Wastewater

Activity Management Plan

VOLUME 3. 2018

Selwyn
DISTRICT COUNCIL

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1.0 ARTHURS PASS WASTEWATER SCHEME

1.1 Scheme Summary

Description		Quantity
Estimated Population Served		25
Scheme Coverage (1 Jan 18)	Full Charges	9
	Half Charges	1
	>1 Charges	0
System Components	Piped (m)	279.7
	Manholes (No.)	3
	Pump Stations (No.)	0
	Treatment	Primary and Secondary Septic Tank
	Disposal	Sand beds
History	Original scheme installation date	1999
Value ($)	Replacement Cost	$424,165.62
	Depreciated Replacement Cost	$256,301.42
Financial	2018/2019 Estimate Annual maintenance cost % of total	$41,720 1.31%
Demand	Annually (m3)	574.1
	Average daily (m3)	1.57
	Peak daily (m3)	9.20
	Minimum daily (m3)	0.0
	Infiltration	-
Sustainability	Ultimate discharge point	Discharge to ground within a national park

1.2 Key Issues

The following key issues are associated with the Arthurs Pass Wastewater Scheme. 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
Cost of scheme operation and maintenance	Council will review options to reduce operation and maintenance costs and optimise renewals. In September 2015, the facility was inspected. It was found that the Rough Creek STP appears to be performing well, and is consistent with the expectations outlined in the design of the system. Overall

1.3 Overview & History

The sewer network serves the southern side of Sunshine Terrace (originally known as Rough Creek Subdivision). The sewage gravitates to a large septic tank and sand soakage disposal area. The majority of properties in the village have on-site septic tanks.

The remote location and harsh alpine environment present challenges for operation and maintenance of a wastewater scheme. 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 should a significant event occur.

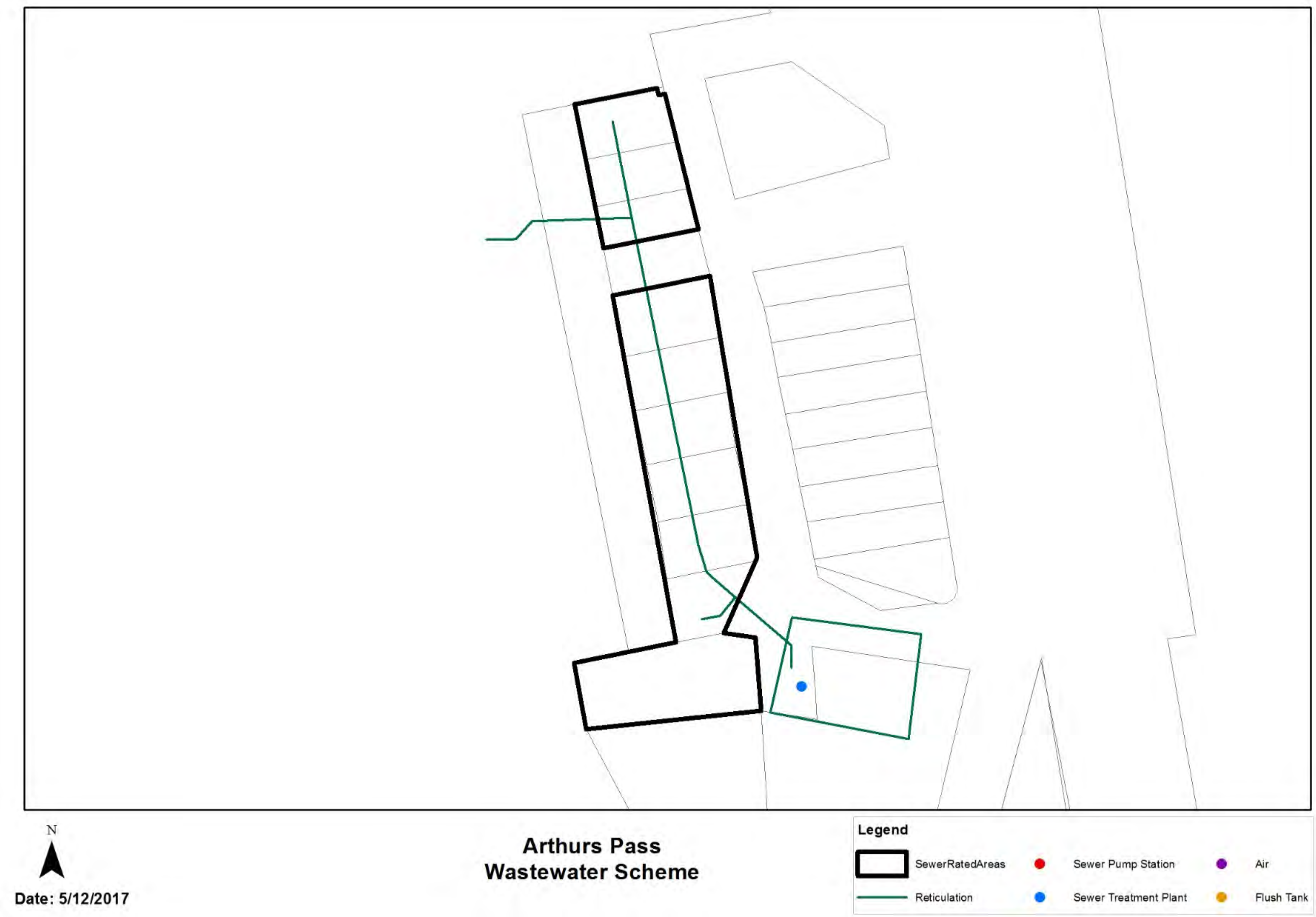


Figure 1-1 Scheme Map

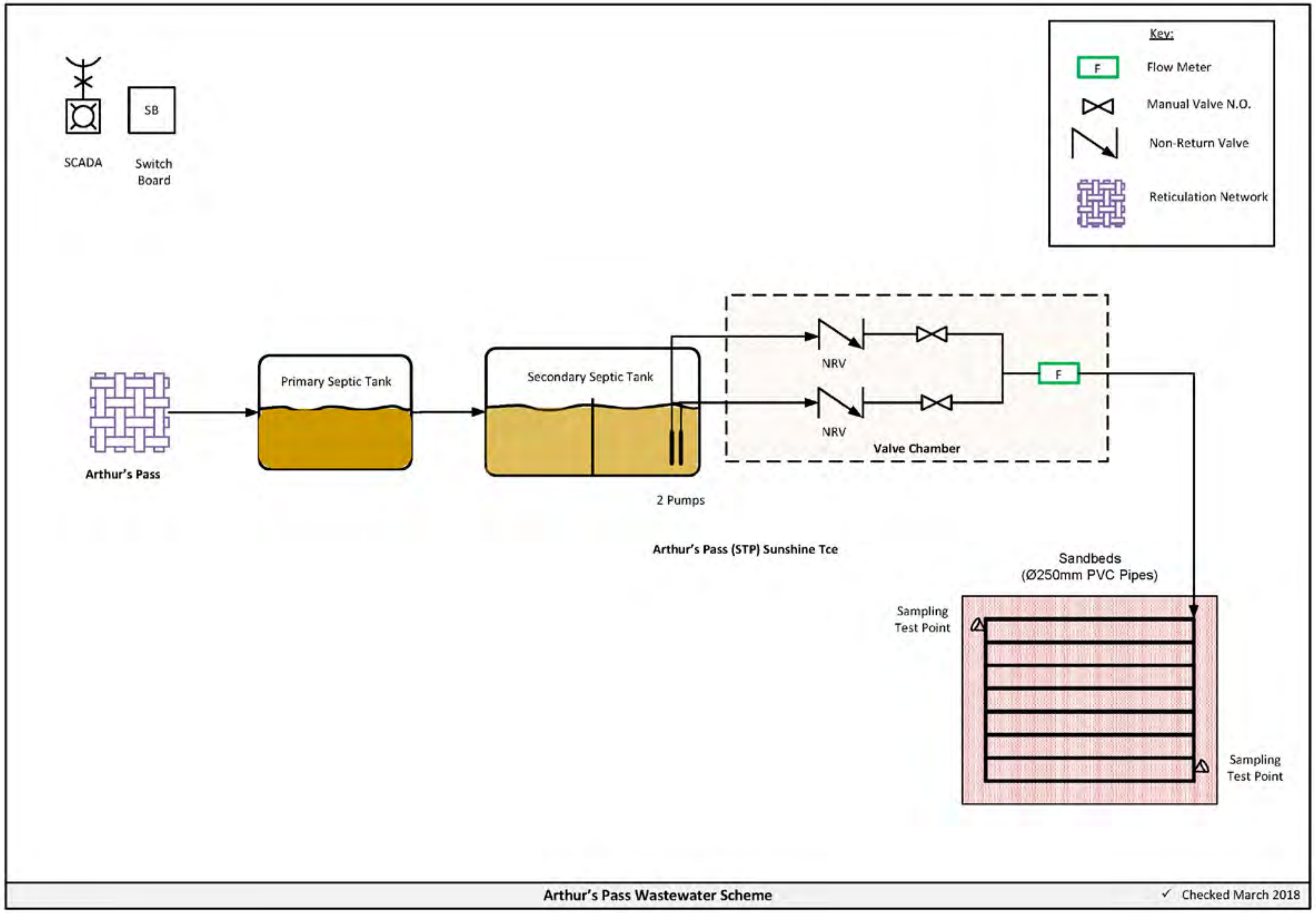


Figure 1-2 Scheme Schematic

1.4 System Capacity

In general the Arthurs Pass scheme is underutilised as the occupancy rate within the houses that the scheme serves is low. There are peak periods but these too are well within the consented limits. During freezing conditions people tend to run their taps resulting in peak flows, but these are isolated cases. Refer to Section 1.6.3 for the design capacity of the system.

There is not expected to be significant growth in the area serviced by this scheme and scheme expansion is not expected to be required over the planning horizon of this AcMP.

1.5 Resource Consents

The Arthurs Pass wastewater scheme has a number of resource consents. Table 1-2 shows the discharge permitted by the resource consents under Selwyn District Councils name in Arthurs Pass.

Table 1-2 Resource Consents

Consent	Description	Location	Date Issued	Expiry Date	Quantities (m^3/day)
CRC073351 *Issued - Active*	To discharge contaminants to land	Sunshine Terrace Road, ARTHURS PASS	5-Nov-07	30-Oct-27	23

1.6 Scheme Assets

A summary of the assets within this scheme is outlined in this section.

1.6.1 Reticulation Overview

A summary of material and diameter for pipes is shown in Figure 1-3 and Figure 1-4.

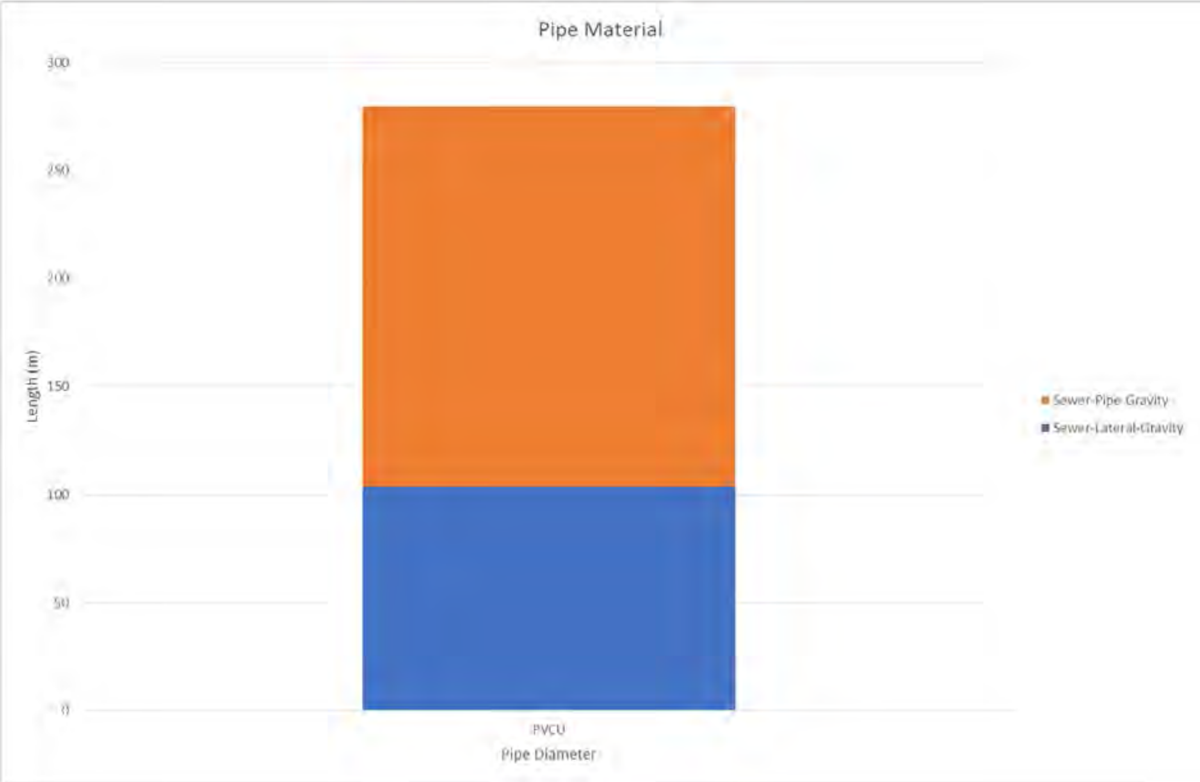


Figure 1-3 Pipe Material – Arthurs Pass

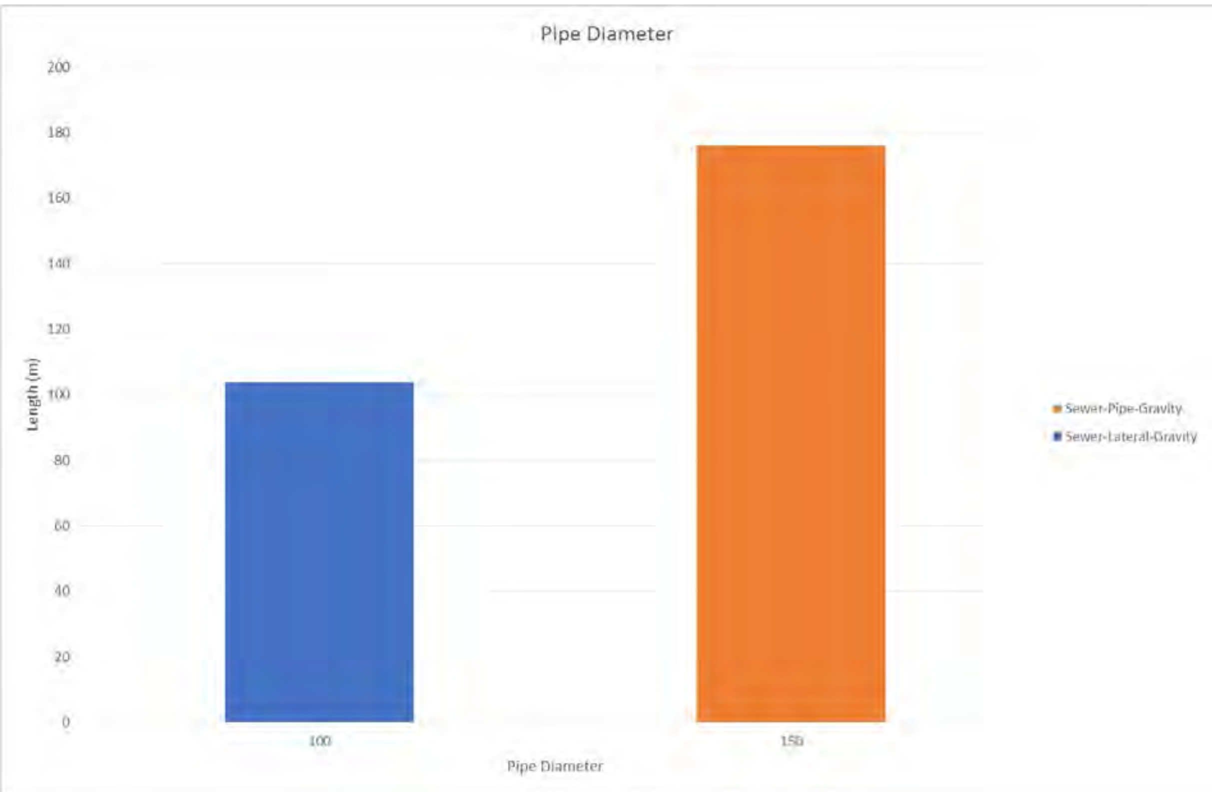


Figure 1-4 Pipe Diameter – Arthurs Pass

1.6.2 Treatment and Disposal

Treatment and disposal consists of primary and secondary septic tanks which enables settlement of solids. Partially treated effluent is then discharged to a sand soakage bed. There are no known issues with the Arthur's Pass treatment and disposal facilities. Details are tabled below.

Table 1-3 Treatment and Disposal

Treatment & Disposal	Description	Year Installed
Primary Septic Tank	23.6m^3 elliptical tank with dia. 3.8 x 3.1 and height 2.9m	1999
Secondary septic tank	15.9m^3 elliptical concrete tank dia. 3.8 x 3.1 and height 1.9m, with two Zabel filters	1999
Pump chamber in secondary chamber	Two submersible pumps (1 duty and 1 standby)	1999
Sand Soakage bed	23m x 10m x 800mm deep, also contains 3 plate lysimeters for monitoring purposes	1999

1.6.3 Design

The design data for the Arthur's Pass system is tabled below.

Table 1-4 Design Data

	Design Population	L/c/d	Design Flow m3/d	Peak Flow m3/d
Full time	22	250	5.5	
Lodge	78	120	9.36	13.9
Holiday house	42	180	7.56	
Combined	142		22.42	

Currently the treatment plant and consent capacity is underutilised.

1.6.4 Pump Stations

There are no pump stations within the Arthur's Pass reticulation. There is a pump chamber and two pumps at the secondary septic tank pumping partially treated effluent to the sand soakage bed.

1.7 Operational Management

The wastewater schemes are operated and maintained under the maintenance contract 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.

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

1.8 Photos of Main Assets

Photo 1 - Pump Station

1.9 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 details the risk priority rating, Table 1-6 outlines the risks and the list of key projects is found in Table 1-11.

Table 1-5 Risk Priority Rating

Risk Score	Level of Risk	Risk Response
> 50	Extreme	Awareness of the event to be reported to Council. Urgent action to eliminate / mitigate / manage the risk. 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. Immediate action required to eliminate / mitigate / manage the risk. 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
Non-consented activities	Renewal of consents	2014	27	27	6
Sewerage system becomes uneconomic	Review operating costs and report on value engineering opportunities	2014	12	12	6

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

1.10 Asset Valuation Details

The total replacement value of assets within the Arthurs Pass Scheme is $376,244 as detailed in Table 1-7 below. The majority of value is made up of plant and equipment.

Table 1-7 Replacement Value, Arthurs Pass

Asset Class 1	Asset Class 2	Sum of Replacement Value
Plant and Equipment		$293,238
Wastewater Reticulation	Lateral	$31,919
	Manhole	$16,471
	Pipe	$34,617

Replacement values for these different types of assets are shown in Figure 1-5 below.

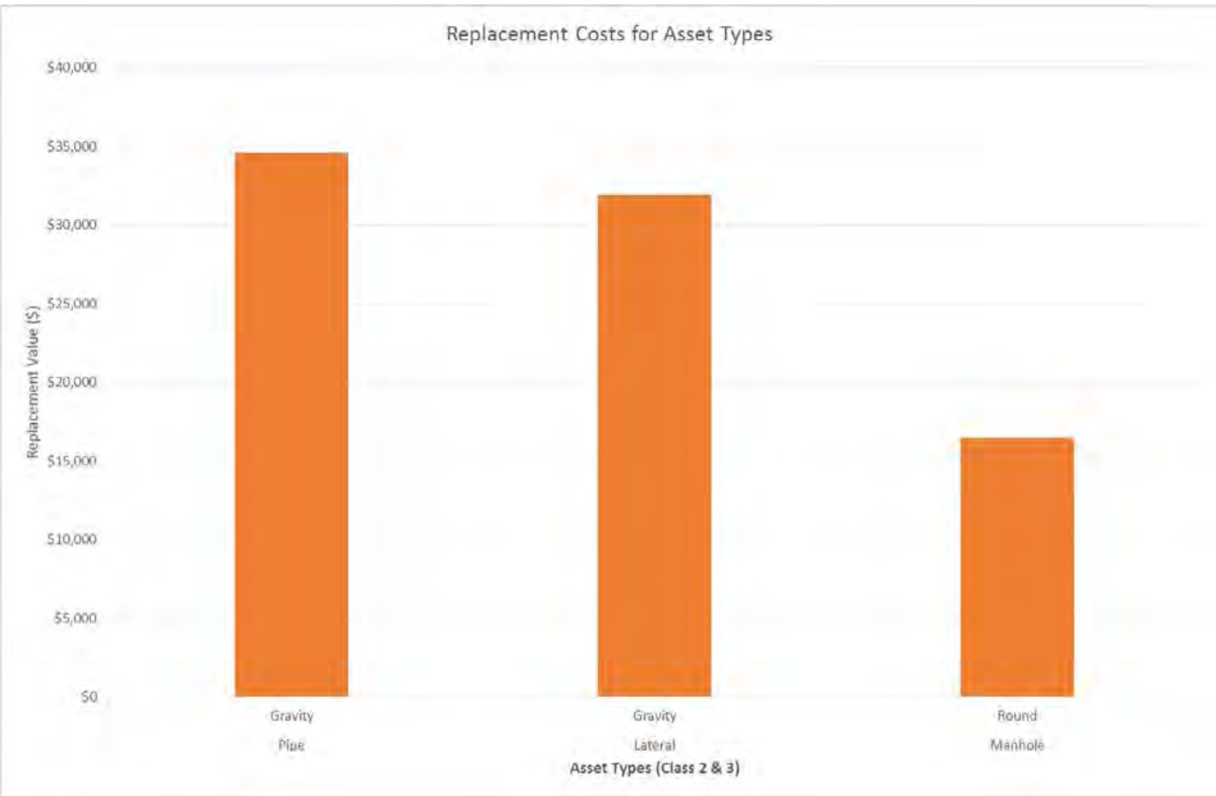


Figure 1-5 Replacement Costs for Arthurs Pass

1.11 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 1-6 below.

Figure 1-6 Arthurs Pass Wastewater Renewal Profile

1.12 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 1-7 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	104
4	Medium-Low	176
3	Medium	0
2	Medium-High	0
1	High	0

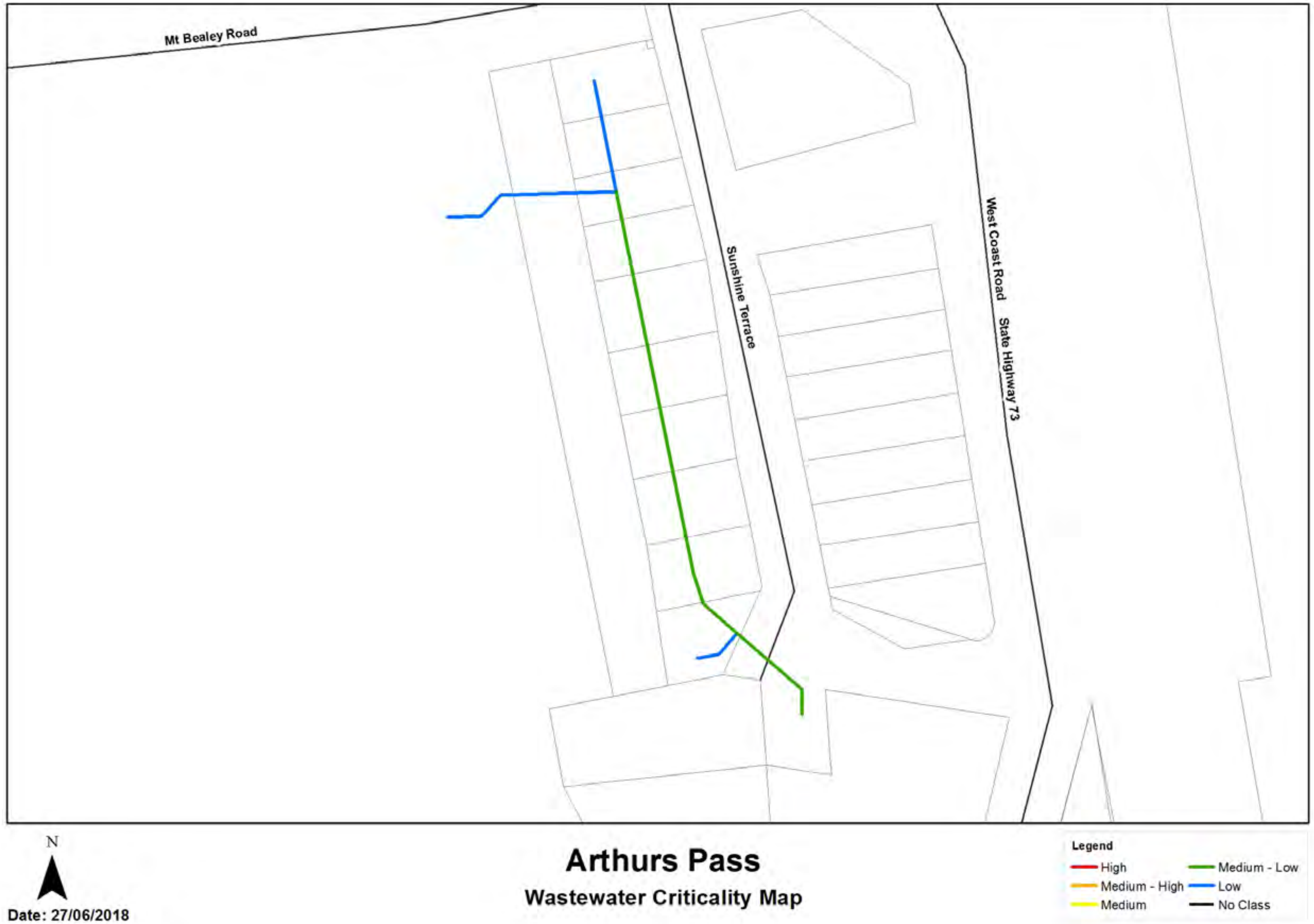


Figure 1-7 Criticality Map

1.13 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 and it provides details of how the model has been calculated for the reticulation assets (particularly pipes). Figure 1-8 below shows the level of asset condition for all of the assets within this scheme that have a recorded known condition.

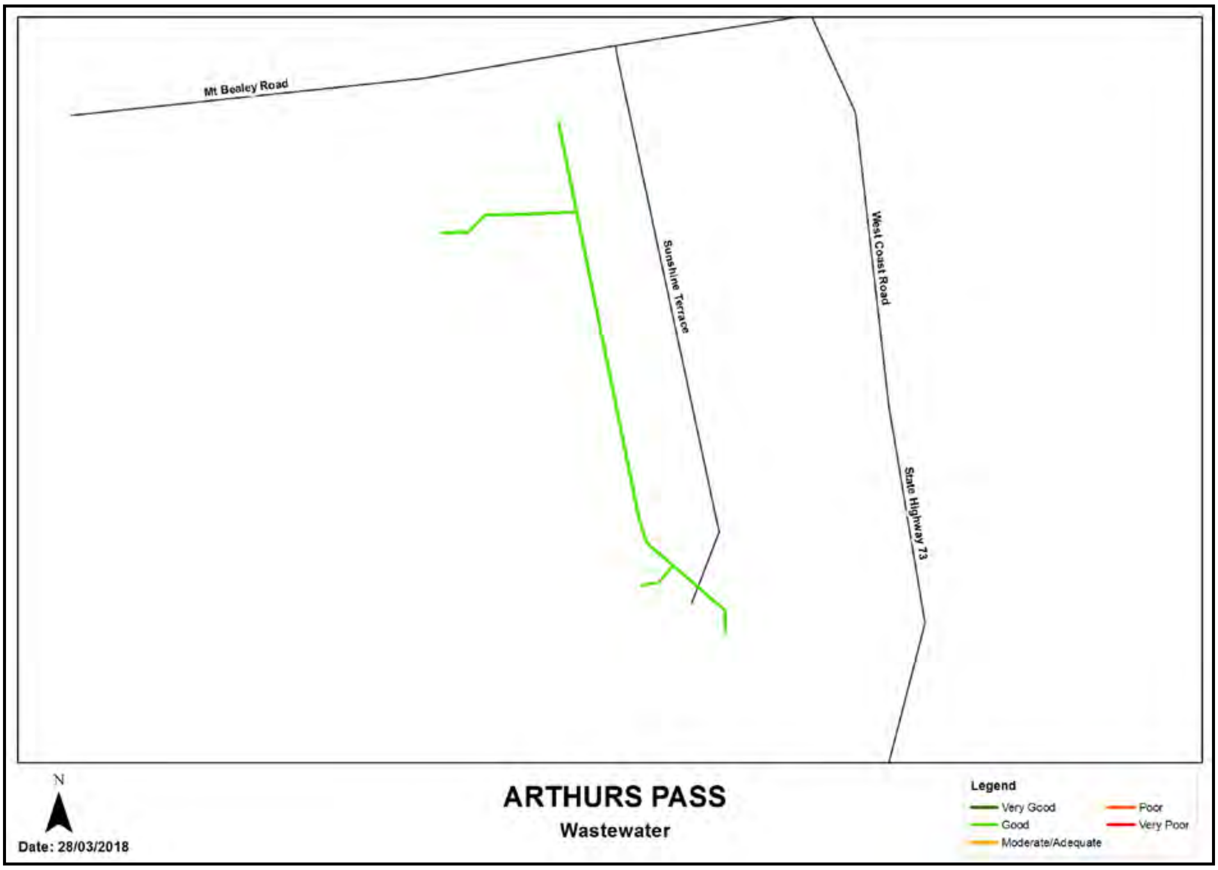


Figure 1-8 Asset Condition – Arthurs Pass

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

1.14 Funding Program

The 10 year budgets for Arthurs Pass are shown by Table 1-10 and Figure 1-9. 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	$41,720		$10,000	$51,720
2019/2020	$41,733	$521		$42,254
2020/2021	$41,746	$90,405		$132,151
2021/2022	$41,759			$41,759
2022/2023	$41,772	$14,972		$56,744
2023/2024	$41,785			$41,785
2024/2025	$41,788			$41,788
2025/2026	$41,791	$51,076		$92,867
2026/2027	$41,794			$41,794
2027/2028	$41,797	$1,668		$43,465
Total	$417,685	$158,642	$10,000	$586,327

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.

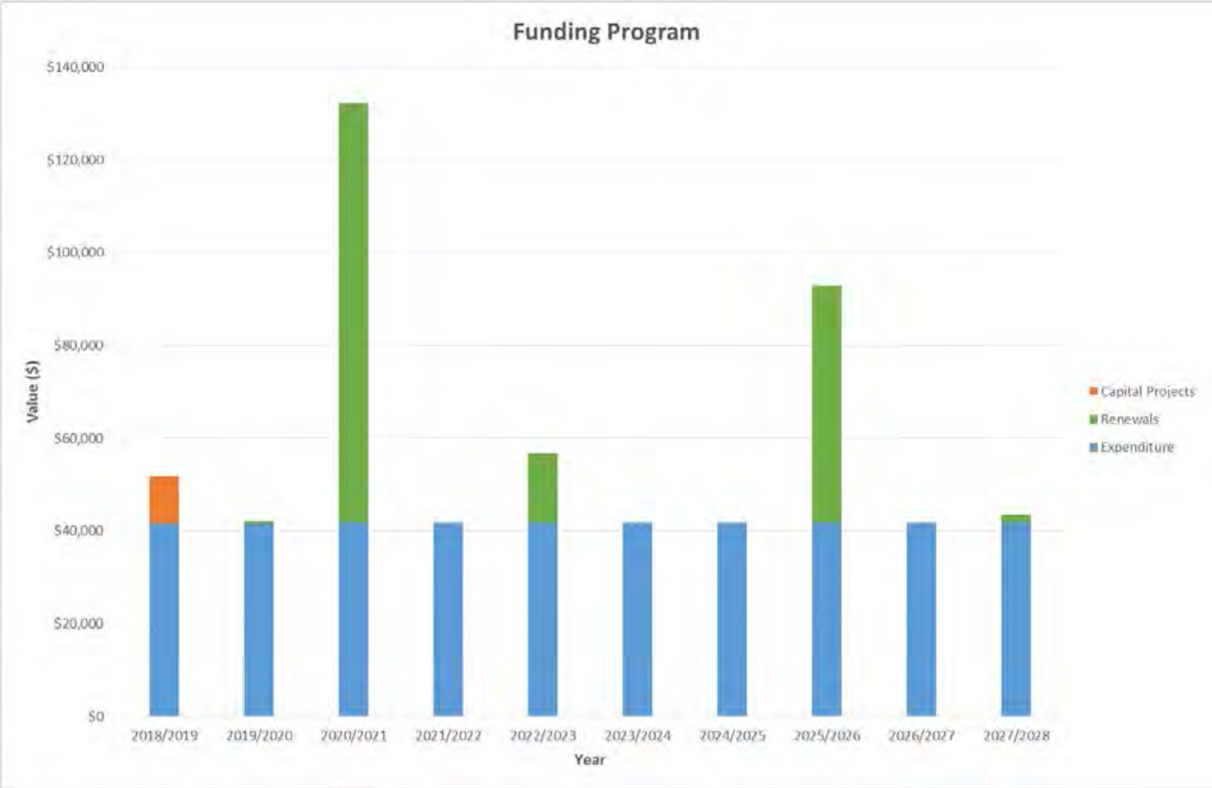


Figure 1-9 Arthurs Pass Funding Summary

There is one project for Arthurs Pass Wastewater scheme in the LTP budget.

Table 1-11 Key Projects

Account Label	GL	Description	Year 1 ($)	Year 2 ($)	Year 3 ($)	Years 4 to 10	Funding Split
Capital Projects	460490009	value engineering	$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.

2.0 CASTLE HILL WASTEWATER SCHEME

2.1 Scheme Summary

Description		Quantity
Estimated Population Served		**339**
Scheme Coverage (1 Jan 18)	**Full Charges**	**121**
	Half Charges	**89**
	>1 Charges	**0**
System Components	**Piped (m)**	**6465.61**
	Manholes (No.)	**72**
	Pump Stations (No.)	**0**
	Treatment	
	Disposal	
History	**Original scheme installation date**	**1982**
Value ($)	**Replacement Cost**	**$3,556,643.41**
	Depreciated Replacement Cost	**$1,887,790.87**
Financial	**2018/2019 Estimate Annual maintenance cost % of total**	**$17,054 0.53%**
Demand	**Annually (m3)**	**20,503.3**
	Average daily (m3)	**56.3**
	Peak daily (m3)	**221.9**
	Minimum daily (m3)	**13.9**
	Infiltration	**Infiltration / inflow is an issue for this scheme**
Sustainability	**Ultimate discharge point**	**Land Irrigation**

2.2 Key Issues

The following key issues are associated with the Castle Hill Wastewater Scheme. 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
High peak flows in wastewater system	Investigate source of infiltration / inflow.
Potential pond seepage	Investigate water balance to monitor seepage levels.

2.3 Overview & History

This scheme is entirely gravity reticulated, taking advantage of the steep natural gradient. Effluent is treated in a single stage oxidation pond and disposed of through land irrigation. The irrigation area is used on average once every two years as the levels in the pond are low due to evaporation and suspected seepage.

The first water right to discharge sewage effluent onto the land was issued in 1979 and it was in the name of Castle Hill development. This right was transferred to the Malvern County Council in June 1986. The current permit is CRC991052

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 café and fuel station.

The remote location and harsh alpine environment present challenges for operation and maintenance of a wastewater scheme. 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 should a significant rupture occur.

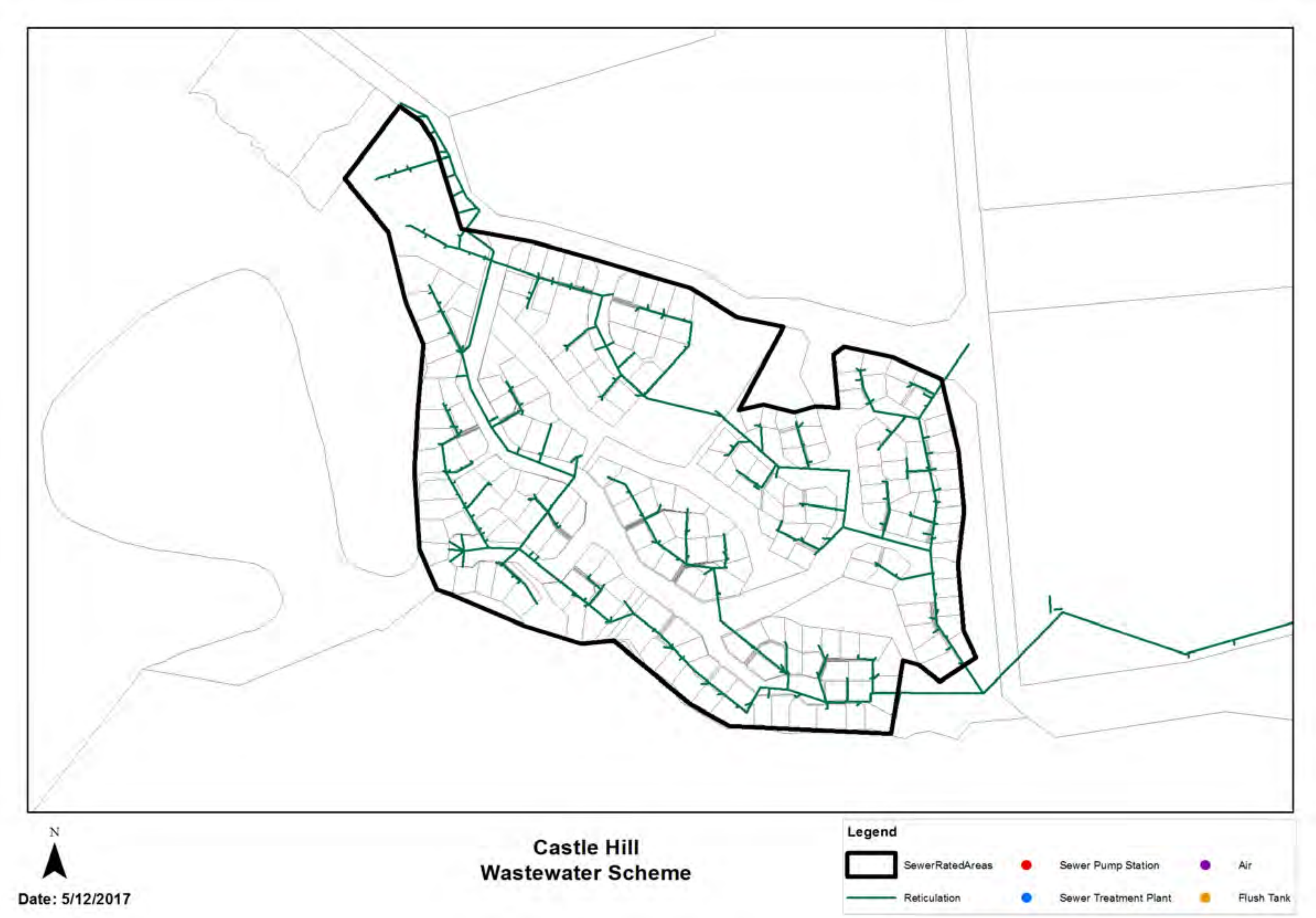


Figure 2-1 Scheme Map

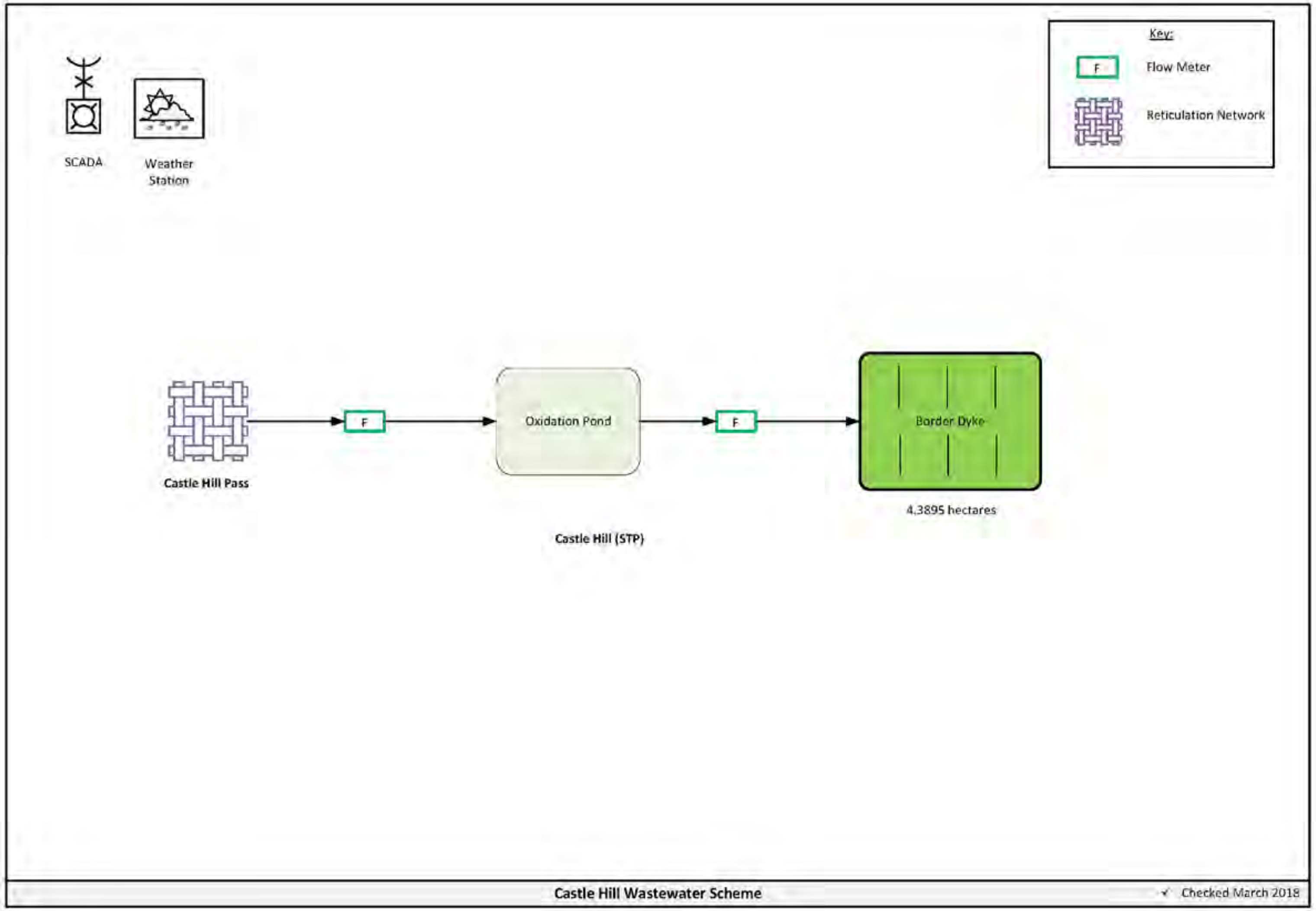


Figure 2-2 Scheme Schematic

2.4 System Capacity

The scheme capacity is currently underutilised.

There is not expected to be significant growth in the area serviced by this scheme and scheme expansion is not expected to be required over the planning horizon of this AcMP.

2.5 Resource Consents

The Castle Hill wastewater scheme has a number of resource consents. Table 2-2 shows the discharge permitted by the resource consents for this scheme.

Table 2-2 Resource Consents

Consent	Description	Location	Date Issued	Expiry Date	Quantities (m^3/day)
CRC991052 *Issued - Active*	To discharge contaminants to land	Castle Hill Village, CASTLE HILL	27-Jan-10	26-Jan-35	785

This consent has a condition that wastewater shall only be discharged during the months of September, October, November, December, January, February, March and April.

2.6 Scheme Assets

A summary of the assets within this scheme is outlined in this section.

2.6.1 Reticulation Overview

A summary of material and diameter for pipes is shown in Figure 2-3 and Figure 2-4.

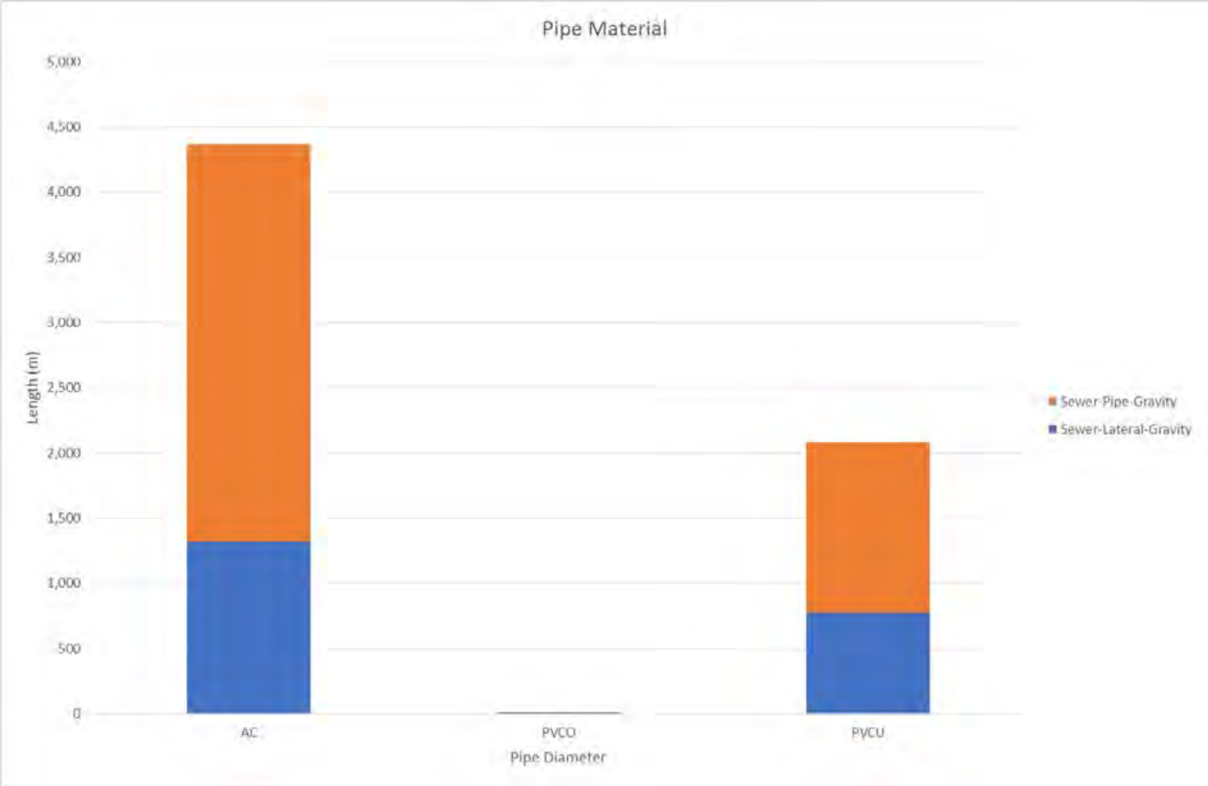


Figure 2-3 Pipe Material – Castle Hill

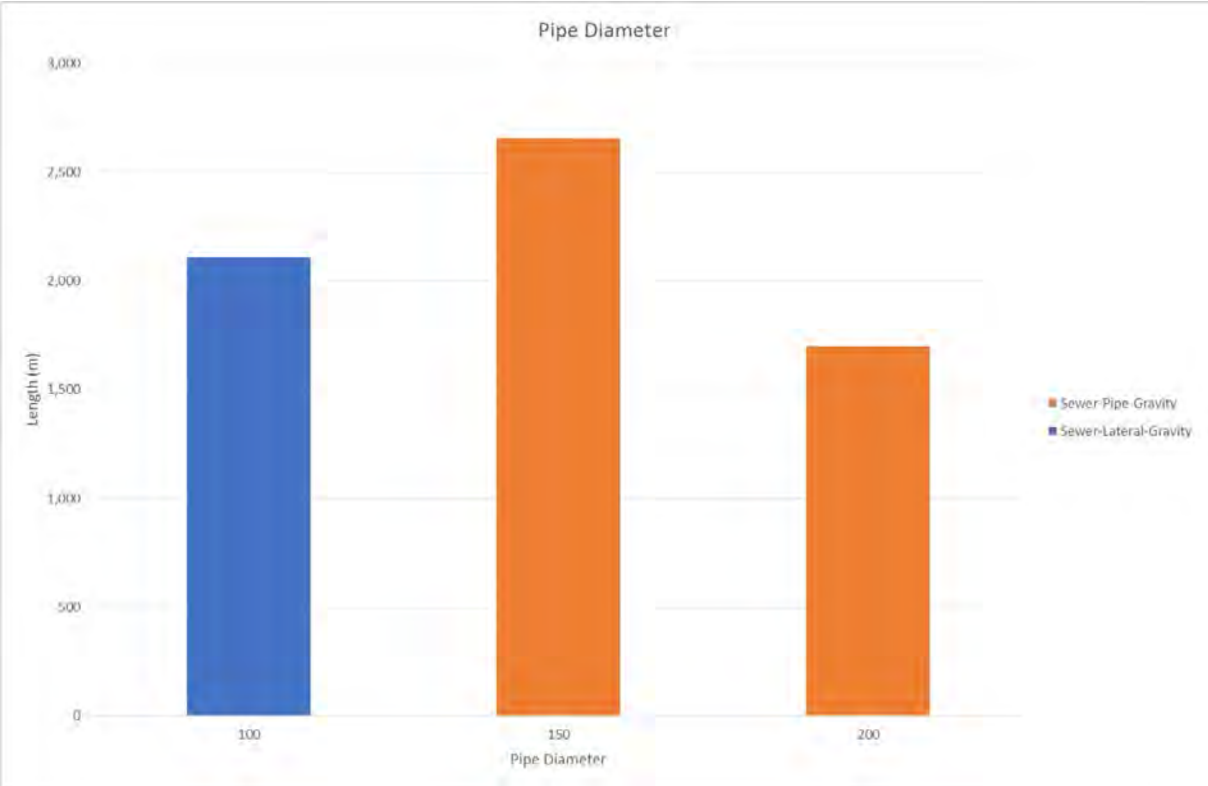


Figure 2-4 Pipe Diameter – Castle Hill

2.6.2 Treatment and Disposal

Treatment and disposal consist of a 10,600m3 oxidation pond and land irrigation through 4.25ha of border dykes with pop up outlets for flow control. The pond was designed by Steven Fitzmaurice and Partners in 1982. There are issues associated with the Castle Hill treatment systems structural integrity. These were greatly improved in the early 1990's by the addition of Bentonite.

Table 2-3 Treatment and Disposal Facilities

Treatment & Disposal	Description	Year Installed
Oxidation Pond	10,600m3 operating storage	1982
Land Disposal	4.25 ha of border dykes with pop up outlets for flow control	1982

2.6.3 Design

Table 2-4 Design Data

<table>
<tr><th></th><th>Design Population</th><th>L/c/d</th><th>Design Flow m3/d</th><th>Peak Flow</th></tr>
<tr><td>Population</td><td>1220</td><td rowspan="3">260</td><td rowspan="3">95.16</td><td rowspan="3">640</td></tr>
<tr><td>Occupancy rate</td><td>30%</td></tr>
<tr><td>Design P.E.</td><td>366</td></tr>
</table>

Castle Hill scheme has the potential to accommodate additional demand. While there is no threat of exceeding the design capacity in the immediate future, growth in the area should be monitored and capacity checked before consents granted.

Peak flows are high for this scheme which should be investigated further.

2.6.4 Pump Stations

There are no pump stations within the Castle Hill sewerage system.

2.7 Operational Management

The wastewater schemes are operated and maintained under the maintenance contract 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.

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

2.8 Photos of Main Assets

Photo 1 – Pond

Photo 2 – Pond

2.9 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 details the risks, Table 2-6 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. Urgent action to eliminate / mitigate / manage the risk. 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. Immediate action required to eliminate / mitigate / manage the risk. Document risk and action in the AMP.

