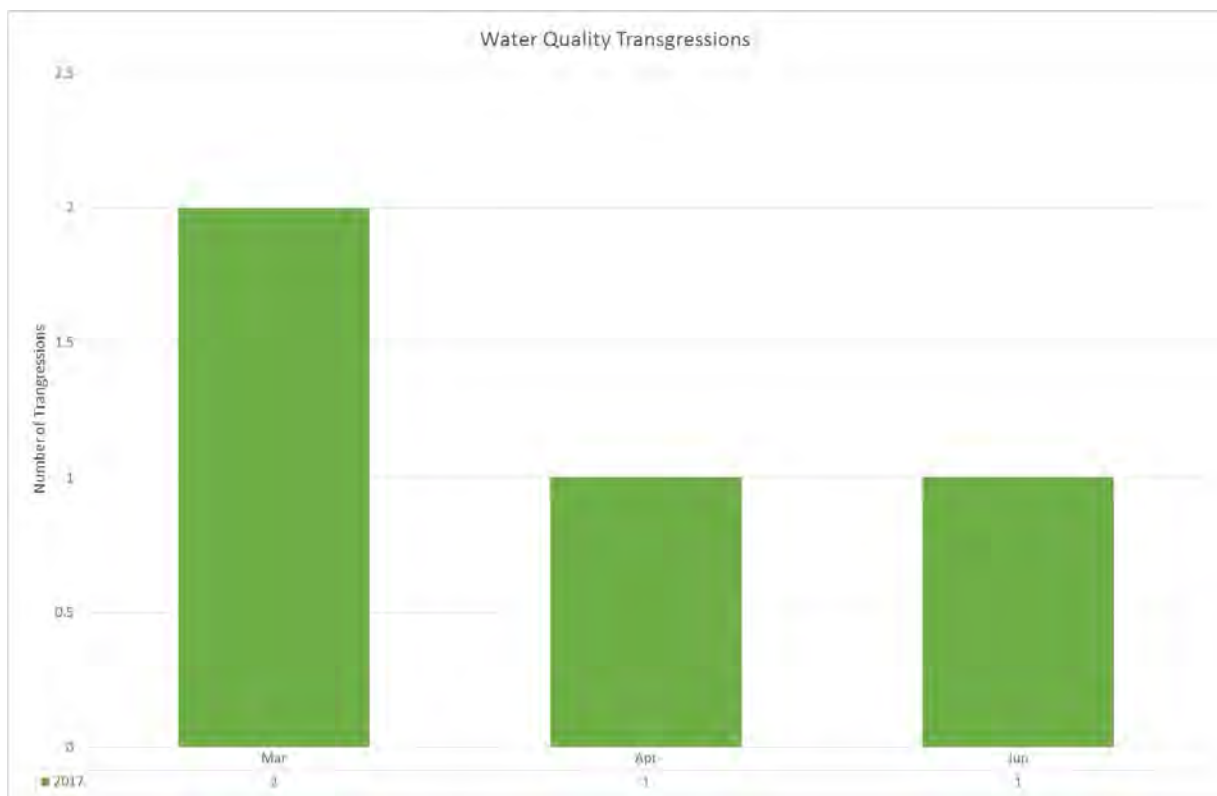


**Figure 19-7 E. coli Transgressions - Zone**

## Chemical Analysis

The following is a summary of the raw water chemical analysis carried out at the Rolleston Water Supply.

**Table 19-5 Rolleston Water Supply Raw Water Chemical Analysis Summary**

| Parameter (unit)                               | Standards<br>MAV* (GV)** | Plant <sup>1</sup><br>2017 | Plant <sup>2</sup><br>2015 | Plant <sup>2</sup><br>2017 | Plant <sup>3</sup><br>2015 | Plant <sup>3</sup><br>2013 | Status |
|------------------------------------------------|--------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|--------|
| Total Lead (g/m3)                              | 0.01                     | 0.001111                   | <0.00011                   | < 0.00011                  | 0.00017                    | < 0.00011                  | ✓      |
| pH (pH units)                                  | 7-8.5                    | 7.4                        | 7.9                        | 7.8                        | 7.9                        | 7.8                        | ✓      |
| Total Hardness<br>(g/m3 as CaCO <sub>3</sub> ) | <200                     | 71.5                       | 50                         | 47.3                       | 49                         | 46.8                       | ✓      |
| Total Calcium<br>(g/m3)                        | n/v                      | 21.29                      | 17                         | 16.10                      | 15.9                       | 15.29                      | ✓      |
| Total Iron (g/m3)                              | <0.2                     | 0.594                      | <0.021                     | < 0.021                    | <0.021                     | < 0.021                    | X      |
| Total Sodium<br>(g/m3)                         | <200                     | 14.24                      | 8.4                        | 8.25                       | 7.8                        | 7.94                       | ✓      |
| Nitrate - Nitrogen<br>(g/m3)                   | 11.3                     | 10.00                      | 2.6                        | 2.66                       | 1.33                       | 1.44                       | ✓      |

\* MAV – Maximum Acceptable Value

\*\* (GV) – Guideline Value

<sup>1</sup> Illinois Dr

<sup>2</sup> Izone Drive

<sup>3</sup> Moore Street 1

| Parameter                                      | Standards<br>MAV*<br>(GV)** | Plant <sup>1</sup><br>2015 | Plant <sup>1</sup><br>2017 | Plant <sup>2</sup><br>2015 | Plant <sup>2</sup><br>2017 | Plant <sup>3</sup><br>2017 | Status |
|------------------------------------------------|-----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|--------|
| Total Lead (g/m3)                              | 0.01                        | <0.00011                   | < 0.00011                  | 0.00036                    | < 0.00011                  | < 0.00011                  | ✓      |
| pH (pH units)                                  | 7-8.5                       | 7.8                        | 7.8                        | 7.8                        | 7.8                        | 7.8                        | ✓      |
| Total Hardness<br>(g/m3 as CaCO <sub>3</sub> ) | <200                        | 57                         | 56.1                       | 51                         | 47.9                       | 46.9                       | ✓      |
| Total Calcium<br>(g/m3)                        | n/v                         | 18.7                       | 18.71                      | 17.4                       | 16.26                      | 15.83                      | ✓      |
| Total Iron (g/m3)                              | <0.2                        | <0.021                     | < 0.021                    | 0.03                       | < 0.021                    | 0.028                      | ✓      |
| Total Sodium<br>(g/m3)                         | <200                        | 10.8                       | 10.89                      | 10.4                       | 8.04                       | 7.99                       | ✓      |

|                              |      |     |      |     |      |      |   |
|------------------------------|------|-----|------|-----|------|------|---|
| Nitrate - Nitrogen<br>(g/m3) | 11.3 | 3.8 | 4.00 | 3.7 | 2.73 | 1.78 | ✓ |
|------------------------------|------|-----|------|-----|------|------|---|

\* MAV – Maximum Acceptable Value

\*\* (GV) – Guideline Value

<sup>1</sup> Overbury Crescent

<sup>2</sup> Westland Place

<sup>3</sup> Moore Street 2

## 19.7 Scheme Assets

A summary of material and diameter for pipes in Figure 19-8 and Figure 19-9.

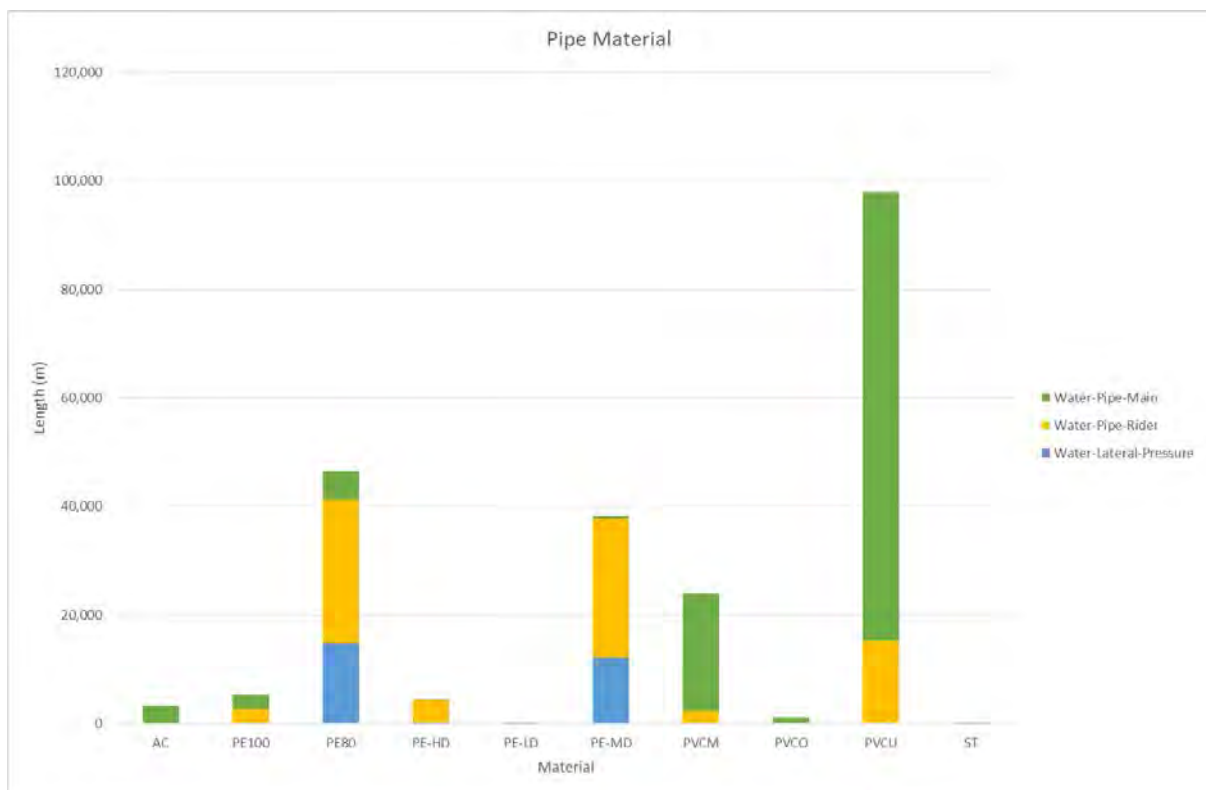


Figure 19-8 Pipe Material – Rolleston



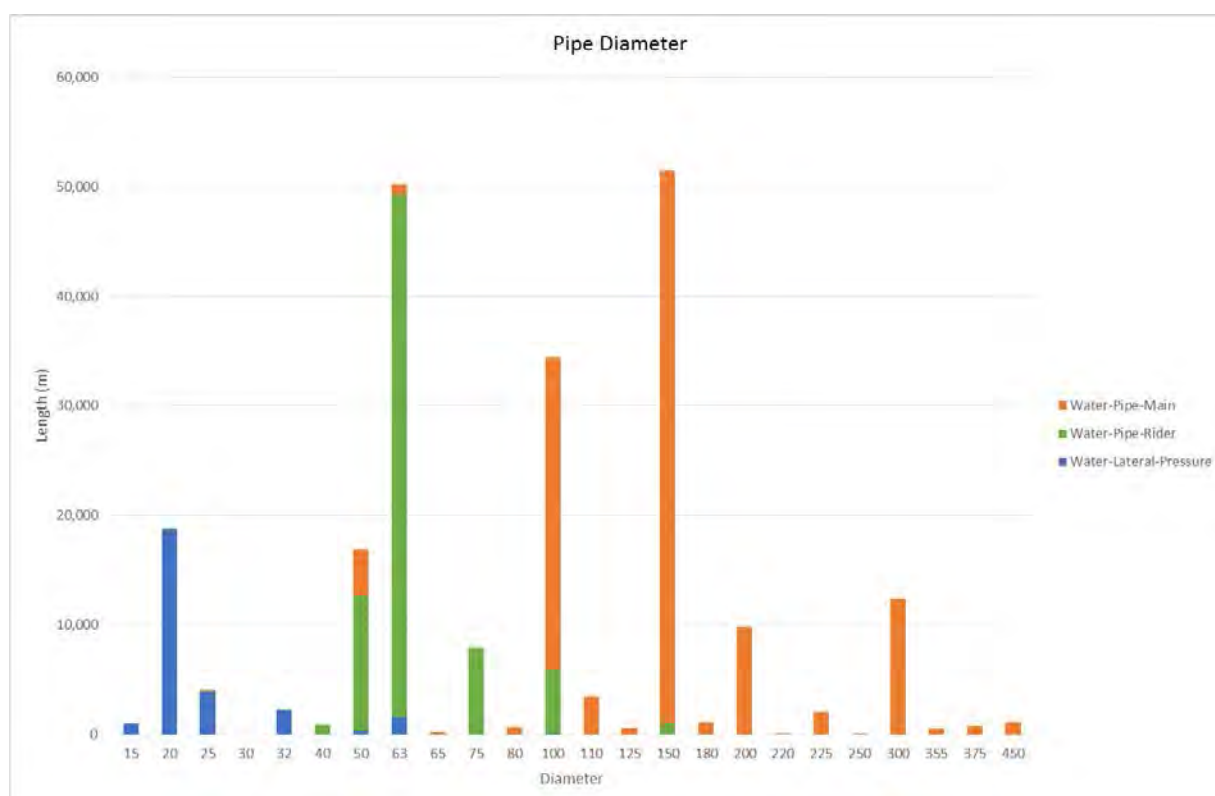


**Figure 19-9 Pipe Diameter – Rolleston**

## 19.8 Operational Management

The water supply is operated and maintained under two maintenance contracts as follows:

- Contract 1241: Water Services Contract. Contract is with SICON Ferguson who undertakes investigations, conditions inspections, proactive and reactive maintenance and minor asset renewals; and
- Contract 1202: Parks and Reserves Contract. Contract is with SICON Ferguson who undertakes the maintenance of land scape features related to water services e.g. mowing, gardens etc.

Water quality sampling is completed under an agreement with Food and Health Ltd as required.

## 19.9 Photos of Main Assets



**Photo 1: Westland Place Well**



**Photo 2: Overbury Cr**



**Photo 3: Izone treatment Shed**



**Photo 4: Izone UV**

## 19.10 Risk Assessment

A risk assessment has been undertaken for the Rolleston scheme. The key output from the risk assessment is the identification of any extreme and high risks which need to be mitigated. In order to mitigate these risks they have been included and budgeted for in the projects within this LTP. Table 19-6 outlines the risk priority rating, Table 19-7 outlines the risks and the list of key projects is found in Table 19-12.

**Table 19-6 Risk Priority Rating**

| Risk Score | Level of Risk | Risk Response                                                                                                                                                     |
|------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| > 50       | Extreme       | Awareness of the event to be reported to Council.<br>Urgent action to eliminate / mitigate / manage the risk.<br>Document risk and action in the AMP.             |
| 35-50      | Very High     | Risk to be eliminated / mitigated / managed through normal business planning processes with responsibility assigned.                                              |
| 14-35      | High          | Manage risk using routine procedures.                                                                                                                             |
| 3.5-14     | Moderate      | Monitor the risk.                                                                                                                                                 |
| < 3.5      | Low           | Awareness of the event to be reported to Council.<br>Immediate action required to eliminate / mitigate / manage the risk.<br>Document risk and action in the AMP. |

**Table 19-7 Risks – Rolleston**

| Risk                                                                          | Action/Project                                                                                                    | Year Identified | 2014 Risk Rating | 2017 Risk Rating | Residual Risk Rating |
|-------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|-----------------|------------------|------------------|----------------------|
| Risks associated with disused well                                            | Decommission George St Well                                                                                       | 2014            | 12               | 0.6              | 0.6                  |
| Inadequate turnover of Branthwaite Drive reservoir during times of low demand | Look at Branthwaite Drive reservoir turnover, if pump shed and reservoir is kept, install flush valve as required | 2014            | 20               | 1                | 1                    |
| Electrical failure due to lightning or network spikes                         | Install surge diverters                                                                                           | 2014            | 50               | 5                | 5                    |
| Failure to meet NES water meter standards                                     | NES Water Meter Compliance                                                                                        | 2014            | 20               | 6                | 6                    |
| Inability to collect income from non-metered properties                       | Install property water meters                                                                                     | 2014            | 45               | 0.6              | 0.6                  |
| Non-compliance with the DWSNZ                                                 | DWSNZ - Age Testing                                                                                               | 2014            | 50               | 0.7              | 0.7                  |
| Non-compliance with the DWSNZ                                                 | DWSNZ - Bore-head security                                                                                        | 2014            | 50               | 50               | 50                   |
| Non-consented activities                                                      | Renewal of consents                                                                                               | 2014            | 27               | 27               | 6                    |

The list of district wide risks can be found in 5Waters Activity Management Plan: Volume 1.

### 19.11 Asset Valuation Details

The total replacement value of assets within the Rolleston water scheme is \$37,548,865 with further details in Table 19-8 below.

**Table 19-8 Replacement Value, Rolleston**

| Asset Class 1              | Asset Class 2 | Sum of Replacement Value |
|----------------------------|---------------|--------------------------|
| <b>Plant and Equipment</b> |               | \$4,002,968              |
| <b>Water Reticulation</b>  | Fire          | \$8,369                  |
|                            | Hydrant       | \$1,737,026              |
|                            | Lateral       | \$1,279,430              |
|                            | Pipe          | \$23,659,424             |
|                            | Supply Point  | \$4,660,657              |
|                            | Valve         | \$2,200,992              |

Replacement values for these different types of assets are shown in Figure 19-10 below.

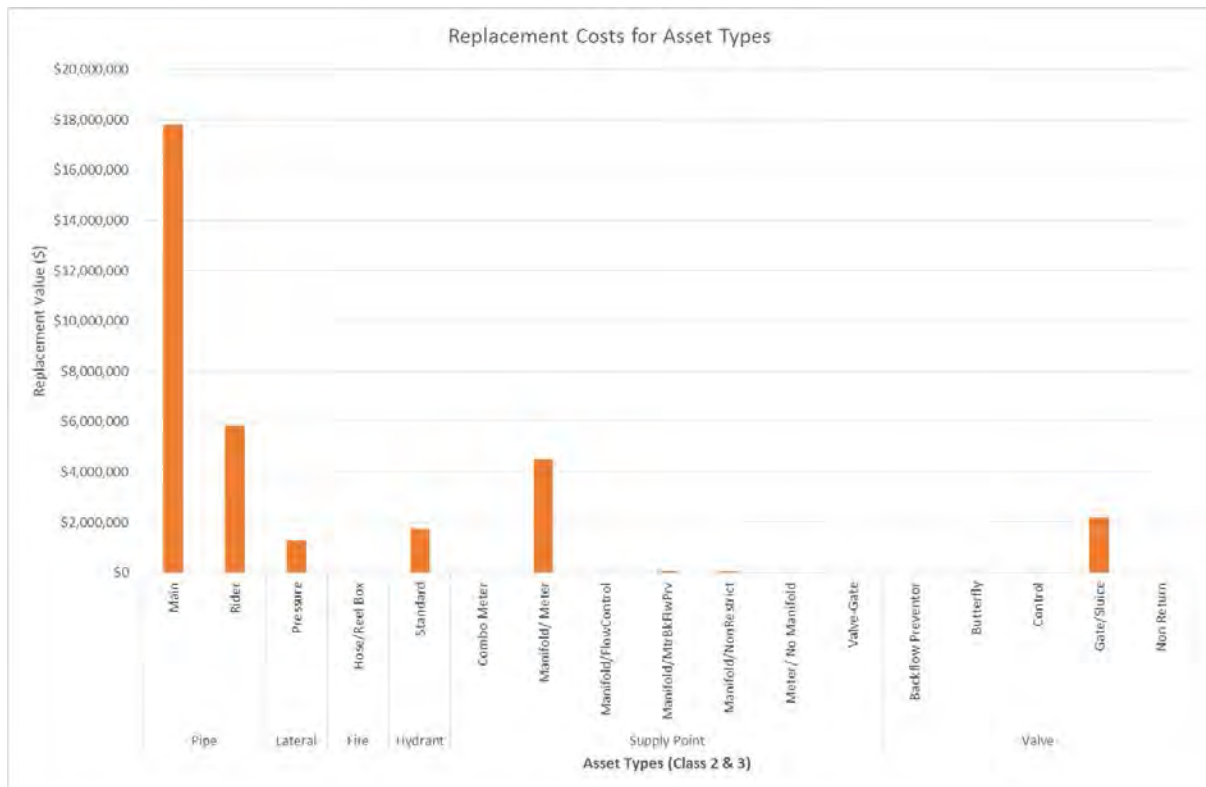


**Figure 19-10 Replacement Costs for Rolleston**

## 19.12 Renewals

The renewal profile has been taken from the 2017 5 Waters Valuation. A graph showing the renewals for this scheme are shown by Figure 19-11 below. The majority renewals occur in the first 15 years.

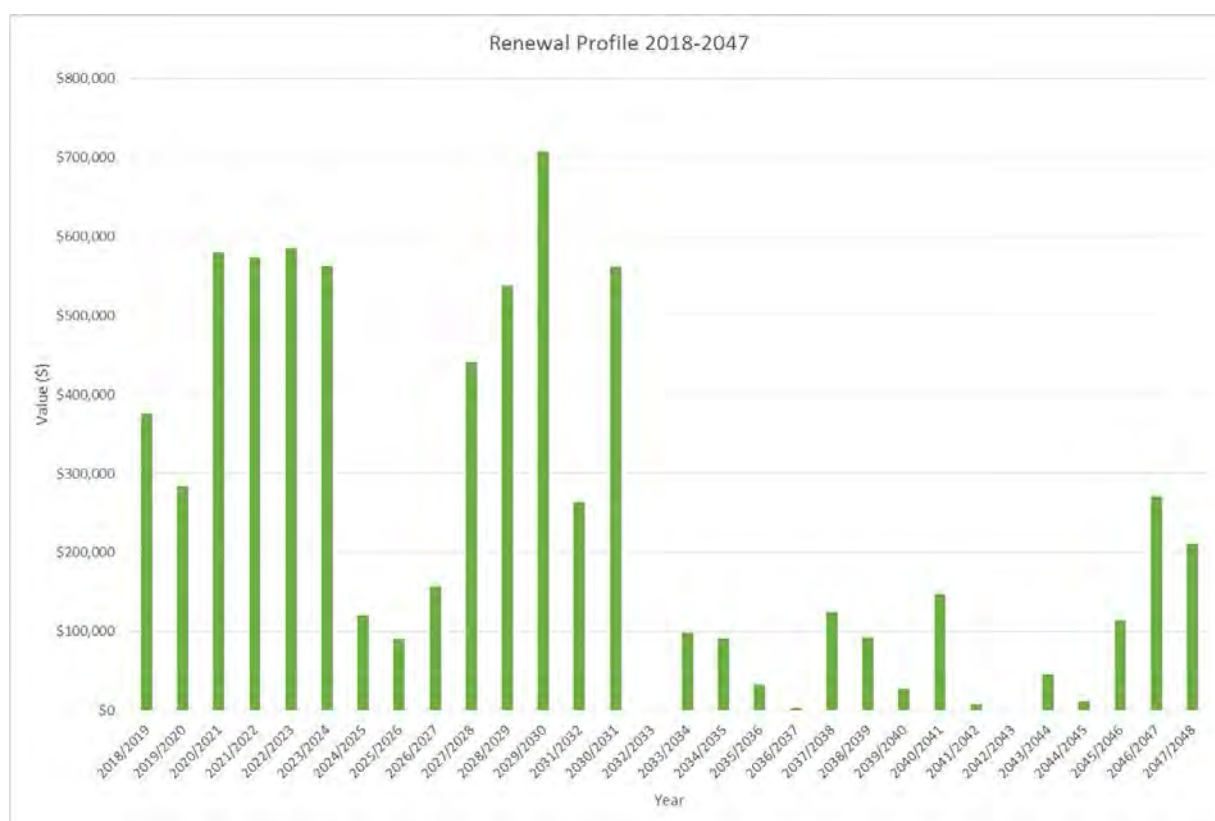


**Figure 19-11 Rolleston Water Renewal Profile**

### 19.13 Critical Assets

The criticality model for Rolleston has been updated for the 2018 AcMP. The methodology of the criticality model can be found in 5Waters Activity Management Plan: Volume 1 and it provides details of how the criticality has been calculated for the reticulation assets. Table 19-9 and Figure 19-12 below shows the calculated criticality for all of the assets within this scheme that have a recorded known length.

**Table 19-9 Length of Assets per Criticality Level**

| Criticality Bands |             | Length (m) |
|-------------------|-------------|------------|
| 5                 | Low         | 160,400    |
| 4                 | Medium-Low  | 40,684     |
| 3                 | Medium      | 47,377     |
| 2                 | Medium-High | 27,236     |
| 1                 | High        | 4,456      |



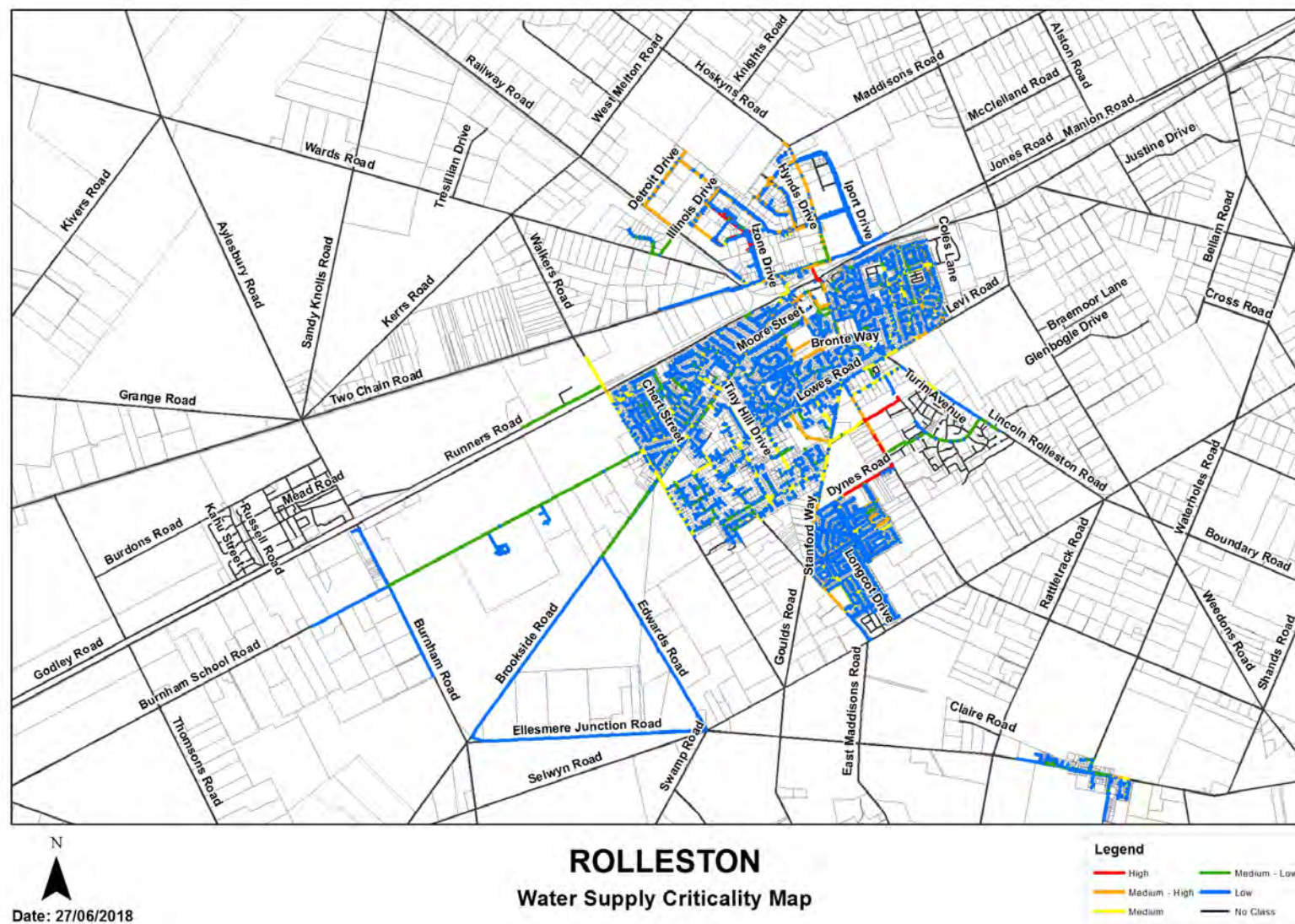


Figure 19-12 Criticality Map



## 19.14 Asset Condition

The asset condition model was run for Rolleston in 2017. The methodology of the model can be found in 5Waters Activity Management Plan: Volume 1 which provides details of how the model has been calculated for the pipe reticulation assets. Figure 19-13 below shows the level of asset condition for these assets within this scheme that have a recorded known condition.

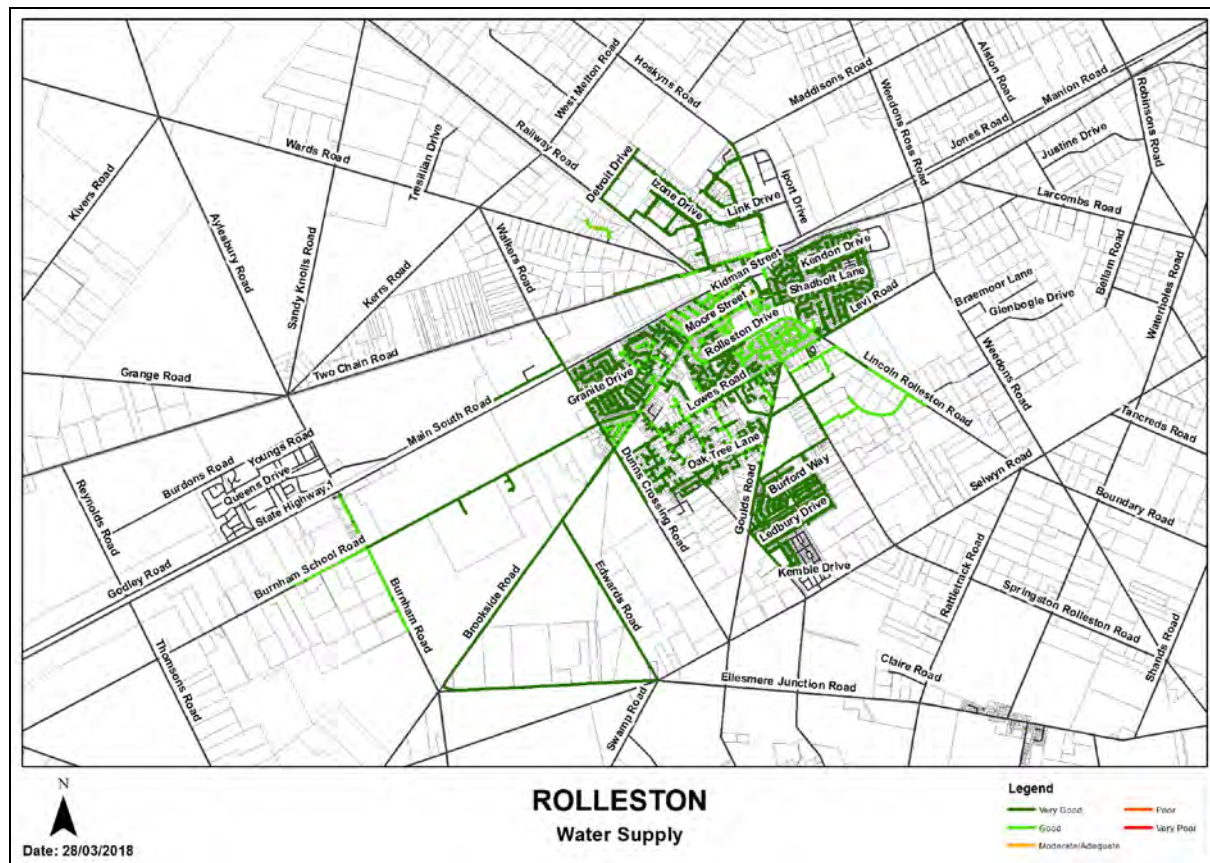


**Figure 19-13 Asset Condition – Rolleston**

Table 19-10 provides a description of the condition rating used within the condition model.

**Table 19-10 Asset Condition Grading**

| Condition Rating | Grading   |
|------------------|-----------|
| 1.0              | Excellent |
| 2.0              | Good      |
| 3.0              | Moderate  |
| 4.0              | Poor      |
| 5.0+             | Fail      |

The number of pipe faults is also measured through the asset management system. Figure 19-14 shows the known historic pipe failures within this scheme.



**Figure 19-14 Pipe Faults, Rolleston**

### 19.15 Funding Program

The 10 year budgets for Rolleston are shown by Table 19-11 and Figure 19-15. Budgets are split into expenditure, renewals, projects and capital projects.

All figures are (\$) not adjusted for CPI “inflation”. They are calculated on historical data, and population growth where relevant.

**Table 19-11 Rolleston Budget Summary**

| Years     | Expenditure | Renewals  | Projects  | Capital Projects |
|-----------|-------------|-----------|-----------|------------------|
| 2018/2019 | \$632,000   | \$375,306 |           | \$2,662,667      |
| 2019/2020 | \$657,715   | \$284,950 |           | \$1,899,000      |
| 2020/2021 | \$683,071   | \$579,272 |           | \$777,000        |
| 2021/2022 | \$708,122   | \$573,665 |           | \$770,000        |
| 2022/2023 | \$732,906   | \$585,380 |           | \$30,000         |
| 2023/2024 | \$741,772   | \$563,400 | \$200,000 | \$1,467,000      |

|           |             |             |           |             |
|-----------|-------------|-------------|-----------|-------------|
| 2024/2025 | \$750,611   | \$120,371   |           |             |
| 2025/2026 | \$759,422   | \$91,117    |           |             |
| 2026/2027 | \$768,208   | \$157,744   |           |             |
| 2027/2028 | \$776,970   | \$441,410   |           | \$2,081,500 |
| Total     | \$7,210,796 | \$3,772,615 | \$200,000 | \$9,687,167 |

An explanation of the categories within the budgets are as follows below:

- Expenditure consists of operation and maintenance costs;
- Renewals are replacement of assets which are nearing or exceeded their useful life;
- Projects are investigations, decisions and planning activities which exclude capital works; and
- Capital projects are activities involving physical works.

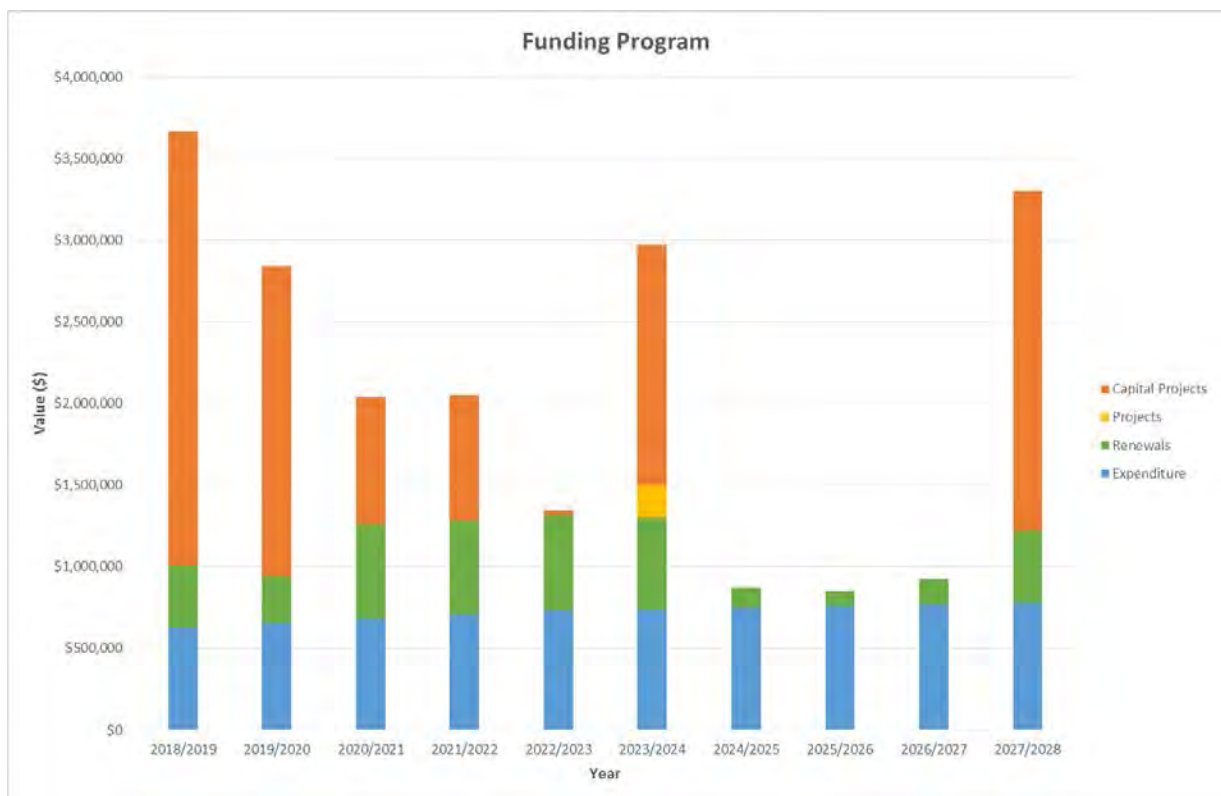


**Figure 19-15 Rolleston Funding Summary**

There are four major projects for Rolleston water scheme in the LTP budget.

**Table 19-12 Key Projects**

| Account Label    | GL        | Description                             | Year 1 (\$) | Year 2 (\$) | Year 3 (\$) | Years 4 to 10 | Funding Split <sup>16</sup> |
|------------------|-----------|-----------------------------------------|-------------|-------------|-------------|---------------|-----------------------------|
| Projects         | 4066050   | Design water reservoir and pump station |             |             |             | \$200,000     | 100% G                      |
| Capital Projects | 406690002 | Water Supply Extension                  | \$2,048,000 | \$502,000   |             | \$2,851,500   | 100% G                      |
| Capital Projects | 406690058 | Rolleston Water Source Improve          |             | \$670,000   |             | \$670,000     | 100% G                      |
| Capital Projects | 406690059 | Rolleston Water Source Improve          | \$614,667   | \$727,000   | \$777,000   | \$827,000     | 100% G                      |

The list of district wide projects can be found in 5Waters Activity Management Plan: Volume 1.

### Discussion on Projects

Projects have been determined based on their:

- Relevance to the scheme
- Requirement to be completed under legislation
- Ability to bring the scheme up to or maintain the Level of Service required under council's Asset Management Policy.

Many projects are **jointly** funded by more than one scheme and activity. Each scheme pays a pro-rata share only, equivalent to the number of connections.

### Discussion on Capital and Projects

Where relevant, Capital (Levels of Service) and Capital (Growth) projects have been included in the scheme financial details.

Levels of Service Projects and growth splits have been provided to ensure the costs of population driven works are clear.

<sup>16</sup> Where LoS refers to Level of Service and G refers to Growth

## 20.0 SHEFFIELD/WADDINGTON WATER SUPPLY

### 20.1 Scheme Summary

| Description                                   |                                   | Quantity                                       |
|-----------------------------------------------|-----------------------------------|------------------------------------------------|
| <b>Estimated Population Served</b>            |                                   | 574                                            |
| <b>Scheme Coverage</b><br>(1 Jan 2018)        | Full Charges                      | 157                                            |
|                                               | Half Charges                      | 4                                              |
|                                               | >1 Charges                        | 48 (46 restricted)                             |
| <b>System Components</b>                      | Bores/Intakes (No.)               | 2                                              |
|                                               | Treatment/Disinfection            | UV                                             |
|                                               | Reservoirs (No.)                  | 1                                              |
|                                               | Pump Stations (No.)               | 0                                              |
|                                               | Piped (m)                         | 40,607.95                                      |
| <b>History</b>                                | Original scheme installation date | 1990                                           |
| <b>Value (\$)</b>                             | Replacement Cost                  | \$3,765,997.10                                 |
|                                               | Depreciated Replacement Cost      | \$2,623,842.20                                 |
| <b>Financial</b>                              | 2018/2019 Estimate                | 101,550                                        |
|                                               | Annual maintenance cost           | 3.17%                                          |
|                                               | % of total                        |                                                |
| <b>Demand (m3)</b><br>(1 Jan – 31 Dec 2017)   | Average daily                     | 310                                            |
|                                               | Peak daily                        | 726                                            |
|                                               | Minimum daily                     | 160                                            |
|                                               | Average daily per connection      | 1.97                                           |
| <b>Type of Supply</b>                         |                                   | High pressure with restricted and unrestricted |
| <b>Target Pressure &amp; Flow at boundary</b> | Pressure                          | >310kPa (150kPa restricted)                    |
|                                               | Flow                              | >20L/min (±10% maric restricted)               |
| <b>Sustainability</b>                         | Well Security                     | Unsecure                                       |

### 20.2 Key Issues

The following key issues are associated with the Sheffield/Waddington water supply. A list of district wide issues are located in 5Waters Activity Management Plan: Volume 1.



**Table 20-1 Sheffield/Waddington Scheme Issues**

| What's the Problem                                                                                      | What we plan to do                                                                                                                     |
|---------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| Required infrastructure upgrades include pump upgrades, mains duplication and treatment plant upgrades. | Council confirm its renewal programme and align renewals with required upgrades to ensure efficiencies prior to undertaking the works. |

### 20.3 Overview & History

Sheffield/Waddington townships were the last major townships in the Malvern County Council to be reticulated. Previously household water was obtained by either the use of stock water races, shallow wells or rain water tanks that were subject to contamination.

Sheffield/Waddington water supply provides treated surface water from two shallow wells located in Hawkins River gravels (adjacent to Hawkins River) to properties located in both the Sheffield and Waddington townships. The water is treated by UV disinfection.

The scheme was installed in 1990 as an unrestricted water supply with full “Fire Fighting Capacity” at the time. Extensions to the scheme into the rural area occurred in 1994 and 1996. These extensions were only for domestic use and are restricted to 2m<sup>3</sup> per day.

#### ***CPW shared water use agreement.***

The Council’s Long Term Plan 2015-2025 identifies one of the major projects to be the Council’s commitment to ‘work with Central Plains Water to develop a concept for converting the Kowai River sourced water race network (part of the Malvern Water Race Scheme) into a combined water race and irrigation network. This concept will then be used for further consultation with the community.

The Council entered into agreement with CPW on 16th December 2016. The philosophy of the Agreement is to achieve a mutually beneficial cost neutral position. While the Scheme will benefit from a potential 200l/s of reliable water for irrigation, the added value the Scheme will provide to the community includes providing a robust and secure long term piped water supply to both the Sheffield and Springfield drinking water treatment stations. Which, from a water quality perspective enables the Council to avoid use of shallow groundwater during periods of high turbidity in adjoining rivers, or as required for capacity augmentation; and providing the necessary water quantity to support future township expansion. In addition, a piped stock water supply to shareholders and non-shareholders will ensure this historical network is upgraded to a high quality, efficient utility.



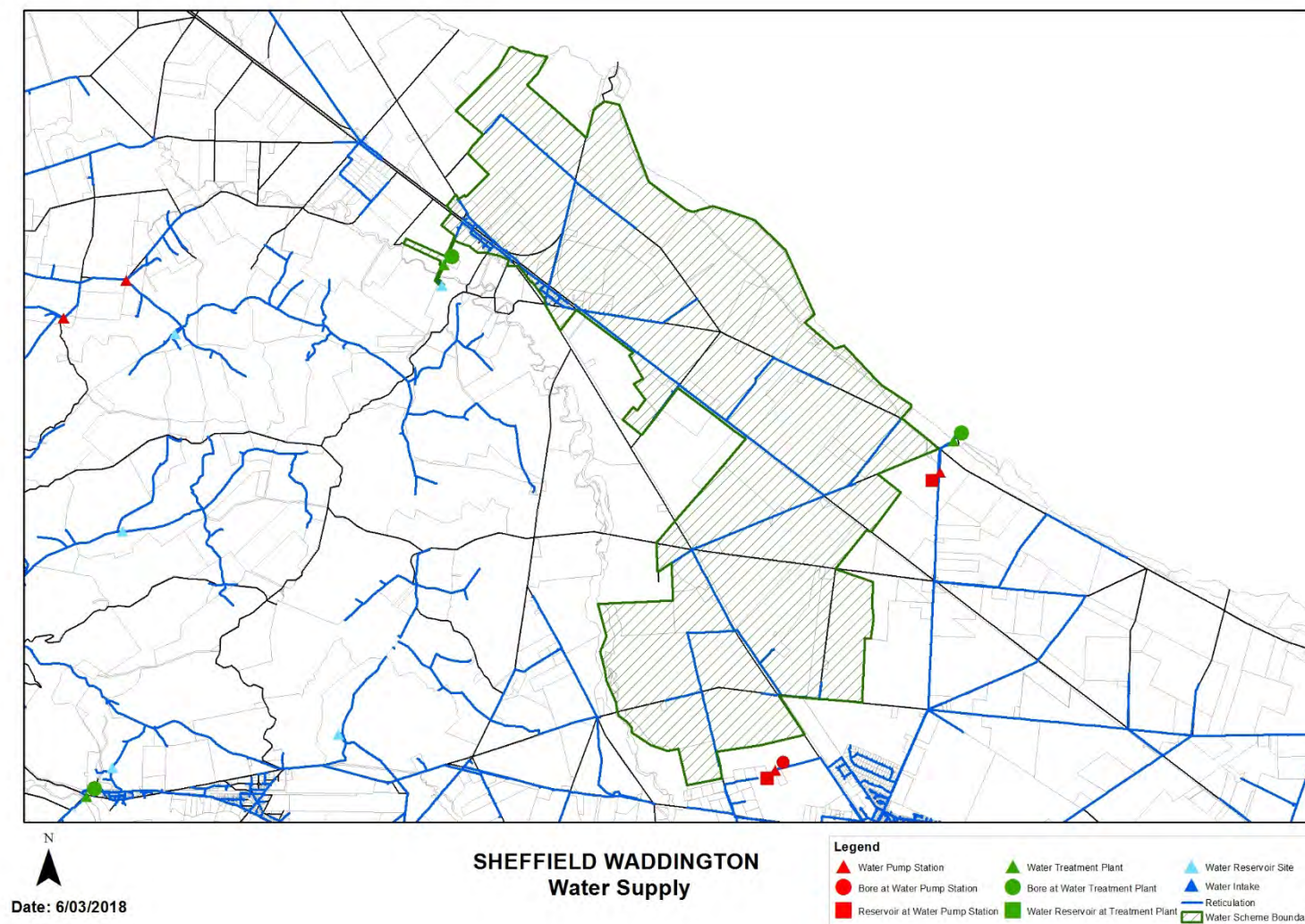


**Figure 20-1 Scheme Map**

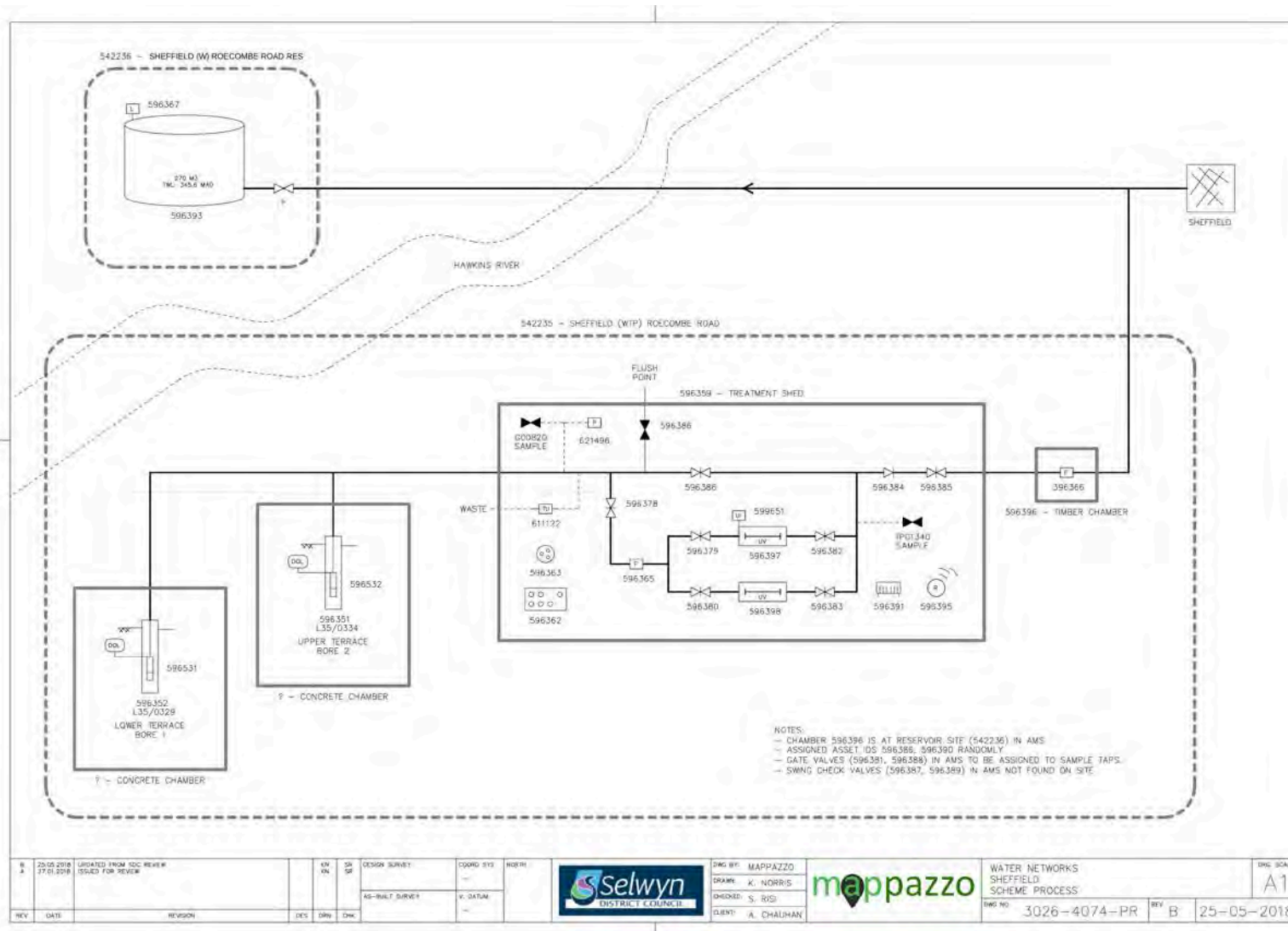


Figure 20-2 Scheme Schematic

## 20.4 System Capacity

This water supply was designed as an unrestricted supply but later extensions into the rural area were provided for domestic use and are restricted to 2m<sup>3</sup>/day.

**Table 20-2 Capacity Summary**

|                      | Flow Rate<br>(L/s) | Daily Volume<br>(m <sup>3</sup> ) | Annual Volume<br>(m <sup>3</sup> ) | Comments           |
|----------------------|--------------------|-----------------------------------|------------------------------------|--------------------|
| Abstraction Capacity | 12.5               | 1080                              | -                                  | Two bore pumps     |
| Treatment Capacity   | >= abstraction     | -                                 | -                                  | UV due for renewal |
| Consented Take       | 11.7               | 1010                              | 245,430                            | CRC010898          |
| Peak Demand          | 15 (typical)       | 726*                              | 118,000                            |                    |
| * 1 March 2015       |                    |                                   |                                    |                    |

## 20.5 Resource Consents

The Sheffield/Waddington water supply has a number of resource consents. Table 20-3 shows the water take permitted by the resource consents for this scheme.

**Table 20-3 Resource Consents**

| Consent                        | Description                 | Location                 | Date Issued | Expiry Date | Consented Max Instantaneous Flow (L/s) | Consented Max Daily Volume (m <sup>3</sup> /day) |
|--------------------------------|-----------------------------|--------------------------|-------------|-------------|----------------------------------------|--------------------------------------------------|
| CRC173786<br>(Issued – Active) | To take and use groundwater | Roecombe Road, SHEFFIELD | 7-Feb-17    | 4-May-36    | 11.7                                   | 1010                                             |

## 20.6 Water Quality

The Sheffield/Waddington supply is a non-secure source which is currently sampled twice weekly at the source, treatment plant and weekly in the reticulation zone.

The following details E. coli transgressions for the period 2012 to 2017.

### Source

There have been 67 E. coli source transgressions during this period.

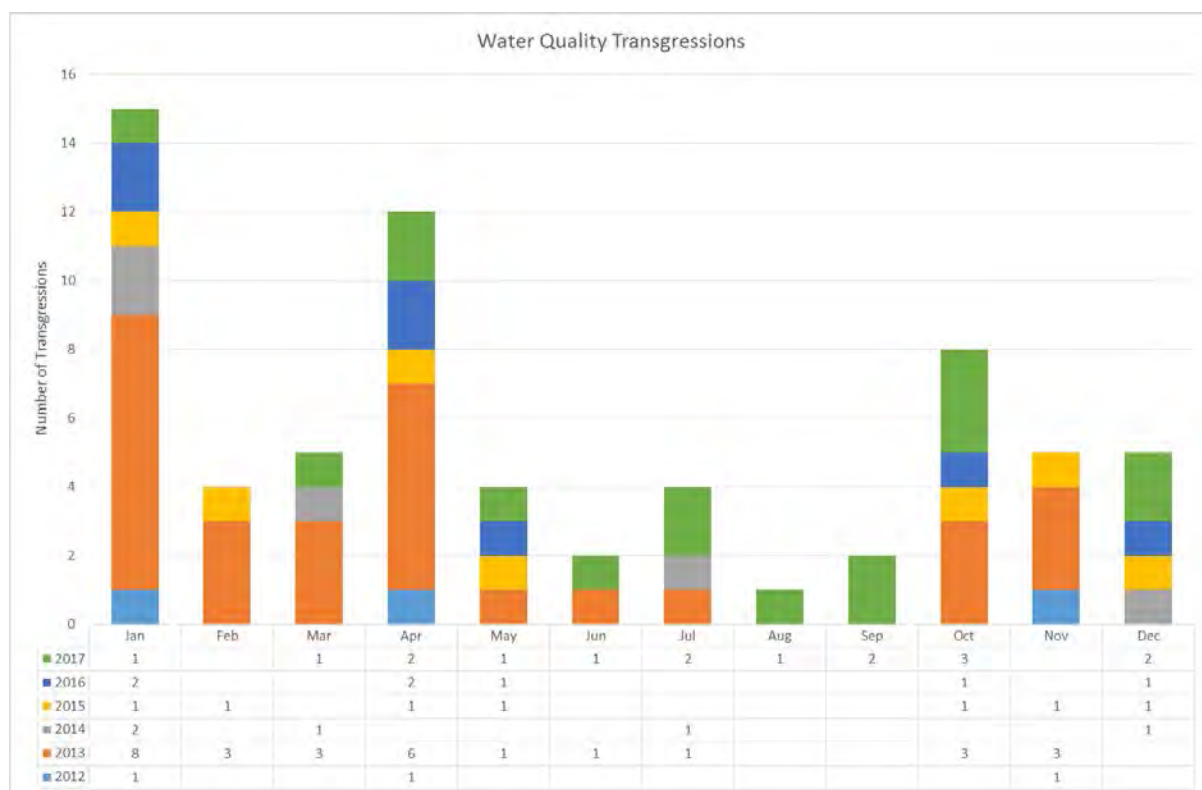


**Figure 20-3 E. coli Transgressions - Source**

#### Treatment

There has been one E. coli treatment transgression during this period which occurred in August 2012.

#### Zone

There has been six E. coli Zone transgression during this period.

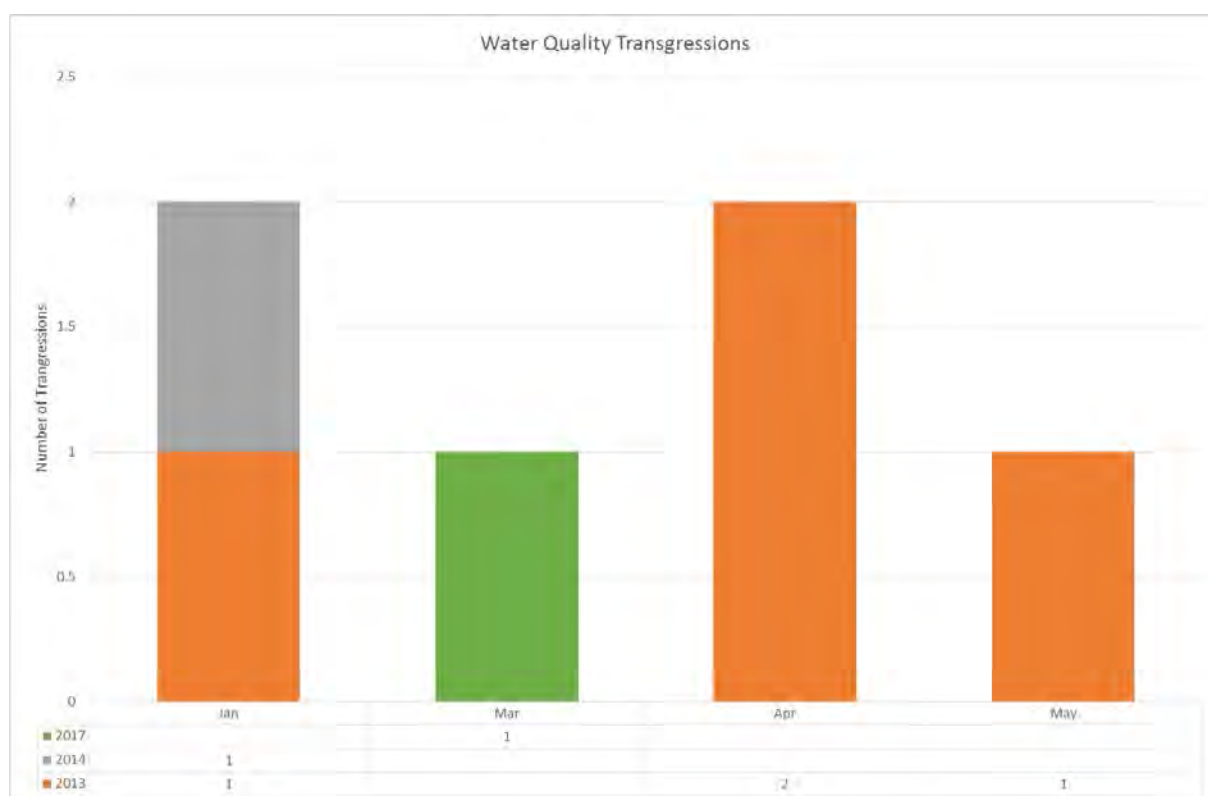


**Figure 20-4 E. coli transgression – Reticulation Zone**

### Chemical Analysis

The following is a summary of the raw water chemical analysis carried out at the Sheffield/Waddington Water Supply.

**Table 20-4 Sheffield/Waddington Water Supply Raw Water Chemical Analysis Summary**

| Parameter                                   | Standards<br>MAV* (GV)** | Plant<br>2015 | Plant<br>2017 | Status |
|---------------------------------------------|--------------------------|---------------|---------------|--------|
| Total Lead (g/m3)                           | 0.01                     | 0.00025       | 0.001670      | ✓      |
| pH (pH units)                               | 7-8.5                    | 7.2           | 7.0           | ✓      |
| Total Hardness (g/m3 as CaCO <sub>3</sub> ) | <200                     | 52            | 45.2          | ✓      |
| Total Calcium (g/m3)                        | n/v                      | 13.1          | 11.70         | ✓      |
| Total Iron (g/m3)                           | <0.2                     | <0.021        | < 0.021       | ✓      |
| Total Sodium (g/m3)                         | <200                     | 8.7           | 7.89          | ✓      |
| Nitrate - Nitrogen (g/m3)                   | 11.3                     | 3             | 2.9           | ✓      |

\* MAV – Maximum Acceptable Value

\*\* (GV) – Guideline Value

## 20.7 Scheme Assets

A summary of material and diameter for pipes in Sheffield/Waddington is shown below in Figure 20-5 and Figure 20-6.

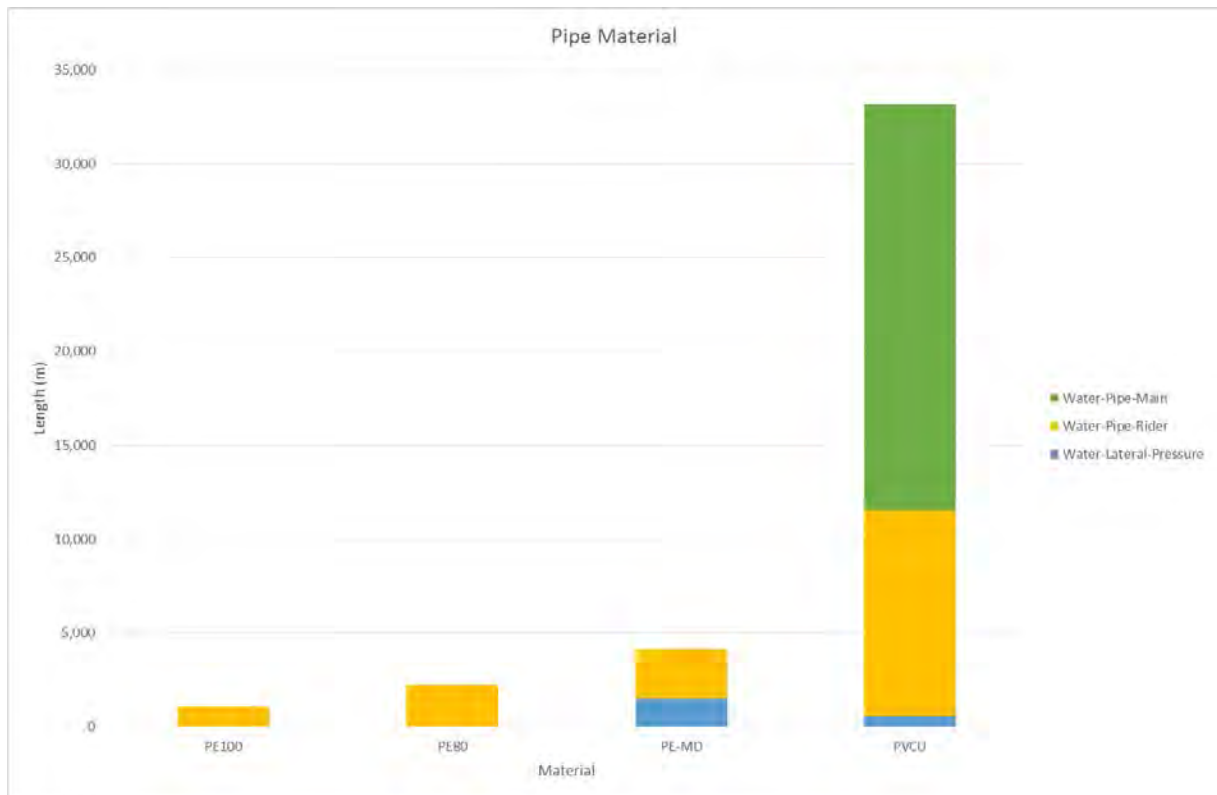


Figure 20-5 Pipe Material – Sheffield/Waddington

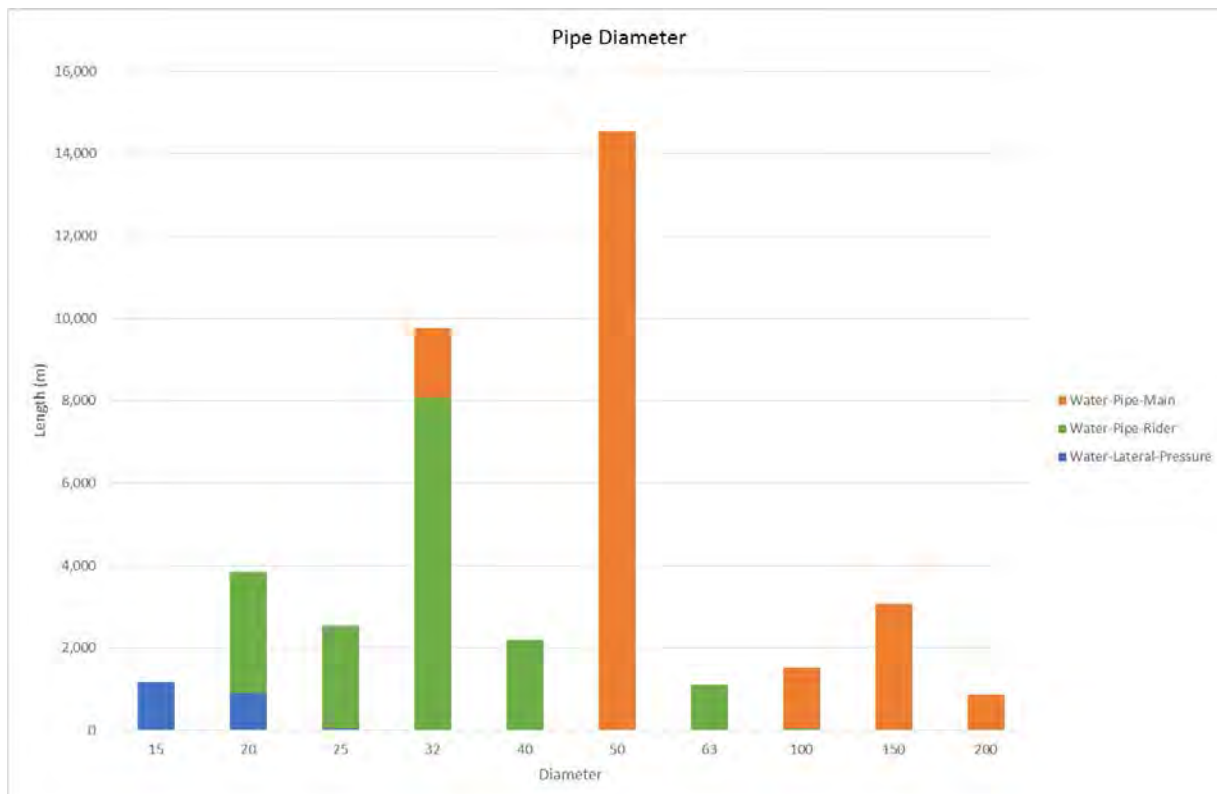




**Figure 20-6 Pipe Diameter – Sheffield/Waddington**

## 20.8 Operational Management

The water supply is operated and maintained under two maintenance contracts as follows:

- Contract 1241: Water Services Contract. Contract is with SICON Ferguson who undertakes investigations, conditions inspections, proactive and reactive maintenance and minor asset renewals; and
- Contract 1202: Parks and Reserves Contract. Contract is with SICON Ferguson who undertakes the maintenance of land scape features related to water services e.g. mowing, gardens etc.

Water quality sampling is completed under an agreement with Food and Health Ltd as required.

## 20.9 Photos of Main Assets



**Photo 1: Well No. 2 (typical of both wells) with Reservoir on hill in background (Well No. 1 further along road)**

## 20.10 Risk Assessment

A risk assessment has been undertaken for the Sheffield/Waddington scheme. The key output from the risk assessment is the identification of any extreme and high risks which need to be mitigated. In order to mitigate these risks they have been included and budgeted for in the projects within this LTP. Table 20-5 outlines the risk priority rating, Table 20-6 outlines the risks and the list of key projects is found in Table 20-11.

**Table 20-5 Risk Priority Rating**

| Risk Score | Level of Risk | Risk Response                                                                                                                                             |
|------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| > 50       | Extreme       | Awareness of the event to be reported to Council.<br>Urgent action to eliminate / mitigate / manage the risk.<br><br>Document risk and action in the AMP. |

|        |           |                                                                                                                                                                   |
|--------|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 35-50  | Very High | Risk to be eliminated / mitigated / managed through normal business planning processes with responsibility assigned.                                              |
| 14-35  | High      | Manage risk using routine procedures.                                                                                                                             |
| 3.5-14 | Moderate  | Monitor the risk.                                                                                                                                                 |
| < 3.5  | Low       | Awareness of the event to be reported to Council.<br>Immediate action required to eliminate / mitigate / manage the risk.<br>Document risk and action in the AMP. |

**Table 20-6 Risks – Sheffield/Waddington**

| Risk                                                    | Action/Project                                | Year Identified | 2014 Risk Rating | 2017 Risk Rating | Residual Risk Rating |
|---------------------------------------------------------|-----------------------------------------------|-----------------|------------------|------------------|----------------------|
| Inability to flush wells                                | Install flushing points on wells              | 2014            | 27               | 7                | 7                    |
| Inadequate treatment                                    | Design new treatment system UV and Filtration | 2014            | 40               | 7                | 7                    |
| Inadequate treatment                                    | Install filtration                            | 2014            | 40               | 40               | 40                   |
| Electrical failure due to lightning or network spikes   | Install surge diverters                       | 2014            | 10               | 10               | 10                   |
| Failure to meet NES water meter standards               | NES Water Meter Compliance                    | 2014            | 20               | 6                | 6                    |
| Inability to collect income from non-metered properties | Install property water meters                 | 2014            | 27               | 27               | 2.1                  |
| Non-consented activities                                | Renewal of consents                           | 2014            | 27               | 27               | 6                    |
| Bore head risks                                         | raise above ground and backflow               | 2017            |                  | 10               | 1                    |
| inadequate chlorine residence time                      | direct pipe to res                            | 2017            |                  | 27               | 0.7                  |

The list of district wide risks can be found in 5Waters Activity Management Plan: Volume 1.

## 20.11 Asset Valuation Details

The total replacement value of assets within the Sheffield/Waddington water scheme is \$3,765,997 with further details in Table 20-7 below.

**Table 20-7 Replacement Value, Sheffield/Waddington**

| Asset Class 1              | Asset Class 2 | Sum of Replacement Value |
|----------------------------|---------------|--------------------------|
| <b>Plant and Equipment</b> |               | \$539,834                |
| <b>Water Reticulation</b>  | Hydrant       | \$33,451                 |
|                            | Lateral       | \$91,765                 |
|                            | Pipe          | \$2,967,099              |
|                            | Supply Point  | \$101,095                |
|                            | Valve         | \$32,752                 |

Replacement values for these different types of assets are shown in Figure 20-7 below.

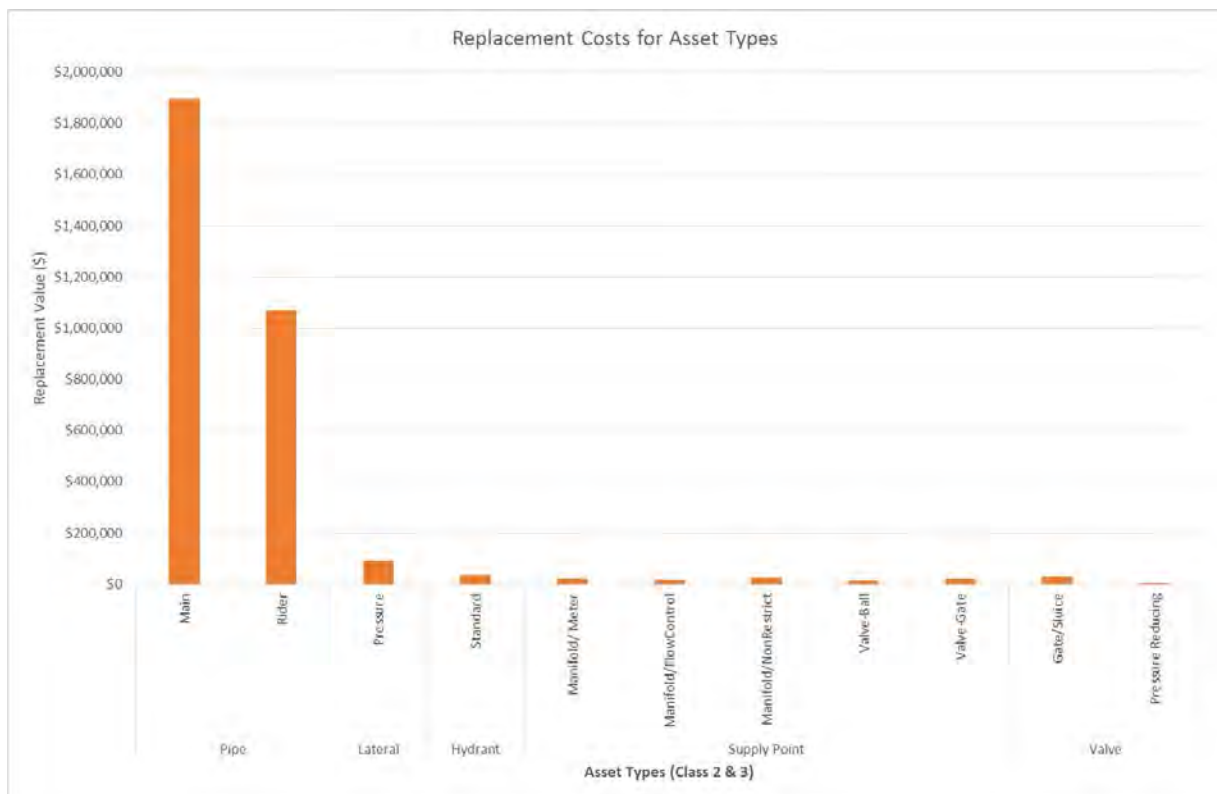


**Figure 20-7 Replacement Costs for Sheffield/Waddington**

## 20.12 Renewals

The renewal profile has been taken from the 2017 5 Waters Valuation. A graph showing the renewals for this scheme are shown by Figure 20-8 below. The majority renewals occur in 2022/2023.

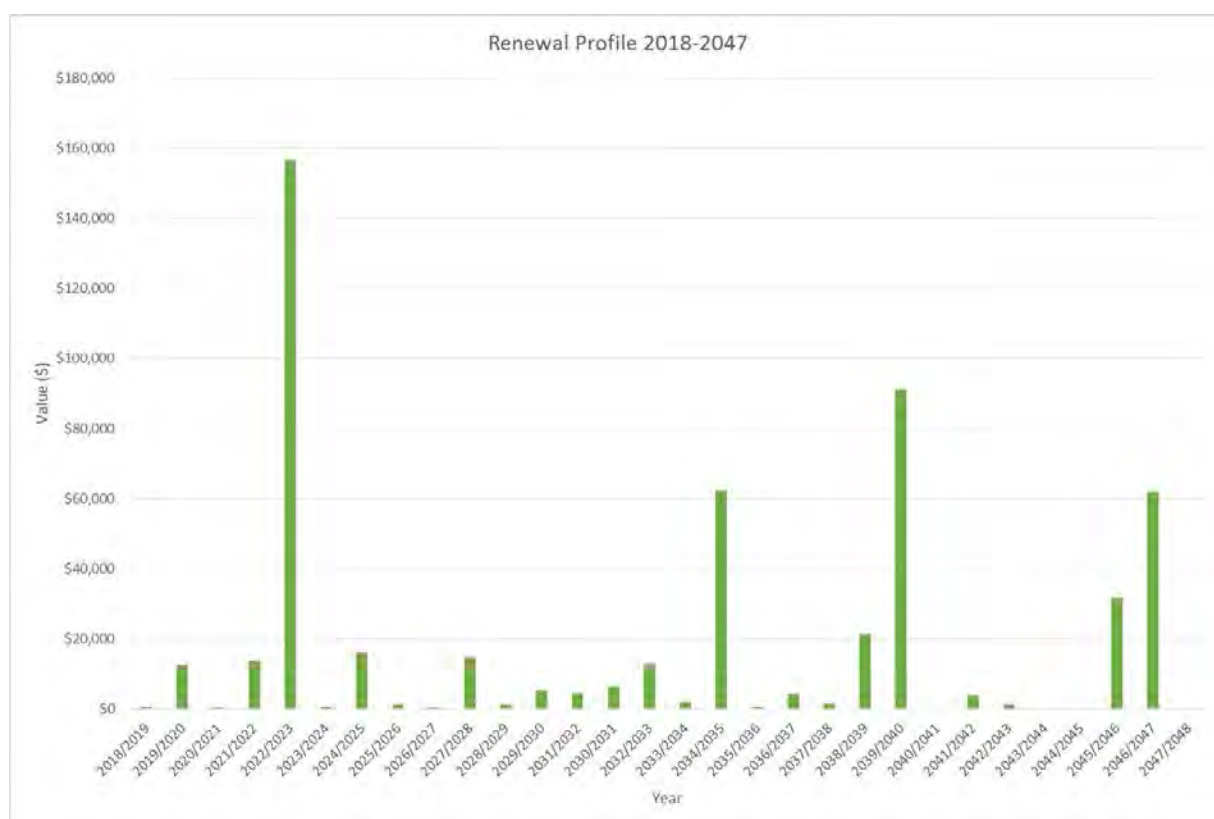


**Figure 20-8 Sheffield/Waddington Water Renewal Profile**

## 20.13 Critical Assets

The criticality model for Sheffield/Waddington has been updated for the 2018 AcMP. The methodology of the criticality model can be found in 5Waters Activity Management Plan: Volume 1 and it provides details of how the criticality has been calculated for the reticulation assets. Table 20-8 and Figure 20-9 below shows the calculated criticality for all of the assets within this scheme that have a recorded known length.

**Table 20-8 Length of Assets per Criticality Level**

| Criticality Bands |             | Length (m) |
|-------------------|-------------|------------|
| 5                 | Low         | 34,566     |
| 4                 | Medium-Low  | 4,057      |
| 3                 | Medium      | 1,461      |
| 2                 | Medium-High | 2601       |
| 1                 | High        | 0          |

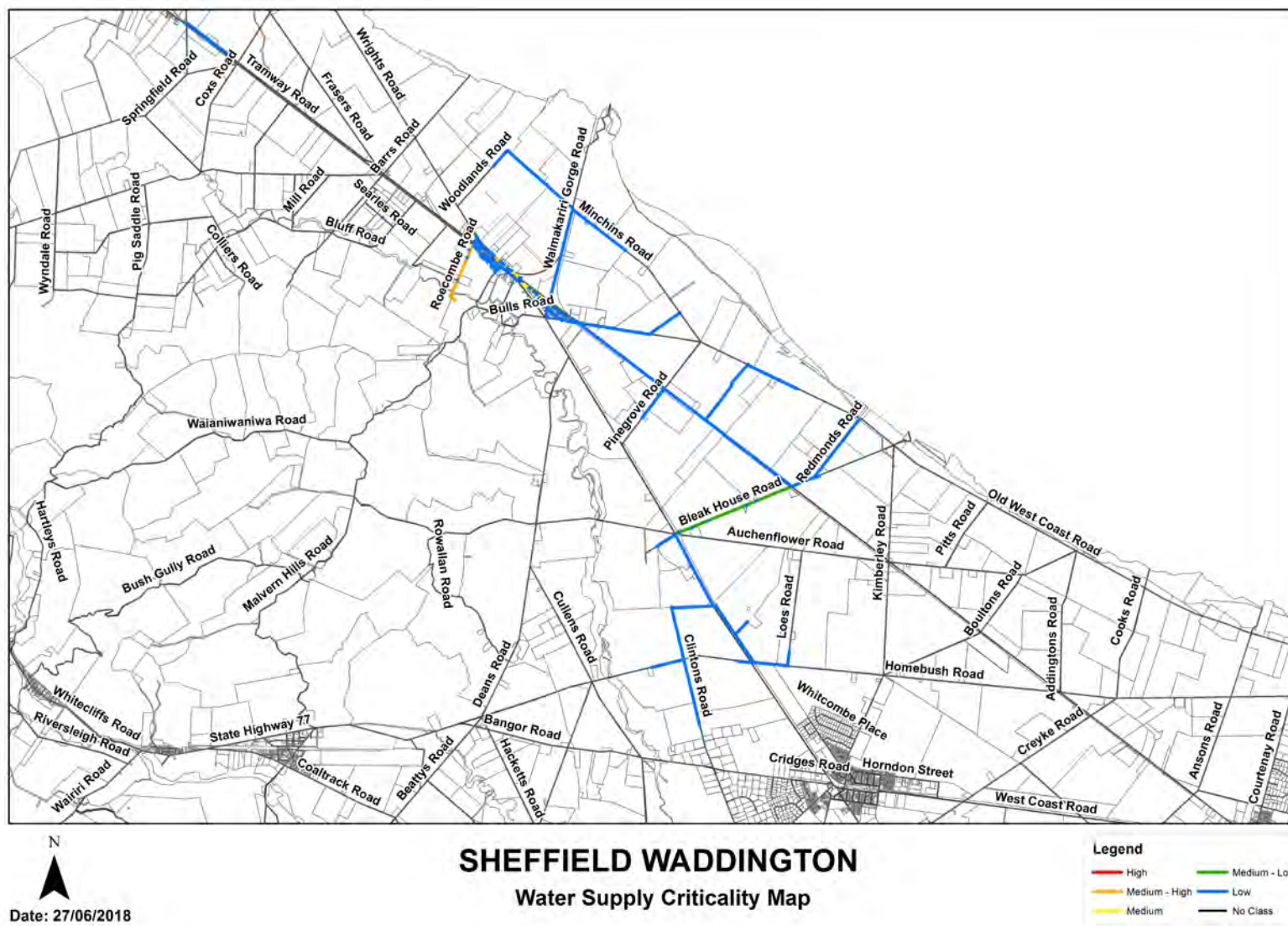


Figure 20-9 Criticality Map

## 20.14 Asset Condition

The asset condition model was run for Sheffield/Waddington in 2017. The methodology of the model can be found in 5Waters Activity Management Plan: Volume 1 which provides details of how the model has been calculated for the pipe reticulation assets. Figure 20-10 below shows the level of asset condition for these assets within this scheme that have a recorded known condition.

### Figure 20-10 Asset Condition – Sheffield/Waddington

Table 20-9 provides a description of the condition rating used within the condition model.

**Table 20-9 Asset Condition Grading**

| Condition Rating | Grading   |
|------------------|-----------|
| 1.0              | Excellent |
| 2.0              | Good      |
| 3.0              | Moderate  |
| 4.0              | Poor      |
| 5.0+             | Fail      |

The number of pipe faults is also measured through the asset management system. Figure 20-11 shows the known historic pipe failures within this scheme.



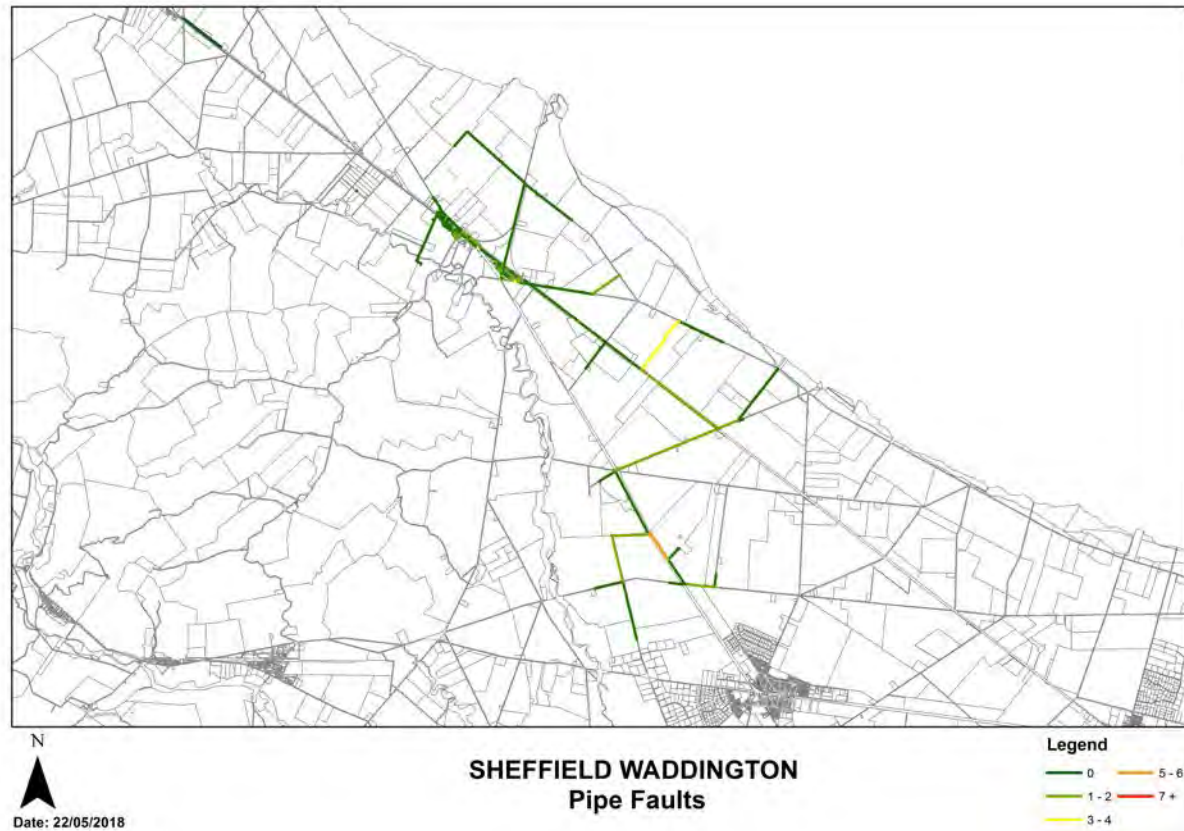


**Figure 20-11 Pipe Faults, Sheffield/Waddington Water Supply**

### 20.15 Funding Program

The 10 year budgets for Sheffield/Waddington are shown by Table 20-10 and Figure 20-12. Budgets are split into expenditure, renewals, projects and capital projects.

All figures are (\$) not adjusted for CPI “inflation”. They are calculated on historical data, and population growth where relevant.

**Table 20-10 Sheffield/Waddington Budget Summary**

| Years     | Expenditure | Renewals  | Projects | Capital Projects |
|-----------|-------------|-----------|----------|------------------|
| 2018/2019 | \$101,550   | \$704     |          | \$30,000         |
| 2019/2020 | \$101,750   | \$12,568  |          |                  |
| 2020/2021 | \$101,950   | \$337     |          |                  |
| 2021/2022 | \$101,950   | \$13,863  |          |                  |
| 2022/2023 | \$101,950   | \$156,500 |          |                  |
| 2023/2024 | \$101,950   | \$768     |          |                  |
| 2024/2025 | \$101,950   | \$16,327  |          |                  |

|           |             |           |  |          |
|-----------|-------------|-----------|--|----------|
| 2025/2026 | \$101,950   | \$1,471   |  |          |
| 2026/2027 | \$101,950   | \$373     |  |          |
| 2027/2028 | \$101,950   | \$14,842  |  |          |
| Total     | \$1,018,900 | \$217,753 |  | \$30,000 |

An explanation of the categories within the budgets are as follows below:

- Expenditure consists of operation and maintenance costs;
- Renewals are replacement of assets which are nearing or exceeded their useful life;
- Projects are investigations, decisions and planning activities which exclude capital works; and
- Capital projects are activities involving physical works.

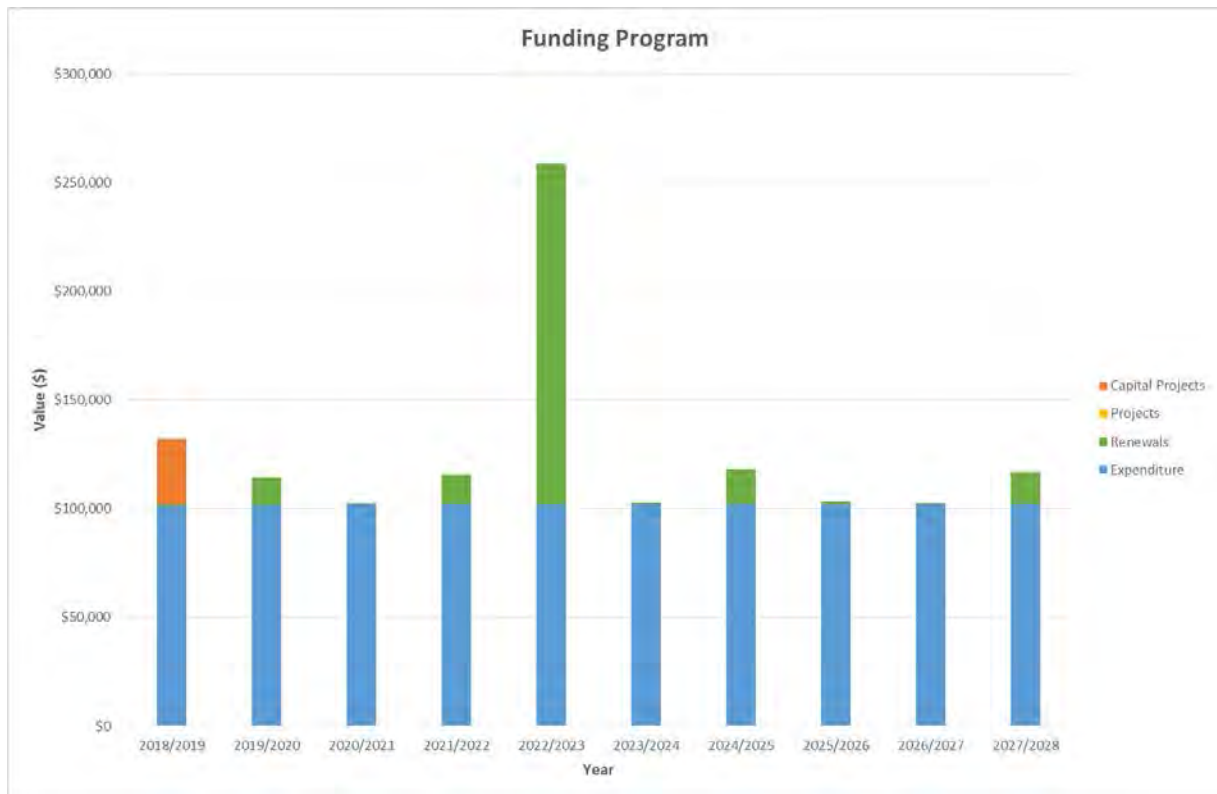


Figure 20-12 Sheffield/Waddington Funding Summary

There is one major project for Sheffield/Waddington water scheme in the LTP budget.

**Table 20-11 Key Projects**

| Account Label    | GL        | Description            | Year 1 (\$) | Year 2 (\$) | Year 3 (\$) | Years 4 to 10 | Funding Split <sup>17</sup> |
|------------------|-----------|------------------------|-------------|-------------|-------------|---------------|-----------------------------|
| Capital Projects | 407490038 | Well head improvements | \$30,000    |             |             |               | 100% LoS                    |

The list of district wide projects can be found in 5Waters Activity Management Plan: Volume 1.

### Discussion on Projects

Projects have been determined based on their:

- Relevance to the scheme
- Requirement to be completed under legislation
- Ability to bring the scheme up to or maintain the Level of Service required under council's Asset Management Policy.

Many projects are **jointly** funded by more than one scheme and activity. Each scheme pays a pro-rata share only, equivalent to the number of connections.

### Discussion on Capital and Projects

Where relevant, Capital (Levels of Service) and Capital (Growth) projects have been included in the scheme financial details.

Levels of Service Projects and growth splits have been provided to ensure the costs of population driven works are clear.

<sup>17</sup> Where LoS refers to Level of Service and G refers to Growth

## 21.0 SOUTHBRIDGE WATER SUPPLY

### 21.1 Scheme Summary

| Description                                   |                                   | Quantity                       |
|-----------------------------------------------|-----------------------------------|--------------------------------|
| <b>Estimated Population Served</b>            |                                   | 983                            |
| <b>Scheme Coverage</b><br>(1 Jan 2018)        | Full Charges                      | 347                            |
|                                               | Half Charges                      | 18                             |
|                                               | >1 Charges                        | 4                              |
| <b>System Components</b>                      | Bores/Intakes (No.)               | 2                              |
|                                               | Treatment/Disinfection            | None                           |
|                                               | Reservoirs (No.)                  | 0                              |
|                                               | Pump Stations (No.)               | 0                              |
|                                               | Piped (m)                         | 14,906.6                       |
| <b>History</b>                                | Original scheme installation date | 1983                           |
| <b>Value (\$)</b>                             | Replacement Cost                  | \$1,806,704.68                 |
|                                               | Depreciated Replacement Cost      | \$949,953.03                   |
| <b>Financial</b>                              | 2018/2019 Estimate                | \$79,500                       |
|                                               | Annual maintenance cost           | 2.48%                          |
|                                               | % of total                        |                                |
| <b>Demand (m3)</b><br>(1 Jan – 31 Dec 2017)   | Average daily                     | 527                            |
|                                               | Peak daily                        | 1,667                          |
|                                               | Minimum daily                     | -                              |
|                                               | Average daily per connection      | 1.52                           |
| <b>Type of Supply</b>                         |                                   | High pressure and unrestricted |
| <b>Target Pressure &amp; Flow at boundary</b> | Pressure                          | >310kPa                        |
|                                               | Flow                              | >20L/min                       |
| <b>Sustainability</b>                         | Well Security                     | Unsecure                       |

### 21.2 Key Issues

The following key issues are associated with the Southbridge water supply. A list of district wide issues are located in 5Waters Activity Management Plan: Volume 1.

**Table 21-1 Southbridge Scheme Issues**

| What's the Problem                                                           | What we plan to do                                                                                                                                                                                                               |
|------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Lack of capacity within this scheme to allow for growth within the township. | Install new bore and or increase capacity of existing bore.                                                                                                                                                                      |
| Areas of low pressure have been anecdotally identified by customers.         | Given the scheme was installed to meet drinking water needs (not fire flow) this may be satisfactory. However, work will be undertaken to confirm issues, if any and propose physical works to address any level of service gap. |

### 21.3 Overview & History

The Southbridge Water Supply provides untreated groundwater to the Southbridge community from two independent well sources.

These were installed to meet a Medical Officer of Health requirement to protect health previously resulting from failing septic tanks effluent rising with shallow bore water.

Until 1983, most properties in the township were on individual bores, with the exception being the subdivision at Taiaroa Place having a communal bore. At this time a reticulated supply was constructed and supplied by the Taiaroa Place well. However to cope with the additional demand, the High Street bore was required immediately.

In areas where the reticulation is constructed of 50mm diameter polythene pipes, property owners experience low pressures during peak periods. To overcome this, a reticulation upgrade programme was completed in 2009.

The Southbridge scheme was designed as a domestic supply and will not comply with the NZ Fire Fighting Code of Practice in most areas.

In 2018 a new bore, UV treatment and reservoir storage was developed on Council owned land located at St John Street, Southbridge.

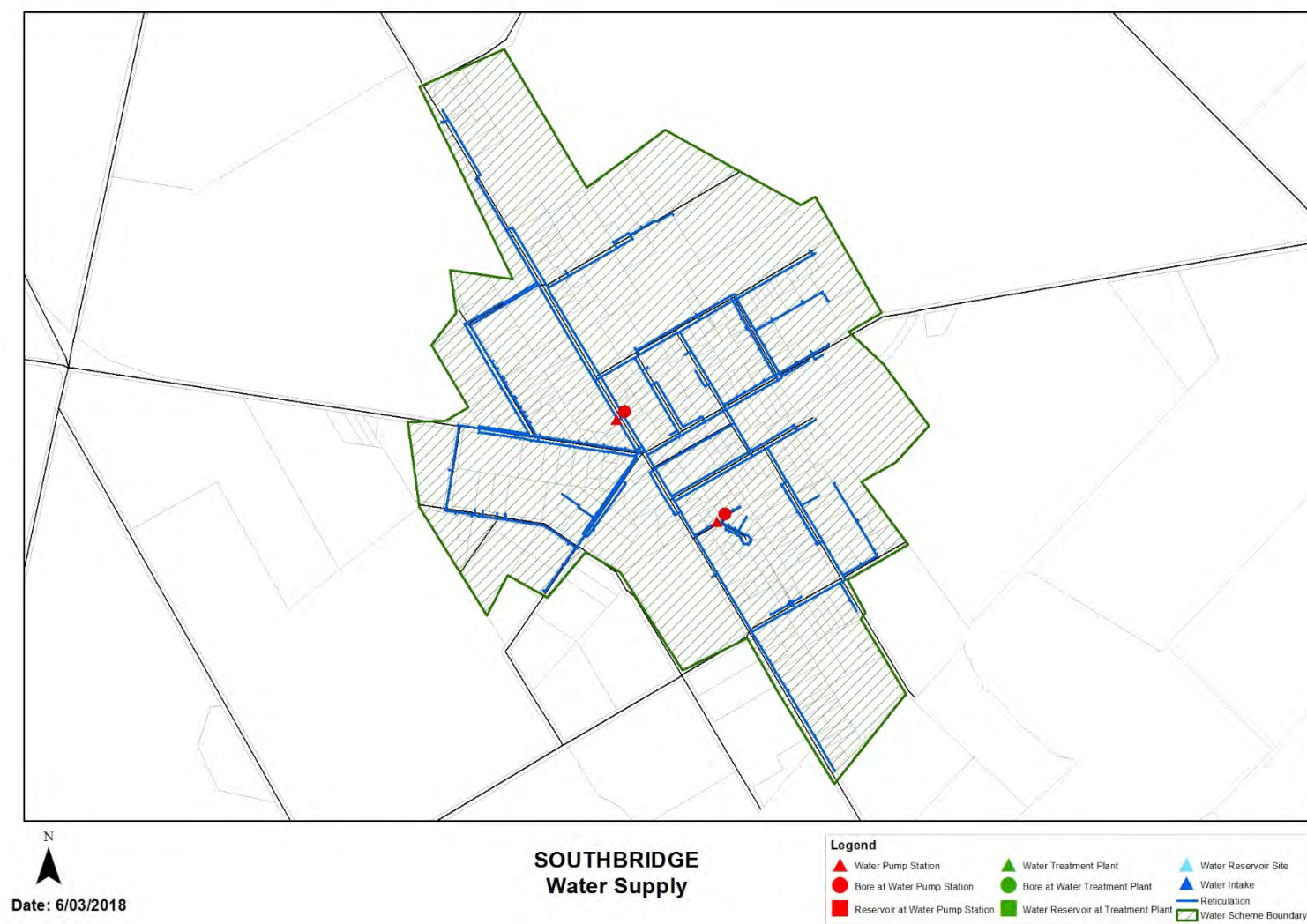


**Figure 21-1 Scheme Map**



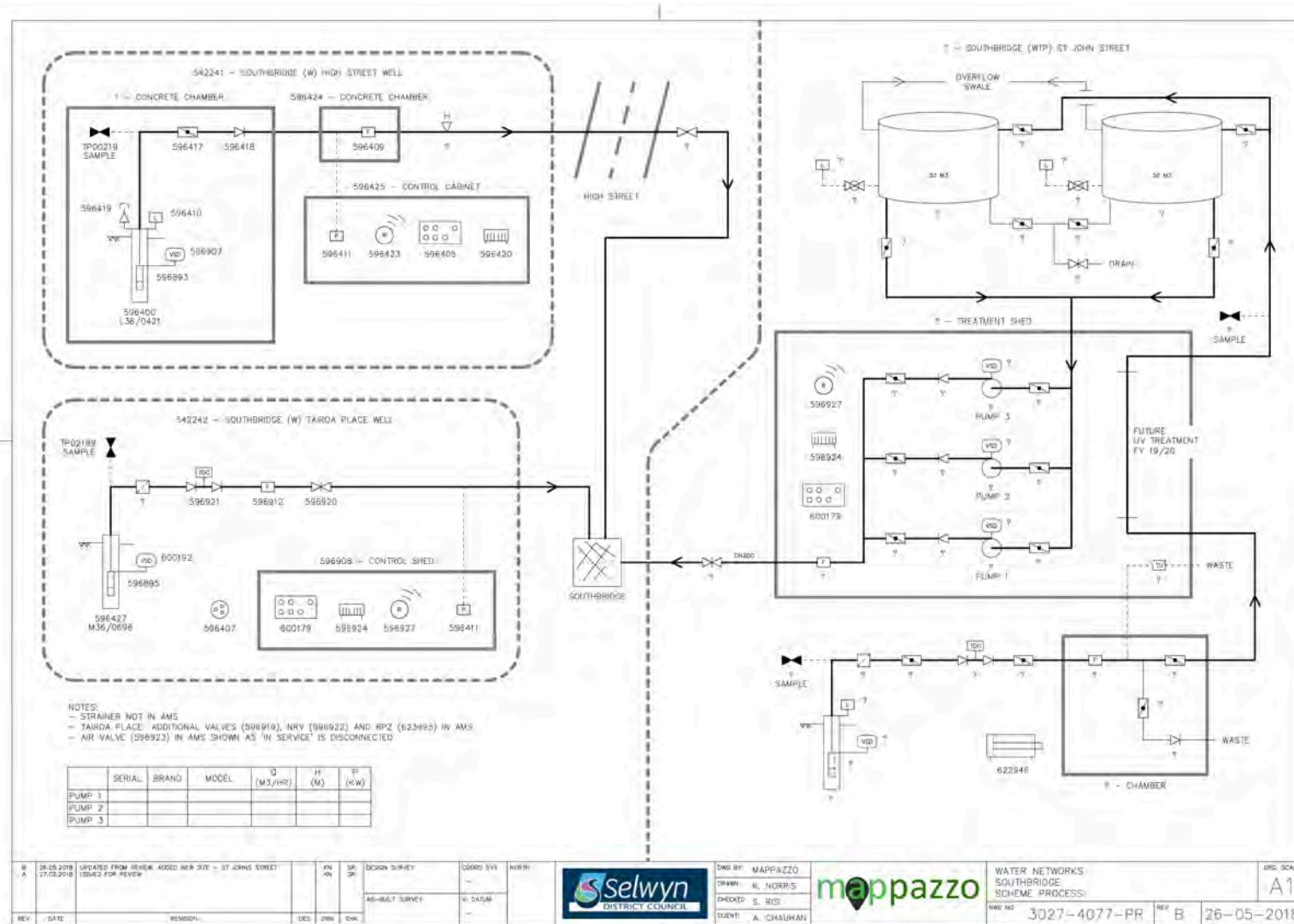


Figure 21-2 Scheme Schematic

## 21.4 System Capacity

In response to the accelerated growth within the Selwyn District hydraulic models have been used to plan future water infrastructure for a number of the water supplies. Hydraulic models have been built and calibrated to international best practice to carry out the '30-year Water Infrastructure Master Planning'.

The master planning provides an assessment of the sizing and timing of new infrastructure for new water sources (wells) and pipelines to service growth. Part of the master planning requires a water balance to be developed to forecast growth, using historical peak demand per household. The water balance forecasts the peak instantaneous flow per year versus the water resources available to determine the staging of new wells. The well staging assumes that one well is redundant for each water supply, to take into consideration maintenance of wells, planning/timing of new wells and security of supply i.e. to maintain average/peak demand.

Population projections are based on SDC 'Household Projections 2018 to 2048' and have been applied to the latest connection figures for each township.

Figure 21-3 shows the projected growth for Southbridge to 2048 per planning horizon (5 years intervals) in accordance with the latest House Projections.

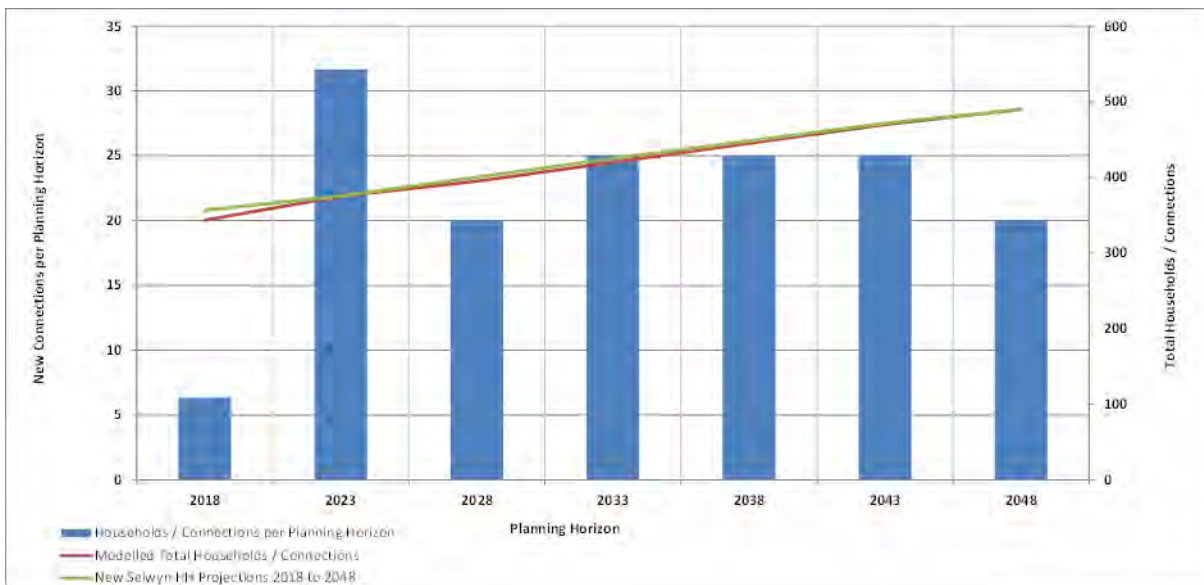


**Figure 21-3: Southbridge Household Projections**

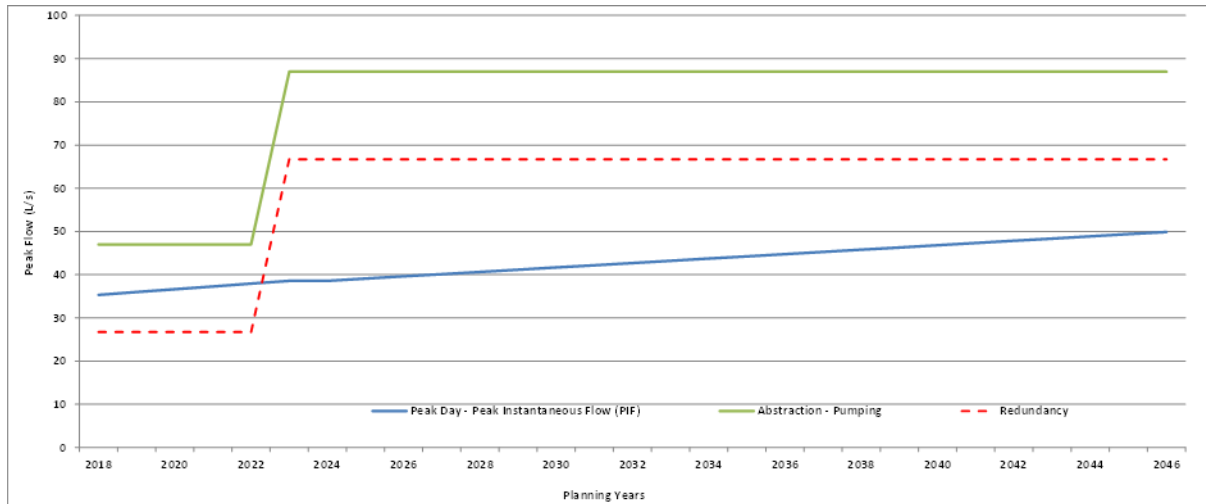


**Figure 21-4: Southbridge Water Demand**

**Table 21-2 Water Source Current Capacity**

| Sites Available | Well | Capacity (L/s) |
|-----------------|------|----------------|
| High Street     | 1    | 15             |
| Tairoa Place    | 1    | 9              |

**Table 21-3 Water Source Future Capacity**

| New Site ID | Well/Site | Location                   | Planning Year | Yield (L/s) |
|-------------|-----------|----------------------------|---------------|-------------|
| SOU1        | Well      | St John Street             | 2018/19       | 40          |
| SOU2        | Well      | High Street - Decommission | 2018/19       | -15         |
| SOU3        | Well      | St John Street (TBC)       | 2022/23       | 40          |

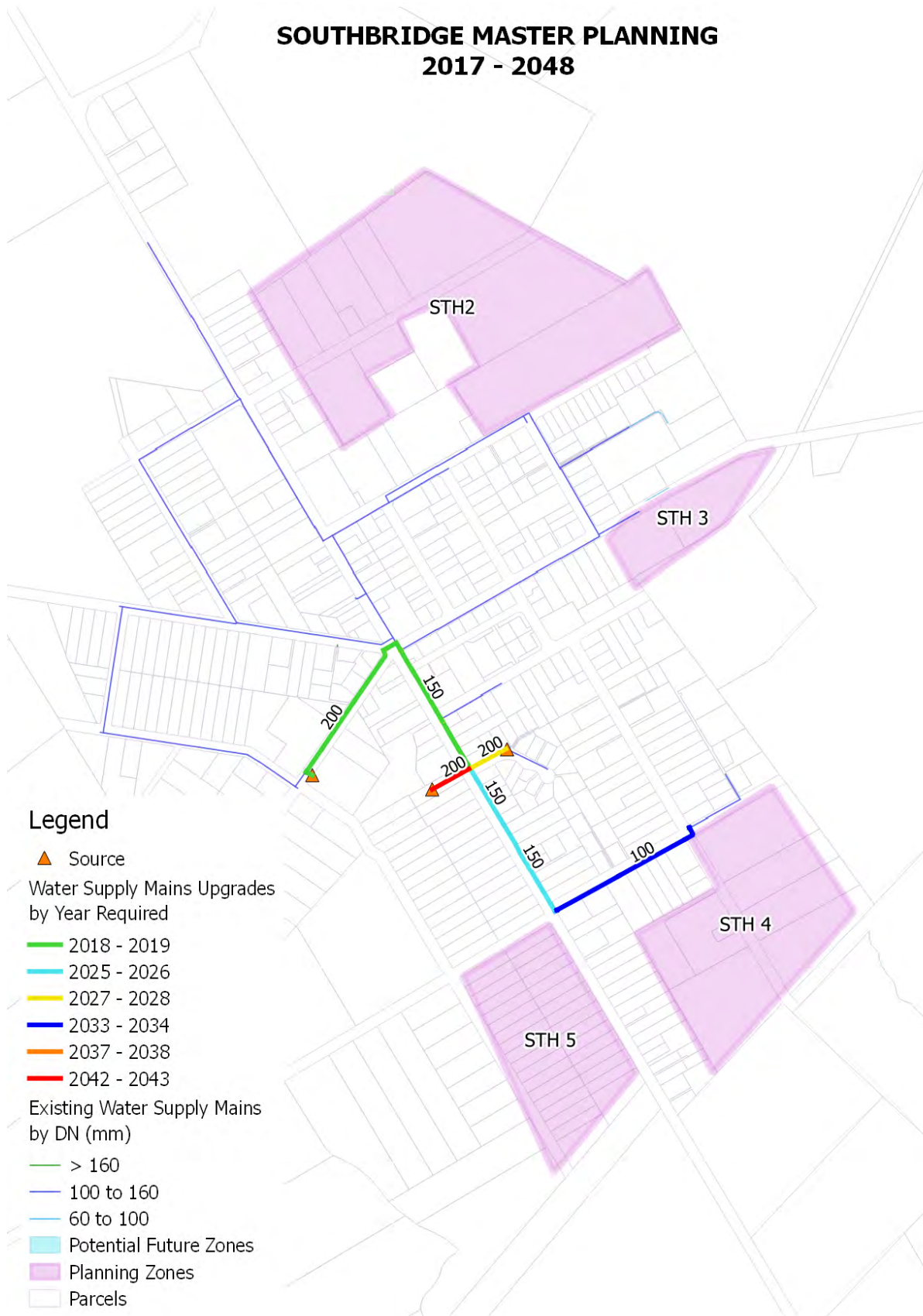


**Figure 21-5 Southbridge Master Plan**

## 21.5 Resource Consents

The Southbridge water supply has a number of resource consents. Table 21-4 shows the water take permitted by the resource consents for this scheme.

**Table 21-4 Resource Consents**

| Consent                        | Description                                      | Location                                   | Date Issued | Expiry Date | Consented Max Instantaneous Flow (L/s) | Consented Max Daily Volume (m <sup>3</sup> /day) |
|--------------------------------|--------------------------------------------------|--------------------------------------------|-------------|-------------|----------------------------------------|--------------------------------------------------|
| CRC010893.1<br>(Issued-Active) | To take and use groundwater - from bore L36/0421 | High Street And Taiaroa Place, SOUTHBRIDGE | 12-Feb-10   | 31-Jan-35   | 43                                     | 2140                                             |

## 21.6 Water Quality

The Southbridge water supply is non-secure with two wells (High Street and Taiaroa Place) which are sampled twice weekly. The reticulation is sampled weekly.

The following details E. coli transgressions for the period 2012 to 2017.

### Treatment

There have been one E. coli source transgression during this period, this occurred during July 2013.