Table 2-6 Risks – Castle Hill

Risk	Action/Project	Year Identified	2014 Risk Rating	2017 Risk Rating	Residual Risk Rating
Plant operation causes breach of consent	Review and document disposal procedure	2014	12	10	10
Non-consented activities	Renewal of consents	2014	27	27	6

Pond leaking	Review options e.g. package plant or pond lining	2017		45	2.1
Infiltration overwhelms network	Lift MH lids	2017		12	6

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

2.10 Asset Valuation Details

The total replacement value of assets within the Castle Hill scheme is $3,556,643 as detailed in Table 2-7 below. The majority of value is made up of pipes.

Table 2-7 Replacement Value, Castle Hill

Asset Class 1	Asset Class 2	Sum of Replacement Value
Plant and Equipment		$1,409,820
Wastewater Reticulation	Chamber	$52,574
	Lateral	$698,572
	Manhole	$340,492
	Pipe	$1,046,886
	Valve	$8,299

Replacement values for these different types of assets are shown in Figure 2-5 below.

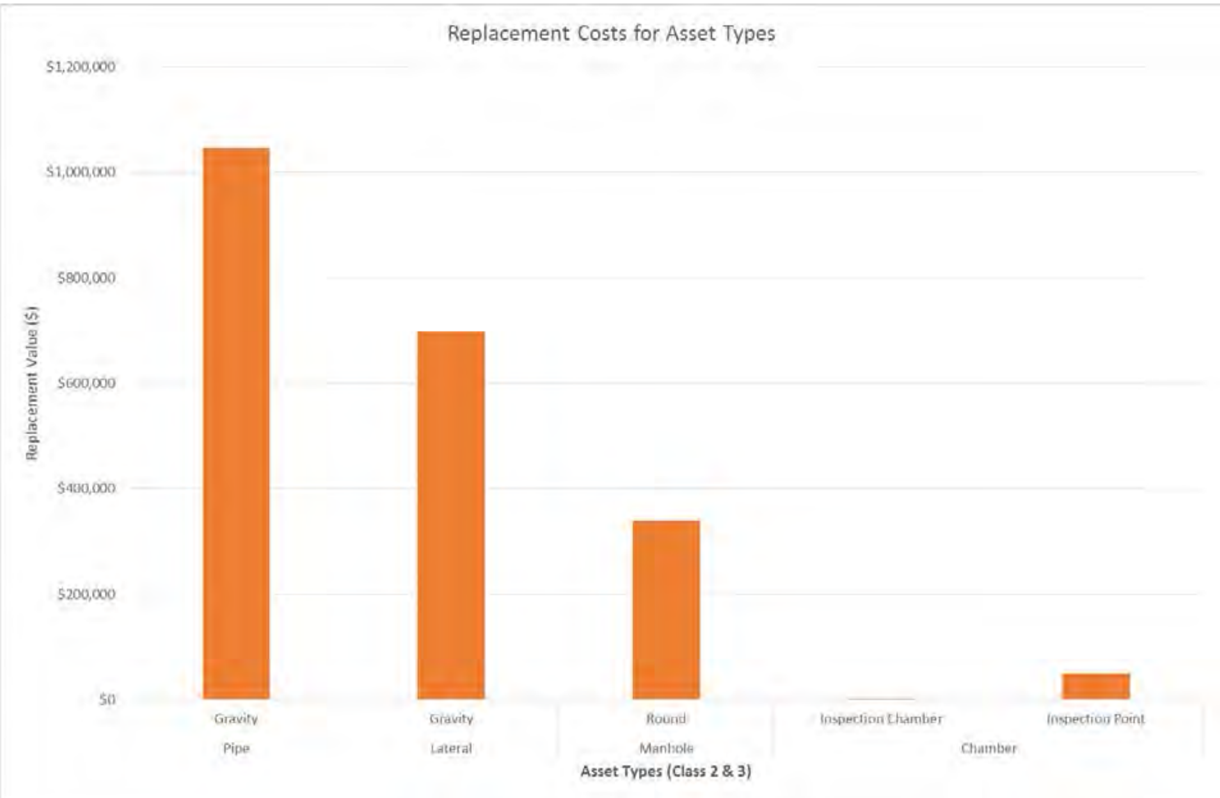


Figure 2-5 Replacement Costs for Castle Hill

2.11 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 2-6 below.

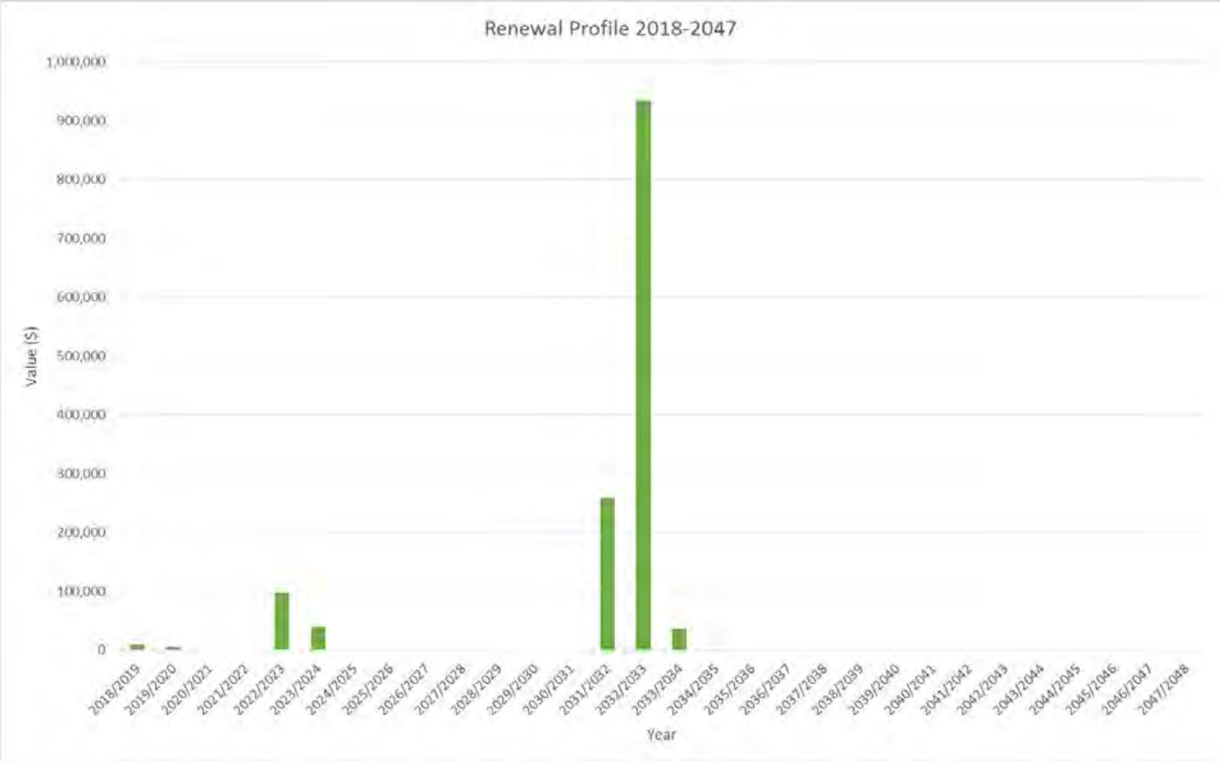


Figure 2-6 Castle Hill Wastewater Renewal Profile

2.12 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 2-7 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	2,515
4	Medium-Low	2,096
3	Medium	0
2	Medium-High	1705
1	High	0

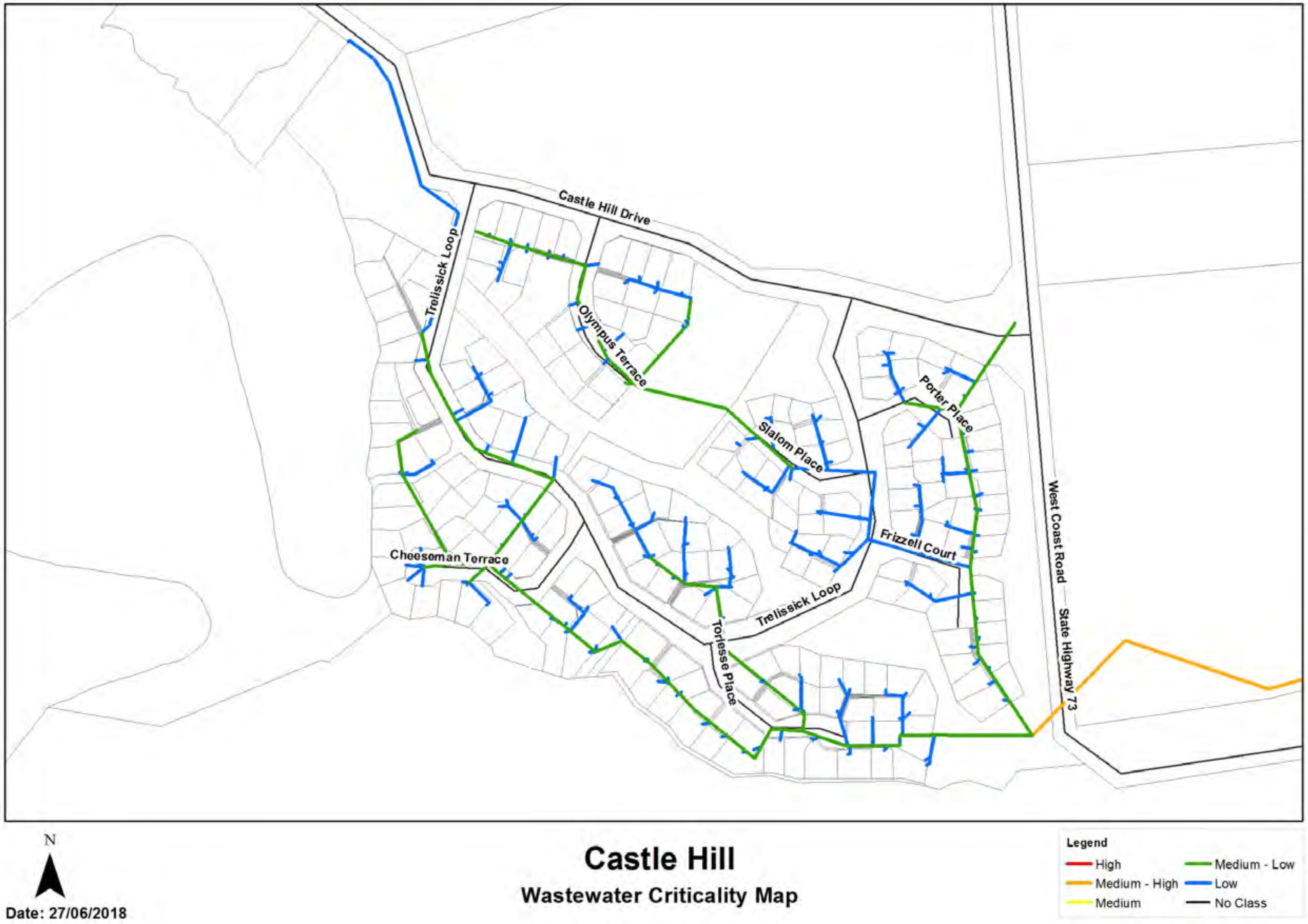


Figure 2-7 Criticality Map

2.13 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 and it provides details of how the model has been calculated for the reticulation assets (particularly pipes). Figure 2-8 below shows the level of asset condition for all of the assets within this scheme that have a recorded known condition.

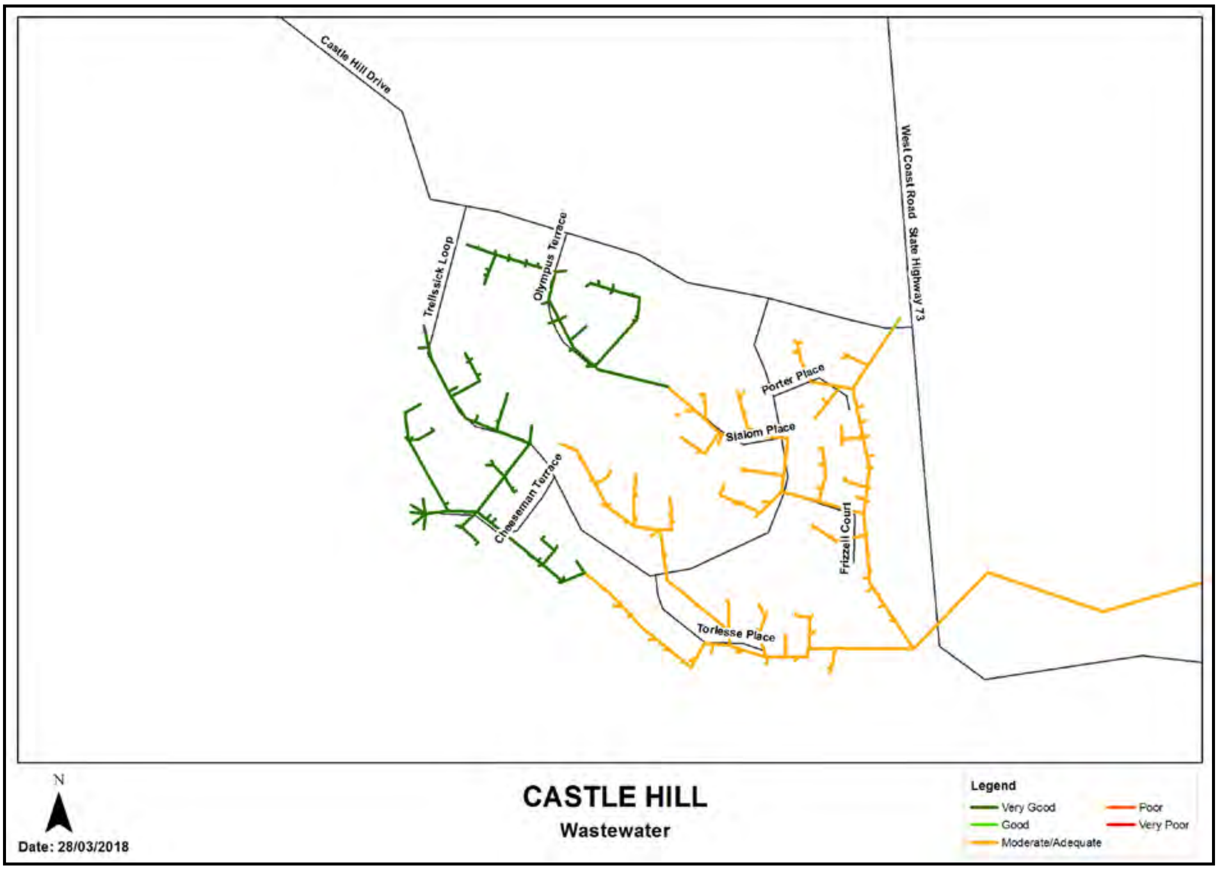


Figure 2-8 Asset Condition – Castle Hill

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

2.14 Funding Program

The 10 year budgets for Castle Hill are shown by Table 2-10 and Figure 2-9. 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	$17,054	$9,295	15,000	5,000
2019/2020	$17,054	$4,873		
2020/2021	$17,054	$687		
2021/2022	$17,054			
2022/2023	$7,054	$97,931		
2023/2024	$17,054	$39,465		
2024/2025	$17,054			
2025/2026	$17,054			
2026/2027	$17,054			
2027/2028	$17,054			
Total	$170,540	$152,252	$15,000	$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.

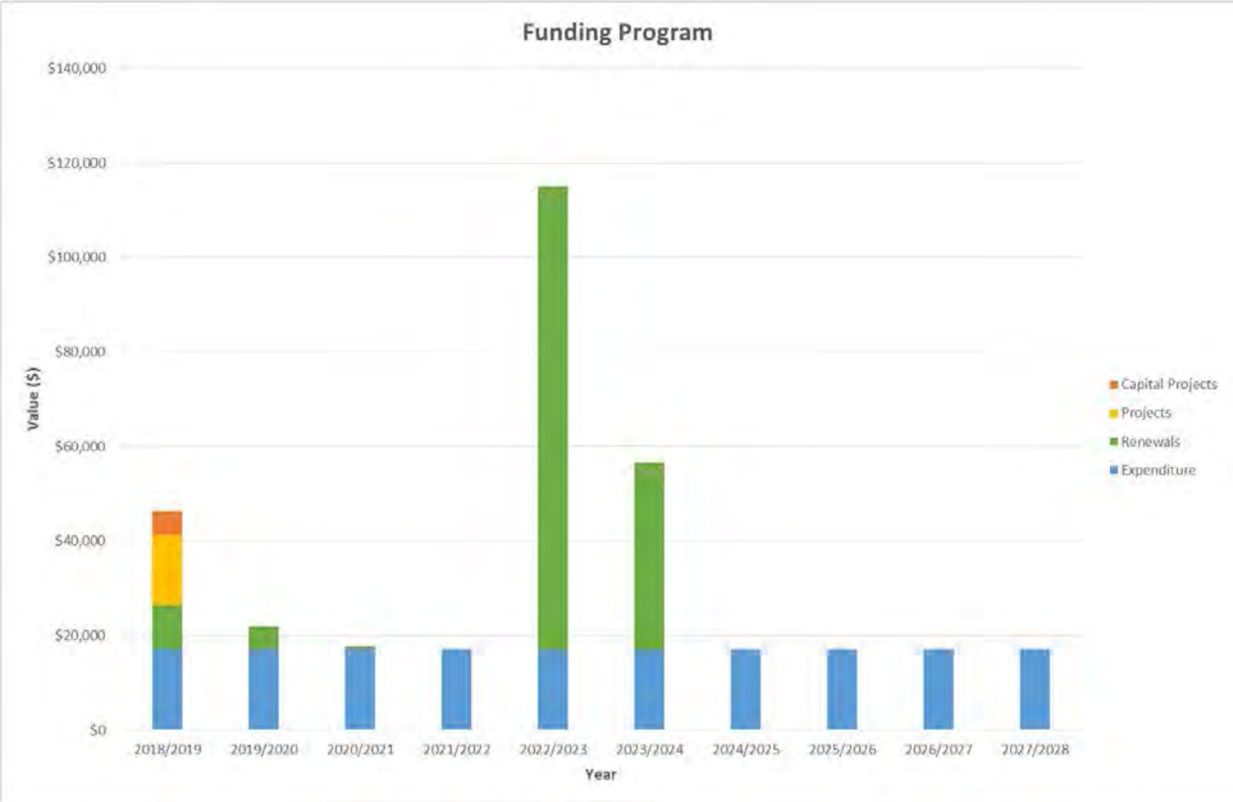


Figure 2-9 Castle Hill Funding Summary

There are a number of major projects for Castle Hill Wastewater 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
Projects	4610027	Future design option	$15,000				100% LoS
Capital Projects	461090008	Lift MH	$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.

3.0 CLAREMONT WASTEWATER SCHEME

3.1 Scheme Summary

Description		Quantity
Estimated Population Served		**148**
Scheme Coverage (1 Jan 18)	**Full Charges**	**52**
	Half Charges	**6**
	>1 Charges	**0**
System Components	**Piped (m)**	**2973.72**
	Manholes (No.)	**16**
	Pump Stations (No.)	**1**
	Treatment	**Package treatment plant**
	Disposal	**Subsurface disposal fields**
History	**Original scheme installation date**	**2005**
Value ($)	**Replacement Cost**	**$4,070,690.37**
	Depreciated Replacement Cost	**$3,254,517.02**
Financial	**2018/2019 Estimate** **Annual maintenance cost** **% of total**	**$56,944** **1.78%**
Demand	**Annually (m3)**	**10,523.8**
	Average daily (m3)	**28.99**
	Peak daily (m3)	**40.7**
	Minimum daily (m3)	**8.9**
	Infiltration	
Sustainability	**Ultimate discharge point**	**Storage and subsurface disposal (irrigation)**

3.2 Key Issues

The following key issues are associated with the Claremont Wastewater Scheme. 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
Cost of scheme operation and maintenance	Council will review options to reduce operation and maintenance costs and optimise renewals.

3.3 Overview & History

Claremont is an independently serviced subdivision adjacent to Templeton. Wastewater is treated by a small 'package' treatment plant and effluent is disposed of to land. Construction was completed in 2005 and the assets adopted by Council in 2007. There is a small rating base which is required to contribute solely to all costs associated with the lifecycle management of this scheme.

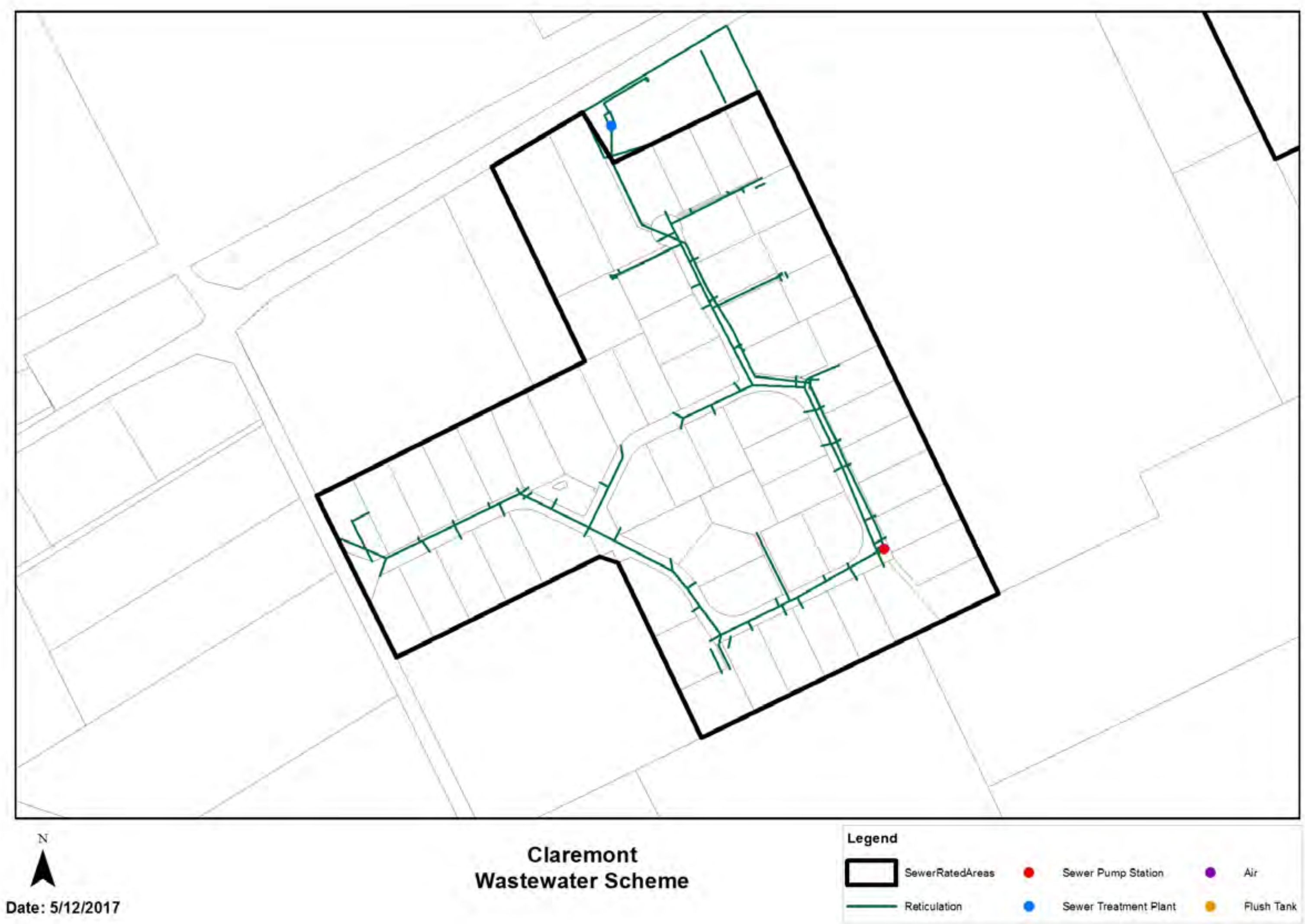


Figure 3-1 Scheme Map

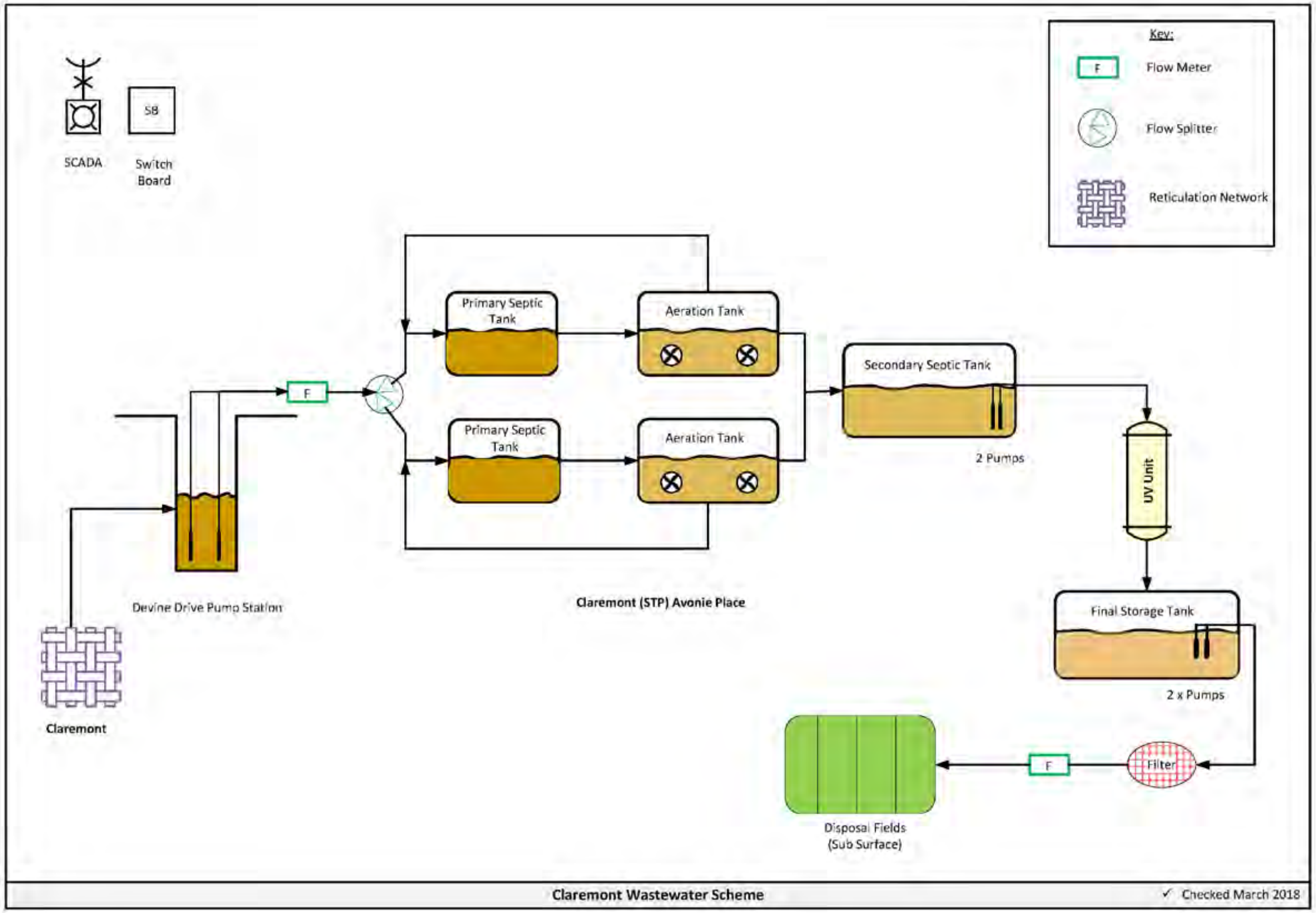


Figure 3-2 Scheme Schematic

3.4 System Capacity

The current Claremont wastewater flows are consistent with the design flows for the current number of connected properties. Consent conditions and system design meets correct needs but limit further growth.

There is not expected to be significant growth in the area serviced by this scheme and scheme expansion is not expected to be required over the planning horizon of this AcMP.

3.5 Resource Consents

The Claremont wastewater scheme has a number of resource consents. Table 3-2 shows the discharge permitted by the resource consents for this scheme.

Table 3-2 Resource Consents

Consent	Description	Location	Date Issued	Expiry Date	Quantities (m^3/day)
CRC000095.2 *Issued - Active*	To discharge domestic sewage effluent to ground via a "Blivot Aerotor" treatment system and "RAAM" irrigation disposal system, at or about map reference NZMS 260 M36:665-380.	Waterholes Road, TEMPLETON	20-Jun-08	9-Feb-35	58

There are no consents up for renewal during the term of this Plan. There is no compliance issues associated with the Claremont Sewerage Scheme.

3.6 Scheme Assets

A summary of the assets within this scheme is outlined in this section.

3.6.1 Reticulation Overview

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

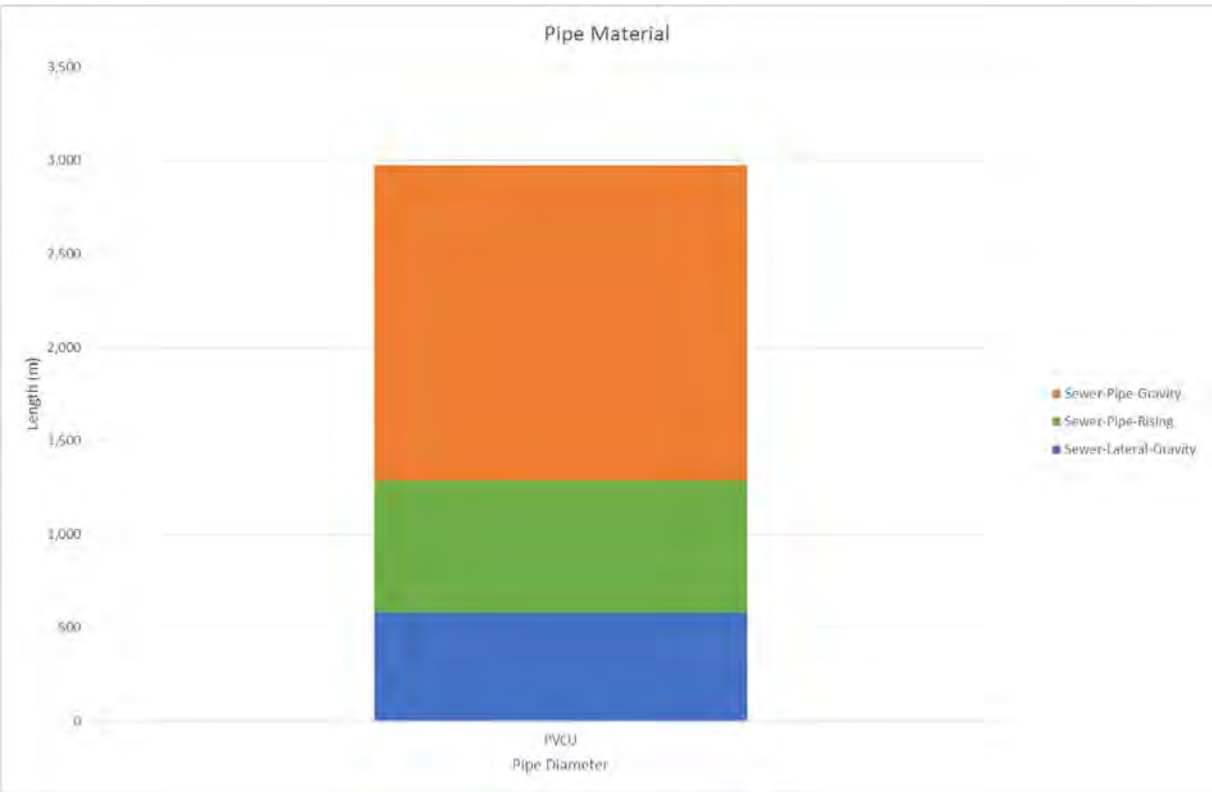


Figure 3-3 Pipe Material – Claremont

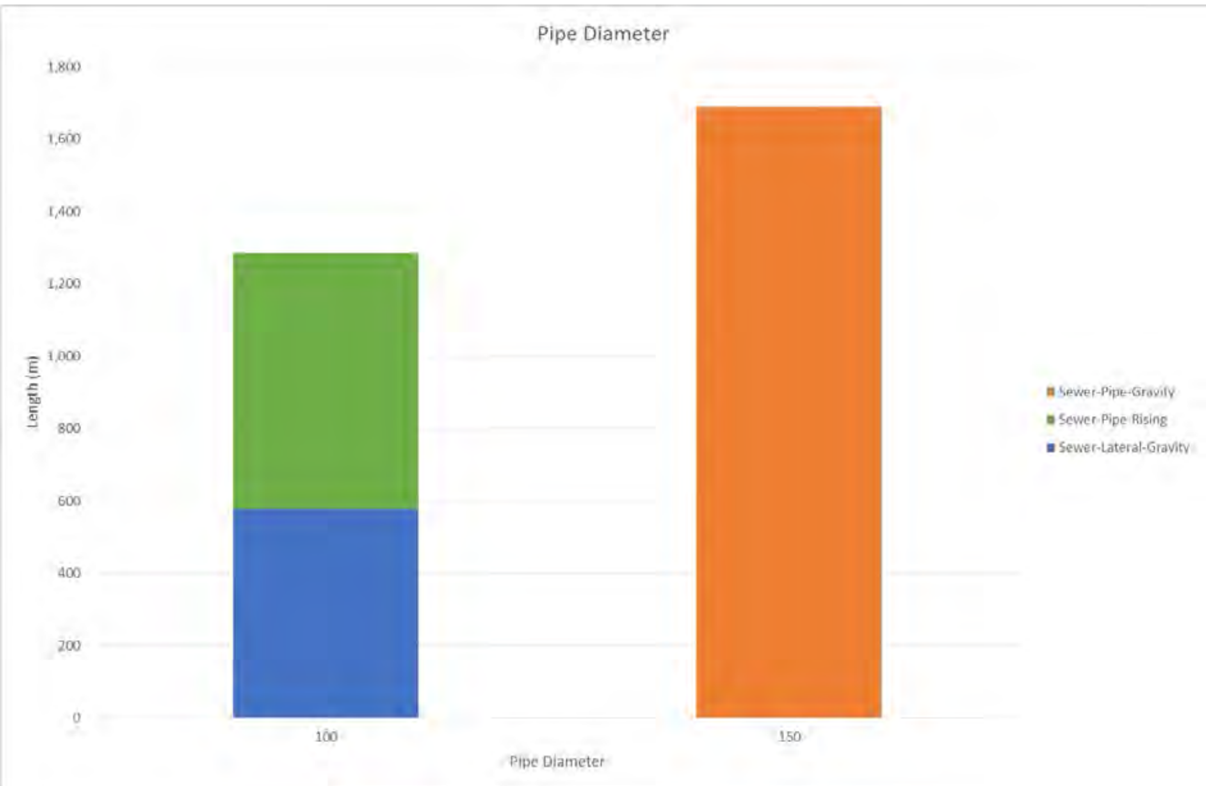


Figure 3-4 Pipe Diameter – Claremont

3.6.2 Treatment and Disposal

The treatment facilities consist of a Smith & Loveless MICROFAST secondary aerated package plant.

Table 3-3 Treatment Plant Package

System	Description	Year Installed/ Upgraded
Flow Splitter	Flow splitter box	2005
Settling tank	2x22m^3 Primary settling tanks with outlet filters	2005
Aeration	2x32m^3 MICROFAST 9.0 secondary aeration tanks with blower and aeration equipment	2005
Storage	Final storage tank	2005
Disposal	Sub surface	2005

3.6.3 Design

The design data for the Claremont system is tabled below.

Table 3-4 Design Data

Design Population	Per Capita Flow L/per/day	Average Day Flow m3/day	Peaking Factor	Peak Day Flow m3/day	Household Population persons	Households
	174			58		58

Claremont Wastewater Scheme is a small scheme with no allowance for expansion beyond the package plant capacity. Expansion is not likely to be required within the foreseeable future as once the number of connection reaches the subdivision maximum so too will the design capacity have been reached. Any further development in the vicinity will require rezoning of land and wastewater and disposal for the development would need to be assessed as part of the development.

3.6.4 Pump Stations

The pump station in Devine Drive pumps to the wastewater treatment plant.

3.7 Operational Management

The wastewater schemes are operated and maintained under the maintenance contract 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.

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

3.8 Photos of Main Assets

Photo 1 - Package Plant

3.9 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 details the risk priority rating and

Table 3-6 outlines the risks for this scheme.

Table 3-5 Risk Priority Rating

Risk Score	Level of Risk	Risk Response
> 50	Extreme	Awareness of the event to be reported to Council. Urgent action to eliminate / mitigate / manage the risk. 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. Immediate action required to eliminate / mitigate / manage the risk. 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
System is not optimised resulting in increased operational costs	Replace manual valves with solenoid valves and control via Datran	2014	12	12	12
Failure of power supply to scheme	Open up 5th irrigation zone to provide operational redundancy	2014	12	12	12
Non-consented activities	Renewal of consents	2014	27	27	6
Limited capacity and redundancy	Extend irrigate to 5th area	2017		2	0.7

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

3.10 Asset Valuation Details

The total replacement value of assets within the Claremont Scheme is $4,070,690 as detailed in Table 3-7.

Table 3-7 Replacement Value, Claremont

Asset Class 1	Asset Class 2	Sum of Replacement Value
Plant and Equipment		$3,065,902
Wastewater Reticulation	Chamber	$7,248
	Lateral	$182,052
	Manhole	$124,720
	Pipe	$688,705
	Valve	$2,063

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

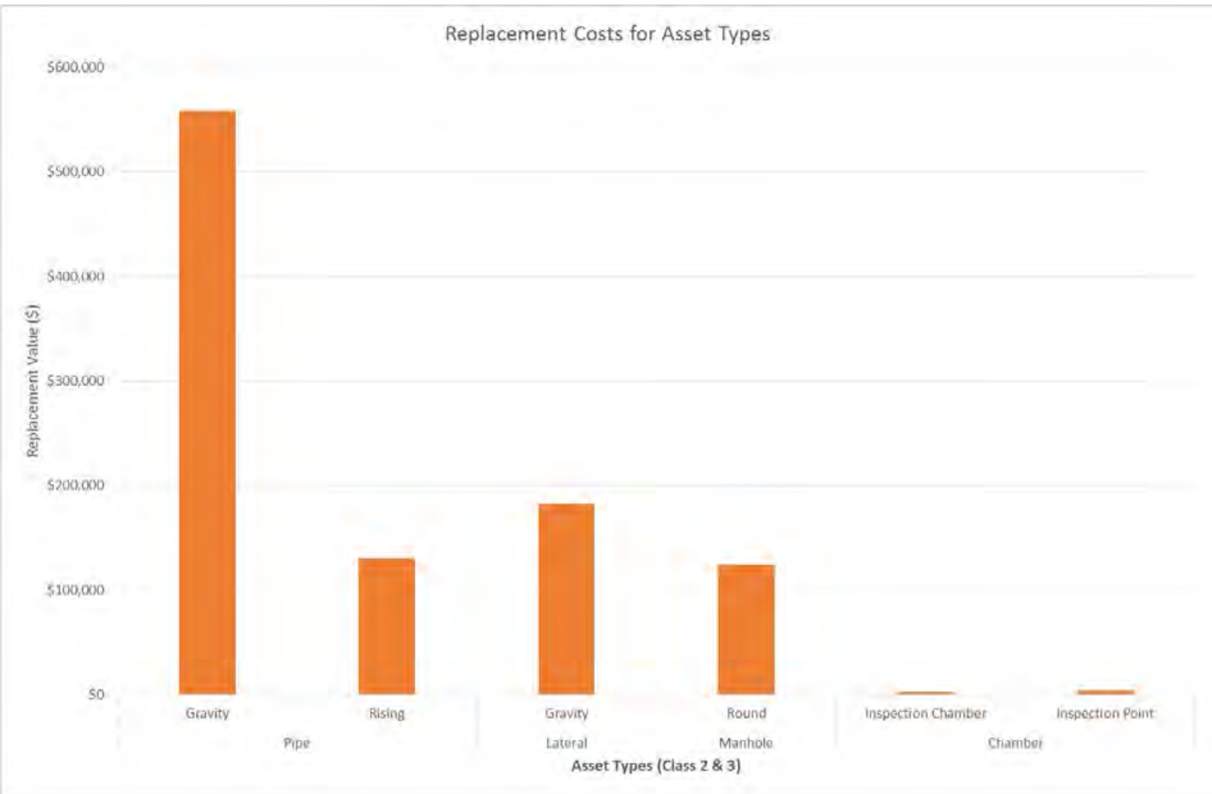


Figure 3-5 Replacement Costs for Claremont

3.11 Renewals

The renewal profile has been taken from the 2014 5 Waters Valuation. A graph showing the renewals for this scheme are shown by Figure 3-6 below.

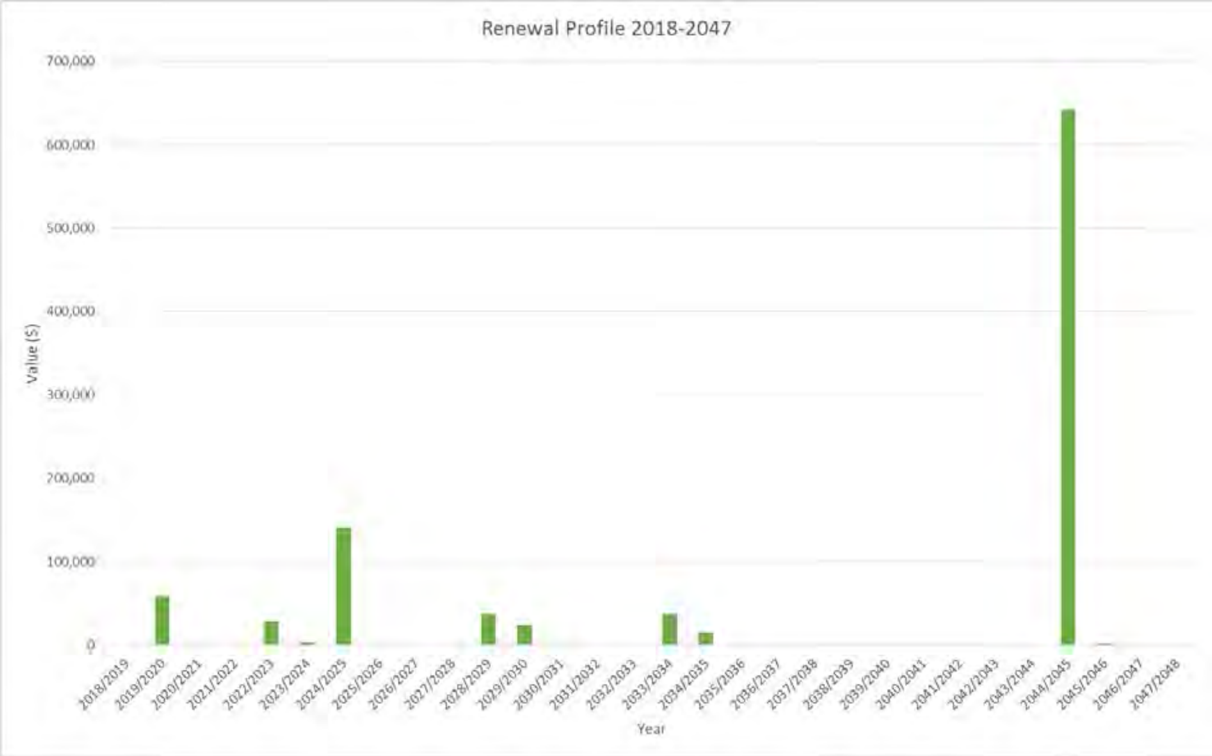


Figure 3-6 Claremont Wastewater Renewal Profile

3.12 Critical Assets

The criticality model for Claremont 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 3-8 and Figure 3-7below 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	3,456
4	Medium-Low	0
3	Medium	0
2	Medium-High	0
1	High	0

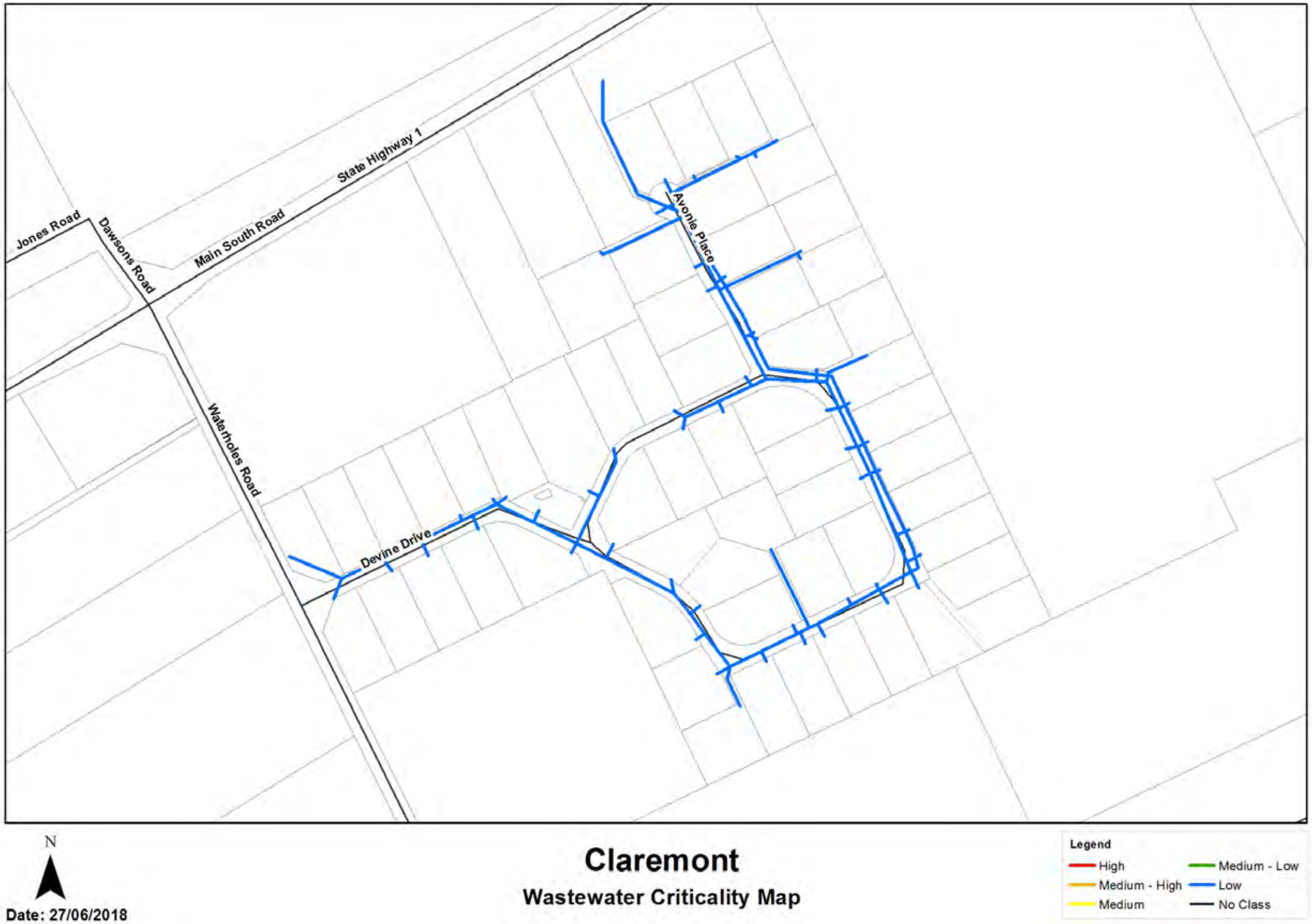


Figure 3-7 Criticality Map

3.13 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 and it provides details of how the model has been calculated for the reticulation assets (particularly pipes). Figure 3-8 below shows the level of asset condition for all of the assets within this scheme that have a recorded known condition.

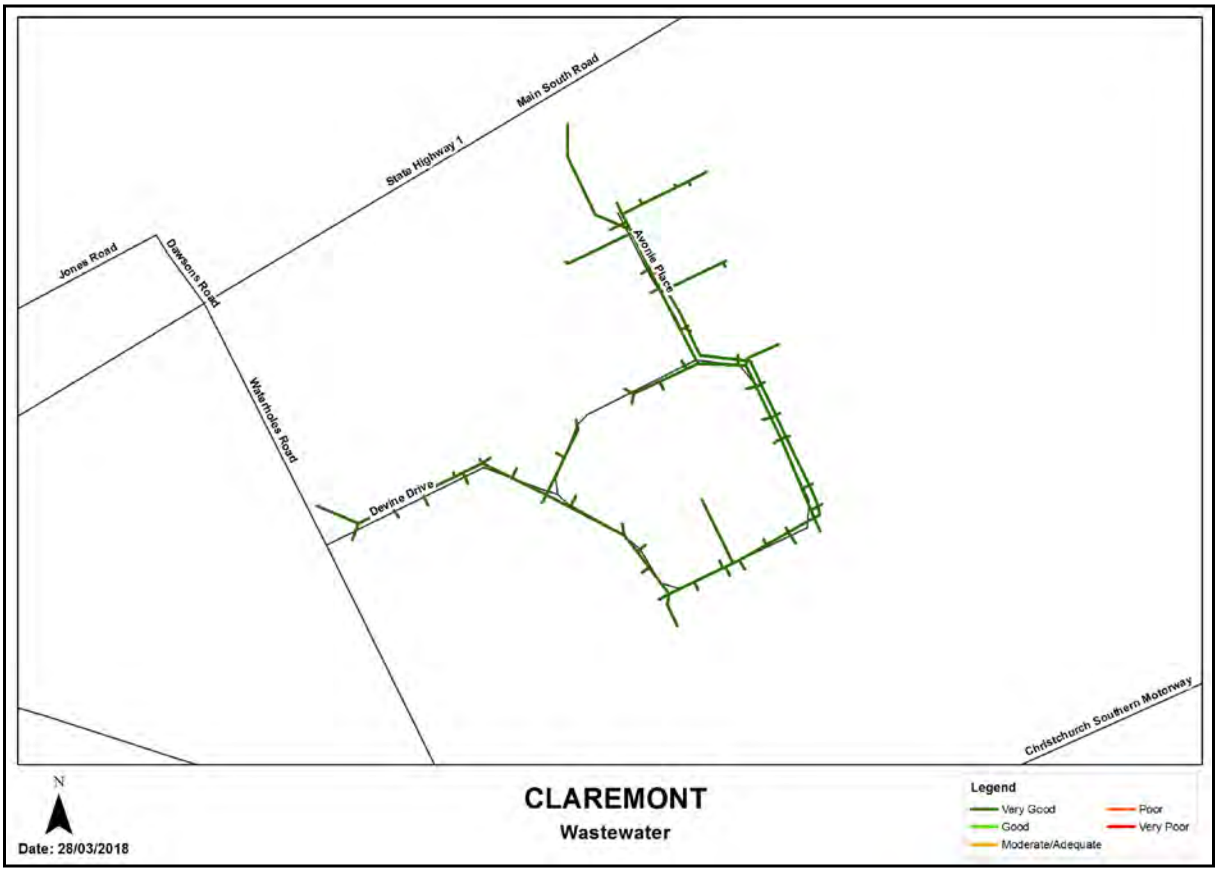


Figure 3-8 Asset Condition - Claremont

Table 3-9 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

3.14 Funding Program

The 10 year budgets for Claremont are shown Table 3-10 and Figure 3-9. 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	$56,944	$26		$15,000
2019/2020	$56,944	$59,274		$250,000
2020/2021	$56,944			
2021/2022	$56,944			
2022/2023	$56,944	$28,723		
2023/2024	$56,944	$4,009		
2024/2025	$56,944	$140,594		
2025/2026	$56,944			
2026/2027	$56,944	$895		
2027/2028	$56,944			
Total	$569,440	$233,520		$265,000

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.

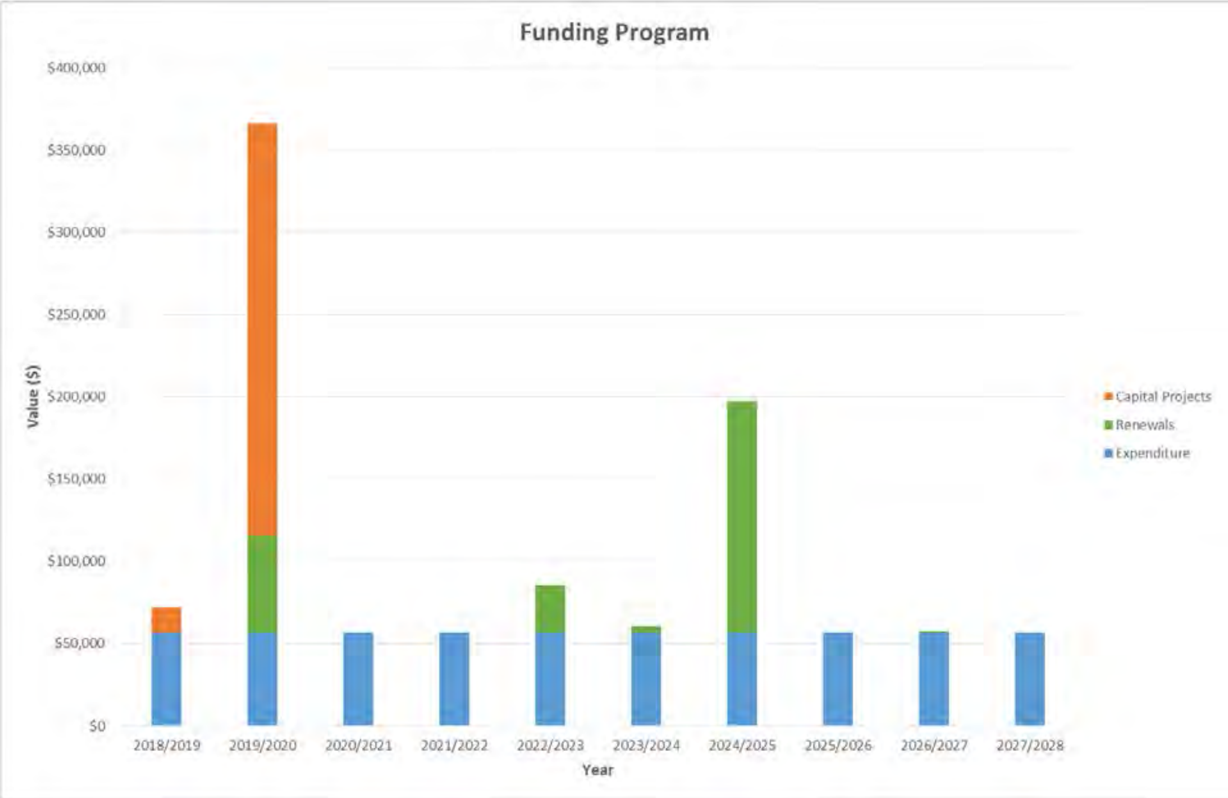


Figure 3-9 Claremont Funding Summary

There are a number of major projects for Claremont Wastewater 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
Capital Projects	468790004	Automate valves	$15,000				100% LoS
Capital Projects	468790005	Power upgrade		$50,000			100% LoS
Capital Projects	468790006	Extend irrigation		$200,000			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.

4.0 DOYLESTON WASTEWATER SCHEME

4.1 Scheme Summary

Description		Quantity
Estimated Population Served		**319**
Scheme Coverage (1 Jan 18)	**Full Charges**	**114**
	Half Charges	**9**
	>1 Charges	**0**
System Components	**Piped (m)**	**6000**
	Manholes (No.)	**34**
	Pump Stations (No.)	**3**
	Treatment	**N/A (to Ellesmere STP)**
	Disposal	**N/A (to Ellesmere STP)**
History	**Original scheme installation date**	**1996**
Value ($)	**Replacement Cost**	**$1,920,789.53**
	Depreciated Replacement Cost	**$1,482,203.68**
Financial	**2018/2019 Estimate Annual maintenance cost % of total**	**$39,021 1.22%**
Demand	**Annually (m3)**	**21,013.6**
	Average daily (m3)	**58.05**
	Peak daily (m3)	**89.40**
	Minimum daily (m3)	**34.60**
	Infiltration	
Sustainability	**Ultimate discharge point**	**To Ellesmere WWTP**

4.2 Key Issues

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

Table 4-1 Doyleston Scheme Issues

What's the Problem	What we plan to do
Potential for future infiltration issues as scheme ages	Monitor groundwater levels and daily flows. Investigate issues as required

4.3 Overview & History

The reticulation was installed in the township in 1996 and replaced a variety of disposal systems i.e. septic tanks (with disposal to adjacent drains) and chemical toilets. High groundwater levels during winter made disposal via standard soak holes difficult and there was a significant amount of discharge to local waterways. The trunk mains are located at the back of properties.

The wastewater from properties is reticulated to a central pump station in Doyleston, and then pumped approximately 2.8 km to Leeston wastewater treatment plant.

Figure 4-1 Scheme Map

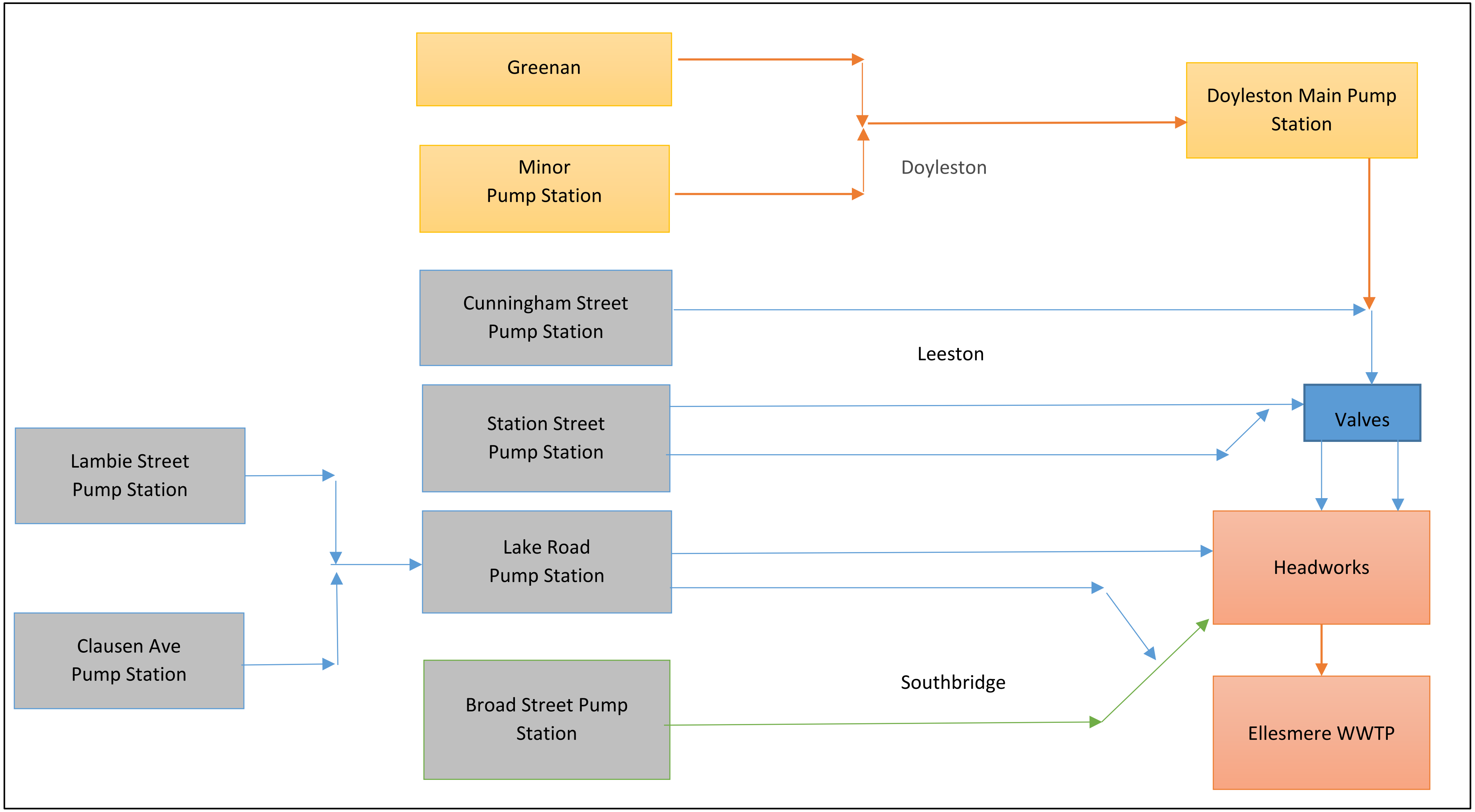


Figure 4-2 Scheme Schematic

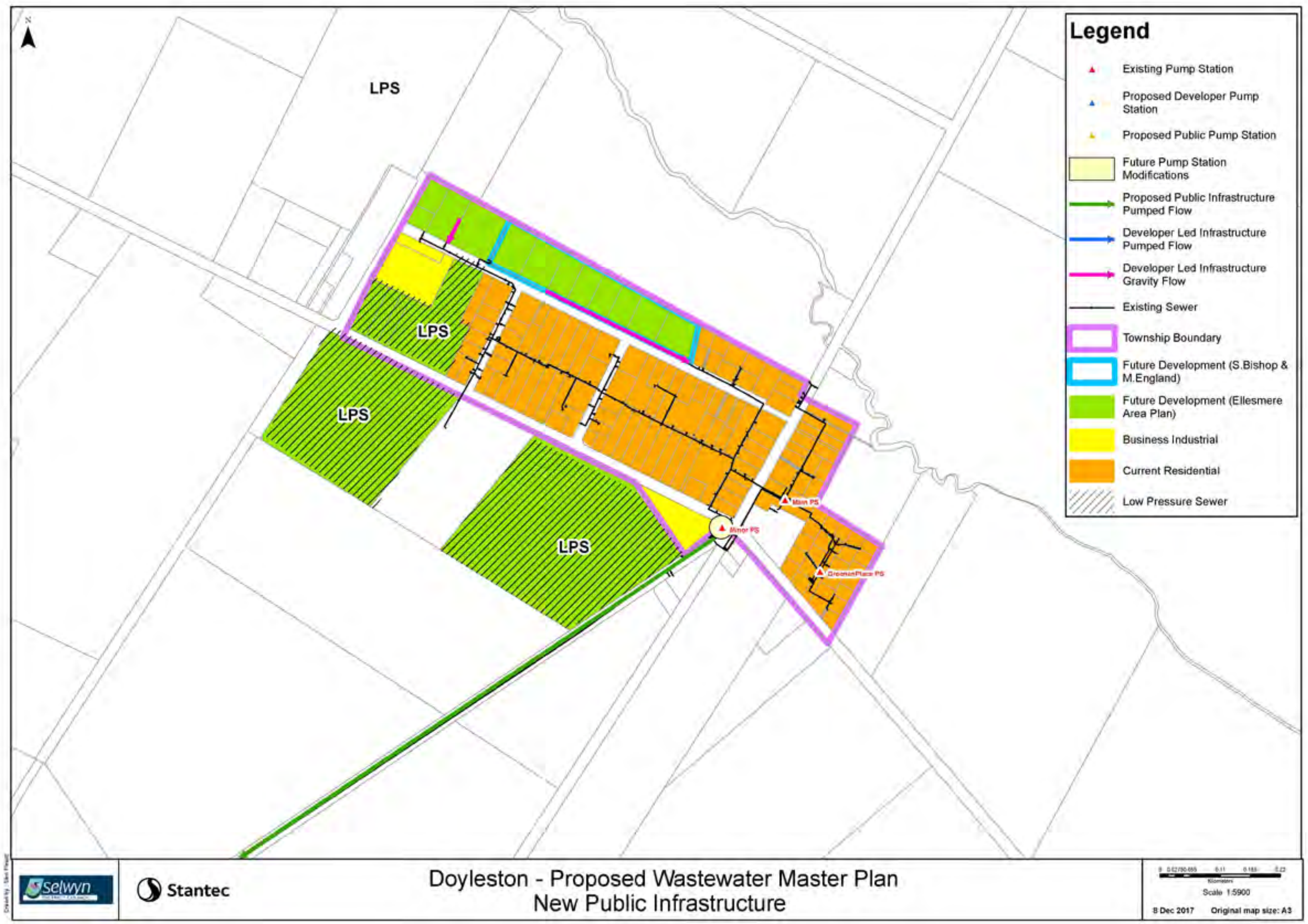


Figure 4-3 Doyleston Master Plan

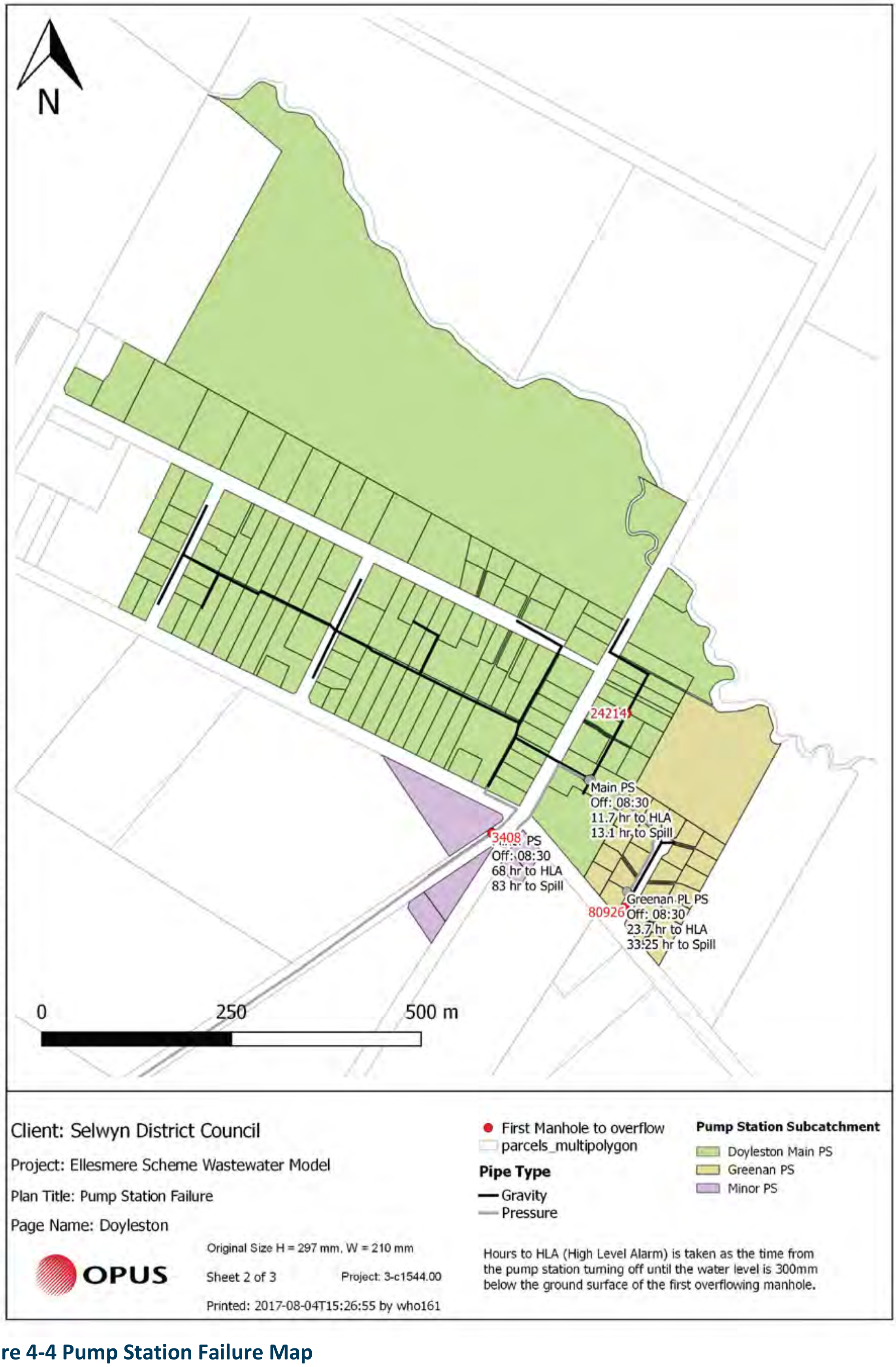


Figure 4-4 Pump Station Failure Map

4.4 System Capacity

The scheme is operating within operating limits. Refer to section 4.6.3 for design information. Pump and pressure main upgrades will be required to provide for additional capacity for growth.

Master Plan upgrades are provided in Figure 4-3.

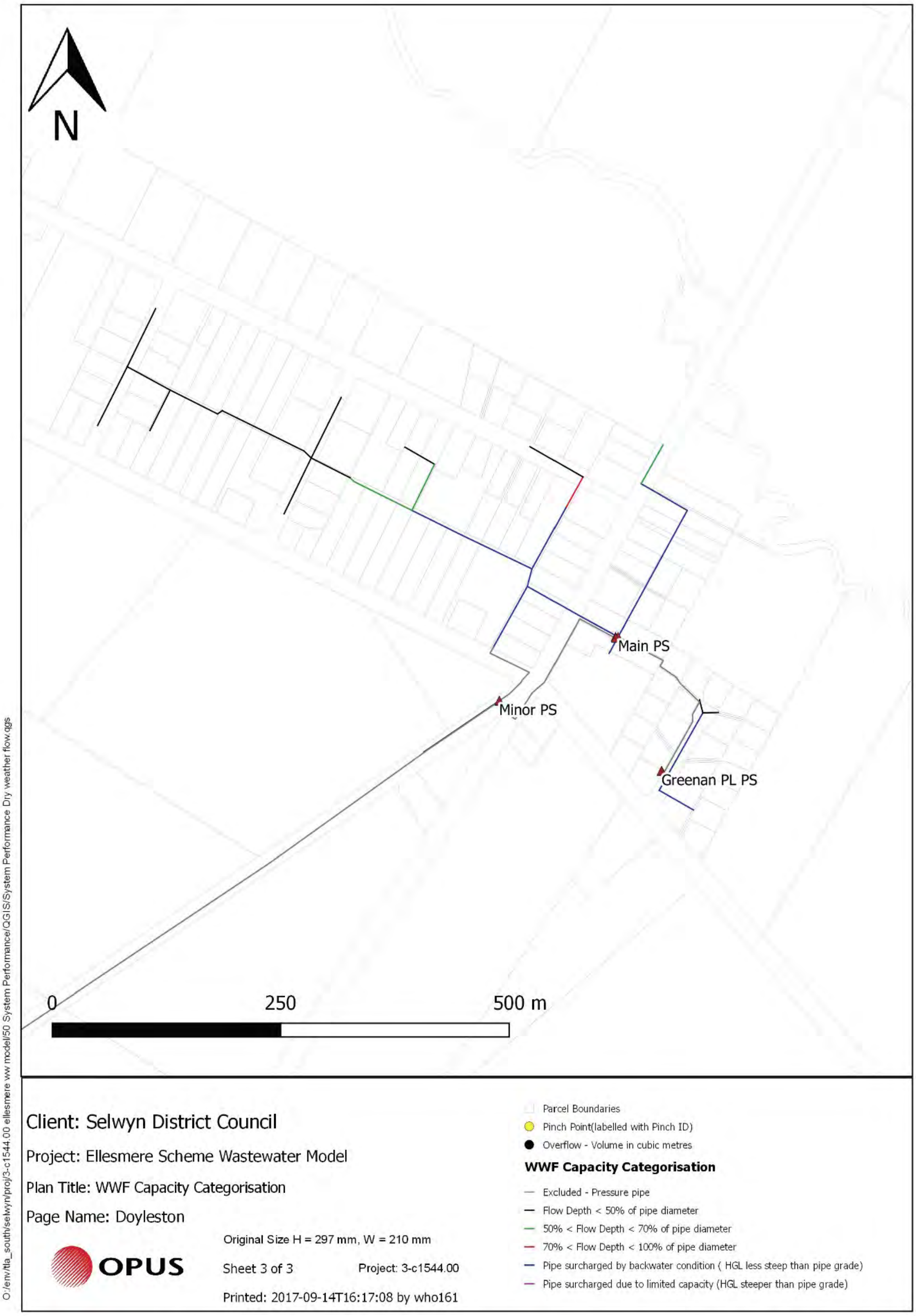


Figure 4-5 Wet Weather Flow Capacity Map

4.5 Resource Consents

Doyleston township is part of the Ellesmere scheme. Therefore, all wastewater is pumped to the Ellesmere Treatment Plant located in Leeston. The resource consents required for this treatment plant are in the Ellesmere section of this plan.

4.6 Scheme Assets

A summary of the assets within this scheme is outlined in this section.

4.6.1 Reticulation Overview

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

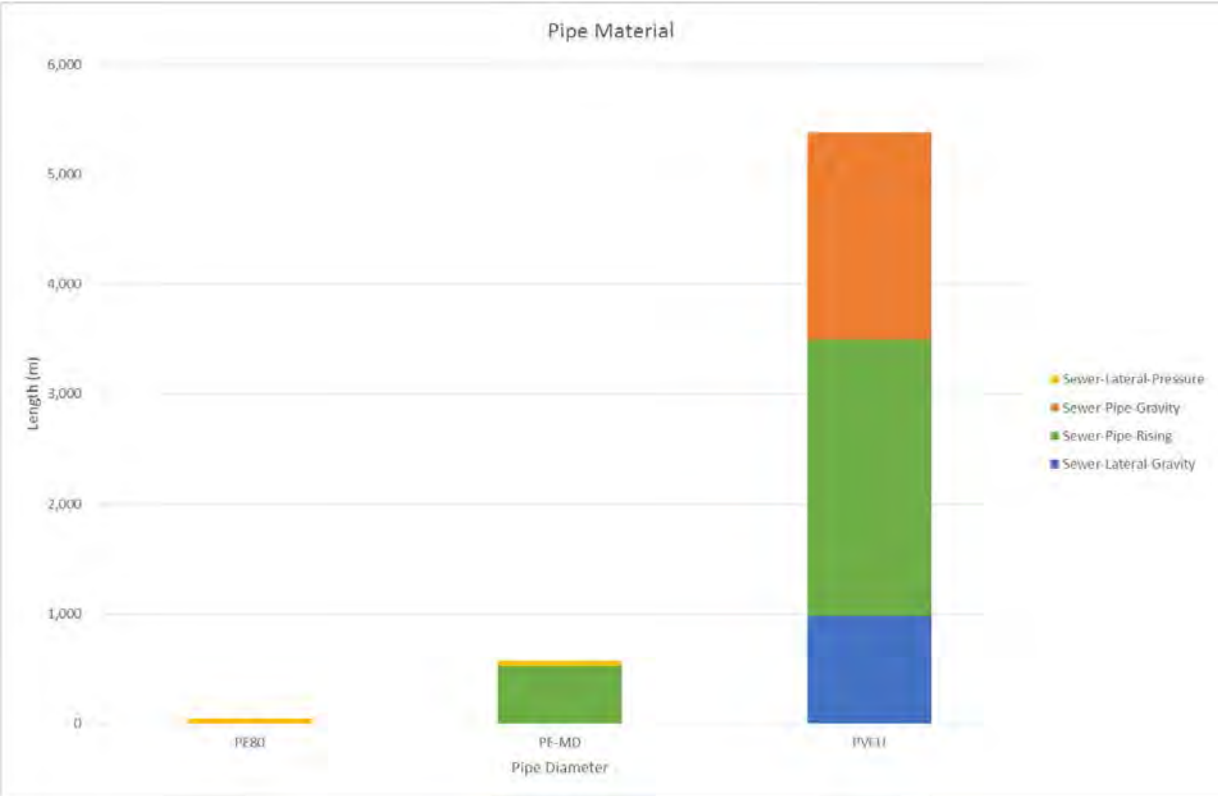


Figure 4-6 Pipe Material – Doyleston

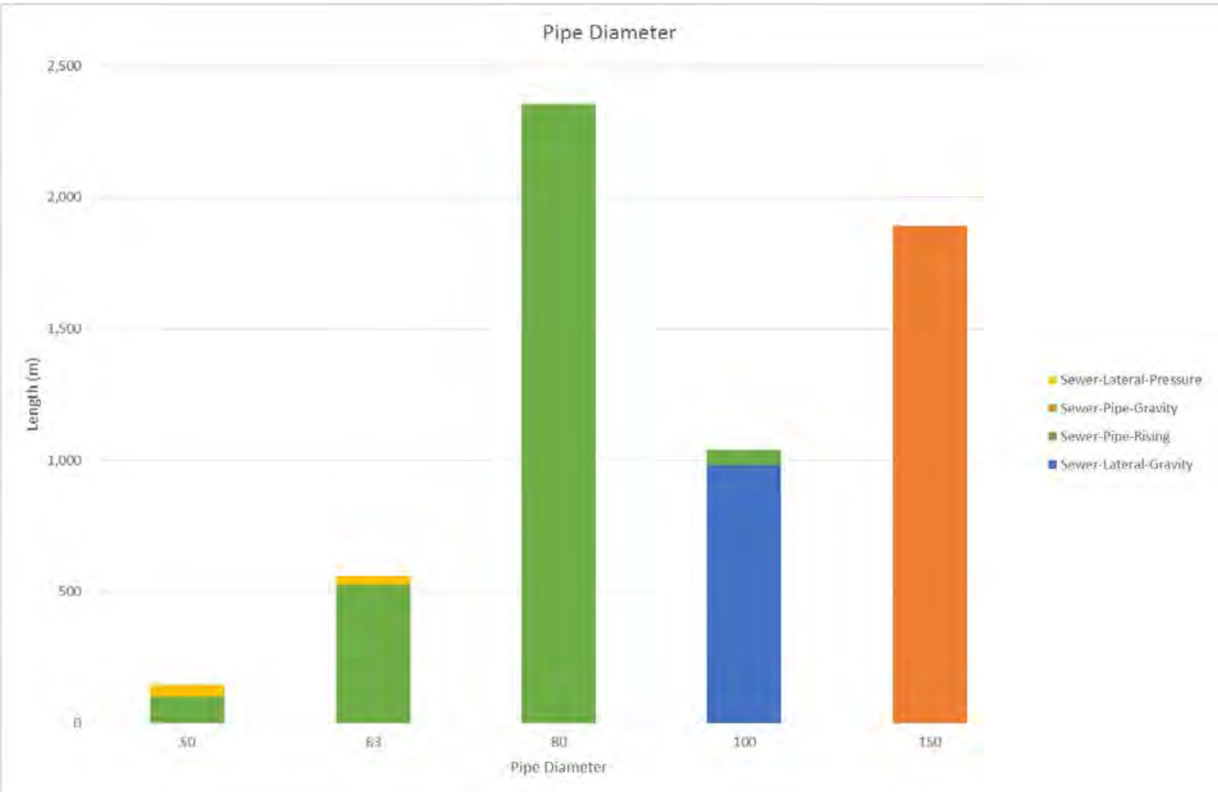


Figure 4-7 Pipe Diameter – Doyleston

4.6.2 Treatment and Disposal

No treatment is carried out with all wastewater pumped to Leeston.

4.6.3 Design

The original design data for the Doyleston system is tabled below.

Table 4-2 Design Data

Design Population	Per Capita Flow L/per/day	Peak Day Flow m^3/day	Household Population persons	Pump capacity l/s
320	**1000**	**320**	**2.7**	**3.50**

The Doyleston, scheme is ultimately limited by the capacity of the Leeston WWTP, which in turn is bound by the resource consents for discharging from the works. This is also the case with Leeston and Southbridge Schemes. These schemes therefore need to be considered collectively in determining future capacity for growth in the three schemes.

Pump and pressure main upgrades will be required to provide for additional capacity for growth.

Master Plan upgrades are provided in Figure 4-3.

4.6.4 Pump Stations

There are three pump stations within the Doyleston scheme, with the main pump station pumping to the Leeston WWTP. Details are tabled below.

Table 4-3 Pump Station

Site Name	Wet well dimensions	Wet Well area (m^2)	Wet Well Depth (m)	No of pumps	Pump curve used	Recorded Flow (L/s)	Model Pump Rate (L/s)	ADWF (L/s)	PDWF (L/s)
Doyleston (S) Main	2000 Ø	3.1	3	2	Flygt FP3124 SH246 7.4 kW	5	4	0.8	0.17
Doyleston (S) Minor	1200 Ø	1.1	2.5	1	Flygt CP3057 260 2.4 kW	N/A	5	0.07	0.17
Doyleston (S) Greenan Pl	1400 Ø	1.5	4	2	Flygt CP3068 251 2.4 kW	N/A	3	0.03	0.08

Table 4-4 Pump Station Storage Time Analysis

Pump Station	Town	Morning Peak Time	PS off time	Hours until HLA reached	Hours until first spill	Spill Level (m AD)	Spill Location – Model ID
Doyleston (S) Main	Doyleston	9:00	8:30	8.7	11.5	15.03	24214
Doyleston (S) Minor	Doyleston	9:00	8:30	27.6	32	19.29	3408

Doyleston (S) Greenan Place	Doyleston	9:00	8:30	25	28.5	15.308	80926

4.6.5 Rising Mains

Table 4-5 Rising Main Overview

Site Name	Material	Pressure Rating	Internal diameter (mm)	Comment
Doyleston PS to Cunningham rising main	PVCU	PN12	100/80	Assumed Pressure Rating
Doyleston (S) Greenan PS	MDPE	PN12.5	51	
Doyleston (S) Minor PS	PVCU	PN12.5	53	Assumed Pressure Rating

4.7 Operational Management

The wastewater schemes are operated and maintained under the maintenance contract 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.

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

4.8 Photos of Main Assets

Photo 1 - Leeston Rd Pump Station

Photo 2 - Doyleston Main Pump Station

4.9 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 4-6 details the risk priority matrix and Table 4-7 outlines the risks for this scheme.

Table 4-6 Risk Priority Rating

Risk Score	Level of Risk	Risk Response
> 50	Extreme	Awareness of the event to be reported to Council. Urgent action to eliminate / mitigate / manage the risk. 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. Immediate action required to eliminate / mitigate / manage the risk. Document risk and action in the AMP.

Table 4-7 Risks - Doyleston

Risk	Action/Project	Year Identified	2014 Risk Rating	2017 Risk Rating	Residual Risk Rating
Failure of low class pipework	Renewal: Upgrade last 1km of pipe from Leeston-Doyleston	2014	12	12	12

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

4.10 Asset Valuation Details

The total replacement value of assets within the Doyleston Scheme is $ 1,920,790 as detailed in Table 4-8 below.

Table 4-8 Replacement Value, Doyleston

Asset Class 1	Asset Class 2	Sum of Replacement Value
Plant and Equipment		$290,437
Wastewater Reticulation	Chamber	$2,842
	Lateral	$332,366
	Manhole	$206,587
	Pipe	$1,078,792
	Valve	$9,766

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

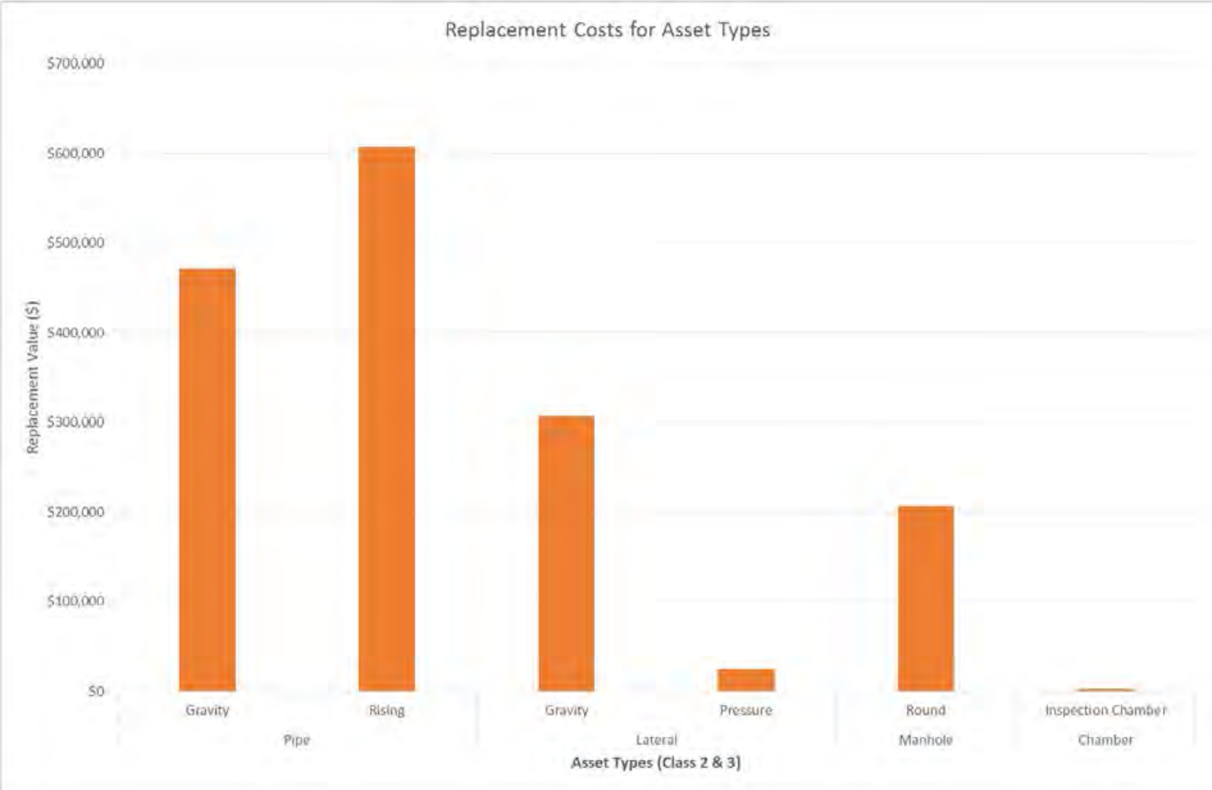


Figure 4-8 Replacement Costs for Doyleston

4.11 Renewals

The renewal profile has been taken from the 2014 5 Waters Valuation. A graph showing the renewals for this scheme are shown by Figure 4-9 below.

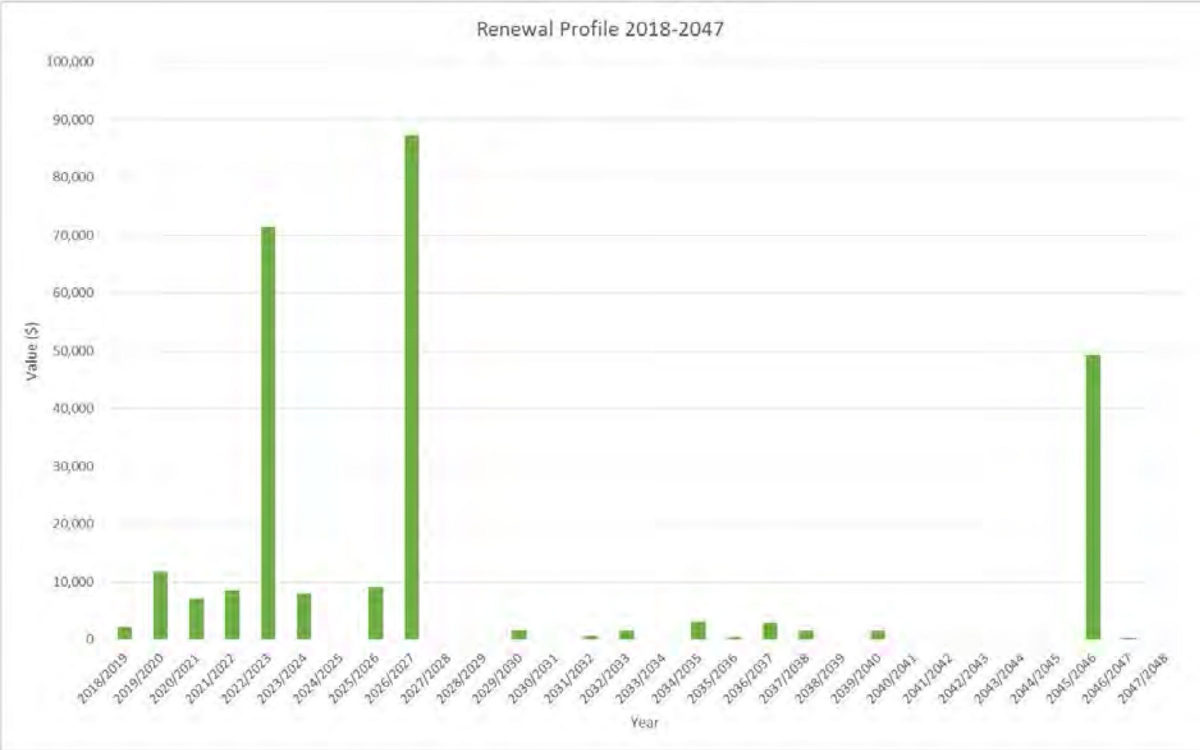


Figure 4-9 Doyleston Wastewater Renewal Profile

4.12 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 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	5,263
4	Medium-Low	757
3	Medium	76
2	Medium-High	0
1	High	0

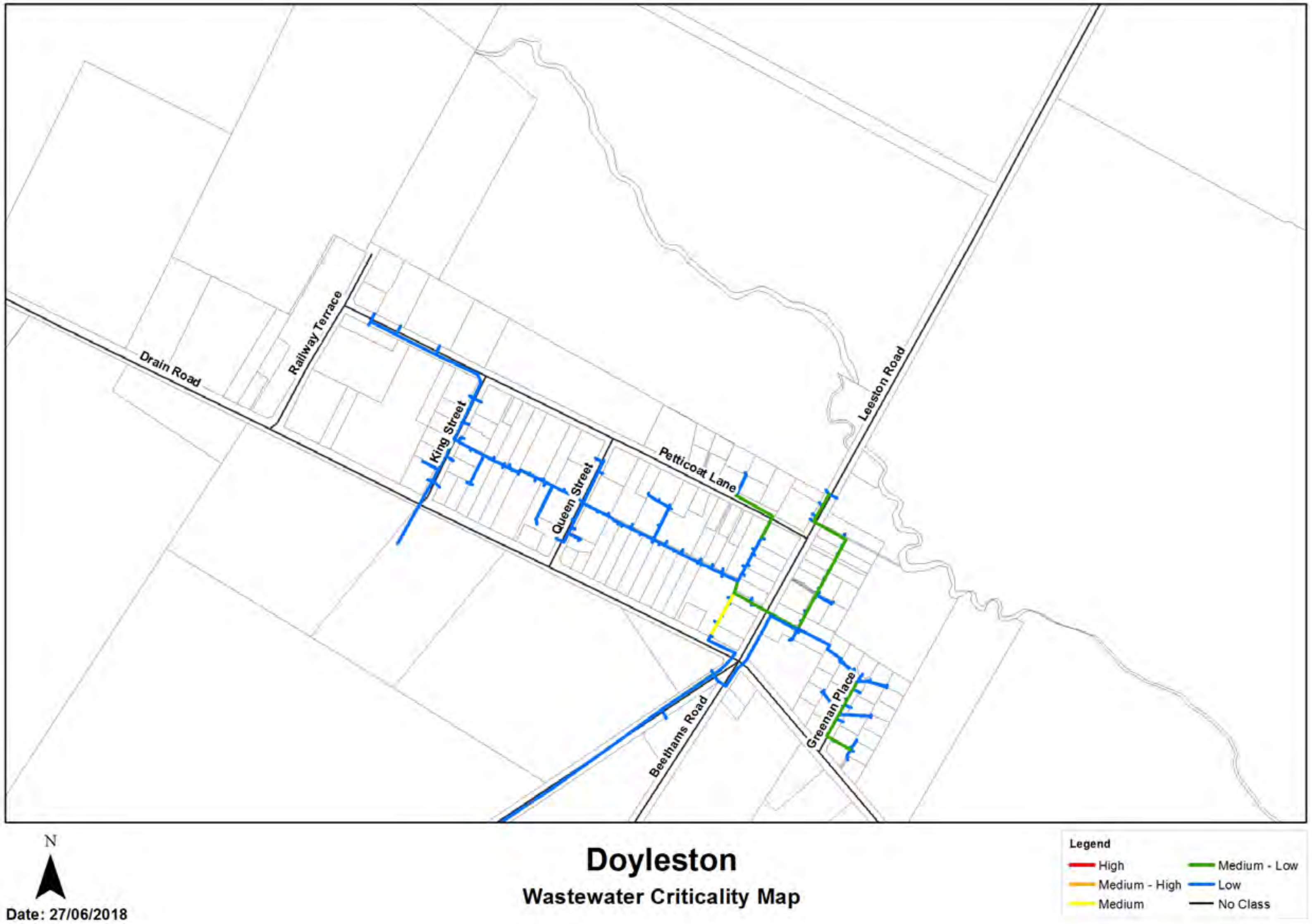


Figure 4-10 Criticality Map

4.13 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 and it provides details of how the model has been calculated for the reticulation assets (particularly pipes). Figure 4-11 below shows the level of asset condition for all of the assets within this scheme that have a recorded known condition.

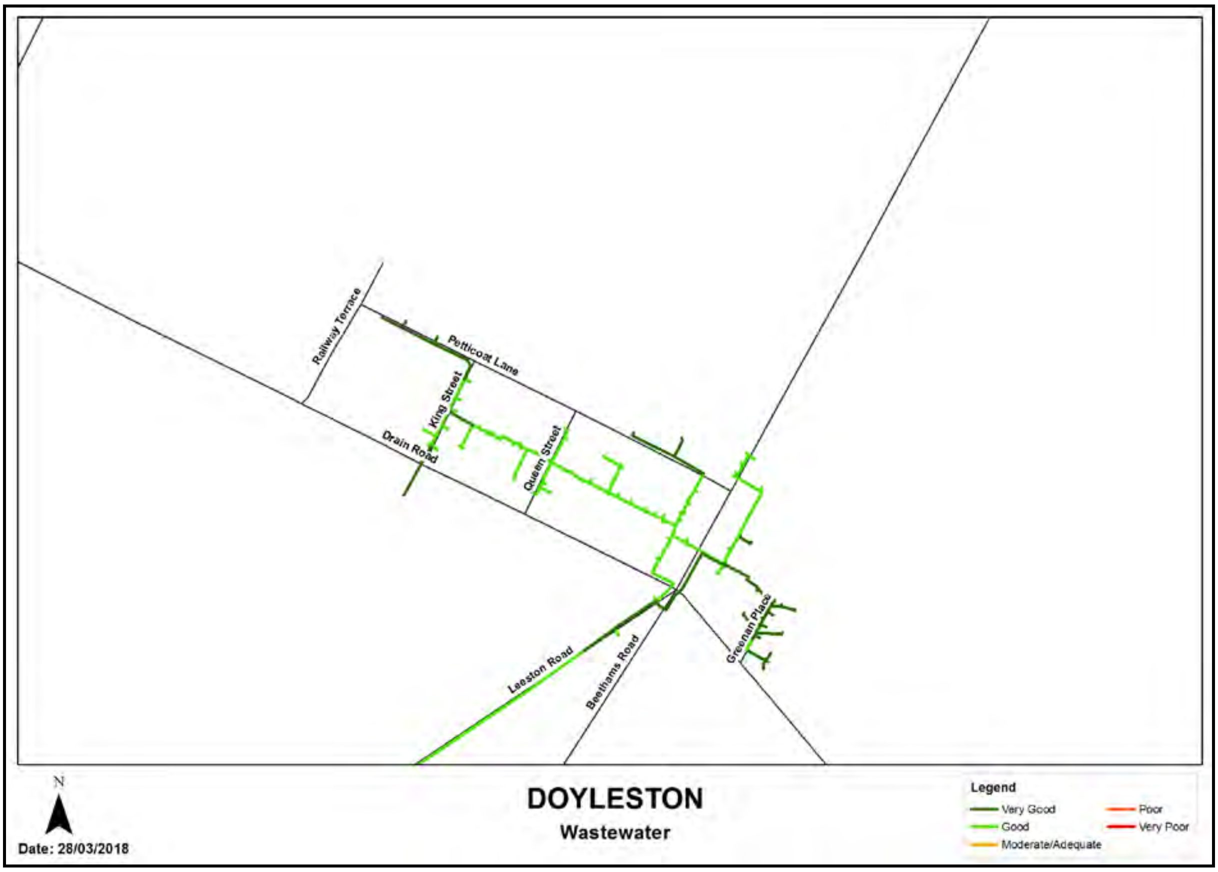


Figure 4-11 Asset Condition - Doyleston

Table 4-10 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

4.14 Funding Program

The 10 year budgets for Doyleston are shown by Table 4-11 and Figure 4-12. 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 4-11 Doyleston Budget Summary

Years	Expenditure	Renewals	Projects	Capital Projects
2018/2019	$39,021	$2,234		$41,255
2019/2020	$39,021	$11,838	$100,000	$150,859
2020/2021	$39,021	$7,106		$46,127
2021/2022	$39,021	$8,591		$47,612
2022/2023	$39,021	$71,454		$110,475
2023/2024	$39,021	$8,017		$47,038
2024/2025	$39,021			$39,021
2025/2026	$39,021	$9,102	$200,000	$248,123
2026/2027	$39,021	$87,324	$536,240	$662,585
2027/2028	$39,021			$39,021
Total	$390,210	$205,667	$836,240	$1,432,117

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.

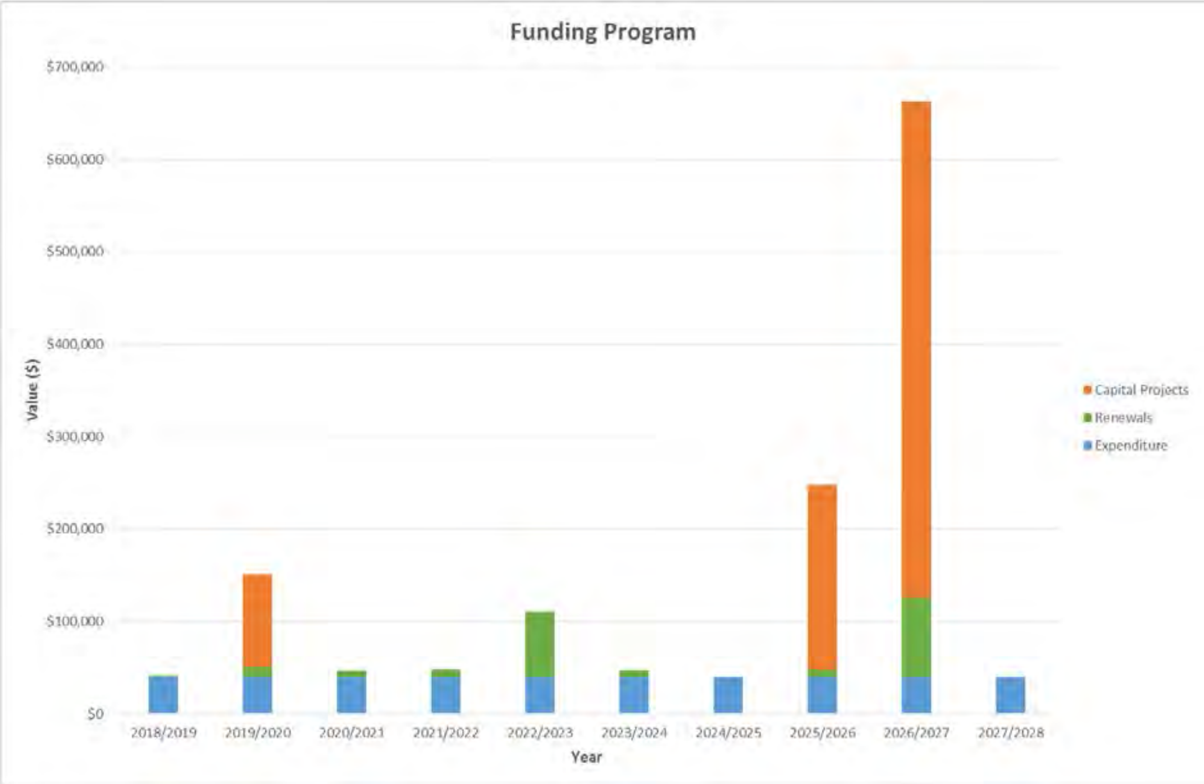


Figure 4-12 Doyleston Funding Summary

There is one project for the Doyleston Wastewater 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
Capital Projects	461990012	Pipeline Upgrade		$100,000		$736,240	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

5.0 EASTERN SELWYN SEWERAGE SCHEME

5.1 Scheme Summary

Description		Quantity
Estimated Population Served		26,177
Scheme Coverage (1 Jan 18)	Full Charges	Serves Lincoln, Rolleston, Prebbleton, Springston and West Melton which are rated.
	Half Charges	
	>1 Charges	
System Components	Piped (m)	36,334
	Manholes (No.)	55
	Pump Stations (No.)	3 (Allendale Lane, Selwyn Road, Burnham School)
	Treatment	30,000 PE, planned upgrades to 60,000PE
	Disposal	Irrigated area 117ha, planned upgrades to 218.5ha
History	Original scheme installation date	2012-2013
Value ($)	Replacement Cost	$57,538,085.46
	Depreciated Replacement Cost	$47,927,778.20
Financial	2018/2019 Estimate Annual maintenance cost % of total	$1,812,970 56.75%
Demand	Annually (m3)	2,688,206
	Average daily (m3)	7,365
	Peak daily (m3)	11,107
	Minimum daily (m3)	6,058
	Infiltration	N/A, pressurised pipeline scheme
Sustainability	Ultimate discharge point	Treated effluent discharged via land irrigation

5.2 Key Issues

The following key issues are associated with the Eastern Selwyn Sewerage Scheme. A list of district wide issues are located in 5Waters Activity Management Plan: Volume 1.

Table 5-1 Eastern Selwyn Sewerage Scheme Issues

What's the Problem	What we plan to do
Rapid growth will put pressure on the plant's capacity	Put in place a program for progressive upgrade works
Rapid growth will put pressure on the conveyance capacity	Put in place a program for progressive upgrade works
Plant capacity to buffer Trade waste discharges	Manage trade waste discharge through trade waste consents

5.3 Overview & History

The Eastern Selwyn Sewerage Scheme (ESSS) was developed to meet the existing and future needs of the towns of Prebbleton, Lincoln, Springston, Rolleston and West Melton. The purpose of this scheme is to ensure a staged and managed approach to the development of wastewater bulk conveyance, treatment and disposal infrastructure while providing equality in the scheme costs for existing residents, new developments and future generations.

The Pines I WWTP was designed as a modular plant so that additional treatment works can be added in stages to service future demand with an ultimate capacity (permitted by resource consent) of 22,000 population equivalents, with disposal to an 80 ha irrigation area. The original plant had a capacity of 6,000 population equivalents.

The Pines II WWTP was completed in March 2013. The plant now has a treatment capacity of nominally 30,000 PE, with the exception of some process units (e.g. inlet screen, grit traps and clarifiers) which have greater capacities.

The treated effluent disposal capacity has been progressively upgraded since completion of the Pines II WWTP. The installation of the Western pivot area has increased the Average daily (m3) flow disposal rate to 123 l/s (accounting for stand down areas), which is equivalent to 42,500PE. The proposal is for future expansion to keep pace with population growth.

Three staged key upgrades have been allowed for in the design: these are Pines 'III', 'IV' and 'V' respectively. However, the upgrades of components with existing excess capacity over the overall plant capacity of 30,000PE could be deferred to the date at which their specific capacities are exceeded. The performance and capacity of the installed Pines II WWTP was completed in February 2016 to determine the scope of works required for the next stage of scheme development. The basis of the assessment included validation of the inflow characteristics and effective capacity of the installed components.

Subsequent to this assessment (which formed the basis of the Pines III WWTP upgrade), further continued monitoring of the Pines WWTP inflow characteristics noted a trending increase in the COD load. Currently, this equates to approximately 15% additional PE within the greater catchment occurring far sooner than anticipated. Based on this COD loading, the plant is currently receiving inflows equivalent to between 35,000 and 40,000 PE. Measures are currently being taken to identify and mitigate COD loads within the greater catchment. An allowance has been made in the timing of treatment elements equivalent to an additional 1,500 PE loading for commercial/industrial contributions.

The WWTP is controlled by a SCADA system with a central PLC controlling the plant functions except for the nominated equipment packages which have individual controllers (inlet works, blowers, UV disinfection, dewatering centrifuges, and solar drying).