### Reticulation Zone

There has been no E. coli treatment transgressions during this period.

### Chemical Analysis

The following is a summary of the raw water chemical analysis carried out at the Southbridge Water Supply.

**Table 21-5 Southbridge Water Supply Raw Water Chemical Analysis Summary**

| Parameter                                   | Standards MAV* (GV)** | Plant <sup>1</sup> 2015 | Plant <sup>1</sup> 2017 | Plant <sup>2</sup> 2015 | Plant <sup>2</sup> 2017 | Status |
|---------------------------------------------|-----------------------|-------------------------|-------------------------|-------------------------|-------------------------|--------|
| Total Lead (g/m3)                           | 0.01                  | <0.00011                | < 0.00011               | <0.00011                | < 0.00011               | ✓      |
| pH (pH units)                               | 7-8.5                 | 7.6                     | 7.5                     | 7.7                     | 7.6                     | ✓      |
| Total Hardness (g/m3 as CaCO <sub>3</sub> ) | <200                  | 78                      | 71.1                    | 75                      | 70.1                    | ✓      |
| Total Calcium (g/m3)                        | n/v                   | 25                      | 23.48                   | 25                      | 23.42                   | ✓      |
| Total Iron (g/m3)                           | <0.2                  | <0.021                  | < 0.021                 | 0.152                   | < 0.021                 | ✓      |
| Total Sodium (g/m3)                         | <200                  | 9                       | 8.05                    | 8.8                     | 7.73                    | ✓      |
| Nitrate - Nitrogen (g/m3)                   | 11.3                  | 4.1                     | 3.66                    | 3.8                     | 3.53                    | ✓      |

\* MAV – Maximum Acceptable Value

\*\* (GV) – Guideline Value

<sup>1</sup> High Street

<sup>2</sup> Taiaroa Place

## 21.7 Scheme Assets

A summary of material and diameter for pipes in Southbridge is shown below in Figure 21-6 and Figure 21-7.

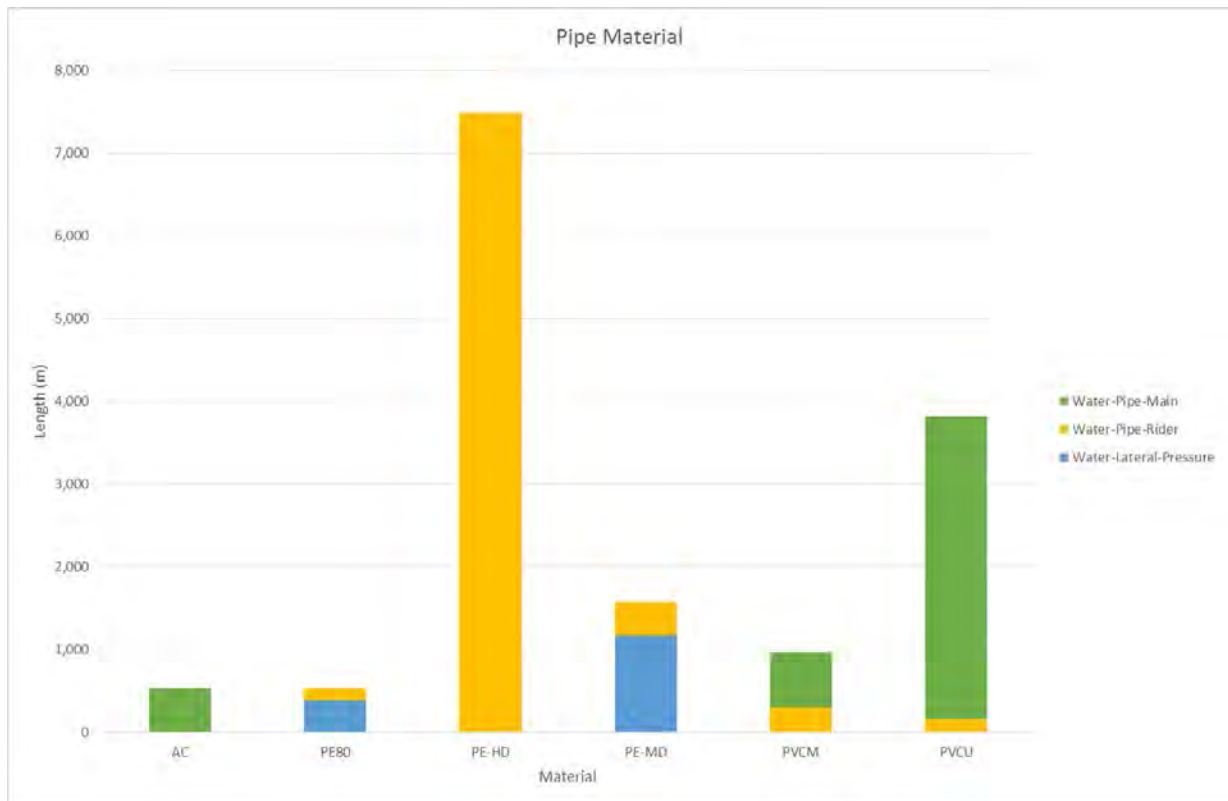


Figure 21-6 Pipe Material – Southbridge



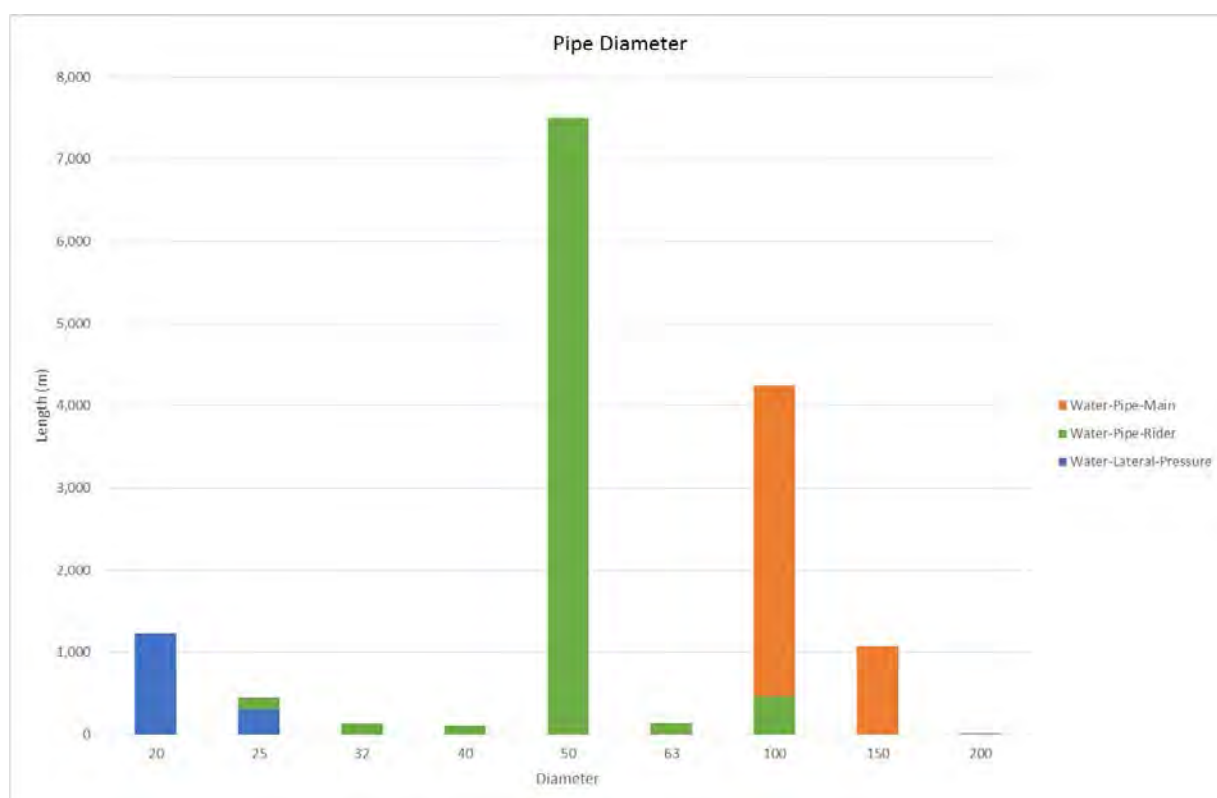


**Figure 21-7 Pipe Diameter – Southbridge**

## 21.8 Operational Management

The water supply is operated and maintained under two maintenance contracts as follows:

- Contract 1241: Water Services Contract. Contract is with SICON Ferguson who undertakes investigations, conditions inspections, proactive and reactive maintenance and minor asset renewals; and
- Contract 1202: Parks and Reserves Contract. Contract is with SICON Ferguson who undertakes the maintenance of land scape features related to water services e.g. mowing, gardens etc.

Water quality sampling is completed under an agreement with Food and Health Ltd as required.

## 21.9 Photos of Main Assets



**Photo 1: Taiaroa Street Control Building**



**Photo 2: High Street Well head (below covers)**

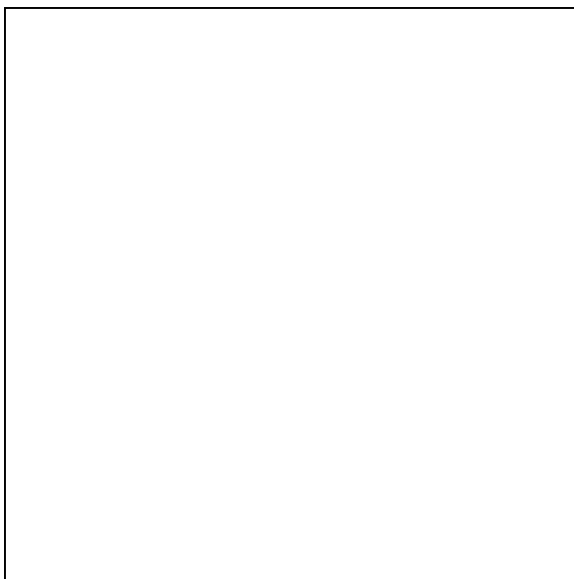


**Photo 3: St Johns St Treatment Plant and Bore**

## 21.10 Risk Assessment

A risk assessment has been undertaken for the Southbridge scheme. The key output from the risk assessment is the identification of any extreme and high risks which need to be mitigated. In order to mitigate these risks they have been included and budgeted for in the projects within this LTP. Table 21-6 outlines the risk priority rating, Table 21-7 outlines the risks and the list of key projects is found in Table 21-12.

**Table 21-6 Risk Priority Rating**

| Risk Score | Level of Risk | Risk Response                                                                                                                                         |
|------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| > 50       | Extreme       | Awareness of the event to be reported to Council.<br>Urgent action to eliminate / mitigate / manage the risk.<br>Document risk and action in the AMP. |
| 35-50      | Very High     | Risk to be eliminated / mitigated / managed through normal business planning processes with responsibility assigned.                                  |

|        |          |                                                                                                                                                                   |
|--------|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 14-35  | High     | Manage risk using routine procedures.                                                                                                                             |
| 3.5-14 | Moderate | Monitor the risk.                                                                                                                                                 |
| < 3.5  | Low      | Awareness of the event to be reported to Council.<br>Immediate action required to eliminate / mitigate / manage the risk.<br>Document risk and action in the AMP. |

**Table 21-7 Risks – Southbridge**

| Risk                                                    | Action/Project                | Year Identified | 2014 Risk Rating | 2017 Risk Rating | Residual Risk Rating |
|---------------------------------------------------------|-------------------------------|-----------------|------------------|------------------|----------------------|
| Wells not run for extended periods of time              | Auto well turnover            | 2014            | 20               | 20               | 20                   |
| Electrical failure due to lightning or network spikes   | Install surge diverters       | 2014            | 20               | 20               | 20                   |
| Failure to meet NES water meter standards               | NES Water Meter Compliance    | 2014            | 20               | 6                | 6                    |
| Inability to collect income from non-metered properties | Install property water meters | 2014            | 27               | 27               | 2.1                  |
| Non-consented activities                                | Renewal of consents           | 2014            | 27               | 27               | 6                    |
| Inadequate capacity into the future                     | Capacity upgrades             | 2017            |                  | 20               | 6                    |

The list of district wide risks can be found in 5Waters Activity Management Plan: Volume 1.

### 21.11 Asset Valuation Details

The total replacement value of assets within the Southbridge water scheme is \$1,806,705 with further details in Table 21-8 below.

**Table 21-8 Replacement Value, Southbridge**

| Asset Class 1              | Asset Class 2 | Sum of Replacement Value |
|----------------------------|---------------|--------------------------|
| <b>Plant and Equipment</b> |               | \$231,326                |
| <b>Water Reticulation</b>  | Hydrant       | \$83,084                 |
|                            | Lateral       | \$67,173                 |
|                            | Pipe          | \$1,154,268              |
|                            | Supply Point  | \$203,603                |
|                            | Valve         | \$67,250                 |

Replacement values for these different types of assets are shown in Figure 21-8 below.

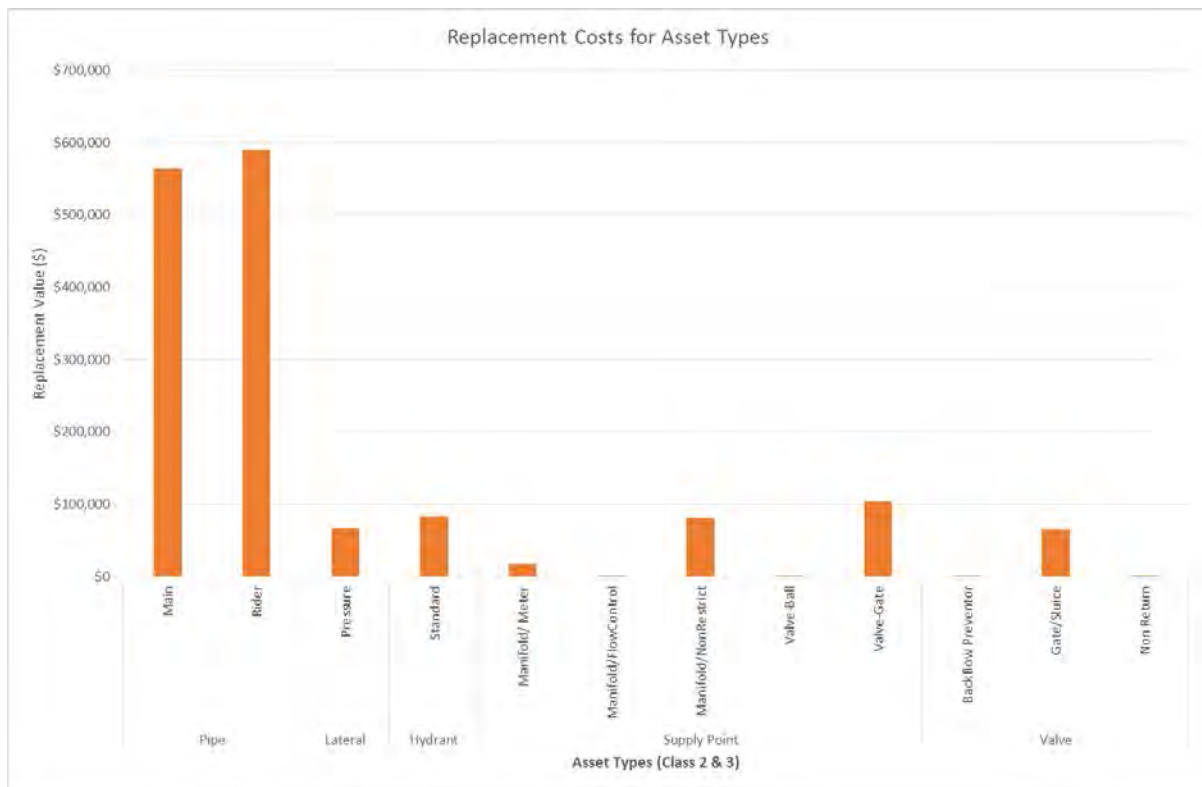


**Figure 21-8 Replacement Costs for Southbridge**

## 21.12 Renewals

The renewal profile has been taken from the 2017 5 Waters Valuation. A graph showing the renewals for this scheme are shown by Figure 21-9 below. The majority renewals occur in 2033/2034.

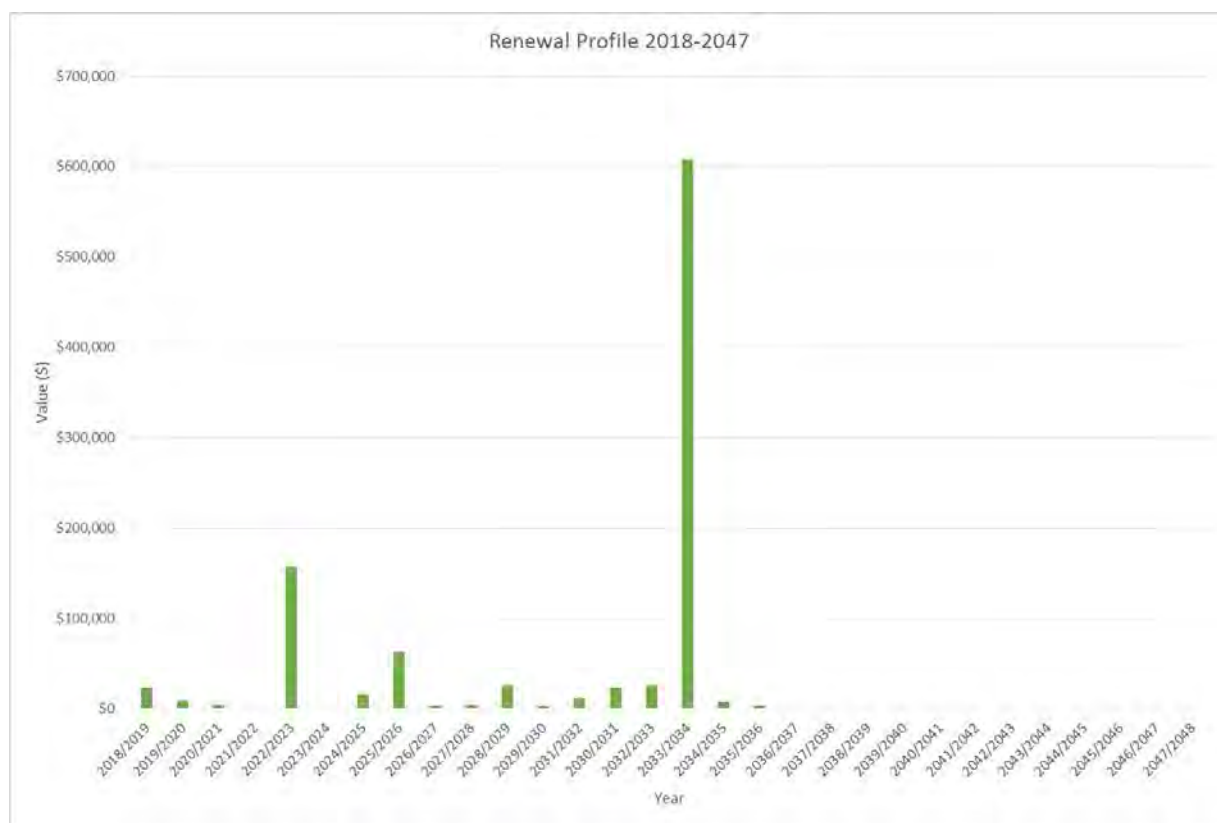


**Figure 21-9 Southbridge Water Renewal Profile**

### 21.13 Critical Assets

The criticality model for Southbridge has been updated for the 2018 AcMP. The methodology of the criticality model can be found in 5Waters Activity Management Plan: Volume 1 and it provides details of how the criticality has been calculated for the reticulation assets. Table 21-9 below shows the calculated criticality for all of the assets within this scheme that have a recorded known length.

**Table 21-9 Length of Assets per Criticality Level**

| Criticality Bands |             | Length (m) |
|-------------------|-------------|------------|
| 5                 | Low         | 9,450      |
| 4                 | Medium-Low  | 4,249      |
| 3                 | Medium      | 516        |
| 2                 | Medium-High | 563        |
| 1                 | High        | 0          |

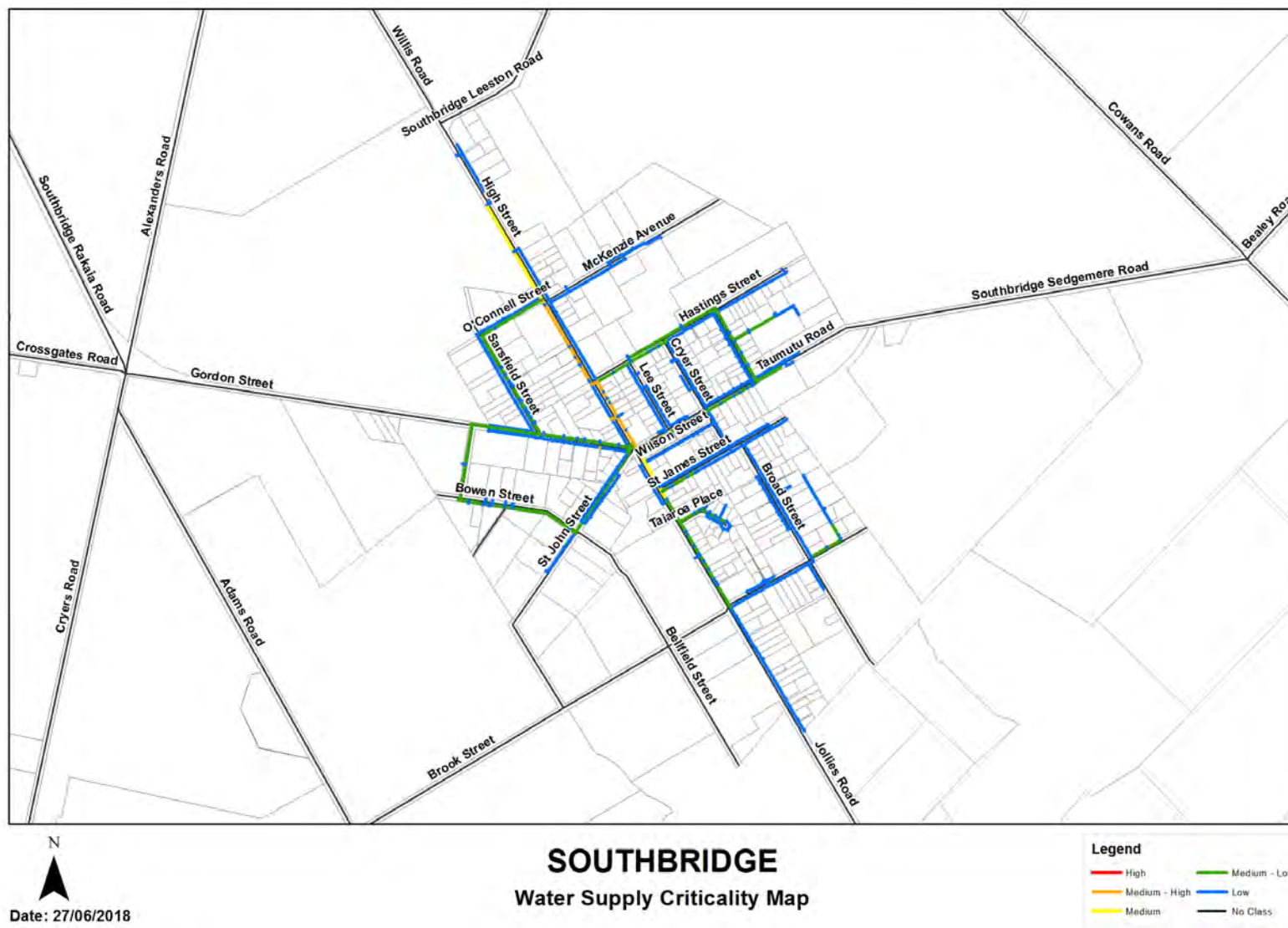


Figure 21-10 Criticality Map



## 21.14 Asset Condition

The asset condition model was run for Southbridge in 2017. The methodology of the model can be found in 5Waters Activity Management Plan: Volume 1 which provides details of how the model has been calculated for the pipe reticulation assets. Figure 21-11 below shows the level of asset condition for these assets within this scheme that have a recorded known condition.

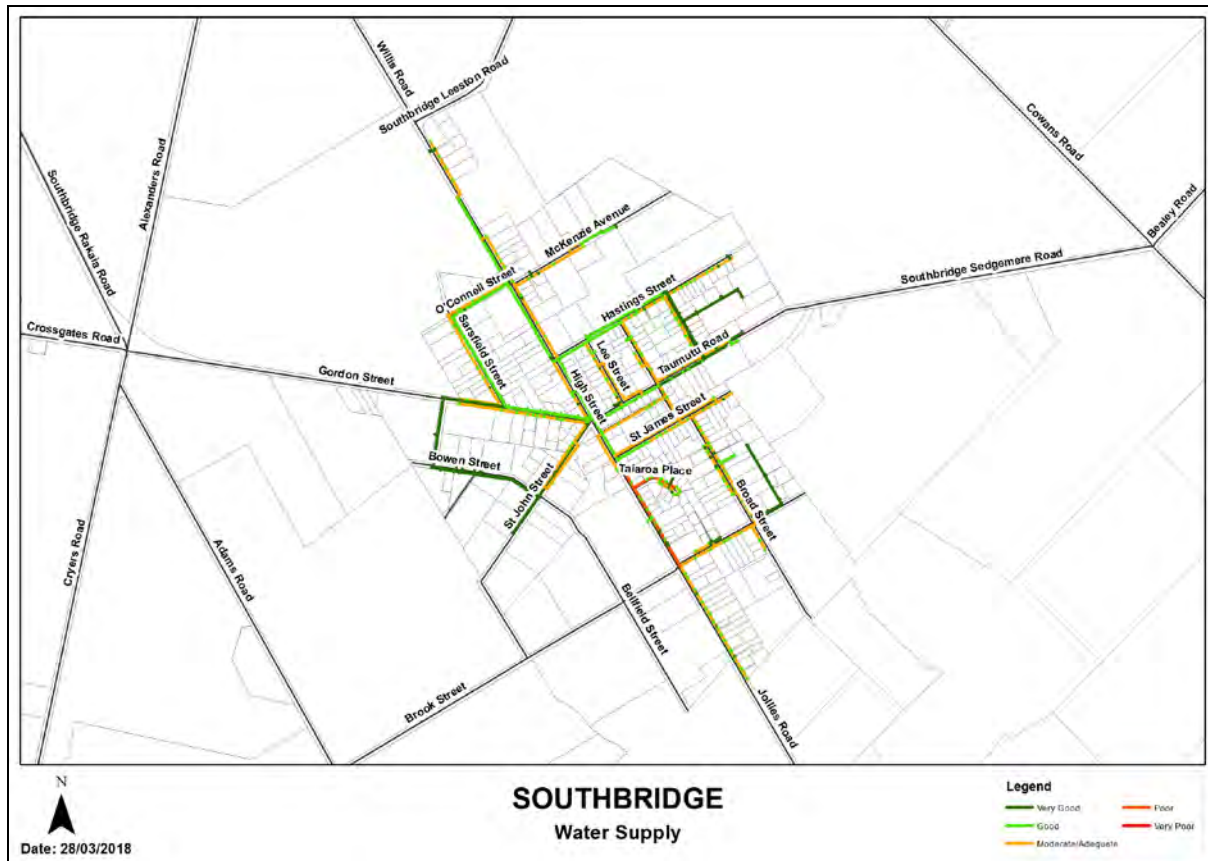


**Figure 21-11 Asset Condition – Southbridge**

Table 21-10 provides a description of the condition rating used within the condition model.

**Table 21-10 Asset Condition Grading**

| Condition Rating | Grading   |
|------------------|-----------|
| 1.0              | Excellent |
| 2.0              | Good      |
| 3.0              | Moderate  |
| 4.0              | Poor      |
| 5.0+             | Fail      |

The number of pipe faults is also measured through the asset management system. Figure 21-12 shows the known historic pipe failures within this scheme.



**Figure 21-12 Pipe Faults, Southbridge**

### 21.15 Funding Program

The 10 year budgets for Southbridge are shown by Table 21-11 and Figure 21-13. Budgets are split into expenditure, renewals, projects and capital projects.

All figures are (\$) not adjusted for CPI “inflation”. They are calculated on historical data, and population growth where relevant.

**Table 21-11 Southbridge Budget Summary**

| Years     | Expenditure | Renewals  | Projects | Capital Projects |
|-----------|-------------|-----------|----------|------------------|
| 2018/2019 | \$79,500    | \$23,494  |          | \$114,000        |
| 2019/2020 | \$80,500    | \$9,234   |          |                  |
| 2020/2021 | \$80,500    | \$4,039   |          |                  |
| 2021/2022 | \$81,500    |           |          |                  |
| 2022/2023 | \$81,500    | \$158,168 |          | \$566,500        |
| 2023/2024 | \$81,500    | \$704     |          |                  |

|           |           |           |  |           |
|-----------|-----------|-----------|--|-----------|
| 2024/2025 | \$81,500  | \$16,400  |  |           |
| 2025/2026 | \$81,500  | \$63,306  |  | \$18,000  |
| 2026/2027 | \$81,500  | \$3,518   |  |           |
| 2027/2028 | \$81,500  | \$4,221   |  |           |
| Total     | \$811,000 | \$283,083 |  | \$698,500 |

An explanation of the categories within the budgets are as follows below:

- Expenditure consists of operation and maintenance costs;
- Renewals are replacement of assets which are nearing or exceeded their useful life;
- Projects are investigations, decisions and planning activities which exclude capital works; and
- Capital projects are activities involving physical works.

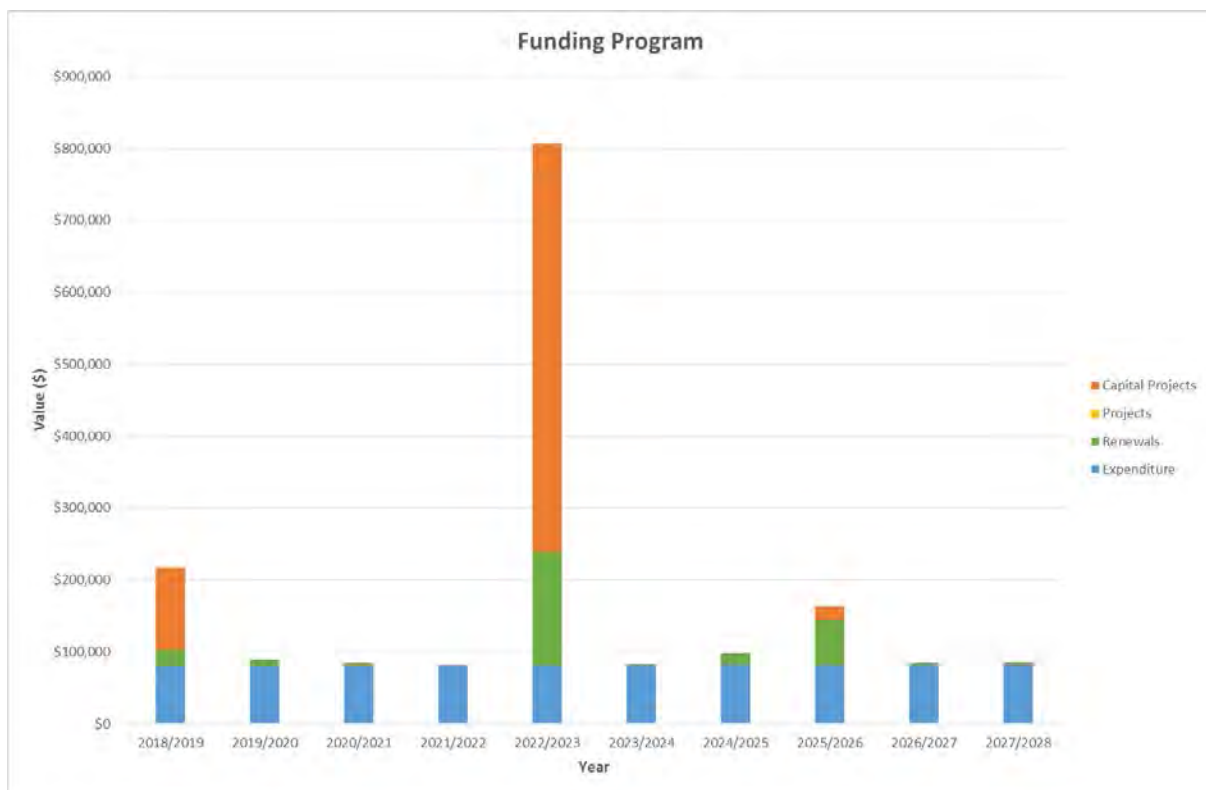


Figure 21-13 Southbridge Funding Summary

There are three major projects for Southbridge water scheme in the LTP budget.

**Table 21-12 Key Projects**

| Account Label    | GL        | Description            | Year 1 (\$) | Year 2 (\$) | Year 3 (\$) | Years 4 to 10 | Funding Split <sup>18</sup> |
|------------------|-----------|------------------------|-------------|-------------|-------------|---------------|-----------------------------|
| Capital Projects | 407790035 | Improve water capacity |             |             |             | \$566,500     | 50% G                       |
| Capital Projects | 407790036 | UV treatment           | \$50,000    |             |             |               | 100% LoS                    |
| Capital Projects | 407790037 | Pipeline Upgrade       | \$64,000    |             |             | \$18,000      | 100% LoS                    |

The list of district wide projects can be found in 5Waters Activity Management Plan: Volume 1.

### Discussion on Projects

Projects have been determined based on their:

- Relevance to the scheme
- Requirement to be completed under legislation
- Ability to bring the scheme up to or maintain the Level of Service required under council's Asset Management Policy.

Many projects are **jointly** funded by more than one scheme and activity. Each scheme pays a pro-rata share only, equivalent to the number of connections.

### Discussion on Capital and Projects

Where relevant, Capital (Levels of Service) and Capital (Growth) projects have been included in the scheme financial details.

Levels of Service Projects and growth splits have been provided to ensure the costs of population driven works are clear.

<sup>18</sup> Where LoS refers to Level of Service and G refers to Growth

## 22.0 SPRINGFIELD WATER SUPPLY

### 22.1 Scheme Summary

| Description                          |                                   | Quantity                                       |                          |
|--------------------------------------|-----------------------------------|------------------------------------------------|--------------------------|
| Estimated Population Served          |                                   | 549                                            |                          |
| Scheme Coverage<br>(1 Jan 2018)      | Full Charges                      | 168                                            | + Restricted Connections |
|                                      | Half Charges                      | 1                                              |                          |
|                                      | >1 Charges                        | 28                                             |                          |
| System Components                    | Bores/Intakes (No.)               | 1 Intake                                       |                          |
|                                      | Treatment/Disinfection            | Filtration, UV and Chlorination                |                          |
|                                      | Reservoirs (No.)                  | 1 Reservoir                                    |                          |
|                                      | Pump Stations (No.)               | 1 Pump Station                                 |                          |
|                                      | Piped (m)                         |                                                |                          |
| History                              | Original scheme installation date | 1985                                           |                          |
| Value (\$)                           | Replacement Cost                  | \$3,610,763.58                                 |                          |
|                                      | Depreciated Replacement Cost      | \$2,537,065.45                                 |                          |
| Financial                            | 2018/2019 Estimate                | \$134,050                                      |                          |
|                                      | Annual maintenance cost           | 4.19%                                          |                          |
|                                      | % of total                        |                                                |                          |
| Demand (m3)<br>(1 Jan – 31 Dec 2017) | Average daily                     | 358                                            |                          |
|                                      | Peak daily                        | 650                                            |                          |
|                                      | Minimum daily                     | 129                                            |                          |
|                                      | Average daily per connection      | 2.13                                           |                          |
| Type of Supply                       |                                   | High pressure with restricted and unrestricted |                          |
| Target Pressure & Flow at boundary   | Pressure                          | >310kPa (150kPa restricted)                    |                          |
|                                      | Flow                              | >20L/min (±10% maric restricted)               |                          |
| Sustainability                       | Well Security                     | Unsecure                                       |                          |

### 22.2 Key Issues

The following key issues are associated with the Springfield water supply. A list of district wide issues are located in 5Waters Activity Management Plan: Volume 1.

**Table 22-1 Springfield Scheme Issues**

| What's the Problem                                                                            | What we plan to do                                                                                                                                                                                                                                                            |
|-----------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Springfield requires infrastructure upgrades which includes treatment plant upgrades.         | Council will develop a long term water supply strategy for Springfield and surrounding towns to guide further capital/renewals expenditure on the existing infrastructure. The renewal strategy and treatment plant upgrades will be addressed through the Water Safety Plan. |
| The Springfield well is subject to high turbidity during periods of flood in the Kowai River. | 1 micron filtration is not sufficient at all times and therefore further treatment or an alternative water source is required.                                                                                                                                                |

## 22.3 Overview & History

The Springfield Water Supply provides chlorinated surface water to the Springfield Township and surrounding areas. The surface water is sourced from a shallow well and gallery located in the Kowai River flood plain adjacent to the Springfield reservoir.

In the 1980s the Council proposed a water supply that would serve the township and completely replace an old NZ Railway water scheme.

Drilling of two deep wells was carried out adjacent to the township (on Pocock Road) but insufficient water was available and a shallow well and gallery intake was installed adjacent to the Kowai River. This scheme was installed in 1987/88 as an unrestricted supply with full “Fire Fighting” capacity. In 1999 the scheme was extended into the rural area to serve properties with domestic water only, the supply now consists of the following zones:

- Springfield Township – on demand pressure supply
- Kowai Bush extension – fully metered pressure supply
- Annat Extension – restricted to 2m<sup>3</sup>/day – consumer must supply own tank & pressure system

### ***CPW shared water use agreement.***

The Council’s Long Term Plan 2015-2025 identifies one of the major projects to be the Council’s commitment to ‘work with Central Plains Water to develop a concept for converting the Kowai River sourced water race network (part of the Malvern Water Race Scheme) into a combined water race and irrigation network. This concept will then be used for further consultation with the community. The Council entered into agreement with CPW on 16th December 2016. The philosophy of the Agreement is to achieve a mutually beneficial cost neutral position. While the Scheme will benefit from a potential 200l/s of reliable water for irrigation, the added value the Scheme will provide to the community includes providing a robust and secure long term piped water supply to both the Sheffield and Springfield drinking water treatment stations. Which, from a water quality perspective enables the Council to avoid use of shallow groundwater during periods of high turbidity in adjoining rivers, or as required for capacity augmentation; and providing the necessary water quantity to support future township expansion. In addition, a piped stock water supply to shareholders and non-shareholders will ensure this historical network is upgraded to a high quality, efficient utility.



***Treatment Plant Upgrade***

Prior to the commissioning of the treatment plant upgrade in July/August 2017, the Springfield water supply was chlorinated. The treatment upgrade provided in addition to chlorine, 1 micron (0.001mm) filtration followed by a UV treatment system. A photo of the new treatment system is provided below. Booster pumps (foreground), UV (mid ground) and Filter (background).

***Water Quality Results***

There has been NO transgressions detected post treatment (79 samples) or in the reticulation (110 samples) since the upgrade of the water supply. Sample results were available up until the end of January 2018. Because of the varying nature of the source water colour/very fine turbidity, precautionary boil water notices have been issued. Council takes a low risk approach to managing its water supplies and does not wait until a transgression is detected in routine sampling rounds.

***Future Upgrades***

Raw water quality in recent storm events has been outside the design parameters of the treatment plant which was based on raw water sampling completed prior to the design of the plant.

To resolve this issue, Council has budgeted \$100,000 in the first year of the 2018-28 Long Term Plan and \$600,000 in the third year of the plan. Potential future upgrades include: coagulation treatment, increased storage, connection to another water supply or connection to CPW network as an alternative raw water source (Council has agreements in place for this option if it is found favourable. All water will pass through the treatment plant).

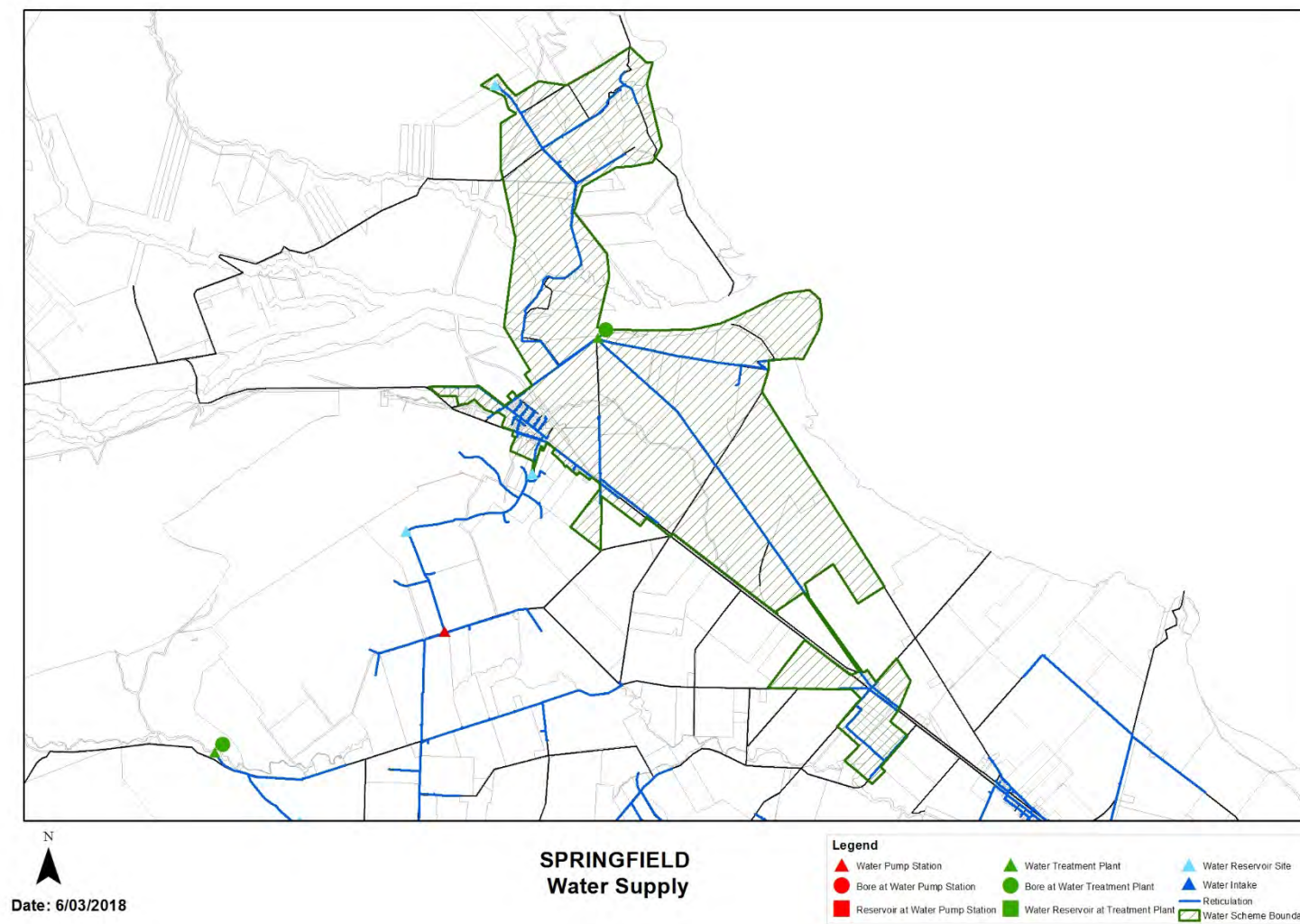


**Figure 22-1 Scheme Map**

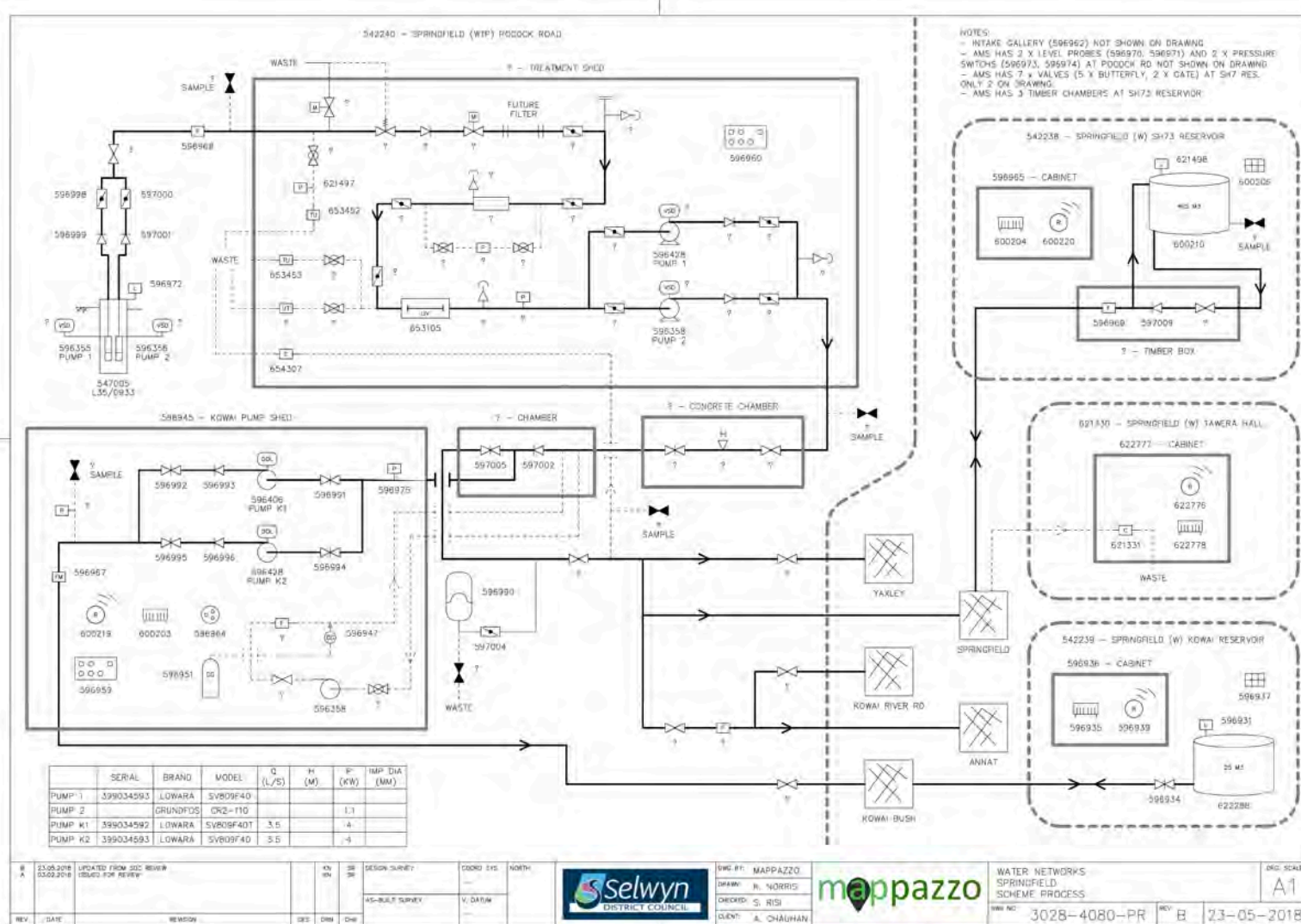


Figure 22-2 Scheme Schematic

## 22.4 System Capacity

There is some opportunity for residential development in Springfield in terms of zoned land availability. The Springfield supply also delivers a restricted supply to a small proportion (<10%) of properties. On-demand (town) connections typically use less water but generate a higher peak flow rate, while restricted (rural) connections require more water but this is trickle fed at a low flow rate. The restricted connections are not metered separately so this capacity assessment considers the supply as a whole.

**Table 22-2 Capacity Summary**

|                                                                                                                                                                                                                                                                                                                | Flow Rate<br>(L/s) | Daily Volume<br>(m <sup>3</sup> ) | Annual Volume<br>(m <sup>3</sup> ) | Comments                               |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|-----------------------------------|------------------------------------|----------------------------------------|
| Consented Take                                                                                                                                                                                                                                                                                                 | 10.5               | 907                               | 136,050 <sup>1</sup>               | CRC9901058 in progress                 |
| Peak Demand – current                                                                                                                                                                                                                                                                                          | 18.1*              | 916**<br>720 <sup>2</sup>         | 118,000 <sup>3</sup>               |                                        |
| Peak Demand - 2046                                                                                                                                                                                                                                                                                             | -                  | 990                               | 163,000                            | Daily volume adequate until about 2036 |
| Abstraction capacity                                                                                                                                                                                                                                                                                           | 10.4               | 900                               | 143,930                            | 1 bore pump (and alternate)            |
| <sup>1</sup> inferred volume based on 150 x daily volume (ECan)<br><sup>2</sup> March 2013<br><sup>3</sup> Jan –Dec 2013 adjusted to address overstated volume (actual was 142,660 m3)<br>(Note July 2012-June 2013 volume = 121,080 m3 actual, or 112,870 m3 adjusted)<br>*Jan 2015<br>**Jan 2009<br>*** 2014 |                    |                                   |                                    |                                        |

There is 360 m<sup>3</sup> of elevated reservoir storage. Additional volume can be delivered from storage at times of high demand.

Peak summer demands are high (but not extreme) relative to average winter demand (3x greater), suggesting some scope for demand management. However, average day demand over the winter months at 1,300 L/connection is higher than would be expected, suggesting high leakage from the network which requires investigation. Reducing losses will create additional capacity available for growth.

The water supply has sufficient capacity to meet current demands but capital upgrades will be required if projected growth is to be accommodated.

## 22.5 Resource Consents

The Springfield water supply has a number of resource consents. Table 22-3 shows the water take permitted by the resource consents for this scheme.

**Table 22-3 Resource Consents**

| Consent | Description | Location | Date Issued | Expiry Date | Consented Max | Consented Max Daily |
|---------|-------------|----------|-------------|-------------|---------------|---------------------|
|---------|-------------|----------|-------------|-------------|---------------|---------------------|

|                                  |                                                                                          |                                   |           |           | Instantaneous Flow (L/s) | Volume (m <sup>3</sup> /day) |
|----------------------------------|------------------------------------------------------------------------------------------|-----------------------------------|-----------|-----------|--------------------------|------------------------------|
| CRC991058<br>(Issued – Inactive) | To take surface water, at or about map reference L35:243-643 for community water supply. | Springfield Township, SPRINGFIELD | 28-Aug-98 | 28-Aug-35 | 10.5                     | 907                          |
| CRC155932<br>(Issued – Inactive) | to divert, take and use water                                                            | Upper & Lower Kowai River, etc    | 28-Aug-15 | 5-Nov-28  | 10                       | 864                          |

## 22.6 Water Quality

The Springfield water supply is a non-secure source and is currently sampled twice weekly at the source, treatment plant and weekly in the reticulation.

The following details E. coli transgressions for the period 2012 to 2017.

### Source

There has been 10 E. coli source transgressions during this period.

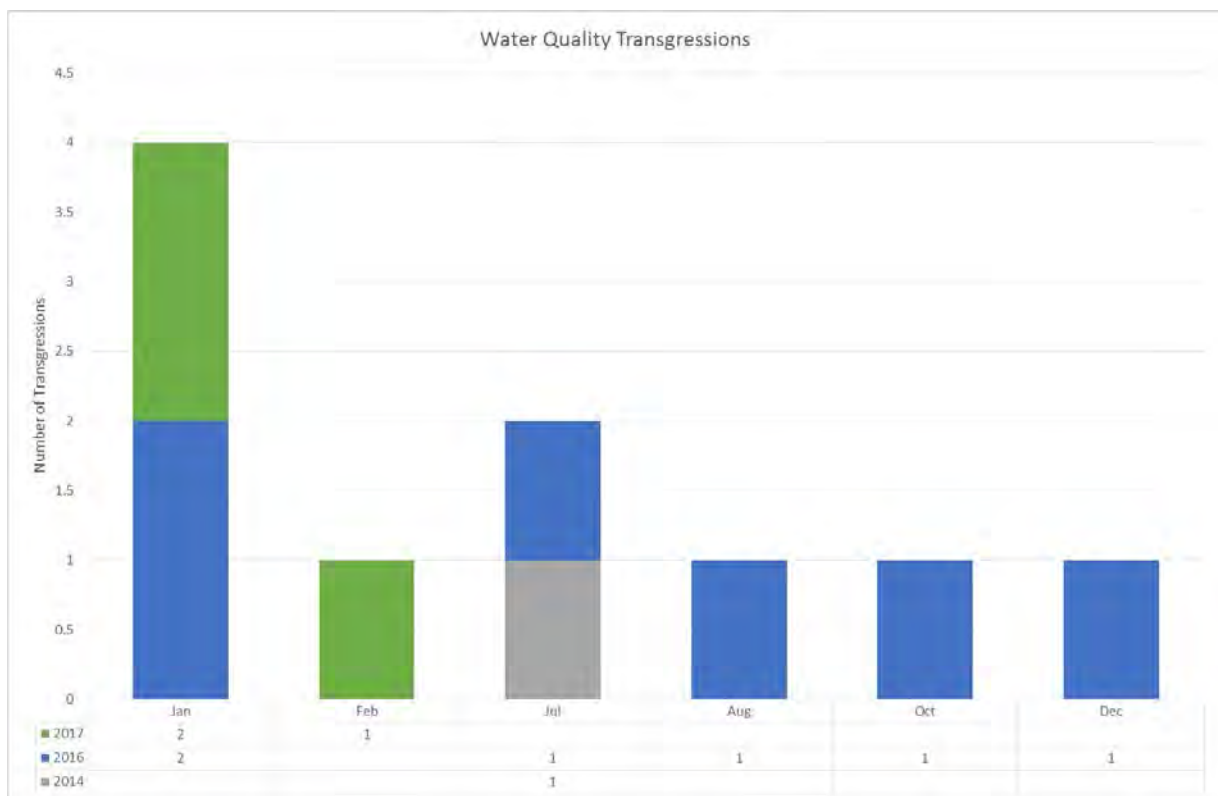


**Figure 22-3 E.coli Transgressions - Source**

### Treatment

There have been no E. coli treatment transgressions during this period.

### Zone

There has been one E. coli Zone transgressions during this period which occurred in April 2017.

## Chemical Analysis

The following is a summary of the raw water chemical analysis carried out at the Springfield Water Supply.

**Table 22-4 Springfield Water Supply Raw Water Chemical Analysis Summary**

| Parameter                                   | Standards<br>MAV* (GV)** | Plant 2011 | Plant 2017 | Status |
|---------------------------------------------|--------------------------|------------|------------|--------|
| Total Lead (g/m3)                           | 0.01                     | 0.0021     | 0.000160   | ✓      |
| pH (pH units)                               | 7-8.5                    | 7.5        | 7.3        | ✓      |
| Total Hardness (g/m3 as CaCO <sub>3</sub> ) | <200                     | 45         | 40.1       | ✓      |
| Total Calcium (g/m3)                        | n/v                      | 12.1       | 11.27      | ✓      |
| Total Iron (g/m3)                           | <0.2                     | 0.041      | 0.030      | ✓      |
| Total Sodium (g/m3)                         | <200                     | 4.7        | 4.38       | ✓      |
| Nitrate - Nitrogen (g/m3)                   | 11.3                     | 0.64       | 0.571      | ✓      |

\* MAV – Maximum Acceptable Value

\*\* (GV) – Guideline Value

## 22.7 Scheme Assets

A summary of material and diameter for pipes in Springfield is shown below in Figure 22-4 and Figure 22-5.

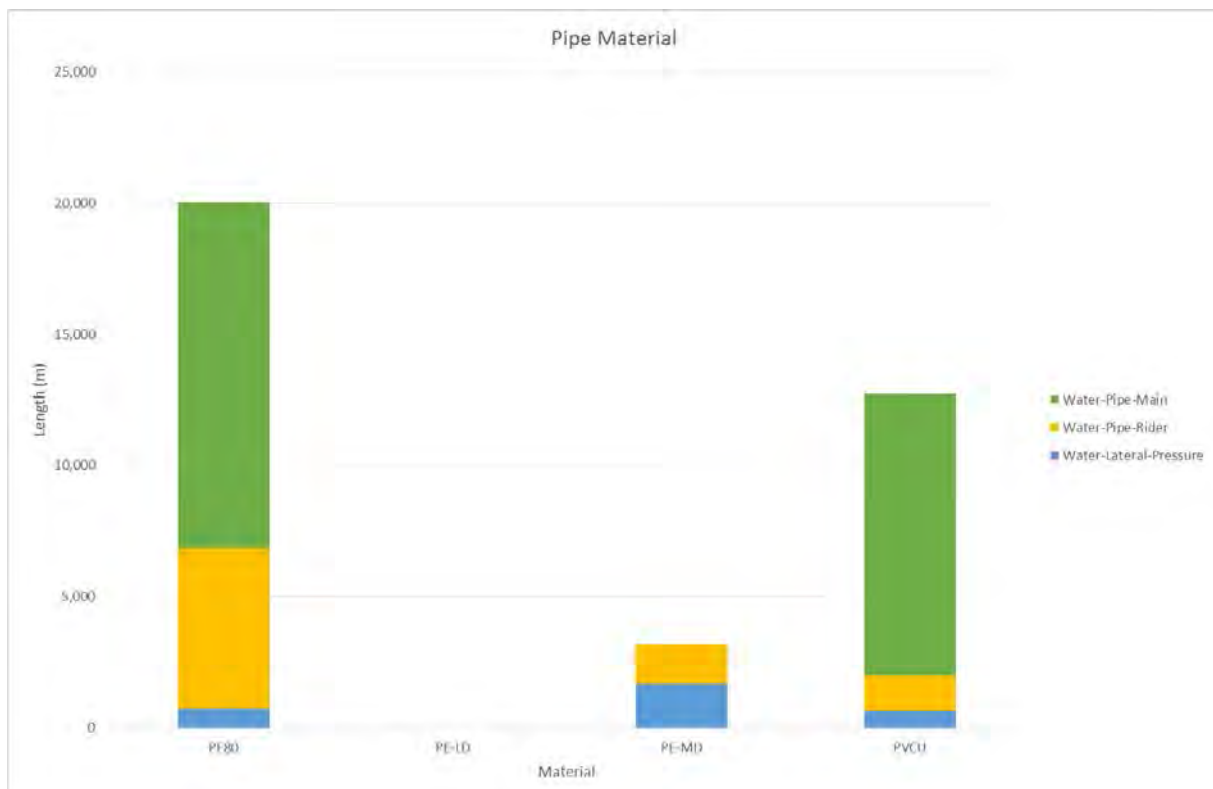




**Figure 22-4 Pipe Material – Springfield**

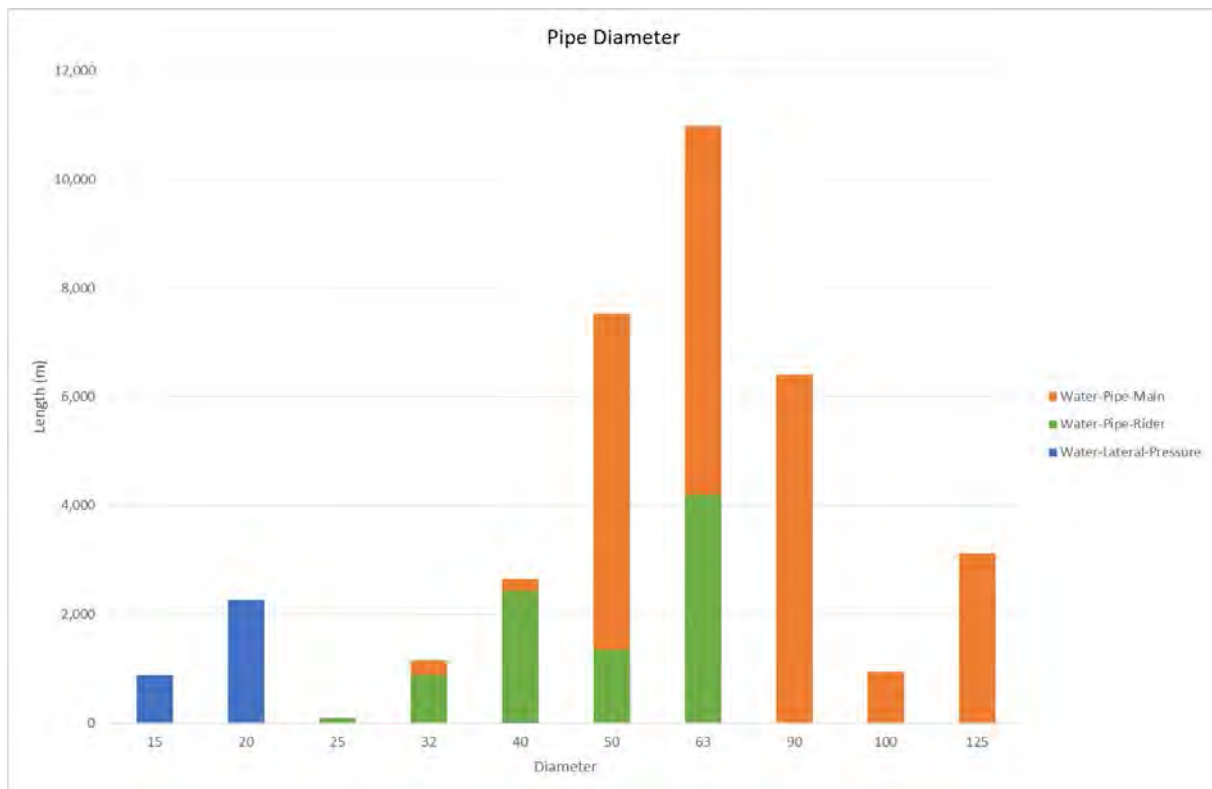


**Figure 22-5 Pipe Diameter – Springfield**

## 22.8 Operational Management

The water supply is operated and maintained under two maintenance contracts as follows:

- Contract 1241: Water Services Contract. Contract is with SICON Ferguson who undertakes investigations, conditions inspections, proactive and reactive maintenance and minor asset renewals; and
- Contract 1202: Parks and Reserves Contract. Contract is with SICON Ferguson who undertakes the maintenance of land scape features related to water services e.g. mowing, gardens etc.

Water quality sampling is completed under an agreement with Food and Health Ltd as required.

## 22.9 Photos of Main Assets



**Photo 1: Intake**



**Photo 2: Treatment Plant**



**Photo 3: Main Reservoir**

## 22.10 Risk Assessment

A risk assessment has been undertaken for the Springfield scheme. The key output from the risk assessment is the identification of any extreme and high risks which need to be mitigated. In order to mitigate these risks they have been included and budgeted for in the projects within this LTP. Table 22-5 details the risk priority rating, Table 22-6 outlines the risks and the list of key projects is found in Table 22-11.

**Table 22-5 Risk Priority Rating**

| Risk Score | Level of Risk | Risk Response                                                                                                                                         |
|------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| > 50       | Extreme       | Awareness of the event to be reported to Council.<br>Urgent action to eliminate / mitigate / manage the risk.<br>Document risk and action in the AMP. |
| 35-50      | Very High     | Risk to be eliminated / mitigated / managed through normal business planning processes with responsibility assigned.                                  |
| 14-35      | High          | Manage risk using routine procedures.                                                                                                                 |
| 3.5-14     | Moderate      | Monitor the risk.                                                                                                                                     |
| < 3.5      | Low           | Awareness of the event to be reported to Council.<br>Immediate action required to eliminate / mitigate / manage the risk.                             |

|  |  |                                      |
|--|--|--------------------------------------|
|  |  | Document risk and action in the AMP. |
|--|--|--------------------------------------|

**Table 22-6 Risks – Springfield**

| Risk                                                    | Action/Project                                | Year Identified | 2014 Risk Rating | 2017 Risk Rating | Residual Risk Rating |
|---------------------------------------------------------|-----------------------------------------------|-----------------|------------------|------------------|----------------------|
| Access issues (currently located private property)      | Gravel track                                  | 2014            | 9                | 9                | 9                    |
| Inadequate treatment                                    | Install filtration                            | 2014            | 45               | 45               | 45                   |
| Inadequate treatment                                    | Install UV Treatment                          | 2014            | 45               | 45               | 45                   |
| Inadequate treatment                                    | Design new treatment system UV and Filtration | 2014            | 45               | 45               | 45                   |
| Poor tank maintenance leads to tank failure             | Maintenance - re tighten covers/liners        | 2014            | 10               | 10               | 10                   |
| Electrical failure due to lightning or network spikes   | Install surge diverters                       | 2014            | 10               | 3.5              | 3.5                  |
| Failure to meet NES water meter standards               | NES Water Meter Compliance                    | 2014            | 20               | 6                | 6                    |
| Inability to collect income from non-metered properties | Install property water meters                 | 2014            | 27               | 0.6              | 0.6                  |

The list of district wide risks can be found in 5Waters Activity Management Plan: Volume 1.

## 22.11 Asset Valuation Details

The total replacement value of assets within the Springfield water scheme is \$3,610,764 with further details in Table 22-7 below.

**Table 22-7 Replacement Value, Springfield**

| Asset Class 1              | Asset Class 2 | Sum of Replacement Value |
|----------------------------|---------------|--------------------------|
| <b>Plant and Equipment</b> |               | \$638,646                |
| <b>Water Reticulation</b>  | Hydrant       | \$25,328                 |
|                            | Lateral       | \$122,508                |
|                            | Pipe          | \$2,628,874              |
|                            | Supply Point  | \$157,268                |
|                            | Valve         | \$38,140                 |

Replacement values for these different types of assets are shown in Figure 22-6 below.

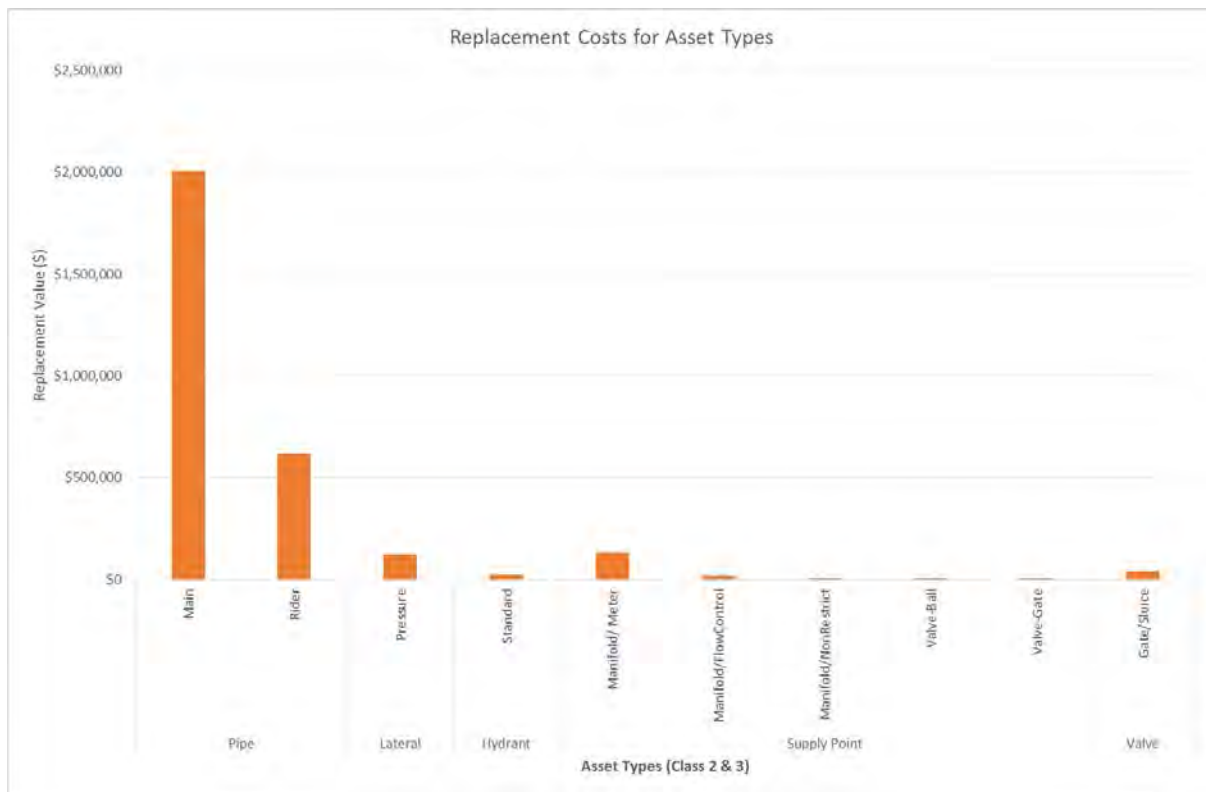


**Figure 22-6 Replacement Costs for Springfield**

## 22.12 Renewals

The renewal profile has been taken from the 2017 5 Waters Valuation. A graph showing the renewals for this scheme are shown by Figure 22-7 below. The majority renewals occur in 2022/2023.

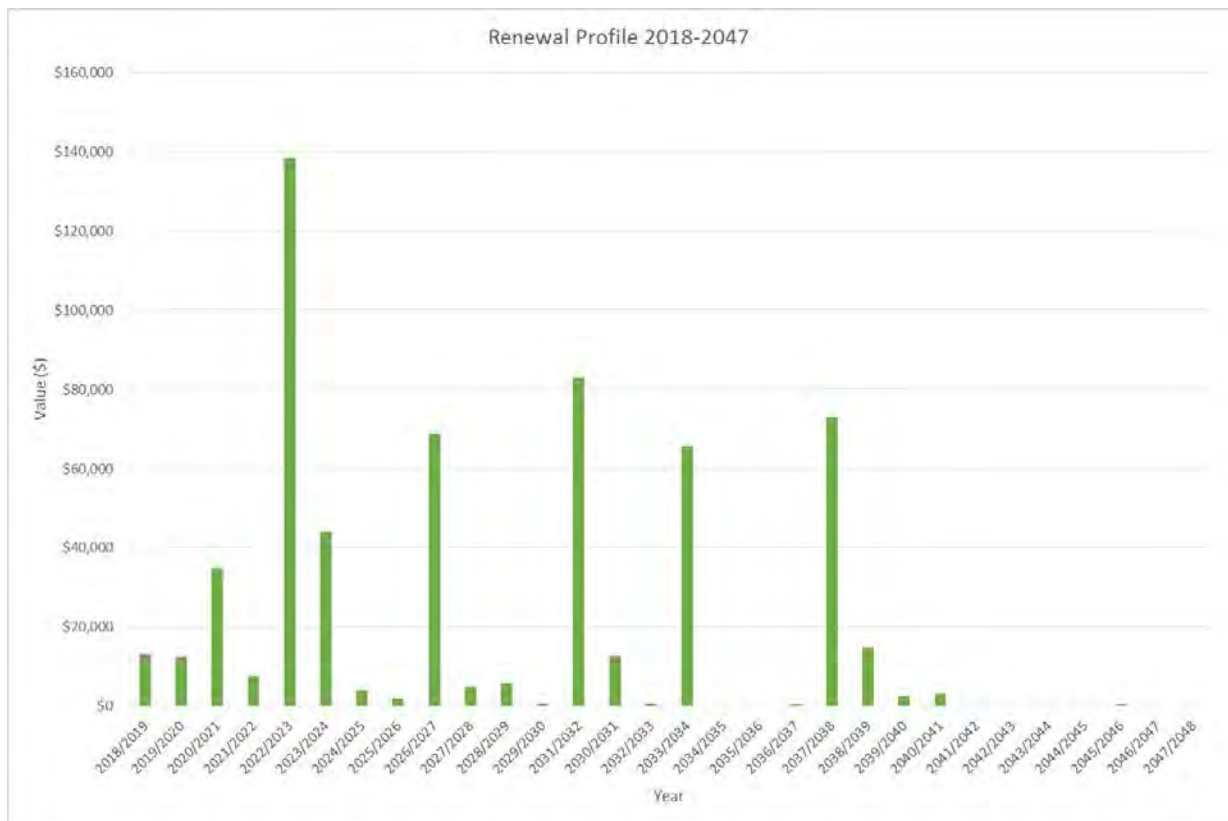


**Figure 22-7 Springfield Water Renewal Profile**

### 22.13 Critical Assets

The criticality model for Springfield has been updated for the 2015 AcMP. The methodology of the criticality model can be found in 5Waters Activity Management Plan: Volume 1 and it provides details of how the criticality has been calculated for the reticulation assets. Table 22-8 and Figure 22-8 below shows the calculated criticality for all of the assets within this scheme that have a recorded known length.

**Table 22-8 Length of Assets per Criticality Level**

| Criticality Bands |             | Length (m) |
|-------------------|-------------|------------|
| 5                 | Low         | 21,034     |
| 4                 | Medium-Low  | 9,721      |
| 3                 | Medium      | 2,142      |
| 2                 | Medium-High | 3,171      |
| 1                 | High        | 0          |

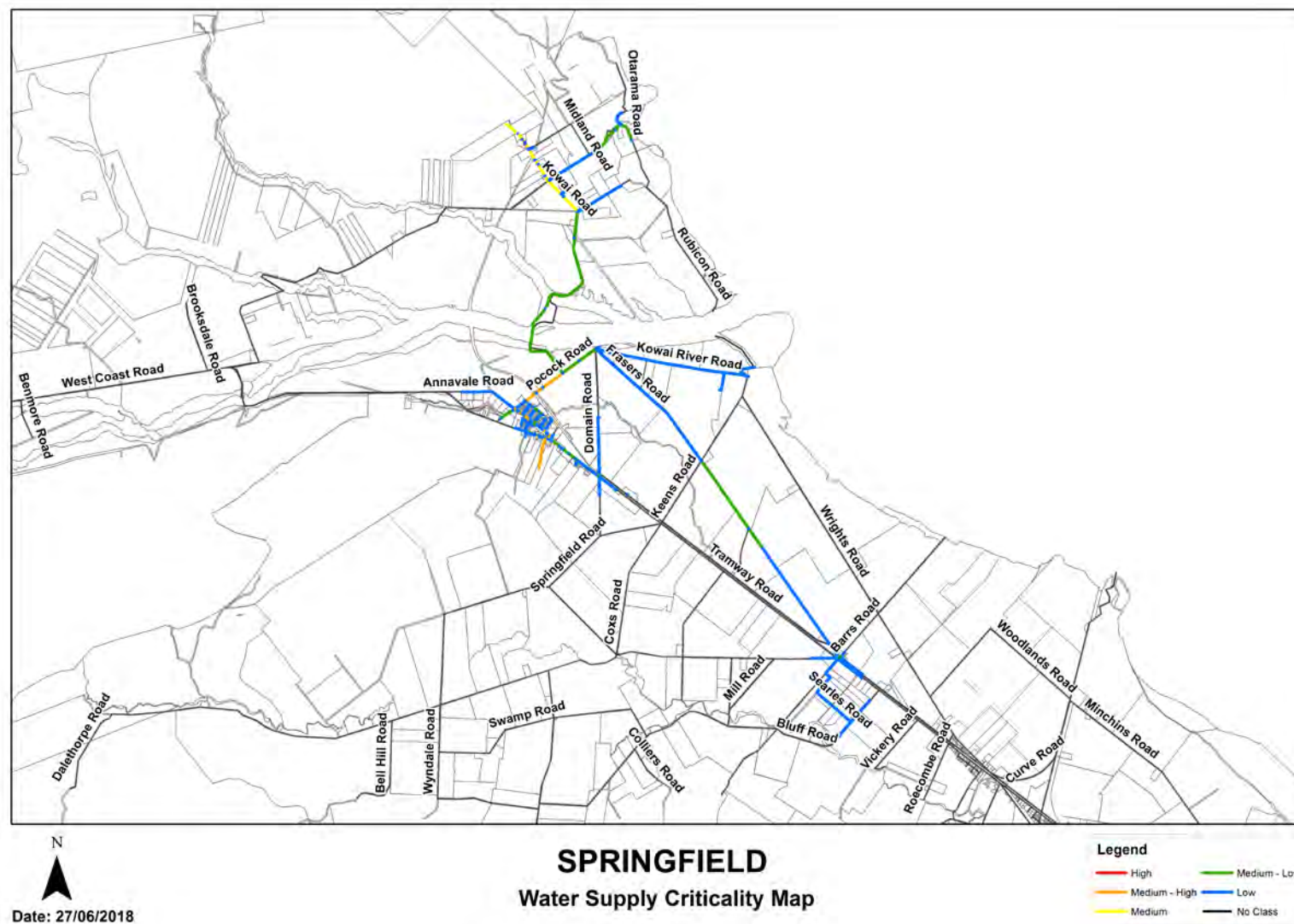


Figure 22-8 Criticality Map



## 22.14 Asset Condition

The asset condition model was run for Springfield in 2017. The methodology of the model can be found in 5Waters Activity Management Plan: Volume 1 which provides details of how the model has been calculated for the pipe reticulation assets. Figure 22-9 below shows the level of asset condition for these assets within this scheme that have a recorded known condition.

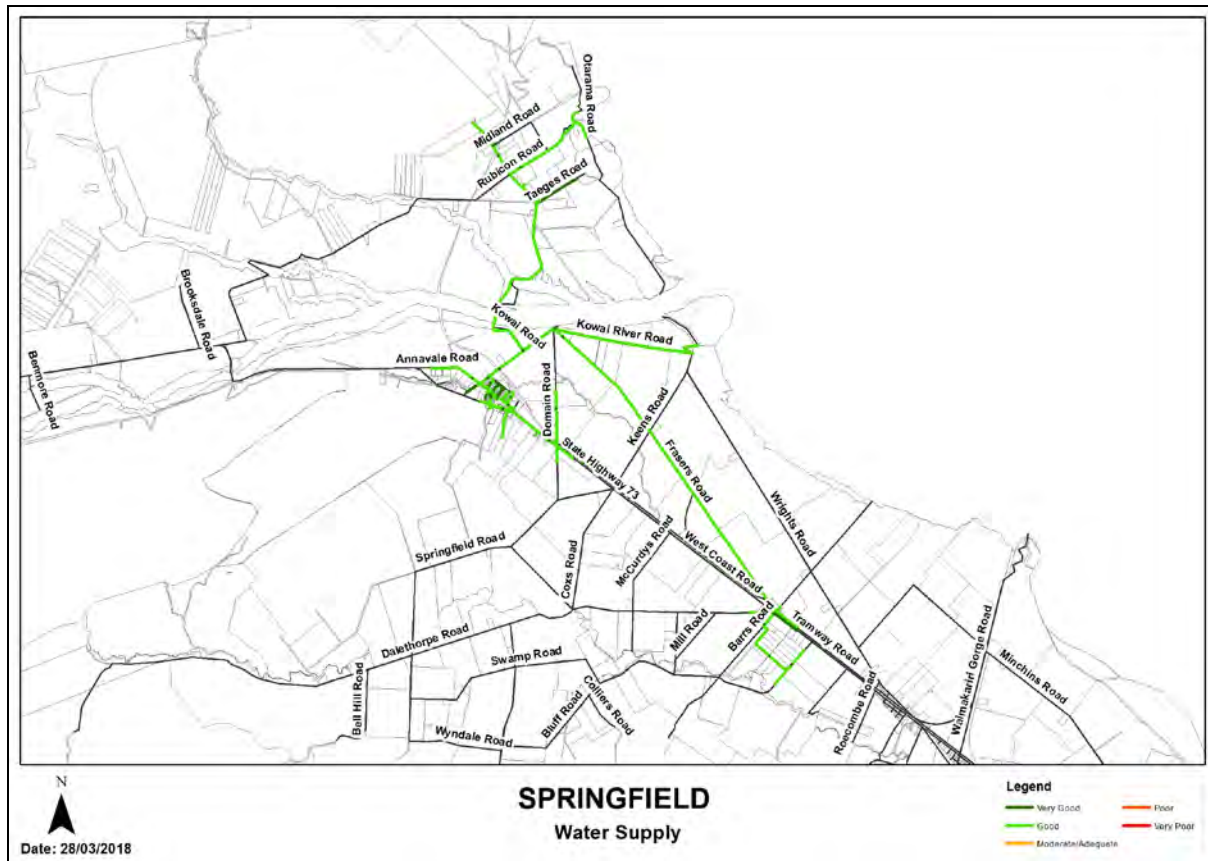


**Figure 22-9 Asset Condition – Springfield**

Table 22-9 provides a description of the condition rating used within the condition model.

**Table 22-9 Asset Condition Grading**

| Condition Rating | Grading   |
|------------------|-----------|
| 1.0              | Excellent |
| 2.0              | Good      |
| 3.0              | Moderate  |
| 4.0              | Poor      |
| 5.0+             | Fail      |

The number of pipe faults is also measured through the asset management system. Figure 22-10 shows the known historic pipe failures within this scheme.

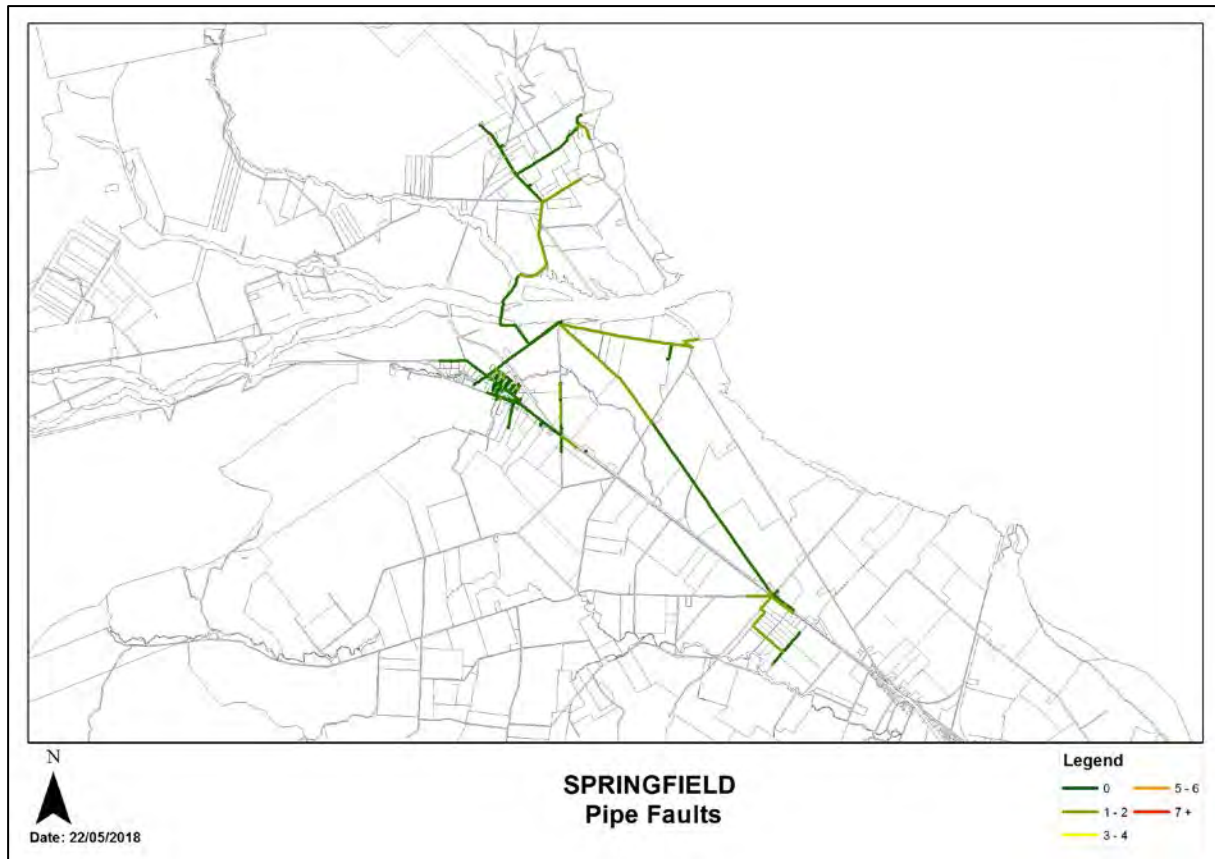


**Figure 22-10 Pipe Faults, Springfield**

### 22.15 Funding Program

The 10 year budgets for Springfield are shown by Table 22-10 and Figure 22-11. Budgets are split into expenditure, renewals, projects and capital projects.

All figures are (\$) not adjusted for CPI “inflation”. They are calculated on historical data, and population growth where relevant.

**Table 22-10 Springfield Budget Summary**

| Years     | Expenditure | Renewals  | Projects | Capital Projects |
|-----------|-------------|-----------|----------|------------------|
| 2018/2019 | \$134,050   | \$13,345  |          | \$110,000        |
| 2019/2020 | \$135,600   | \$12,660  |          |                  |
| 2020/2021 | \$137,100   | \$34,869  |          | \$600,000        |
| 2021/2022 | \$138,600   | \$7,510   |          |                  |
| 2022/2023 | \$140,100   | \$138,328 |          |                  |
| 2023/2024 | \$141,100   | \$44,115  |          |                  |

|           |             |           |  |           |
|-----------|-------------|-----------|--|-----------|
| 2024/2025 | \$141,100   | \$4,172   |  |           |
| 2025/2026 | \$141,100   | \$2,111   |  |           |
| 2026/2027 | \$141,100   | \$68,840  |  |           |
| 2027/2028 | \$141,100   | \$4,892   |  |           |
| Total     | \$1,390,950 | \$330,842 |  | \$710,000 |

An explanation of the categories within the budgets are as follows below:

- Expenditure consists of operation and maintenance costs;
- Renewals are replacement of assets which are nearing or exceeded their useful life;
- Projects are investigations, decisions and planning activities which exclude capital works; and
- Capital projects are activities involving physical works.

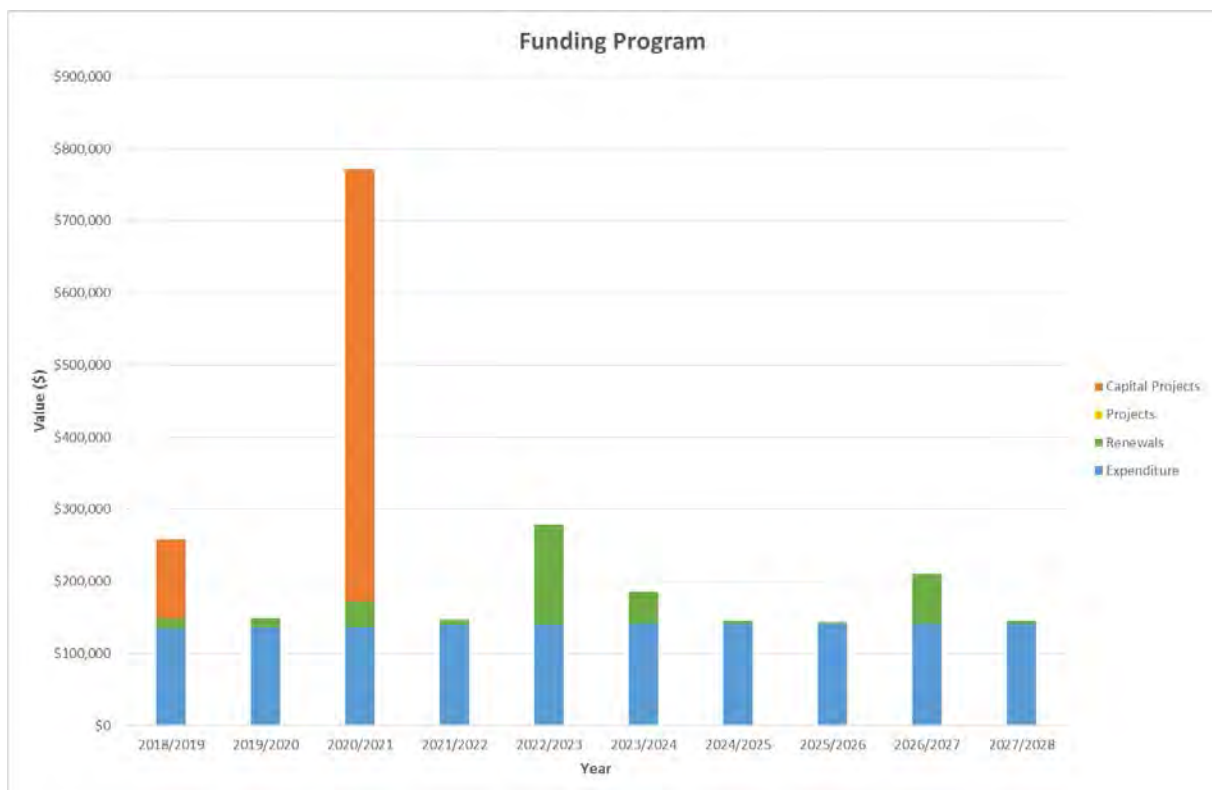


**Figure 22-11 Springfield Funding Summary**

There are two major projects for Springfield water scheme in the LTP budget.

**Table 22-11 Key Projects**

| Account Label    | GL        | Description            | Year 1 (\$) | Year 2 (\$) | Year 3 (\$) | Years 4 to 10 | Funding Split <sup>19</sup> |
|------------------|-----------|------------------------|-------------|-------------|-------------|---------------|-----------------------------|
| Capital Projects | 408090055 | Gravel track           | \$10,000    |             |             |               | 100% LoS                    |
| Capital Projects | 408090056 | Water quality upgrades | \$100,000   |             | \$600,000   |               | 100% LoS                    |

The list of district wide projects can be found in 5Waters Activity Management Plan: Volume 1.

### Discussion on Projects

Projects have been determined based on their:

- Relevance to the scheme
- Requirement to be completed under legislation
- Ability to bring the scheme up to or maintain the Level of Service required under council's Asset Management Policy.

Many projects are **jointly** funded by more than one scheme and activity. Each scheme pays a pro-rata share only, equivalent to the number of connections.

### Discussion on Capital and Projects

Where relevant, Capital (Levels of Service) and Capital (Growth) projects have been included in the scheme financial details.

Levels of Service Projects and growth splits have been provided to ensure the costs of population driven works are clear.

<sup>19</sup> Where LoS refers to Level of Service and G refers to Growth

## 23.0 SPRINGSTON WATER SUPPLY

### 23.1 Scheme Summary

| Description                                   |                                   | Quantity                       |
|-----------------------------------------------|-----------------------------------|--------------------------------|
| <b>Estimated Population Served</b>            |                                   | 529                            |
| <b>Scheme Coverage</b><br>(1 Jan 2018)        | Full Charges                      | 189                            |
|                                               | Half Charges                      | 0                              |
|                                               | >1 Charges                        | 0                              |
| <b>System Components</b>                      | Bores/Intakes (No.)               | 1 Bore                         |
|                                               | Treatment/Disinfection            | None                           |
|                                               | Reservoirs (No.)                  | 2 Storage tanks                |
|                                               | Pump Stations (No.)               | 1                              |
|                                               | Piped (m)                         | 7038                           |
| <b>History</b>                                | Original scheme installation date | 1969                           |
| <b>Value (\$)</b>                             | Replacement Cost                  | \$1,110,609.59                 |
|                                               | Depreciated Replacement Cost      | \$660,603.26                   |
| <b>Financial</b>                              | 2018/2019 Estimate                | \$49,025                       |
|                                               | Annual maintenance cost           | 1.53%                          |
|                                               | % of total                        |                                |
| <b>Demand (m3)</b><br>(1 Jan – 31 Dec 2017)   | Average daily                     | 196                            |
|                                               | Peak daily                        | 595                            |
|                                               | Minimum daily                     | 87                             |
|                                               | Average daily per connection      | 1.04                           |
| <b>Type of Supply</b>                         |                                   | High pressure and unrestricted |
| <b>Target Pressure &amp; Flow at boundary</b> | Pressure                          | >350kPa                        |
|                                               | Flow                              | >15L/min                       |
| <b>Sustainability</b>                         | Well Security                     | Secure                         |

### 23.2 Key Issues

There are no key issues associated with the Springston water supply. A list of district wide issues are located in 5Waters Activity Management Plan: Volume 1.

### 23.3 Overview & History

The Springston Water Supply provides untreated groundwater to the Springston community located approximately 5kms west of Lincoln. Properties within the township originally obtained their domestic water from shallow bores until contamination of the groundwater presumably by septic tanks necessitated installation of a community water supply in 1969.

The Springston scheme was designed as an unrestricted supply complying with the NZ Fire Fighting Code of Practice.

A new deep (>100m) bore was brought into service in 2008 to address water quality issues. The old well, also at Mather Place has been abandoned.

The mothballed well has not been disconnected, and a submersible pump still remains in it. It has been suggested that this well remain as an emergency standby using chlorination. That should not occur.



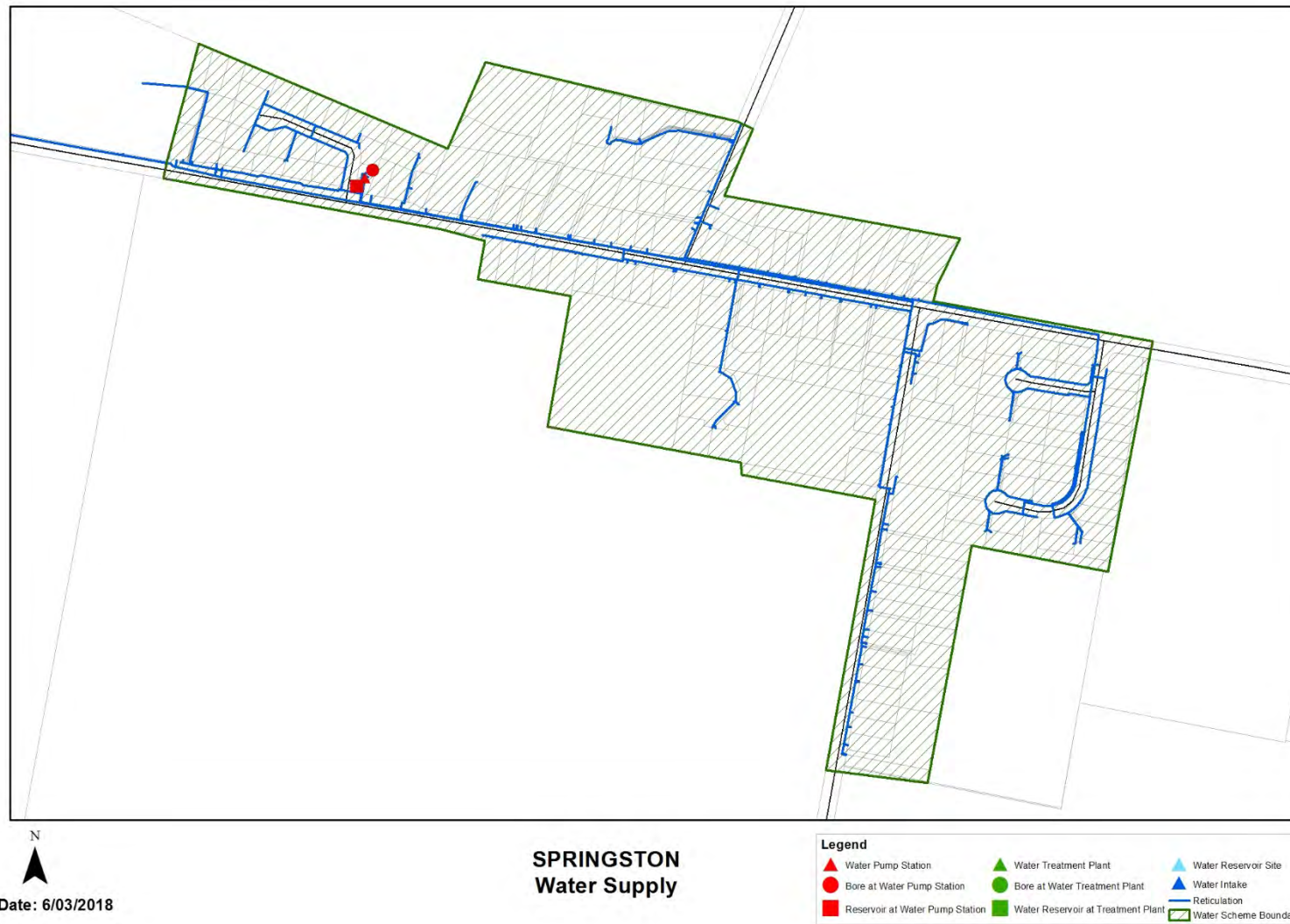


**Figure 23-1 Scheme Map**

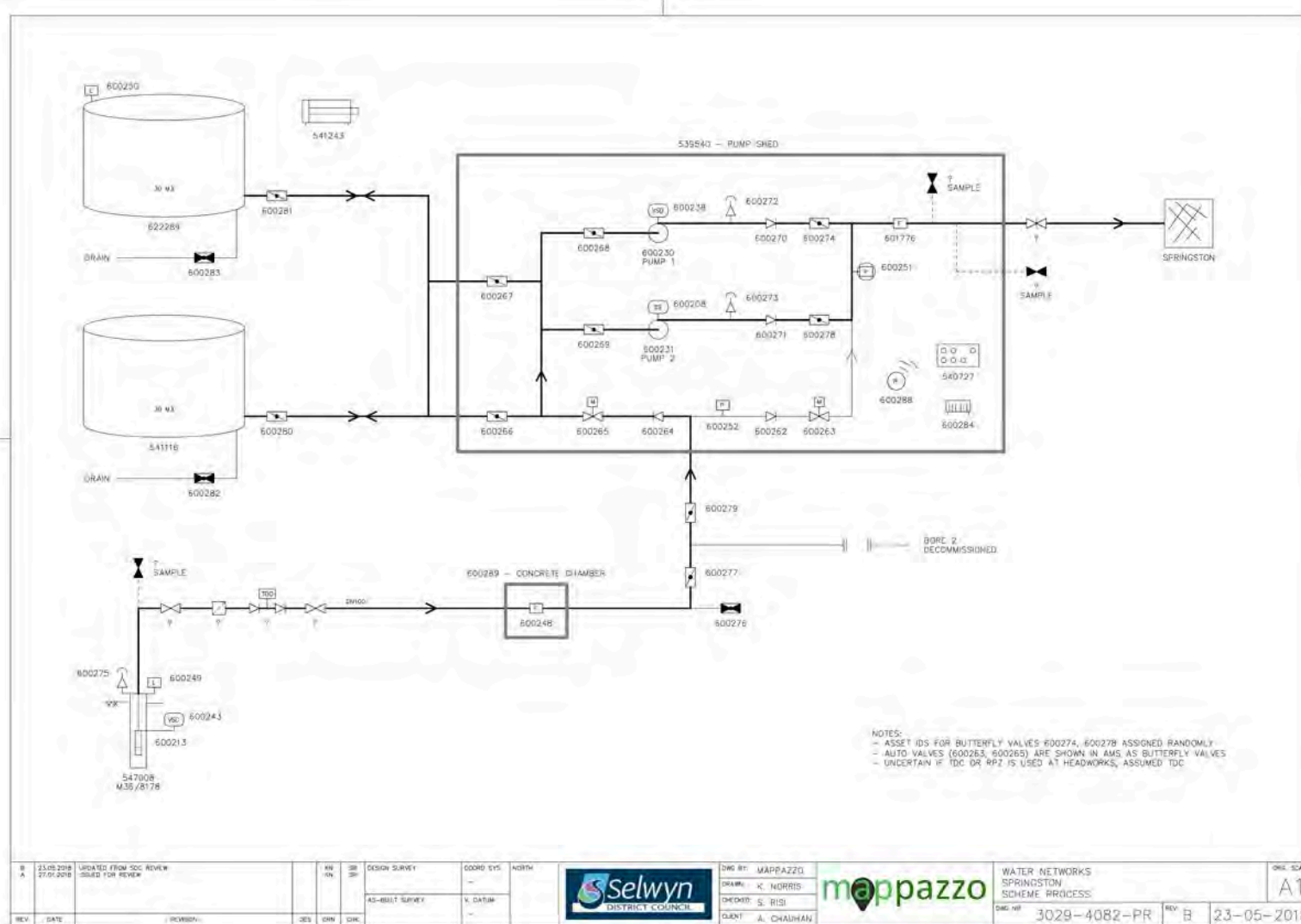


Figure 23-2 Scheme Schematic

## 23.4 System Capacity

There is adequate supply capacity to meet current and projected demands for this community.

**Table 23-1 Capacity Summary**

|                      | Flow Rate<br>(L/s) | Daily Volume<br>(m <sup>3</sup> ) | Annual Volume<br>(m <sup>3</sup> ) | Comments      |
|----------------------|--------------------|-----------------------------------|------------------------------------|---------------|
| Abstraction Capacity | 16.7               | 1443                              | -                                  | One bore pump |
| Consented Take       | 15                 | 900                               | 135,000*                           | CRC010895.1   |
| Peak Demand          | 17.3**             | 843**                             | 78,300                             |               |
| * inferred value     |                    |                                   |                                    |               |
| **Jan 2015           |                    |                                   |                                    |               |

## 23.5 Resource Consents

The Springston water supply has a number of resource consents. Table 23-2 shows the water take permitted by the resource consents for this scheme.

**Table 23-2 Resource Consents**

| Consent                        | Description                  | Location                            | Date Issued | Expiry Date | Consented Max Instantaneous Flow (L/s) | Consented Max Daily Volume (m <sup>3</sup> /day) |
|--------------------------------|------------------------------|-------------------------------------|-------------|-------------|----------------------------------------|--------------------------------------------------|
| CRC010895.1<br>(Issued-Active) | To take and use groundwater. | Ellesmere Junction Road, SPRINGSTON | 4-Dec-08    | 31-Jan-35   | 15                                     | 900                                              |

## 23.6 Water Quality

The Springston water supply is a secure source and is currently sampled twice weekly at the treatment plant and weekly in the reticulation zone.

The following details E. coli transgressions for the period 2012 to 2017.

### Treatment

There have been no E. coli treatment transgressions during this period.

### Zone

There have been two E. coli transgressions during this period, these occurred in March 2015 and June 2016.

### Chemical Analysis

The following is a summary of the raw water chemical analysis carried out at the Springston Water Supply.

**Table 23-3 Springston Water Raw Water Chemical Analysis Summary**

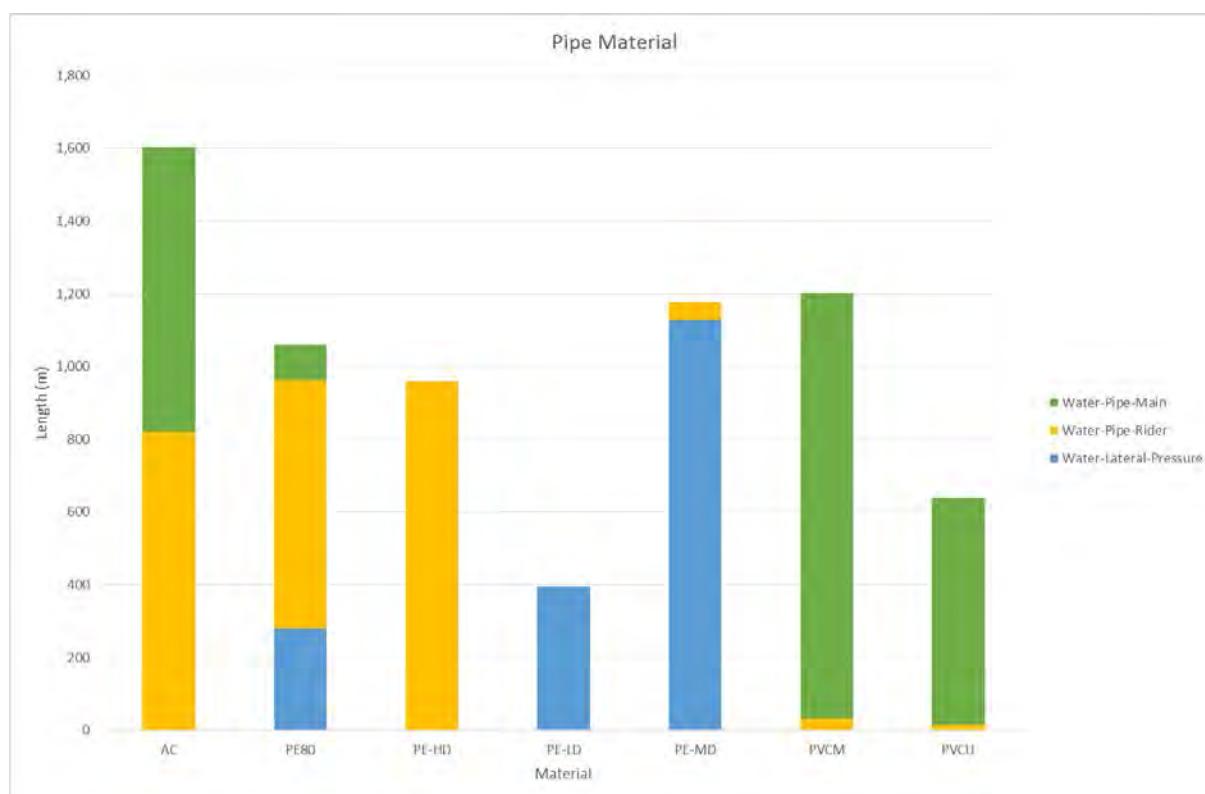
| Parameter                                   | Standards<br>MAV* (GV)** | Plant 2015 | Plant 2017 | Status |
|---------------------------------------------|--------------------------|------------|------------|--------|
| Total Lead (g/m3)                           | 0.01                     | <0.00011   | < 0.00011  | ✓      |
| pH (pH units)                               | 7-8.5                    | 7.9        | 7.8        | ✓      |
| Total Hardness (g/m3 as CaCO <sub>3</sub> ) | <200                     | 50         | 48.9       | ✓      |
| Total Calcium (g/m3)                        | n/v                      | 16.6       | 16.37      | ✓      |
| Total Iron (g/m3)                           | <0.2                     | <0.021     | < 0.021    | ✓      |
| Total Sodium (g/m3)                         | <200                     | 9.3        | 8.68       | ✓      |
| Nitrate - Nitrogen (g/m3)                   | 11.3                     | 1.61       | 1.72       | ✓      |

\* MAV – Maximum Acceptable Value

\*\* (GV) – Guideline Value

## 23.7 Scheme Assets

A summary of material and diameter for pipes in Springston is shown below in Figure 23-3 and Figure 23-4.


**Figure 23-3 Pipe Material – Springston**

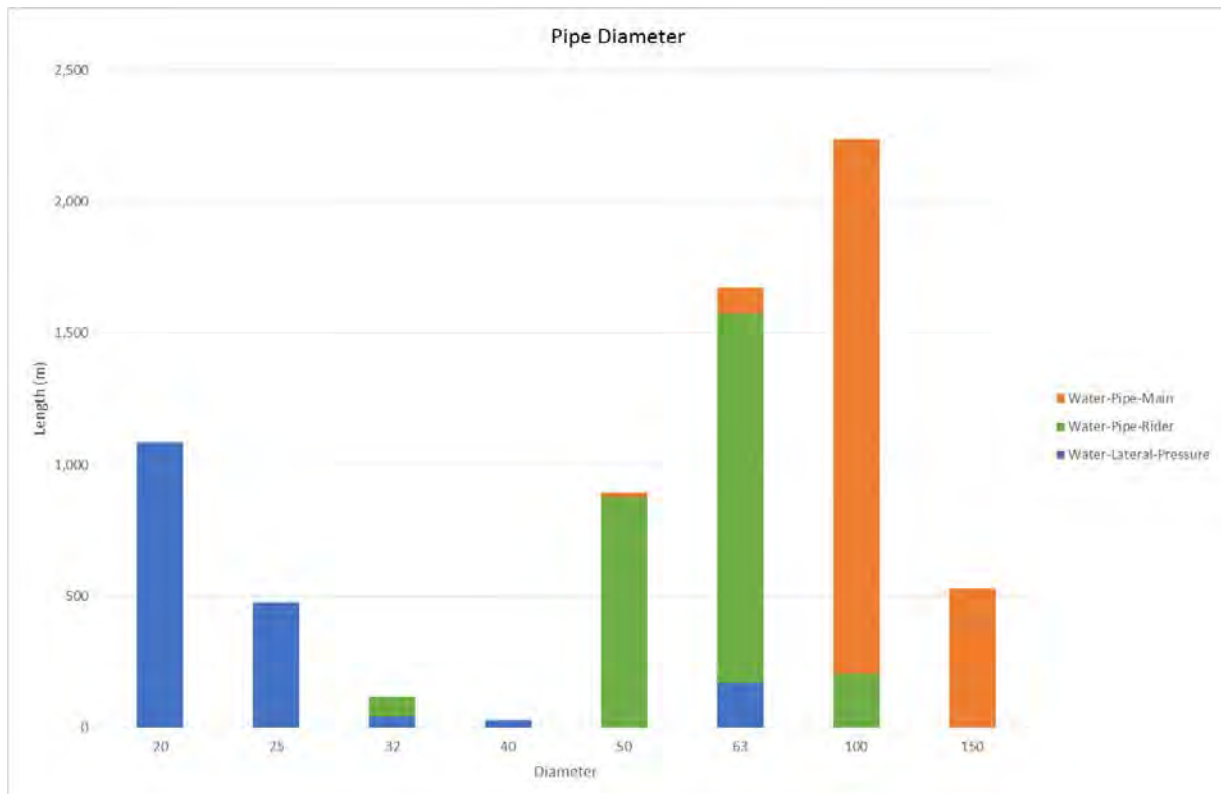


**Figure 23-4 Pipe Diameter – Springston**

## 23.8 Operational Management

The water supply is operated and maintained under two maintenance contracts as follows:

- Contract 1241: Water Services Contract. Contract is with SICON Ferguson who undertakes investigations, conditions inspections, proactive and reactive maintenance and minor asset renewals; and
- Contract 1202: Parks and Reserves Contract. Contract is with SICON Ferguson who undertakes the maintenance of land scape features related to water services e.g. mowing, gardens etc.

Water quality sampling is completed under an agreement with Food and Health Ltd as required.

## 23.9 Photos of Main Assets



**Photo 1: Bore headworks and reservoirs**

## 23.10 Risk Assessment

A risk assessment has been undertaken for the Springston scheme. The key output from the risk assessment is the identification of any extreme and high risks which need to be mitigated. In order to mitigate these risks they have been included and budgeted for in the projects within this LTP. Table 23-4 details the risk priority rating, Table 23-5 outlines the risks and the list of key projects is found in Table 23-10.

**Table 23-4 Risk Priority Rating**

| Risk Score | Level of Risk | Risk Response                                                                                                                                                     |
|------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| > 50       | Extreme       | Awareness of the event to be reported to Council.<br>Urgent action to eliminate / mitigate / manage the risk.<br>Document risk and action in the AMP.             |
| 35-50      | Very High     | Risk to be eliminated / mitigated / managed through normal business planning processes with responsibility assigned.                                              |
| 14-35      | High          | Manage risk using routine procedures.                                                                                                                             |
| 3.5-14     | Moderate      | Monitor the risk.                                                                                                                                                 |
| < 3.5      | Low           | Awareness of the event to be reported to Council.<br>Immediate action required to eliminate / mitigate / manage the risk.<br>Document risk and action in the AMP. |

**Table 23-5 Risks – Springston**

| Risk            | Action/Project                        | Year Identified | 2014 Risk Rating | 2017 Risk Rating | Residual Risk Rating |
|-----------------|---------------------------------------|-----------------|------------------|------------------|----------------------|
| Noisy pump shed | Look at means to reduce noise volumes | 2014            | 4                | 4                | 4                    |



|                                                         |                                          |      |    |     |     |
|---------------------------------------------------------|------------------------------------------|------|----|-----|-----|
| Electrical failure due to lightning or network spikes   | Install surge diverters                  | 2014 | 10 | 10  | 10  |
| Failure to meet NES water meter standards               | NES Water Meter Compliance               | 2014 | 20 | 6   | 6   |
| Inability to collect income from non-metered properties | Install property water meters            | 2014 | 27 | 0.6 | 0.6 |
| Non-compliance with the DWSNZ                           | DWSNZ - Age Testing                      | 2014 | 10 | 0.7 | 0.7 |
| Non-compliance with the DWSNZ                           | DWSNZ - Bore-head security               | 2014 | 10 | 10  | 10  |
| Non-consented activities                                | Renewal of consents                      | 2014 | 27 | 27  | 6   |
| Scheme efficiency / redundancy                          | Join Springfield to Lincoln or Rolleston | 2017 |    | 2   | 0.7 |

The list of district wide risks can be found in 5Waters Activity Management Plan: Volume 1.

### 23.11 Asset Valuation Details

The total replacement value of assets within the Springston water scheme is \$1,110,610 with further details in Table 23-6 below.