The structures of the existing plant were used to form the first stage of the solids treatment stream, converted into aerated sludge digester and gravity thickener prior to transferring of the digested sludge through to the centrifuges. This made use of the existing blowers for the aeration system and used the configuration of the tank to provide the dual purposes of sludge aeration and gravity thickening.

There is significant investment required in the establishment of the redevelopment of the Pines WWTP. Each element within the plant has been considered on basis of design for the expected life of the structures and to meet the criteria of the resource consents obtained. The design life for the civil works is in excess of 50 years and this has been taken into consideration when defining the scope of the design. Also, any future staging at the site is not to compromise the operation of the WWTP, which means that space is to be allowed whether within structures for future mechanical plant, within major pipelines for future flows, or adjacent to facilities for future civil construction.

Also incorporated into the design was process resilience without compromising the capital investment in the plant. The major process elements (inlet/bioreactors/clarifiers/UV) were established with a dual stream process to allow for one bank to be out of operation while still maintaining, at least, ADWF treatment.

The WWTP consists of the following components:

- Liquids Stream
  - Inlet Works:
    - Inlet screening
    - Grit removal
  - Activated sludge bioreactors with biological nitrogen removal (4 stage bardenpho)
  - Clarifiers
  - UV Disinfection
  - Irrigation of treated wastewater onto dedicated land
- Solids Treatment and Handling:
  - Gravity thickening
  - Aerobic digestion
  - Dewatering
  - Solar drying

A diagram of the plant layout is provided below in Figure 5-1.

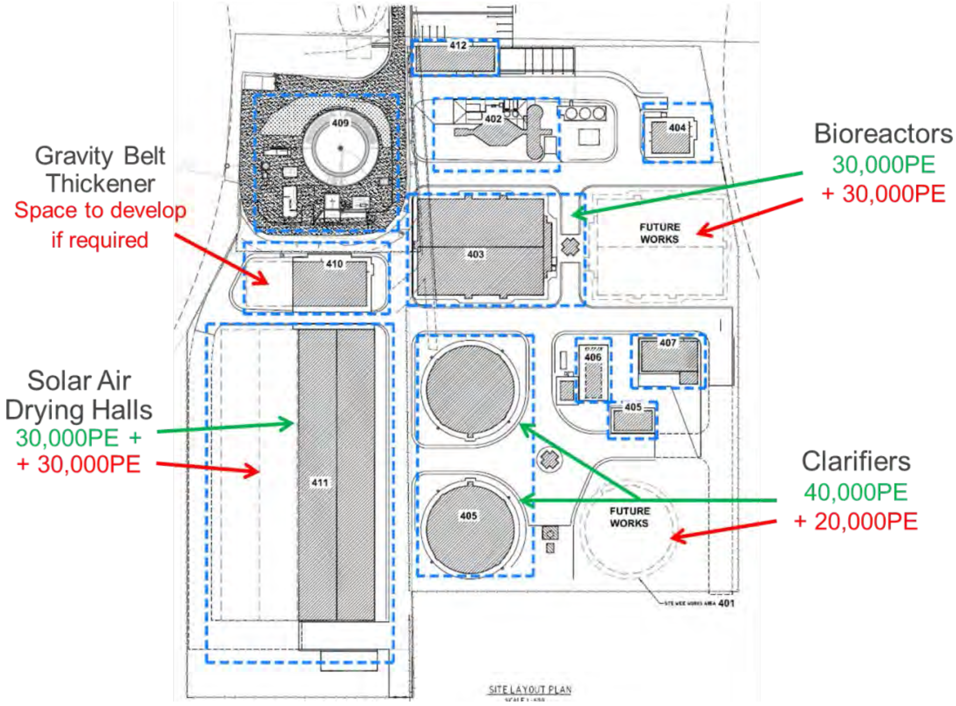


Figure 5-1 Staging at Pines WWTP

The treatment process consistently reduces nitrogen to levels at and below 7mg/l. This does not support strong grass growth, which would assist in water uptake and improve returns on sale of bailage.

The earthquakes from September 2011 onwards have had a minor impact on the condition of the sewerage infrastructure. The Pines I bioreactor suffered minor damage, with repairs taking 10 days to complete.

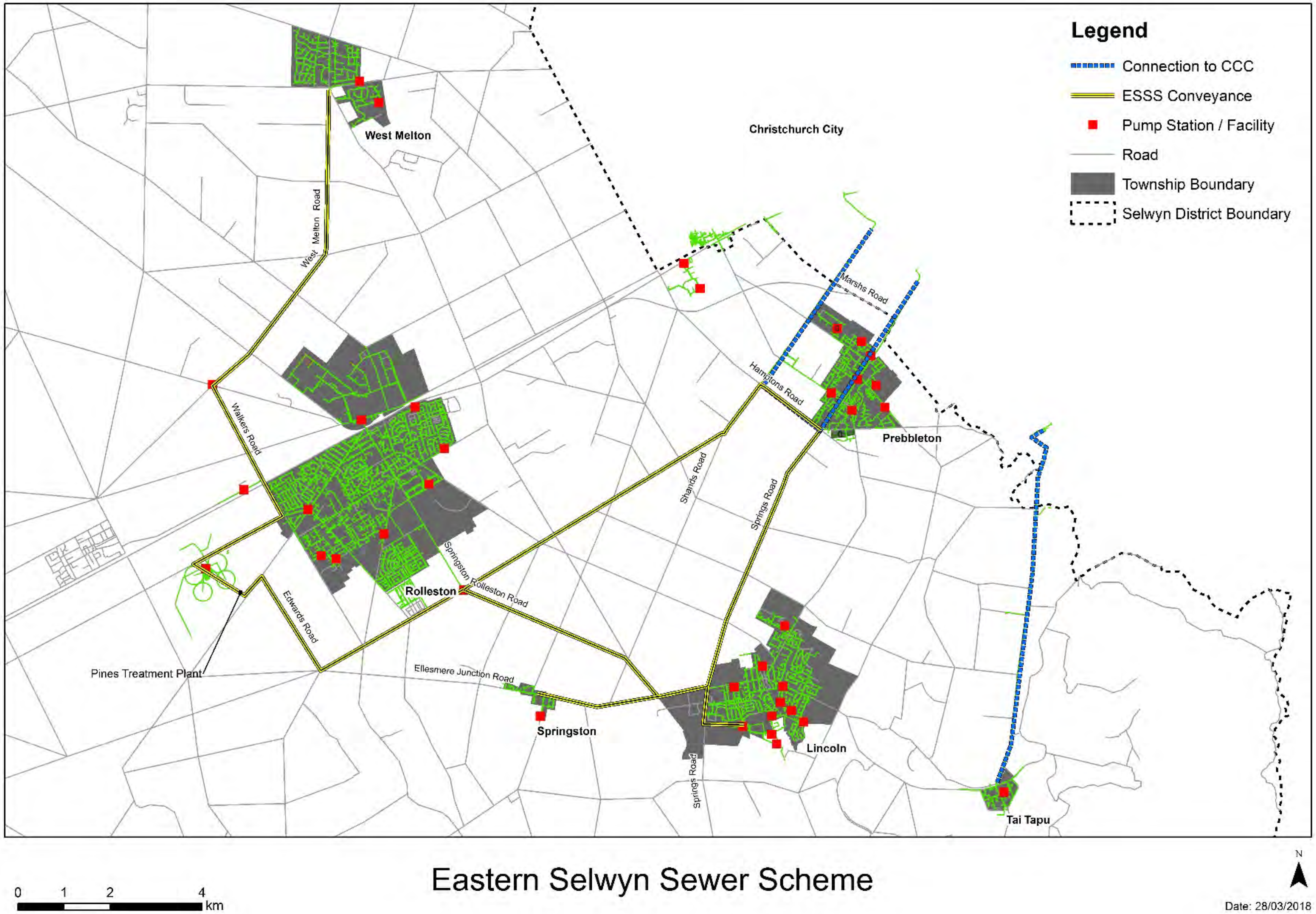


Figure 5-2 Scheme Map

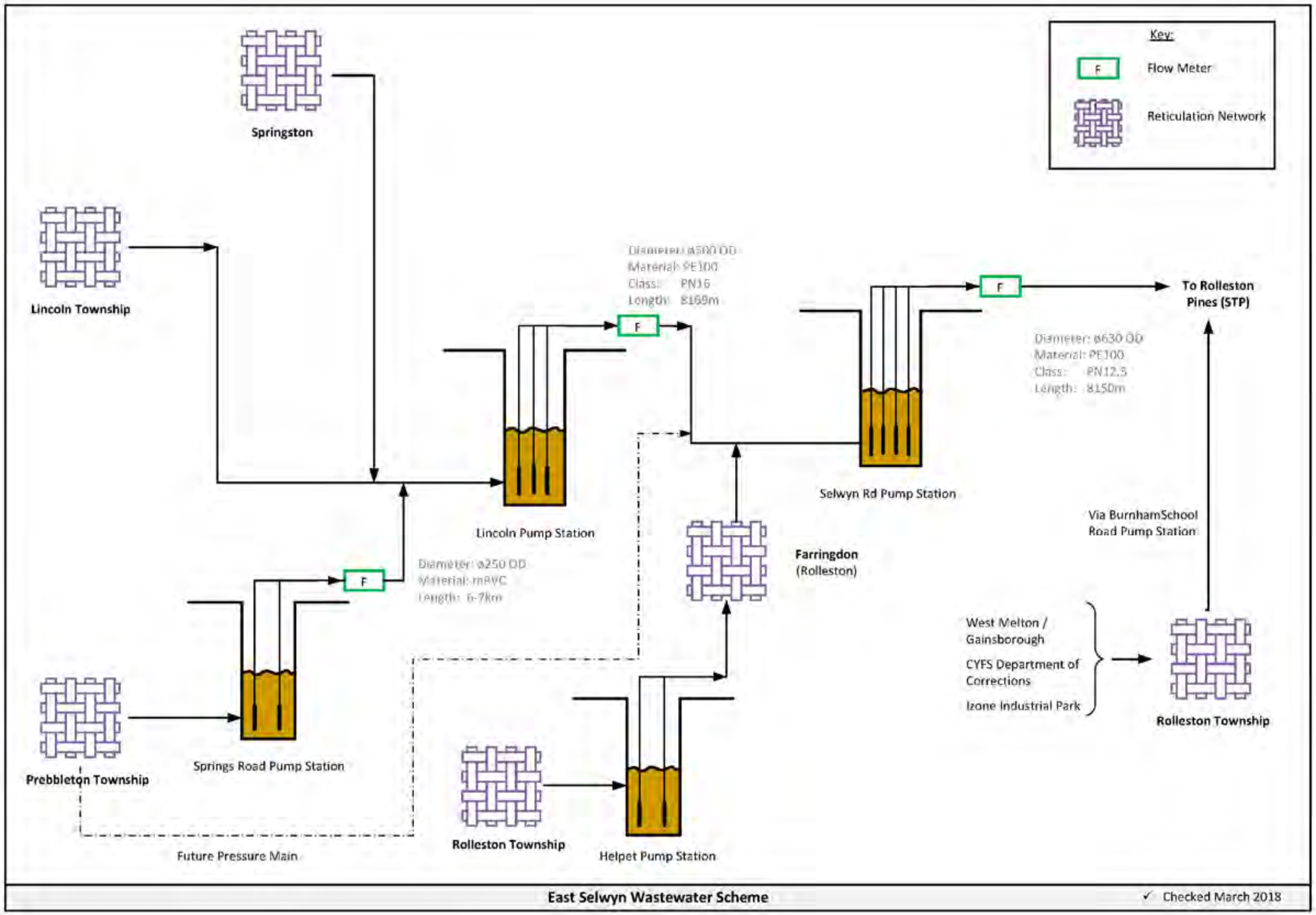


Figure 5-3 Scheme Schematic 1

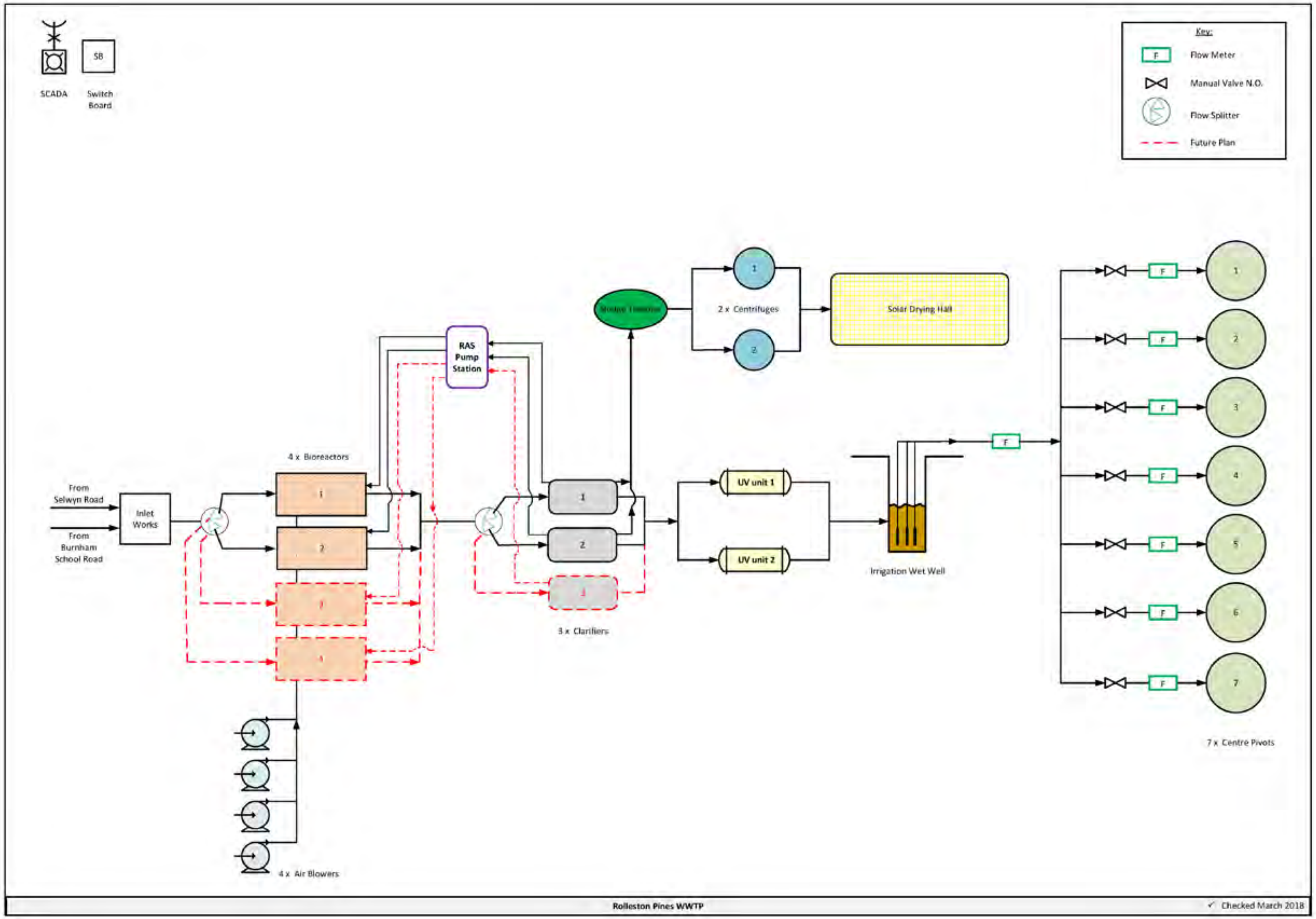


Figure 5-4 Scheme Schematic 2

5.4 System Capacity

The fundamental criterion for the scheme was the ability to dispose of wastewater from a rapidly growing population. There was no spare capacity under the existing discharge agreements with CCC to meet the growth predictions for either Prebbleton or Lincoln. Options to increase the allocation were formally discussed with CCC staff throughout the options development stage and through to completion of the consenting of the irrigation block at the Pines WWTP. Limitations within the downstream network and the timing of future upgrades meant the discharge volumes could not be increased and therefore SDC needed to provide an alternative solution.

Discharge of treated wastewater via waterways was not considered viable due the water quality requirements and the cultural sensitivity of the ultimate receiving environment (Lake Ellesmere / Te Waihora). Therefore, two viable solutions were considered, Land Disposal and Ocean Outfall Disposal.

The projected populations for each of the communities need to be defined to assess the capacity required of the ESSS infrastructure and the timing of any staged development. Where the development of the infrastructure within the individual communities cannot be staged due to the commitments stated under the Land Use Recovery Plan (LURP), the balance of the ESSS (the Pines WWTP and bulk conveyance) can be staged in accordance with the projected growth rates. Population projections have therefore been determined by SDC and provided to us as part of this investigation.

The development of the ESSS was established on the basis of estimated population growth in 2010/11. The population projections were based on an initial rate of growth of 6% in 2013/14, slowing to 1% by 2026, finally arriving at an ultimate population for the ESSS communities of approximately 39,200 in 2041.

The growth projections were revised in 2013 following publication of the LURP.

The growth projections were revised in 2016 and again in 2017, with significant increases: a 10% initial rate slowing to an ultimate rate of 1%, and a residential population of approximately 61,250 by 2046 – a horizon 15 years ahead of the previous projections.

In addition to the residential population growth, an allowance is made to account for industrial and commercial flows. Industrial and commercial growth is assumed to be linear from 2016 until 2048.

Table 5-2 Ultimate Population Equivalent Projection to 2048

Community	Residential Population	Commercial & Industrial Population Equivalent	Population Equivalent
Rolleston/West Melton	36,659	8,415	45,074
Prebbleton	7,386	410	7,796
Lincoln	19,095	2,850	21,945
Total	63,140	11,675	74,815

What can be identified in the following figures is the rapid rate of growth that is being projected over the next five years which has a significant impact on the timing and size of the infrastructure stages for the ESSS.

Table 5-3 below presents the current process capacity, in terms of population equivalent (PE) units and the future capacities based on assumed upgrades (duplication of existing infrastructure).

Table 5-3 Current and Future Unit Process Capacities (PE)

Upgrade	Required by: Date	Required by: PE	Upgraded Capacity (PE)	Cost Estimate
Pines II	Complete			
West Block Irrigation	Complete			
N block irrigation	Complete		30,000	
Pines lll	2017/18	30,000	40,000	$8,100,000
Solar Drying Hall	2018/19	38,000	45,000	$3,100,000
Pines IV	2020/21	45,000	52,500	$5,170,000
Blowers	2022/23	45,000	60,000	$750,000
Pines V	2026/27	52,500	60,000	$4,400,000

An interim upgrade between Pines III and Pines IV is required to increase the capacity of the treatment plant, refer to Table 5-4.

Table 5-4 Interim Component Upgrade

Component	Installed (Pines, IIII) Capacity, PE	Upgrade	Upgrade Capacity, PE
Solar Drying Hall	45,000	Addition of a new solar drying hall (no. 3)	55,000

The Pines IV upgrade (referred in Table 5-4) requires the following components to be constructed or installed at the Pines WWTP site:

Table 5-5 Summary of Pines IV WWTP Component Upgrades

Component	Installed (Pines, IIII) Capacity, PE	Upgrade	Upgrade Capacity, PE
Clarifier No. 3 and RAS Pumps	45,000*	Third of three clarifiers installed	60,000
Digester	30,000		60,000
Irrigation Pump Station and Field Irrigators	40,000	Additional Irrigators / extending irrigation arms	60,000

* Based on combined treatment capacity with installed clarifier/bioreactor components

After the Pines IV upgrade, an interim upgrade will be required. The interim upgrade prior to Pines V is summarised in Table 5-6.

Table 5-6 Interim Component Upgrades (Post Pines IV, pre Pines V)

Component	Installed (Pines, IIII) Capacity, PE	Upgrade	Upgrade Capacity, PE
Blowers	45,000	Replace blowers 1-4	60,000

The Pines V upgrade (referred in Table 5-6) requires the following components to be constructed or installed at the Pines WWTP site:

Table 5-7 Summary of Pines V WWTP Component Upgrades

Component	Installed (Pines, IIII) Capacity, PE	Upgrade	Upgrade Capacity, PE
Bioreactor	52,500	Bioreactor 4 mechanical and electrical installation	60,000
Solar Drying Hall	55,000	Addition of a new solar drying hall (no. 4)	+60,000
Inlet Structure	52,500	Addition of a third inlet screen	60,000

The development of the Izone Business Park has brought an increased diversity to the district in the type of wastewater generated. Such operators as currently known have been incorporated in this assessment. However, should any trade waste user be added to the scheme or any current connection wish to increase their discharge (by volume or contaminant load), then the staging of treatment and wastewater conveyance will need to be reassessed.

Council will have to decide whether the additional trade waste flows can be accommodated within the tolerances of the population projections or, in the event that the projected loads are far in excess of normal residential loading rates, what restrictions may need to be applied. Large, untreated trade waste flows may have a significant effect on the staging of components within the ESSS scheme.

There are a number of steps that can be undertaken to improve the treatment process and/or reduce operational costs:

- Reduce peak influent flows – managing incoming peak flows
- Blower control – control blowers based on influent loading (s::can probe) values;
- DO setpoints – reduce the DO setpoints to reduce airflow requirements and improve transfer efficiency;
- A-recycle ratios – reduce pumping power requirements,
- RAS recycle ratios – reduce pumping power requirements and thereby improve performance of anaerobic selector.

5.5 Resource Consents

The ESSS has a number of resource consents. Table 5-8 shows the discharge permitted by the resource consents for this scheme.

Table 5-8 Resource Consents

Consent	Description	Location	Date Issued	Expiry Date	Quantities (m3/day)
CRC040100.1 *Issued - Active*	To discharge contaminants to air from the treatment of raw sewage and sludges.	Burnham School Road, ROLLESTON	21-Dec-10	15-Dec-38	
CRC131423 *Issued - Active*	To discharge contaminants to land	Burnham School Road, ROLLESTON	19-Jun-13	20-Dec-38	7760
CRC101111 *Issued - Active*	To store contaminants.	Burnham School Road, Main South Road & Brookside Road, ROLLESTON	21-Dec-10	17-Dec-45	
CRC060964 Issued - Active	To discharge domestic sewage tank effluent into ground	Burnham School Road, ROLLESTON	28-Sep-05		
CRC153952 *Issued - Active*	To discharge contaminants to land and to air	Burnham School Road, Main South Road & Brookside Road, Rolleston	6-Mar-15	17-Dec-45	TBC

5.6 Scheme Assets

The configuration of the scheme was developed to be aligned with the expected growth within the communities and to incorporate the existing wastewater infrastructure. The configuration of the scheme is shown in Figure 5-5 below.

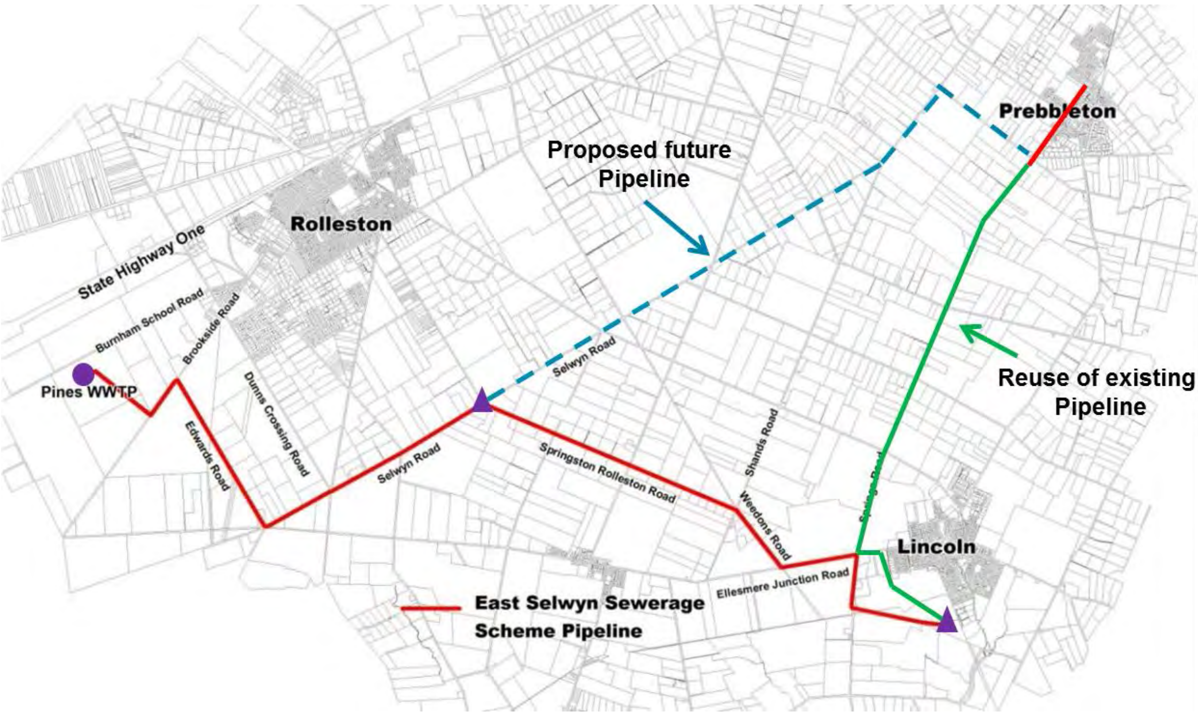


Figure 5-5 Configuration of the ESSS

5.6.1 Reticulation Overview

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

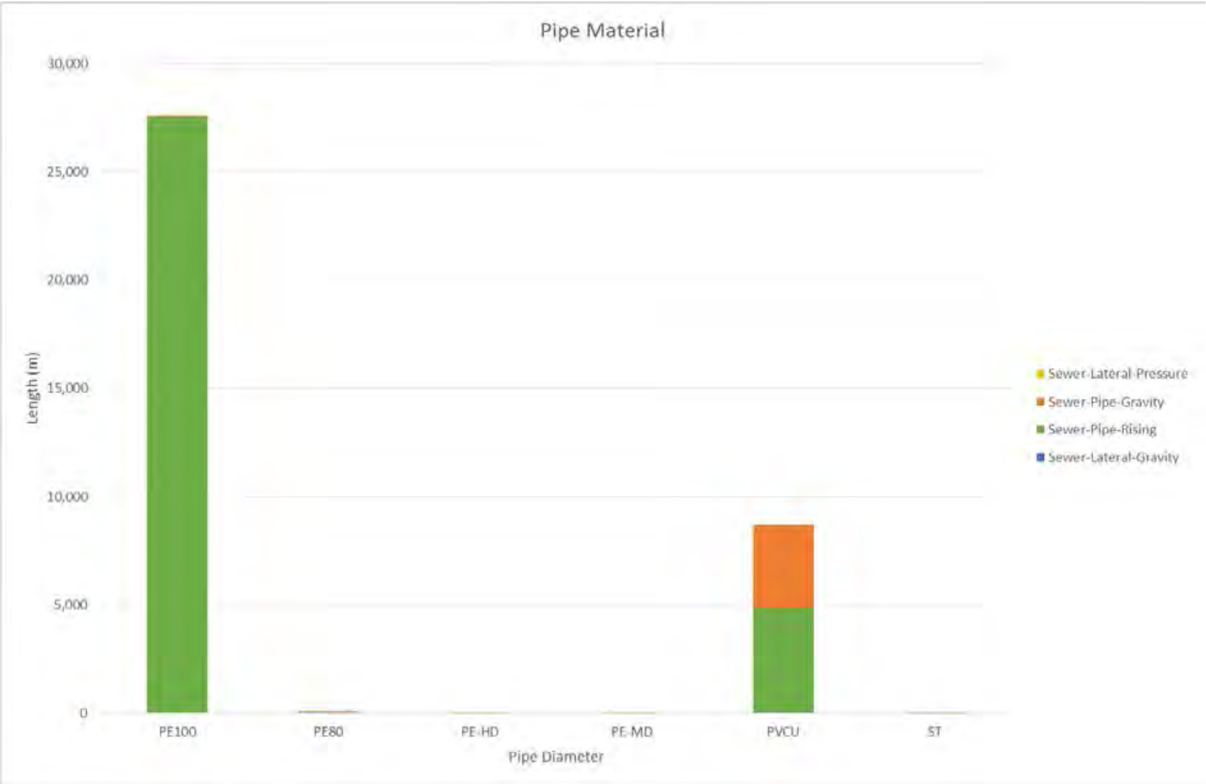


Figure 5-6 Pipe Material – Eastern Selwyn Sewerage Scheme

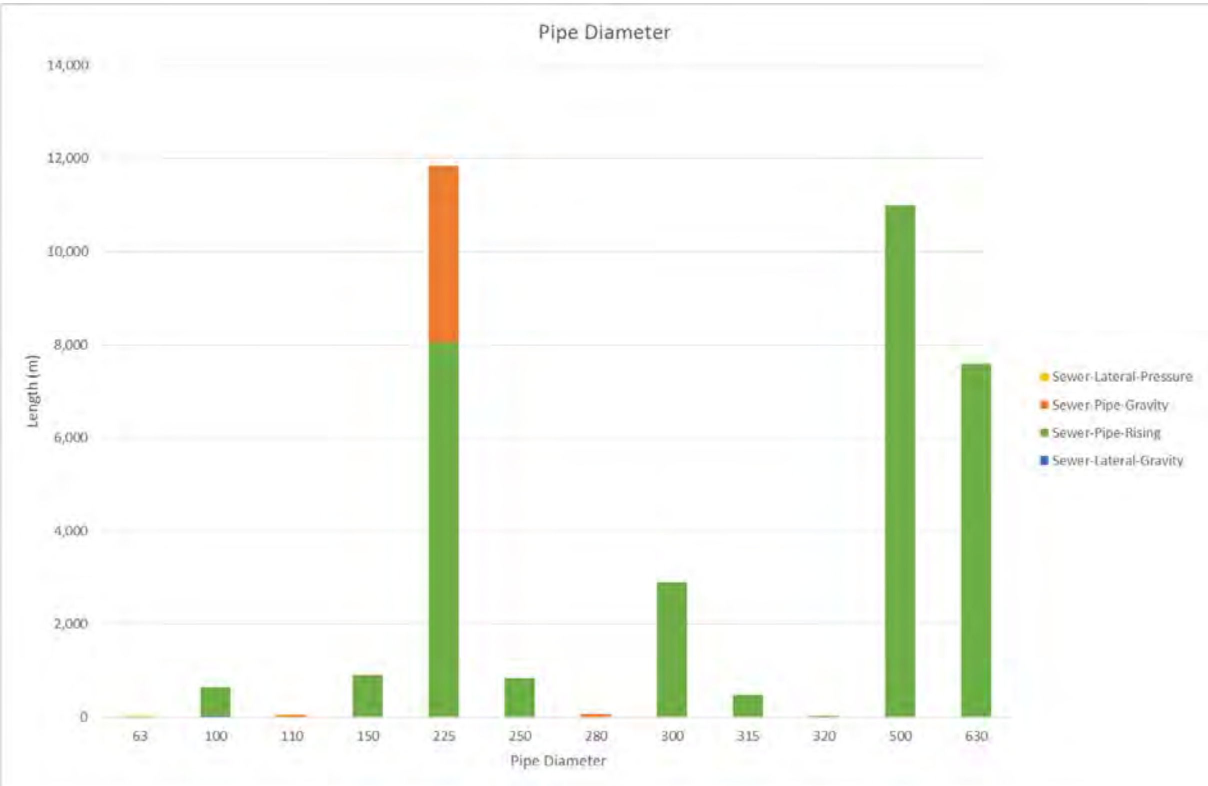


Figure 5-7 Pipe Diameter – Eastern Selwyn Sewerage Scheme

5.6.2 Treatment and Disposal

Liquid Stream

The liquid stream treatment consists of two 4-stage, activated sludge, biological nutrient removal (BNR) reactors with anaerobic selectors. Wastewater enters the inlet works and passes through screening and grit removal before entering into the anaerobic selector and mixing with the return activated sludge (RAS) from the clarifiers. The activated sludge then moves into the first anoxic zones where recycled nitrate is converted into nitrogen gas and released from the process (denitrification). The activated sludge is then aerated: organics are broken down by the microorganisms in the biomass and converted into additional biomass, carbon dioxide and water; ammonia is converted into nitrates (nitrification). A second denitrification step then removes more nitrogen before the activated sludge is re-aerated and sent to clarification.

The activated sludge biomass from both bioreactors is combined before being sent to two clarifiers.

Sludge enters in the centre of the clarifiers and is allowed to settle to the bottom of the clarifier while a slowly rotating scraper moves settled solids to the centre pump-well where they are returned as RAS to the front of the BNR reactors. The clarified and treated wastewater overflows into clarifier launders where it is then collected and passed through an ultra-violet (UV) treatment reactor for disinfection. The disinfected treated wastewater is then stored in the irrigation wet well before being sprayed by pivot irrigators onto the irrigation fields.

Inlet Works

The influent wastewater is pumped via community based pumping stations into a reception chamber and it then flows into screening channels. Two screening channels operate in duty/assist. A third channel exists for installation of a future screen. An emergency bypass channel with a high level overflow entry weir and manually raked bar screen is available if there is a complete failure of the inlet screens. The screens are automatically cleaned and the screenings washed and compacted, and then stored in a covered screenings skip/bin.

Screened wastewater then flows to one of two vortex grit chambers. The grit is settled in the grit hopper at the bottom of the chamber and periodically pumped out and delivered to the grit classifier for washing and dewatering. Dewatered grit is stored in a covered grit skip/bin.

Secondary Treatment

The screened and degritted wastewater from the inlet works, under normal operation, is evenly split between two activated sludge bioreactors which operate in parallel. The flow splitter includes overflow weirs and connections for the future third and fourth bioreactors. The bioreactors comprise anoxic and aerobic zones and provide BOD and nitrogen removal.

The mixed liquor from the bioreactors flows to the clarifiers where the suspended solids are separated and pumped back to the inlet of the bioreactors. Surface scum is automatically removed from the surface of the clarifiers. Clarified water overflows the vee-notch weir and gravitates to the Ultra Violet (UV) disinfection system and irrigation pump station.

Tertiary Treatment

The UV disinfection plant reduces pathogens via inactivation by UV light. The treated wastewater then flows into the irrigation pump station and is pumped to centre pivot irrigators for disposal to land.

Irrigation areas are provided below in (Ha).

CP1	CP2	CP3	CP4	CP5	CP6	CP7
12.19	12.19	12.67	12.57	15.62	15.62	116.76

Solids Stream

To control the biomass inventory of the BNR process it is necessary to remove the surplus activated sludge generated by the biological processes. Waste Activated Sludge (WAS) pumps send a fraction of the biomass through to the gravity thickener where the solids are thickened.

In the thickener, solids settle to the bottom and are intermittently pumped to the digester. Supernatant from the thickener is then collected and pumped back to the inlet works for further treatment via the supernatant pump station.

The digester is broken down into four-stages that have alternating unaerated/aerated cycles. Volatile solids are further broken down as they pass through the digester.

The centrifuge receives the digested sludge, and dewaters it further with the liquid centrate being recycled back to the inlet works for further treatment.

The dewatered solids are taken via conveyor to the solar drying halls where automated sludge managers shift and till the sludge around the hall allowing it to dry out within the glass -house environs.

A large portion of the operating cost of the original Pines WwTP was the handling and disposal of sludge. The waste sludge was carted off from the site and disposed of. The intention of the solids stream is to substantially reduce the volume of material that is required to be taken from the site. Part of this process is the thickening of the sludge through the sludge digester and dewatering via the centrifuges. An addition to these elements is a solar air drying hall into which the sludge at approximately 18% dry solids is placed and then turned over slowly by an automated process.

Sludge Stabilisation

Waste Activated Sludge (WAS) is removed from the bioreactors to maintain a target Solids Retention Time (SRT) of 10 to 15 days in the bioreactors. WAS is pumped from the bioreactors into a Gravity Thickener (GT) where it settles to between 1.0 and 1.5% Dry Solids (DS). The thickened WAS (TWAS) is periodically pumped from the bottom of the GT into the inlet of the Aerobic Digester (AD). Supernatant from the GT flows over the vee-notch weir and then by gravity to the supernatant pump station, which returns the supernatant to the inlet works for treatment.

The TWAS is stabilised in the AD over 8 to 10 days. The AD provides volatile solids destruction and nitrogen removal. Alternating aeration and mixing is used to provide aerobic and anoxic conditions for nitrogen reduction.

Solids Dewatering

The digested TWAS is transferred to the centrifuge feed tank. The centrifuge feed pumps draws from the feed tank into one of two centrifuges, where the digested TWAS (biosolids) is dewatered to between 18 and 20%DS. Centrate from this process is collected and pumped to the inlet works for treatment.

Solids Drying

Dewatered biosolids is transferred to the solar drying halls via screw conveyors. Once in the drying halls, the dewatered biosolids is automatically turned and transported along the length of the structure. The two solar halls operate in parallel and further stabilise and dry the biosolids as it moves through the hall. Dried biosolids is manually loaded into trucks for disposal off site.

The drying hall makes the best use of the natural climate in Canterbury to increase the moisture removal rate, provide a residence time for the removal of pathogens, and minimise the volume to be removed from site. A 70% dry solids content is targeted as an output of this process, providing a significant decrease in the volumes of biosolids to be removed from site. The surrounding land has been consented for the disposal of Grade Aa biosolids. Testing will prove whether the pathogen and metal content of the biosolids can achieve this standard. If so, further savings will be made with disposal on adjacent pasture land.

5.6.3 Design

The civil and mechanical infrastructure for the ESSS was designed to international best practice and to New Zealand engineering design guidelines/standards. Design for the civil structures at the Pines WwTP and for the Allendale Lane and Selwyn Road Pump Stations was underway at the time of the February 2011 Canterbury Earthquake. The structural designs were revised prior to issuing of tender documentation to be compliant with the new engineering code of practice for seismic design in the Canterbury area.

The civil and mechanical plant items, including the irrigation disposal areas, have been built or planned to the built to meet the design flows and loads in Table 5-9, to meet the treated wastewater quality parameters as consented and as summarised in Table 5-10.

Table 5-9 Design Flows and Loads for Pines WwTP

Upgrade Staging	Unit	Pines II	Pines III	Pines IV
Design Population	PE	30,000	45,000	60,000
Flow:				
ADWF	m3/d	7,150	10,830	14,580
PDWF	L/s	175	265	355
MDF	m3/d	17,160	25,990	34,990
PIF	L/s	250	375	510
Design (Incl. Recycles)	L/s	350	450	610
Pipe Flushing Flow	L/s	310	310	310
Load:				
COD	kg/d	3,940	5,100	7,796
BOD	kg/d	1,970	2,550	3,898
TSS	kg/d	2,120	2,750	4,204
TKN	kg/d	390	510	780

Table 5-10 Treated Wastewater Quality Parameters for Pines WwTP

Parameter	Median*	95th Percentile*
Biochemical Oxygen Demand (BOD)	15	60
Suspended Solids	20	90

Total Nitrogen	7	35
Faecal Coliforms (cfu/100ml)	500	1,000

*All values are expressed in grams per cubic meter, except faecal coliforms which are expressed colony forming units per 100 milliliters.

These can be compared to the original design flows and loads for Pines II of

- Average Dry Weather Flow (ADWF) 7,150 m^3/d;
- TSS load 2,120 kg/d; and
- COD load 3,940 kg/d.

Both TSS and COD are measured by spectrolyser located at the inlet works (shown in Figure 5-8), it should be noted that this does include loadings from recycle streams and this is discussed later. The nitrogen load to the plant is not currently measured.

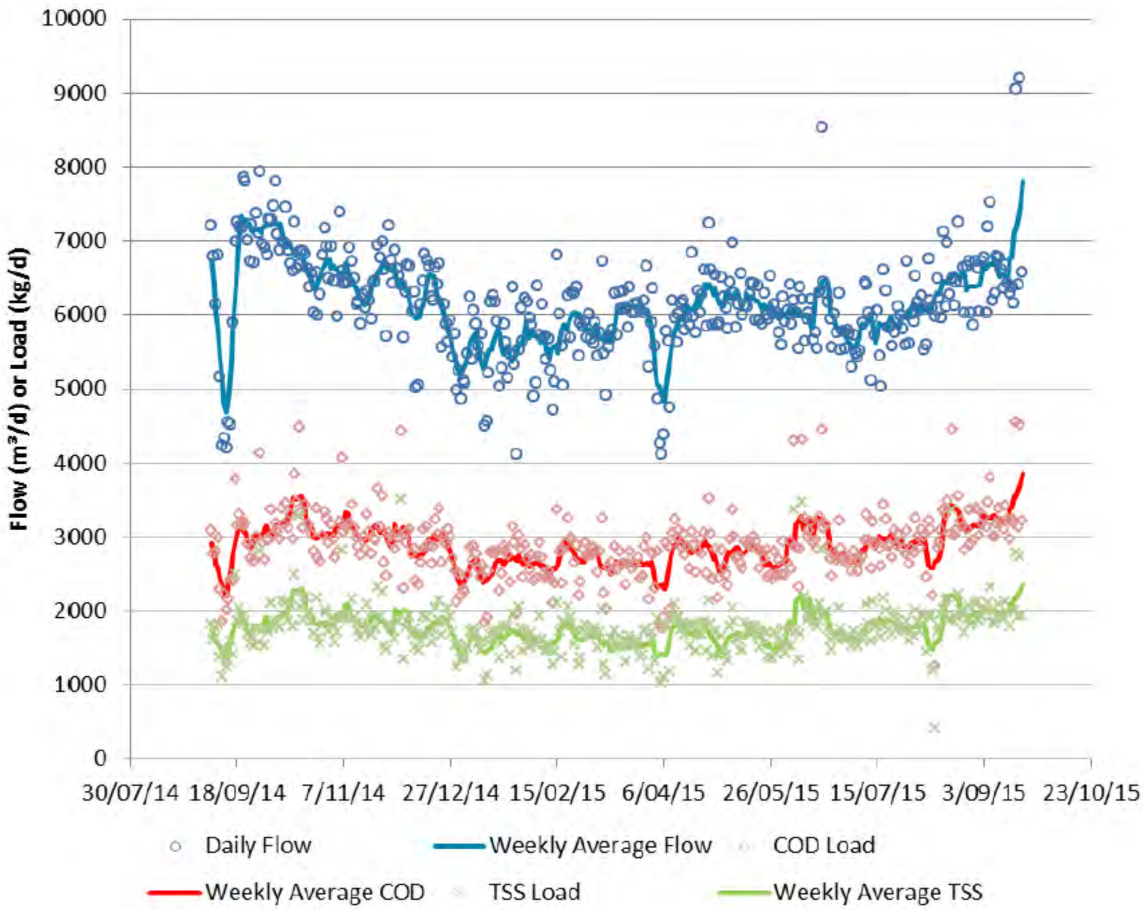


Figure 5-8 Pines II – Influent Flow and Load

Table 5-11 Designs Flows and Loads

Upgrade Staging	Unit	Pines II	Pines II+	Pines III	Pines IV
Design Population	PE	30,000	40,000	45,000	60,000
Flow:					
ADWF	m^3/d	7,150	9,600	10,830	14,580
PDWF (2.0 PF)	L/s	175	235	265	355
MDF(2.5 PF)	m^3/d	17,160	23,050	25,990	34,990
PIF (3.0 PF)	L/s	250	335	375	510
Pipe Flushing Flow	L/s	310	310	310	310
Load:					
COD	kg/d	3,940	4,710	5,100	7,796
BOD	kg/d	1,970	2,360	2,550	3,898
TSS	kg/d	2,120	2,540	2,750	4,204
TKN	kg/d	390	470	510	780

Population equivalent (PE) loading of these historical flows and loads has been assessed through use of standard per capita loading rates. Figure 5-9 shows the in 2014-2015 the plant serviced the equivalent of 20,000 to 30,000 PE. There appears to be a seasonal trend to this which increases at the start of spring and is likely related to the operation of the Westland dairy factory and their discharge to the WWTP.

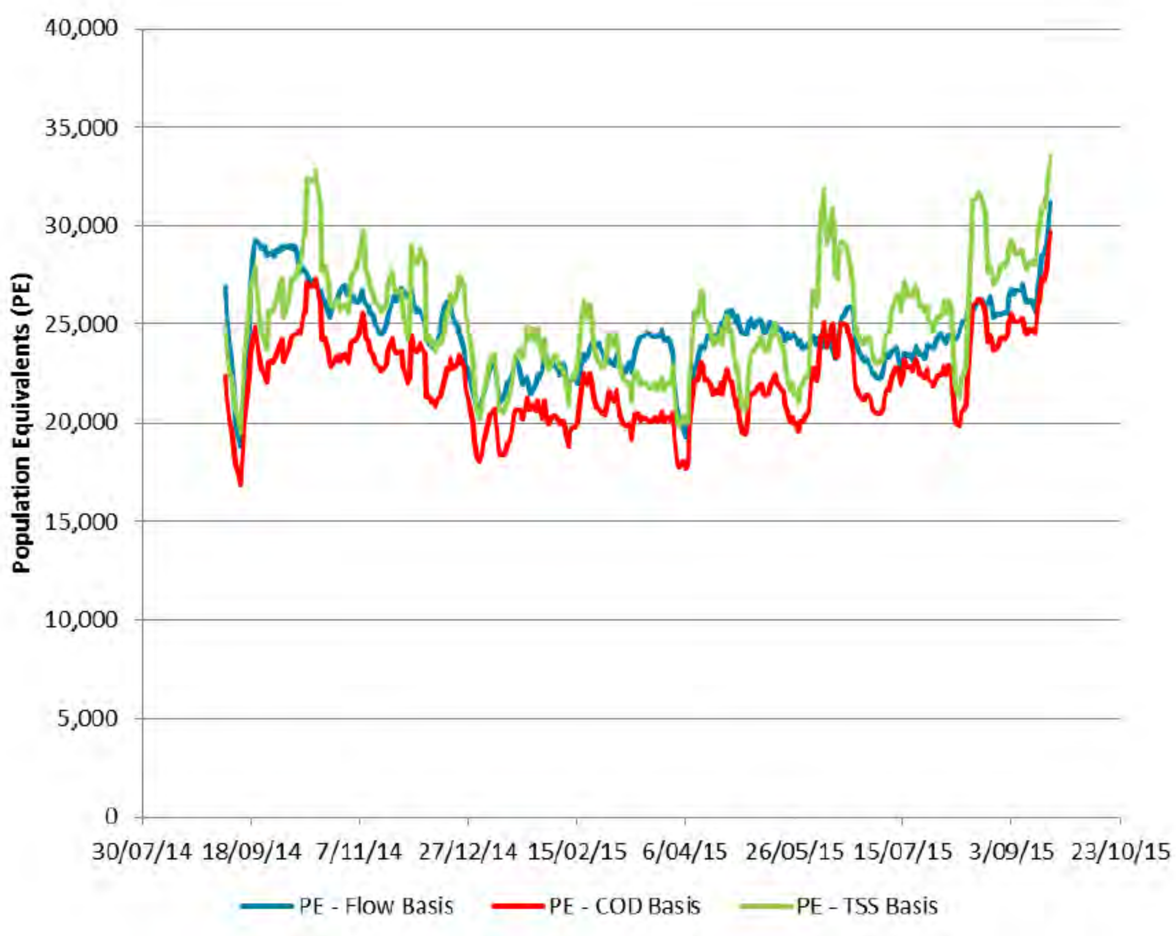


Figure 5-9 Pines II – Population Equivalents Serviced

The ESSS pump stations (at Allendale Lane, Selwyn Road and Burnham School Road) have been designed to allow incremental increase in design flows to meet the growth of the communities. The staged design flow development of the ESSS pump stations is outlined in Table 5-12. The ultimate configuration will be the direct connection of the Prebbleton pump station to the Selwyn Road pump station, however the interim measure is currently in place with the existing pipeline to Lincoln being used before on pumping to Selwyn Road.

Table 5-12 Design Flows and Loads for ESSS Pump Stations

Conveyance System	2026 Design Flow (l/s)	2041 Design Flow (l/s)
Prebbleton via Lincoln		
Prebbleton to Allendale Lane	40.0*	40.0*
Allendale Lane to Selwyn Road	129	158
Selwyn Road to Pines WWTP	262	311

Prebbleton direct to Selwyn Road PS		
Prebbleton to Selwyn Road	64	58
Allendale Lane to Selwyn Road	89	121
Selwyn Road to Pines WWTP	286	333

*Defined design capacity of the pipeline from Prebbleton to Lincoln. This would require balanced flows from Prebbleton

5.6.4 Pump Stations

Each of the pump stations within the ESSS has been designed to meet the incoming flows and the expected quality of influent. This means that the infrastructure has been designed with the possibility of septic sewage within the conveyance mains and material selected for construction accordingly. At each of the main pump stations sites odour treatment units with positive air displacement have been installed.

Allendale Lane Pump Station

Allendale Lane PS has an existing pump capacity of 165l/s. The design capacity of the pump station is defined by the maximum day average flow rates where the peak flows are stored within the basins on site.

Prebbleton's wastewater will need to be diverted to Selwyn Road pump station before the pump capacity at Allendale Lane is exceeded. This necessitates a new pump station in Prebbleton connecting to the new rising main to Selwyn Road.

Thereafter, Allendale Lane PS's pump capacity of 165l/s is expected to meet the incoming flows from the Lincoln community to beyond 2060.

Possible upgrades to provide further pumping capacity include additional pumps, replacement higher duty pumps, additional storage and/or changes to the operational regime in order to provide attenuation and reduce the reliance on peak pumping capacity equalling or exceeding peak inflow.

The DN500 HDPE pipeline has an ultimate capacity of 200l/s. This is not expected to be exceeded before 2060. If the design philosophy is altered to pump peak flows then the capacity of the pipeline would be expected to be exceeded before 2049/50.

Selwyn Road Pump Station

Selwyn Road pump station has an existing pump capacity of 335l/s. According to growth projections this is expected to be exceeded before 2041.

Possible upgrades at that time will include additional pumps, replacement higher duty pumps, additional storage and changes to the operating philosophy.

The DN630 HDPE pipeline has an ultimate capacity of 445l/s. This is expected to be exceeded after 2060.

Possible upgrades thereafter include additional pipeline capacity, additional pump station storage, and changes to the operating philosophy.

Pump stations where the standby / assist pump is predicted to start have been highlighted in yellow and red for those that experience a peak wet weather response.

Yellow Pumps are can convey the peak flow without backing up the system

Red Pumps are unable to convey the peak flow causing the system to back up

Table 5-13 Pump Station Overview

Site Name	Wet well dimensions	No of pumps	Pump curve used	Recorded instantaneous pump rate (L/s)	Model Pump Rate (L/s)	ADWF (L/s)	PDWF (L/s)	PWWF 1 in 5 year ARI (L/s)
ESSS (S) Allendale Ln PS	8000 x 5000	3	Grundfos S2.100.200.160 0.4.70.H.C.430 GND	165	150	23.7	173.0	223.4
ESSS (S) Burnham School Rd PS	3500 x 3000	3	Flygt 3202 180 HT450	93	94	6.1	13.1	13.1
ESSS (S) Selwyn Rd PS	9000 x 7000	4	Grundfos S2.110.200.160 0.4.70.M.C.441. GND	240	244	48.3	217.7	253.5

Table 5-14 Pump Station Storage Time Analysis

Pump Station	Hours until HLA reached*	Hours until first spill	Spill Location - AMS ID
ESSS (S) Allendale Ln PS	0.9	1.0	610420
ESSS (S) Burnham School Rd PS	6.7	8.2	547609
ESSS (S) Selwyn Rd PS	1.4	1.5	621237

*This does not include offline, installed catchment storage such as the Helpet and Lincoln pond emergency storage basins

5.6.5 Rising Mains

Table 5-15 Rising Main Overview

Pump Station	Town	Total Length (m)	Total Volume (m3)	ADWF (L/s)	Uphill Retention Time (hours)	Drain Time (hours)	Total Time (hours)	Model Max Pressure (kPa)	SCADA Max Pressure (kPa)
ESSS (S) Allendale Ln PS	Lincoln	8,166	1,062.0	23.7	12.4	0.0	12.4	555	500
ESSS (S) Burnham School Rd PS	Rolleston	2,896	183.3	6.1*	3.5	0.0	3.5	340	130 - 240

ESSS (S) Selwyn Rd PS	Rolleston	7,696	1,735.0	48.3	10.0	0.0	10.0	395	335 - 360

5.7 Operational Management

The wastewater schemes are operated and maintained under the maintenance contract 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.