**Table 23-6 Replacement Value, Springston**

| Asset Class 1              | Asset Class 2 | Sum of Replacement Value |
|----------------------------|---------------|--------------------------|
| <b>Plant and Equipment</b> |               | \$302,620                |
| <b>Water Reticulation</b>  | Hydrant       | \$23,601                 |
|                            | Lateral       | \$85,368                 |
|                            | Pipe          | \$525,388                |
|                            | Supply Point  | \$142,177                |
|                            | Valve         | \$31,455                 |

Replacement values for these different types of assets are shown in Figure 23-5 below.

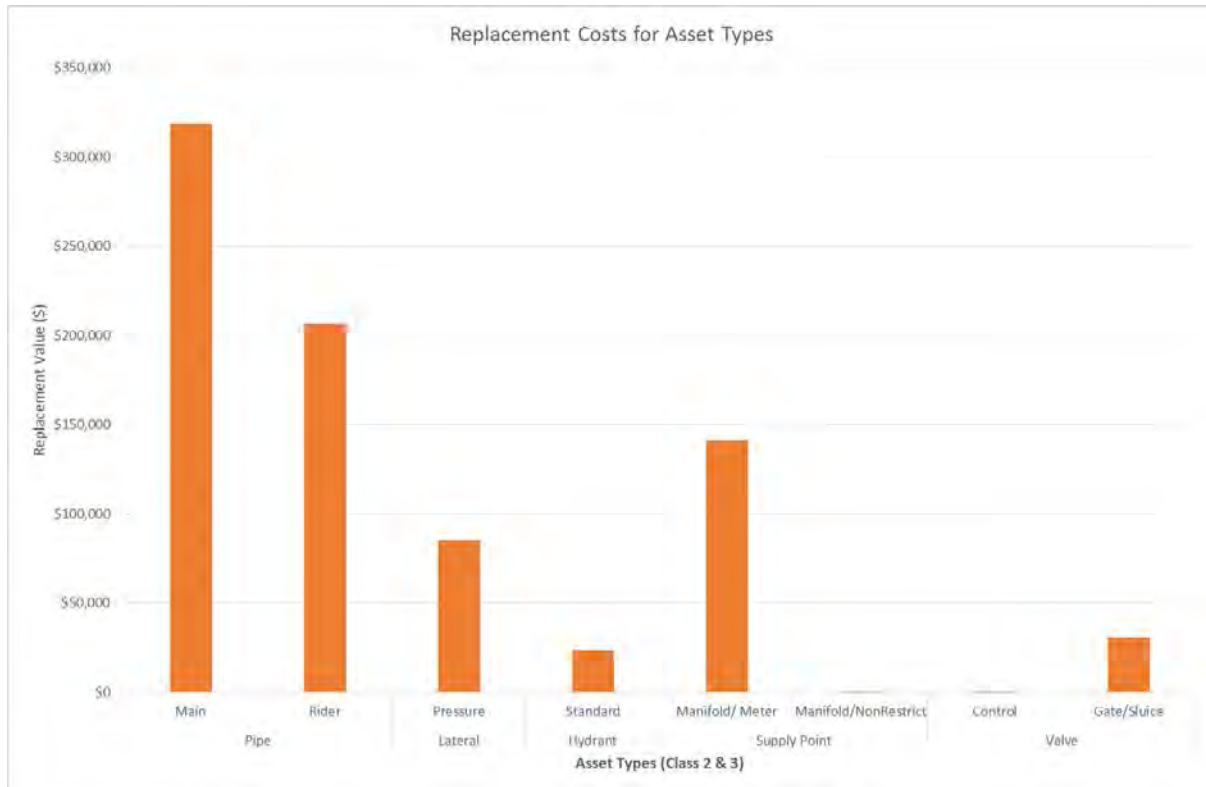


**Figure 23-5 Replacement Costs for Springston**

## 23.12 Renewals

The renewal profile has been taken from the 2017 5 Waters Valuation. A graph showing the renewals for this scheme are shown by Figure 23-6 below. The majority renewals occur in 2019/2020.



**Figure 23-6 Springston Water Renewal Profile**

### 23.13 Critical Assets

The criticality model for Springston has been updated for the 2018 AcMP. The methodology of the criticality model can be found in 5Waters Activity Management Plan: Volume 1 and it provides details of how the criticality has been calculated for the reticulation assets. Table 23-7 and Figure 23-7 below shows the calculated criticality for all of the assets within this scheme that have a recorded known length.

**Table 23-7 Length of Assets per Criticality Level**

| Criticality Bands |             | Length (m) |
|-------------------|-------------|------------|
| 5                 | Low         | 4,092      |
| 4                 | Medium-Low  | 2,344      |
| 3                 | Medium      | 365        |
| 2                 | Medium-High | 154        |
| 1                 | High        | 0          |

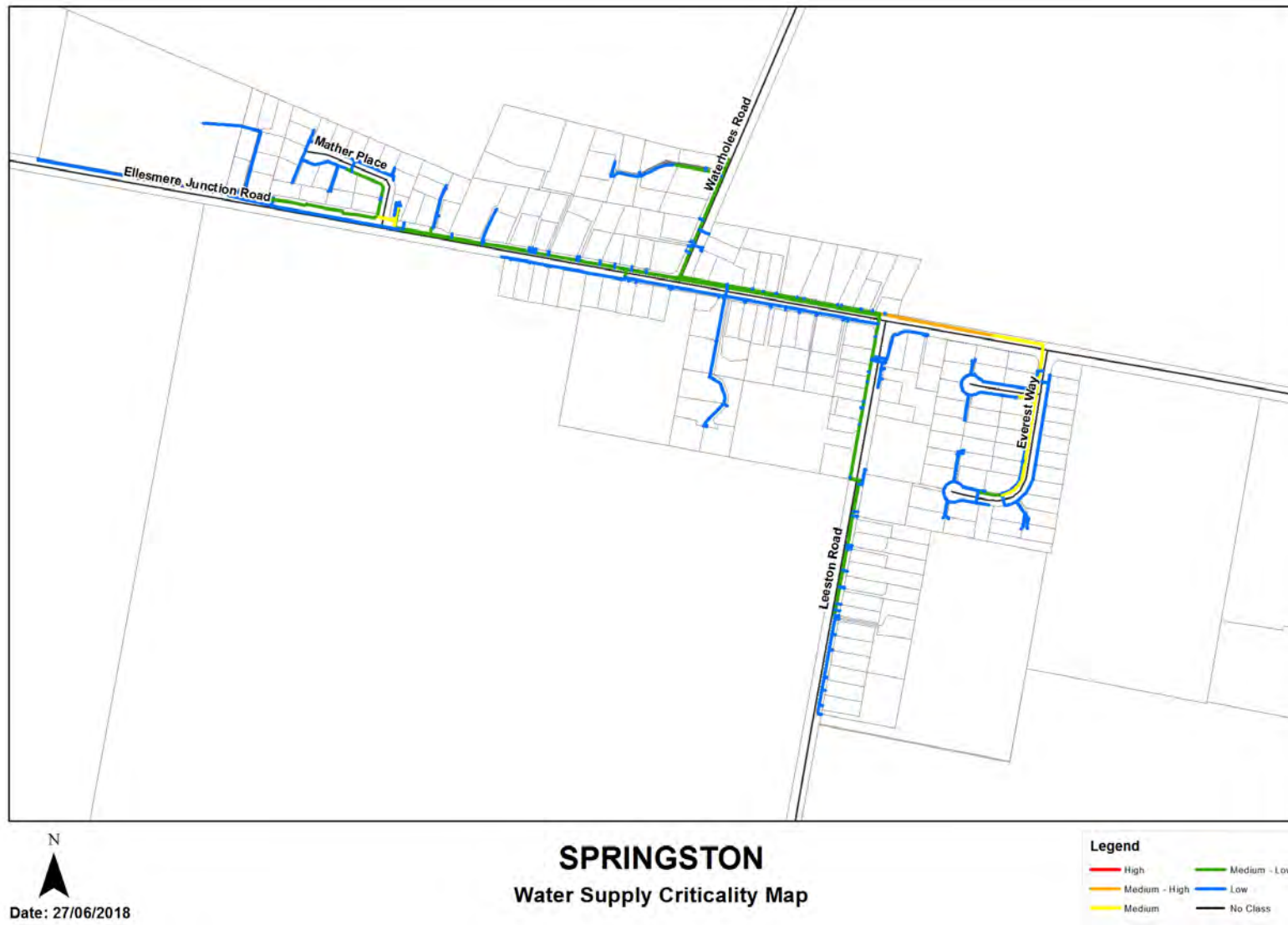


Figure 23-7 Criticality Map

## 23.14 Asset Condition

The asset condition model was run for Springston in 2017. The methodology of the model can be found in 5Waters Activity Management Plan: Volume 1 which provides details of how the model has been calculated for the pipe reticulation assets. Figure 23-8 below shows the level of asset condition for these assets within this scheme that have a recorded known condition.



**Figure 23-8 Asset Condition – Springston**

Table 23-8 provides a description of the condition rating used within the condition model.

**Table 23-8 Asset Condition Grading**

| Condition Rating | Grading   |
|------------------|-----------|
| 1.0              | Excellent |
| 2.0              | Good      |
| 3.0              | Moderate  |
| 4.0              | Poor      |
| 5.0+             | Fail      |

The number of pipe faults is also measured through the asset management system. Figure 23-9 shows the known historic pipe failures within this scheme.



**Figure 23-9 Pipe Faults, Springston**

### 23.15 Funding Program

The 10 year budgets for Springston are shown by Table 23-9 and Figure 23-10. Budgets are split into expenditure, renewals, projects and capital projects.

All figures are (\$) not adjusted for CPI “inflation”. They are calculated on historical data, and population growth where relevant.

**Table 23-9 Springston Budget Summary**

| Years     | Expenditure | Renewals  | Projects | Capital Projects |
|-----------|-------------|-----------|----------|------------------|
| 2018/2019 | \$49,025    | \$2,814   |          | \$10,000         |
| 2019/2020 | \$53,625    | \$204,788 |          | \$228,000        |
| 2020/2021 | \$53,725    | \$50,714  |          |                  |
| 2021/2022 | \$53,725    |           |          |                  |
| 2022/2023 | \$53,725    | \$30,108  |          |                  |
| 2023/2024 | \$53,725    | \$2,111   |          |                  |



|           |           |           |  |           |
|-----------|-----------|-----------|--|-----------|
| 2024/2025 | \$53,725  | \$18,132  |  |           |
| 2025/2026 | \$53,725  | \$2,111   |  |           |
| 2026/2027 | \$53,725  |           |  |           |
| 2027/2028 | \$53,725  |           |  |           |
| Total     | \$532,450 | \$310,778 |  | \$238,000 |

An explanation of the categories within the budgets are as follows below:

- Expenditure consists of operation and maintenance costs;
- Renewals are replacement of assets which are nearing or exceeded their useful life;
- Projects are investigations, decisions and planning activities which exclude capital works; and
- Capital projects are activities involving physical works.

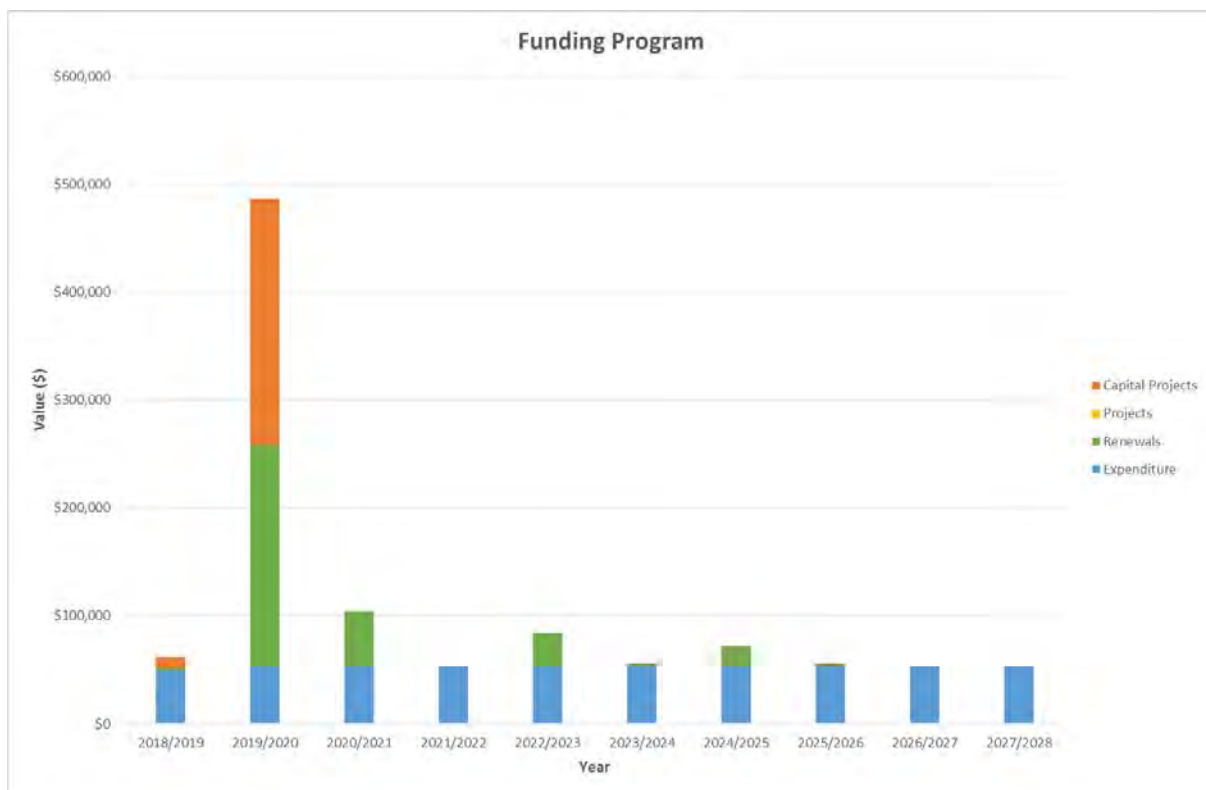


Figure 23-10 Springston Funding Summary

There are two major projects for Springston water scheme in the LTP budget.

**Table 23-10 Key Projects**

| Account Label    | GL        | Description  | Year 1 (\$) | Year 2 (\$) | Year 3 (\$) | Years 4 to 10 | Funding Split <sup>20</sup> |
|------------------|-----------|--------------|-------------|-------------|-------------|---------------|-----------------------------|
| Capital Projects | 408290031 | UV treatment |             | \$ 228,000  |             | \$ -          | 100% LoS                    |
| Capital Projects | 408290031 | UV Design    | \$ 10,000   |             |             | \$ -          | 100% LoS                    |

The list of district wide projects can be found in 5Waters Activity Management Plan: Volume 1.

### Discussion on Projects

Projects have been determined based on their:

- Relevance to the scheme
- Requirement to be completed under legislation
- Ability to bring the scheme up to or maintain the Level of Service required under council's Asset Management Policy.

Many projects are **jointly** funded by more than one scheme and activity. Each scheme pays a pro-rata share only, equivalent to the number of connections.

### Discussion on Capital and Projects

Where relevant, Capital (Levels of Service) and Capital (Growth) projects have been included in the scheme financial details.

Levels of Service Projects and growth splits have been provided to ensure the costs of population driven works are clear.

<sup>20</sup> Where LoS refers to Level of Service and G refers to Growth

## 24.0 TAI TAPU/OTAHUNA WATER SUPPLY

### 24.1 Scheme Summary

| Description                                   |                                   | Quantity                                       |
|-----------------------------------------------|-----------------------------------|------------------------------------------------|
| <b>Estimated Population Served</b>            |                                   | 666                                            |
| <b>Scheme Coverage</b><br>(1 Jan 2018)        | Full Charges                      | 188                                            |
|                                               | Half Charges                      | 31                                             |
|                                               | >1 Charges                        | 50 (Restricted)                                |
| <b>System Components</b>                      | Bores/Intakes (No.)               | 1                                              |
|                                               | Treatment/Disinfection            | None                                           |
|                                               | Reservoirs (No.)                  | 4                                              |
|                                               | Pump Stations (No.)               | 2                                              |
|                                               | Piped (m)                         | 21,298                                         |
| <b>History</b>                                | Original scheme installation date | 1972                                           |
| <b>Value (\$)</b>                             | Replacement Cost                  | \$2,553,077.15                                 |
|                                               | Depreciated Replacement Cost      | \$1,695,747.02                                 |
| <b>Financial</b>                              | 2018/2019 Estimate                | \$70,900                                       |
|                                               | Annual maintenance cost           | 2.21%                                          |
|                                               | % of total                        |                                                |
| <b>Demand (m3)</b><br>(1 Jan – 31 Dec 2017)   | Average daily                     | 395                                            |
|                                               | Peak daily                        | 989                                            |
|                                               | Minimum daily                     | 141                                            |
|                                               | Average daily per connection      | 1.66                                           |
| <b>Type of Supply</b>                         |                                   | High pressure with restricted and unrestricted |
| <b>Target Pressure &amp; Flow at boundary</b> | Pressure                          | >310kPa                                        |
|                                               | Flow                              | >20L/min                                       |
| <b>Sustainability</b>                         | Well Security                     | Secure                                         |

### 24.2 Key Issues

The following key issues are associated with the Tai Tapu water supply. A list of district wide issues are located in 5Waters Activity Management Plan: Volume 1.

**Table 24-1 Tai Tapu Scheme Issues**

| What's the Problem                                             | What we plan to do                                                                      |
|----------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| Review and confirm pumping capacity and plan for future growth | Growing community may put pressure on supply and investigate demand management measures |

### 24.3 Overview & History

The Tai Tapu Water Supply provides untreated groundwater to the Tai Tapu township and the nearby Otahuna Valley area (restricted supply, 3m<sup>3</sup>/property).

The community water supply was installed in 1972 to overcome health concerns in relation to septic tank effluent and high groundwater levels leading to contamination shallow domestic wells.

Attempts at drilling deep bores adjacent to the Scout Den were unsuccessful with no water found. An attempt near Ryans bridge on Lincoln Tai Tapu Road was unsuccessful with a very high sand content. The third attempt at Perymans Road was successful and is in use today.

Water is sourced from a single bore and supplied directly to the town, and to the Otahuna Valley supply zone via a booster pump station.

Following the September 2010 and February 2011 earthquake liquefaction occurred throughout the township. Water services along the Halswell River, in the area of Ryans Road failed due to lateral spread of material. No other acute failures were recorded, this section of main has been relaid.

The Department of Building and Housing have classified this well as being Foundation Technical Category 2 (TC2).

This recognises minor to moderate land damage has occurred. It requires increases in vertical infrastructure strength including foundation design. Careful review of horizontal infrastructure i.e. pipes installation is recommended.

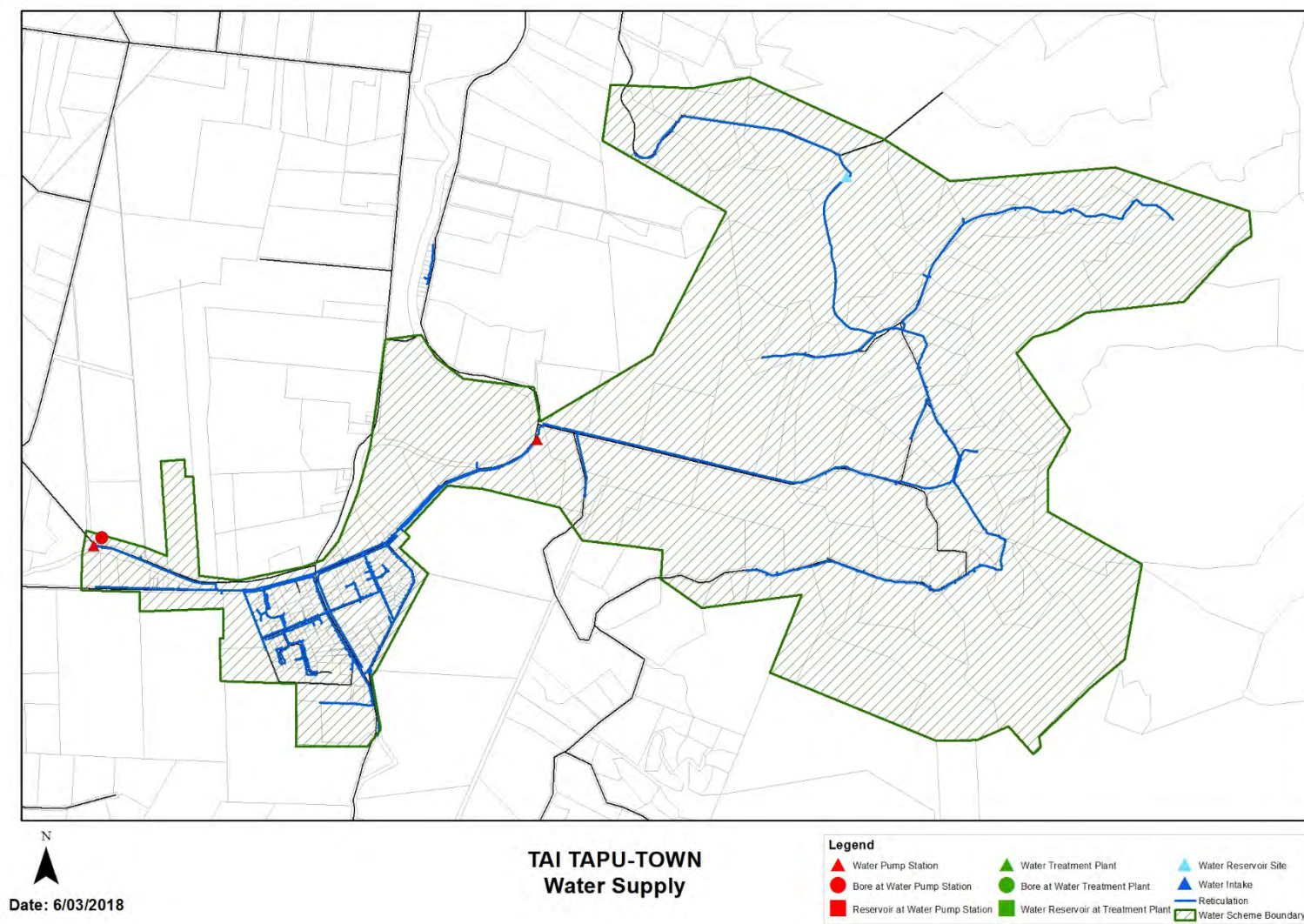


**Figure 24-1 Scheme Map**

**Figure 24-2 Scheme Schematic**



## 24.4 System Capacity

There is some potential for residential growth in Tai Tapu in terms of zoned land availability and modest growth is anticipated in this area (10% over 30 years). The Tai Tapu supply also delivers a restricted supply to properties in the Otahuna valley. On-demand (town) connections typically use less water but generate a higher peak flow rate, while restricted (rural) connections require more water but this is trickle fed at a low flow rate. This capacity assessment considers the supply as a whole and also the restricted supply (Otahuna) zone which is metered separately.

**Table 24-2 Capacity Summary**

|                                                                                                                                                                                                                                                                                                                      | Flow Rate<br>(L/s) | Daily Volume<br>(m <sup>3</sup> )                                                                         | Annual Volume<br>(m <sup>3</sup> ) | Comments                    |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|-----------------------------------------------------------------------------------------------------------|------------------------------------|-----------------------------|
| Consented Take                                                                                                                                                                                                                                                                                                       | 25                 | 6599m <sup>3</sup> /7days<br>Ave = 937 m <sup>3</sup> /day<br>Max = 1080 m <sup>3</sup> /day <sup>1</sup> | 140,550 <sup>2</sup>               | CRC134786                   |
| Peak Demand - current                                                                                                                                                                                                                                                                                                | -                  | 4739m <sup>3</sup> /7 days <sup>3</sup><br>772 m <sup>3</sup> /day <sup>4</sup>                           | 120,550 <sup>5</sup>               |                             |
| Peak Demand - 2046                                                                                                                                                                                                                                                                                                   | -                  | 5190 m <sup>3</sup> /7 days<br>850 m <sup>3</sup> /day                                                    | 132,000                            |                             |
| Abstraction capacity                                                                                                                                                                                                                                                                                                 | 25                 |                                                                                                           |                                    | 1 bore pump (and alternate) |
| <sup>1</sup> estimated maximum on any single day such that weekly limit will not be exceeded<br><sup>2</sup> inferred volume based on 150 x daily volume (ECan)<br><sup>3</sup> 25-31 Jan 2013<br><sup>4</sup> 14 Jan 2013<br><sup>5</sup> Jan –Dec 2013 (note July 2012-June 2013 volume = 105,470 m <sup>3</sup> ) |                    |                                                                                                           |                                    |                             |

The water take consent limits the maximum rate of take to 25 L/s. This is matched by the installed pump capacity. There is no reservoir storage so the maximum flow rate that can be supplied to the community is 25 L/s.

Providing that instantaneous demand can be managed within the capacity of the installed pump there is potential to accommodate additional connections on this supply. Demand management approaches could be used to smooth the daily demand profile and reduce the instantaneous peak demand.

Increasing the instantaneous flow capacity could be potentially achieved by installing a larger pump, subject to any physical constraints, source limitations and consenting issues. Alternatively, above ground storage and pumping could be provided to augment supply at peak times.

Peak day demands are moderately high relative to average winter day demands (x3) but not so extreme as other towns that have been examined (Dunsandel, Kirwee, x8). This may reflect differing climatic conditions and soil types. Demand management may be less effective in Tai Tapu where demands are less extreme.

Overall the supply capacity is sufficient to meet current and projected future demands.

## Otahuna Rural Restricted Zone

A booster pumping system is used to transfer water from Tai Tapu to the Otahuna valley restricted supply scheme. There are no consent limitations specific to the Otahuna scheme. All connections are restricted, ie an agreed volume (typically 3 m<sup>3</sup>) is supplied at a steady flow rate over 24 hours. The capacity of this scheme is thus only constrained by the booster pump capacity.

**Table 24-3 Capacity Summary - Otahuna**

|                       | Flow Rate<br>(L/s) | Daily Volume<br>(m <sup>3</sup> ) | Annual Volume<br>(m <sup>3</sup> ) | Comments                                    |
|-----------------------|--------------------|-----------------------------------|------------------------------------|---------------------------------------------|
| Allocated Volume      | 1.3                | 108                               | 39,420                             | 36 connections,<br>3m <sup>3</sup> /con/day |
| Peak Demand           | 2.4                | 210 (195%)                        | 29,500 (75%)                       |                                             |
| Booster pump capacity | 2.7                | 233                               | -                                  | Lowara SV81475                              |
|                       |                    |                                   |                                    |                                             |

It is evident that peak demands are well in excess of the total allocated volume for these restricted connections, which was exceeded on about 20% of the days during 2013. The peak day demand exceeds the booster pump capacity, suggesting drawdown of the storage volume provided (120m<sup>3</sup>).

Additional Otahuna connections could be supported providing that all consumers operate within their daily allocation.

## 24.5 Resource Consents

The Tai Tapu/Otahuna water supply has a number of resource consents. Table 24-4 shows the water take permitted by the resource consents for this scheme.

**Table 24-4 Resource Consents**

| Consent                      | Description                  | Location                | Date Issued | Expiry Date | Consented Max Instantaneous Flow (L/s) | Consented Max Daily Volume (m <sup>3</sup> /day) |
|------------------------------|------------------------------|-------------------------|-------------|-------------|----------------------------------------|--------------------------------------------------|
| CRC134786<br>(Issued-Active) | To take and use groundwater. | Perymans Road, TAI TAPU | 27-Mar-13   | 31-Jan-35   | 25                                     | 937<br>(6559 per 7 days)                         |

## 24.6 Water Quality

The Tai Tapu water supply is a secure source and is currently sampled twice weekly at the treatment plant and weekly in the reticulation zone.

The following details E. coli transgressions for the period 2012 to 2017.

#### Treatment

There have been no E. coli source transgressions during this period.

#### Zone

There has been one E. coli treatment transgressions during this period which occurred in March 2015.

#### Chemical Analysis

The following is a summary of the raw water chemical analysis carried out at the Tai Tapu Water Supply.

**Table 24-5 Tai Tapu Water Supply Raw Water Chemical Analysis Summary**

| Parameter                                   | Standards<br>MAV* (GV)** | Plant 2011 | Plant 2017 | Status |
|---------------------------------------------|--------------------------|------------|------------|--------|
| Total Lead (g/m3)                           | 0.01                     | 0.0029     | 0.000194   | ✓      |
| pH (pH units)                               | 7-8.5                    | 7.9        | 7.8        | ✓      |
| Total Hardness (g/m3 as CaCO <sub>3</sub> ) | <200                     | 55         | 51.3       | ✓      |
| Total Calcium (g/m3)                        | n/v                      | 17         | 16.16      | ✓      |
| Total Iron (g/m3)                           | <0.2                     | 0.43       | < 0.021    | ✓      |
| Total Sodium (g/m3)                         | <200                     | 10.2       | 9.43       | ✓      |
| Nitrate - Nitrogen (g/m3)                   | 11.3                     | 0.24       | 0.260      | ✓      |

\* MAV – Maximum Allowable Value

\*\* (GV) – Guideline Value

### 24.7 Scheme Assets

A summary of material and diameter for pipes in Tai Tapu/Otahuna is shown below in Figure 24-3 and Figure 24-4.

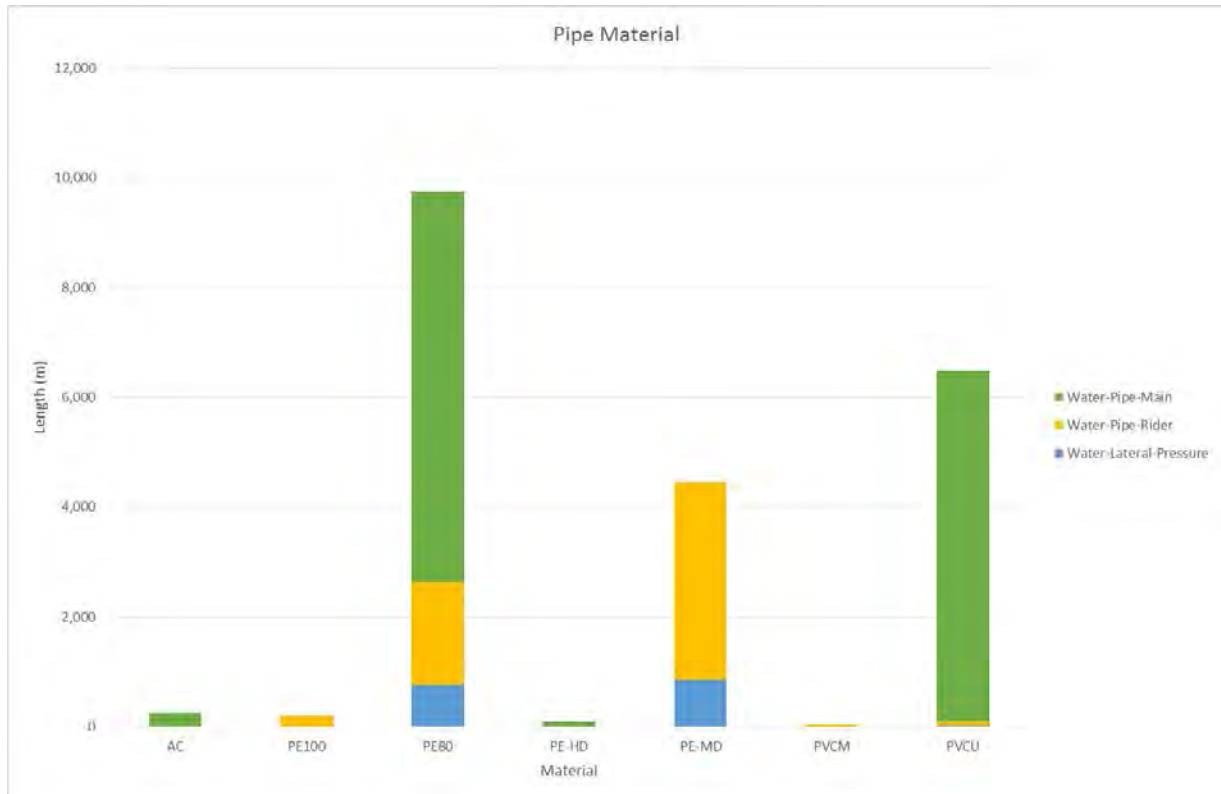


**Figure 24-3 Pipe Material – Tai Tapu/Otahuna**

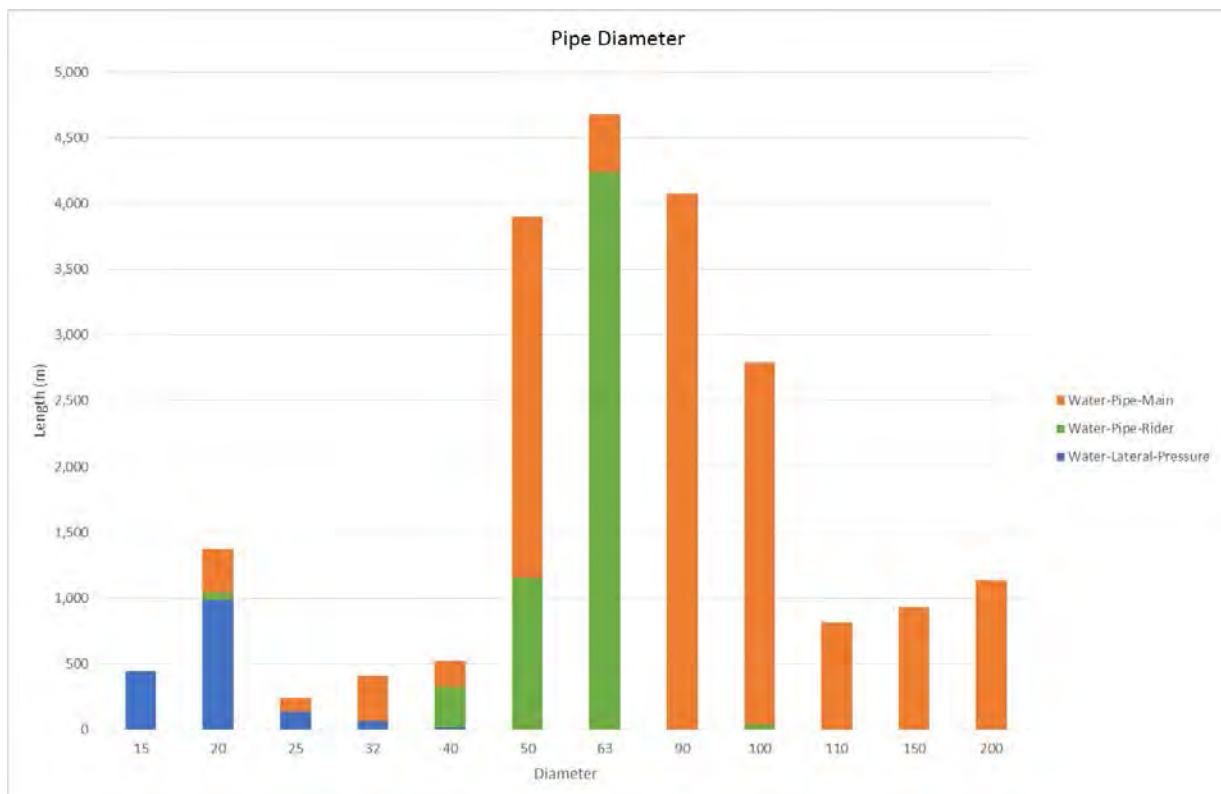


**Figure 24-4 Pipe Diameter – Tai Tapu/Otahuna**

## 24.8 Operational Management

The water supply is operated and maintained under two maintenance contracts as follows:

- Contract 1241: Water Services Contract. Contract is with SICON Ferguson who undertakes investigations, conditions inspections, proactive and reactive maintenance and minor asset renewals; and
- Contract 1202: Parks and Reserves Contract. Contract is with SICON Ferguson who undertakes the maintenance of land scape features related to water services e.g. mowing, gardens etc.

Water quality sampling is completed under an agreement with Food and Health Ltd as required.

## 24.9 Photos of Main Assets

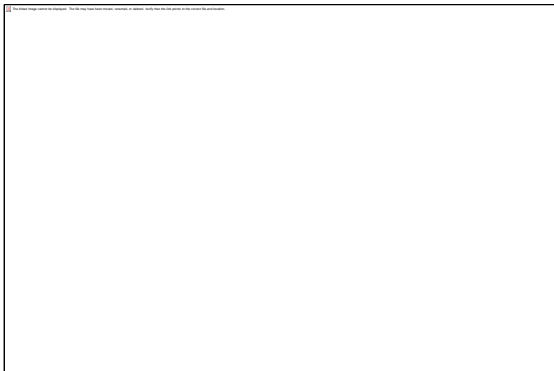


**Photo 1: Perymans Road pump shed**



**Photo 2: Otahuna Valley pump shed**



**Photo 3: Otahuna Valley reservoirs (fifth reservoir on right is privately owned and is not part of the scheme's storage)**

## 24.10 Risk Assessment

A risk assessment has been undertaken for the Tai Tapu/Otahuna scheme. The key output from the risk assessment is the identification of any extreme and high risks which need to be mitigated. In order to mitigate these risks they have been included and budgeted for in the projects within this LTP. Table 24-6 outlines the risk priority rating, Table 24-7 outlines the risks and the list of key projects is found in Table 24-12.

**Table 24-6 Risk Priority Rating**

| Risk Score | Level of Risk | Risk Response                                                                                                                                                         |
|------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| > 50       | Extreme       | Awareness of the event to be reported to Council.<br>Urgent action to eliminate / mitigate / manage the risk.<br><br>Document risk and action in the AMP.             |
| 35-50      | Very High     | Risk to be eliminated / mitigated / managed through normal business planning processes with responsibility assigned.                                                  |
| 14-35      | High          | Manage risk using routine procedures.                                                                                                                                 |
| 3.5-14     | Moderate      | Monitor the risk.                                                                                                                                                     |
| < 3.5      | Low           | Awareness of the event to be reported to Council.<br>Immediate action required to eliminate / mitigate / manage the risk.<br><br>Document risk and action in the AMP. |

**Table 24-7 Risks – Tai Tapu/Otahuna**

| Risk                                                    | Action/Project                | Year Identified | 2014 Risk Rating | 2017 Risk Rating | Residual Risk Rating |
|---------------------------------------------------------|-------------------------------|-----------------|------------------|------------------|----------------------|
| Electrical failure due to lightning or network spikes   | Install surge diverters       | 2014            | 10               | 10               | 10                   |
| Failure to meet NES water meter standards               | NES Water Meter Compliance    | 2014            | 20               | 6                | 6                    |
| Inability to collect income from non-metered properties | Install property water meters | 2014            | 27               | 27               | 2.1                  |
| Non-compliance with the DWSNZ                           | DWSNZ - Age Testing           | 2014            | 10               | 0.7              | 0.7                  |
| Non-compliance with the DWSNZ                           | DWSNZ - Bore-head security    | 2014            | 10               | 10               | 10                   |
| Non-consented activities                                | Renewal of consents           | 2014            | 27               | 27               | 6                    |
| Scheme efficiently / redundancy                         | Join Tai Tapu to Lincoln      | 2017            |                  | 20               | 3.5                  |

The list of district wide risks can be found in 5Waters Activity Management Plan: Volume 1.

## 24.11 Asset Valuation Details

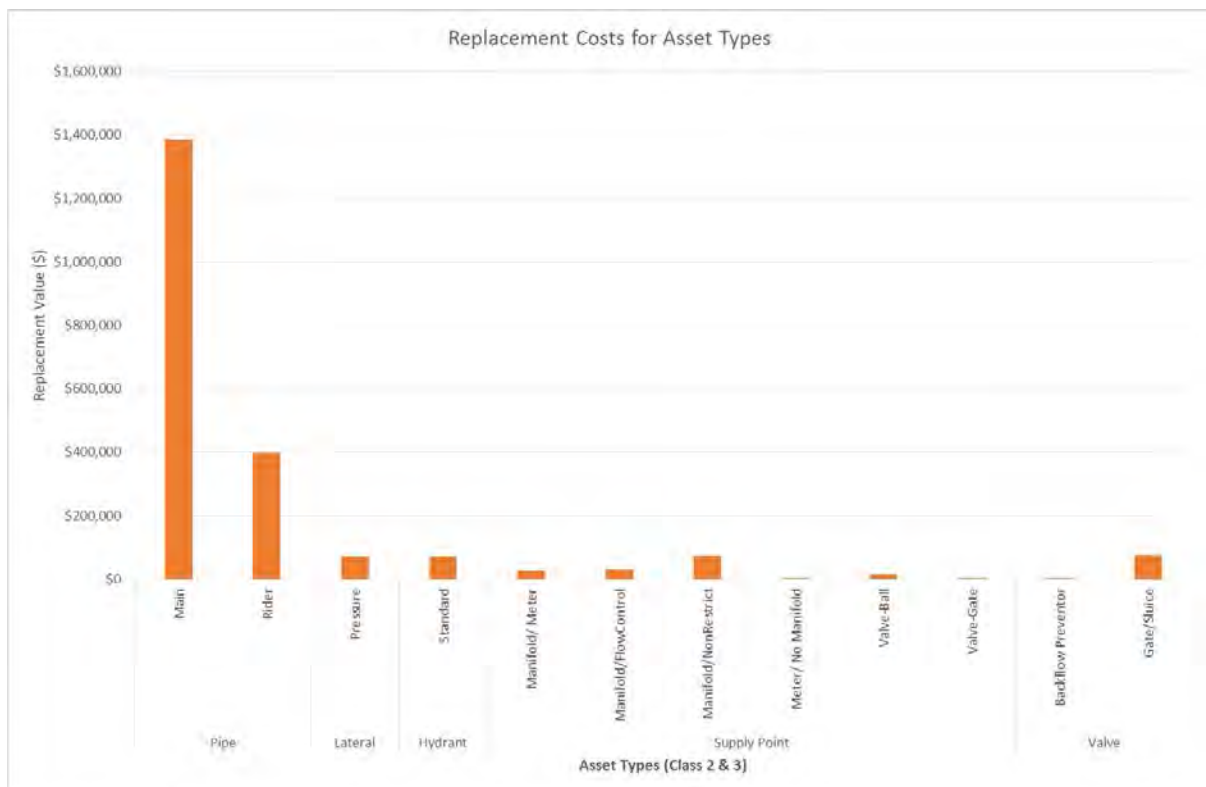
The total replacement value of assets within the Tai Tapu/Otahuna water scheme is \$2,553,077 with further details in Table 24-8 below.



**Table 24-8 Replacement Value, Tai Tapu/Otahuna**

| Asset Class 1              | Asset Class 2 | Sum of Replacement Value |
|----------------------------|---------------|--------------------------|
| <b>Plant and Equipment</b> |               | \$408,640                |
| <b>Water Reticulation</b>  | Hydrant       | \$69,205                 |
|                            | Lateral       | \$70,926                 |
|                            | Pipe          | \$1,784,971              |
|                            | Supply Point  | \$144,630                |
|                            | Valve         | \$74,705                 |

Replacement values for these different types of assets are shown in Figure 24-5 below.


**Figure 24-5 Replacement Costs for Tai Tapu/Otahuna**

## 24.12 Renewals

The renewal profile has been taken from the 2017 5 Waters Valuation. A graph showing the renewals for this scheme are shown by Figure 24-6 below. The majority renewals occur in 2022/2023.

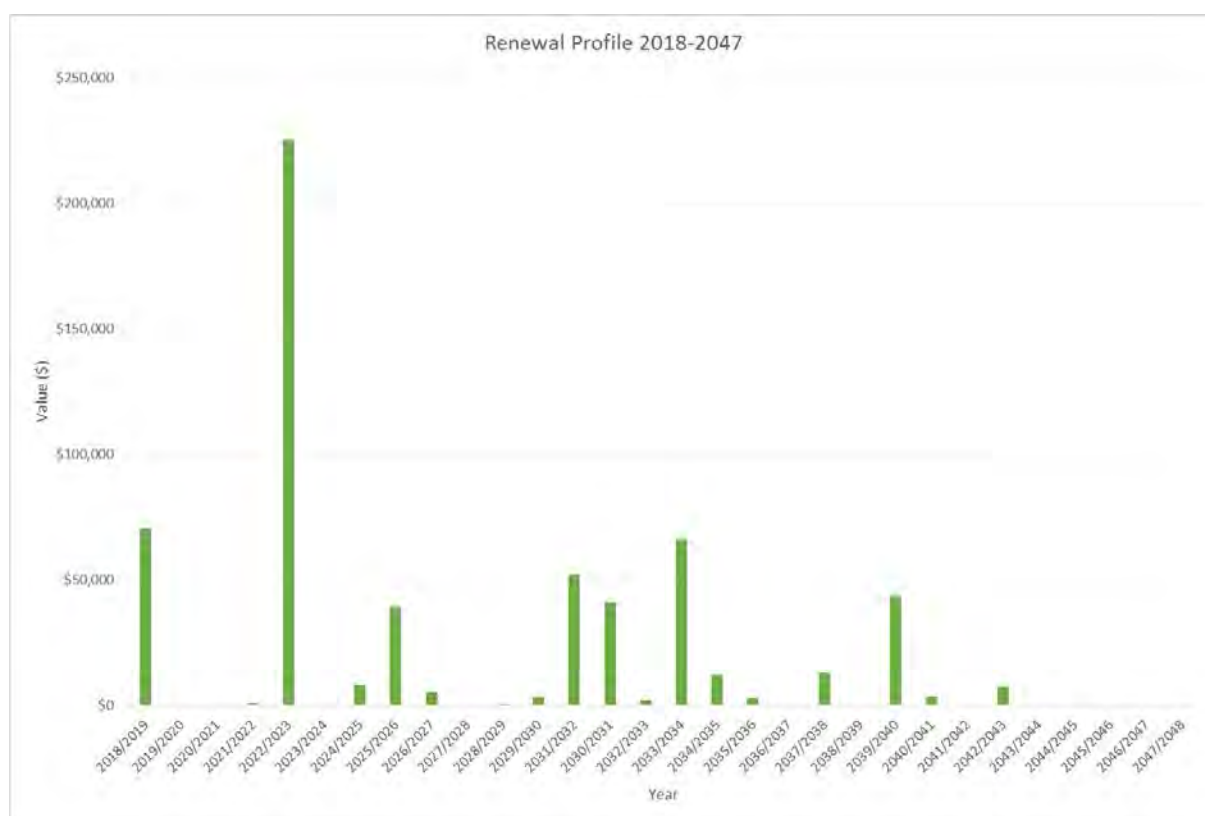


Figure 24-6 Tai Tapu/Otahuna Water Renewal Profile

## 24.13 Critical Assets

The criticality model for Tai Tapu/Otahuna has been updated for the 2018 AcMP. The methodology of the criticality model can be found in 5Waters Activity Management Plan: Volume 1 and it provides details of how the criticality has been calculated for the reticulation assets. , **Error! Reference source not found.** and Figure 24-7 below shows the calculated criticality for all of the assets within this scheme that have a recorded known length.

Table 24-9 Length of Assets per Criticality Level

| Criticality Bands |             | Length (m) |
|-------------------|-------------|------------|
| 5                 | Low         | 7,203      |
| 4                 | Medium-Low  | 10,336     |
| 3                 | Medium      | 1,279      |
| 2                 | Medium-High | 2,876      |
| 1                 | High        | 0          |

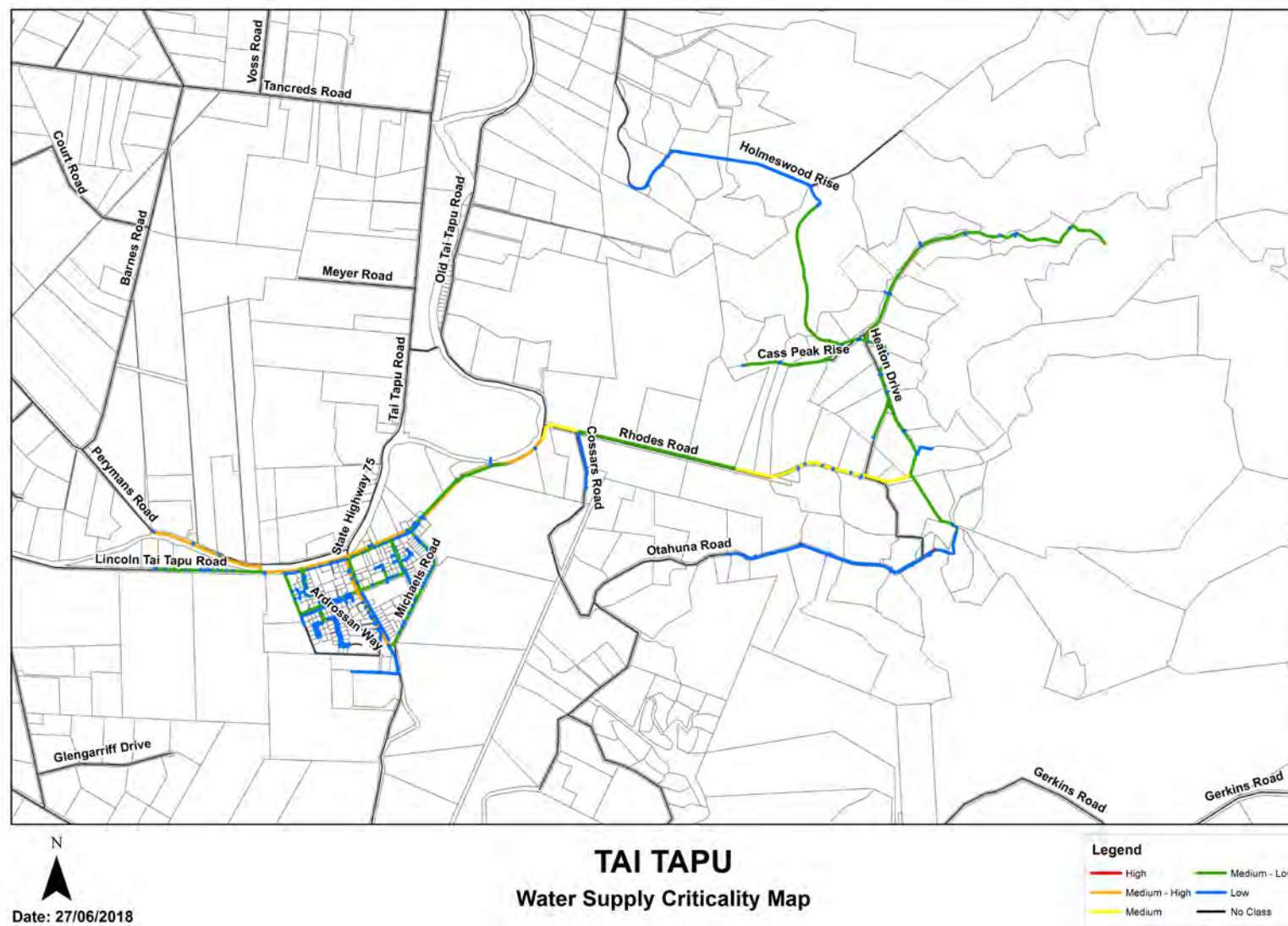


Figure 24-7 Criticality Map

## 24.14 Asset Condition

The asset condition model was run for Tai Tapu/Otahuna in 2017. The methodology of the model can be found in 5Waters Activity Management Plan: Volume 1 which provides details of how the model has been calculated for the pipe reticulation assets. Figure 24-8 below shows the level of asset condition for these assets within this scheme that have a recorded known condition.

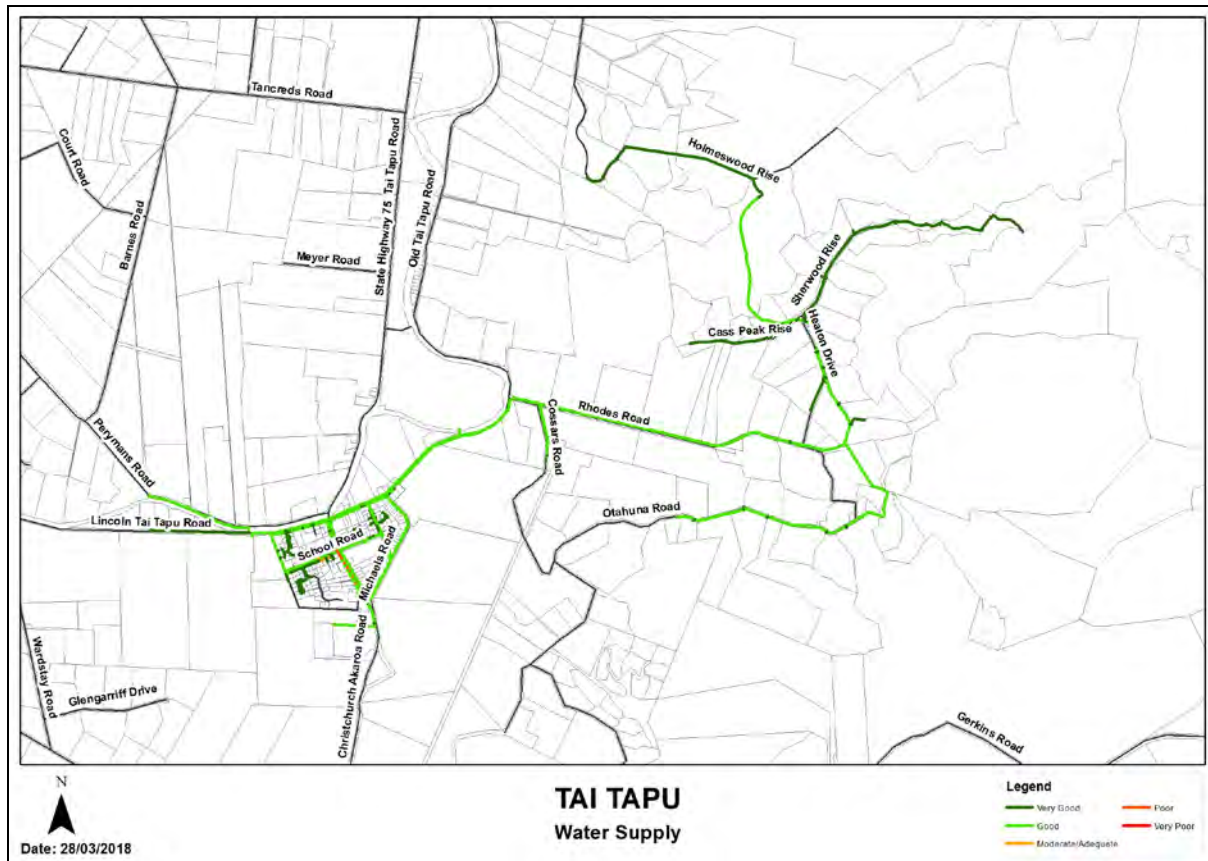


**Figure 24-8 Asset Condition – Tai Tapu/Otahuna**

Table 24-10 provides a description of the condition rating used within the condition model.

**Table 24-10 Asset Condition Grading**

| Condition Rating | Grading   |
|------------------|-----------|
| 1.0              | Excellent |
| 2.0              | Good      |
| 3.0              | Moderate  |
| 4.0              | Poor      |
| 5.0+             | Fail      |

The number of pipe faults is also measured through the asset management system. Figure 24-9 shows the known historic pipe failures within this scheme.