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

5.8 Photos of Main Assets

Photo 1: Pines WWTP (Rolleston)

Photo 2: Allendale Lane PS (Lincoln)

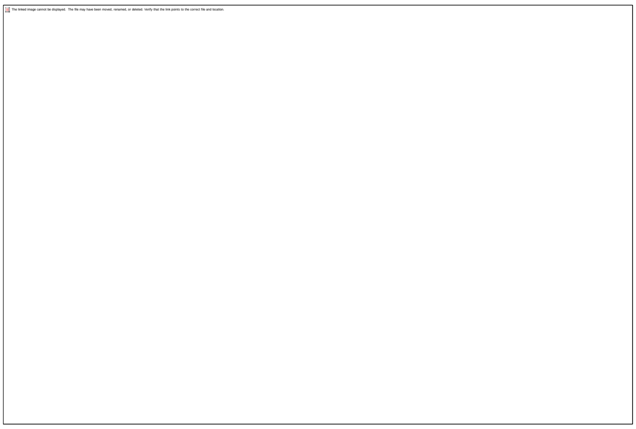


Photo 3: Selwyn Road PS (Rolleston)

5.9 Risk Assessment

A risk assessment has been undertaken for the ESSS. 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 5-16 details the risk priority rating, Table 5-17 outlines the risks and the list of key projects is found in Table 5-22.

Table 5-16 Risk Priority Rating

Risk Score	Level of Risk	Risk Response
> 50	Extreme	Awareness of the event to be reported to Council. Urgent action to eliminate / mitigate / manage the risk. 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. Immediate action required to eliminate / mitigate / manage the risk. Document risk and action in the AMP.

Table 5-17 Risks – Eastern Selwyn Sewerage Scheme

Risk	Action/Project	Year Identified	2014 Risk Rating	2017 Risk Rating	Residual Risk Rating
Non-consented activities	Renewal of consents	2014	27	27	6
Inadequate septage facilities	Provide septage facilities	2017		27	4
Plant capacity inadequate	Irrigation Pump	2017		20	6
Irrigation Pump H&S	Irrigation Pump gantry	2017		45	6
Lincoln pond odour risk	Lincoln pond aeration	2017		4	4
Complex network is not run with efficiency	Develop hydraulic models to optimise operation, renewals and criticality assessment	2014	12	2.1	2.1
Disposal capacity via current irrigators is exceeded	Upgrade no. 5&6 central pivots (extend 150m)	2014	27	27	2.1
New treatment plant does not meet design criteria	Review plant operations	2014	27	27	2.1
Sewage generating gases and potential for odour within pressure mains	Review adequacy of odour control	2014	27	27	2.1

Sludge does not meet AA grade for disposal onsite	Install a sludge blending facility to mix organic waste from recovery park	2014	27	27	45

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

5.10 Asset Valuation Details

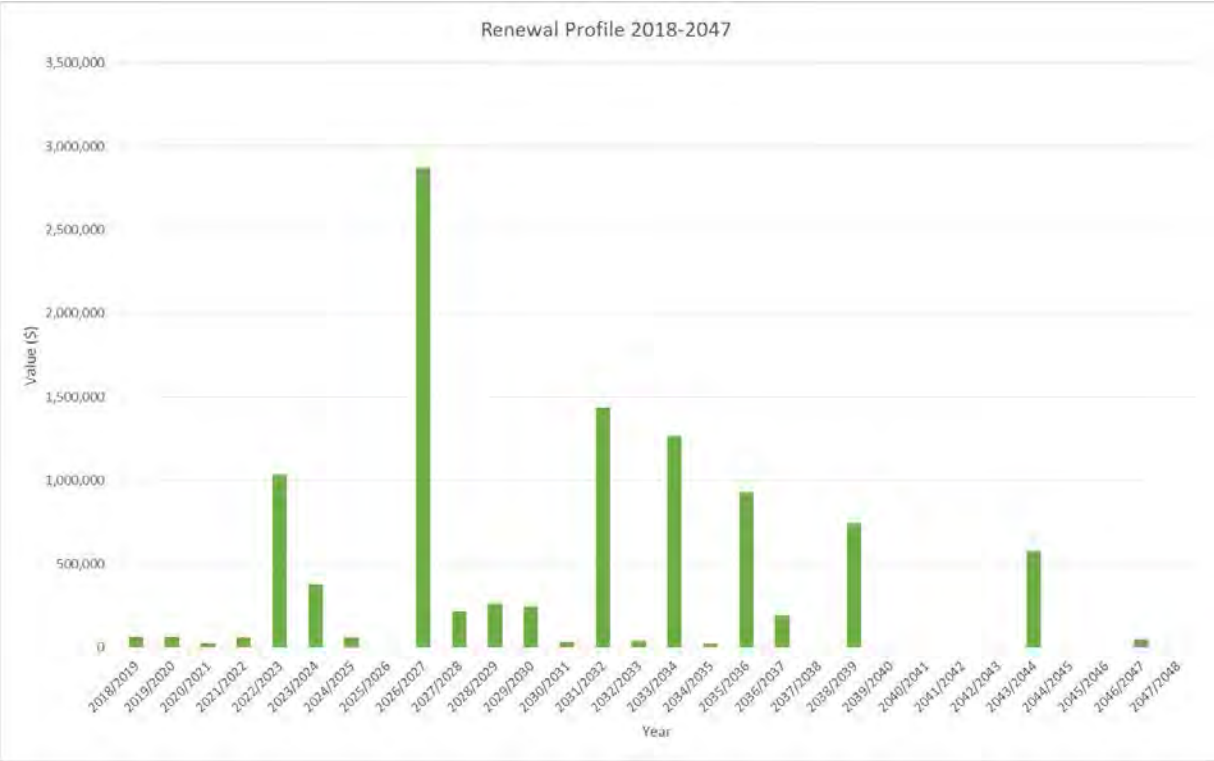
The total replacement value of assets within the Eastern Selwyn Sewerage Scheme is $59,560,344.80 as detailed in Table 5-18 below.

Table 5-18 Replacement Value, Eastern Selwyn

Asset Class 1	Sum of Replacement Value
ESSS Pump Stations	
Pines II Wastewater Treatment Plant	
Wastewater Reticulation and Pines I	

5.11 Renewals

The renewal profile has been taken from the 2017 5 Waters Valuation.



5.12 Critical Assets

The criticality model for ESSS 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 5-19 and Figure 5-10 below shows the calculated criticality for all of the assets within this scheme that have a recorded known length.

Table 5-19 Length of Assets per Criticality Level

Criticality Bands		Length (m)
5	Low	1,644
4	Medium-Low	10,838
3	Medium	626
2	Medium-High	4,085
1	High	18,685

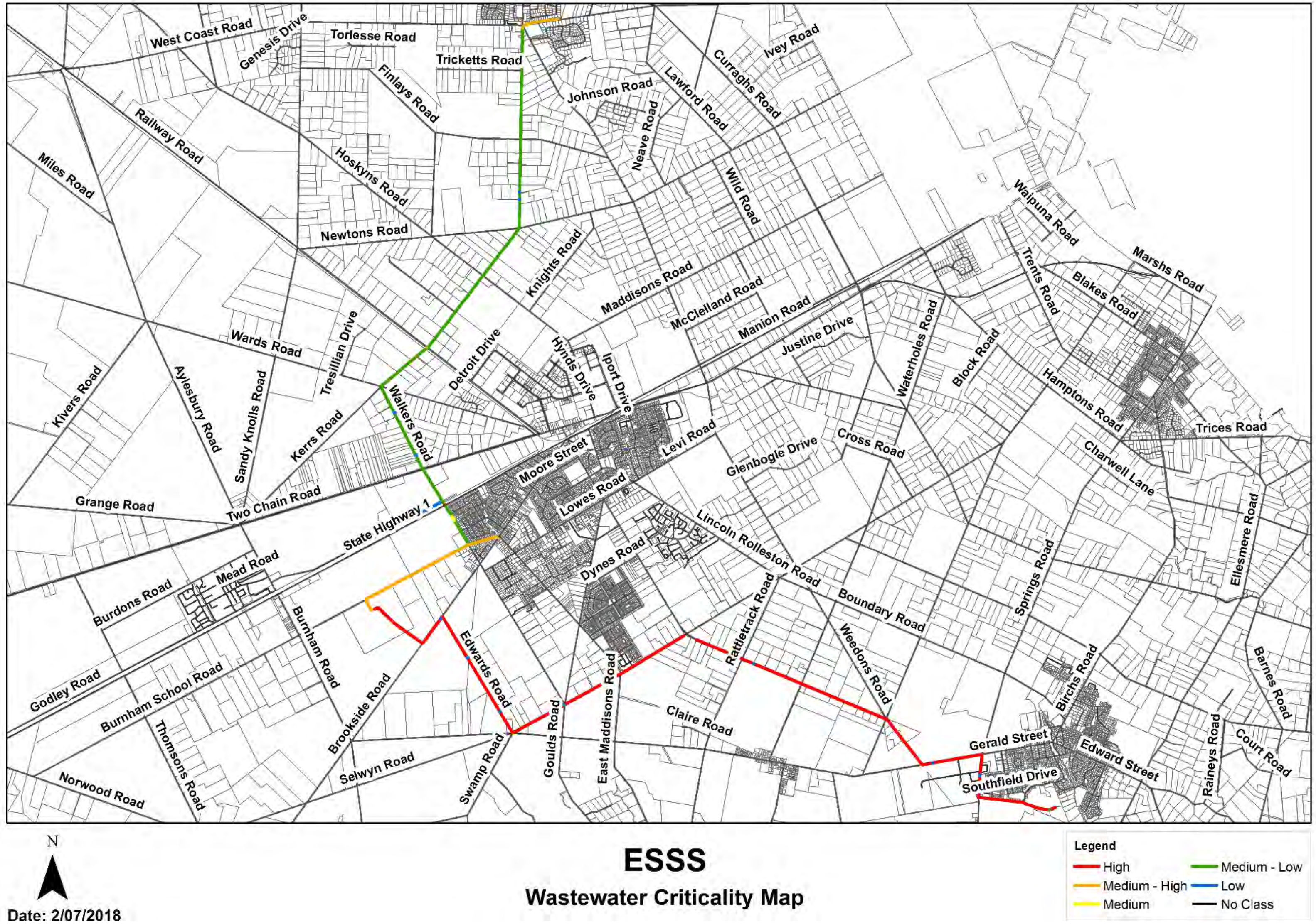


Figure 5-10 Criticality Map

5.13 Asset Condition

The asset condition model was run for Eastern Selwyn Sewerage Scheme in 2017. The methodology of the model can be found in 5Waters Activity Management Plan: Volume 1 and it provides details of how the model has been calculated for the reticulation assets (particularly pipes). Figure 5-11 below shows the level of asset condition for all of the assets within this scheme that have a recorded known condition.

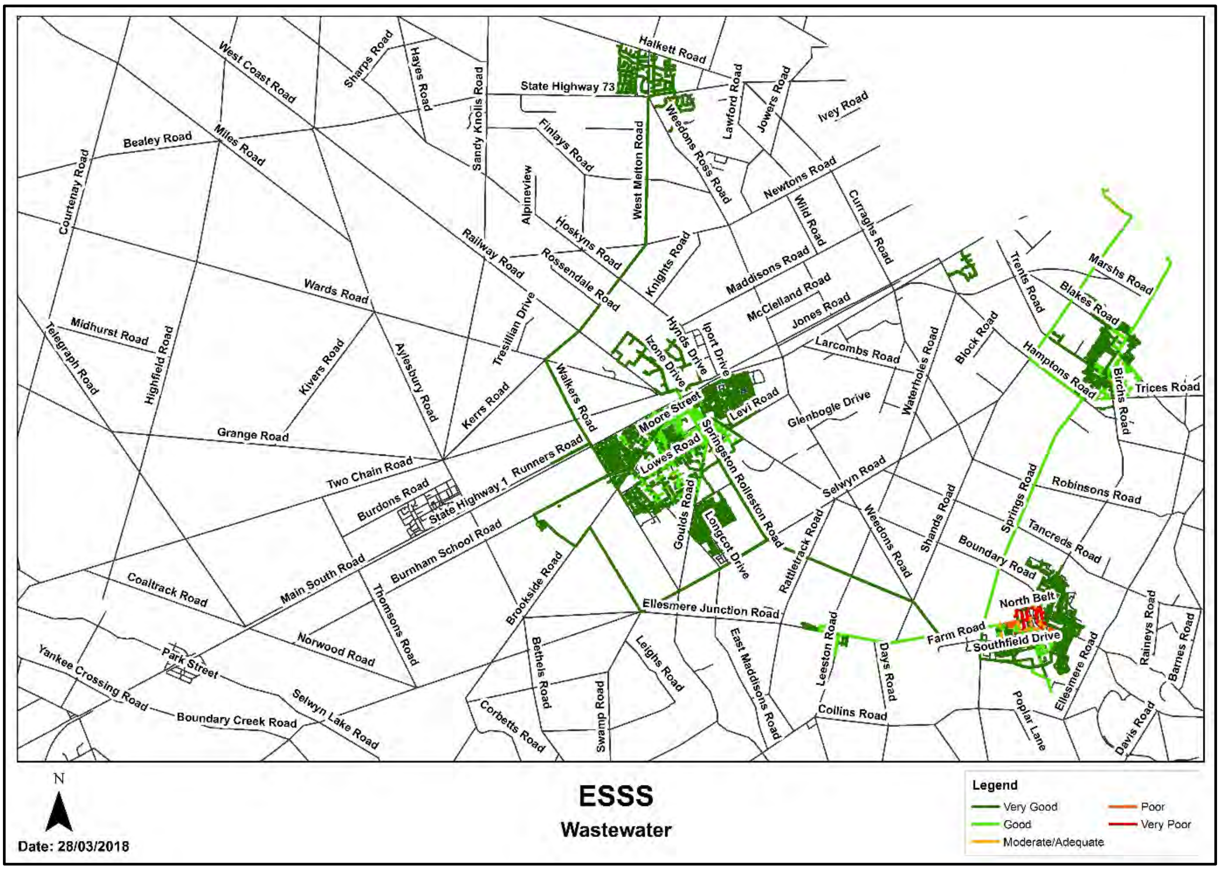


Figure 5-11 Asset Condition – Eastern Selwyn Sewerage Scheme

Table 5-20 provides a description of the condition rating used within the condition model.

Table 5-20 Asset Condition Grading

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

5.14 Funding Program

The 10 year budgets for ESSS are shown by Table 5-21 and Figure 5-12. 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 5-21 Eastern Selwyn Sewerage Budget Summary

Years	Expenditure	Renewals	Projects	Capital Projects
2018/2019	$1,812,970	$65,343	$10,000	$3,870,000
2019/2020	$1,860,636	$65,768	$30,000	$2,450,000
2020/2021	$1,906,740	$27,152	$10,000	$5,520,000
2021/2022	$1,951,468	$61,420	$10,000	$100,000
2022/2023	$1,994,973	$1,038,205	$30,000	$1,250,000
2023/2024	$2,014,309	$379,196	$10,000	
2024/2025	$2,033,432	$62,188	$10,000	
2025/2026	$2,052,354	$3,836	$30,000	
2026/2027	$2,071,083	$2,872,143	$10,000	$4,400,000
2027/2028	$2,089,627	$221,400	$10,000	
Total	$19,787,592	$4,796,652	$160,000	$17,590,000

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.

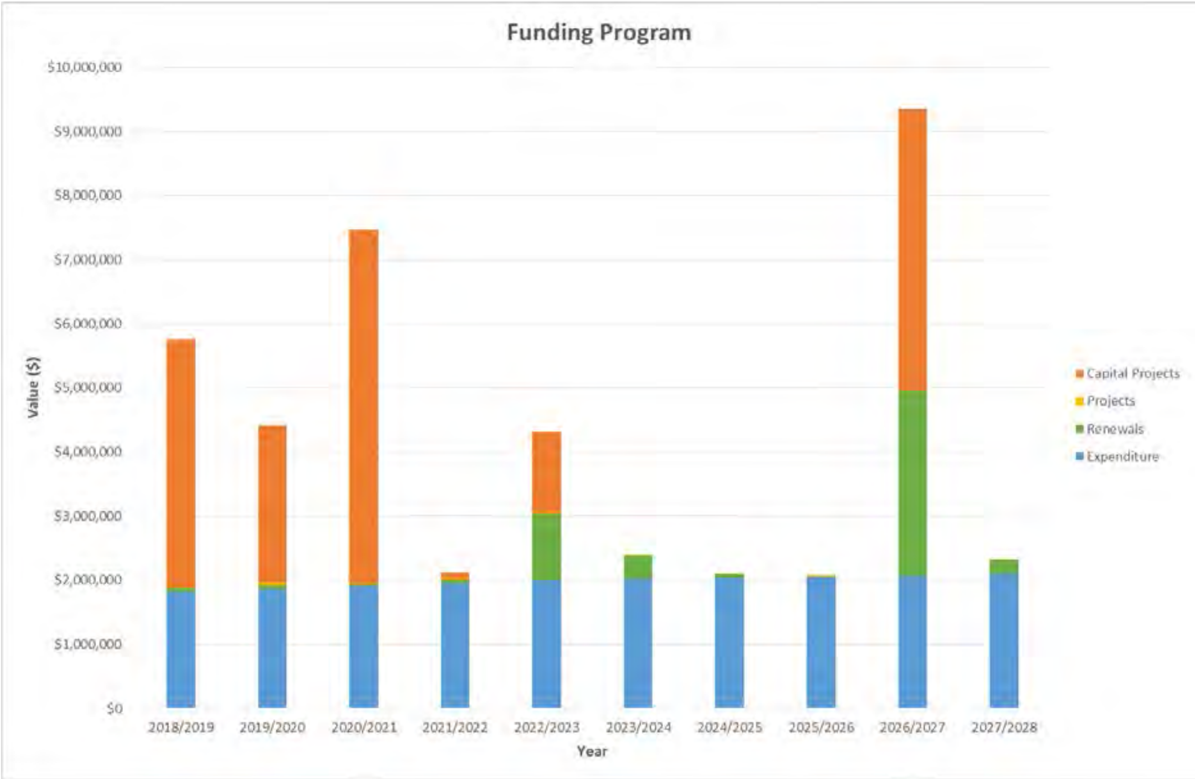


Figure 5-12 Eastern Selwyn Sewerage Funding Summary

There are a number of major projects for Eastern Selwyn Sewerage scheme in the LTP budget.

Table 5-22 Key Projects

Account Label	GL	Description	Year 1 ($)	Year 2 ($)	Year 3 ($)	Years 4 to 10	Funding Split
Projects	4667006	ESSS - Master Plan Updates	$10,000	$10,000	$10,000	$70,000	100% LoS
Projects	4667012	Develop hydraulic models to op		$20,000		$40,000	100% LoS
Capital Projects	466790078	Increased Capacity - Blowers				$750,000	100% LoS
Capital Projects	466790081	Review plant operations	$20,000				100% LoS
Capital Projects	466790028	Pines V				$4,400,000	100% G
Capital Projects	466790024	Septage	$100,000	$1,000,000			100% LoS
Capital Projects	466790025	Lincoln pond aeration	$50,000				100% LoS
Capital Projects	466790026	Solar Drying Hall	$3,100,000				100% G
Capital Projects	466790027	Pines IV			$5,170,000		100% G
Capital Projects	466790029	Pump Stations		$1,000,000			100% G
Capital Projects	466790030	Pump Stations over above	$500,000	$250,000	$250,000	$500,000	100% G
Capital Projects	466790031	Pipelines over above	$100,000	$200,000	$100,000	$ 100,000	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.

6.0 ELLESMERE SEWERAGE SCHEME

6.1 Scheme Summary

Description		Quantity
Estimated Population Served		**3,738**
Scheme Coverage (1 Jan 2018)	**Full Charges**	**Serves Doyleston, Leeston and Southbridge townships which are rated.**
	Half Charges	
	>1 Charges	
System Components	**Piped (m)**	**-**
	Manholes (No.)	**-**
	Pump Stations (No.)	**-**
	Treatment	**Multi stage maturation ponds**
	Disposal	**Border dyke, side rollers, centre pivot, and infiltration basins, and Tramway Drain Reserve.**
History	**Original scheme installation date**	**1975**
Value ($)	**Replacement Cost**	**-**
	Depreciated Replacement Cost	**-**
Financial	**2018/2019 Estimate** **Annual maintenance cost** **% of total**	**$164,814** **5.16%**
Demand	**Annually (m3)**	**244,268**
	Average daily (m3)	**674.77**
	Peak daily (m3)	**2,340.30**
	Minimum daily (m3)	**304.80**
	Infiltration	**Yes**
Sustainability	**Ultimate discharge point**	**Irrigation to land and discharge to surface water via Tramway Reserve Drain**

6.2 Key Issues

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

Table 6-1 Ellesmere Scheme Issues

What's the Problem	What we plan to do
Treatment capacity will limit growth	Plan for upgrade program in line with growth predictions.
Inflow and Infiltration overloads system	Investigate infiltration in contributing catchments, budget for renewals as required.
Sludge build-up in the oxidation pond may affect plant performance	Monitor sludge levels as part of operation and maintenance activity.
Limited water quality data is available	Undertake additional sampling

6.3 Overview & History

The Wastewater Treatment Plant (WWTP) was designed to accommodate wastewater from Leeston, Doyleston, Southbridge and Dunsandel, with a long term combined population of 3600 person equivalent. It was determined that Dunsandel will continue its existing on-site disposal freeing up the additional capacity for Leeston, Doyleston and Southbridge.

It was determined that the upgraded wetland system could not comply with consent conditions. Nutrient removal has proved to be less efficient than predicted. Critically, the plant was designed on the basis of textbook formulae for nutrient removal that have been shown to be inappropriate from monitoring of ponds in Australasia and France. Concentrations of ammonia, nitrate, total nitrogen and total phosphorus do not comply with consented limits. As a related consequence, the nitrogen loading rate of the effluent into the border dyke irrigation area also exceeds the consented limit.

In 2008 Council began seeking variation to the consent conditions. The variation allows for extension of the irrigation area and additional methods of disposing wastewater onto land associated with the Leeston Wastewater Treatment Plant as follows:

- Extend the existing wastewater irrigation area from 15.7ha to a total of 41.9ha (currently 34.3ha) to allow the WWTP to operate within the required application of nitrogen at a rate of 200kg/ha
- Permit the use of spray irrigation with the backup facility of border dyke application over those blocks currently consented for that purpose; and
- Amalgamate the conditions of seven of the existing consents so that the total number of consents associated with the WWTP was reduced from eight to two.

Variations were granted in 2011, aggregating previous consent conditions. Expansion of the disposal area commenced in 2014.

In 2002 the Tramway Reserve Trust was established as a result of requests of affected parties to the Ellesmere Waste Water plant Resource consent applications. The purpose of the trust was to commit to an ongoing programme of environmental maintenance and improvement to Tramway drain as the receiving waters of the Ellesmere Waste Water treatment plant effluent disposal.

A sum of $64,000 was allocated for upgrade work to be undertaken in the first two calendar years, and to follow that $10000 was to be allocated each year from general rates for ongoing maintenance works.

The Trust was established with representatives of the local community (Selwyn District), Department of Conservation (DOC), Fish and Game, and Te Taumutu Runanga.

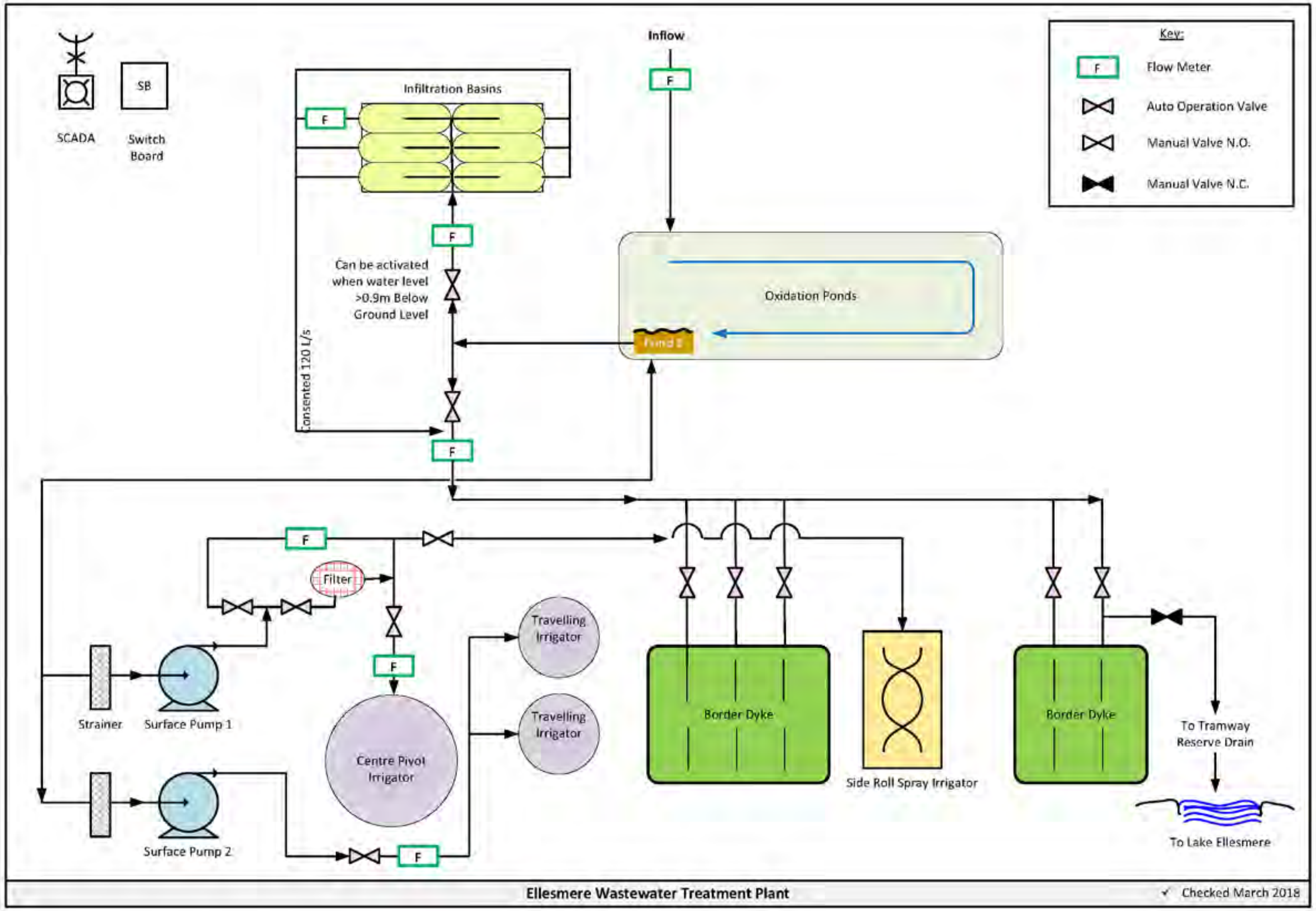


Figure 6-1 Scheme Schematics

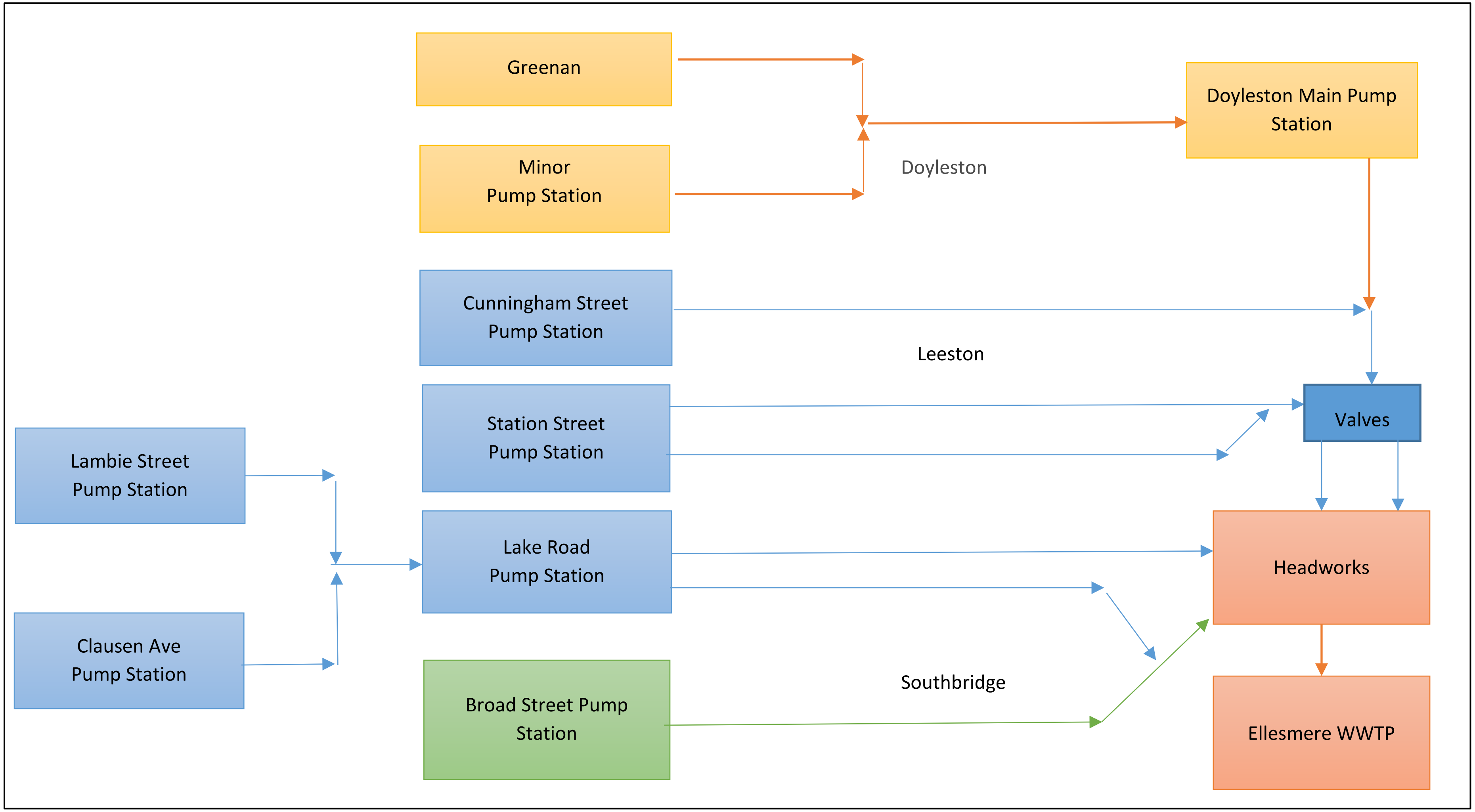


Figure 6-2 Schematic Pump Station Connectivity

6.4 System Capacity

This section details the system capacity of the Ellesmere treatment plant.

6.4.1 Inlet

The average flow entering the plant over the 2010-2012 (incl) period was 1195m3/d. The plant influent data provided in Table 6-2 is for samples collected between 23-4-13 and 21-2-14.

Table 6-2 Ellesmere WWTP Influent Data

Parameter	Average	50th %-ile	90th %-ile	Maximum
cBOD5 (mg/L)	133	130	183	**210**
COD (mg/L)	305	290	410	**520**
TKN (mg/l)	**47**	**46**	**60**	**64**

6.4.2 Through Process

Table 6-3 details the total ammoniacal nitrogen (TAN) data for samples taken in effluent areas.

Table 6-3 Current Pond Effluent TKN and TAN Concentration Data

	TAN (mg/L)			TKN (mg/L)		
Sample Location	10th	50th %-	90th %-	10th	50th %-	90th %-
WWTP Influent	-	-	-	34	46	**60**
Effluent from Pond 2A	18	24	34	30	36	**51**
Effluent from Pond 2B	1	24	35	24	33	**45**
Effluent from Pond 3	8	21	35	21	29	**43**
Effluent from Pond 4	4	21	36	15	29	**41**
Effluent from Pond 5	3	19	35	15	28	**42**
Effluent from Pond 6	1	16	33	13	25	**40**
Effluent from Pond 8	**1**	**16**	**31**	**12**	**23.**	**35**

6.4.3 Final Effluent

The final effluent (Pond 8 effluent) quality data provided in Table 6-4 is for samples collected between 23-4-13 and 21-2-14.

Table 6-4 Final Effluent Quality Results for the period 23rd April 2013 to 21st February 2014

Parameter	10th %-ile	Ave	50th %-ile	90th %-ile	Max
Total Suspended Solids (mg/L)	30	63	63	99	**100**
cBOD5 (mg/L)	12	22	19	39	**40**
TKN (mg/L)	12	23	23	36	**37**
Total Ammoniacal-N	1.5	17	16.6	31.5	**36.0**
Total Organic Nitrogen (mg/L)	5.2	8.4	8.0	11.7	**16.5**
Nitrite + Nitrate (mg/L)	**0.5**	**1.7**	**1.7**	**2.9**	**3.0**

6.4.4 Growth

Future Influent Flows and Loads

The Leeston WWTP population is forecast to increase to nearly double from 3,722 (2018) to 6,631 (2048), which will result in exceedance of current consent standards and require additional capital expenditure.

Based on the predictions of growth, further capital expenditure will be required in 2023. The average Total Nitrogen concentration from the WWTP will need to be reduced from current 47 mg/l to 20 mg/l to meet compliance in 2048.

The effect of population and flow are presented in Figure 6-1.

Flows are predicted on the following basis. Base Population is 3304 (2013) and, from the data, is associated with a flow of 1195 m3/d. For each additional population connected, the average flow has been increased by 200 l/hd/d, which includes usage and infiltration.

It is noted in the evaluation of data that the current flows of 594 m3/d (January 17-May 17 partial year) are substantially lower than previous flow estimates of 1195 m3/d used in the previous study, identified as 2014 data. It is also considered that this may be partially attributed to variations in groundwater and seasonality.

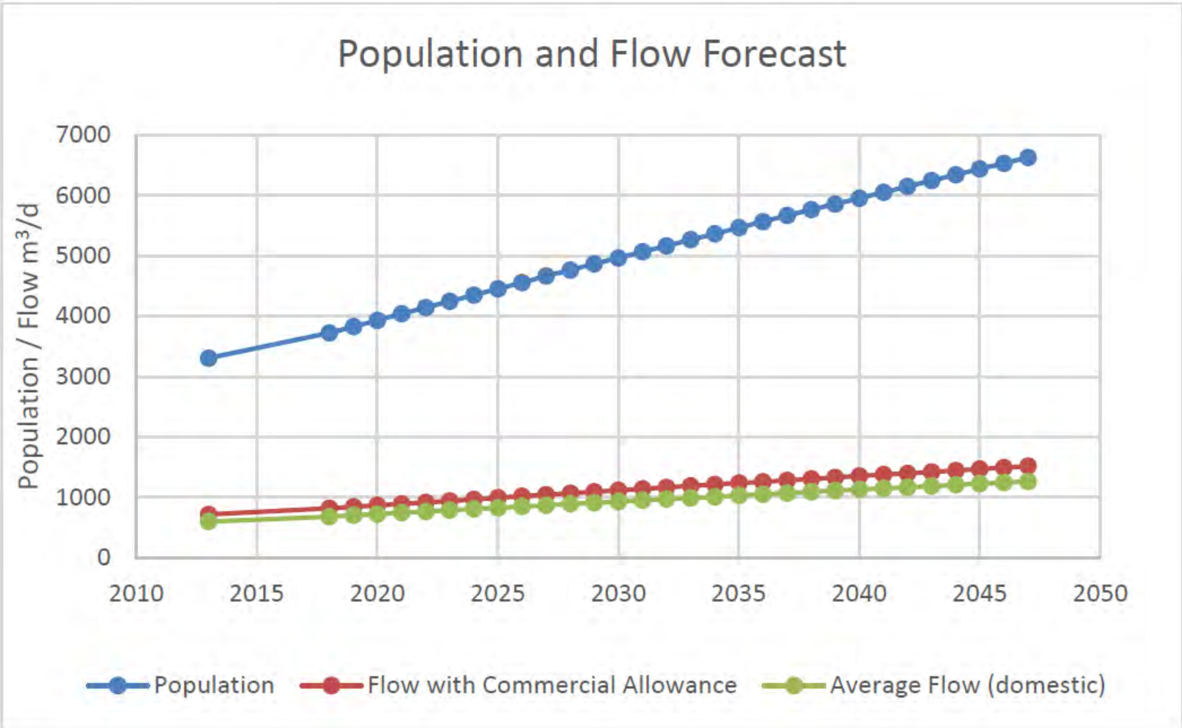


Figure 6-1 Population and Flow Forecast

Medium/Long Term treatment Options

Options have been reviewed for an earth bank style Activated Sludge Plant(ASP) for 100% of flows, a concrete 50% side stream ASP and a 50% side stream SAF. It is noted that the two ASP options are very similar in size as the former need only achieve 20 mg/l TN, whereas the second must achieve < 10 mg/l TN to achieve performance by blending.

All options include an inlet pump station, screening of 4.5 x average flow, grit removal and UV disinfection of effluent on the discharge to the irrigation area. Sludge facilities are provided for sludge to be exported to The Pines WWTP for further treatment and disposal.

Side stream options will rely on pond performance, but it is noted that recent pond performance data indicates that suspended solids are too high for UV disinfection, and any pond related option will require additional solids removal technology.

It is assumed that the pond effluent in the short term will produce a consistent effluent quality, and total load only increases because of flow. This is used to demonstrate performance long term, but can be expected to deteriorate as the pond retention time will decrease with increased flows.

Allowance is included for hay removal based on typical performance of 250 kg/ha/yr removed, so allowing a maximum Nitrogen load of 450 kg/ha/yr. This allows a daily average load of 35.3kg/d/ha over 28.6 ha, or 43.5 kg/d over 35.3ha.

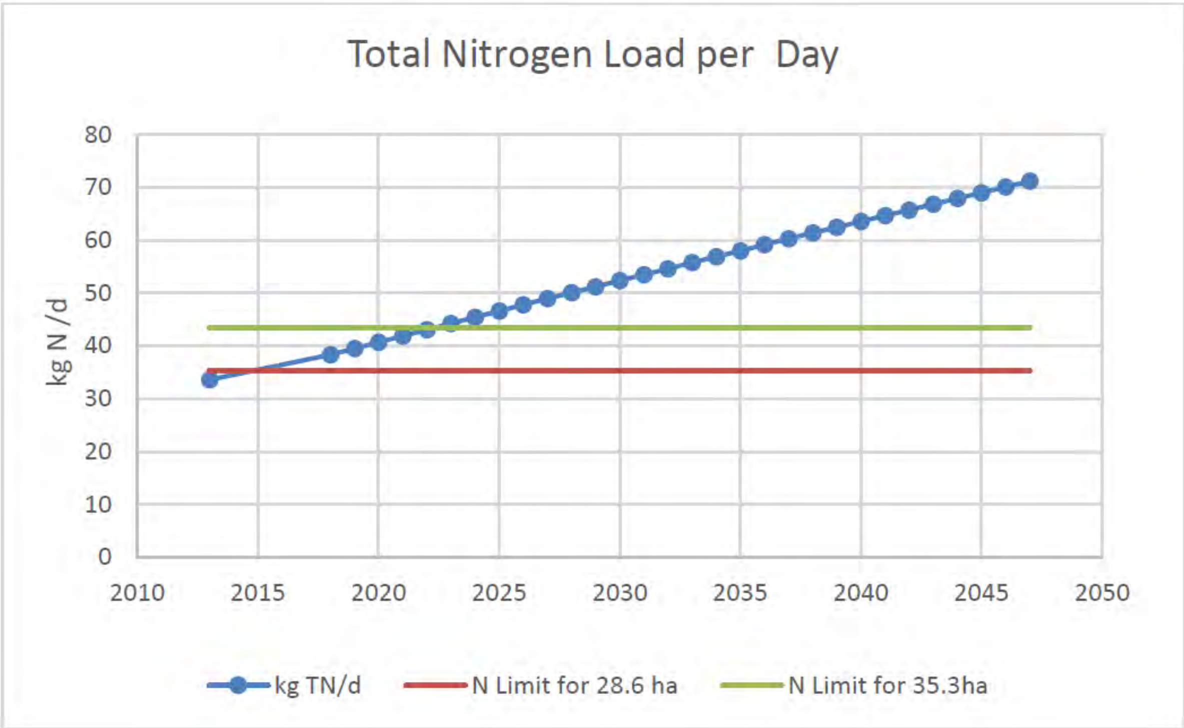


Figure 6-2 Total Nitrogen Load per Day

It is therefore recommended that the plant upgrade is planned for 2023/24 to maintain compliance with consent.

Parameter	Per Capita Contribution	Units	Average / d
Population	-	-	6631
Commercial Allowance	Flow 20%	Load 10%	-
Flow	200 l/h/d	m3/d	1511
BOD	60 g/hd/d	kg/d	437.6
TSS	70 g/hd/d	kg/d	510.6
NH3-N	7.5 g/hd/d	kg/d	54.7
TKN	12 g/hd/d	kg/d	87.5

TP	5 g/hd/d	kg/d	36.5

Option Summary Costs

The method selected for whole life cost estimation is a simplified NPV. This method uses an approximation of a 20 year discounted calculation, using CAPEX + 12 x Annual Opex. For this calculation, the average OPEX cost is used.

Option	Base Capex	Annual Avg Opex	Whole Life Cost
ASP 100%	$6,199,678	$450,141	$11,601,370
ASP 50%	$6,656,356	$325,853	$10,566,592
SAF 50%	$7,015,447	$271,407	$10,272,331

It is clear from this analysis that the lower operational costs associated with the SAF plant counter the increased capital costs. This increased capital cost is due to the complexity of the above ground tank, media and an additional settlement tank. This option has minimal sludge systems and therefore has no requirement for an additional building for this equipment.

Comparing the Activated sludge options, the most notable difference is that the ASP 100% option utilises earth banks. As pond 1 is not suitable without modification, extensive earthworks are required. The nature of the pond system is for a shallow treatment basin of 2.6m depth. This requires expensive surface aerators, and by their nature, less energy efficient. Surface aeration is approximately one third as efficient at oxygen transfer as diffused aeration using disk diffusers. This has a substantial impact on operational costs. Additionally, with this option, all sludge is thickened and exported, whereas the side stream treats less sludge with associated lower Opex.

It is noted within the performance data that pond effluent is not always sufficient to ensure UV disinfection in the future. For this reason, it is recommended that the project progress with the 100% ASP option, as this plant enables Nitrogen and Phosphorous removal and a low suspended solids effluent to be produced, provided the ponds are bypassed.

6.5 Resource Consents

The Ellesmere sewerage scheme has a number of resource consents. Table 5-8 shows the discharge permitted by the resource consents for this scheme.

Table 6-5 Resource Consents

Consent	Description	Location	Date Issued	Expiry Date	Quantity
CRC011679.1 Issued - Active	To discharge contaminants into air from construction and operation of additional wastewater treatment and disposal facilities.	Beethams Road And Station Street, Leeston	20/07/2009	28/07/2029	
CRC941475.1	To discharge contaminants to air.	Beethams Road, Leeston	17/07/2009	7/09/2029	

Issued - Active					
CRC011680.1 Issued - Active	To discharge contaminants into land and groundwater from the operation of additional wastewater treatment and disposal.	Beethams Road And Station Street, Leeston	20/07/2009	28/07/2029	
CRC110148 Issued - Active	To discharge contaminants to land, air, and groundwater and surface water.	Beethams Road, Leeston	29/10/2010	28/07/2029	
CRC930165.1 Issued - Active	To discharge contaminants to land	Tramway Reserve Drain, Beethams Road, Leeston	5/01/2010	28/07/2029	
CRC950253 Issued - Active	To discharge oxidation pond effluent onto land via border dyke irrigation for the Leeston Sewage treatment facility, at or about map reference M36:5447-1570.	Beethams Road, Leeston	16/02/1998	28/07/2029	
CRC941476 Issued - Active	To discharge contaminants into land at or about map reference M36:544-154.	Beethams Road, Leeston	16/09/1994	7/09/2029	
CRC011681.2 Issued - Active	To discharge up to 120 litres per second of extracted groundwater into Tramway Reserve Drain.	Beethams Road And Station Street, Leeston	20/07/2009	28/07/2029	120L/s
CRC011678 Issued - Active	To take groundwater	Beethams Road And Station Street, Leeston	23/05/2002	28/07/2029	795m3/day

Since Feb 2018 compliance reports have been fully compliant.

6.6 Scheme Assets

A summary of the assets within this scheme is outlined in this section.

6.6.1 Reticulation Overview

A summary of the material and diameter is not available for this scheme as there is no reticulated network is covered under each township section.

6.6.2 Treatment and Disposal

The following details the treatment facilities within the Leeston Sewerage Scheme.

Table 6-6 Treatment Facilities

Scheme	System	Description	Year Installed/ Upgraded
Leeston WWTP Serves Leeston, Doyleston and Southbridge	Screening Plant	For removal of plastics and material greater than 6mm	2003
	Oxidation and Maturation Ponds	Oxidation and maturation ponds in series for improved wastewater quality. With aerators and rock filters	1975 2003
	Wetlands	Wetlands with alternating open water areas, planted areas and gravel beds to improve wastewater quality	1975 2003
	UV Disinfection	Provision for future	
	Border Dyke Land Disposal	Irrigation via 8 border dyke areas (10.6ha) with piped head races and bubble-up valves when groundwater below 0.9m.	1975, 1985 & 2003
	Alternate Wet Weather Disposal	Land infiltration using 6 Rapid infiltration basins (RI) when local groundwater less than 0.9m from ground surface. Treated wastewater is discharged to RI basin and groundwater pumped from beneath basins and discharged to Tramway Reserve drain.	2003
	Centre pivot	New centre pivot installed adding an irrigated area of 13.18ha	2014/15
	Travelling irrigator	New travel irrigator adding an area of 5.7ha	2016/17

The irrigation areas are summarised below.

Table 6-7 Irrigation Areas

Area in HA							
Area 1	Area 2	Area 3	Area 4&6	Area 5	Area 7	Area 8	Area 9-travelling irrigator
1.854	1.885	1.92	3.38	1.36	5	13.18	5.7

6.6.3 Design

The Wastewater Treatment Plant was designed to accommodate wastewater from Leeston, Doyleston, Southbridge and Dunsandel, with a long term combined population of 3600 person equivalent. It has since been determined that Dunsandel will continue its existing on-site disposal freeing up the additional capacity for Leeston, Doyleston and Southbridge.

6.7 Operational Management

The wastewater schemes are operated and maintained under the maintenance contract 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.

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

6.8 Photos of Main Assets

Photo 1 – Treatment Pond

Photo 2 – Treatment Pond / Wetland

Photo 3 - Rapid infiltration basins (RI)

Photo 4 – New pivot

Photo 5 – Pivot Pump station and Irrigator (background)

6.9 Risk Assessment

A risk assessment has been undertaken for the Ellesmere Sewerage 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 6-8 details the risk priority rating, Table 6-9 outlines the risks and the list of key projects is found in Table 6-11.

Table 6-8 Risk Priority Rating

Risk Score	Level of Risk	Risk Response
> 50	Extreme	Awareness of the event to be reported to Council. Urgent action to eliminate / mitigate / manage the risk. 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. Immediate action required to eliminate / mitigate / manage the risk. Document risk and action in the AMP.

Table 6-9 Risks – Ellesmere Sewer Scheme

Risk	Action/Project	Year Identified	2014 Risk Rating	2017 Risk Rating	Residual Risk Rating
Non-consented activities	Renewal of consents	2014	27	27	6
Complex network is not run with efficiency	Develop hydraulic models to optimise operation, renewals and criticality assessment	2014	12	2.1	3.5
Infiltration could overwhelm wastewater treatment plant	Optimise sewer renewals to maximise impact on infiltration	2014	27	27	27
Power failure causes treatment plant failure	Install a generator (relocate 'blue' generator) at the treatment plant and run a cable back to power the Station Street wastewater pump station.	2014	12	2.1	3.5
Treatment Plant exceeds consent requirements	WWTP treatment options investigation	2014	20	20	20
Treatment Plant exceeds consent requirements	WWTP treatment concept design	2014	20	20	20
Treatment Plant exceeds consent requirements	WWTP treatment upgrade detailed design	2014	20	20	20
Treatment Plant exceeds consent requirements	Construction of WWTP treatment upgrade	2014	20	20	20

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

6.10 Asset Valuation Details

The total replacement value of assets within the Ellesmere Sewerage scheme is embedded within the Leeston scheme.

6.11 Renewals

The renewal profile has been taken from the 2017 5 Waters Valuation. The renewal profile of the Ellesmere Sewerage scheme is embedded within the Leeston scheme.

6.12 Critical Assets

The identification of critical assets within the Ellesmere Sewerage scheme is embedded within the Leeston scheme.

6.13 Asset Condition

There is no pipe asset condition for this scheme.

6.14 Funding Program

The 10 year budgets for the Ellesmere Sewerage Scheme are shown by Table 6-10 and Figure 6-3. 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 Ellesmere Sewerage Budget Summary

Years	Expenditure	Renewals	Projects	Capital Projects
2018/2019	$164,814		$50,000	
2019/2020	$166,343		$150,000	$100,000
2020/2021	$167,872			
2021/2022	$169,401	$61,420		
2022/2023	$170,930			$200,000
2023/2024	$172,751			$6,625,000
2024/2025	$219,572			
2025/2026	$236,915			
2026/2027	$239,513			
2027/2028	$242,111			
Total	$1,950,221	$61,420	$200,000	$6,925,000

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.

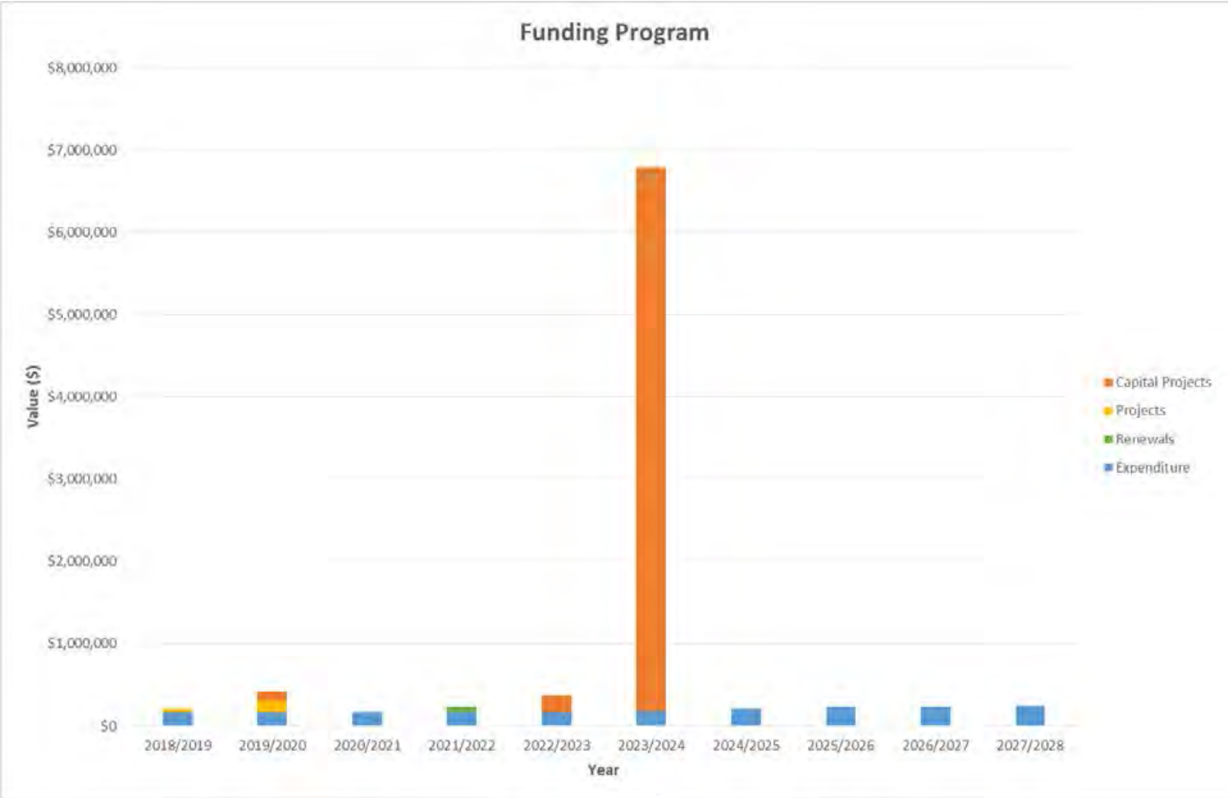


Figure 6-3 Ellesmere Sewerage Funding Summary

There are a number of major projects for Ellesmere Wastewater 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
Projects	4621030	WWTP treatment concept design		$100,000			100% LoS
Capital Projects	462190005	Construction of WWTP treatment				$6,625,000	90% G
Capital Projects	462190008	WWTP treatment detail		$100,000		$200,000	100% LoS
Projects	4621006	WWTP sampling	$50,000	$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.