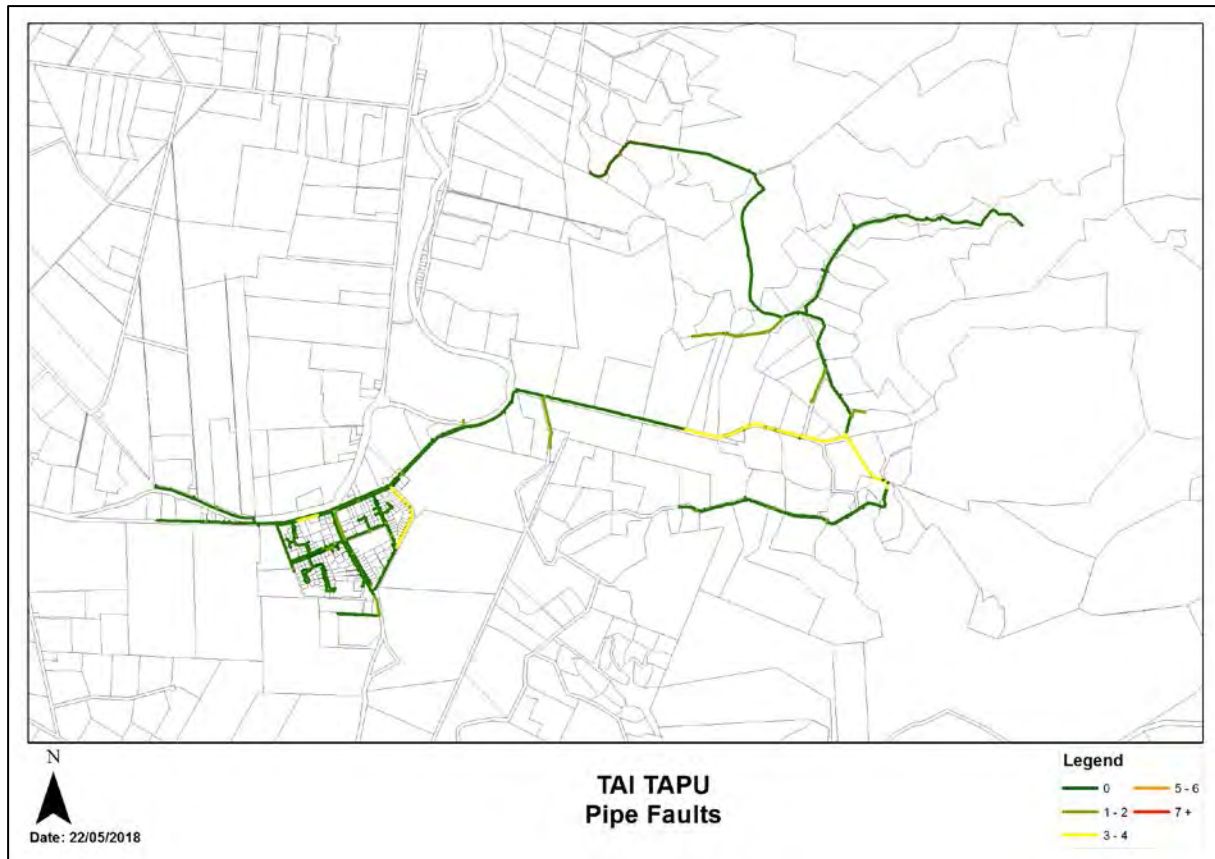


**Figure 24-9 Pipe Faults, Tai Tapu**

### 24.15 Funding Program

The 10 year budgets for Tai Tapu are shown by Table 24-11 and Figure 24-10. Budgets are split into expenditure, renewals, projects and capital projects.

All figures are (\$) not adjusted for CPI “inflation”. They are calculated on historical data, and population growth where relevant.

**Table 24-11 Tai Tapu Budget Summary**

| Years     | Expenditure | Renewals  | Projects | Capital Projects |
|-----------|-------------|-----------|----------|------------------|
| 2018/2019 | \$70,900    | \$70,391  |          | \$60,000         |
| 2019/2020 | \$73,850    |           |          |                  |
| 2020/2021 | \$74,950    |           |          |                  |
| 2021/2022 | \$76,050    | \$1,054   |          |                  |
| 2022/2023 | \$76,050    | \$225,091 |          |                  |
| 2023/2024 | \$76,050    |           |          |                  |



|           |           |           |  |          |
|-----------|-----------|-----------|--|----------|
| 2024/2025 | \$76,050  | \$8,431   |  |          |
| 2025/2026 | \$76,050  | \$39,307  |  |          |
| 2026/2027 | \$76,050  | \$5,523   |  |          |
| 2027/2028 | \$76,050  |           |  |          |
| Total     | \$752,050 | \$349,796 |  | \$60,000 |

An explanation of the categories within the budgets are as follows below:

- Expenditure consists of operation and maintenance costs;
- Renewals are replacement of assets which are nearing or exceeded their useful life;
- Projects are investigations, decisions and planning activities which exclude capital works; and
- Capital projects are activities involving physical works.

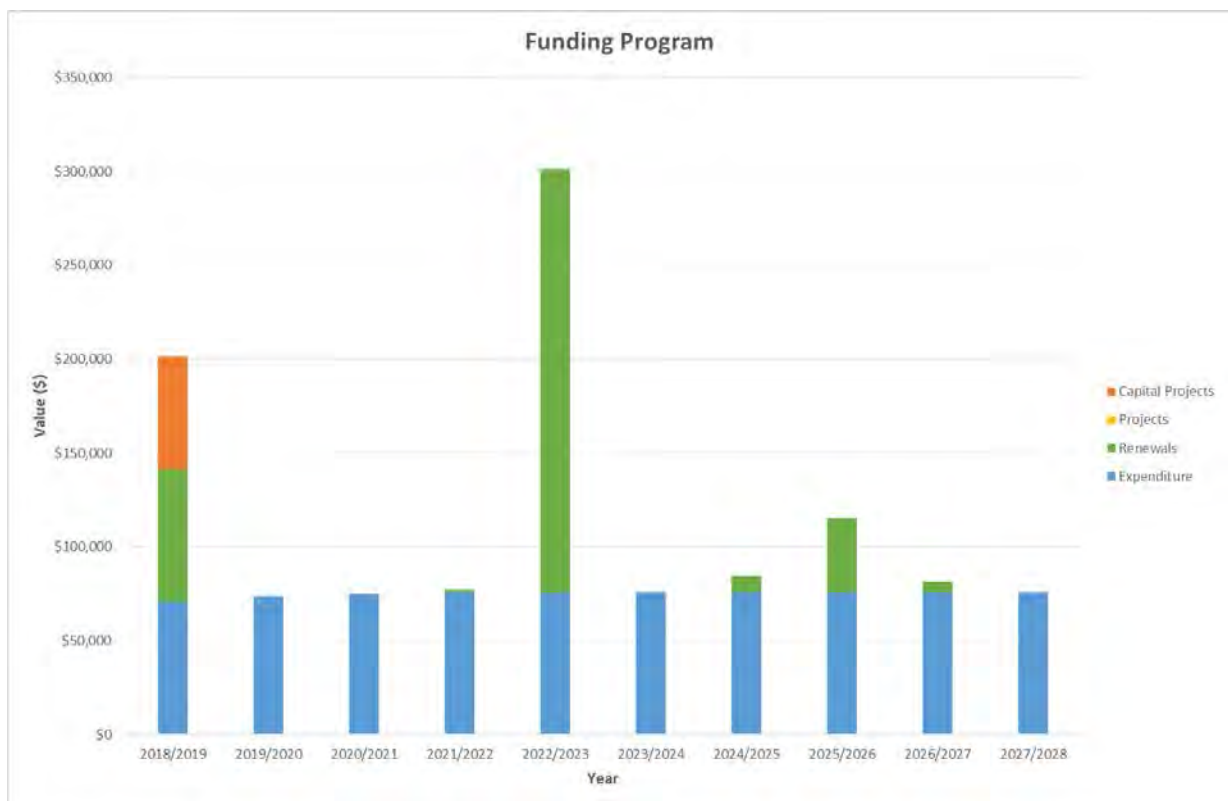


**Figure 24-10 Tai Tapu Funding Summary**



There is one major project for Tai Tapu/Otahuna water scheme in the LTP budget.

**Table 24-12 Key Projects**

| Account Label    | GL        | Description  | Year 1 (\$) | Year 2 (\$) | Year 3 (\$) | Years 4 to 10 | Funding Split <sup>21</sup> |
|------------------|-----------|--------------|-------------|-------------|-------------|---------------|-----------------------------|
| Capital Projects | 408390020 | UV treatment | \$60,000    |             |             |               | 100% LoS                    |

The list of district wide projects can be found in 5Waters Activity Management Plan: Volume 1.

### Discussion on Projects

Projects have been determined based on their:

- Relevance to the scheme
- Requirement to be completed under legislation
- Ability to bring the scheme up to or maintain the Level of Service required under council's Asset Management Policy.

Many projects are **jointly** funded by more than one scheme and activity. Each scheme pays a pro-rata share only, equivalent to the number of connections.

### Discussion on Capital and Projects

Where relevant, Capital (Levels of Service) and Capital (Growth) projects have been included in the scheme financial details.

Levels of Service Projects and growth splits have been provided to ensure the costs of population driven works are clear.

<sup>21</sup> Where LoS refers to Level of Service and G refers to Growth

## 25.0 TAUMUTU WATER SUPPLY

### 25.1 Scheme Summary

| Description                                   |                                   | Quantity                         |
|-----------------------------------------------|-----------------------------------|----------------------------------|
| <b>Estimated Population Served</b>            |                                   | 30                               |
| <b>Scheme Coverage</b><br>(1 Jan 2018)        | Full Charges                      | Approx. 11 Connections           |
|                                               | Half Charges                      |                                  |
|                                               | >1 Charges                        |                                  |
| <b>System Components</b>                      | Bores/Intakes (No.)               | 1                                |
|                                               | Treatment/Disinfection            | None                             |
|                                               | Reservoirs (No.)                  | None                             |
|                                               | Pump Stations (No.)               | 1                                |
|                                               | Piped (m)                         | 850.4                            |
| <b>History</b>                                | Original scheme installation date | 1960's                           |
| <b>Value (\$)</b>                             | Replacement Cost                  | \$105,562.85                     |
|                                               | Depreciated Replacement Cost      | \$43,297.48                      |
| <b>Financial</b>                              | 2018/2019 Estimate                | \$8,340                          |
|                                               | Annual maintenance cost           | 0.26%                            |
|                                               | % of total                        |                                  |
| <b>Demand</b><br>(1 Jan – 31 Dec 2017)        | Average daily                     | -                                |
|                                               | Peak daily                        | Unknown (no SCADA)               |
|                                               | Minimum daily                     | Unknown (no SCADA)               |
|                                               | Average daily per connection      | -                                |
| <b>Type of Supply</b>                         |                                   | Medium pressure and unrestricted |
| <b>Target Pressure &amp; Flow at boundary</b> | Pressure                          | >240kPa                          |
|                                               | Flow                              | >15L/min                         |
| <b>Sustainability</b>                         | Well Security                     | Unsecure                         |

### 25.2 Key Issues

The following key issues are associated with the Taumutu water supply. A list of district wide issues are located in 5Waters Activity Management Plan: Volume 1.

**Table 25-1 Taumutu Scheme Issues**

| What's the Problem                                                                                                                                                                                                      | What we plan to do                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| There is great deal of uncertainty surrounding the reticulation location, size and condition. As a result the data confidence for the Taumutu Water Supply is low.                                                      | Council plan to undertake a GPS survey of the reticulation and the results will be incorporated into the AMS, Valuation and Activity Plan.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| The Taumutu community have previously requested Council to consider transferring the water supply into local ownership and management. With approximately 11 connections, this would be possible but is not a priority. | <p>The Local Government Act 2002 permits such a transfer (S131 and S135) where a scheme serves less than 200 persons. The following would be required for a Transfer:</p> <ul style="list-style-type: none"> <li>• A plan be developed on all aspects of scheme operation and maintenance and management</li> <li>• The Medical Officer of Health prepare a report on any health issues and make this publicly available</li> <li>• A binding referendum be held with &gt; 50% in favour support.</li> </ul> <p>The Water Safety Plan will address and confirm if the operational requirements are appropriate for transfer.</p> |

### 25.3 Overview & History

The Taumutu Water Supply provides untreated groundwater to a small coastal community (11 water connections) located at the south-western corner of Te Waihora/Lake Ellesmere, near the lake opening.

After consultation with the community in 2006/07 the responsibility of scheme management may be transferred to Ngai Tahu, as this is a marae based supply.

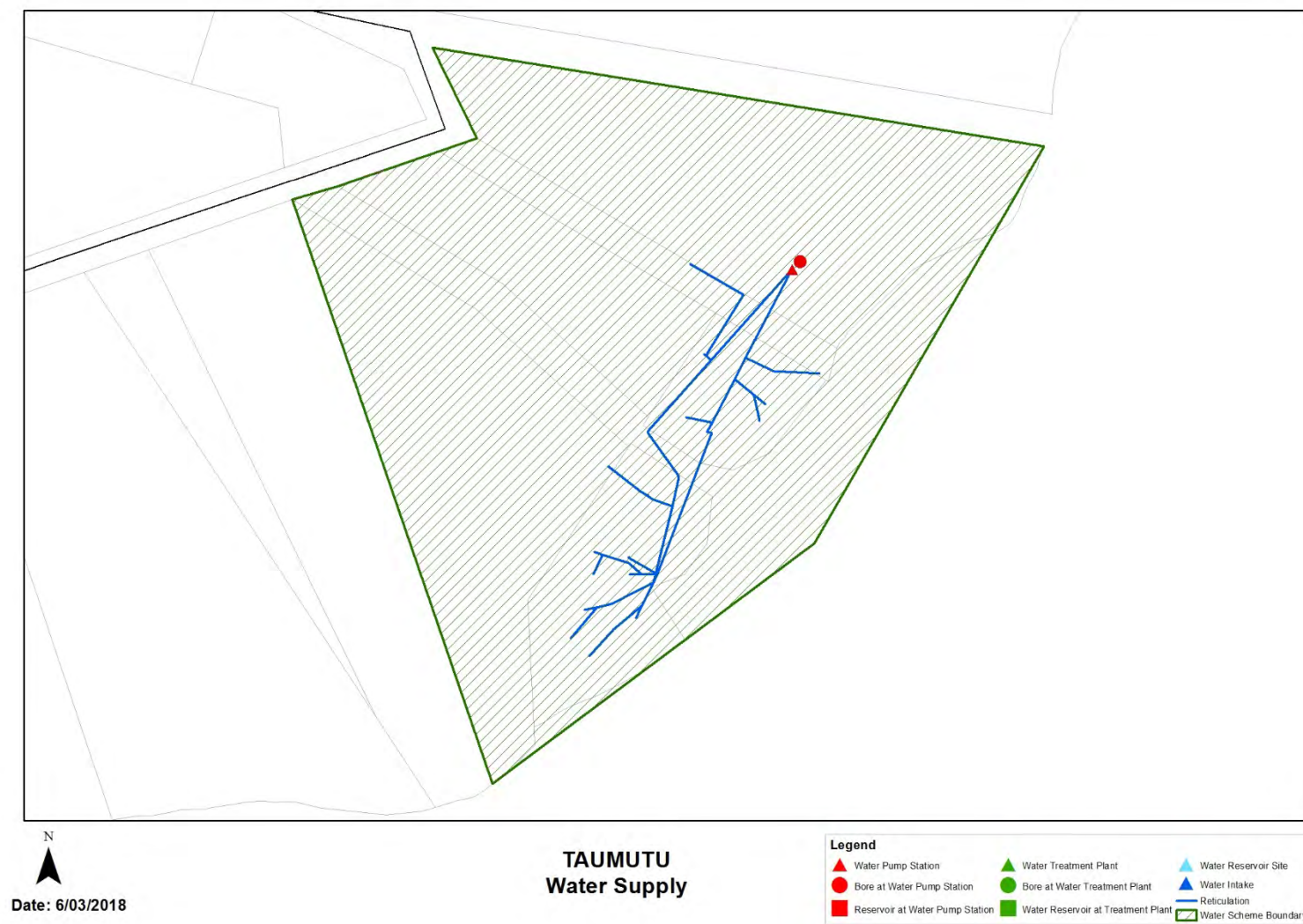


**Figure 25-1 Scheme Map**

**Figure 25-2 Scheme Schematic**

## 25.4 System Capacity

This water supply was developed to serve this small coastal community. All connections have been allocated and are utilised. No additional connections are anticipated. Existing capacity is adequate.

**Table 25-2 Capacity Summary**

|                      | Flow Rate<br>(L/s) | Daily Volume<br>(m <sup>3</sup> ) | Annual Volume<br>(m <sup>3</sup> ) | Comments                                         |
|----------------------|--------------------|-----------------------------------|------------------------------------|--------------------------------------------------|
| Abstraction Capacity | -                  |                                   |                                    | 1 x bore pump                                    |
| Consented Take       | 1                  | 76                                | 11,400                             |                                                  |
| Peak Demand          | -                  | 77                                | 14,400                             | Recent demand has returned within consent limits |

## 25.5 Resource Consents

The Taumutu water supply has a number of resource consents. Table 25-3 shows the water take permitted by the resource consents for this scheme.

**Table 25-3 Resource Consents**

| Consent                        | Description                  | Location                  | Date Issued | Expiry Date | Consented Max Instantaneous Flow (L/s) | Consented Max Daily Volume (m <sup>3</sup> /day) |
|--------------------------------|------------------------------|---------------------------|-------------|-------------|----------------------------------------|--------------------------------------------------|
| CRC010894.1<br>(Issued-Active) | To take and use groundwater. | Fishermans Point, TAUMUTU | 12-Feb-10   | 31-Jan-35   | 1                                      | 76                                               |

## 25.6 Water Quality

The Taumutu water supply is a secure non-source and is currently sampled weekly at the treatment plant and monthly in the reticulation zone.

The following details E. coli transgressions for the period 2012 to 2017.

### Treatment

There have been no E. coli source transgressions during this period.

### Zone

There have been no E. coli treatment transgressions during this period.

### Chemical Analysis

The following is a summary of the raw water chemical analysis carried out at the Taumutu Water Supply.

**Table 25-4 Taumutu Water Supply Raw Water Chemical Analysis**

| Parameter | Standards<br>MAV* (GV)** | Plant 2015 | Plant 2017 | Status |
|-----------|--------------------------|------------|------------|--------|
|-----------|--------------------------|------------|------------|--------|



|                                             |       |         |          |   |
|---------------------------------------------|-------|---------|----------|---|
| Total Lead (g/m3)                           | 0.01  | 0.00016 | 0.000112 | ✓ |
| pH (pH units)                               | 7-8.5 | 7.7     | 7.7      | ✓ |
| Total Hardness (g/m3 as CaCO <sub>3</sub> ) | <200  | 37      | 35.9     | ✓ |
| Total Calcium (g/m3)                        | n/v   | 11.4    | 11.11    | ✓ |
| Total Iron (g/m3)                           | <0.2  | <0.021  | < 0.021  | ✓ |
| Total Sodium (g/m3)                         | <200  | 6.2     | 6.04     | ✓ |
| Nitrate - Nitrogen (g/m3)                   | 11.3  | 1.08    | 1.160    | ✓ |

\* MAV – Maximum Allowable Value

\*\* (GV) – Guideline Value

## 25.7 Scheme Assets

A summary of material and diameter for pipes in Taumutu is shown below in Figure 25-3 and Figure 25-4.

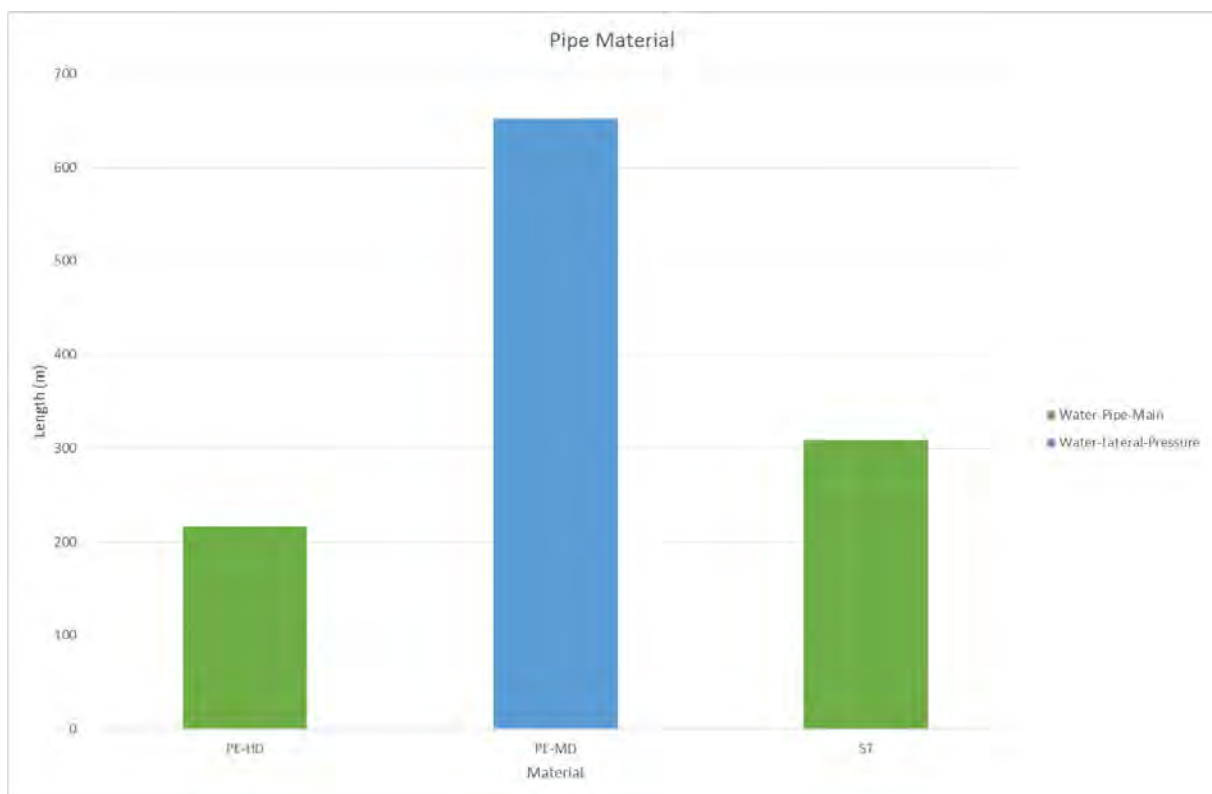


Figure 25-3 Pipe Material – Taumutu

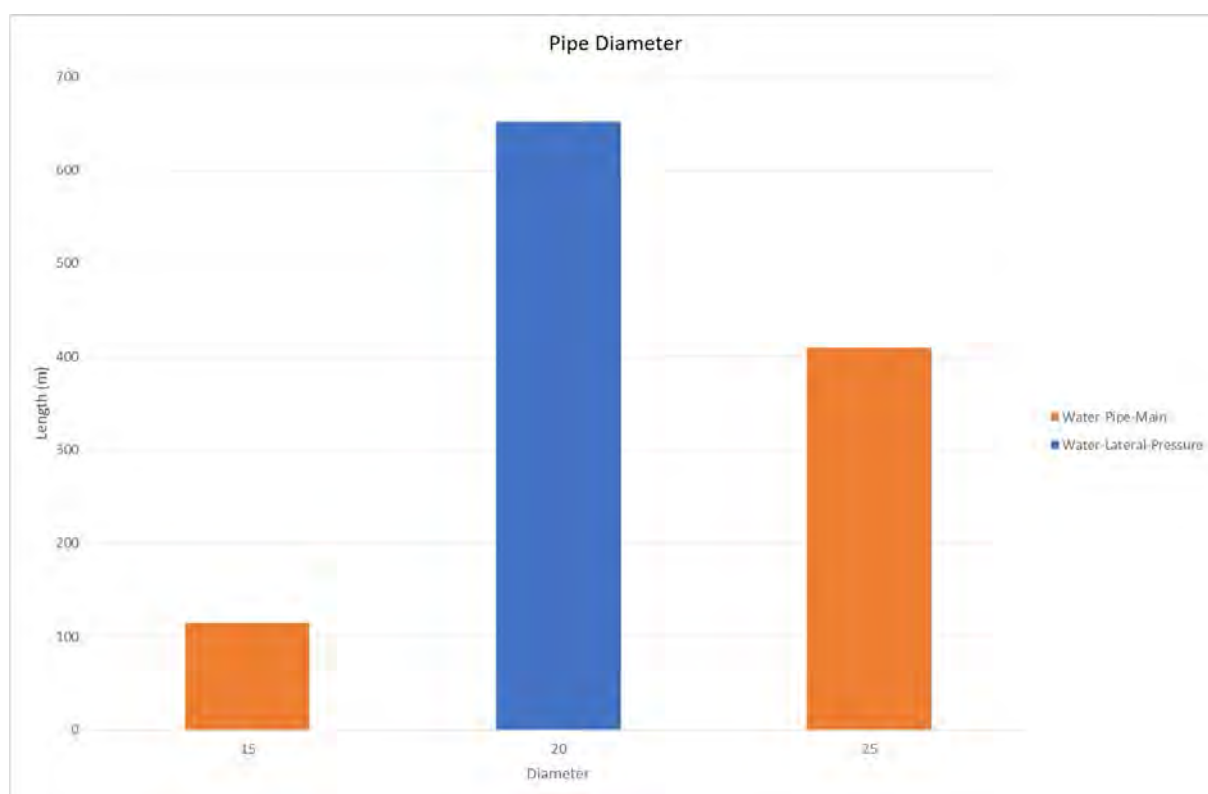


**Figure 25-4 Pipe Diameter – Taumutu**

## 25.8 Operational Management

The water supply is operated and maintained under two maintenance contracts as follows:

- Contract 1241: Water Services Contract. Contract is with SICON Ferguson who undertakes investigations, conditions inspections, proactive and reactive maintenance and minor asset renewals; and
- Contract 1202: Parks and Reserves Contract. Contract is with SICON Ferguson who undertakes the maintenance of land scape features related to water services e.g. mowing, gardens etc.

Water quality sampling is completed under an agreement with Food and Health Ltd as required.

## 25.9 Photos of Main Assets



**Photo 1: Well head**

## 25.10 Risk Assessment

A risk assessment has been undertaken for the Taumutu scheme. The key output from the risk assessment is the identification of any extreme and high risks which need to be mitigated. In order to mitigate these risks they have been included and budgeted for in the projects within this LTP. Table 25-5 details the risk priority, Table 25-6 outlines the risks and the list of key projects is found in Table 25-11.

**Table 25-5 Risk Priority Rating**

| Risk Score | Level of Risk | Risk Response                                                                                                                                                     |
|------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| > 50       | Extreme       | Awareness of the event to be reported to Council.<br>Urgent action to eliminate / mitigate / manage the risk.<br>Document risk and action in the AMP.             |
| 35-50      | Very High     | Risk to be eliminated / mitigated / managed through normal business planning processes with responsibility assigned.                                              |
| 14-35      | High          | Manage risk using routine procedures.                                                                                                                             |
| 3.5-14     | Moderate      | Monitor the risk.                                                                                                                                                 |
| < 3.5      | Low           | Awareness of the event to be reported to Council.<br>Immediate action required to eliminate / mitigate / manage the risk.<br>Document risk and action in the AMP. |

**Table 25-6 Risks – Taumutu**

| Risk                                                  | Action/Project          | Year Identified | 2014 Risk Rating | 2017 Risk Rating | Residual Risk Rating |
|-------------------------------------------------------|-------------------------|-----------------|------------------|------------------|----------------------|
| Electrical failure due to lightning or network spikes | Install surge diverters | 2014            | 6                | 2.1              | 2.1                  |

|                                                         |                                                           |      |    |     |     |
|---------------------------------------------------------|-----------------------------------------------------------|------|----|-----|-----|
| Failure to meet NES water meter standards               | NES Water Meter Compliance                                | 2014 | 20 | 6   | 6   |
| Inability to collect income from non-metered properties | Install property water meters                             | 2014 | 27 | 27  | 2.1 |
| Non-compliance with the DWSNZ                           | DWSNZ - Age Testing                                       | 2014 | 6  | 0.7 | 0.7 |
| Non-compliance with the DWSNZ                           | DWSNZ - Bore-head security                                | 2014 | 6  | 6   | 6   |
| Non-consented activities                                | Renewal of consents                                       | 2014 | 27 | 27  | 6   |
| Scheme efficiency                                       | locate PRV and move to head works + res and surface pumps | 2017 |    | 4   | 0.7 |

The list of district wide risks can be found in 5Waters Activity Management Plan: Volume 1.

## 25.11 Asset Valuation Details

The total replacement value of assets within the Taumutu water scheme is \$105,563 with further details in Table 25-7 below.

**Table 25-7 Replacement Value, Taumutu**

| Asset Class 1              | Asset Class 2 | Sum of Replacement Value |
|----------------------------|---------------|--------------------------|
| <b>Plant and Equipment</b> |               | \$60,307                 |
| <b>Water Reticulation</b>  | Lateral       | \$14,026                 |
|                            | Pipe          | \$30,650                 |
|                            | Valve         | \$581                    |

Replacement values for these different types of assets are shown in Figure 25-5 below.

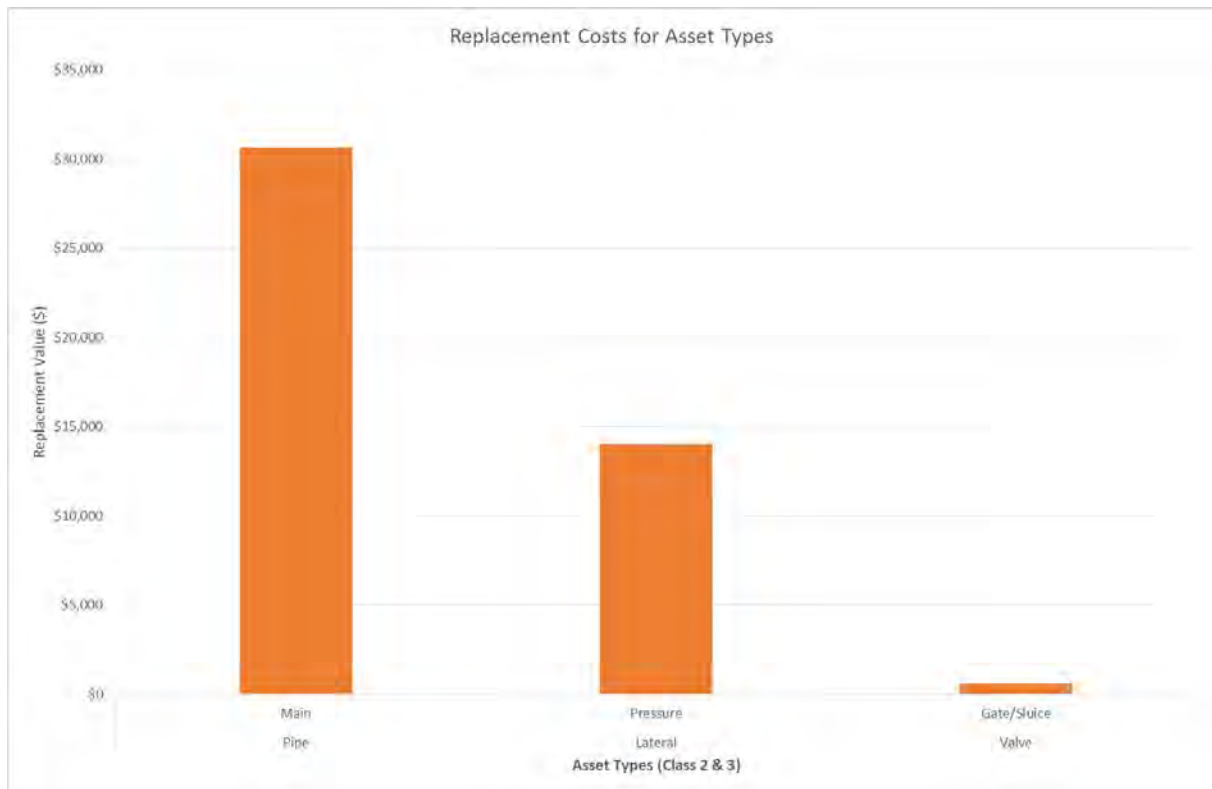


**Figure 25-5 Replacement Costs for Taumutu**

## 25.12 Renewals

The renewal profile has been taken from the 2017 5 Waters Valuation. A graph showing the renewals for this scheme are shown by Figure 25-6 below. The majority renewals occur in 2033/2034.



**Figure 25-6 Taumutu Water Renewal Profile**

## 25.13 Critical Assets

The criticality model for Taumutu has been updated for the 2018 AcMP. The methodology of the criticality model can be found in 5Waters Activity Management Plan: Volume 1 and it provides details of how the criticality has been calculated for the reticulation assets. Table 25-8 and Figure 25-7 below shows the calculated criticality for all of the assets within this scheme that have a recorded known length.

**Table 25-8 Length of Assets per Criticality Level**

| Criticality Bands |             | Length (m) |
|-------------------|-------------|------------|
| 5                 | Low         | 851        |
| 4                 | Medium-Low  | 0          |
| 3                 | Medium      | 0          |
| 2                 | Medium-High | 0          |
| 1                 | High        | 0          |



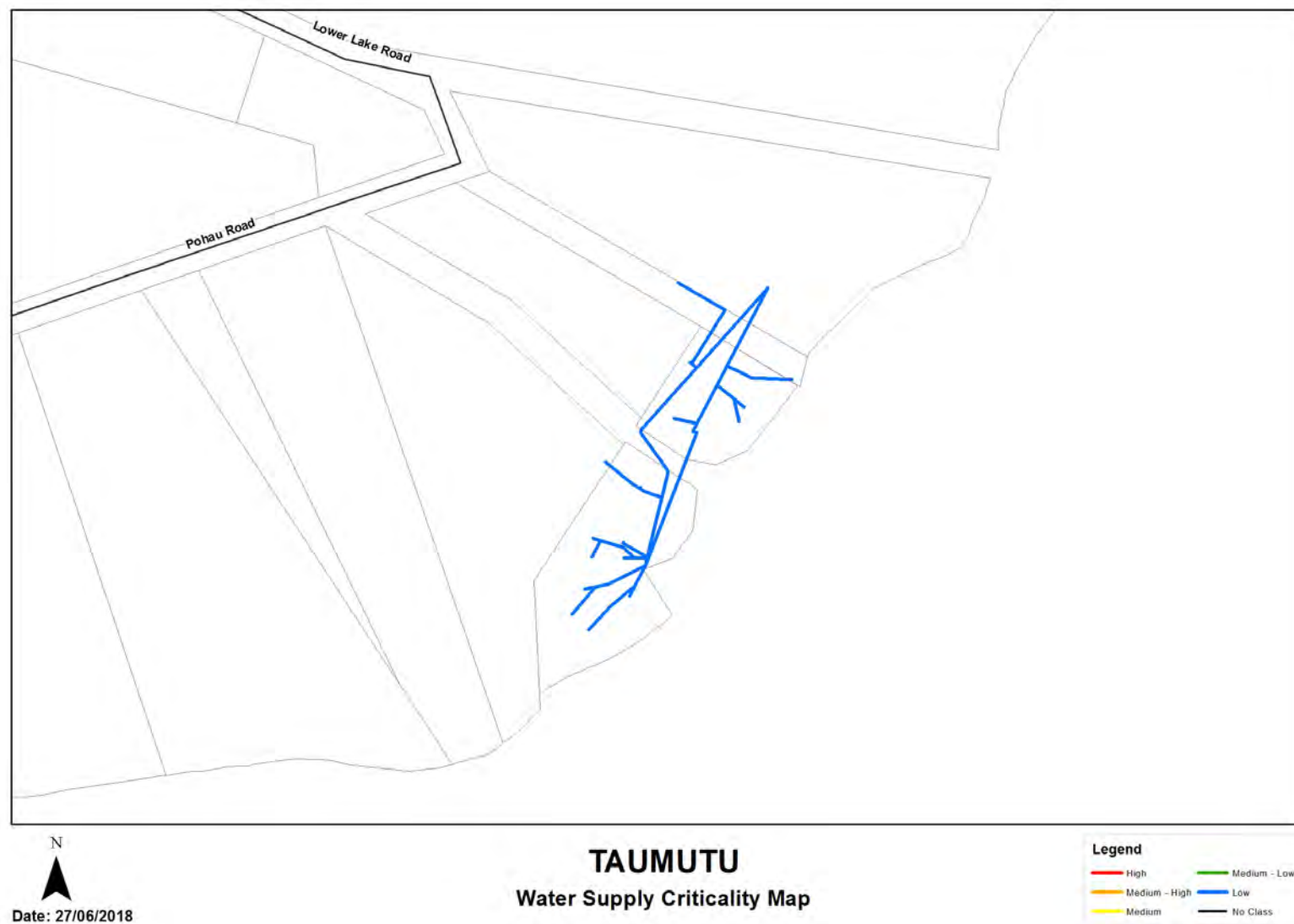


Figure 25-7 Criticality Map

## 25.14 Asset Condition

The asset condition model was run for Taumutu in 2017. The methodology of the model can be found in 5Waters Activity Management Plan: Volume 1 which provides details of how the model has been calculated for the pipe reticulation assets. Figure 25-8 below shows the level of asset condition for these assets within this scheme that have a recorded known condition.

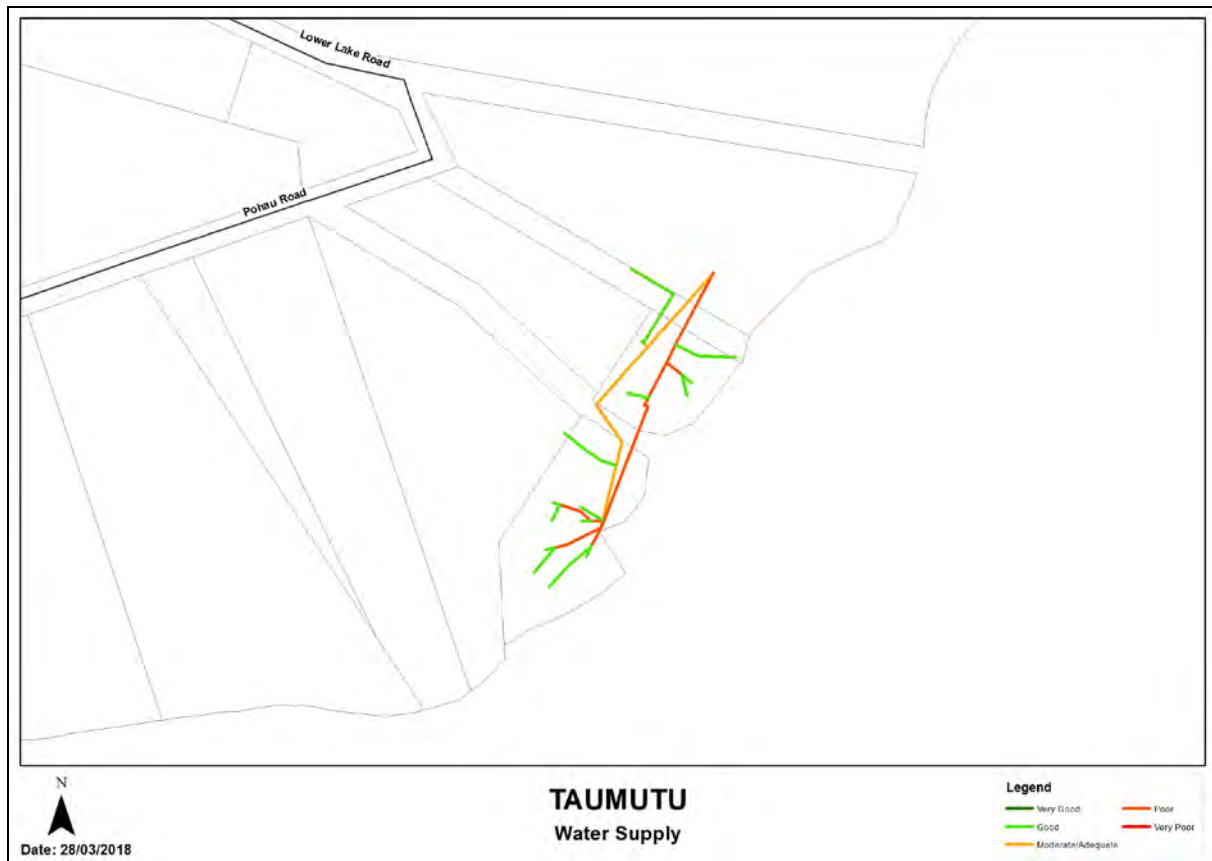


**Figure 25-8 Asset Condition – Taumutu**

Table 25-9 provides a description of the condition rating used within the condition model.

**Table 25-9 Asset Condition Grading**

| Condition Rating | Grading   |
|------------------|-----------|
| 1.0              | Excellent |
| 2.0              | Good      |
| 3.0              | Moderate  |
| 4.0              | Poor      |
| 5.0+             | Fail      |

The number of pipe faults is also measured through the asset management system. Figure 25-9 shows the known historic pipe failures within this scheme.

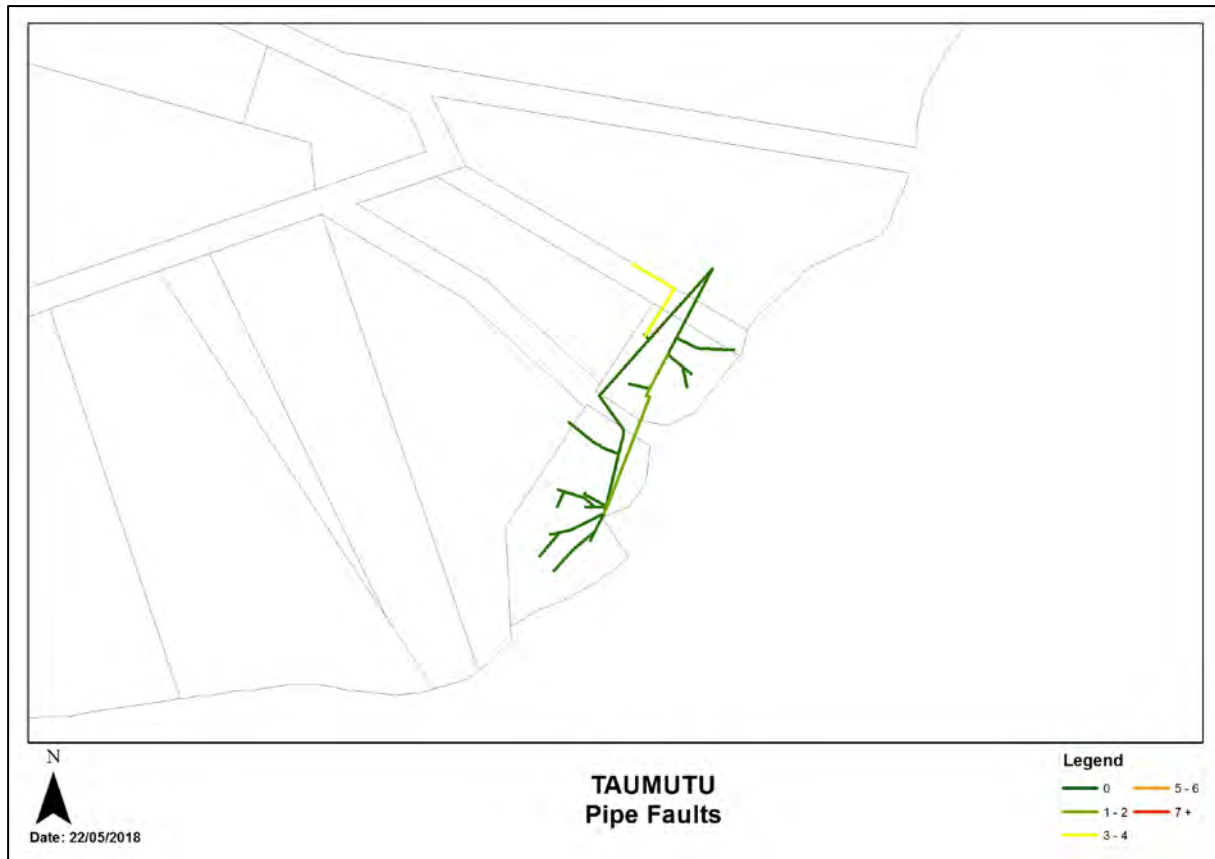


**Figure 25-9 Pipe Faults, Taumutu**

### 25.15 Funding Program

The 10 year budgets for Taumutu are shown by Table 25-10 and Figure 25-10. Budgets are split into expenditure, renewals, projects and capital projects.

All figures are (\$) not adjusted for CPI “inflation”. They are calculated on historical data, and population growth where relevant.

**Table 25-10 Taumutu Budget Summary**

| Years     | Expenditure | Renewals | Projects | Capital Projects |
|-----------|-------------|----------|----------|------------------|
| 2018/2019 | \$8,340     |          |          |                  |
| 2019/2020 | \$8,340     | \$12,371 |          | \$45,000         |
| 2020/2021 | \$8,340     |          |          |                  |
| 2021/2022 | \$8,340     |          |          |                  |
| 2022/2023 | \$8,340     |          |          |                  |
| 2023/2024 | \$8,340     |          |          |                  |

|           |          |          |     |          |
|-----------|----------|----------|-----|----------|
| 2024/2025 | \$8,340  |          |     |          |
| 2025/2026 | \$8,340  | \$17,574 |     |          |
| 2026/2027 | \$8,340  |          |     |          |
| 2027/2028 | \$8,340  |          |     |          |
| Total     | \$83,400 | \$29,945 | \$0 | \$45,000 |

An explanation of the categories within the budgets are as follows below:

- Expenditure consists of operation and maintenance costs;
- Renewals are replacement of assets which are nearing or exceeded their useful life;
- Projects are investigations, decisions and planning activities which exclude capital works; and
- Capital projects are activities involving physical works.

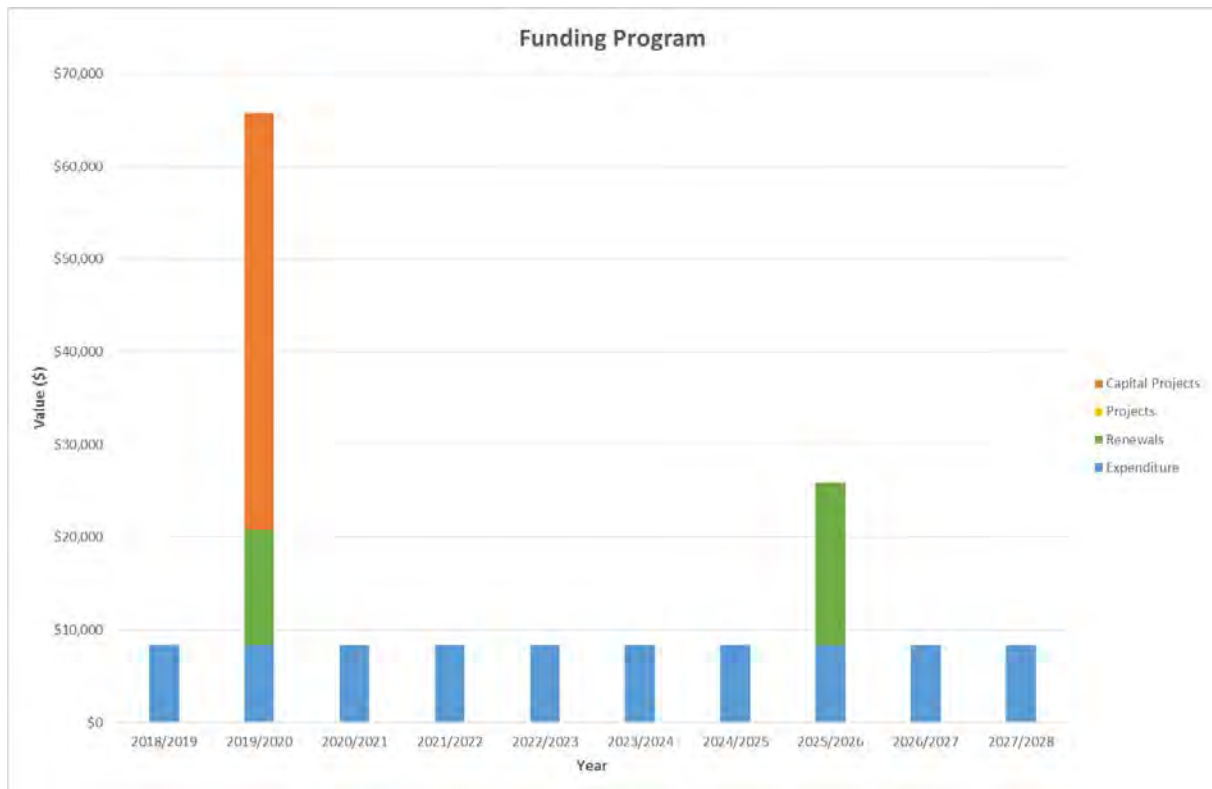


Figure 25-10 Taumutu Funding Summary

There are two major projects for Taumutu water scheme in the LTP budget.

**Table 25-11 Key Projects**

| Account Label    | GL        | Description  | Year 1 (\$) | Year 2 (\$) | Year 3 (\$) | Years 4 to 10 | Funding Split <sup>22</sup> |
|------------------|-----------|--------------|-------------|-------------|-------------|---------------|-----------------------------|
| Capital Projects | 402690017 | PRV          |             | \$30,000    |             |               | 100% LoS                    |
| Capital Projects | 402690018 | UV treatment |             | \$15,000    |             |               | 100% LoS                    |

The list of district wide projects can be found in 5Waters Activity Management Plan: Volume 1.

### Discussion on Projects

Projects have been determined based on their:

- Relevance to the scheme
- Requirement to be completed under legislation
- Ability to bring the scheme up to or maintain the Level of Service required under council's Asset Management Policy.

Many projects are **jointly** funded by more than one scheme and activity. Each scheme pays a pro-rata share only, equivalent to the number of connections.

### Discussion on Capital and Projects

Where relevant, Capital (Levels of Service) and Capital (Growth) projects have been included in the scheme financial details.

Levels of Service Projects and growth splits have been provided to ensure the costs of population driven works are clear.

<sup>22</sup> Where LoS refers to Level of Service and G refers to Growth

## 26.0 TE PIRITA WATER SUPPLY

### 26.1 Scheme Summary

| Description                                   |                                   | Quantity                         |
|-----------------------------------------------|-----------------------------------|----------------------------------|
| <b>Estimated Population Served</b>            |                                   | 28                               |
| <b>Scheme Coverage</b><br>(1 Jan 2018)        | Full Charges                      | 9                                |
|                                               | Half Charges                      | 0                                |
|                                               | >1 Charges                        | 1                                |
| <b>System Components</b>                      | Bores/Intakes (No.)               | 1                                |
|                                               | Treatment/Disinfection            | None                             |
|                                               | Reservoirs (No.)                  | 2                                |
|                                               | Pump Stations (No.)               | 1                                |
|                                               | Piped (m)                         | 22,872.8                         |
| <b>History</b>                                | Original scheme installation date | Unknown                          |
| <b>Value (\$)</b>                             | Replacement Cost                  | \$1,952,998.88                   |
|                                               | Depreciated Replacement Cost      | \$1,094,175.62                   |
| <b>Financial</b>                              | 2018/2019 Estimate                | \$36,450                         |
|                                               | Annual maintenance cost           | 1.14%                            |
|                                               | % of total                        |                                  |
| <b>Demand (m3)</b><br>(1 Jan – 31 Dec 2017)   | Average daily                     | 203                              |
|                                               | Peak daily                        | 345                              |
|                                               | Minimum daily                     | 105                              |
|                                               | Average daily per connection      | 22.6                             |
| <b>Type of Supply</b>                         |                                   | Unrestricted metered tank supply |
| <b>Target Pressure &amp; Flow at boundary</b> | Pressure                          | >150kPa                          |
|                                               | Flow                              | ±10% maric size                  |
| <b>Sustainability</b>                         | Well Security                     | Secure                           |

### 26.2 Key Issues

The following key issues are associated with the Te Pirita water supply. A list of district wide issues are located in 5Waters Activity Management Plan: Volume 1.



**Table 26-1 Te Pirita Scheme Issues**

| What's the Problem                                                                                                                                                                                                                                                                            | What we plan to do                                                                                                                                                                                                                  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| The change in farming practice, especially from sheep and cattle to dairying has increased the demand for water. Dairy farming is more labour intensive and requires high quality water for cleaning of milking equipment.                                                                    | Council will review the metering data and the associated impacts of demand. This will assist in identifying any capacity constraints that may exist. Metering will assist in ensuring that equitable payment for water use is made. |
| The Te Pirita scheme pipes were used for conveyance of river water prior to commissioning of the deep well in 1999. Repair reports in 2011 identified that they were not flushed prior to this change over. The silt has coagulated in the base of the pipes, and could affect water quality. | Initial flushing has occurred. Investigate options for silt removal. Proceed with silt removal and a methodology for maintenance of high quality water delivery including removal of silt is to be prepared by Council.             |

### 26.3 Overview & History

The Te Pirita Water Supply provides untreated groundwater to a rural area of 2,719ha formerly served by an unreliable water race system (Snowden Water Race). The scheme was designed as a restricted supply for stock use only. Restrictors were never installed and consequently the scheme operates as an on demand scheme directly into farm tanks and stock troughs. The intake was initially adjacent to the Ellesmere Water Race, but later a new deep well was drilled and pump station constructed establishing the current source.

Water meters were installed from 2007 and per cubic metre charging initiated.