7.0 LAKE COLERIDGE WASTEWATER SCHEME

7.1 Scheme Summary

Description		Quantity
Estimated Population Served		**140**
Scheme Coverage (1 Jan 18)	**Full Charges**	**48**
	Half Charges	**17**
	>1 Charges	**2**
System Components	**Piped (m)**	**3099.67**
	Manholes (No.)	**54**
	Pump Stations (No.)	**1 (at treatment plant)**
	Treatment	**Imhoff tank, wetland and UV treatment**
	Disposal	**Overland treatment and denitrification trench**
History	**Original scheme installation date**	**1965**
Value ($)	**Replacement Cost**	**$1,531,568.81**
	Depreciated Replacement Cost	**$680,429.32**
Financial	**2018/2019 Estimate Annual maintenance cost % of total**	**$61,635 1.93%**
Demand	**Annually (m3)**	**8,349.2**
	Average daily (m3)	**22.94**
	Peak daily (m3)	**45.10**
	Minimum daily (m3)	**6.30**
	Infiltration	**No**
Sustainability	**Ultimate discharge point**	**Overland flow, denitrification trench and discharge to stream**

7.2 Key Issues

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

Table 7-1 Lake Coleridge Scheme Issues

What's the Problem	What we plan to do
Physical distance and remote nature of plant increases operation and maintenance costs.	Review operation costs with the aim of finding optimised maintenance procedures including plant upgrades as required.

7.3 Overview & History

Currently raw domestic sewage from the 48 connections in the village gravitates to the pump station at the treatment plant. From the pump station sewage is pumped to the top of an Imhoff tank where the solids are separated. The partially treated sewage then gravitates to the subsurface wetland, passing through a natural treatment process prior to UV disinfection. The treated and disinfected sewage then flows via a dosing chamber to the overland flow area, a denitrification process occurs. If necessary, (due to saturated ground conditions) treated sewage can then flow into Post Office Creek through the rock diffuser structure.

There is a small residential population but little commercial activity in the village. Recent subdivision developments in the Lake Coleridge basin have connected to the village wastewater scheme.

Historically there has been high infiltration and inflow.

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 heard on. An agreement was signed dated 11 July 2012 between the Council and TrustPower which stated:

1. *Trustpower will not, through the Coleridge Project, adversely affect the existing assets held and operated by the Council for the purposes of conveying, treating and disposing of wastewater from the village.*
2. *Trustpower will continue to provide, through existing Coleridge infrastructure, or through the Coleridge Project, flushing flows for the Councils sewerage outflow/overflow as may be reasonably required.*
3. *Trustpower will ensure that any effects on the Village wastewater scheme as a result of TrustPower's future infrastructure works will not be disadvantage or burden the Village wastewater scheme.*

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

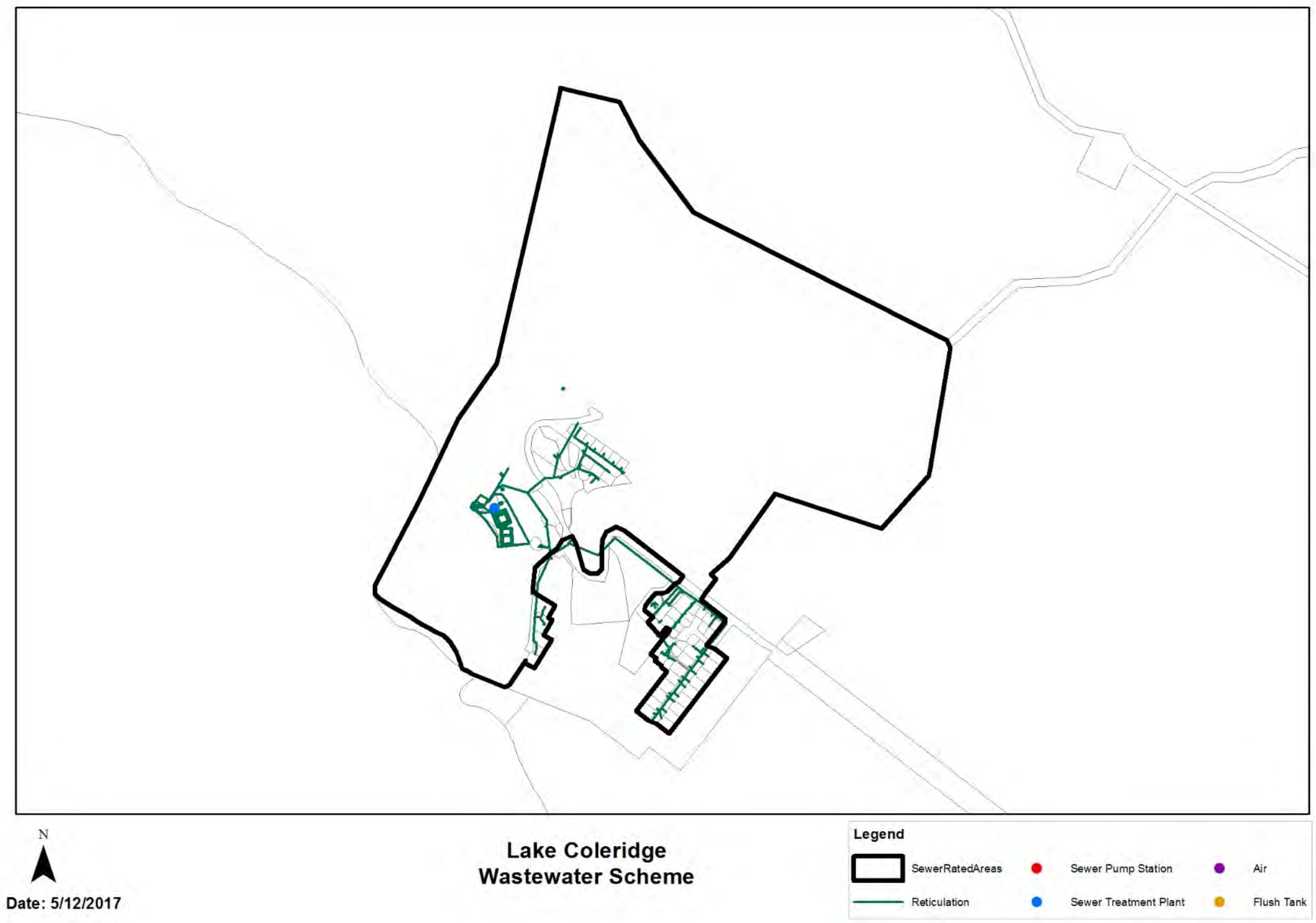


Figure 7-1 Scheme Map

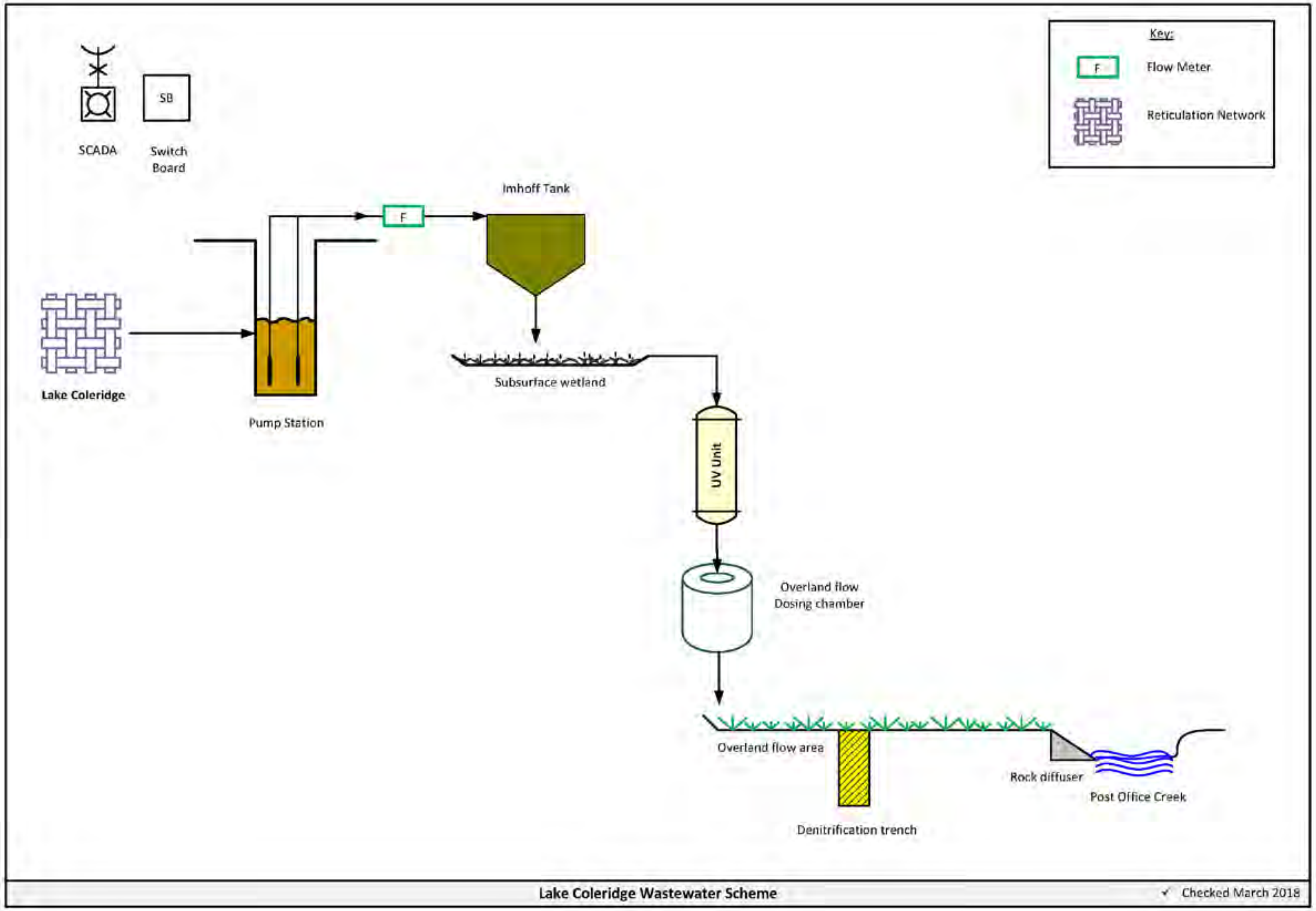


Figure 7-2 Scheme Schematic

7.4 System Capacity

In general the Lake Coleridge scheme is underutilised as the occupancy rate within the houses that the scheme serves is low. There are peak periods but these too are well within the consented limits.

There is not expected to be significant growth in the area serviced by this scheme and scheme expansion is not expected to be required over the planning horizon of this AcMP.

7.5 Resource Consents

The Lake Coleridge wastewater scheme has a number of resource consents. Table 7-2 shows the discharge permitted by the resource consents for this scheme.

Table 7-2 Resource Consents

Consent	Description	Location	Date Issued	Expiry Date	Quantities (m^3/day)
CRC012168 *Issued - Active*	To undertake works on the banks of the Post Office Creek at or about map reference NZMS 260 K35:9065-5925.	Hummocks Road, Lake Coleridge	12/07/2002	9/07/2027	
CRC012170.1 *Issued - Active*	To discharge treated domestic sewage to land.	Hummocks Road, Lake Coleridge	3/05/2011	9/07/2027	41
CRC012169 *Issued - Active*	To discharge treated domestic sewage to Post Office Creek.	Hummocks Road, Lake Coleridge	12-Jul-02	9/07/2027	41

7.6 Scheme Assets

A summary of the assets within this scheme is outlined in this section.

7.6.1 Reticulation Overview

A summary of material and diameter for pipes is shown below in Figure 7-3 and Figure 7-4.

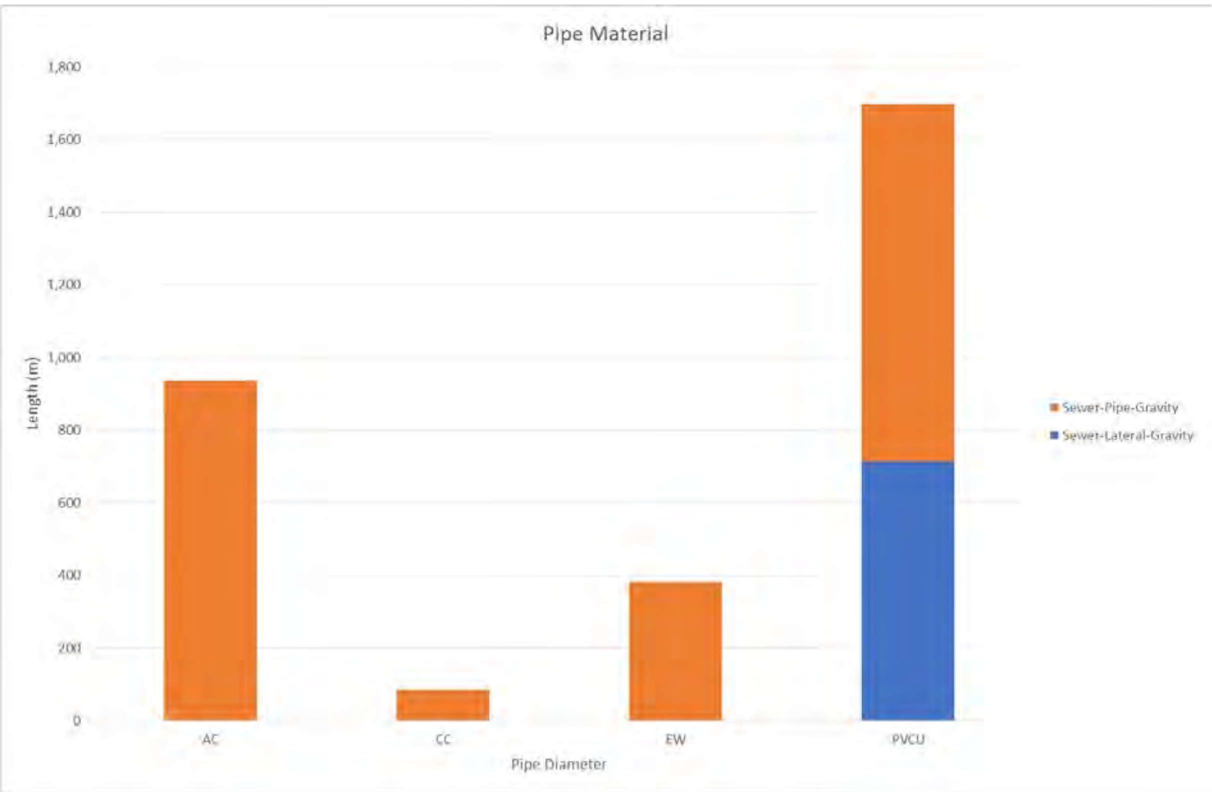


Figure 7-3 Pipe Material – Lake Coleridge

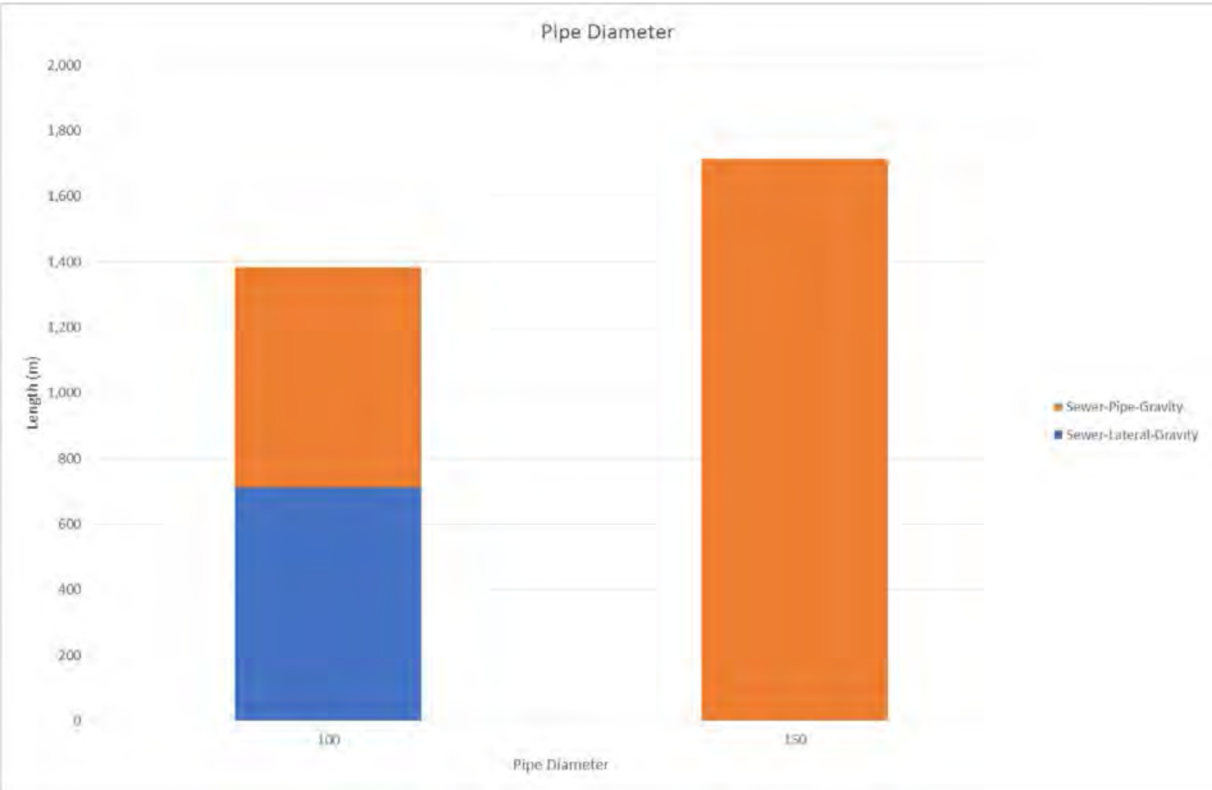


Figure 7-4 Pipe Diameter – Lake Coleridge

7.6.2 Treatment and Disposal

Table 7-3 outlines treatment and disposal systems used within the Lake Coleridge scheme.

Table 7-3 Treatment Plant Components

Treatment & Disposal	Description	Year Installed
Imhoff tank	Provides primary treatment for the raw sewerage	1965 & 2004
Subsurface wet land	The submerged vegetated bed wetland with a surface area of 500m^2. It has a working depth of 0.55 m at the outlet producing a hydraulic retention time of approximately 2 days	2004
UV disinfection	The UV unit is sized to accommodate the flow through the wastewater treatment plant with a design flow of 1.8 L/s	2004
Overland flow area	The overland flow area is approximately 500m^2. The overland flow area is divided by a denitrification trench into two cells. The slope of two overland flow cells is approximately 2%. It is planted with a variety of local grasses	2004

7.6.3 Design

The Lake Coleridge scheme was designed for a resident population of 110 PE, equivalent to approximately 44 occupied dwellings. This is shown below in Table 7-4.

Table 7-4 Design Data

	Design Population	L/c/d	Design Flow m^3/d	Av Daily Flow m^3/d (1998-2000)	Peak Flow
Design Population	110 (366 30% Occupancy	370	41	14.2*	73 (PF 1.8)

7.6.4 Pump Stations

There are no pump stations within the Lake Coleridge reticulation. There is a pump chamber and two pumps at the treatment plant pumping sewage to the Imhoff tank. These are detailed below in Table 7-5.

Table 7-5 Pump Stations

Pump Station	Description	Year Installed /Upgraded	Capacity (l/s)
At Treatment Plant	Two pumps (1 submersible & 1 surface mounted)	1996	3.8
			standby

7.7 Operational Management

The wastewater schemes are operated and maintained under the maintenance contract 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.

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

7.8 Photos of Main Assets

Photo 1 – Pump house and Imhoff tank

Photo 2 - Wetland

7.9 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 7-6 details the risk priority rating, Table 7-7 outlines the risks and the list of key projects is found in Table 7-12.

Table 7-6 Risk Priority Rating

Risk Score	Level of Risk	Risk Response
> 50	Extreme	Awareness of the event to be reported to Council. Urgent action to eliminate / mitigate / manage the risk. 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. Immediate action required to eliminate / mitigate / manage the risk. Document risk and action in the AMP.

Table 7-7 Risks – Lake Coleridge

Risk	Action/Project	Year Identified	2014 Risk Rating	2017 Risk Rating	Residual Risk Rating
Impact of power failure on receiving environment	Install generator plug	2014	12	6	6
Plant failure impact on receiving environment	Review failure consequence of individual items of plant	2014	12	12	6
Poor functioning UV treatment may lead to consent breaches	Install wipers on UV unit or renew UV unit with unit which has self cleansing wipers.	2014	12	2.1	2.1
Non-consented activities	Renewal of consents	2014	27	27	6
Poor functioning treatment may lead to consent breaches	New TP Design	2017		2.1	6
Poor functioning treatment may lead to consent breaches	New TP Construction	2017		2.1	6
Plant renewal	New TP Construction	2017		2.1	6

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

7.10 Asset Valuation Details

The total replacement value of assets within the Lake Coleridge Scheme is $1,531,569 as detailed in Table 7-8 below.

Table 7-8 Replacement Value, Lake Coleridge

Asset Class 1	Asset Class 2	Sum of Replacement Value
Plant and Equipment		$514,443
Wastewater Reticulation	Chamber	$11,996

	Lateral	$224,873
	Manhole	$299,249
	Pipe	$481,008

Replacement values for these different types of assets are shown in Figure 7-5 below.

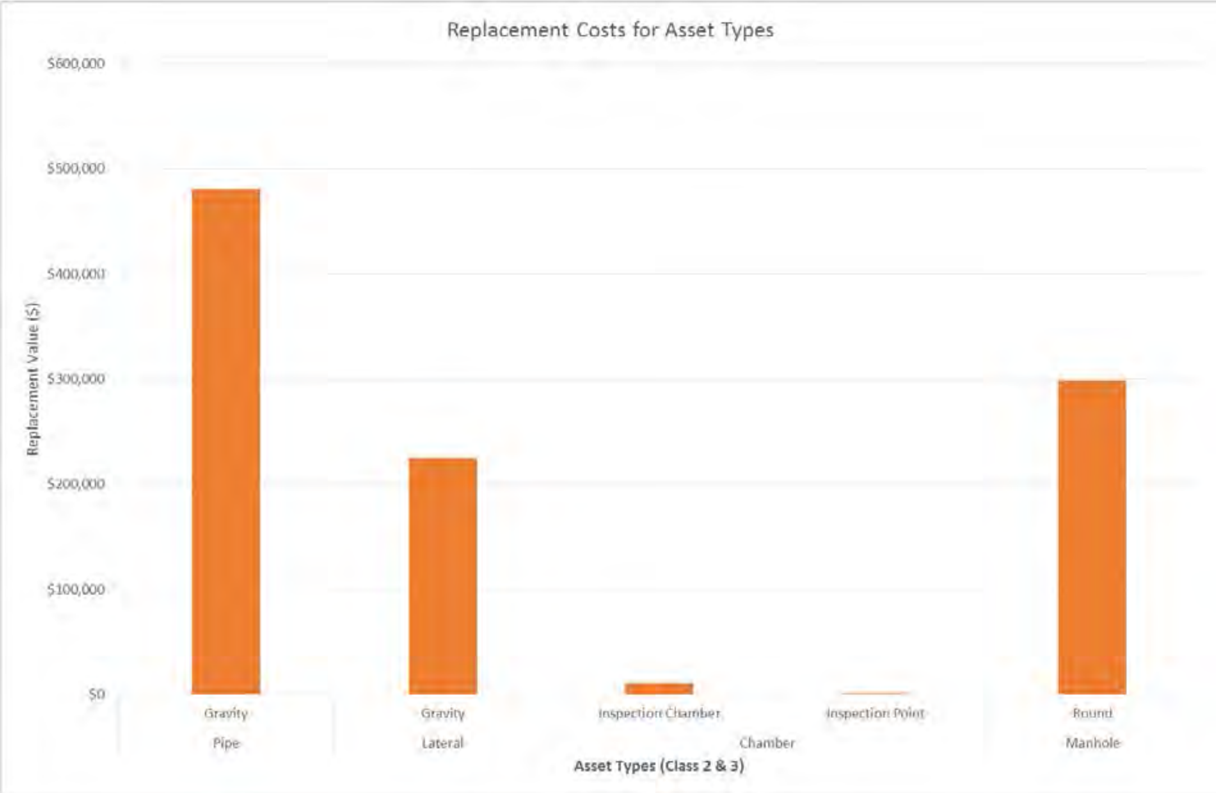


Figure 7-5 Replacement Costs for Lake Coleridge

7.11 Renewals

The renewal profile has been taken from the 2014 5 Waters Valuation. A graph showing the renewals for this scheme are shown by Figure 7-6 below.

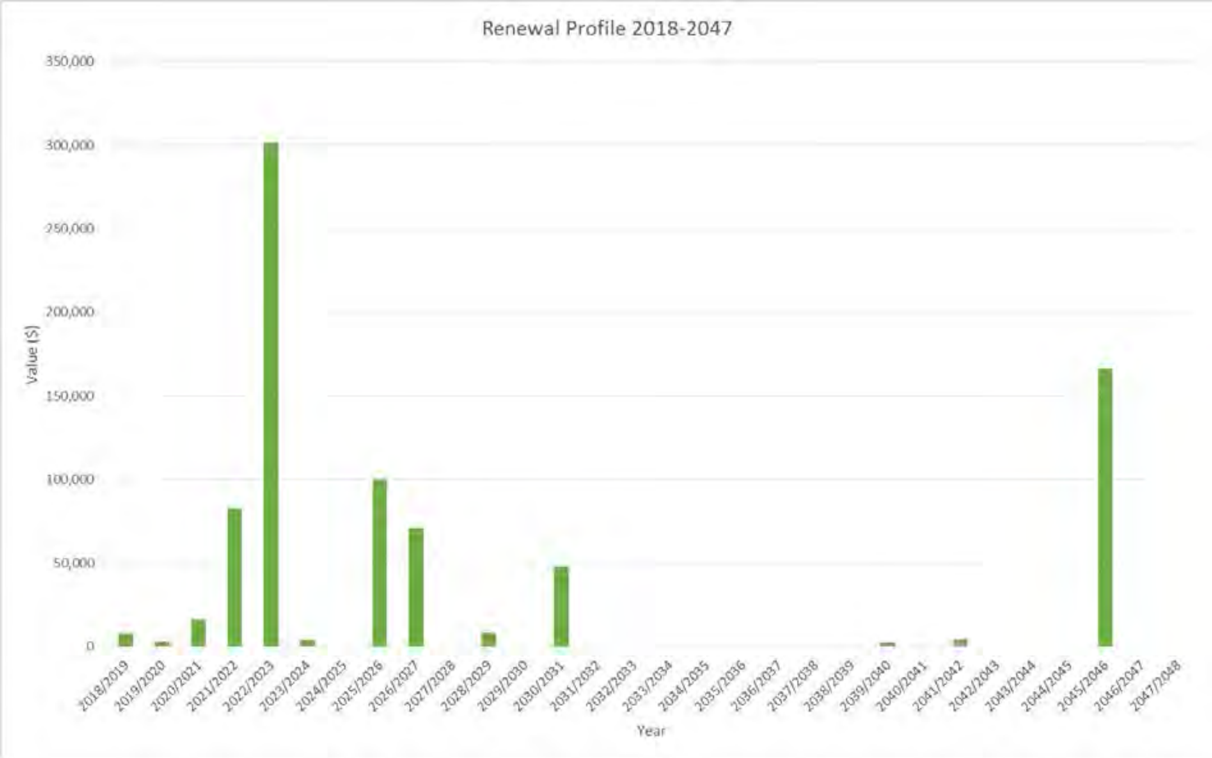


Figure 7-6 Lake Coleridge Wastewater Renewal Profile

7.12 Critical Assets

The criticality model for Lake Coleridge 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 7-9 and Figure 7-7 below shows the calculated criticality for all of the assets within this scheme that have a recorded known length.

Table 7-9 Length of Assets per Criticality Level

Criticality Bands		Length (m)
5	Low	1,628
4	Medium-Low	1,469
3	Medium	0
2	Medium-High	0
1	High	0

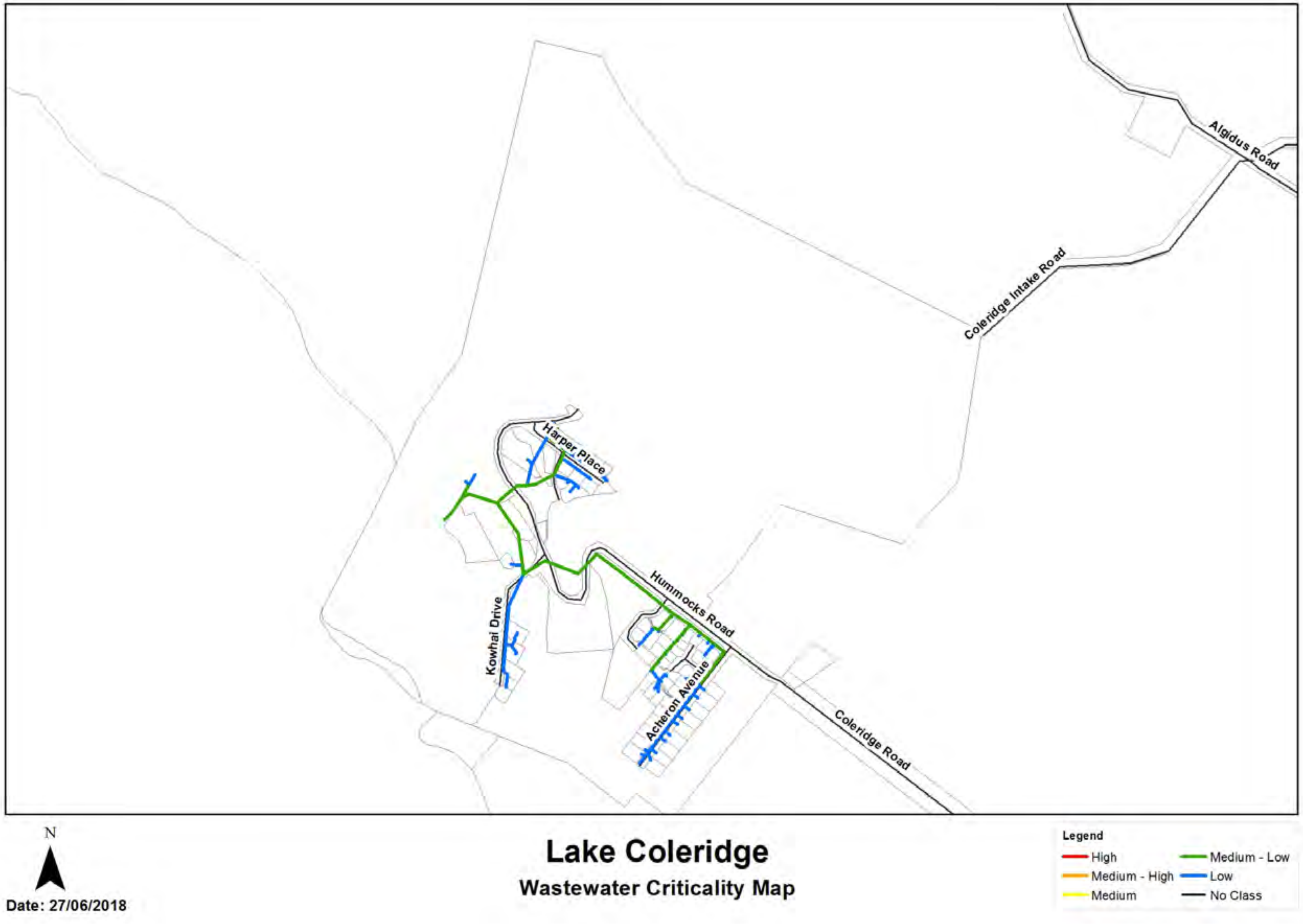


Figure 7-7 Criticality Map

7.13 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 and it provides details of how the model has been calculated for the reticulation assets (particularly pipes). Figure 7-8 below shows the level of asset condition for all of the assets within this scheme that have a recorded known condition.

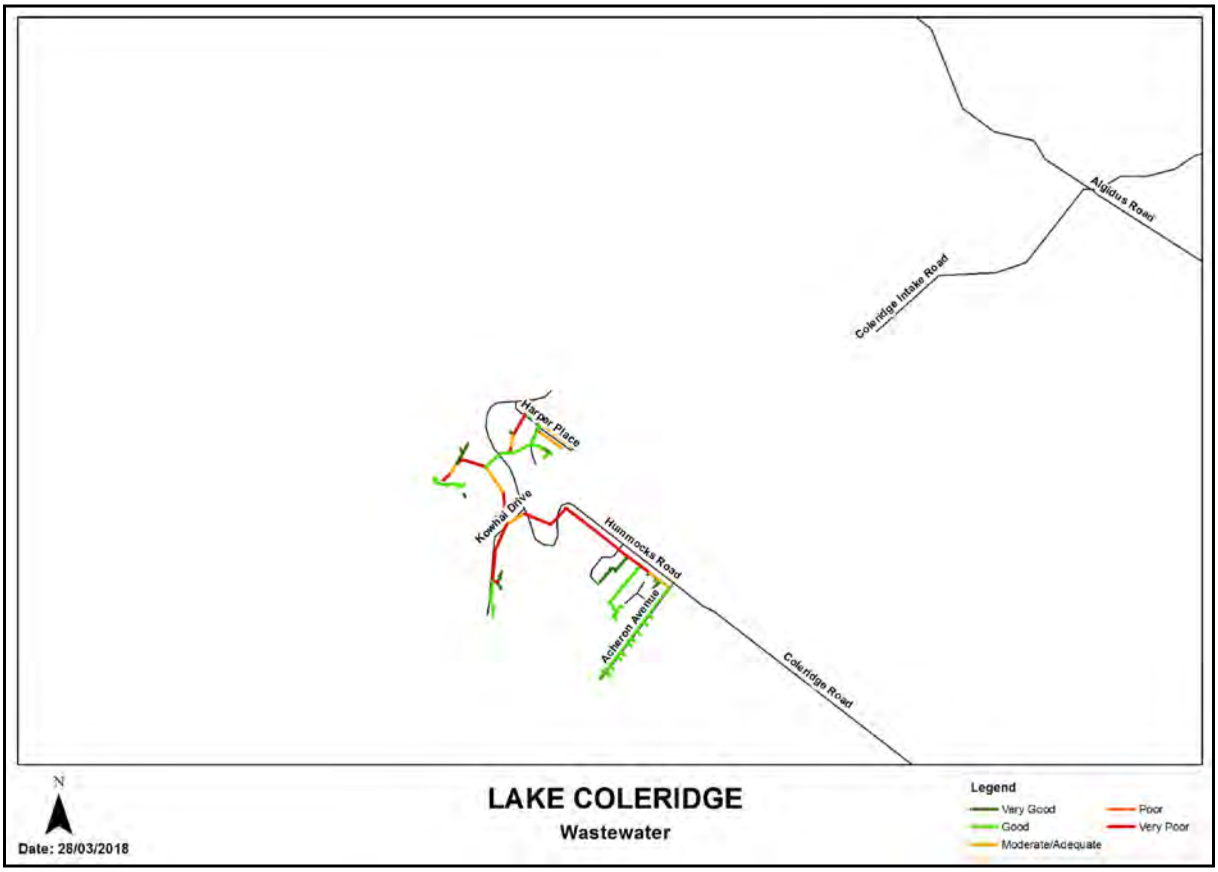


Figure 7-8 Asset Condition – Lake Coleridge

Table 7-10 provides a description of the condition rating used within the condition model.

Table 7-10 Asset Condition Grading

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

7.14 Funding Program

The 10 year budgets for Lake Coleridge are shown by Table 7-11and Figure 7-9. 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 7-11 Lake Coleridge Budget Summary

Years	Expenditure	Renewals	Projects	Capital Projects
2018/2019	$61,635	$7,964		$20,000
2019/2020	$60,781	$3,111		$60,000
2020/2021	$61,666	$16,551		
2021/2022	$61,847	$83,229		
2022/2023	$62,028	$301,181		
2023/2024	$62,261	$4,027		
2024/2025	$62,493			
2025/2026	$62,750	$100,000		
2026/2027	$62,959	$70,803		
2027/2028	$63,216			
Total	$621,636	$586,866		$80,000

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.

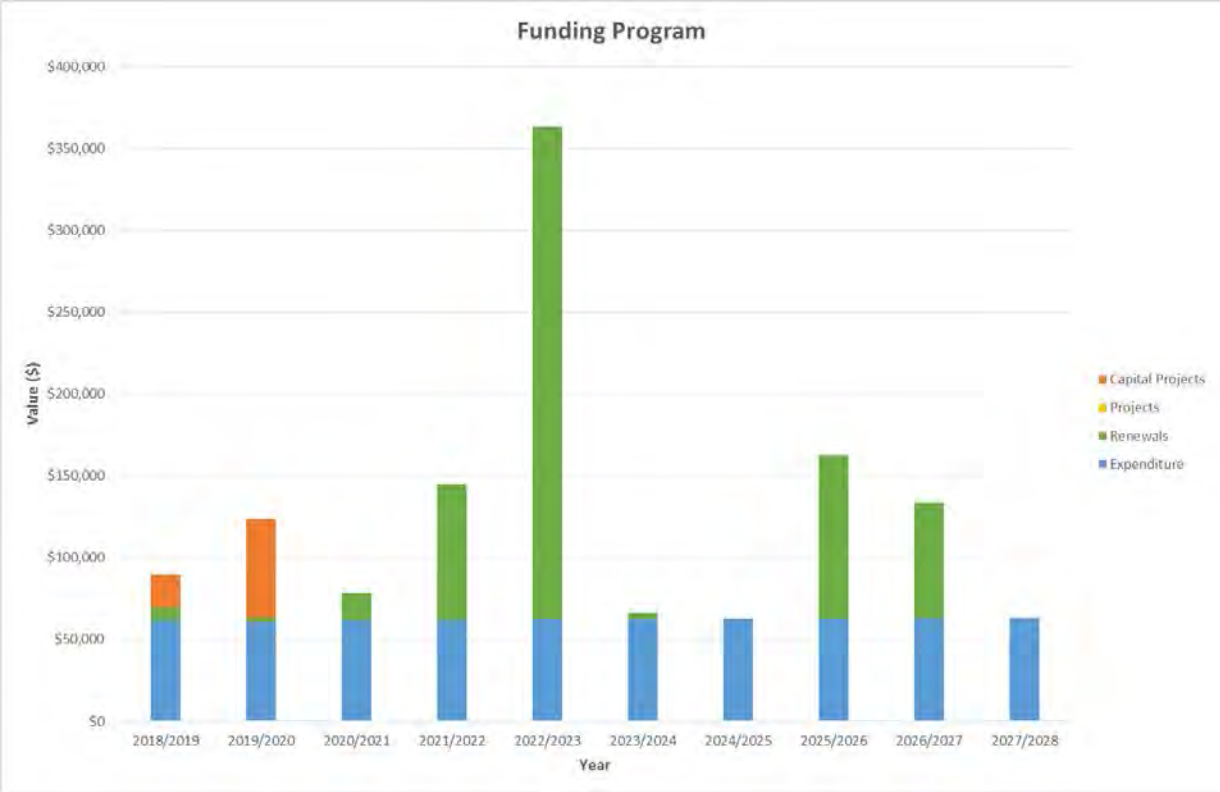


Figure 7-9 Lake Coleridge Funding Summary

There are a number of major projects for Lake Coleridge Wastewater scheme in the LTP budget.

Table 7-12 Key Projects

Account Label	GL	Description	Year 1 ($)	Year 2 ($)	Year 3 ($)	Years 4 to 10	Funding Split
Capital Projects	464190024	WWTP Review	$20,000				100% LoS
Capital Projects	464190025	WWTP Design		$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.

8.0 LEESTON WASTEWATER SCHEME

8.1 Scheme Summary

Description		Quantity
Estimated Population Served		2,489
Scheme Coverage	Full Charges	874
	Half Charges	87
	>1 Charges	15
System Components	Piped (m)	26959
	Manholes (No.)	223
	Pump Stations (No.)	5
	Treatment	N/A (to Ellesmere STP)
	Disposal	N/A (to Ellesmere STP)
History	Original scheme installation date	1975
Value ($)	Replacement Cost	$17,350,918.51
	Depreciated Replacement Cost	$10,302,970.74
Financial	2018/2019 Estimate Annual maintenance cost % of total	$120,475 3.77%
Demand	Annually (m3)	
	Average daily (m3)	
	Peak daily (m3)	
	Minimum daily (m3)	
	Infiltration	
Sustainability	Ultimate discharge point	Land and surface water based treatment. Ultimately discharged to Te Waihora/Lake Ellesmere.

8.2 Key Issues

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

Table 8-1 Leeston Scheme Issues

What's the Problem	What we plan to do
Significant infiltration and inflow is experienced during wet weather	Target renewals to address infiltration and investigate sources of infiltration
Capacity to meet growth demands	Construct capital upgrades to meet growth demands

8.3 Overview & History

Leeston Township is located in an area lower than the surrounding land and soakage is very poor. Ground water levels vary from 1.5m in summer to 0.3m below ground level in winter. In 1975 reticulation and an oxidation pond were installed to replace a "night cart" service for the township and sullage that went to local waterways (Tramway Reserve Drain) from side channels.

In 1993 both pump stations were substantially upgraded along with installation of an aeration pond to increase treatment capacity. In 2003 further extension of the treatment system occurred with additional ponds and the upgrading of the wastewater disposal system.

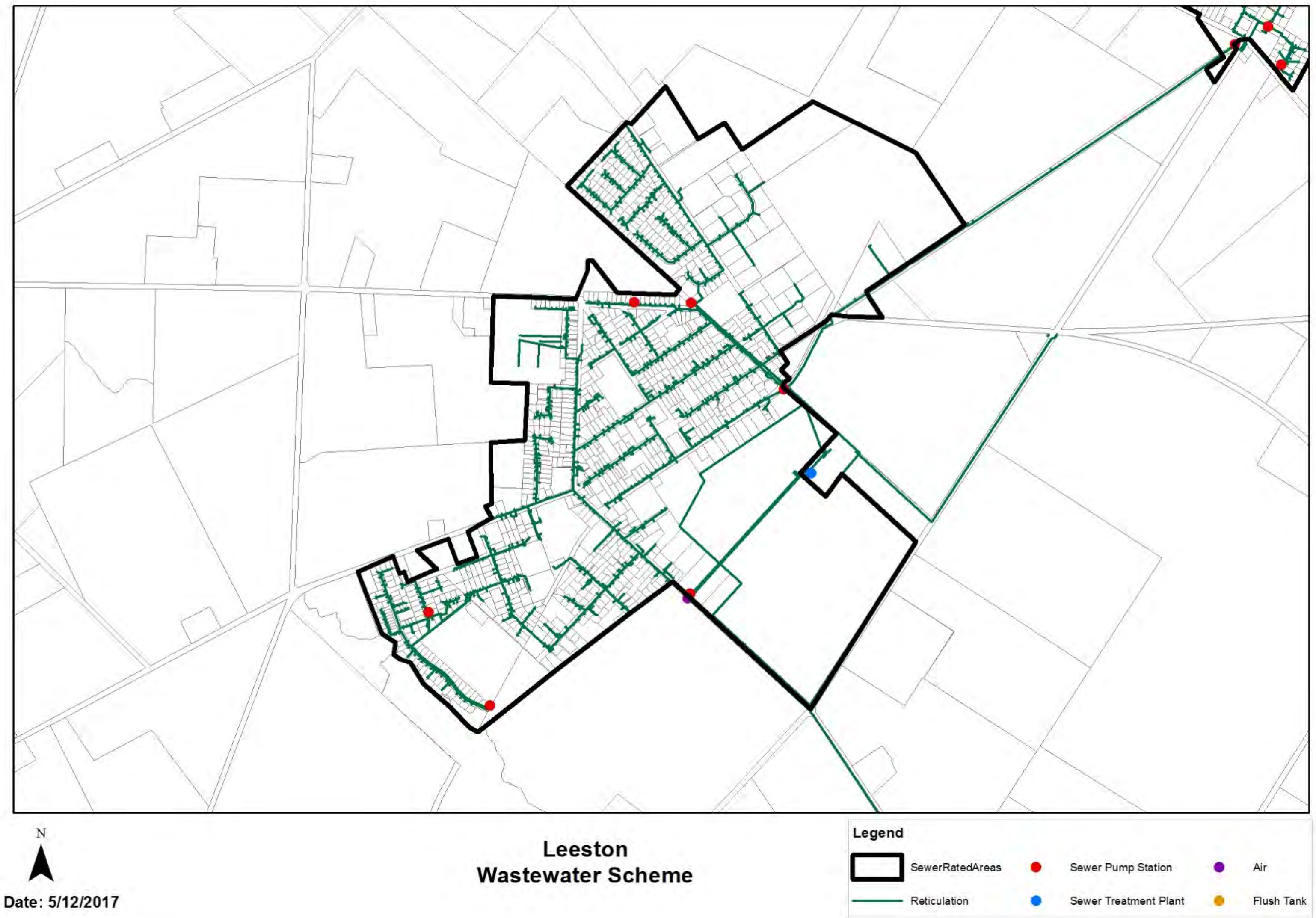


Figure 8-1 Scheme Map

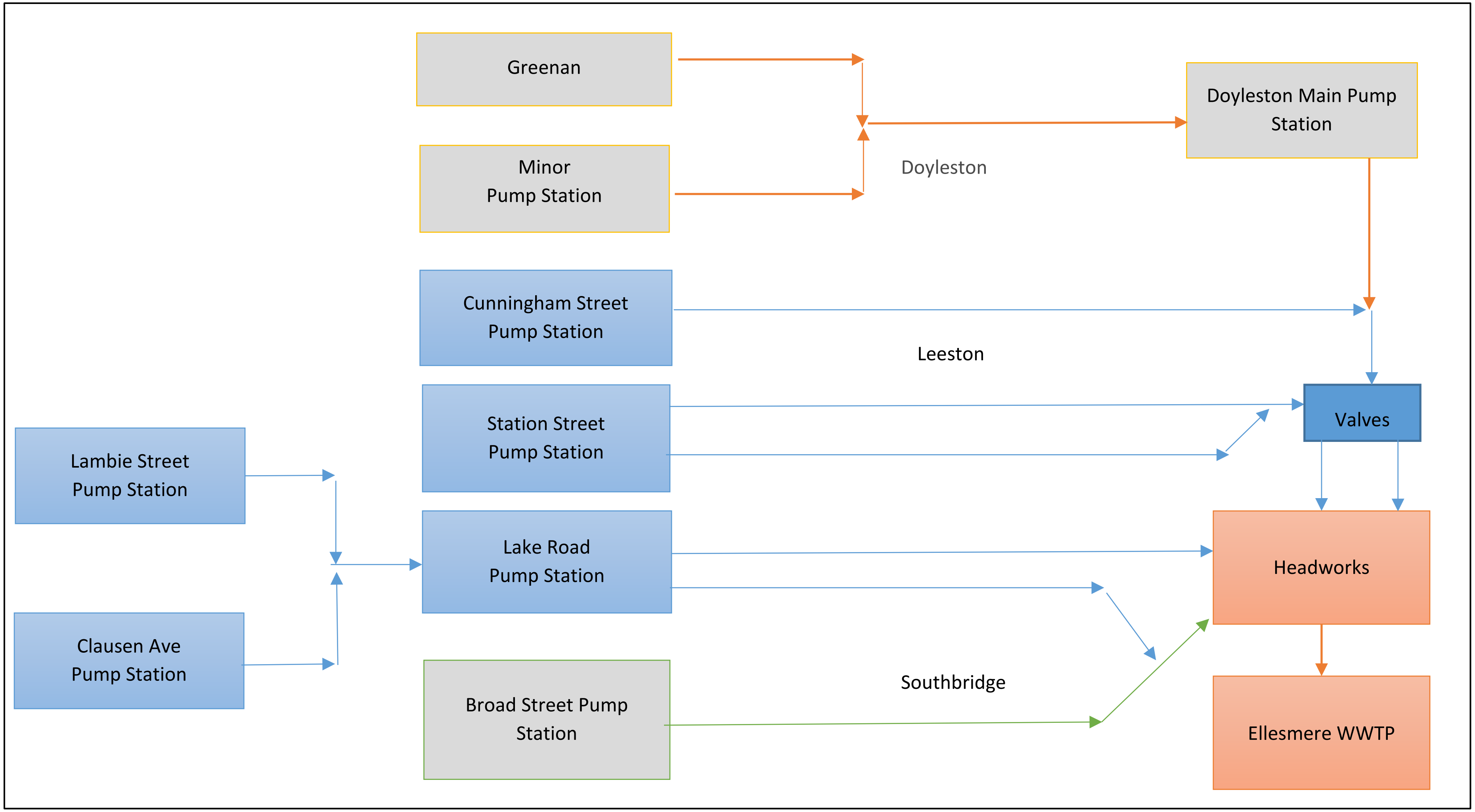


Figure 8-2 Scheme Schematic

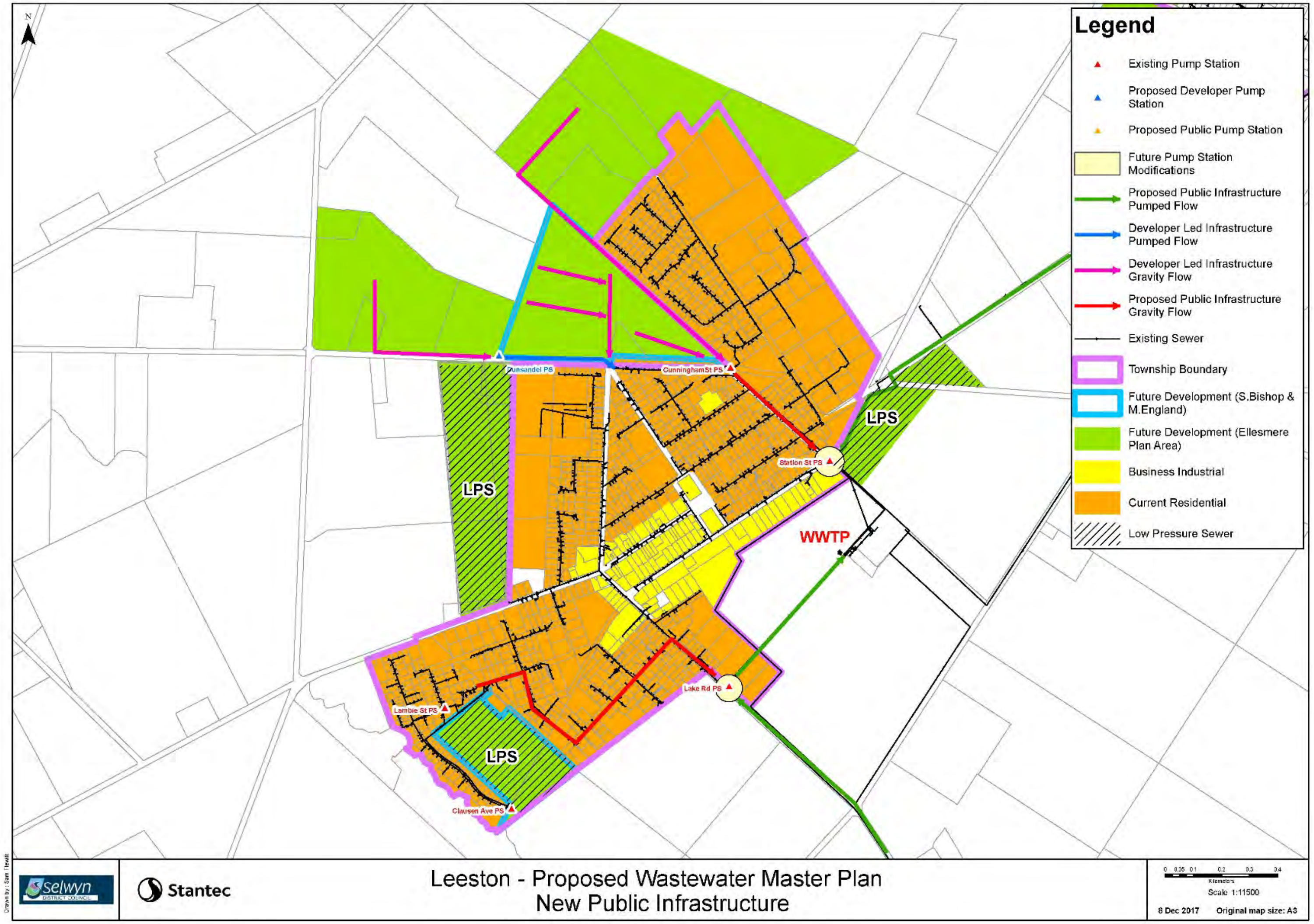


Figure 8-3 Leeston Master Plan

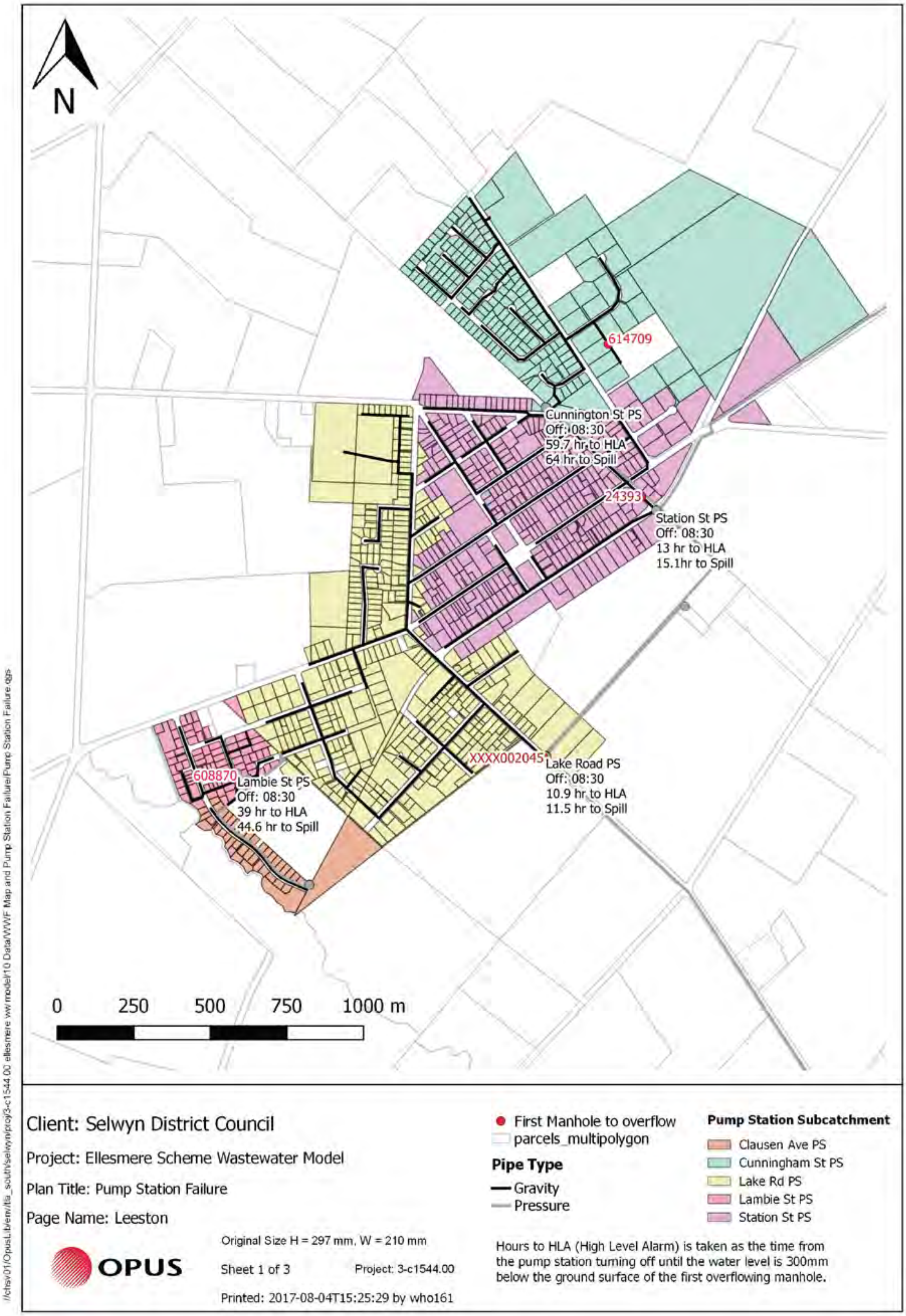


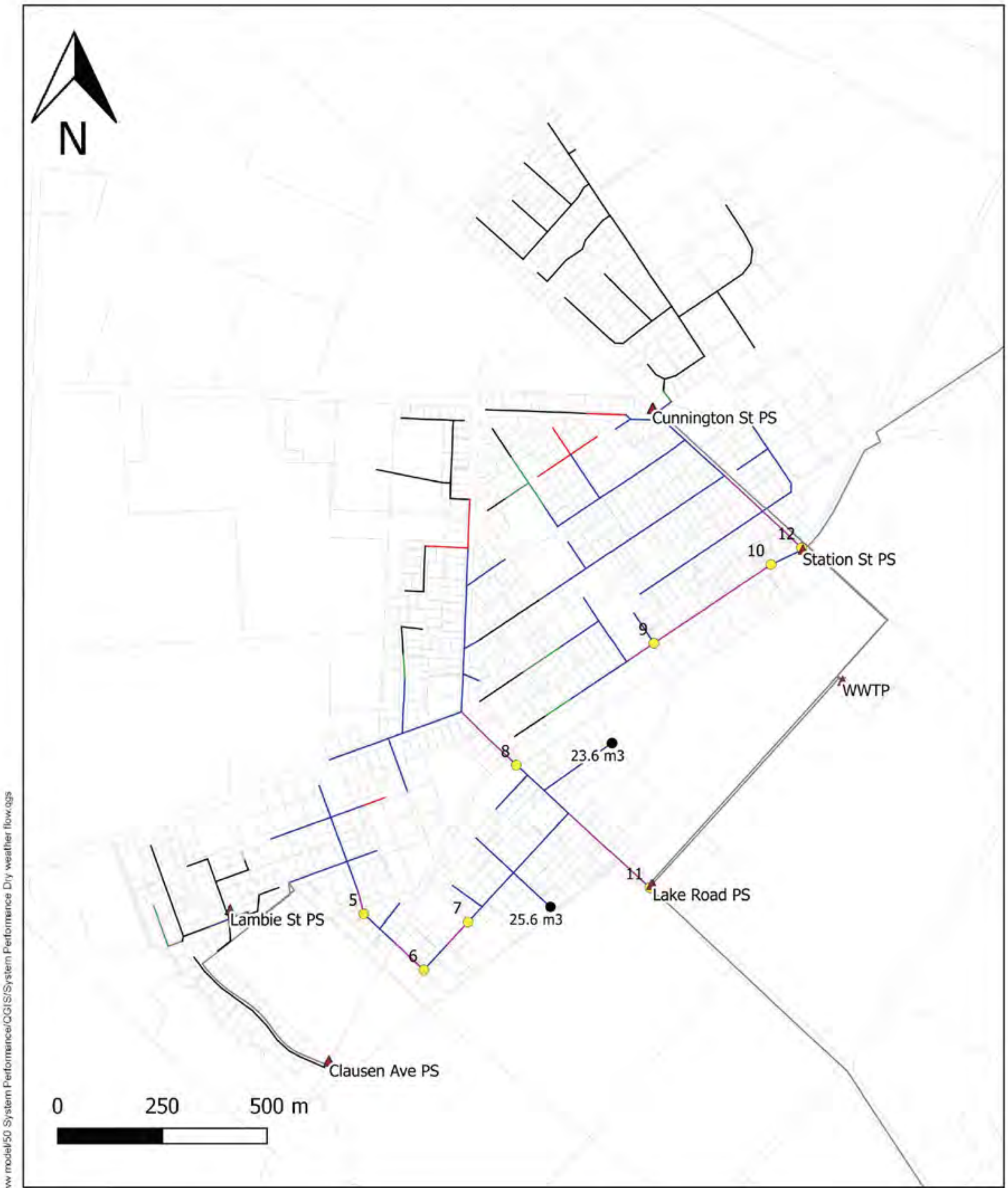
Figure 8-4 Pump Station Failure Map

8.4 System Capacity

Flows from Leeston, Doyleston and Southbridge schemes are treated at the Leeston Wastewater Treatment Plant. The Doyleston, Leeston and Southbridge schemes are operating within the maximum design limits occasionally reaching the design flow maximum for the current population.

Master planning work for the network has been completed. Refer Figure 8-3 Leeston Master PlanFigure 8-3

Section 8.6.2 provides pump station capacity information.



Client: Selwyn District Council

Project: Ellesmere Scheme Wastewater Model

Plan Title: WWF Capacity Categorisation

Page Name: Leeston

OPUS

Original Size H = 297 mm, W = 210 mm

Sheet 1 of 3 Project: 3-c1544.00

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Parcel Boundaries
Pinch Point(labelled with Pinch ID)
Overflow - Volume in cubic metres

WWF Capacity Categorisation

- Excluded - Pressure pipe
- Flow Depth < 50% of pipe diameter
- 50% < Flow Depth < 70% of pipe diameter
- 70% < Flow Depth < 100% of pipe diameter
- Pipe surcharged by backwater condition (HGL less steep than pipe grade)
- Pipe surcharged due to limited capacity (HGL steeper than pipe grade)

Figure 8-5 Wet Weather Flow Capacity Map

8.5 Resource Consents

Leeston township is part of the Ellesmere scheme. Therefore, all wastewater is pumped to the Ellesmere Treatment Plant located in Leeston. The resource consents required for this treatment plant are in the Ellesmere section of this plan.

8.6 Scheme Assets

A summary of the assets within this scheme is outlined in this section.

8.6.1 Reticulation Overview

A summary of material and diameter for pipes is shown in Figure 8-6 and Figure 8-7.

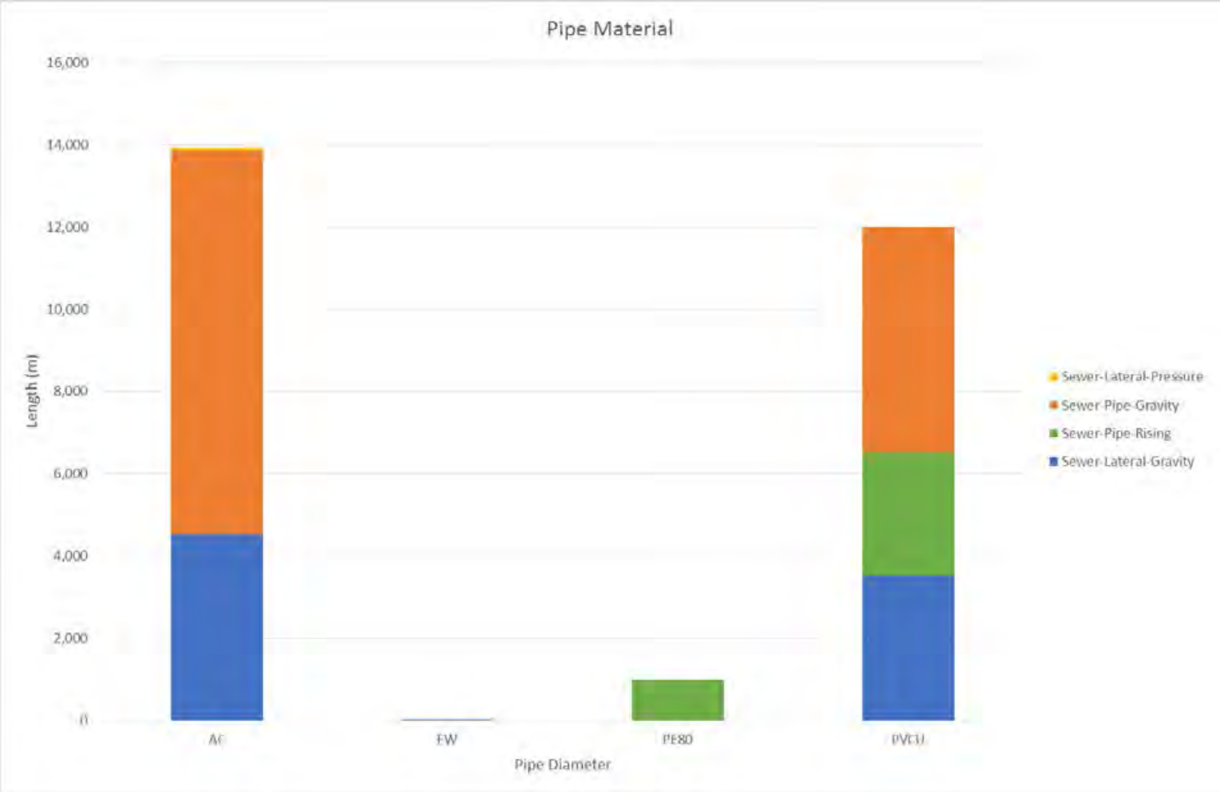


Figure 8-6 Pipe Material - Leeston

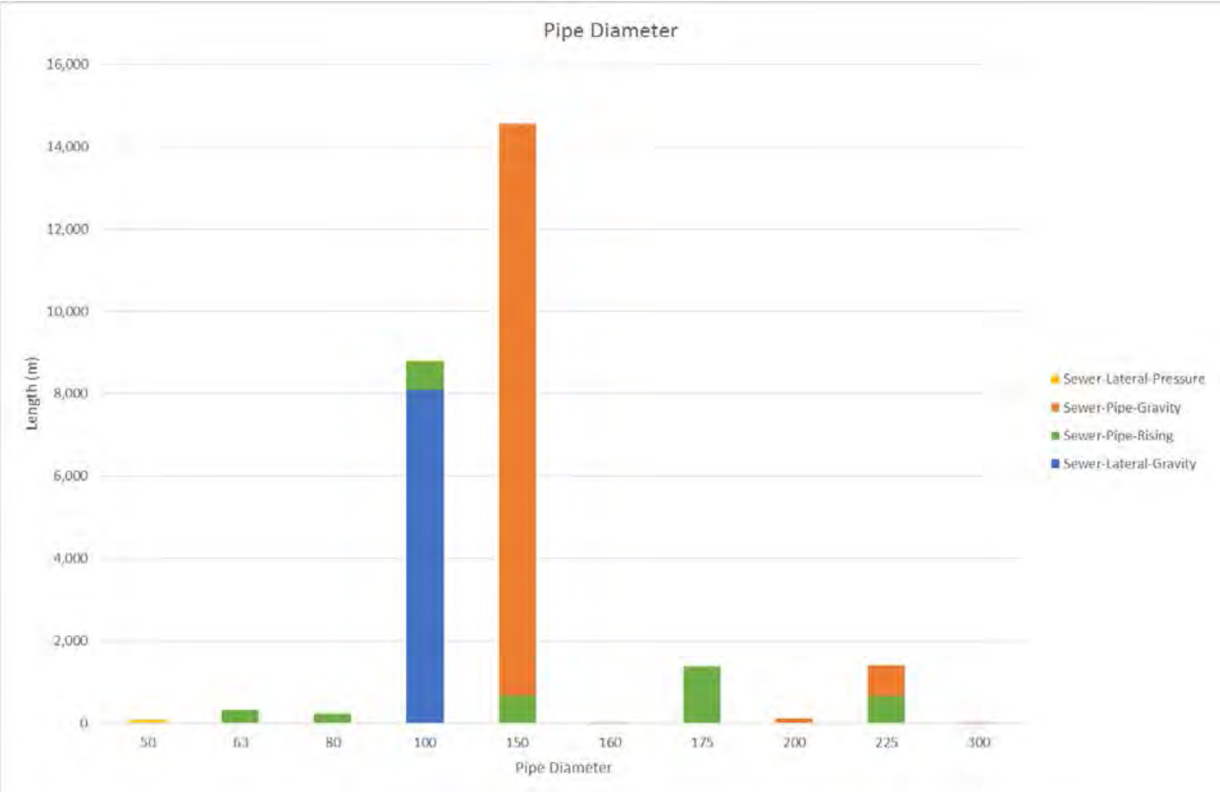


Figure 8-7 Pipe Diameter - Leeston

8.6.2 Pump Stations

There are five pump station within the Leeston Scheme, these pump to Leeston WWTP. Details are tabled below in Table 8-2.

Table 8-2 Pump Stations

Site Name	Wet well dimensions	Wet Well area (m^2)	Wet Well Depth (m)	No of pumps	Pump curve used	Recorded Flow (L/s)	Model Pump Rate (L/s)	ADWF (L/s)	PDWF (L/s)
Leeston (S) Cunningham St	1800 Ø	2.5	6	2	Flygt NP3153 13.5 kW	40	37.5	0.4	0.6
Leeston (S) Lambie St	900 Ø	0.6	4	2	Flygt NP3085 2.4 kW	7.5	7.5	0.4	1.1
Leeston (S) Clausen Avenue	1500 Ø	1.8	5	2	Flygt NP3085 2.4 kW	8	8	0.006	0.02
Leeston (S) Station St	2100 Ø	3.5	3.5	2	Flygt NP3127 437 5.9 kW Flygt NP3153 MT433 9 kW	36	32.4	1.6	4.1
Leeston (S) Lake Rd	1800 Ø	4.2	3.5	2	Flygt NP3127 437 5.9 kW Flygt NP3153 HT456 9 kW	N/A	20.4	2.3	6.1

Table 8-3 Pump Station Storage Time Analysis

Pump Station	Town	Hours until HLA reached	Hours until first spill	Spill Level (m AD)	Spill Location – Model ID
Leeston (S) Cunningham St	Leeston	111	123	19.760	614709
Leeston (S) Lambie St	Leeston	40	45.6	20.409	608870
Leeston (S) Clausen Avenue	Leeston	-	-	-	-
Leeston (S) Station St	Leeston	9.55	12	18.240	24393
Leeston (S) Lake Rd	Leeston	4.6	6	17.798	xxxx002045

HLA = High Level Alarm. The table assumes the pump station fails at 8:30am with peak flow occurring at 9am.

8.6.3 Rising Mains

Site Name	Material	Pressure Rating	Internal diameter (mm)	Comment
Cunningham to WWTP	PVCU	PN12	180	
Lake Road to WWTP	PVCU/PE80	PN12/PN8	135	Assumed pressure rating on DN150 rising main
Clausen Avenue	PVCU	PN12	102	
Lambie St	PVCU	PN9	81	

8.7 Operational Management

The wastewater schemes are operated and maintained under the maintenance contract 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.

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

8.8 Photos of Main Assets

Photo 1 - Station Street Pump Station

Photo 2 – Lake Road Pump Station

8.9 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. There were no risks identified for this scheme.

8.10 Asset Valuation Details

The total replacement value of assets within the Leeston Scheme is $17,350,919 as detailed in Table 8-4 below. This includes the valuation details for the Ellesmere Sewerage Scheme which is situated in Leeston.

Table 8-4 Replacement Value, Leeston

Asset Class 1	Asset Class 2	Sum of Replacement Value
Plant and Equipment		$6,504,458
Wastewater Reticulation	Chamber	$1,423
	Lateral	$2,611,278
	Manhole	$1,407,693
	Pipe	$6,775,079
	Valve	$50,987

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

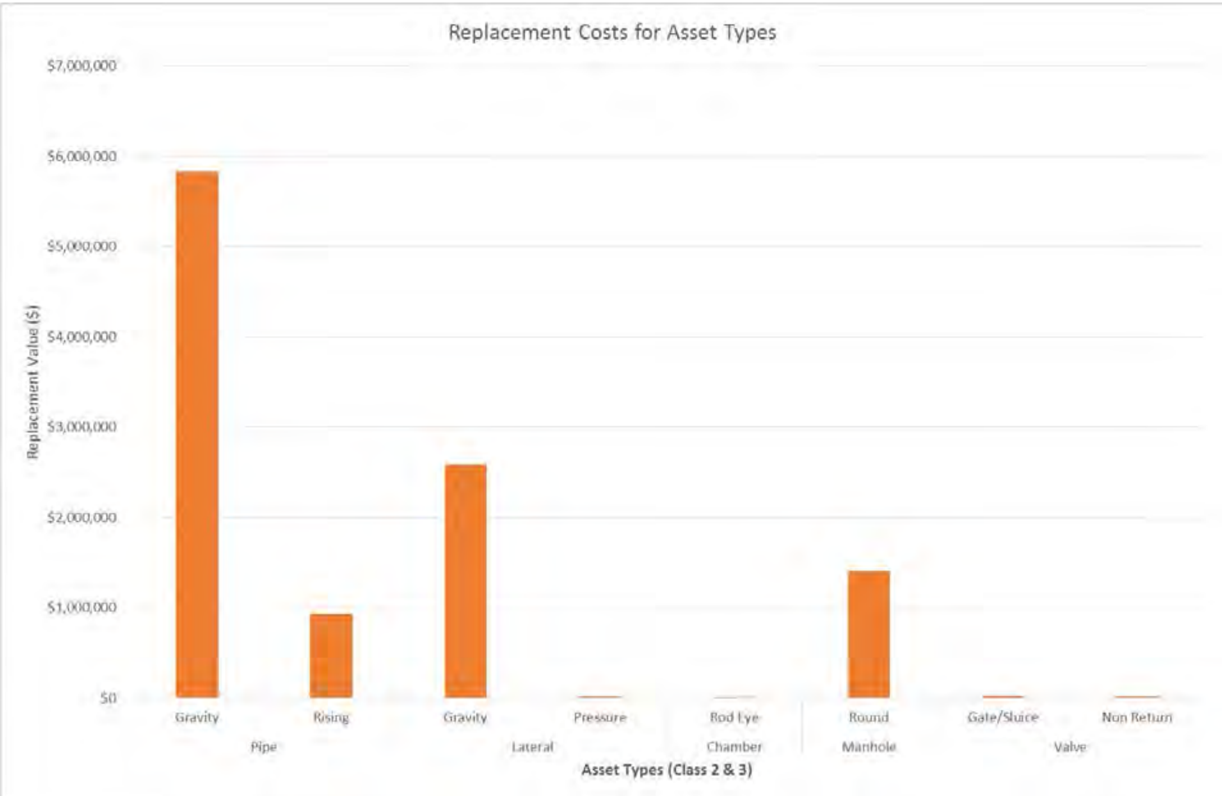


Figure 8-8 Replacement Costs for Leeston

8.11 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 8-9 below.

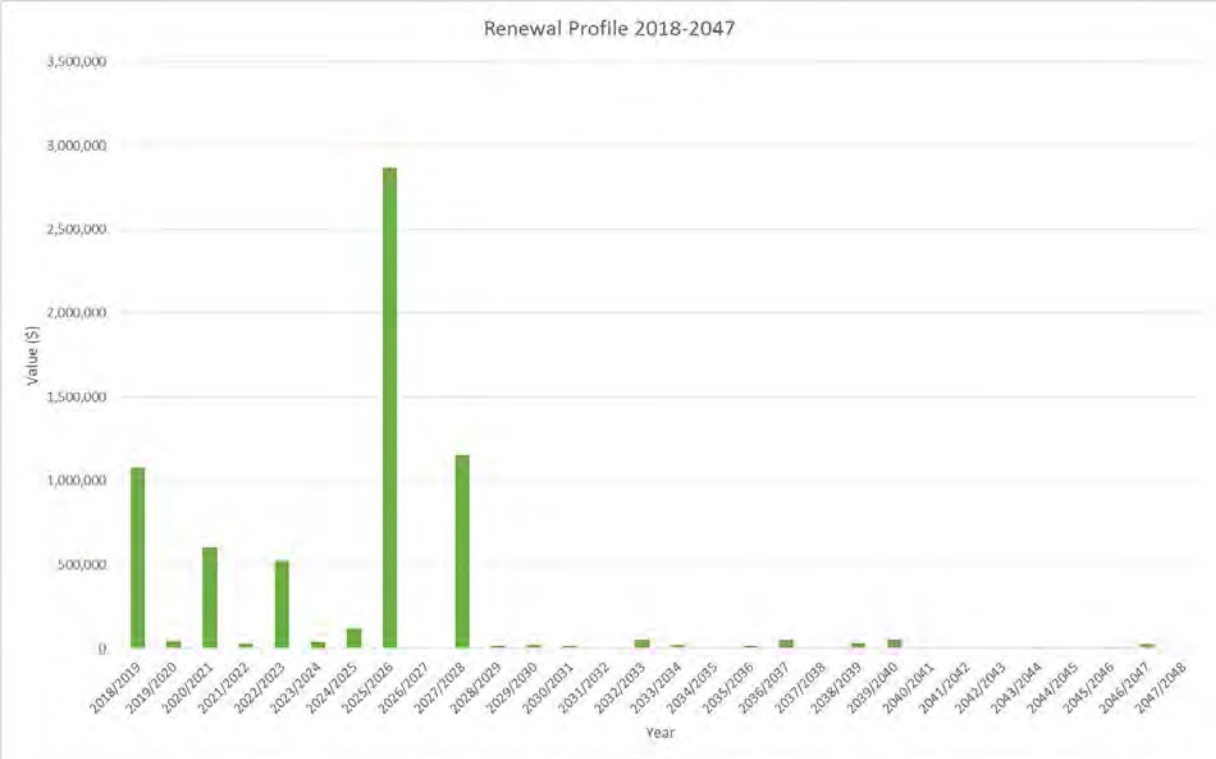


Figure 8-9 Leeston Wastewater Renewal Profile

8.12 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 8-5 and Figure 8-10 below shows the calculated criticality for all of the assets within this scheme that have a recorded known length.

Table 8-5 Length of Assets per Criticality Level

Criticality Bands		Length (m)
5	Low	17,700
4	Medium-Low	6,878
3	Medium	1,911
2	Medium-High	1,250
1	High	171

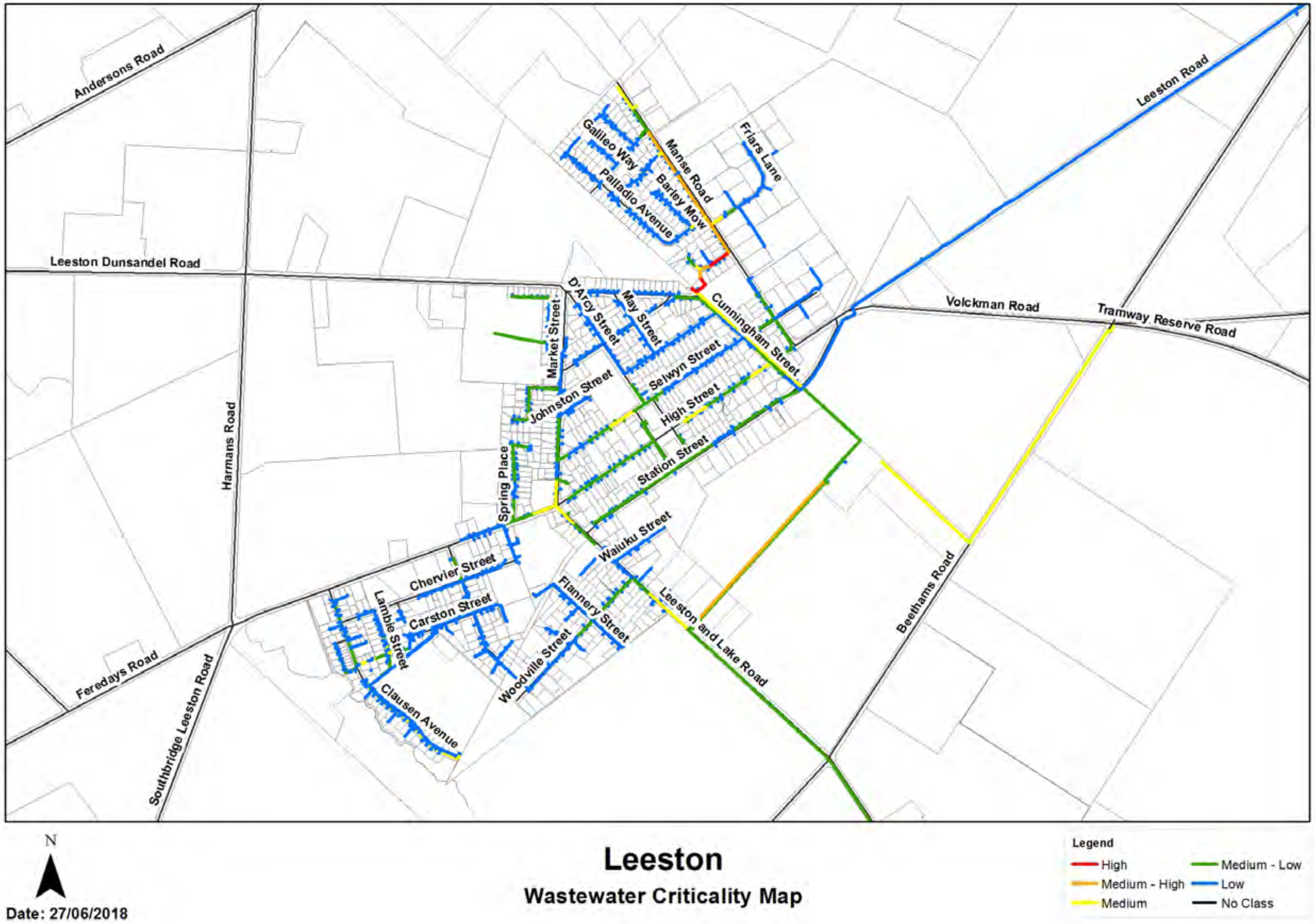


Figure 8-10 Criticality Map

8.13 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 and it provides details of how the model has been calculated for the reticulation assets (particularly pipes). Figure 8-11 below shows the level of asset condition for all of the assets within this scheme that have a recorded known condition.

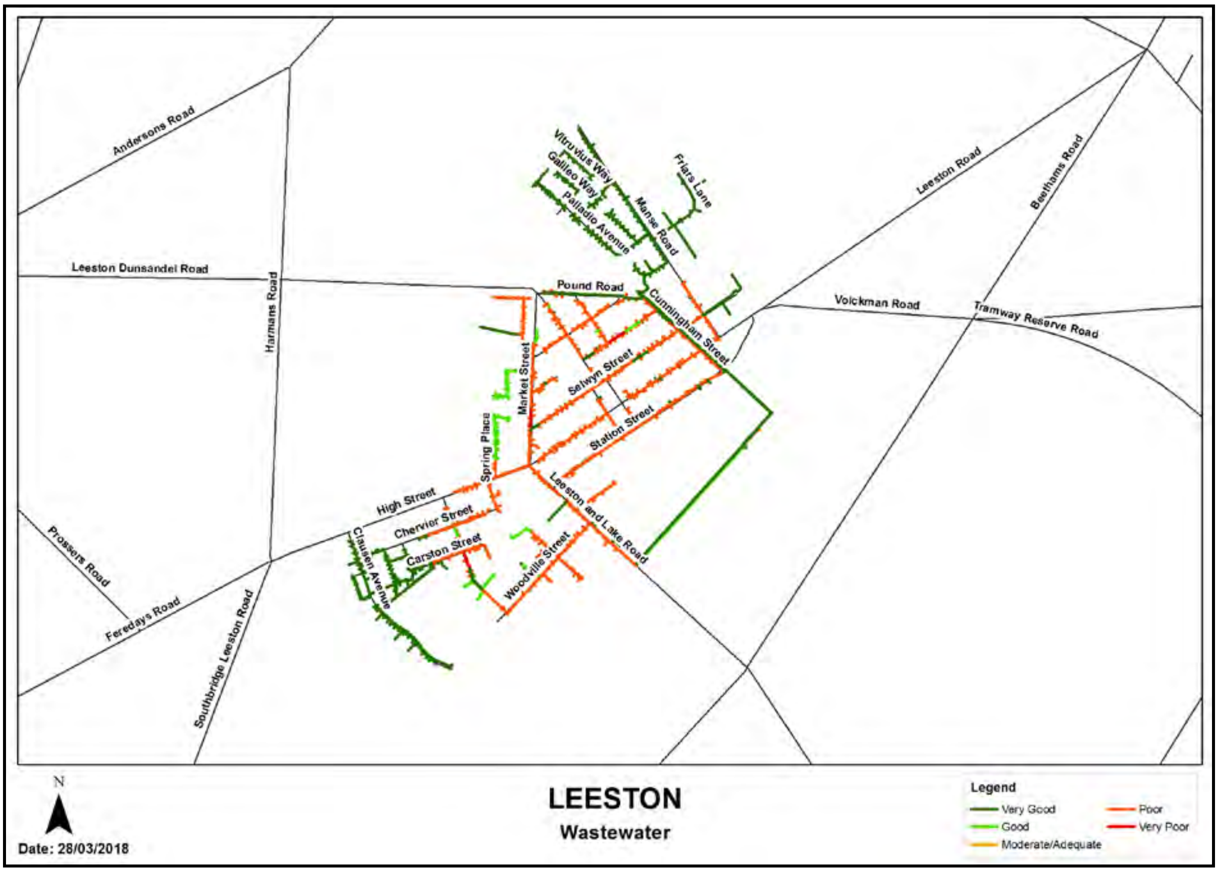


Figure 8-11 Asset Condition - Leeston

Table 8-6 provides a description of the condition rating used within the condition model.

Table 8-6 Asset Condition Grading

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

8.14 Funding Program

The 10 year budgets for Leeston and the Ellesmere Sewerage Scheme are shown by Table 8-7 and Figure 8-12. 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 8-7 Leeston Budget Summary

Years	Expenditure	Renewals	Projects	Capital Projects
2018/2019	$120,475	1,079,833		532,576
2019/2020	$120,943	47,897		300,000
2020/2021	$121,402	606,725		356,553
2021/2022	$121,853	27,000		170,000
2022/2023	$122,297	524,097		
2023/2024	$122,804	39,475		
2024/2025	$123,302	118,707		
2025/2026	$124,537	2,870,131		
2026/2027	$124,162			
2027/2028	$125,402	1,155,091		
Total	$1,227,176	6,468,956		1,359,128

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.

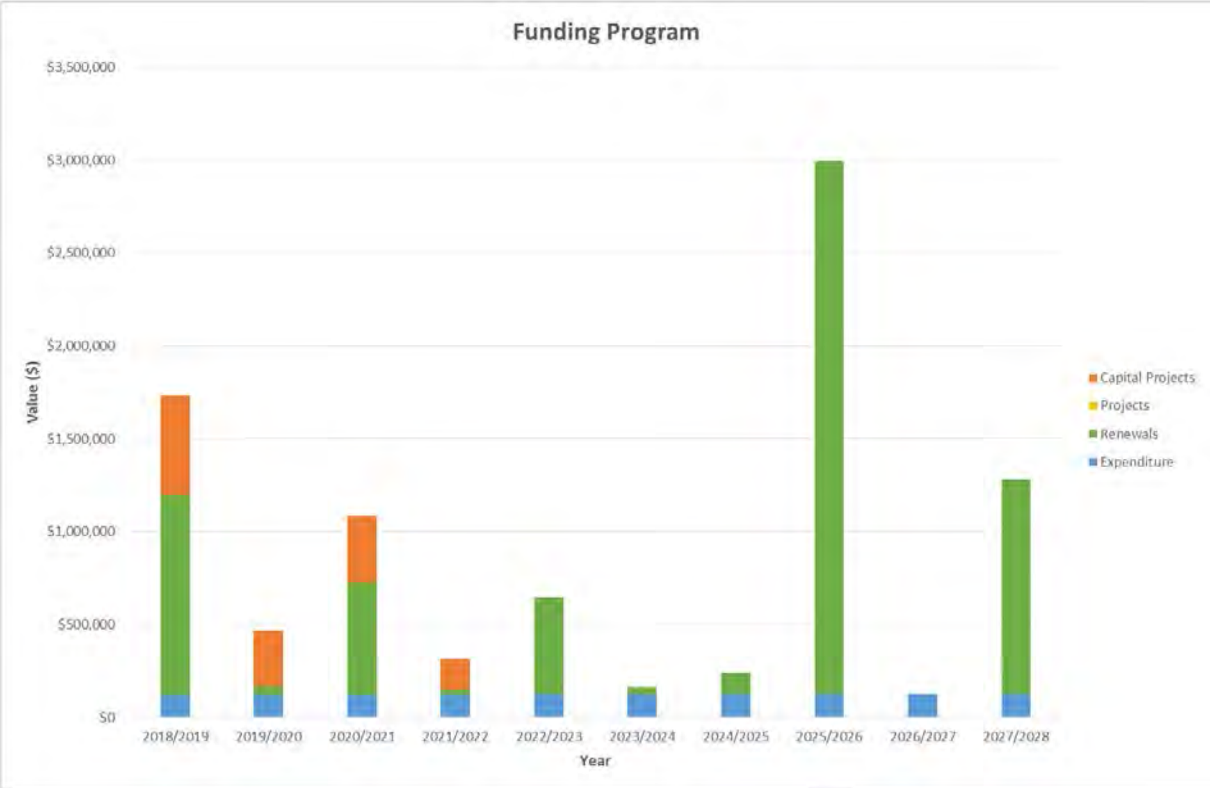


Figure 8-12 Leeston Funding Summary

There are three major projects for Leeston Wastewater scheme in the LTP budget.

Table 8-8 Key Projects

Account Label	GL	Description	Year 1 ($)	Year 2 ($)	Year 3 ($)	Years 4 to 10	Funding Split
Capital Projects	464490053	Pipeline Upgrade	$300,788	$250,000	$106,553	$170,000	100% G
Capital Projects	464490054	PS Clausen Ave	$231,788				100% G
Capital Projects	464490055	Lake Rd PS Upgrade		$50,000	$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.

9.0 LINCOLN WASTEWATER SCHEME

9.1 Scheme Summary

Description		Quantity
Estimated Population Served		**5,494**
Scheme Coverage (1 Jan 18)	**Full Charges**	**1930**
	Half Charges	**530**
	>1 Charges	**32**
System Components	**Piped (m)**	**82431.71**
	Manholes (No.)	**684**
	Pump Stations (No.)	**9**
	Treatment	**N/A (to Pines WWTP)**
	Disposal	**N/A (to Pines WWTP)**
History	**Original scheme installation date**	**1964**
Value ($)	**Replacement Cost**	**$43,335,546.56**
	Depreciated Replacement Cost	**$34,806,926.77**
Financial	**2018/2019 Estimate** **Annual maintenance cost** **% of total**	**$185,100** **5.79%**
Demand	**Annually (m3)**	
	Average daily (m3)	
	Peak daily (m3)	
	Minimum daily (m3)	
	Infiltration	
Sustainability	**Ultimate discharge point**	**To Pines WWTP Land Disposal**

9.2 Key Issues

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

Table 9-1 Lincoln Scheme Issues

What's the Problem	What we plan to do
Significant infiltration and inflow is experienced during wet weather	Target renewals to address infiltration and investigate sources of infiltration
Meeting growth demands	Capital upgrades as required to meet growth demands

9.3 Overview & History

In 1986 an oxidation pond with discharge to the LII River was installed with subsequent closure of the previously used Pasveer treatment plant. (Marion Place)

In early 1991 a Council Project Team recommended and received approval for the installation of aeration tanks that could be converted to a Sequential Batch Reactor (SBR) system. Three aeration tanks were installed and commissioned in 1993 but SBR's were not installed

A Council led Project Team was set up in the mid 1990's to consider the options for wastewater treatment and disposal as the consent for discharge to the Lll was due to expire.

An agreement between Selwyn District Council and Christchurch City Council was signed in November 1997 allowing pumping of treated wastewater from Lincoln Sewage Treatment Plant to Christchurch City's sewerage scheme. The permitted period of pumping was from 6pm to 4am at a maximum flow rate of 50L/sec. The maximum volume of discharge was 1,200,000m^3 in each financial year. In 1998 construction of the pump station and rising main from Lincoln through to Christchurch city sewer reticulation was completed.

The growth of Prebbleton and Lincoln was limited by the discharge restrictions as defined in the CCC agreement. Without an alternative solution being adopted, no further growth could occur. Similarly for Rolleston, there would be limited growth without greater capacity of treatment and conveyance being constructed in accordance with the master plan, even on a standalone basis. Council therefore decided to investigate the options available for servicing the wider community to meet current and future needs, and subsequently formed the basis for the establishment of the Eastern Selwyn Sewerage Scheme.

From December 2012 Lincoln township wastewater treatment and disposal has been undertaken at the Pines WWTP (Rolleston) as part of the Eastern Selwyn Sewerage Scheme (refer Section 5.0). The Lincoln oxidation pond is now only used as a contingency measure in emergency situations for buffer storage.

2010/2011 Earthquakes

The 2010/2011 earthquakes had a minor impact on the scheme's below ground infrastructure. Several deep lateral connections separated but were repaired. Based on visual assessment (CCTV and qualified staff) no other damage to the below ground infrastructure or resulting effects e.g. blockages have been detected. There may however be long term but intangible impacts on maintenance and renewals programmes.

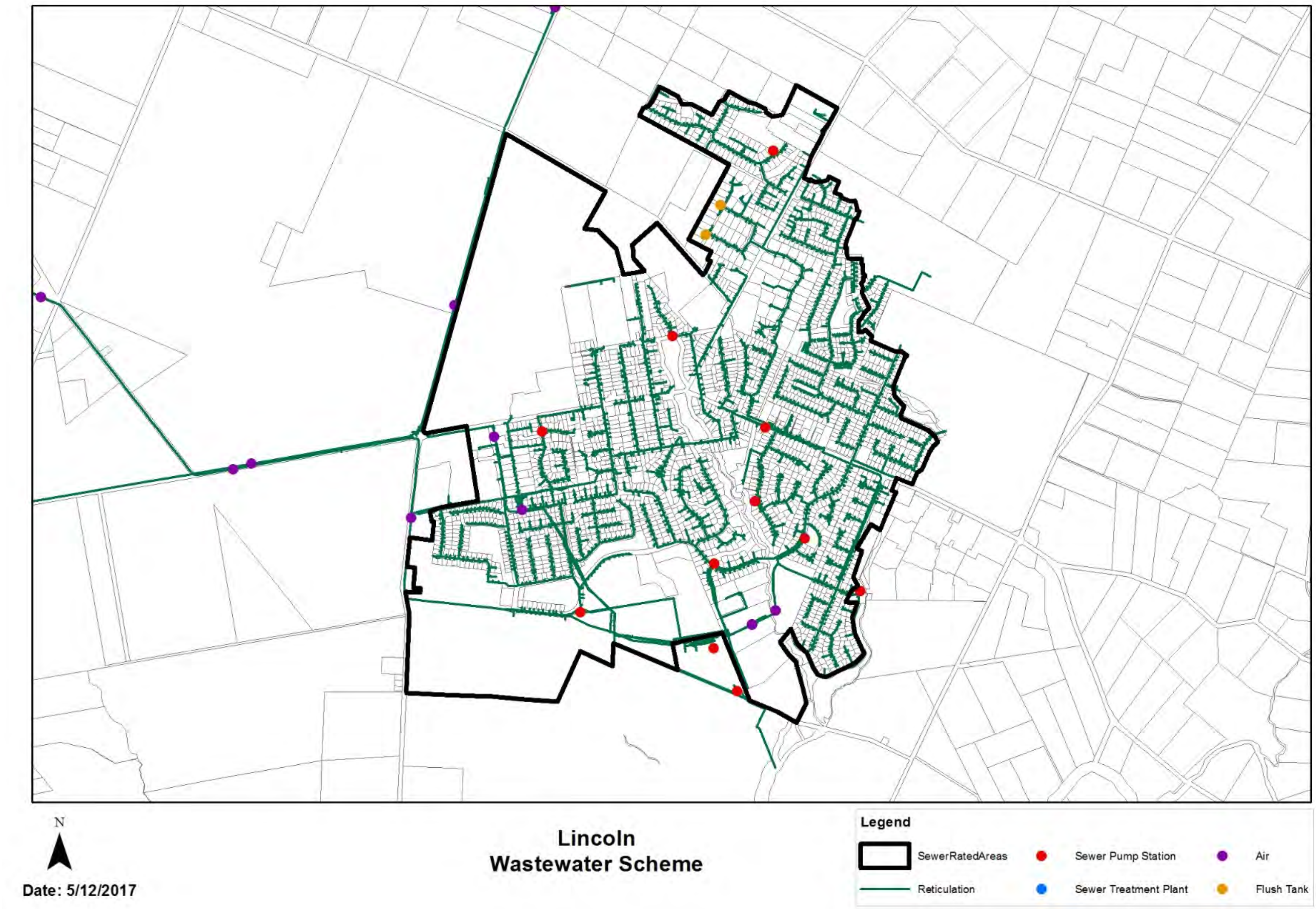


Figure 9-1 Scheme Map

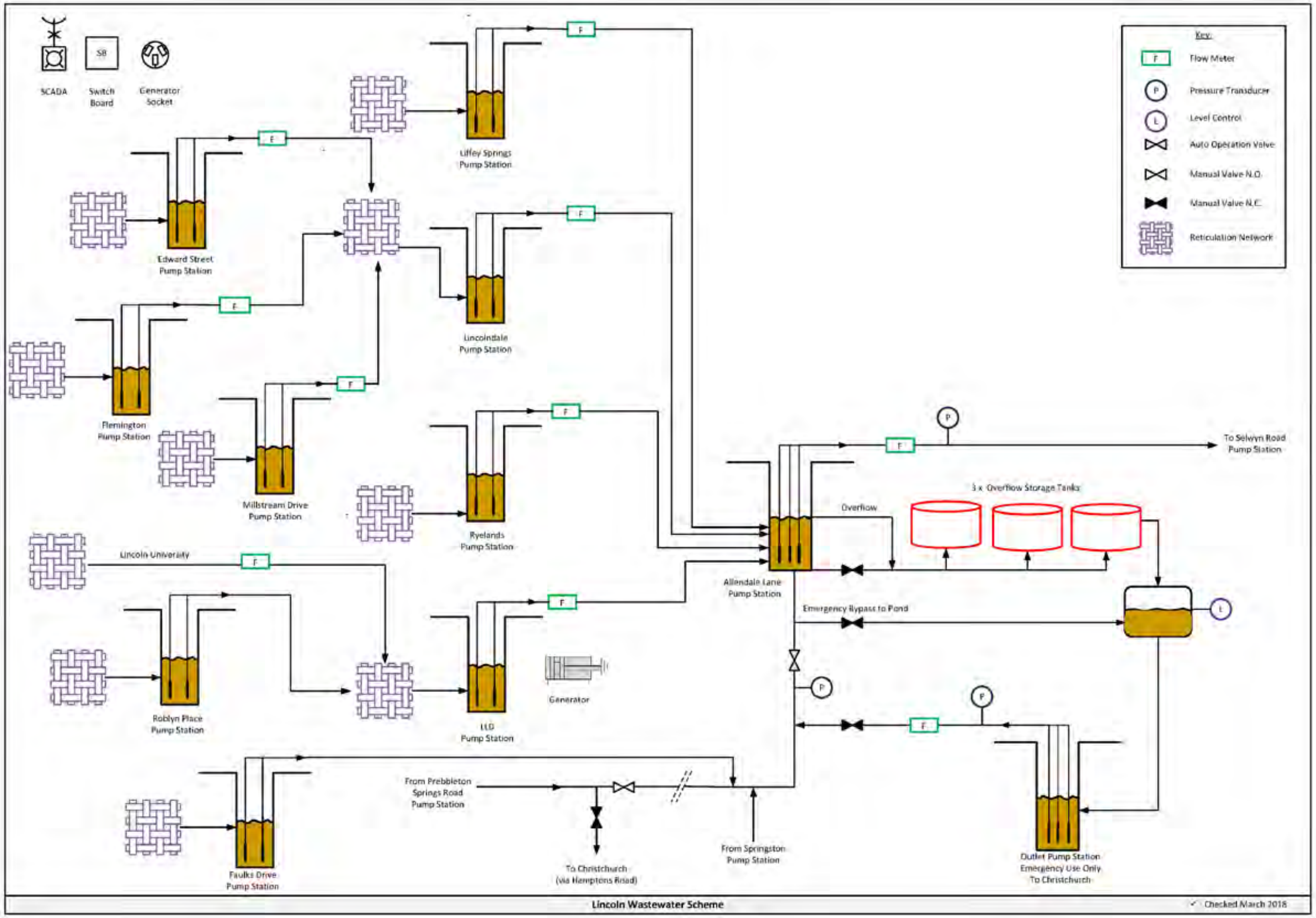


Figure 9-2 Scheme Schematic

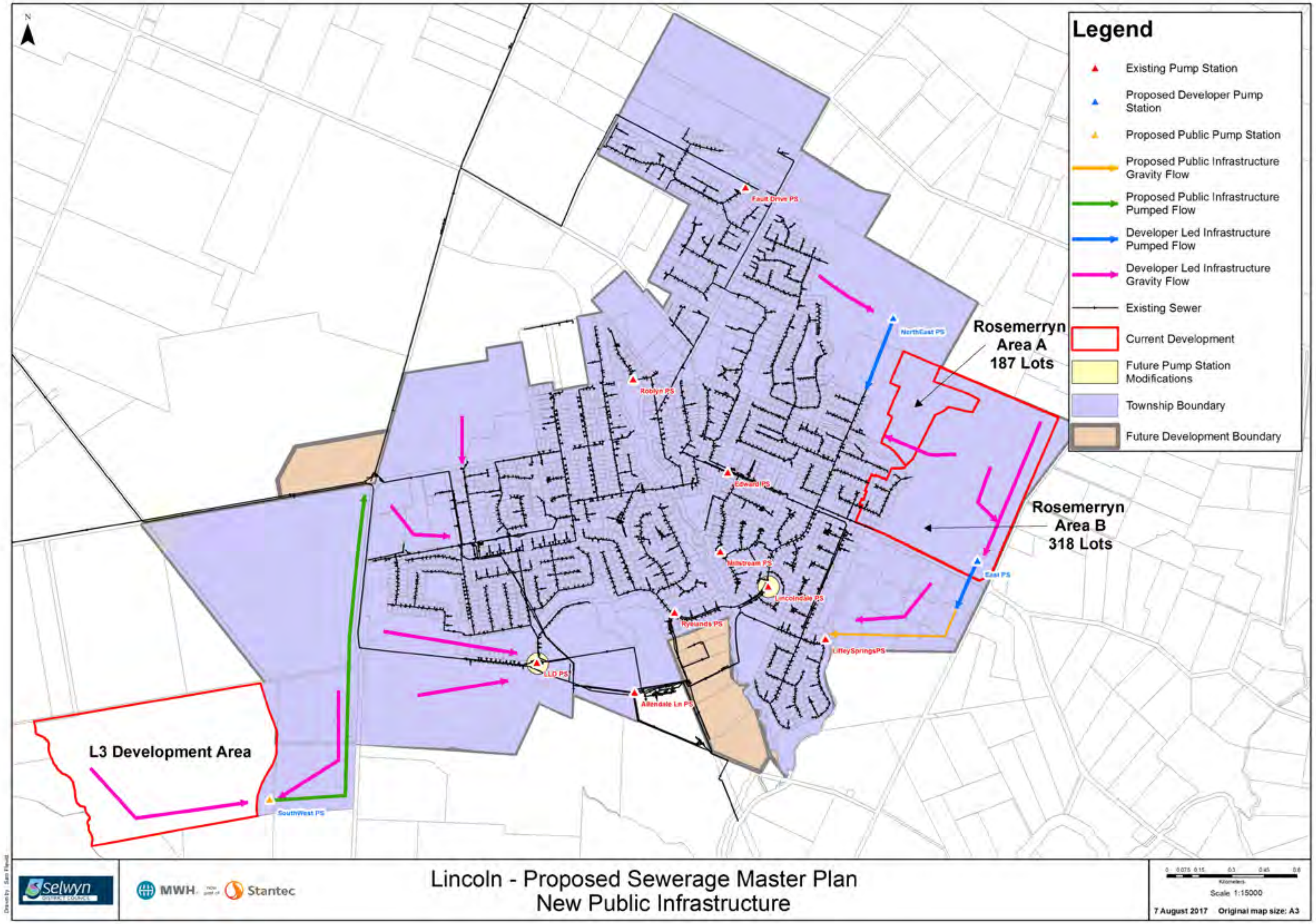


Figure 9-3 Lincoln Master Plan

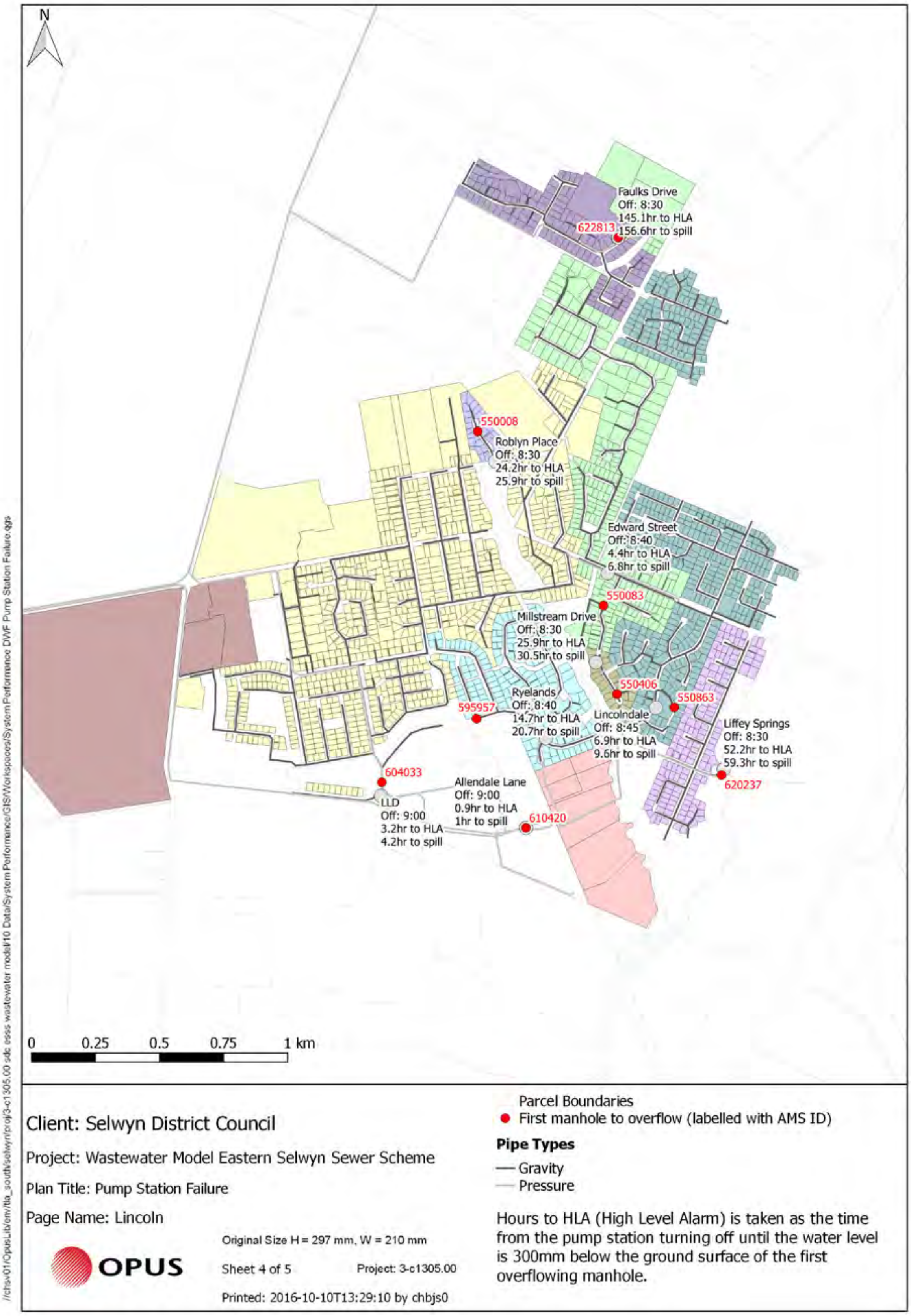


Figure 9-4 Pump Station Failure Map

9.4 System Capacity

In recent years there has been rapid residential growth in the Lincoln community. This has placed a strain on the existing wastewater collection system. Therefore, with the implementation of the ESSS, the wastewater system has been expanded in stages to meet the increasing flows. A wastewater masterplan has been established to structure the expansion of scheme to meet the timing of new development. The capacity of existing catchment pump stations, while not yet reached, will need to be monitored and upgraded as pump renewals are considered.