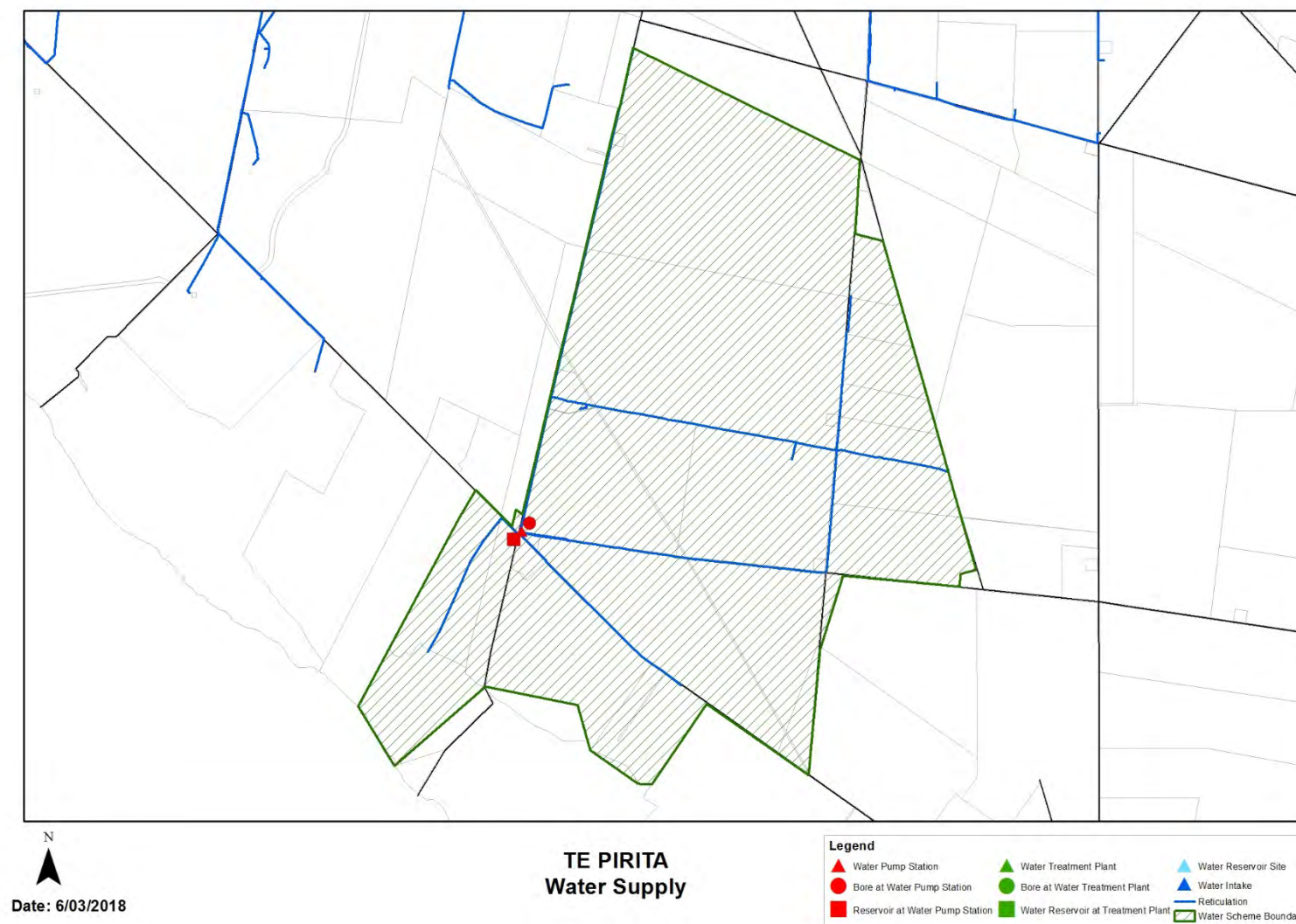


**Figure 26-1 Scheme Map**

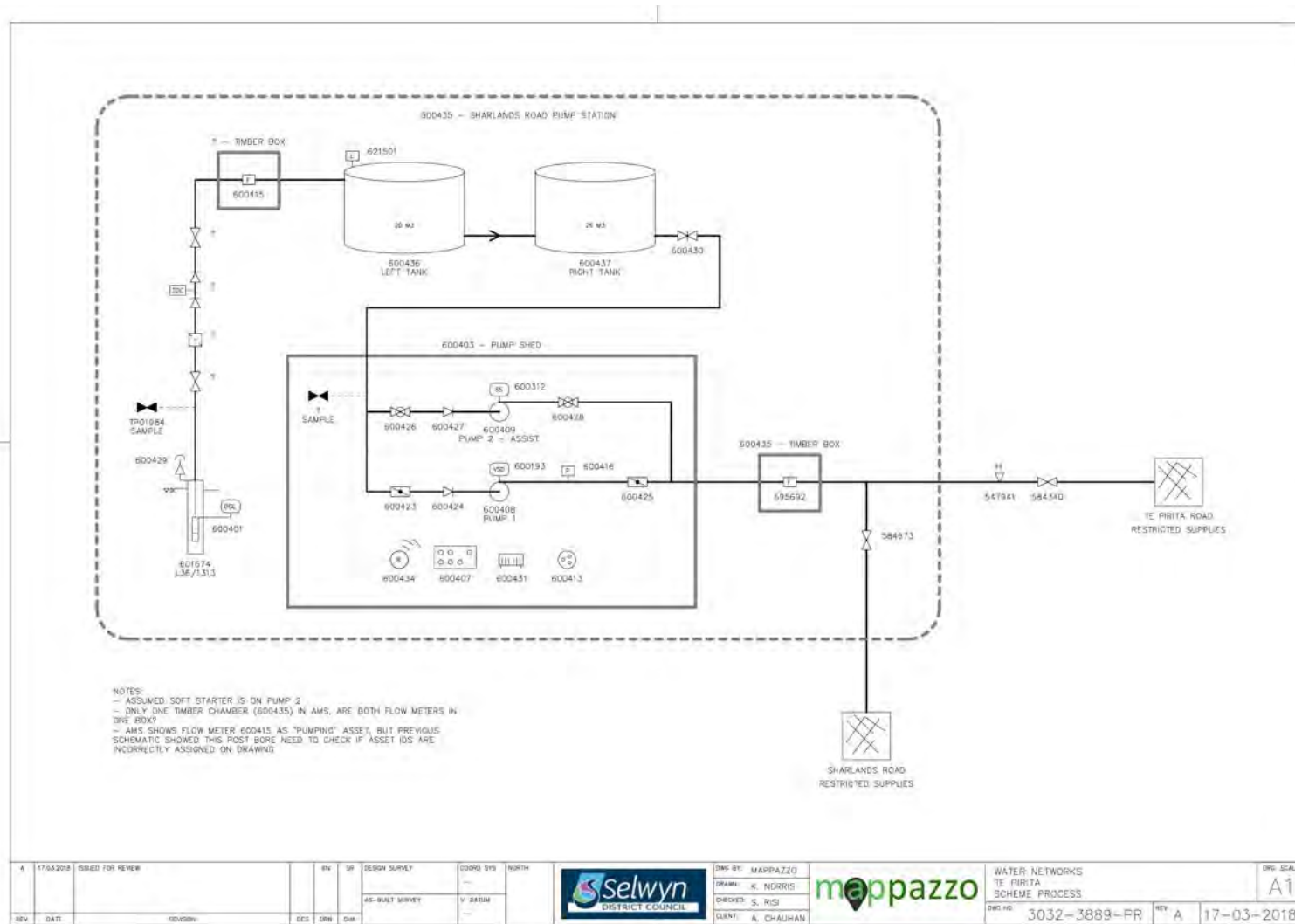


Figure 26-2 Scheme Schematic

## 26.4 System Capacity

This rural water supply was developed to serve 10 rural properties, supplying water for domestic and agricultural use. All connections have been allocated and are utilised. No additional connections are allowed for. Demand has increased over recent years reflecting changing land use and additional farm dwellings, and will need to be managed within the constraints of the supply/consent.

**Table 26-2 Capacity Summary**

|                      | Flow Rate<br>(L/s) | Daily Volume<br>(m <sup>3</sup> ) | Annual Volume<br>(m <sup>3</sup> ) | Comments                     |
|----------------------|--------------------|-----------------------------------|------------------------------------|------------------------------|
| Abstraction Capacity | 12.8               | 1106                              | -                                  | 1 x bore pump (nom capacity) |
| Consented Take       | 10                 | 450                               | 67,500                             |                              |
| Peak Demand          | -                  | 320*                              | 67,936**                           | Unrestricted tank supply     |
| * 4 Jan 2015         |                    |                                   |                                    |                              |
| ** 2014              |                    |                                   |                                    |                              |

## 26.5 Resource Consents

The Te Pirita water supply has a number of resource consents. Table 26-3 shows the water take permitted by the resource consents for this scheme.

**Table 26-3 Resource Consents**

| Consent                        | Description                                                                                                      | Location                                 | Date Issued | Expiry Date | Consented Max Instantaneous Flow (L/s) | Consented Max Daily Volume (m <sup>3</sup> /day) |
|--------------------------------|------------------------------------------------------------------------------------------------------------------|------------------------------------------|-------------|-------------|----------------------------------------|--------------------------------------------------|
| CRC991530.1<br>(Issued-Active) | To take groundwater via bore L36/1313, at or about map reference NZMS 260 L36:2075-2981 for public water supply. | cnr Te Pirita & Sharland Roads, HORORATA | 12-Feb-10   | 9-Apr-34    | 10                                     | 450                                              |

## 26.6 Water Quality

The Te Pirita water supply is a secure source and is currently sampled quarterly at the treatment plant and reticulation zone.

The following details E. coli transgressions for the period 2012 to 2017.

### Treatment

There has been no E. coli transgressions during this period.

### Zone

There has been three E. coli transgressions during this period. These occurred in April 2015 and two occurred in May 2015.

### Chemical Analysis

The following is a summary of the raw water chemical analysis carried out at the Te Pirita Water Supply.

**Table 26-4 Te Pirita Water Supply Raw Water Chemical Analysis Summary**

| Parameter                                   | Standards<br>MAV* (GV)** | Plant 2015 | Plant 2017 | Status |
|---------------------------------------------|--------------------------|------------|------------|--------|
| Total Lead (g/m3)                           | 0.01                     | 0.00041    | 0.00019    | ✓      |
| pH (pH units)                               | 7-8.5                    | 7.8        | 7.7        | ✓      |
| Total Hardness (g/m3 as CaCO <sub>3</sub> ) | <200                     | 54         | 47.0       | ✓      |
| Total Calcium (g/m3)                        | n/v                      | 18.1       | 16.0       | ✓      |
| Total Iron (g/m3)                           | <0.2                     | 0.083      | < 0.021    | ✓      |
| Total Sodium (g/m3)                         | <200                     | 4.9        | 4.4        | ✓      |
| Nitrate - Nitrogen (g/m3)                   | 11.3                     | 3.8        | 2.3        | ✓      |

\* MAV – Maximum Acceptable Value

\*\* (GV) – Guideline Value

## 26.7 Scheme Assets

A summary of material and diameter for pipes in Te Pirita is shown below in Figure 26-3 and Figure 26-4.

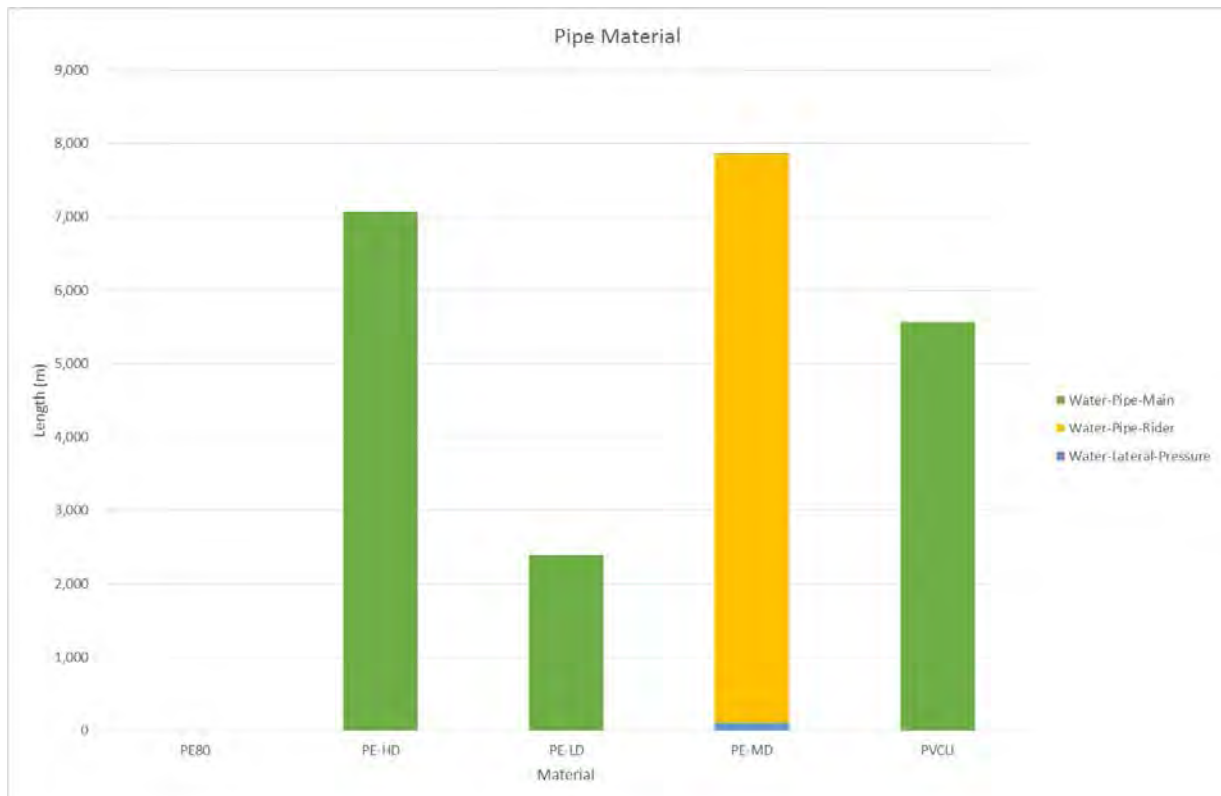


**Figure 26-3 Pipe Material – Te Pirita**

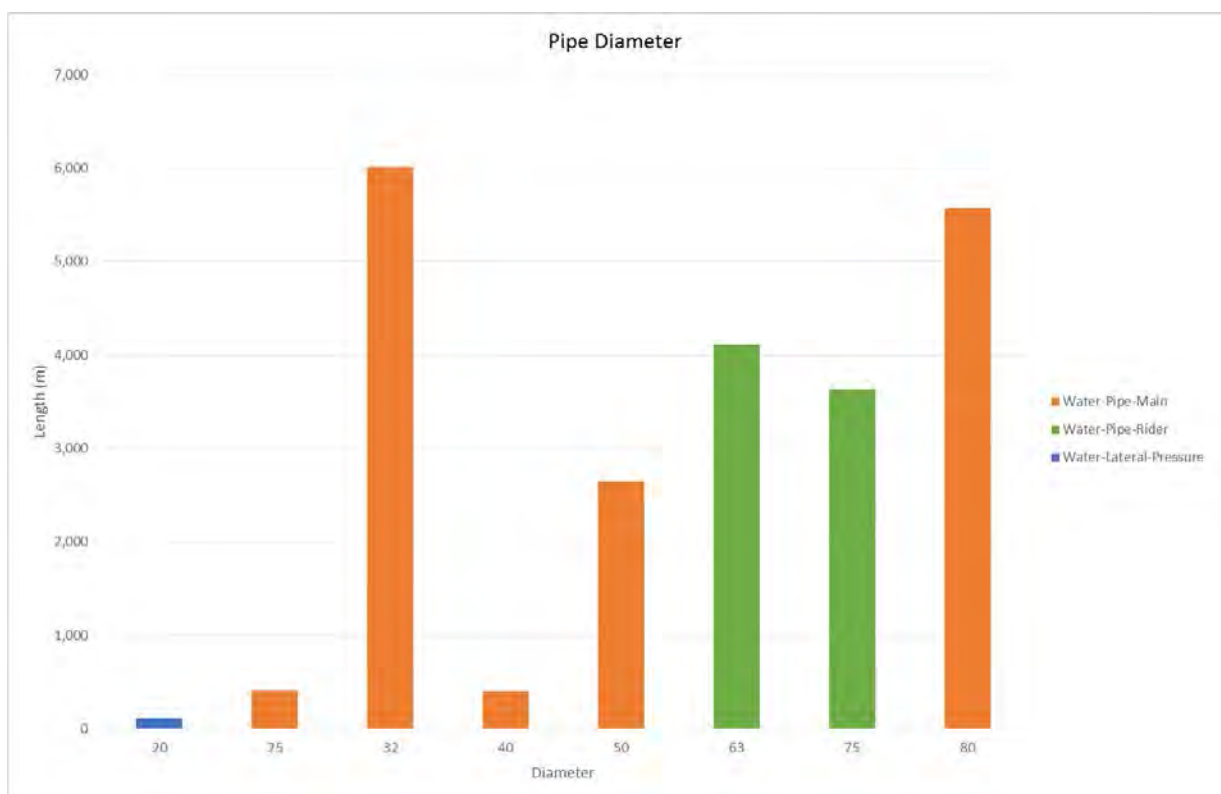


**Figure 26-4 Pipe Diameter – Te Pirita**

## 26.8 Operational Management

The water supply is operated and maintained under two maintenance contracts as follows:



- Contract 1241: Water Services Contract. Contract is with SICON Ferguson who undertakes investigations, conditions inspections, proactive and reactive maintenance and minor asset renewals; and
- Contract 1202: Parks and Reserves Contract. Contract is with SICON Ferguson who undertakes the maintenance of land scape features related to water services e.g. mowing, gardens etc.

Water quality sampling is completed under an agreement with Food and Health Ltd as required.

## 26.9 Photos of Main Assets



**Photo 1: Wellhead, Tanks and Pump Shed**

## 26.10 Risk Assessment

A risk assessment has been undertaken for the Te Pirita scheme. The key output from the risk assessment is the identification of any extreme and high risks which need to be mitigated. In order to mitigate these risks they have been included and budgeted for in the projects within this LTP. Table 26-6 details the risk priority rating, Table 25-6 outlines the risks and the list of key projects is found in Table 26-11.

**Table 26-5 Risk Priority Rating**

| Risk Score | Level of Risk | Risk Response                                                                                                                                                     |
|------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| > 50       | Extreme       | Awareness of the event to be reported to Council.<br>Urgent action to eliminate / mitigate / manage the risk.<br>Document risk and action in the AMP.             |
| 35-50      | Very High     | Risk to be eliminated / mitigated / managed through normal business planning processes with responsibility assigned.                                              |
| 14-35      | High          | Manage risk using routine procedures.                                                                                                                             |
| 3.5-14     | Moderate      | Monitor the risk.                                                                                                                                                 |
| < 3.5      | Low           | Awareness of the event to be reported to Council.<br>Immediate action required to eliminate / mitigate / manage the risk.<br>Document risk and action in the AMP. |

**Table 26-6 Risks – Te Pirita**

| Risk                                                    | Action/Project                | Year Identified | 2014 Risk Rating | 2017 Risk Rating | Residual Risk Rating |
|---------------------------------------------------------|-------------------------------|-----------------|------------------|------------------|----------------------|
| Electrical failure due to lightning or network spikes   | Install surge diverters       | 2014            | 6                | 6                | 6                    |
| Failure to meet NES water meter standards               | NES Water Meter Compliance    | 2014            | 20               | 6                | 6                    |
| Inability to collect income from non-metered properties | Install property water meters | 2014            | 27               | 0.6              | 0.6                  |
| Non-compliance with the DWSNZ                           | DWSNZ - Age Testing           | 2014            | 6                | 0.7              | 0.7                  |
| Non-compliance with the DWSNZ                           | DWSNZ - Bore-head security    | 2014            | 6                | 6                | 6                    |
| Non-consented activities                                | Renewal of consents           | 2014            | 27               | 27               | 6                    |
| Inadequate treatment under all conditions               | UV treatment                  | 2017            |                  | 1                | 1                    |

The list of district wide risks can be found in 5Waters Activity Management Plan: Volume 1.

## 26.11 Asset Valuation Details

The total replacement value of assets within the Te Pirita water scheme is \$1,952,999 with further details in Table 26-7 below.

**Table 26-7 Replacement Value, Te Pirita**

| Asset Class 1              | Asset Class 2 | Sum of Replacement Value |
|----------------------------|---------------|--------------------------|
| <b>Plant and Equipment</b> |               | \$297,995                |
| <b>Water Reticulation</b>  | Hydrant       | \$2,111                  |
|                            | Lateral       | \$3,429                  |
|                            | Pipe          | \$1,629,563              |
|                            | Supply Point  | \$17,801                 |
|                            | Valve         | \$2,101                  |

Replacement values for these different types of assets are shown in Figure 26-5 below.

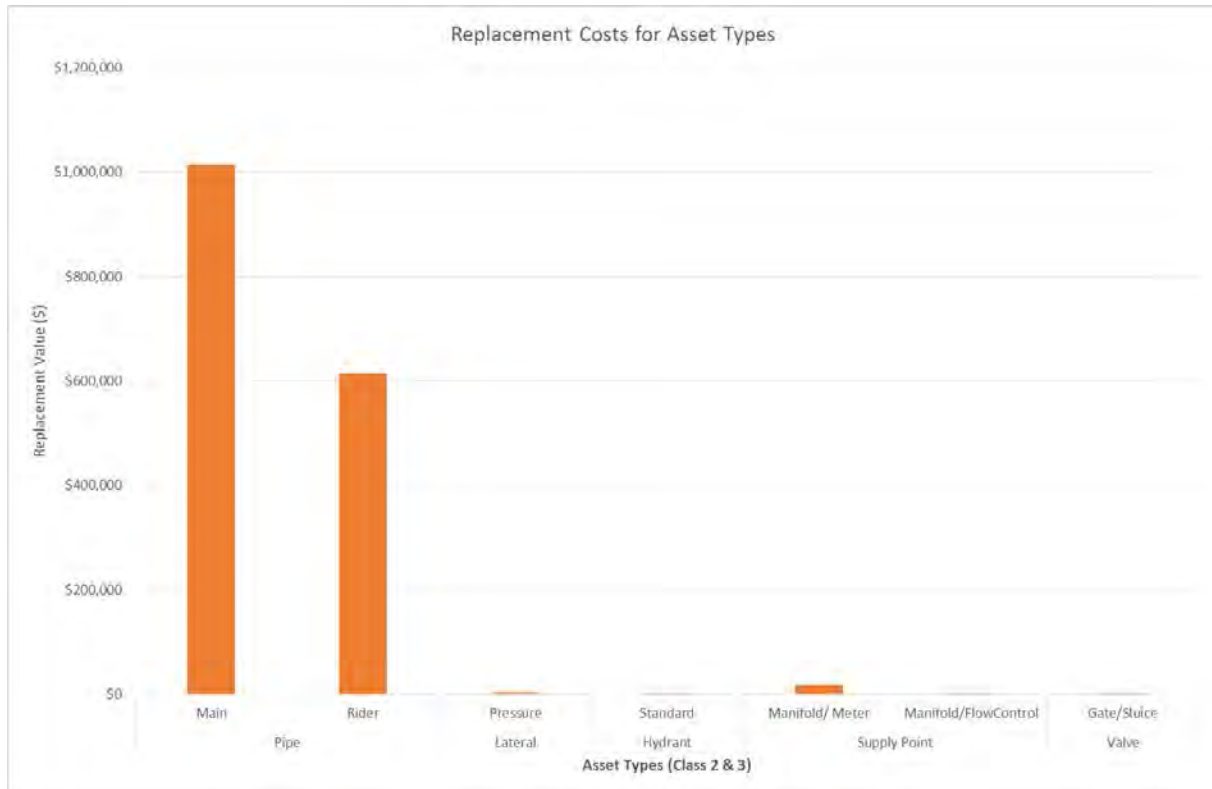


**Figure 26-5 Replacement Costs for Te Pirita**

## 26.12 Renewals

The renewal profile has been taken from the 2017 5 Waters Valuation. A graph showing the renewals for this scheme are shown by Figure 26-6 below. The majority renewals occur in 2025/2026.

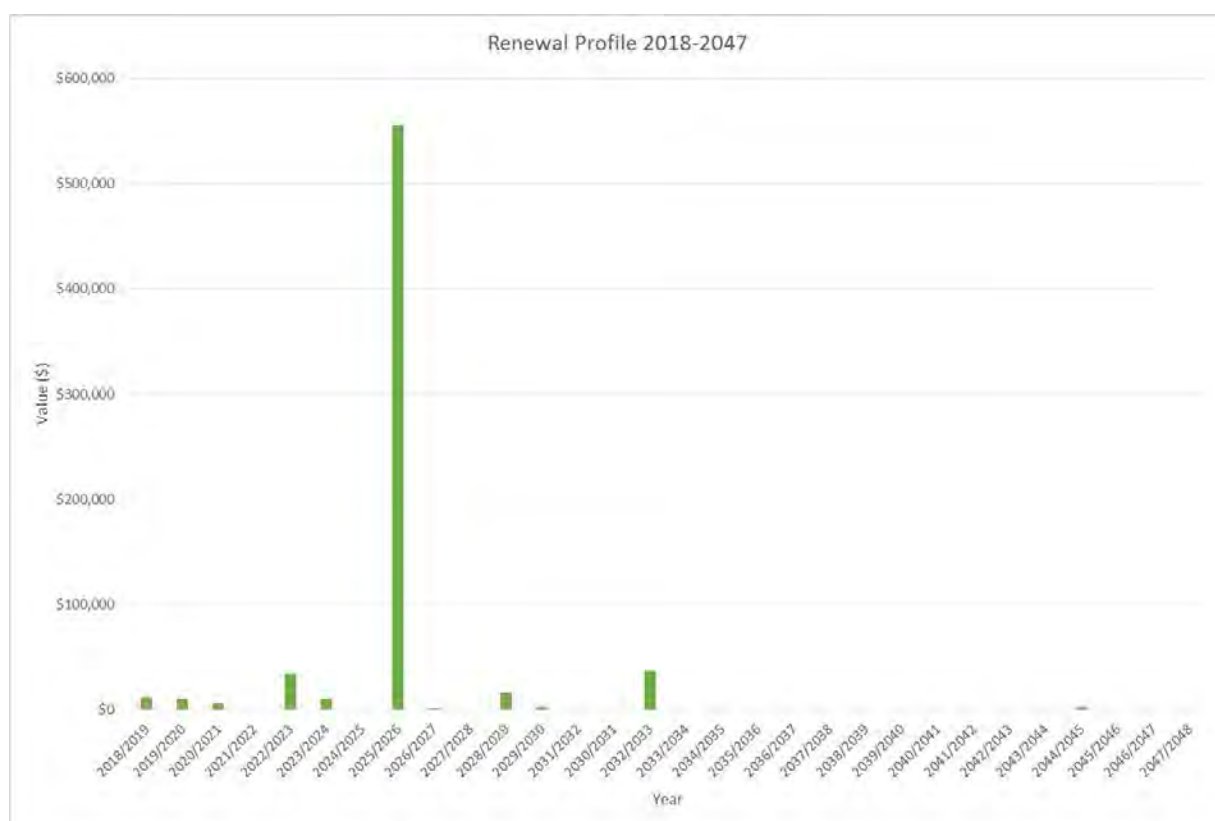


**Figure 26-6 Te Pirita Water Renewal Profile**

## 26.13 Critical Assets

The criticality model for Te Pirita has been updated for the 2018 AcMP. The methodology of the criticality model can be found in 5Waters Activity Management Plan: Volume 1 and it provides details of how the criticality has been calculated for the reticulation assets. Table 26-8 and Figure 26-7 below shows the calculated criticality for all of the assets within this scheme that have a recorded known length.

**Table 26-8 Length of Assets per Criticality Level**

| Criticality Bands |             | Length (m) |
|-------------------|-------------|------------|
| 5                 | Low         | 15,735     |
| 4                 | Medium-Low  | 6930       |
| 3                 | Medium      | 0          |
| 2                 | Medium-High | 0          |
| 1                 | High        | 0          |

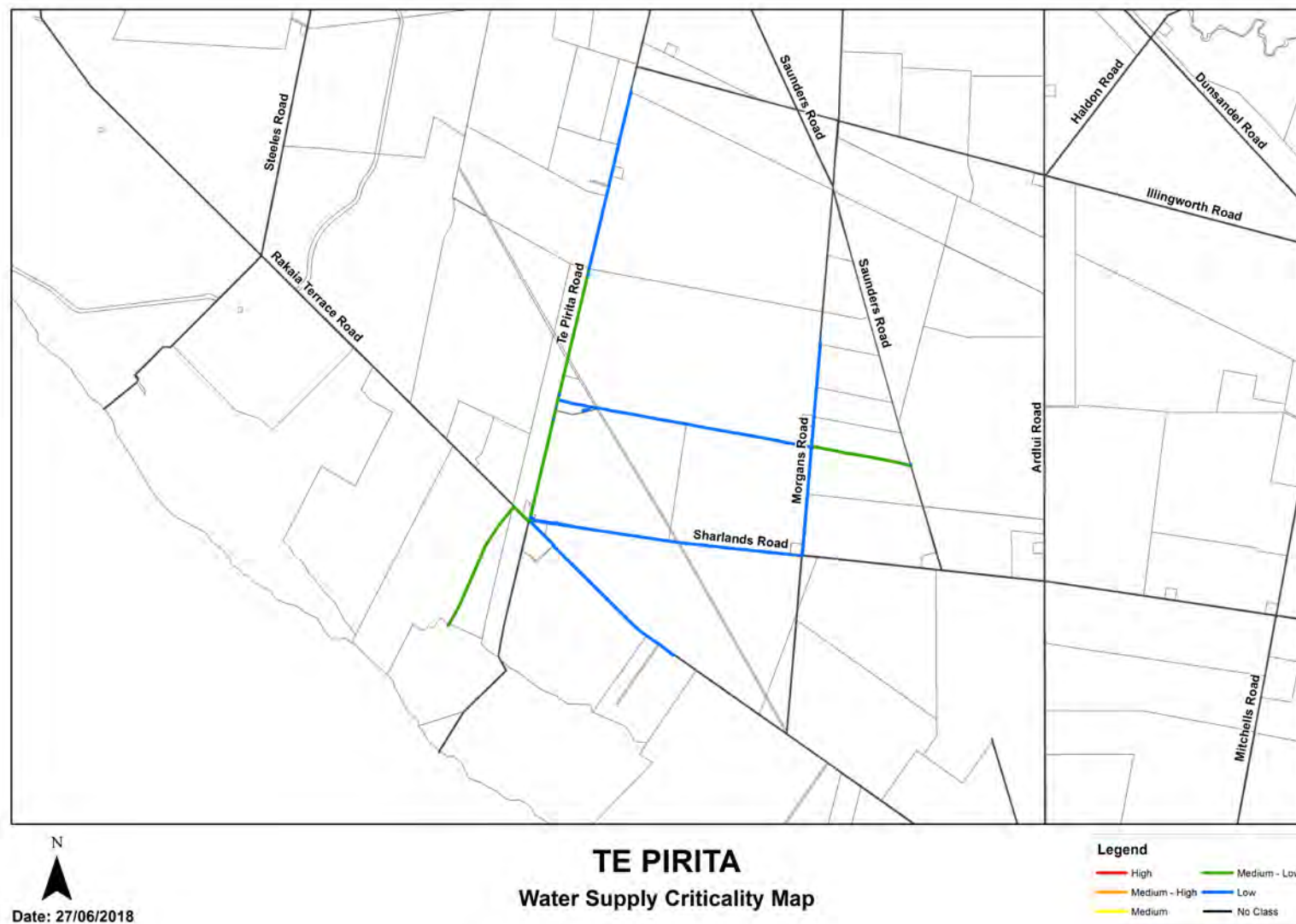


Figure 26-7 Criticality Map

## 26.14 Asset Condition

The asset condition model was run for Te Pirita in 2017. The methodology of the model can be found in 5Waters Activity Management Plan: Volume 1 which provides details of how the model has been calculated for the pipe reticulation assets. Figure 26-8 below shows the level of asset condition for these assets within this scheme that have a recorded known condition.

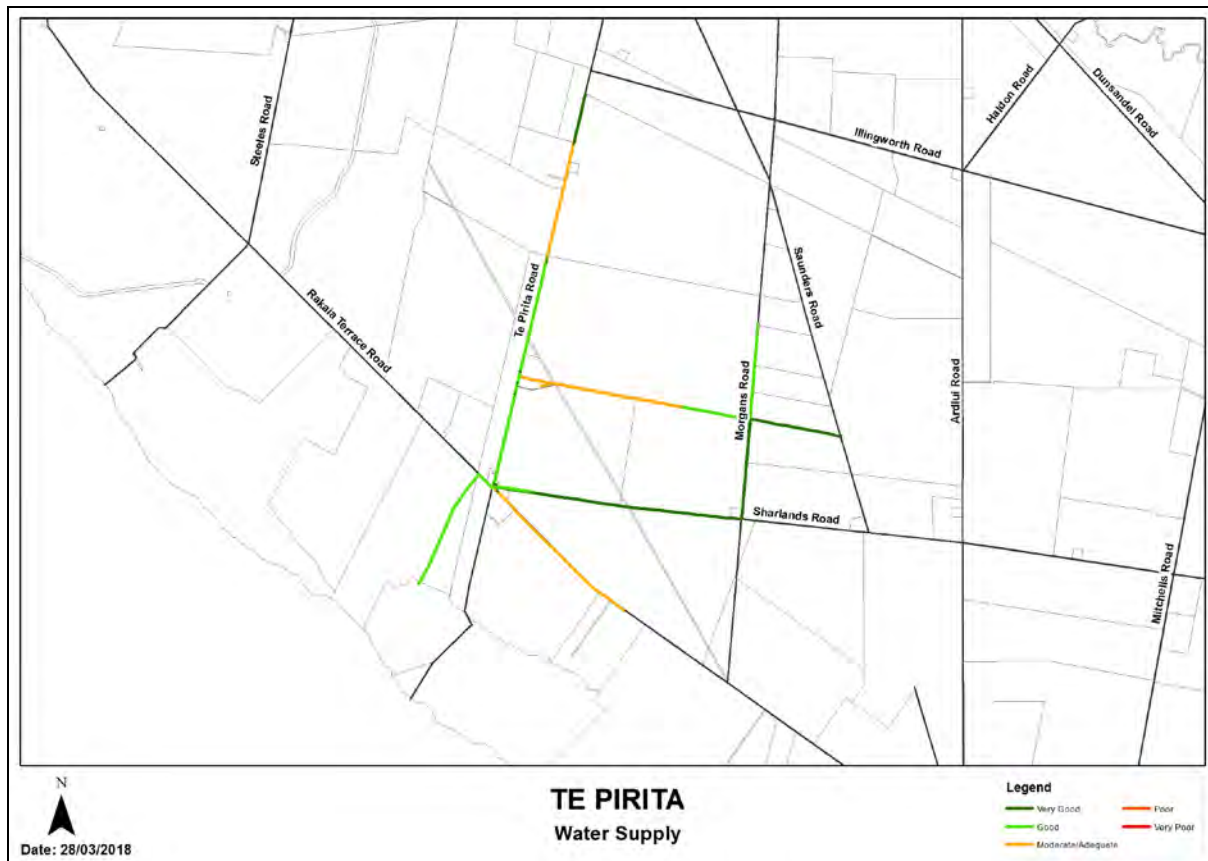


**Figure 26-8 Asset Condition – Te Pirita**

Table 26-9 provides a description of the condition rating used within the condition model.

**Table 26-9 Asset Condition Grading**

| Condition Rating | Grading   |
|------------------|-----------|
| 1.0              | Excellent |
| 2.0              | Good      |
| 3.0              | Moderate  |
| 4.0              | Poor      |
| 5.0+             | Fail      |



The number of pipe faults is also measured through the asset management system. Figure 26-9 shows the known historic pipe failures within this scheme.

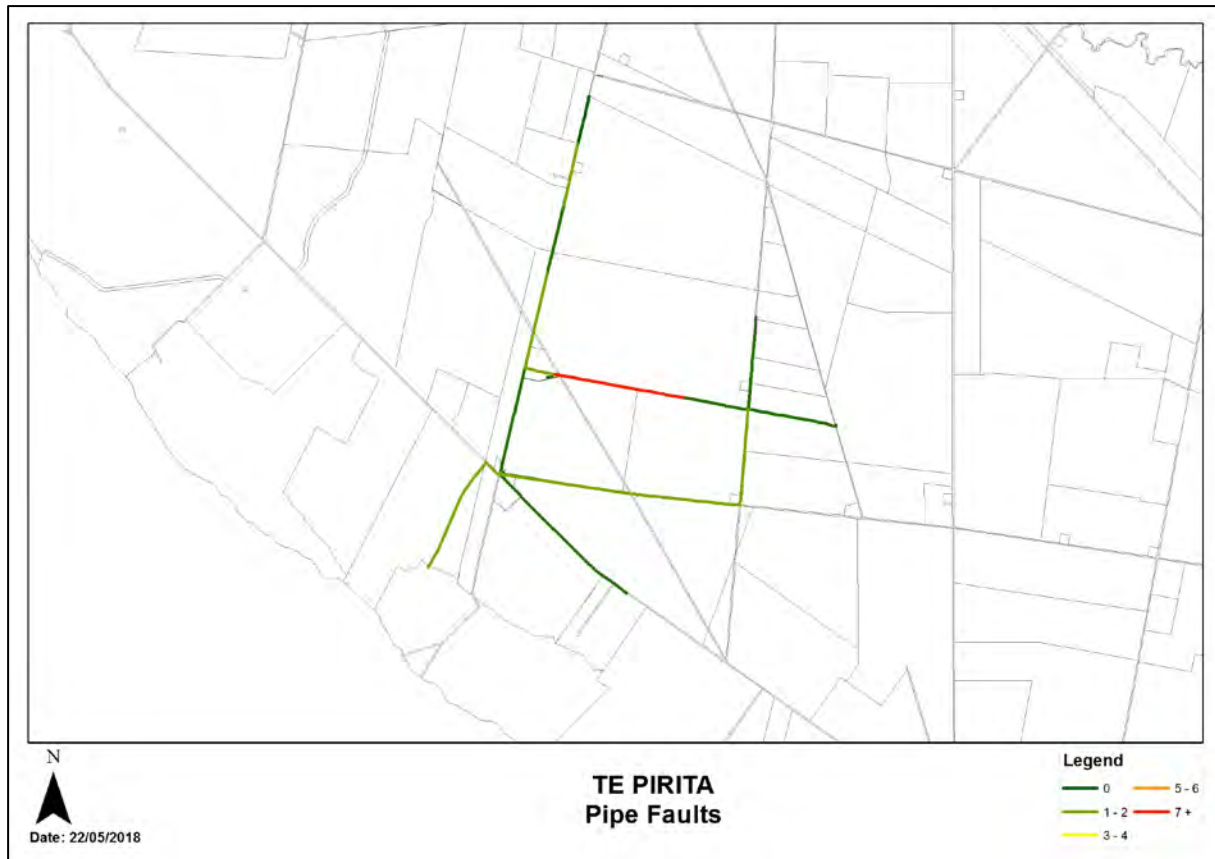


**Figure 26-9 Pipe Faults, Te Pirita**

### 26.15 Funding Program

The 10 year budgets for Te Pirita are shown by Table 26-10 and Figure 26-10. Budgets are split into expenditure, renewals, projects and capital projects.

All figures are (\$) not adjusted for CPI “inflation”. They are calculated on historical data, and population growth where relevant.

**Table 26-10 Te Pirita Budget Summary**

| Years     | Expenditure | Renewals | Projects | Capital Projects |
|-----------|-------------|----------|----------|------------------|
| 2018/2019 | \$36,450    | \$11,623 |          | \$10,000         |
| 2019/2020 | \$37,450    | \$10,532 |          | \$323,000        |
| 2020/2021 | \$38,450    | \$5,862  |          |                  |
| 2021/2022 | \$38,450    | \$704    |          |                  |
| 2022/2023 | \$38,450    | \$34,685 |          |                  |
| 2023/2024 | \$38,450    | \$10,476 |          |                  |

|           |           |           |  |           |
|-----------|-----------|-----------|--|-----------|
| 2024/2025 | \$38,450  |           |  |           |
| 2025/2026 | \$38,450  | \$555,176 |  |           |
| 2026/2027 | \$38,450  | \$1,775   |  |           |
| 2027/2028 | \$38,450  |           |  |           |
| Total     | \$381,500 | \$630,834 |  | \$333,000 |

An explanation of the categories within the budgets are as follows below:

- Expenditure consists of operation and maintenance costs;
- Renewals are replacement of assets which are nearing or exceeded their useful life;
- Projects are investigations, decisions and planning activities which exclude capital works; and
- Capital projects are activities involving physical works.

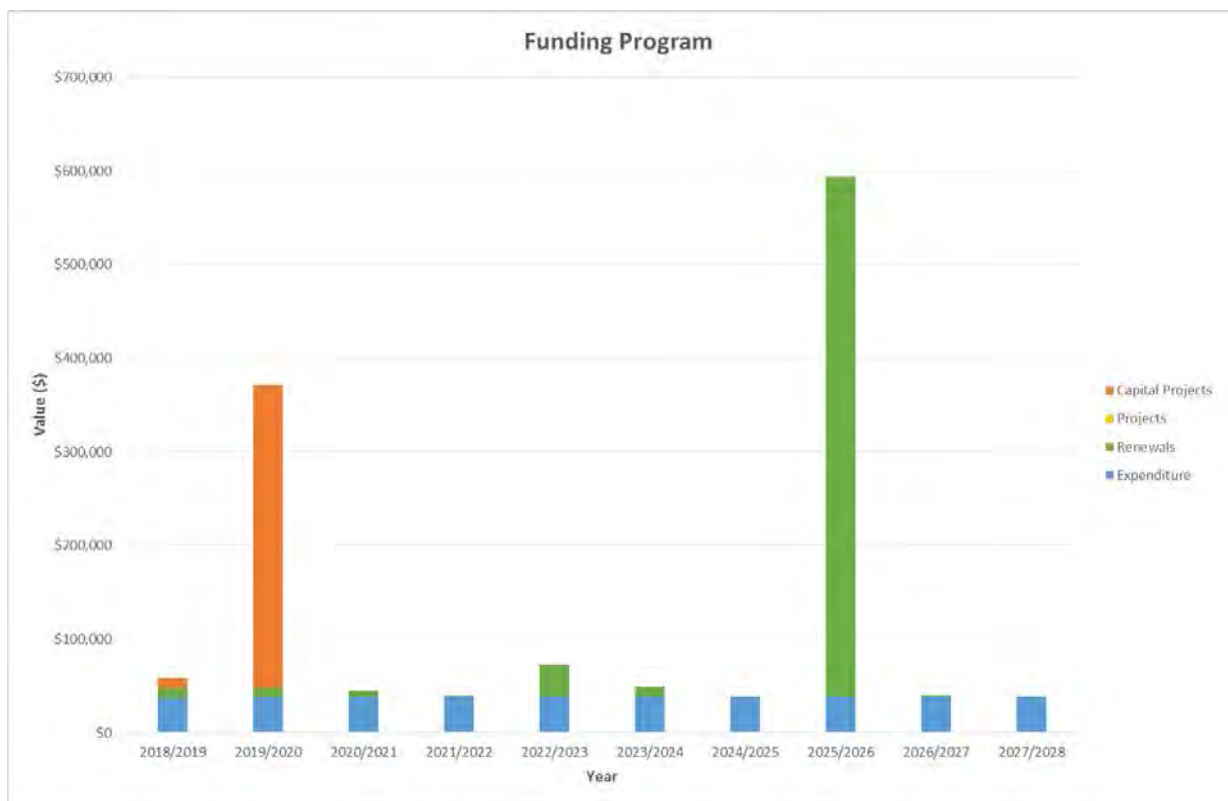


**Figure 26-10 Te Pirita Funding Summary**

There are two major projects for Te Pirita water scheme in the LTP budget.

**Table 26-11 Key Projects**

| Account Label    | GL        | Description         | Year 1 (\$) | Year 2 (\$) | Year 3 (\$) | Years 4 to 10 | Funding Split <sup>23</sup> |
|------------------|-----------|---------------------|-------------|-------------|-------------|---------------|-----------------------------|
| Capital Projects | 388990012 | UV treatment        |             | \$323,000   |             |               | 100% LoS                    |
| Capital Projects | 388990013 | UV treatment design | \$10,000    |             |             |               | 100% LoS                    |

The list of district wide projects can be found in 5Waters Activity Management Plan: Volume 1.

### Discussion on Projects

Projects have been determined based on their:

- Relevance to the scheme
- Requirement to be completed under legislation
- Ability to bring the scheme up to or maintain the Level of Service required under council's Asset Management Policy.

Many projects are **jointly** funded by more than one scheme and activity. Each scheme pays a pro-rata share only, equivalent to the number of connections.

### Discussion on Capital and Projects

Where relevant, Capital (Levels of Service) and Capital (Growth) projects have been included in the scheme financial details.

Levels of Service Projects and growth splits have been provided to ensure the costs of population driven works are clear.

<sup>23</sup> Where LoS refers to Level of Service and G refers to Growth

## 27.0 UPPER SELWYN HUTS WATER SUPPLY

### 27.1 Scheme Summary

| Description                                   |                                   | Quantity                                 |
|-----------------------------------------------|-----------------------------------|------------------------------------------|
| <b>Estimated Population Served</b>            |                                   | 90                                       |
| <b>Scheme Coverage</b><br>(1 Jan 2018)        | Full Charges                      |                                          |
|                                               | Half Charges                      |                                          |
|                                               | >1 Charges                        |                                          |
| <b>System Components</b>                      | Bores/Intakes (No.)               | 1                                        |
|                                               | Treatment/Disinfection            | None                                     |
|                                               | Reservoirs (No.)                  | Multiple, currently being decommissioned |
|                                               | Pump Stations (No.)               | -                                        |
|                                               | Piped (m)                         | Unknown                                  |
| <b>History</b>                                | Original scheme installation date | Unknown                                  |
| <b>Value (\$)</b>                             | Replacement Cost                  | \$68,311.47                              |
|                                               | Depreciated Replacement Cost      | \$32,874.72                              |
| <b>Financial</b>                              | 2018/2019 Estimate                | \$18,010                                 |
|                                               | Annual maintenance cost           | 0.56%                                    |
|                                               | % of total                        |                                          |
| <b>Demand</b><br>(1 Jan – 31 Dec 2017)        | Average daily                     | -                                        |
|                                               | Peak daily                        | Unknown (no SCADA)                       |
|                                               | Minimum daily                     | Unknown (no SCADA)                       |
|                                               | Average daily per connection      | -                                        |
| <b>Type of Supply</b>                         |                                   | Unrestricted                             |
| <b>Target Pressure &amp; Flow at boundary</b> | Pressure                          |                                          |
|                                               | Flow                              |                                          |
| <b>Sustainability</b>                         | Well Security                     | Unsecure                                 |

### 27.2 Key Issues

The following key issues are associated with the Upper Selwyn Huts water supply. A list of district wide issues are located in 5Waters Activity Management Plan: Volume 1.

**Table 27-1 Upper Selwyn Huts Scheme Issues**

| What's the Problem                                                                                                                                                           | What we plan to do                                                                                                                                                                                                                                              |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| There is great deal of uncertainty surrounding the reticulation location, size and condition. As a result the data confidence for the Upper Selwyn Huts Water Supply is low. | The Upper Selwyn Huts Committee will provide Council with the reticulation location for GIS mapping. Council plans to undertake a progressive pipe location and sampling programme. The results will be incorporated into the AMS, Valuation and Activity Plan. |

### 27.3 Overview & History

The community was formally established in 1895 when the land was permanently set aside as a reserve. The initial water system was installed by the community in 1929. The Springston South Reserve Management Committee operated and maintained the water supply (using Allied Water Systems and Nairn Electrical), directly funded by the community, until the Committee was discharged by Selwyn District Council in June 2011.

The supply has been upgraded over the years. Reducing artesian pressure necessitated installation of a small pump at the well head to fill the suction tank from which water is pumped to the elevated header tank.

A total of 97 dwellings exist within the reserve area and are considered to have access to water and wastewater services

Following the September 2010 earthquake structural damage occurred to the reinforced concrete tank stand. This was repaired through installation of a steel external frame.



**Figure 27-1 Scheme Map**



**Figure 27-2 Scheme Schematic**

## 27.4 System Capacity

This water supply serves 97 dwellings on Reserve land, only 12 of which may be permanently occupied and the balance occupied no more than 9 months in the year. All connections have been allocated and are utilised. No additional connections are anticipated. Existing capacity is adequate.

**Table 27-2 Capacity Summary**

|                                                                | Flow Rate<br>(L/s) | Daily Volume<br>(m <sup>3</sup> ) | Annual Volume<br>(m <sup>3</sup> ) | Comments      |
|----------------------------------------------------------------|--------------------|-----------------------------------|------------------------------------|---------------|
| Abstraction Capacity                                           | -                  | -                                 | -                                  | 1 x bore pump |
| Consented Take                                                 | No limit           | 90 **                             | 9,000 *                            |               |
| Peak Demand                                                    | -                  | -                                 | -                                  | No SCADA      |
| * inferred value                                               |                    |                                   |                                    |               |
| ** estimated, based on 7 day average of 60 m <sup>3</sup> /day |                    |                                   |                                    |               |

## 27.5 Resource Consents

The Upper Selwyn Huts water supply has a number of resource consents. Table 27-3 shows the water take permitted by the resource consents for this scheme.

**Table 27-3 Resource Consents**

| Consent                      | Description                  | Location                                  | Date Issued | Expiry Date | Consented Max Instantaneous Flow (L/s) | Consented Max Daily Volume (m <sup>3</sup> /day) |
|------------------------------|------------------------------|-------------------------------------------|-------------|-------------|----------------------------------------|--------------------------------------------------|
| CRC146688<br>(Issued-Active) | to take and use groundwater. | Days Road And Spackman Avenue, SPRINGSTON | 19-Mar-02   | 31-Jan-35   |                                        | 60<br>(420 per week)                             |

## 27.6 Water Quality

The Upper Selwyn Huts water supply is a non-secure supply which is sampled weekly in the treatment plant and monthly in the reticulation zone.

The following details E. coli transgressions for the period 2012 to 2017.

### Treatment

There has been three E. coli source transgressions during this period. These occurred in October 2016, March 2017 and April 2017.

### Zone

There have been two E. coli treatment transgressions during this period which occurred in March 2015 and April 2017.

## Chemical Analysis

The following is a summary of the raw water chemical analysis carried out at the Upper Selwyn Huts water supply.

**Table 27-4 Upper Selwyn Huts Water Supply Raw Water Chemical Analysis Summary**

| Parameter                                   | Standards<br>MAV* (GV)** | Plant 2015 | Plant 2017 | Status |
|---------------------------------------------|--------------------------|------------|------------|--------|
| Total Lead (g/m3)                           | 0.01                     | <0.00011   | < 0.00011  | ✓      |
| pH (pH units)                               | 7-8.5                    | 8          | 7.9        | ✓      |
| Total Hardness (g/m3 as CaCO <sub>3</sub> ) | <200                     | 66         | 64.2       | ✓      |
| Total Calcium (g/m3)                        | n/v                      | 20         | 19.10      | ✓      |
| Total Iron (g/m3)                           | <0.2                     | <0.021     | < 0.021    | ✓      |
| Total Sodium (g/m3)                         | <200                     | 13.4       | 13.61      | ✓      |
| Nitrate - Nitrogen (g/m3)                   | 11.3                     | 0.25       | 0.230      | ✓      |

\* MAV – Maximum Acceptable Value

\*\* (GV) – Guideline Value

## 27.7 Scheme Assets

A summary of material and diameter for pipes is not available for this scheme.

## 27.8 Operational Management

The water supply is operated and maintained under two maintenance contracts as follows:

- Contract 1241: Water Services Contract. Contract is with SICON Ferguson who undertakes investigations, conditions inspections, proactive and reactive maintenance and minor asset renewals; and
- Contract 1202: Parks and Reserves Contract. Contract is with SICON Ferguson who undertakes the maintenance of land scape features related to water services e.g. mowing, gardens etc.

Water quality sampling is completed under an agreement with Food and Health Ltd as required.

## 27.9 Photos of Main Assets



**Photo 1: Well and pump shed**

## 27.10 Risk Assessment

A risk assessment has been undertaken for the Upper Selwyn Huts scheme. The key output from the risk assessment is the identification of any extreme and high risks which need to be mitigated. In order to mitigate these risks they have been included and budgeted for in the projects within this LTP. Table 26-8 details the risk priority, Table 27-6 outlines the risks and the list of key projects is found in Table 27-9.

**Table 27-5 Risk Priority Rating**

| Risk Score | Level of Risk | Risk Response                                                                                                                                                         |
|------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| > 50       | Extreme       | Awareness of the event to be reported to Council.<br>Urgent action to eliminate / mitigate / manage the risk.<br><br>Document risk and action in the AMP.             |
| 35-50      | Very High     | Risk to be eliminated / mitigated / managed through normal business planning processes with responsibility assigned.                                                  |
| 14-35      | High          | Manage risk using routine procedures.                                                                                                                                 |
| 3.5-14     | Moderate      | Monitor the risk.                                                                                                                                                     |
| < 3.5      | Low           | Awareness of the event to be reported to Council.<br>Immediate action required to eliminate / mitigate / manage the risk.<br><br>Document risk and action in the AMP. |

**Table 27-6 Risks – Upper Selwyn Huts**

| Risk                                                  | Action/Project             | Year Identified | 2014 Risk Rating | 2017 Risk Rating | Residual Risk Rating |
|-------------------------------------------------------|----------------------------|-----------------|------------------|------------------|----------------------|
| Electrical failure due to lightning or network spikes | Install surge diverters    | 2014            | 6                | 6                | 6                    |
| Failure to meet NES water meter standards             | NES Water Meter Compliance | 2014            | 20               | 6                | 6                    |

|                                                         |                               |      |    |    |     |
|---------------------------------------------------------|-------------------------------|------|----|----|-----|
| Inability to collect income from non-metered properties | Install property water meters | 2014 | 27 | 27 | 2.1 |
| Non-consented activities                                | Renewal of consents           | 2014 | 27 | 27 | 6   |
| Inadequate As-builts                                    | as-builts                     | 2017 |    | 9  | 0.7 |

The list of district wide risks can be found in 5Waters Activity Management Plan: Volume 1.

## 27.11 Asset Valuation Details

The total replacement value of assets within the Upper Selwyn Huts water scheme is detailed in Table 27-7 below.

**Table 27-7 Replacement Value, Upper Selwyn Huts**

| Asset Class 1              | Asset Class 2 | Sum of Replacement Value |
|----------------------------|---------------|--------------------------|
| <b>Plant and Equipment</b> |               | \$68,311                 |
| <b>Water Reticulation</b>  |               | Unmapped                 |

## 27.12 Renewals

The renewal profile has been taken from the 2017 5 Waters Valuation. A graph showing the renewals for this scheme are shown by Figure 27-3 below. The majority renewals occur in 2024/2025.

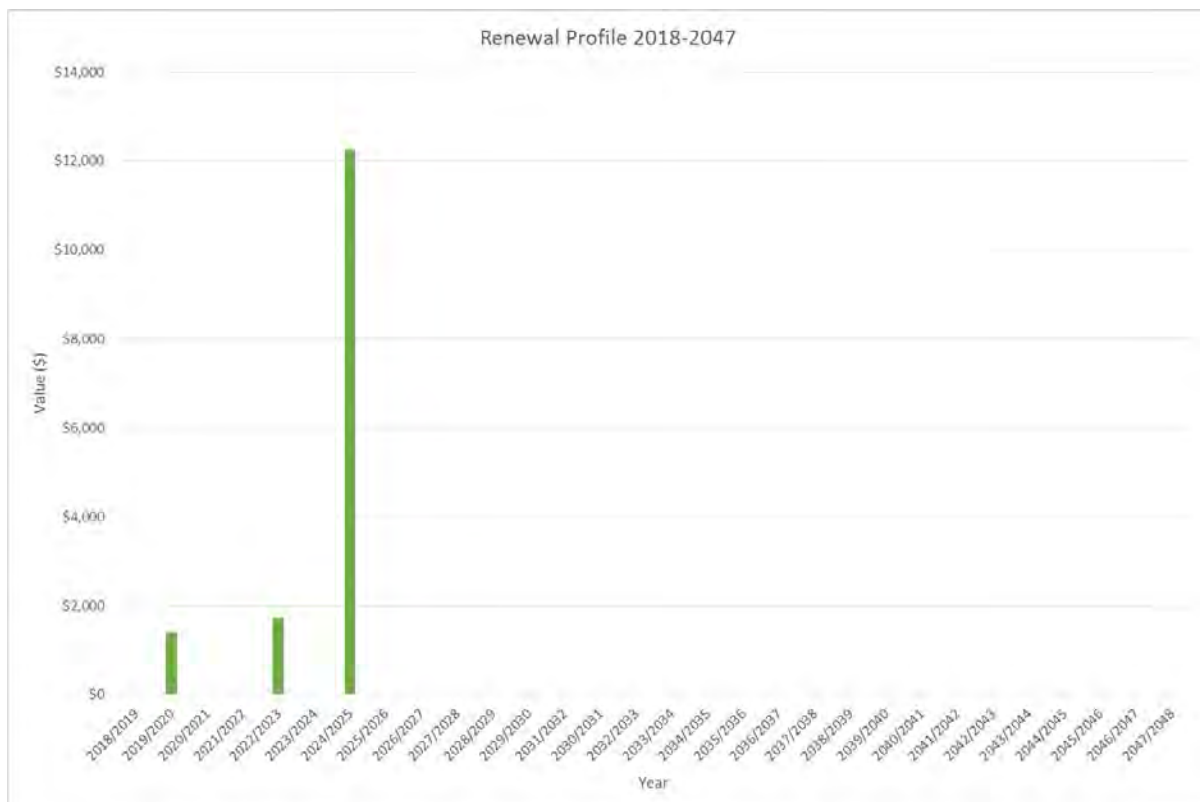


**Figure 27-3 Upper Selwyn Huts Water Renewal Profile**

### 27.13 Critical Assets

There is no criticality information available for this scheme.

### 27.14 Asset Condition

There is no condition information available for this scheme.

### 27.15 Funding Program

The 10 year budgets for Upper Selwyn Huts are shown by Table 27-8 and Figure 27-4. Budgets are split into expenditure, renewals, projects and capital projects.

All figures are (\$) not adjusted for CPI “inflation”. They are calculated on historical data, and population growth where relevant.

**Table 27-8 Upper Selwyn Huts Budget Summary**

| Years     | Expenditure | Renewals | Projects | Capital Projects |
|-----------|-------------|----------|----------|------------------|
| 2018/2019 | \$18,010    |          | \$5,000  |                  |
| 2019/2020 | \$18,010    | \$1,407  |          |                  |
| 2020/2021 | \$18,010    |          |          |                  |
| 2021/2022 | \$18,010    |          |          |                  |
| 2022/2023 | \$18,010    | \$1,722  |          |                  |
| 2023/2024 | \$18,010    |          |          |                  |
| 2024/2025 | \$18,010    | \$12,251 |          |                  |
| 2025/2026 | \$18,010    |          |          |                  |
| 2026/2027 | \$18,010    |          |          |                  |
| 2027/2028 | \$18,010    |          |          |                  |
| Total     | \$180,100   | \$15,380 | \$5,000  |                  |

An explanation of the categories within the budgets are as follows below:

- Expenditure consists of operation and maintenance costs;
- Renewals are replacement of assets which are nearing or exceeded their useful life;
- Projects are investigations, decisions and planning activities which exclude capital works; and
- Capital projects are activities involving physical works.



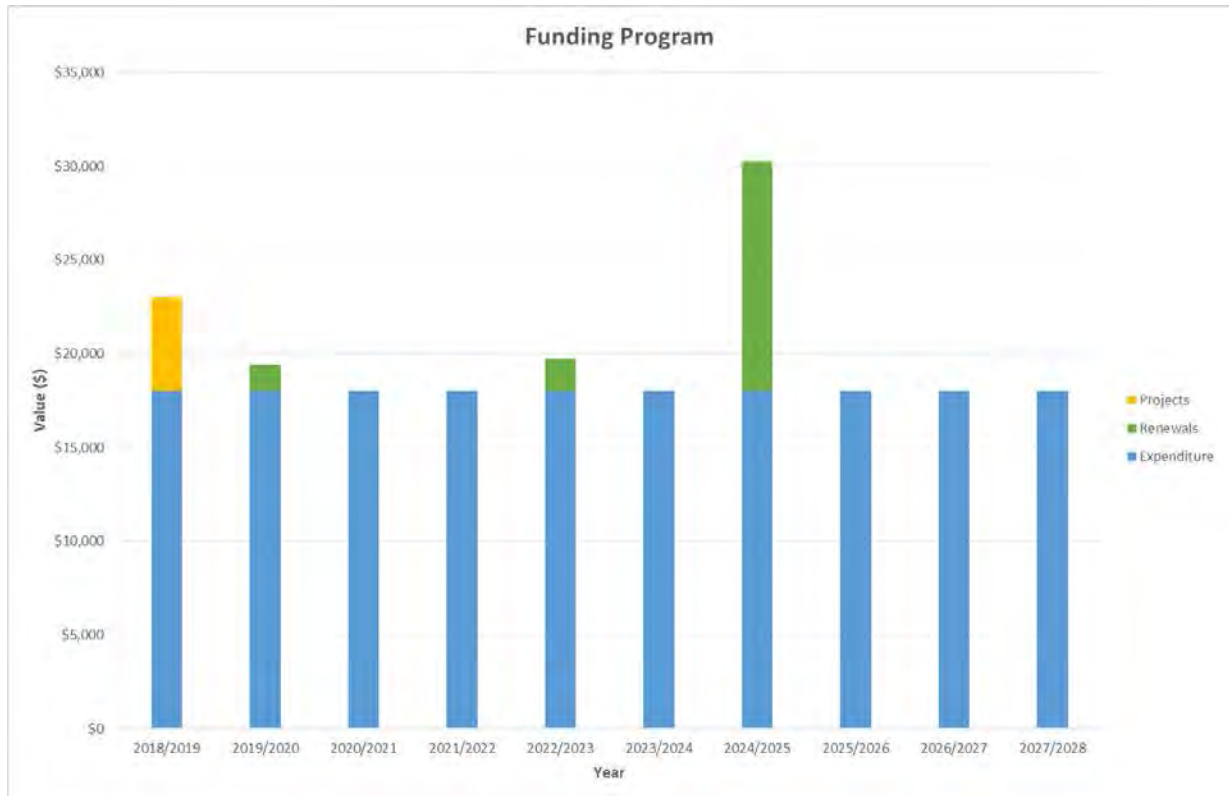


**Figure 27-4 Upper Selwyn Huts Funding Summary**

There is one major project for Upper Selwyn Huts water scheme in the LTP budget.

**Table 27-9 Key Projects**

| Account Label | GL      | Description | Year 1 (\$) | Year 2 (\$) | Year 3 (\$) | Years 4 to 10 | Funding Split <sup>24</sup> |
|---------------|---------|-------------|-------------|-------------|-------------|---------------|-----------------------------|
| Projects      | 4069023 | Asbuilt     | \$5,000     |             |             |               | 100% LoS                    |

The list of district wide projects can be found in 5Waters Activity Management Plan: Volume 1.

### Discussion on Projects

Projects have been determined based on their:

- Relevance to the scheme
- Requirement to be completed under legislation
- Ability to bring the scheme up to or maintain the Level of Service required under council's Asset Management Policy.

Many projects are **jointly** funded by more than one scheme and activity. Each scheme pays a pro-rata share only, equivalent to the number of connections.

### Discussion on Capital and Projects

Where relevant, Capital (Levels of Service) and Capital (Growth) projects have been included in the scheme financial details.

Levels of Service Projects and growth splits have been provided to ensure the costs of population driven works are clear.

<sup>24</sup> Where LoS refers to Level of Service and G refers to Growth

## 28.0 WEST MELTON WATER SUPPLY

### 28.1 Scheme Summary

| Description                                   |                                   | Quantity                       |
|-----------------------------------------------|-----------------------------------|--------------------------------|
| <b>Estimated Population Served</b>            |                                   | 1831                           |
| <b>Scheme Coverage</b><br>(1 Jan 2018)        | Full Charges                      | 650                            |
|                                               | Half Charges                      | 109                            |
|                                               | >1 Charges                        | 4                              |
| <b>System Components</b>                      | Bores/Intakes (No.)               | 4                              |
|                                               | Treatment/Disinfection            | Filtration and UV              |
|                                               | Reservoirs (No.)                  | 10 (+ 2 temporary)             |
|                                               | Pump Stations (No.)               | 3                              |
|                                               | Piped (m)                         | 36,432.57                      |
| <b>History</b>                                | Original scheme installation date | 1984                           |
| <b>Value (\$)</b>                             | Replacement Cost                  | \$6,937,905.67                 |
|                                               | Depreciated Replacement Cost      | \$5,984,858.81                 |
| <b>Financial</b>                              | 2018/2019 Estimate                | 197,200                        |
|                                               | Annual maintenance cost           | 6.16%                          |
|                                               | % of total                        |                                |
| <b>Demand (m3)</b><br>(1 Jan – 31 Dec 2017)   | Average daily                     | 1,050                          |
|                                               | Peak daily                        | 3,085                          |
|                                               | Minimum daily                     | 427                            |
|                                               | Average daily per connection      | 1.6                            |
| <b>Type of Supply</b>                         |                                   | High pressure and unrestricted |
| <b>Target Pressure &amp; Flow at boundary</b> | Pressure                          | >175kPa                        |
|                                               | Flow                              | >15L/min                       |
| <b>Sustainability</b>                         | Well Security                     | Unsecure                       |

### 28.2 Key Issues

The following key issues are associated with the West Melton water supply. A list of district wide issues are located in 5Waters Activity Management Plan: Volume 1.

**Table 28-1 West Melton Scheme Issues**

| What's the Problem                                                                                                                     | What we plan to do                           |
|----------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|
| Demand management will remain a part of this high growth community located in the Waimakariri – Selwyn (West Melton) groundwater zone. | Develop and implement demand management plan |

### 28.3 Overview & History

The original (Laird Place) scheme was formed in 1984 by the then Paparua County in conjunction with a subdivision constructed by a developer. The scheme was designed as a high pressure domestic supply with fire fighting capacity. However a suitable submersible pump was not installed until 2003, solving low pressure issues. The timber reservoir had a history of allowing contamination in via its timber roof. This problem was overcome by covering the reservoir with butanol in about 1988.

The scheme was substantially expanded in 2011 with the adoption of water supply infrastructure developed for the Gainsborough subdivision east of Weedons Ross Road. This included the Royston Common well, Rossington Drive tank farm and associated pumping system. Two additional bores constructed in conjunction with the Preston Downs development west of Weedons Ross Road were also incorporated. The Laird well was decommissioned at this time, as was the timber tank that had sustained damage in the September 2010 earthquake.

The West Melton township is now supplied by four groundwater bores; one near Royston Common in Halkett Grove, a second on Elizabeth drive in Preston Downs and a third on Jacqueline Drive, also in Preston Downs. The final bore is located in Wilfield and is connected to the Rossington reservoir site.

The Elizabeth Allen Drive and Jacqueline Drive bores have a history of providing low quality water after significant rainfall events. These wells were expected to provide a secure source of water and the contamination following heavy rain meant that additional treatment was required.

When this problem was discovered in August 2012 the Elizabeth Allen Drive and Jacqueline Drive bores were taken offline. An Ultraviolet (UV) treatment system was installed in December 2012 to treat the Elizabeth Allen Drive bore to ensure water would remain safe for consumption. The Jacqueline Drive bore remained offline, as the surplus provided by the well was not needed at the time and required treatment before bringing online.

The Royston Common bore failed in terms of water quality on in 2014. A temporary UV unit was installed and the bore brought back online.

All water in West Melton is UV treated and has turbidity control via 1 micron filtration.

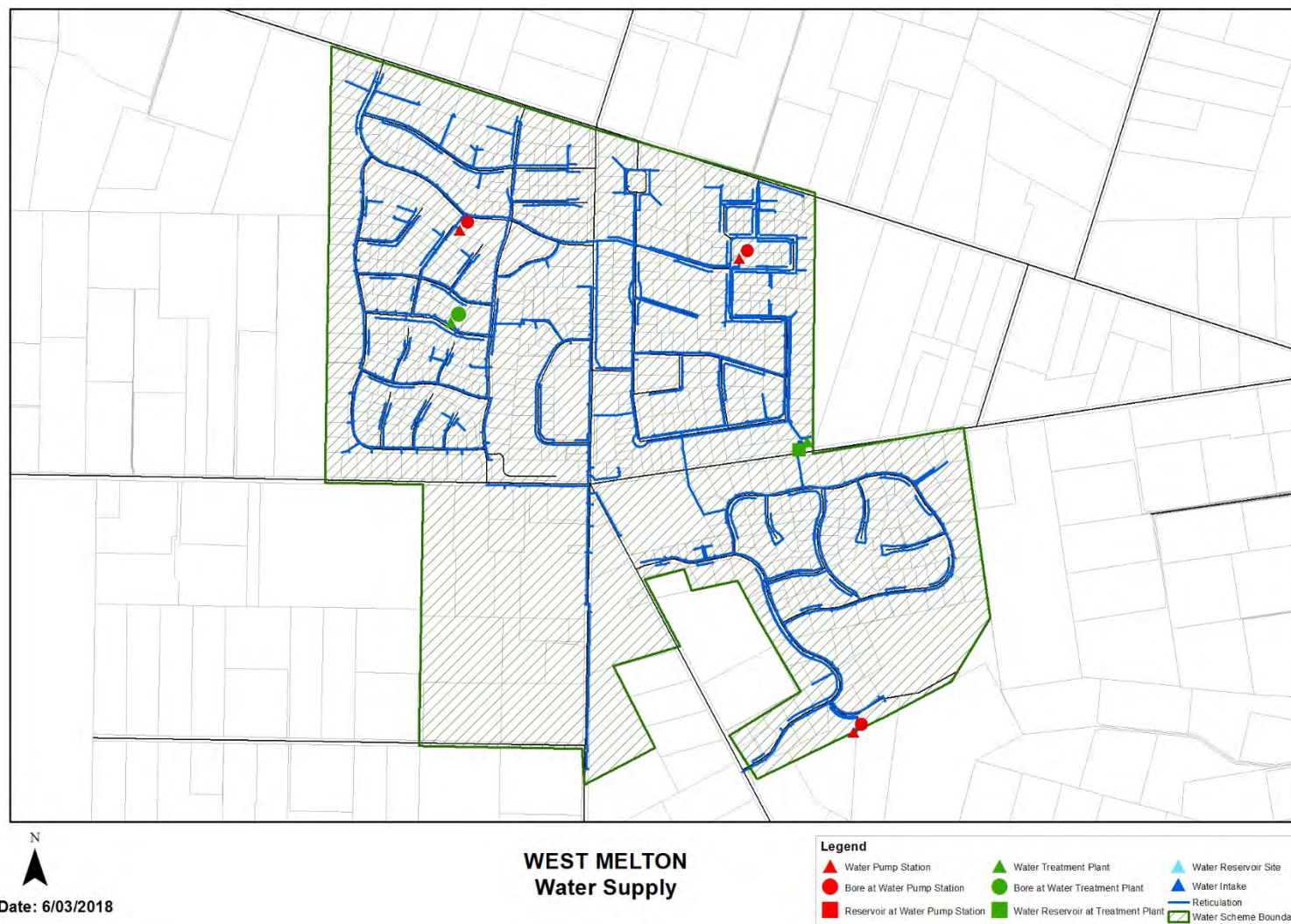


**Figure 28-1 Scheme Map**









## 28.4 System Capacity

In response to the accelerated growth within the Selwyn District hydraulic models have been used to plan future water infrastructure for a number of the water supplies. Hydraulic models have been built and calibrated to international best practice to carry out the '30-year Water Infrastructure Master Planning'.

The master planning provides an assessment of the sizing and timing of new infrastructure for new water sources (wells) and pipelines to service growth. Part of the master planning requires a water balance to be developed to forecast growth, using historical peak demand per household. The water balance forecasts the peak instantaneous flow per year versus the water resources available to determine the staging of new wells. The well staging assumes that one well is redundant for each water supply, to take into consideration maintenance of wells, planning/timing of new wells and security of supply i.e. to maintain average/peak demand.

Population projections are based on SDC 'Household Projections 2018 to 2048' and have been applied to the latest connection figures for each township.

Figure 28-3 shows the projected growth for West Melton to 2048 per planning horizon (5 years intervals) in accordance with the latest House Projections.

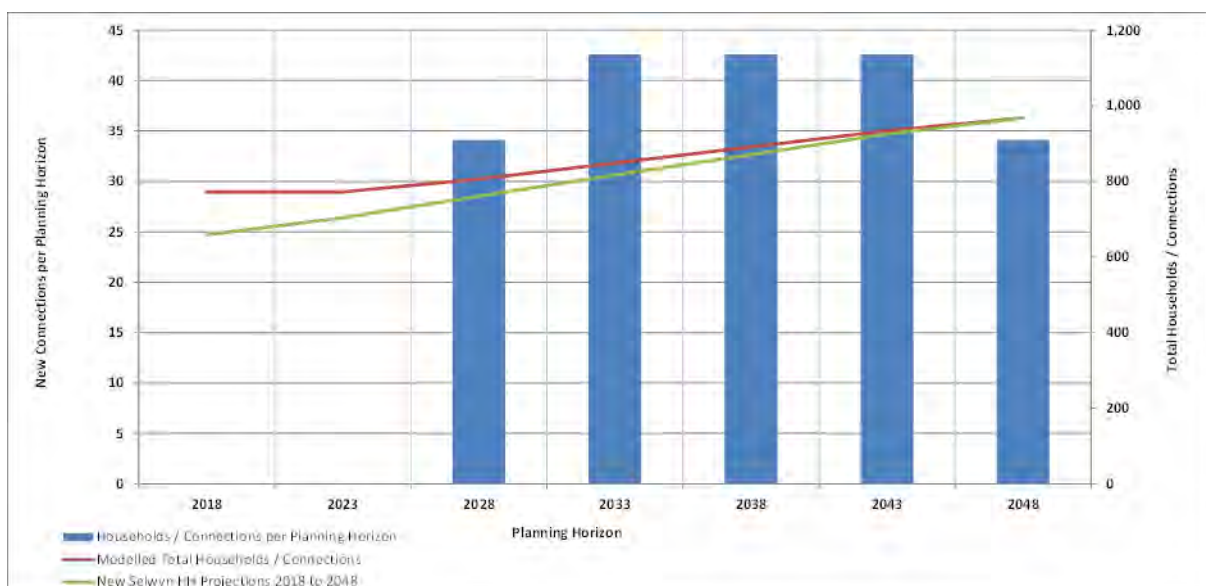


**Figure 28-3: West Melton Household Projections**

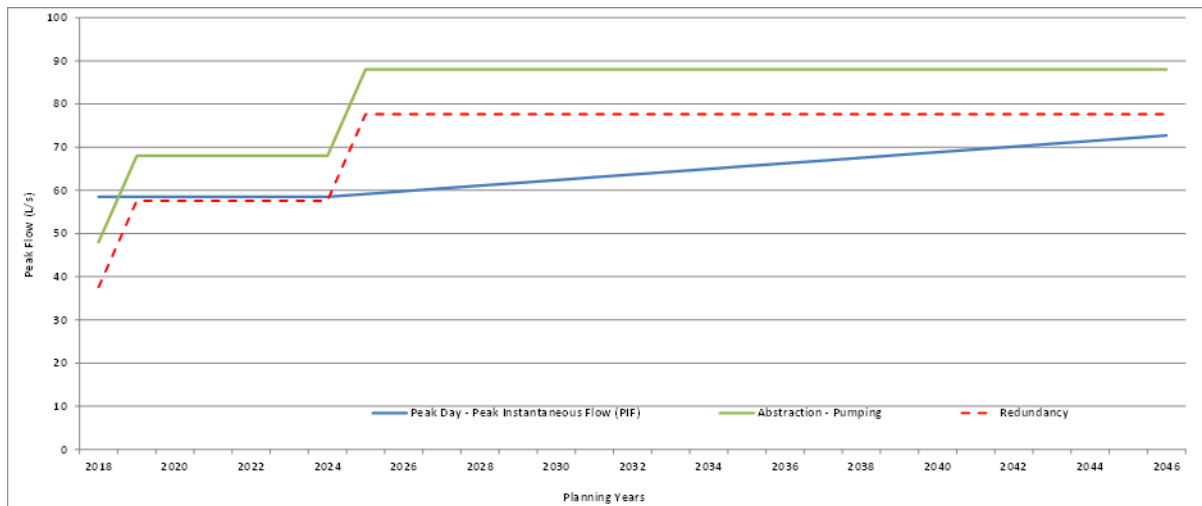


**Figure 28-4: West Melton Water Demand**

Prior to the December 2015 consent change extraction was required to reduce with water restrictions in place once water monitoring bore M35/5696 reaches trigger levels.

**Table 28-2 Water Source Current Capacity**

| Sites Available       | Well | Capacity (L/s) |
|-----------------------|------|----------------|
| Jacqueline Drive      | 1    | 13             |
| Elizabeth Allen Drive | 1    | 10             |
| Rossington Drive      | 1    | 13             |
| Ridgeland Way         | 1    | 18             |

**Table 28-3 Water Source Future Capacity**

| New Site ID | Well/Site | Location                                                                                                                                             | Planning Year | Yield (L/s)                     |
|-------------|-----------|------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|---------------------------------|
| West1       | Well      | Upgrade Ridgeland Way                                                                                                                                | 2018          | 7                               |
| West2       | Well      | Edendale new bore 35 L/s (need to review amalgamation of Edendale and Johnsons Rd supplies (needs to be verified as part of ongoing master planning) | 2019          | 20 L/s Available to West Melton |
| West3       | Well      | New Well                                                                                                                                             | 2025          | 20                              |

All capacity upgrades in West Melton to provide for growth are Developer lead and funded. There is no water DC for West Melton.



**Figure 28-5 West Melton Master Plan**

## 28.5 Resource Consents

The West Melton water supply has a number of resource consents. Table 28-4 shows the water take permitted by the resource consents for this scheme.

**Table 28-4 Resource Consents**

| Consent                      | Description                                                         | Location                                               | Date Issued | Expiry Date | Consented Max Instantaneous Flow (L/s) | Consented Max Daily Volume (m <sup>3</sup> /day) |
|------------------------------|---------------------------------------------------------------------|--------------------------------------------------------|-------------|-------------|----------------------------------------|--------------------------------------------------|
| CRC164009<br>(Issued-Active) | To take and use water - from bore M35/17757                         | Weedons Ross Road and Halkett Road, WEST MELTON        | 18-Dec-2015 | 13-Mar-47   | 49.5                                   | 2563<br>(17,941 per 7 days)                      |
| CRC172261<br>(Issued-Active) | To take and use water from bore M35/6201                            | Cnr West Coast Road (SH73) & Weedons Road, West Melton | 9-Sept-2016 | 26-Feb-2026 | 26                                     | 1,267                                            |
| CRC121242<br>(Issued-Active) | To take and use water - from bore M35/17757 & M35/17758 & M35/10751 | Weedons Ross Road and Halkett Road, WEST MELTON        | 14-Mar-12   | 13-Mar-47   | 49.5                                   | 366<br>(2563 per 7 days)                         |

## 28.6 Water Quality

The West Melton water supply consists of non-secures wells. The wells are sampled twice weekly and the reticulation is sampled weekly.

The following details E. coli transgressions for the period 2012 to 2017.

### Source

There have been 37 E. coli source transgressions during this period.

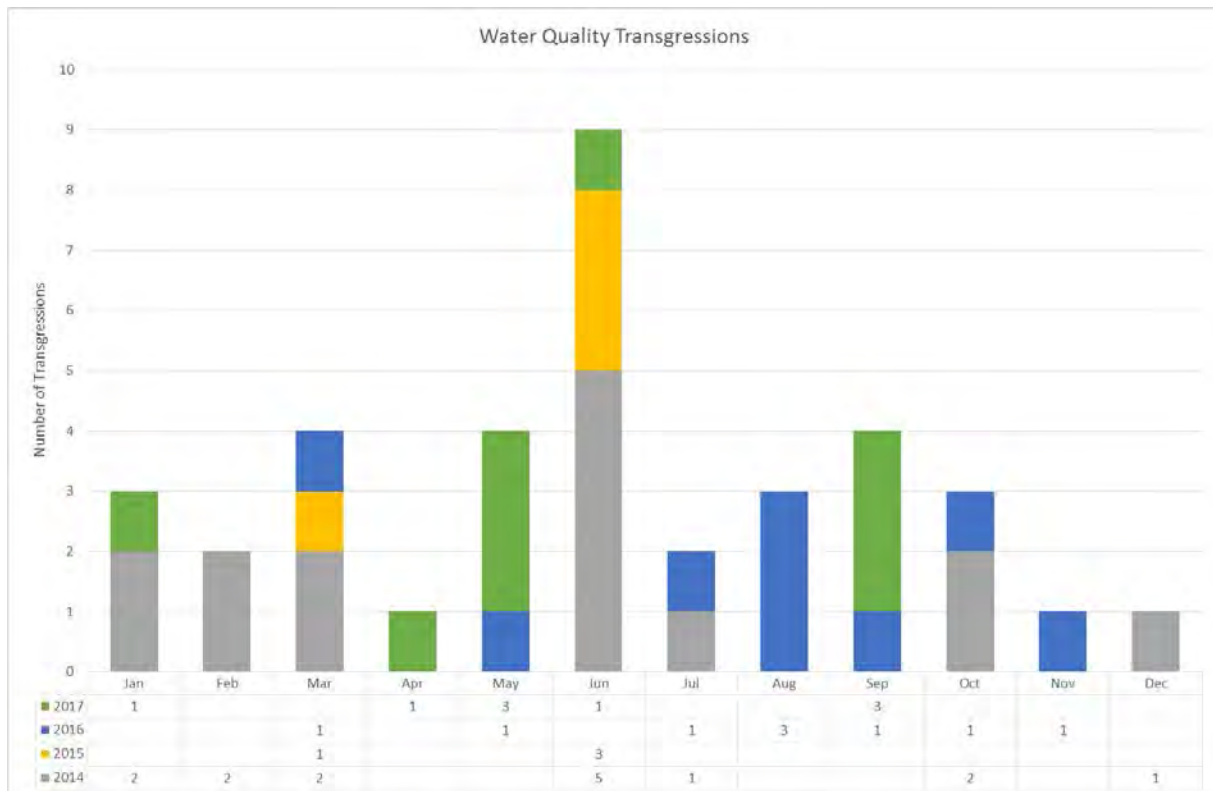
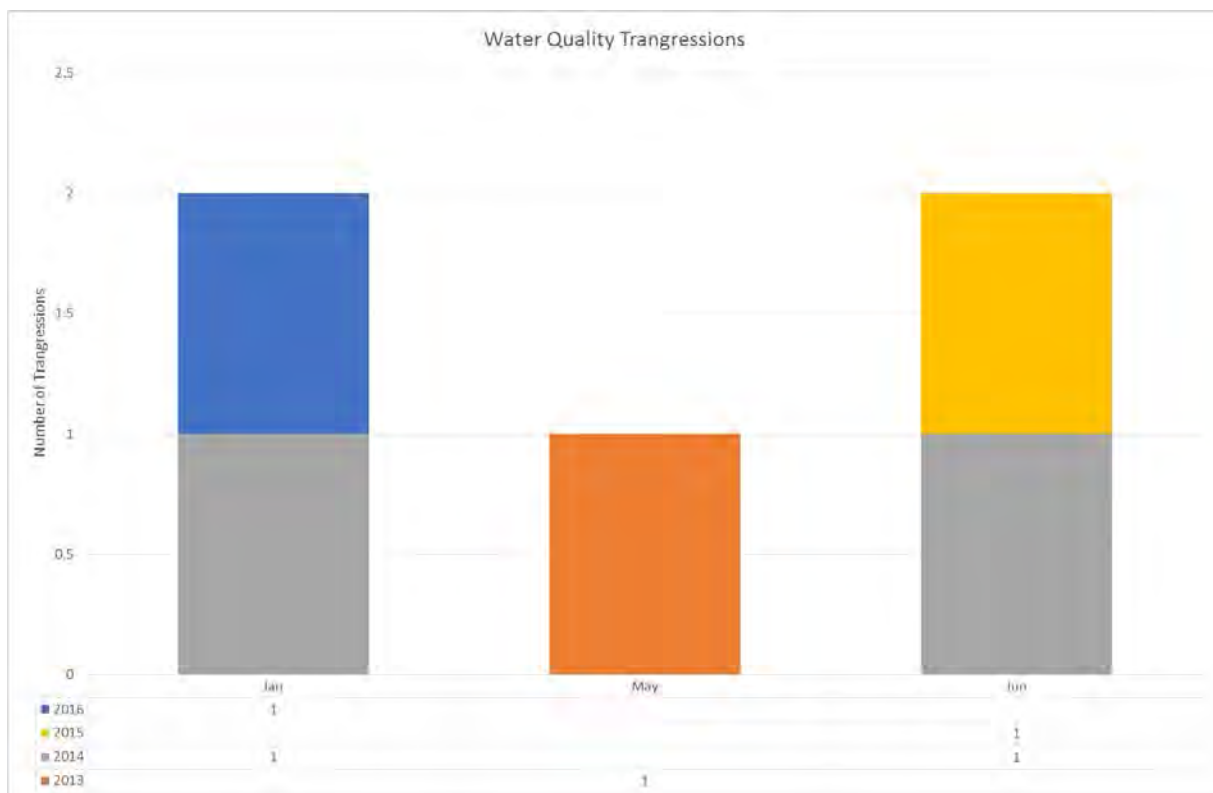


**Figure 28-6 E.coli Transgressions - Source**

### Treatment

There have been five E. coli treatment transgressions during this period.



## Figure 28-7 E. coli transgressions - Treatment

### Zone

There have been three E. coli transgressions during this period, these occurred in May 2013, April 2014 and June 2016.

### Chemical Analysis

The following is a summary of the raw water chemical analysis carried out at the West Melton Water Supply.

**Table 28-5 West Melton Water Supply Raw Water Chemical Analysis Summary**

| Parameter                                      | Standards<br>MAV* (GV)** | Plant <sup>1</sup><br>2011 | Plant <sup>1</sup><br>2017 | Plant <sup>2</sup><br>2011 | Plant <sup>2</sup><br>2017 | Plant <sup>3</sup><br>2017 | Status |
|------------------------------------------------|--------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|--------|
| Total Lead (g/m3)                              | 0.01                     | 0.00014                    | < 0.00011                  | <0.00011                   | < 0.00011                  | 0.000200                   | ✓      |
| pH (pH units)                                  | 7-8.5                    | 7.6                        | 7.4                        | 7.7                        | 7.5                        | 7.4                        | ✓      |
| Total Hardness<br>(g/m3 as CaCO <sub>3</sub> ) | <200                     | 54                         | 45.8                       | 49                         | 45.4                       | 45.6                       | ✓      |
| Total Calcium<br>(g/m3)                        | n/v                      | 17.9                       | 15.02                      | 16.3                       | 15.25                      | 15.28                      | ✓      |
| Total Iron (g/m3)                              | <0.2                     | <0.021                     | < 0.021                    | <0.021                     | < 0.021                    | < 0.021                    | ✓      |
| Total Sodium<br>(g/m3)                         | <200                     | 6.3                        | 5.06                       | 5.8                        | 5.07                       | 4.90                       | ✓      |
| Nitrate - Nitrogen<br>(g/m3)                   | 11.3                     | 2.4                        | 1.55                       | 2.1                        | 1.56                       | 1.57                       | ✓      |

\* MAV – Maximum Acceptable Value

\*\* (GV) – Guideline Value

<sup>1</sup> Royston Common

<sup>2</sup> Elizabeth Allen

<sup>3</sup> Jacqueline Dr

## 28.7 Scheme Assets

A summary of material and diameter for pipes in West Melton is shown below in Figure 28-8 and Figure 28-9.



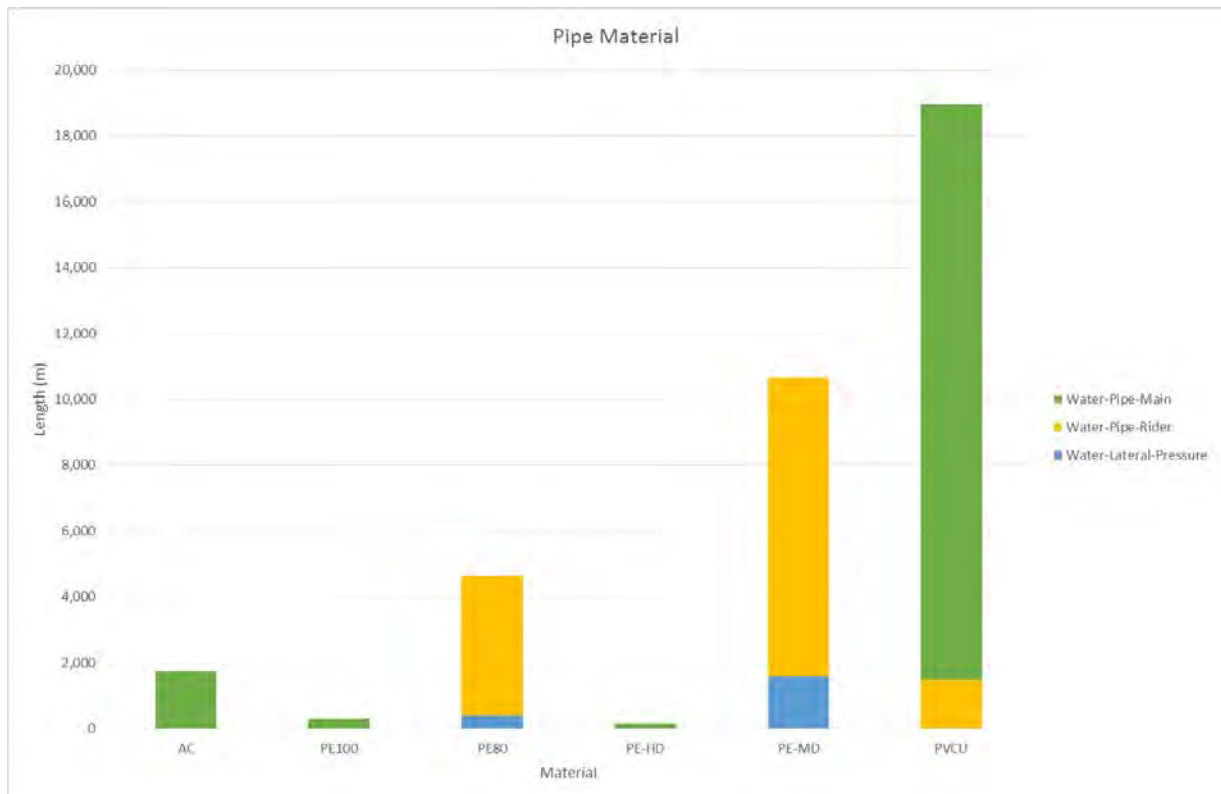


**Figure 28-8 Pipe Material – West Melton**

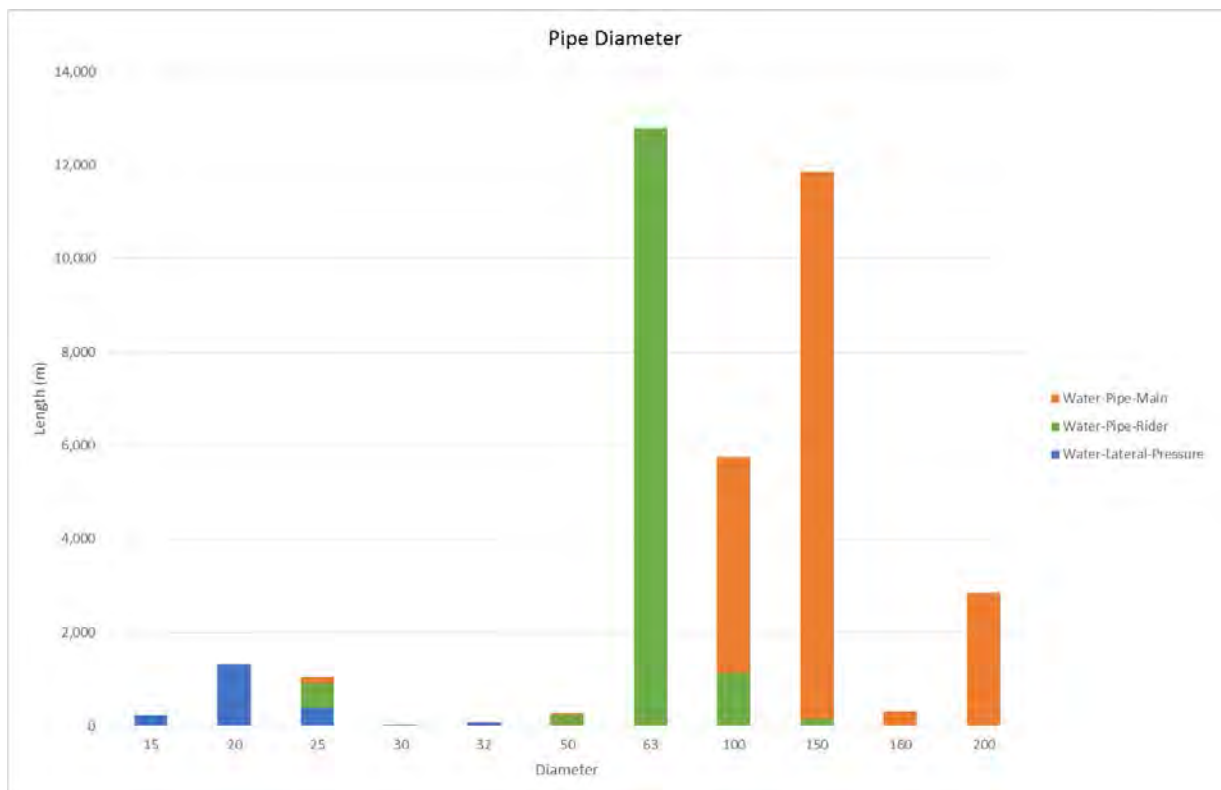


**Figure 28-9 Pipe Diameter – West Melton**

## 28.8 Operational Management

The water supply is operated and maintained under two maintenance contracts as follows:

- Contract 1241: Water Services Contract. Contract is with SICON Ferguson who undertakes investigations, conditions inspections, proactive and reactive maintenance and minor asset renewals; and
- Contract 1202: Parks and Reserves Contract. Contract is with SICON Ferguson who undertakes the maintenance of land scape features related to water services e.g. mowing, gardens etc.

Water quality sampling is completed under an agreement with Food and Health Ltd as required.

## 28.9 Photos of Main Assets



**Photo 1: Royston Common Well Location**



**Photo 2: Rossington Drive Tanks and Pump Building**

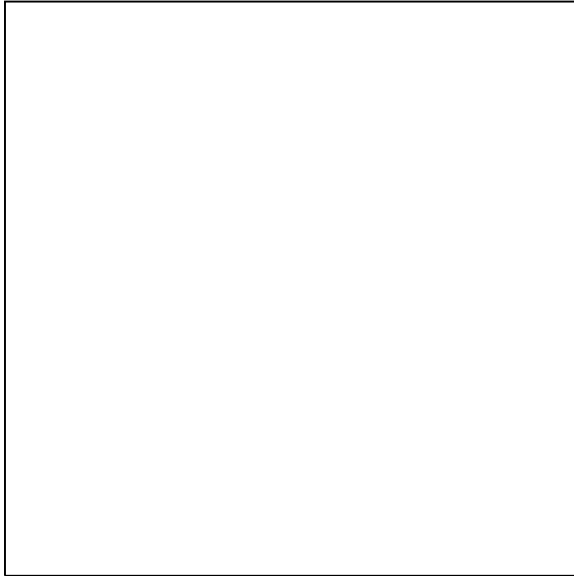


**Photo 3: Elizabeth Allen Drive Wellhead**



**Photo 4: Jacqueline Drive Wellhead)**




**Photo 4: Elizabeth Allen Treatment Plant**
**Photo 6: Willfield Bore**

## 28.10 Risk Assessment

A risk assessment has been undertaken for the West Melton scheme. The key output from the risk assessment is the identification of any extreme and high risks which need to be mitigated. In order to mitigate these risks they have been included and budgeted for in the projects within this LTP. Table 27-5 details the risk priority matrix and Table 28-7 outlines the risks for this scheme.

**Table 28-6 Risk Priority Rating**

| Risk Score | Level of Risk | Risk Response                                                                                                                                                     |
|------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| > 50       | Extreme       | Awareness of the event to be reported to Council.<br>Urgent action to eliminate / mitigate / manage the risk.<br>Document risk and action in the AMP.             |
| 35-50      | Very High     | Risk to be eliminated / mitigated / managed through normal business planning processes with responsibility assigned.                                              |
| 14-35      | High          | Manage risk using routine procedures.                                                                                                                             |
| 3.5-14     | Moderate      | Monitor the risk.                                                                                                                                                 |
| < 3.5      | Low           | Awareness of the event to be reported to Council.<br>Immediate action required to eliminate / mitigate / manage the risk.<br>Document risk and action in the AMP. |

**Table 28-7 Risks – West Melton**

| Risk                                  | Action/Project                      | Year Identified | 2014 Risk Rating | 2017 Risk Rating | Residual Risk Rating |
|---------------------------------------|-------------------------------------|-----------------|------------------|------------------|----------------------|
| Catchment contamination impacts bores | Investigate source of contamination | 2014            | 20               | 7                | 7                    |

|                                                         |                               |      |    |     |     |
|---------------------------------------------------------|-------------------------------|------|----|-----|-----|
| Electrical failure due to lightning or network spikes   | Install surge diverters       | 2014 | 10 | 3.5 | 3.5 |
| Failure to meet NES water meter standards               | NES Water Meter Compliance    | 2014 | 20 | 6   | 6   |
| Inability to collect income from non-metered properties | Install property water meters | 2014 | 27 | 0.6 | 0.6 |
| Non-compliance with the DWSNZ                           | DWSNZ - Age Testing           | 2014 | 10 | 0.7 | 0.7 |
| Non-compliance with the DWSNZ                           | DWSNZ - Bore-head security    | 2014 | 10 | 10  | 10  |

The list of district wide risks can be found in 5Waters Activity Management Plan: Volume 1.

### 28.11 Asset Valuation Details

The total replacement value of assets within the West Melton water scheme is \$6,937,906 with further details in Table 28-8 below.

**Table 28-8 Replacement Value, West Melton**

| Asset Class 1              | Asset Class 2 | Sum of Replacement Value |
|----------------------------|---------------|--------------------------|
| <b>Plant and Equipment</b> |               | \$1,564,449              |
| <b>Water Reticulation</b>  | Hydrant       | \$969                    |
|                            | Lateral       | \$335,214                |
|                            | Pipe          | \$87,458                 |
|                            | Supply Point  | \$4,071,799              |
|                            | Valve         | \$599,272                |

Replacement values for these different types of assets are shown in Figure 28-10 below.



**Figure 28-10 Replacement Costs for West Melton**

## 28.12 Renewals

The renewal profile has been taken from the 2017 5 Waters Valuation. A graph showing the renewals for this scheme are shown by Figure 28-11 below. The majority renewals occur in 2034/2035.

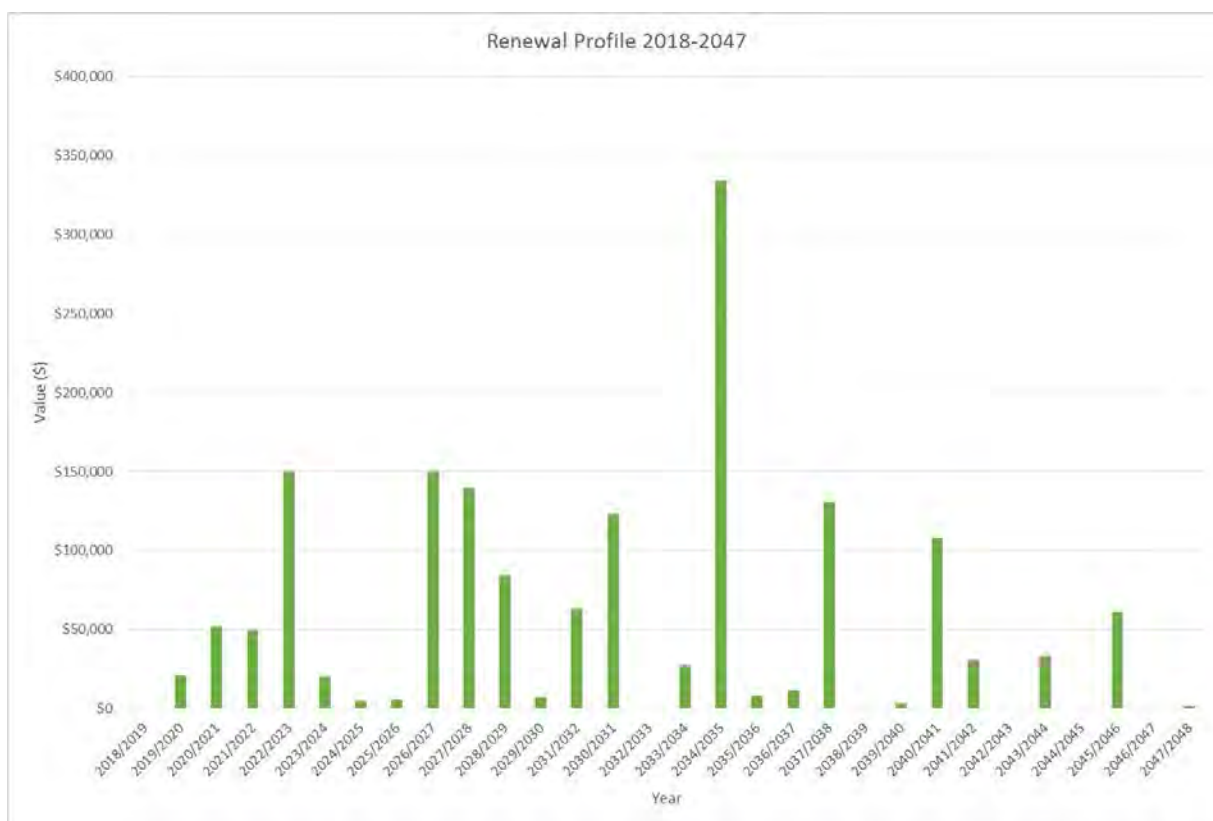


**Figure 28-11 West Melton Water Renewal Profile**

### 28.13 Critical Assets

The criticality model for West Melton has been updated for the 2018 AcMP. The methodology of the criticality model can be found in 5Waters Activity Management Plan: Volume 1 and it provides details of how the criticality has been calculated for the reticulation assets. Table 28-9 and Figure 28-12 below shows the calculated criticality for all of the assets within this scheme that have a recorded known length.

**Table 28-9 Length of Assets per Criticality Level**

| Criticality Bands |             | Length (m) |
|-------------------|-------------|------------|
| 5                 | Low         | 18,906     |
| 4                 | Medium-Low  | 5,821      |
| 3                 | Medium      | 11,364     |
| 2                 | Medium-High | 3,602      |
| 1                 | High        | 0          |



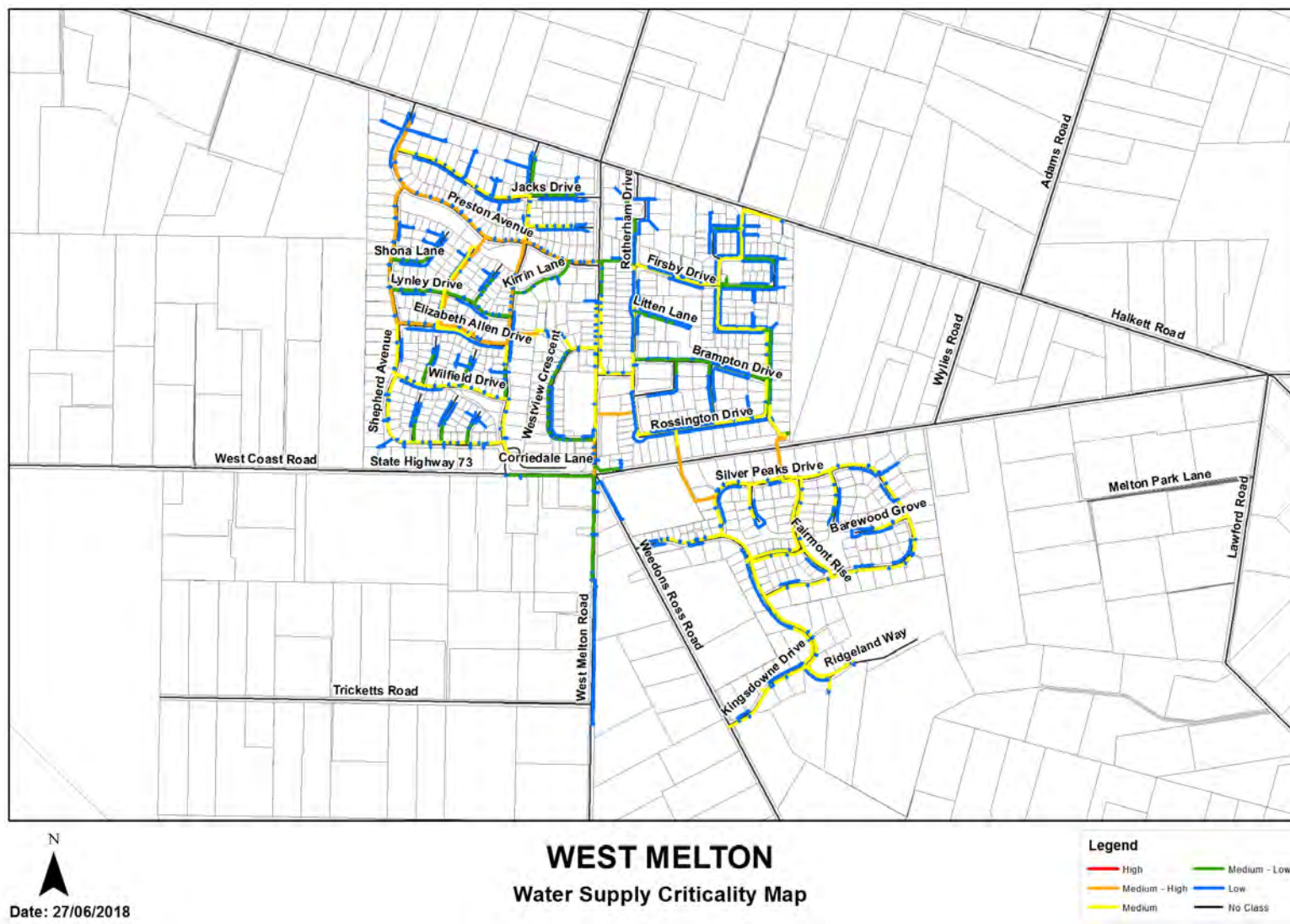


Figure 28-12 Criticality Map



## 28.14 Asset Condition

The asset condition model was run for West Melton in 2017. The methodology of the model can be found in 5Waters Activity Management Plan: Volume 1 which provides details of how the model has been calculated for the pipe reticulation assets. Figure 28-13 below shows the level of asset condition for these assets within this scheme that have a recorded known condition.

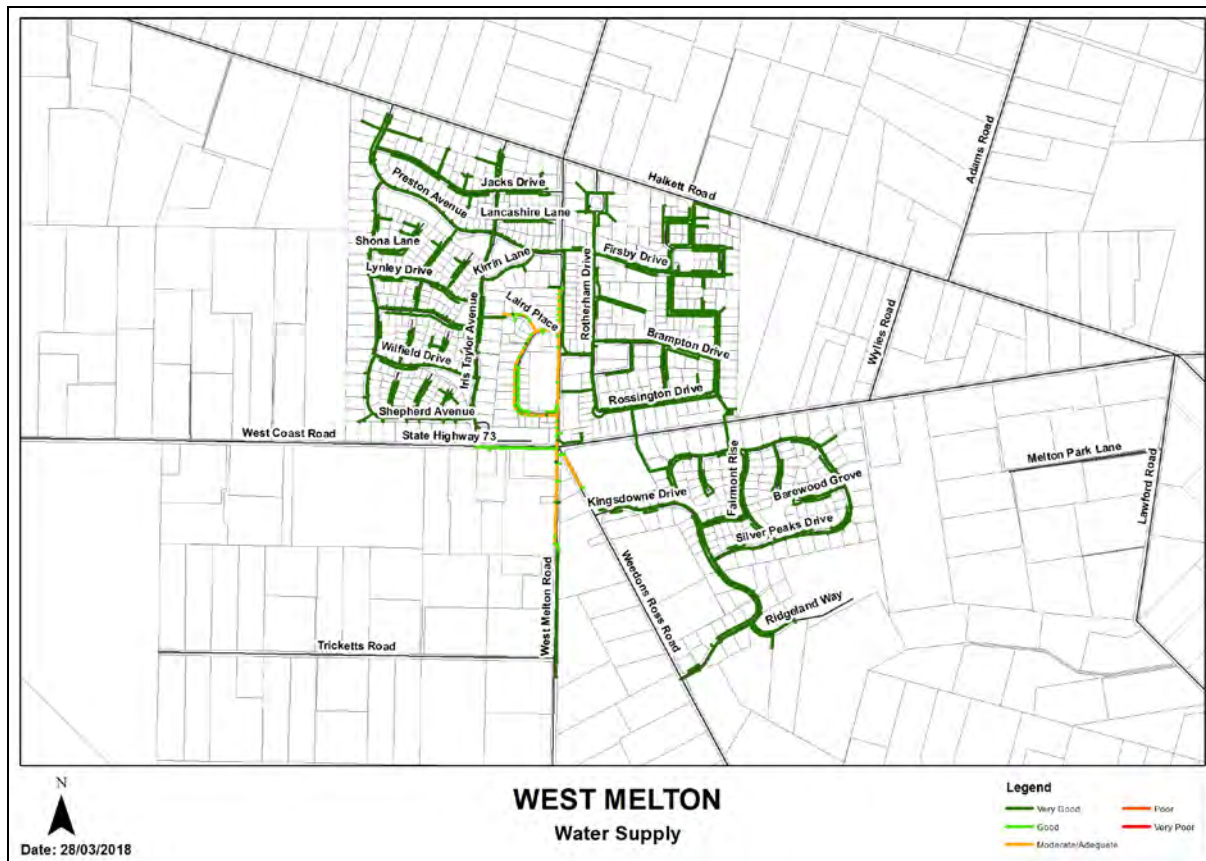


**Figure 28-13 Asset Condition – West Melton**

Table 28-10 provides a description of the condition rating used within the condition model.

**Table 28-10 Asset Condition Grading**

| Condition Rating | Grading   |
|------------------|-----------|
| 1.0              | Excellent |
| 2.0              | Good      |
| 3.0              | Moderate  |
| 4.0              | Poor      |
| 5.0+             | Fail      |

The number of pipe faults is also measured through the asset management system. Figure 28-14 shows the known historic pipe failures within this scheme.



**Figure 28-14 Pipe Faults, West Melton**

### 28.15 Funding Program

The 10 year budgets for West Melton are shown by Table 28-11 and Figure 28-15. Budgets are split into expenditure, renewals, projects and capital projects.

All figures are (\$) not adjusted for CPI “inflation”. They are calculated on historical data, and population growth where relevant.

**Table 28-11 West Melton Budget Summary**

| Years     | Expenditure | Renewals  | Projects | Capital Projects |
|-----------|-------------|-----------|----------|------------------|
| 2018/2019 | \$197,200   |           |          |                  |
| 2019/2020 | \$198,255   | \$20,912  |          |                  |
| 2020/2021 | \$199,307   | \$51,861  |          |                  |
| 2021/2022 | \$200,356   | \$49,995  |          |                  |
| 2022/2023 | \$201,402   | \$149,881 |          |                  |
| 2023/2024 | \$202,790   | \$20,824  |          |                  |

|           |             |           |  |  |
|-----------|-------------|-----------|--|--|
| 2024/2025 | \$204,174   | \$5,243   |  |  |
| 2025/2026 | \$205,551   | \$5,697   |  |  |
| 2026/2027 | \$206,924   | \$149,871 |  |  |
| 2027/2028 | \$208,292   | \$139,500 |  |  |
| Total     | \$2,024,253 | \$593,783 |  |  |

An explanation of the categories within the budgets are as follows below:

- Expenditure consists of operation and maintenance costs;
- Renewals are replacement of assets which are nearing or exceeded their useful life;
- Projects are investigations, decisions and planning activities which exclude capital works; and
- Capital projects are activities involving physical works.

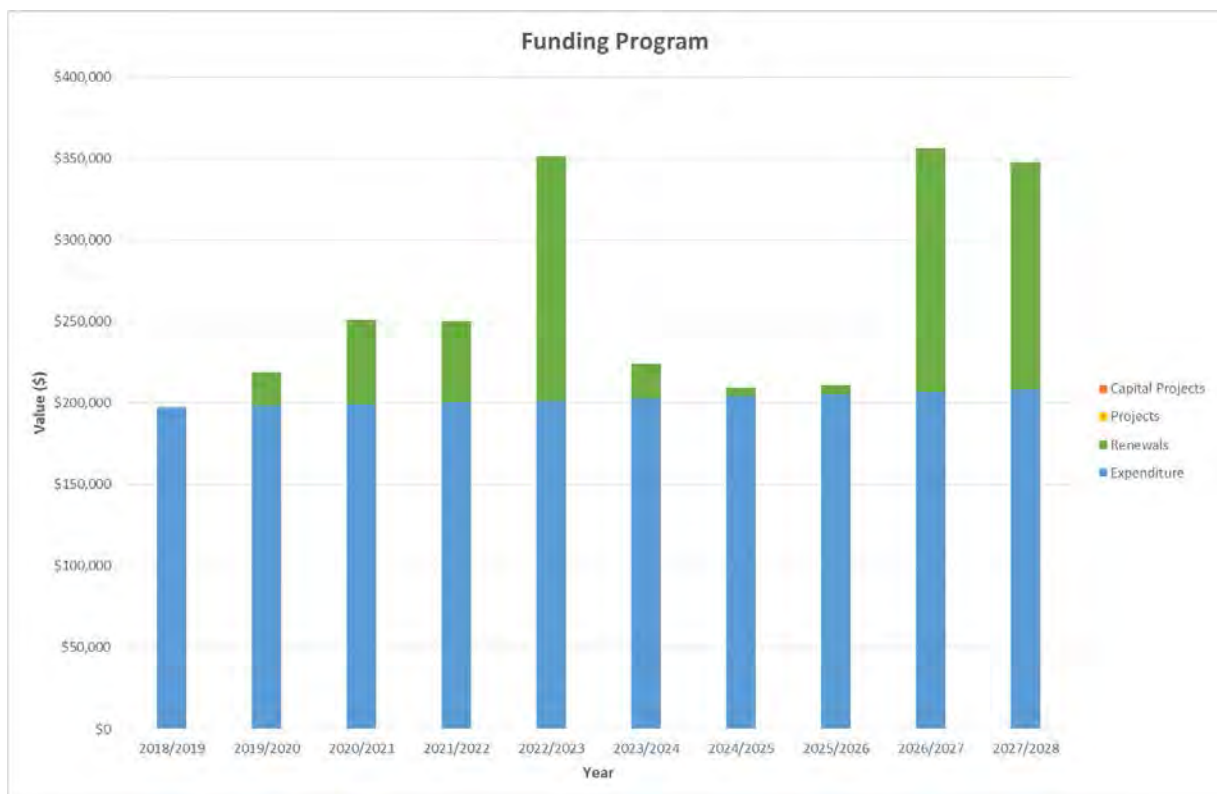


**Figure 28-15 West Melton Funding Summary**

There are no major projects for West Melton water scheme in the LTP budget.

The list of district wide projects can be found in 5Waters Activity Management Plan: Volume 1.