Figure 9-5 below outlines the projected population growth within Lincoln.

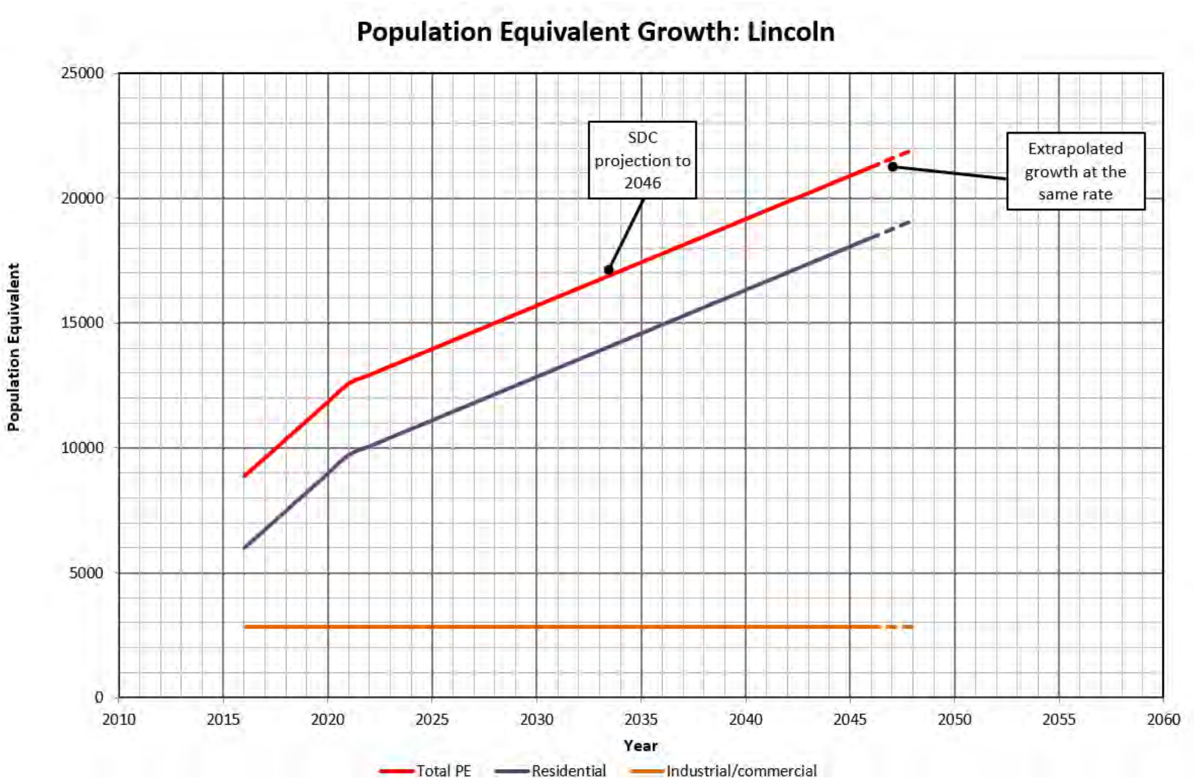


Figure 9-5 Projected PE growth – Lincoln

Emergency Storage

The oxidation pond operates at a normal operating volume of 55,000m^3 (7.0m). It can be raised to 7.6m or an additional 20,400m^3. This would allow for 5-7 wet weather days storage from Lincoln before discharge would have to occur.

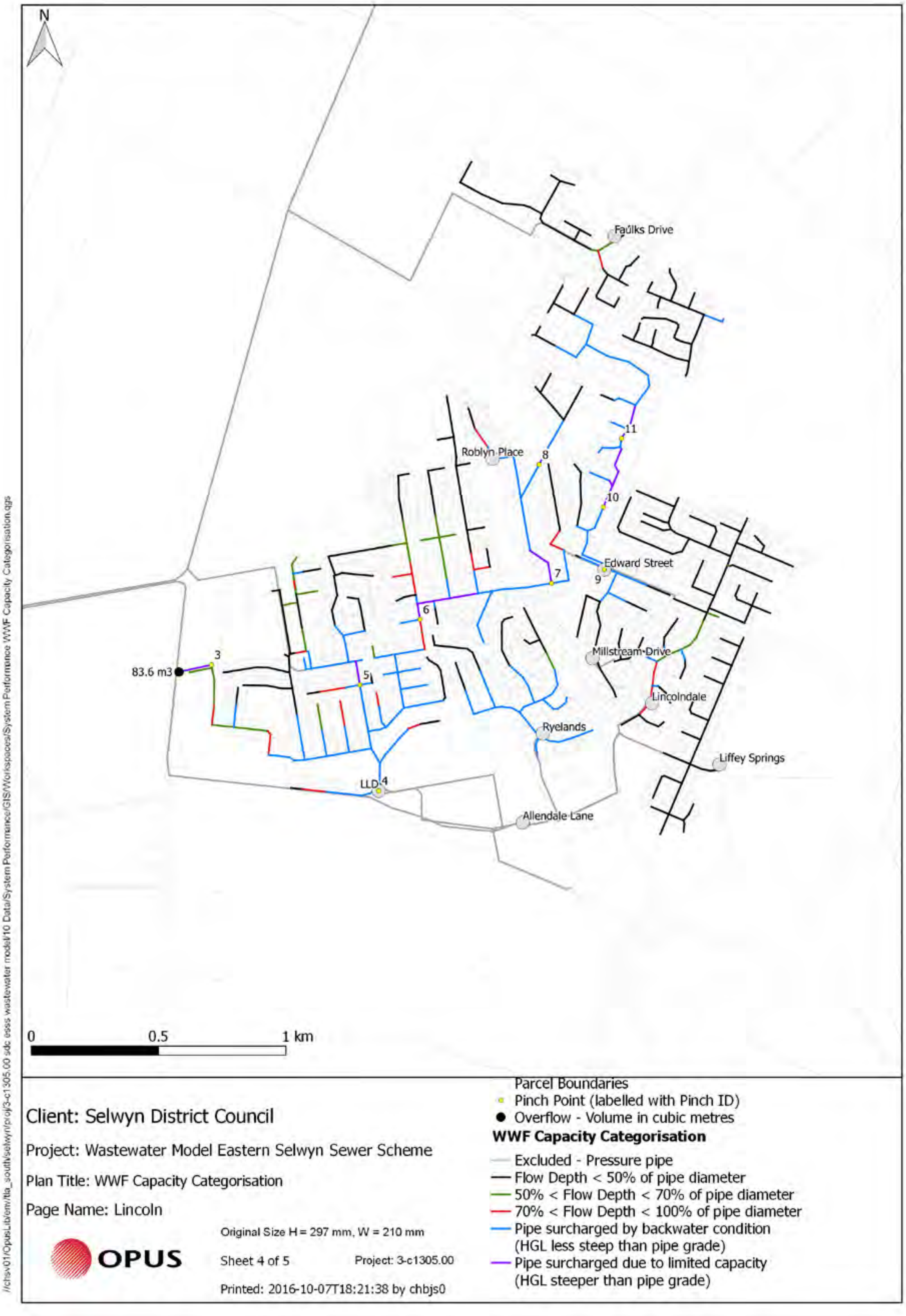


Figure 9-6 Wet Weather Flow Capacity Map

9.5 Resource Consents

The Lincoln wastewater scheme has a number of resource consents. Lincoln township is part of the ESSS scheme. Therefore, all wastewater is pumped to the Pines Treatment Plant located in Rolleston. The resource consents required for this treatment plant are in the ESSS section of this plan. Lincoln also holds a non-enforcement notice, shown in Table 9-2.

Table 9-2 Resource Consents

Consent	Description	Location	Date Issued	Expiry Date	Quantities
CRC145804 *Issued - Active*	To discharge to air from a sewage air valve	21 Allendale Lane, Lincoln	8-Apr- 14		

9.6 Scheme Assets

A summary of the assets within this scheme is outlined in this section.

9.6.1 Reticulation Overview

A summary of material and diameter for pipes is shown in Figure 9-7 and Figure 9-8.

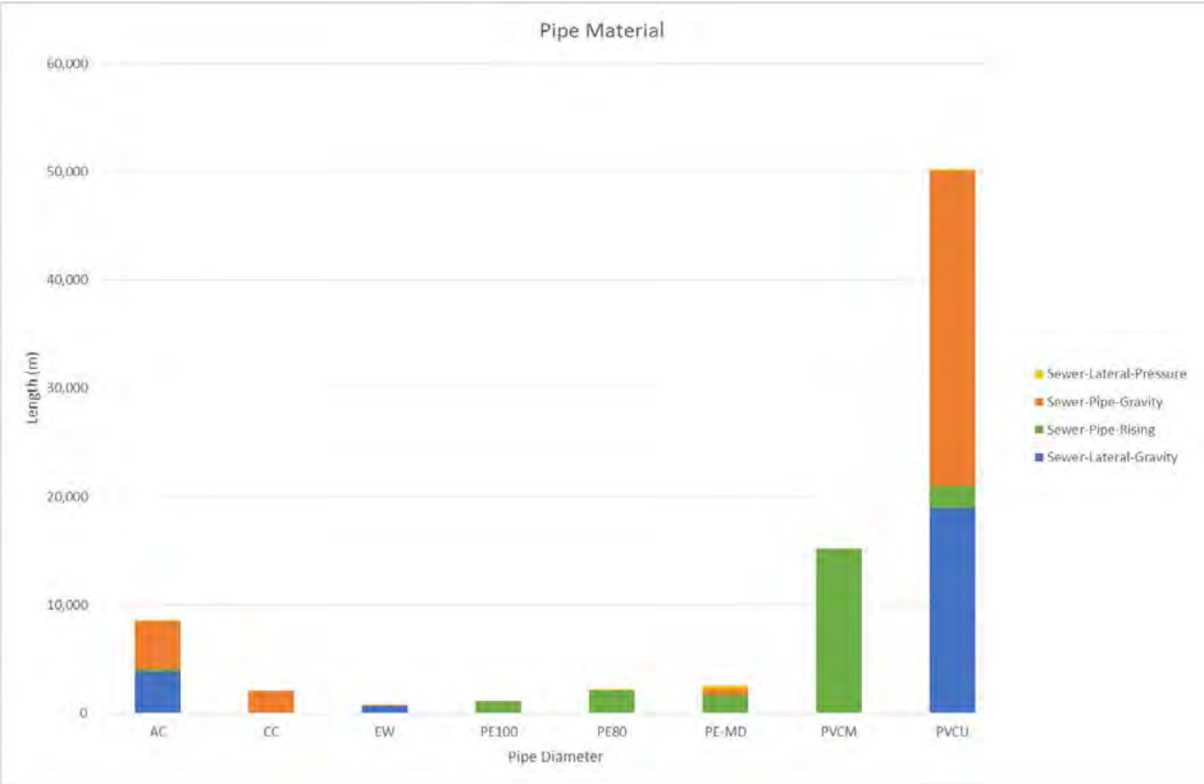


Figure 9-7 Pipe Material - Lincoln

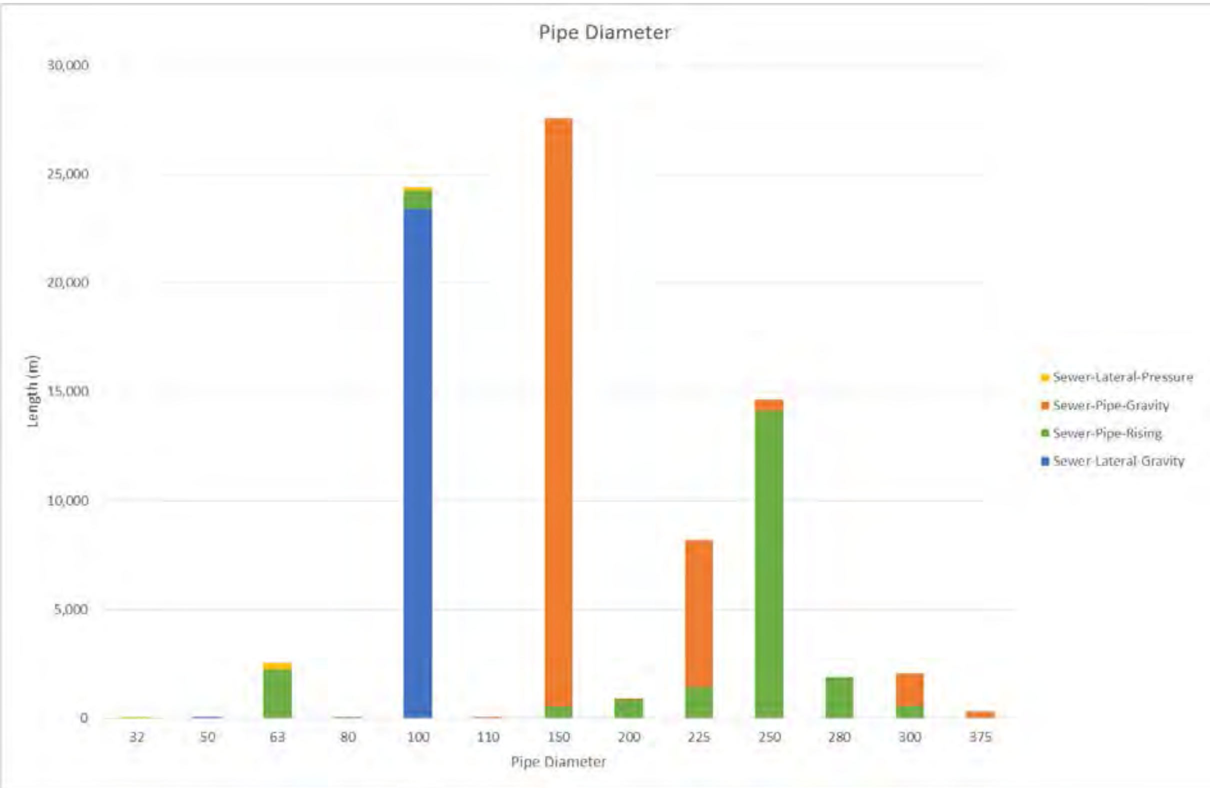


Figure 9-8 Pipe Diameter – Lincoln

9.6.2 Treatment and Disposal

Council has installed a bulk wastewater conveyance pipeline from Lincoln to the Rolleston Pines site via the Selwyn Road Pump Station (completed February 2012). This allows Prebbleton, Springston and Lincoln's sewage to be pumped to the Rolleston Pines site for treatment and disposal.

No decision has been made on relinquishing the discharge right accorded under the agreement between CCC and SDC.

Table 9-3 Treatment and disposal facilities

System	Description	Year Installed/ Upgraded
Aeration Tanks (Emergency Storage)	Three aeration tanks with aerators Now used for online, peak flow lopping being directly connected to the Allendale Lane PS	1991
Oxidation Pond (Emergency Storage)	Single stage pond of 3.2ha Acts as a storage buffer when inflows exceed Pines treatment capacity	1986
Pump Station to CCC system (Life line)	For disposal of treated wastewater via DN250 pipeline to CCC system at Hornby. Maximum permitted discharge is 50 L/s during a daily 10 hour period between 6 pm and 4 am. The wastewater discharge standard is 50g/m^3 BOD and 50g/m^3 suspended solids.	1998

Further reference to the treatment and disposal of Lincoln wastewater is described in Section 5.0.

9.6.3 Design

The wastewater collection system has been designed in accordance with the appropriate New Zealand engineering design guidelines at the time of construction and in accordance with the Selwyn District Council Engineering Design Standards. Specific designs for portions of the scheme outside of these standards have been considered where detailed engineering designs have been provided.

9.6.4 Pump Stations

There are currently a total of eleven pump stations, ten pump stations within the Lincoln reticulation and one pump station at the Lincoln treatment plant which has the ability to pump effluent to the Christchurch City reticulation. Details are tabled below.

Pump stations where the standby / assist pump is predicted to start have been highlighted in yellow and red for those that experience a peak wet weather response.

Yellow Pumps are can convey the peak flow without backing up the system

Red Pumps are unable to convey the peak flow causing the system to back up

Table 9-4 Pump Station Overview

Site Name	Wet well dimensions	No of pumps	Pump curve used	Recorded instantaneous pump rate (L/s)	Model Pump Rate (L/s)	ADWF (L/s)	PDWF (L/s)	PWWF 1 in 5 year ARI (L/s)
Lincoln (S) Edward St PS	1500Ø	2	Flygt 3127 181 MT439	22	19	1.5	3.8	23.1
Lincoln (S) Faulks Dr PS	2050Ø	2	Flygt 3171 181 SH270	34	31	0.2	0.5	9.3
Lincoln (S) Liffey Springs PS	2050Ø	2	Flygt 3153 181 HT450	42	37	0.6	1.5	5.9
Lincoln (S) Lincolndale PS	3500Ø	2	Flygt 3153 180 HT450	42	42	3.7	13.2	49.5
Lincoln (S) LLD PS	2550Ø	2	Flygt 3202 180 HT456	74	77	9.3	19.8	101.4
Lincoln (S) Millstream Dr PS	1800Ø	2	Flygt 3085 182 MT470	12	11	0.2	0.4	0.4
Lincoln (S) Roblyn Pl PS	1800Ø	2	Flygt 3102 180 MT433			0.1	0.4	2.9
Lincoln (S) Ryelands PS	1800Ø	2	Flygt 3085 182 HT252	8	8.7	1.5	3.3	12.1

Table 9-5 Pump Station Storage Time Analysis

Pump Station		Hours until HLA reached	Hours until first spill	Spill Location - AMS ID
Lincoln (S) Edward St PS	Pumps into main catchment	4.4	6.8	550083
Lincoln (S) Faulks Dr PS	Pumps directly to Allendale Lane	145.1	156.6	622813
Lincoln (S) Liffey Springs PS	Pumps directly to Allendale Lane	52.2	59.3	620237
Lincoln (S) Lincolndale PS	Pumps directly to Allendale Lane	6.9	9.6	550863
Lincoln (S) LLD PS	Pumps directly to Pines WWTP via Selwyn road	3.2	4.2	604033
Lincoln (S) Millstream Dr PS	Pumps to Edward St	25.9	30.5	550406
Lincoln (S) Roblyn Pl PS	Pumps into main catchment	24.2	25.9	550008
Lincoln (S) Ryelands PS	Pumps directly to Allendale Lane	14.7	20.7	595957

The Hasendene (Murray Place) Pump Station, Barker St Pump Station, Marion Pl Pump Station have been decommissioned.

9.6.5 Rising Mains

Table 9-6 Rising Main Overview

Pump Station	Town	Total Length (m)	Total Volume (m3)	ADWF (L/s)	Uphill Retention Time (hours)	Drain Time (hours)	Total Time (hours)	Model Max Pressure (kPa)	SCADA Max Pressure (kPa)
Lincoln (S) Edward St PS	Lincoln	327	5.2	1.5	1.0	0.0	1.0	45	No data
Lincoln (S) Faulks Dr PS	Lincoln	1,714	39.6	0.2	52.8	0.0	52.8	360	No data
Lincoln (S) Liffey Springs PS	Lincoln	1,134	32.0	0.6	15.2	0.0	15.2	150	170 - 250
Lincoln (S) Lincolndale PS	Lincoln	893	34.6	3.7	2.6	0.0	2.6	170	130 - 210
Lincoln (S) LLD PS	Lincoln	673	26.5	9.3	0.8	0.0	0.8	170	No data
Lincoln (S) Millstream Dr PS	Lincoln	134	0.7	0.2	0.1	0.4	0.5	10	No data
Lincoln (S) Roblyn Pl PS	Lincoln	32	0.3	0.1	0.5	0.0	0.5	30	No data
Lincoln (S) Ryelands PS	Lincoln	493	4.2	1.5	0.8	0.0	0.8	80	No data

9.7 Operational Management

The wastewater schemes are operated and maintained under the maintenance contract 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.

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

9.8 Photos of Main Assets

Photo 1 – Buffer storage tanks

Photo 2 – Pond for additional buffer storage

Photo 3 - Ryelands Pump Station

Photo 4 – LLD Pump Station

9.9 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 9-7 details the risk priority rating, Table 9-8 outlines the risks and the list of key projects is found in Table 9-13.

Table 9-7 Risk Priority Rating

Risk Score	Level of Risk	Risk Response
> 50	Extreme	Awareness of the event to be reported to Council. Urgent action to eliminate / mitigate / manage the risk. 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. Immediate action required to eliminate / mitigate / manage the risk. Document risk and action in the AMP.

Table 9-8 Risks - Lincoln

Risk	Action/Project	Year Identified	2014 Risk Rating	2017 Risk Rating	Residual Risk Rating
Aeration of pond is not sufficient resulting in odour generation	install additional aerator	2014	27	27	27
Infiltration could overwhelm sewer pump station and ESSS network	Design high flow diversion to oxidation ponds including drawings and tender documents	2014	20	3.5	3.5
Infiltration could overwhelm sewer pump station and ESSS network	Allendale Lane Sewage Site - install an automate "valve" (between Allendale Lane pump station and tanks) and a larger pipe between storage tanks and pond.	2014	10	10	3.5
LLD sewer PS capacity is exceeded	Design additional storage for LLD sewer pump station	2014	10	3.5	3.5
LLD sewer PS capacity is exceeded	Upgrade LLD pump station with additional storage	2014	10	3.5	3.5
Safe removal of pumps	Allendale gantrey	2017		45	6
Poor understanding of catchment flows	Roblen Pl - Flow meter	2017		9	2
Scheme efficiency	review storeage and pump operation	2017		12	6

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

9.10 Asset Valuation Details

The total replacement value of assets within the Lincoln Scheme is $43,335,547 as detailed in Table 9-9 below. The majority of reticulation value is made up of pipes.

Table 9-9 Replacement Value, Lincoln

Asset Class 1	Asset Class 2	Sum of Replacement Value
Plant and Equipment		$1,539,567

Wastewater Reticulation	Chamber	$163,451
	Lateral	$7,156,944
	Manhole	$4,104,749
	Pipe	$30,228,932
	Valve	$141,904

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

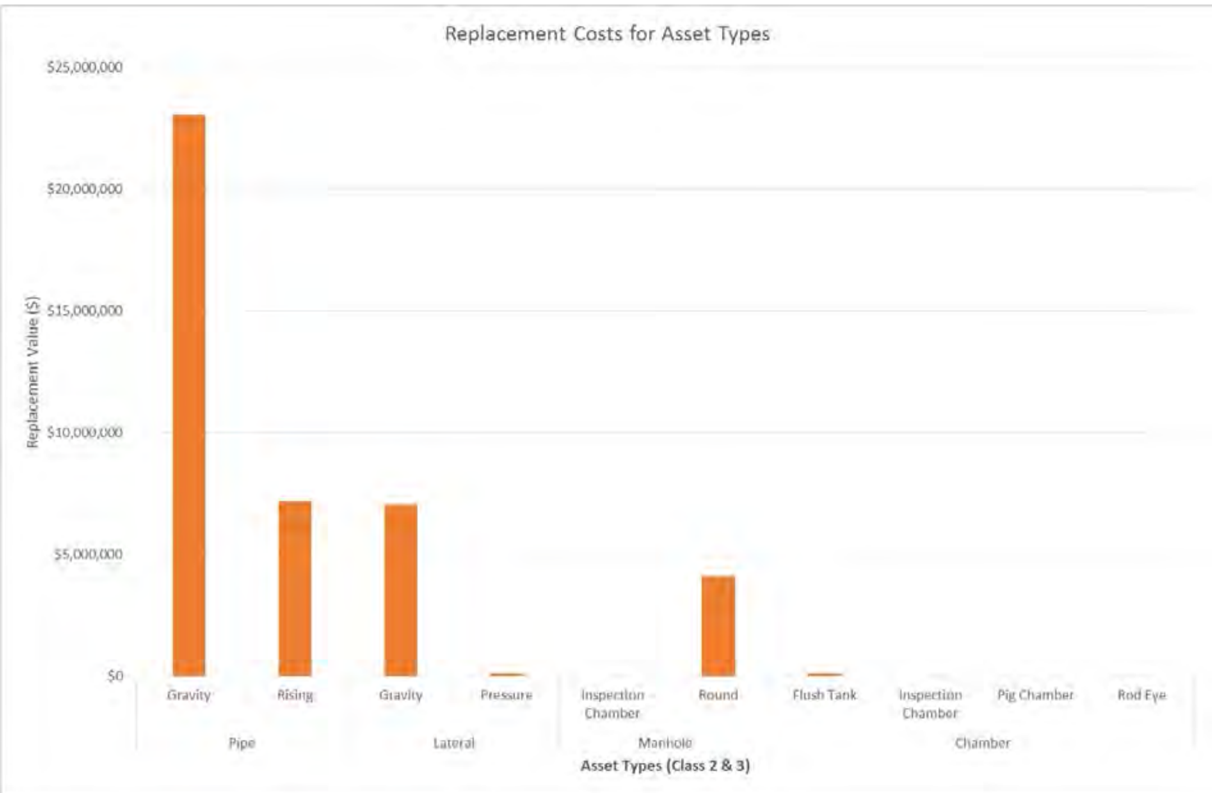


Figure 9-9 Replacement Costs for Lincoln

9.11 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 9-10 below.

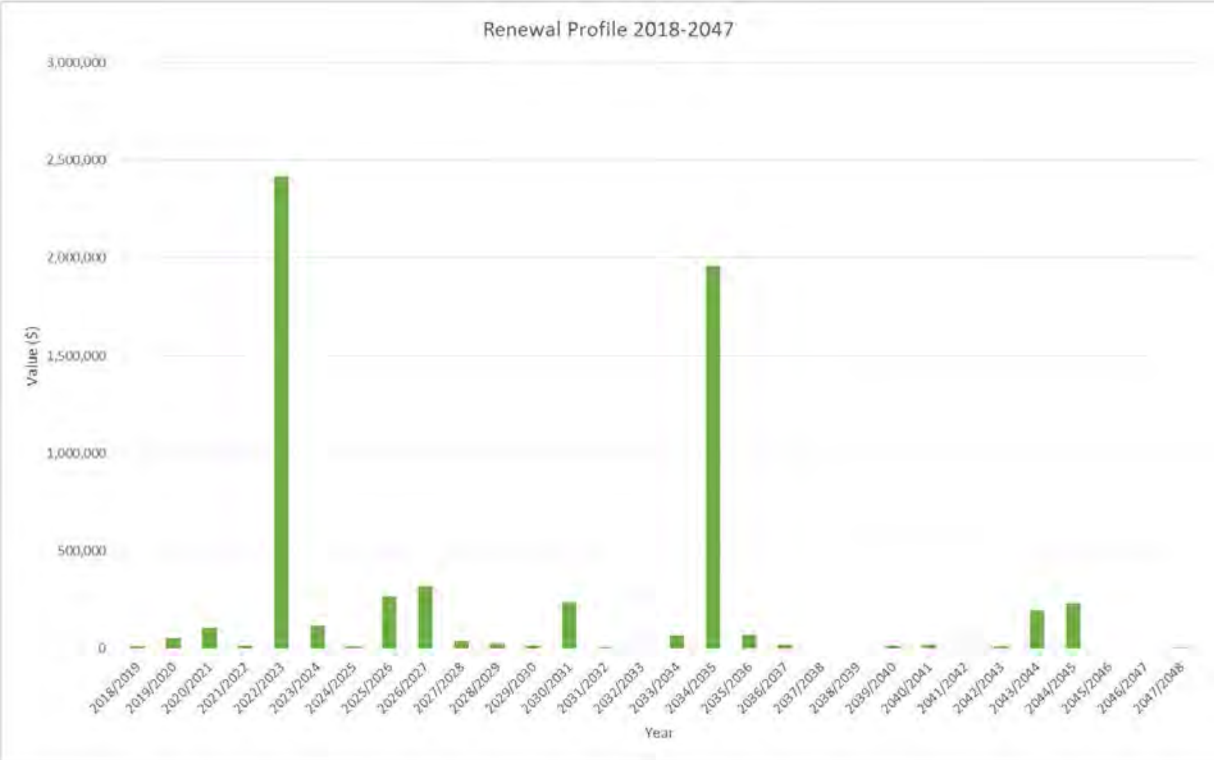


Figure 9-10 Lincoln Wastewater Renewal Profile

9.12 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 9-10 and Figure 9-11 below shows the calculated criticality for all of the assets within this scheme that have a recorded known length.

Table 9-10 Length of Assets per Criticality Level

Criticality Bands		Length (m)
5	Low	40,379
4	Medium-Low	13,603
3	Medium	16,258
2	Medium-High	11,020
1	High	2,052

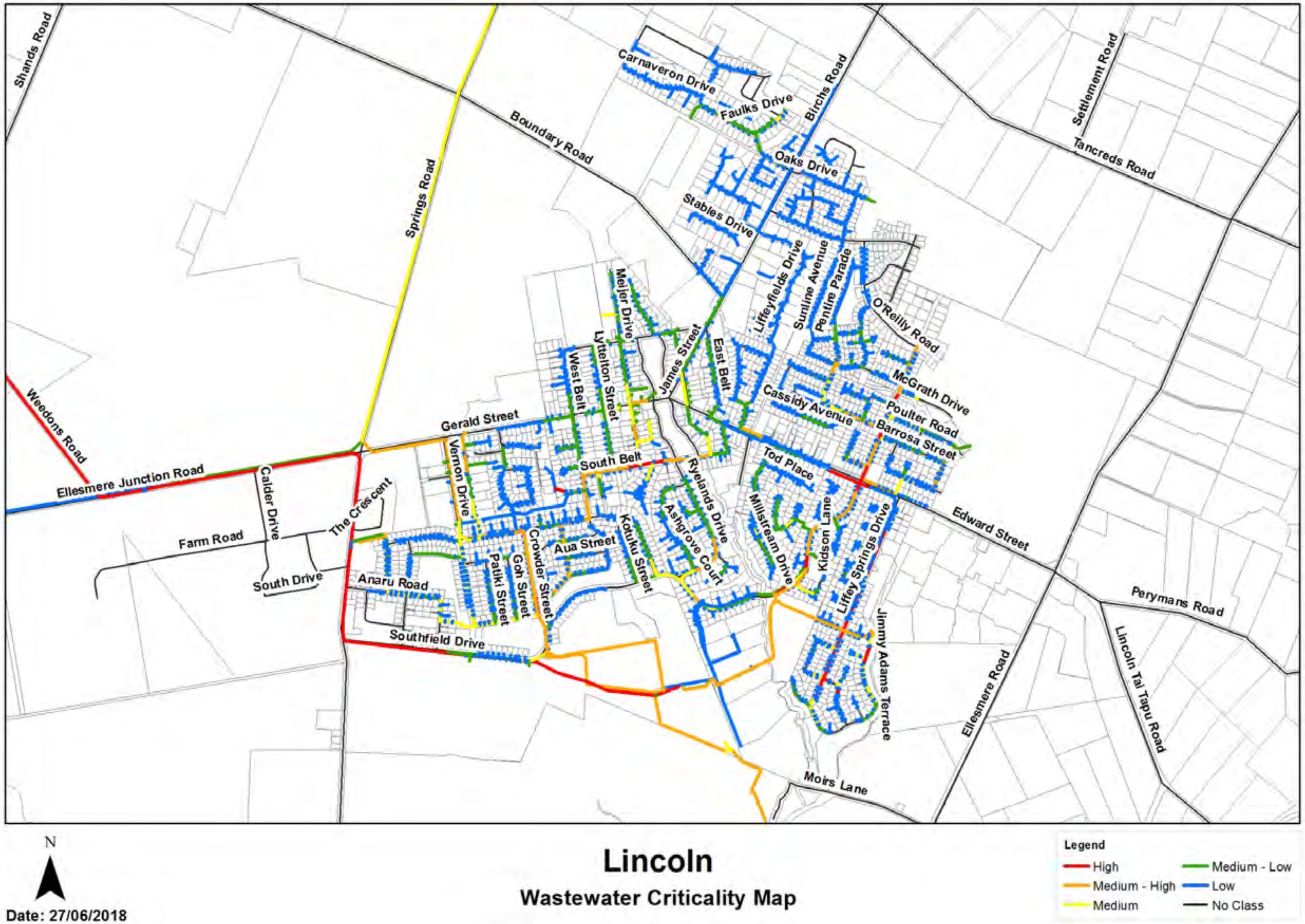


Figure 9-11 Criticality Map

9.13 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 and it provides details of how the model has been calculated for the reticulation assets (particularly pipes). Figure 9-12 below shows the level of asset condition for all of the assets within this scheme that have a recorded known condition.

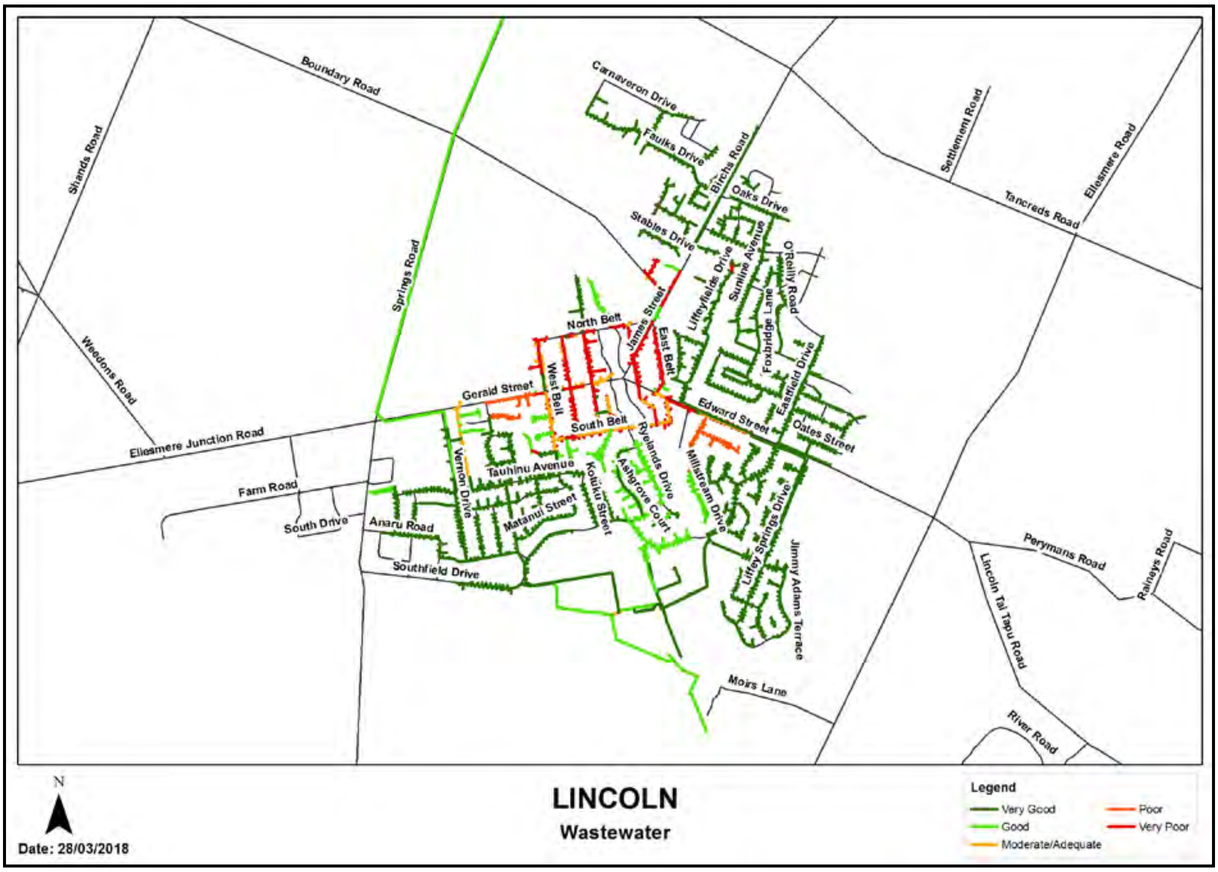


Figure 9-12 Asset Condition - Lincoln

Table 9-11 provides a description of the condition rating used within the condition model.

Table 9-11 Asset Condition Grading

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

9.14 Funding Program

The 10 year budgets for Lincoln are shown by Table 9-12 and Figure 9-13. 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 9-12 Lincoln Budget Summary

Years	Expenditure	Renewals	Projects	Capital Projects
2018/2019	$185,100	$10,889		$60,000
2019/2020	$188,111	$56,952		
2020/2021	$191,054	$107,073		
2021/2022	$193,942	$16,755		$1,540,000
2022/2023	$196,780	$2,418,982		$650,000
2023/2024	$198,257	$115,469		
2024/2025	$199,724	$12,879		
2025/2026	$201,180	$266,994		
2026/2027	$202,627	$322,005		
2027/2028	$204,064	$38,350		
Total	$1,960,838	$3,366,348		$2,250,000

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.

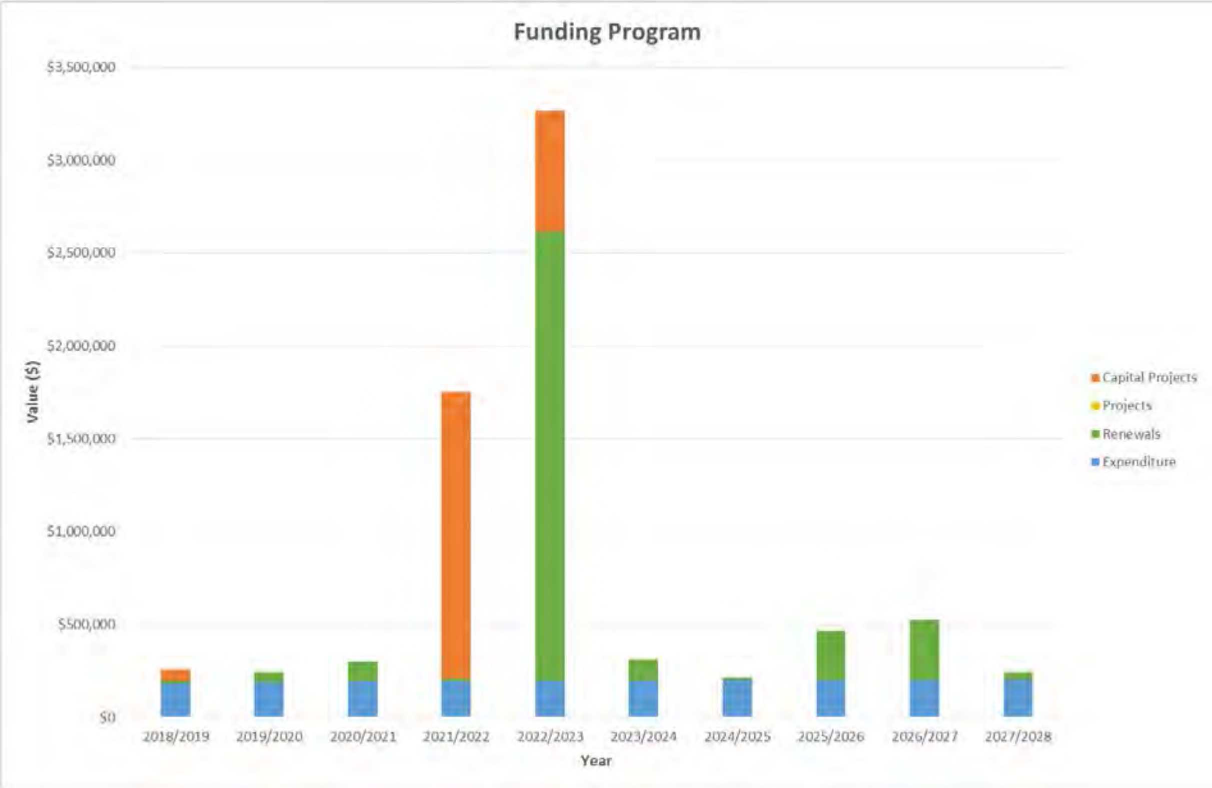


Figure 9-13 Lincoln Funding Summary

There are a number of major projects for Lincoln Wastewater scheme in the LTP budget.

Table 9-13 Key Projects

Account Label	GL	Description	Year 1 ($)	Year 2 ($)	Year 3 ($)	Years 4 to 10	Funding Split
Capital Projects	464790084	Allendale gantry	$40,000				100% LoS
Capital Projects	464790085	Roblen Pl - Flow meter	$20,000				100% LoS
Capital Projects	464790086	ODP 3c gravity				$650,000	100% G
Capital Projects	464790087	South West PS, RM				$1,540,000	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.

10.0 PREBBLETON WASTEWATER SCHEME

10.1 Scheme Summary

Description		Quantity
Estimated Population Served		**3,797**
Scheme Coverage (1 Jan 2018)	**Full Charges**	**1348**
	Half Charges	**250**
	>1 Charges	**8**
System Components	**Piped (m)**	**50590.4**
	Manholes (No.)	**435**
	Pump Stations (No.)	**8**
	Treatment	**N/A (to Pines WWTP)**
	Disposal	**N/A (to Pines WWTP)**
History	**Original scheme installation date**	**1996**
Value ($)	**Replacement Cost**	**$18,045,934.48**
	Depreciated Replacement Cost	**$15,700,134.77**
Financial	**2018/2019 Estimate** **Annual maintenance cost** **% of total**	**$147,000** **4.6%**
Demand	**Annually (m3)**	**254,108**
	Average daily (m3)	**700**
	Peak daily (m3)	**1,483**
	Minimum daily (m3)	**498**
	Infiltration	**Yes**
Sustainability	**Ultimate discharge point**	**To Pines WWTP**

10.2 Key Issues

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

Table 10-1 Prebbleton Scheme Issues

What's the Problem	What we plan to do
Significant infiltration and inflow is experienced during wet weather	Target renewals to address infiltration and investigate sources of infiltration
Capacity limitations of discharge to Lincoln	Construct new direct pipeline and pump station to the Selwyn Road Pump Station

10.3 Overview & History

A reticulated sewerage scheme for Prebbleton was proposed in the 1980s by the then Paparua County Council. Costs for reticulation and treatment were not acceptable to the residents at that time so development of the township stopped due to restrictions placed by the Regional Council.

In 1995/96, agreement with Meadow Mushrooms helped facilitate the installation of a sewerage scheme system by guaranteeing Meadow Mushroom 84 future lots on their site and the "existing Township" paying their share for a pump station and rising main. This coupled with Christchurch City's agreement to take untreated sewage allowed the scheme to proceed. The scheme was commissioned in 1996.

The SDC/CCC 1995/96 agreement for Prebbleton sewerage allowed for the raw sewage and trade waste to be pumped 24 hours a day at a maximum flow rate of 25 L/s and a maximum annual discharge of 250,000m3 in each financial year.

For Prebbleton, as with Lincoln, a discharge agreement was reached with CCC to connect to their wastewater system. Unlike Lincoln, there is neither the level of pre-treatment nor buffer storage afforded by the oxidation pond. Therefore the growth of the Prebbleton community was significantly impacted by the amount of wastewater servicing that can be provided under the CCC agreement.

The growth of Prebbleton and Lincoln was limited by the discharge restrictions as defined in the CCC agreement. Without an alternative solution being adopted, no further growth could occur. Similarly for Rolleston, there would be limited growth without greater capacity of treatment and conveyance being constructed in accordance with the master plan, even on a standalone basis.

In order to solve these issues, Prebbleton was connected to the ESSS scheme via a diversion line (completed in April 2011) which allows switching of the CCC directed flows to the installed Lincoln/Springston sewer pipe. Aberdeen subdivision is pumped back to Prebbleton via a new pressure main.

Sewage effluent will gravity feed to the Lincoln WWTP (aeration only) and be pumped to the Rolleston Pines for final treatment and disposal.

2010/2011 Earthquakes

The 2010/2011 earthquakes had a minor impact on the scheme's below ground infrastructure. Several deep lateral connections separated but were repaired. Based on visual assessment (CCTV and qualified staff) no other damage to the below ground infrastructure or resulting effects e.g. blockages have been detected. There may however be long term but intangible impact on maintenance and renewals programmes.

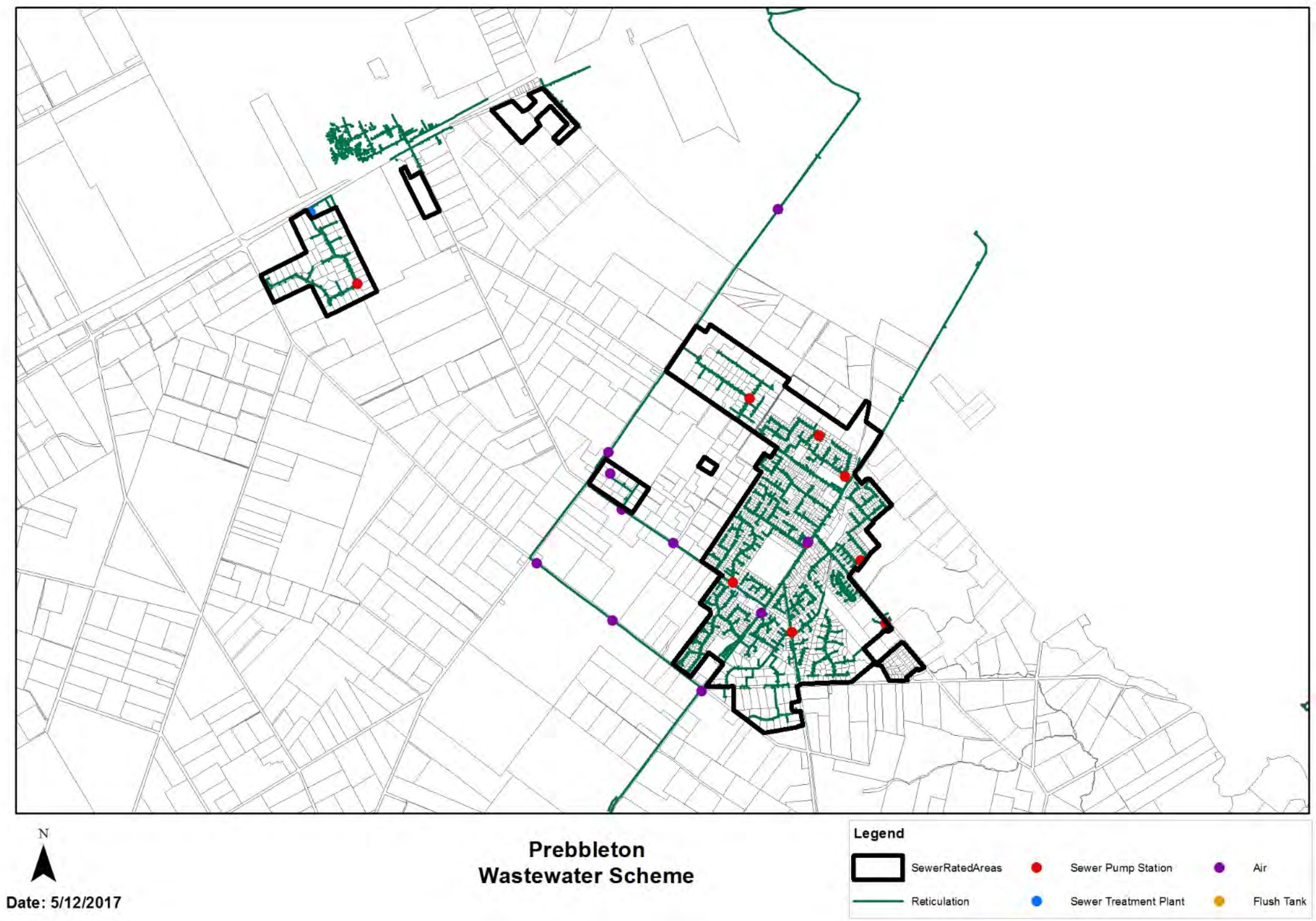


Figure 10-1 Scheme Map

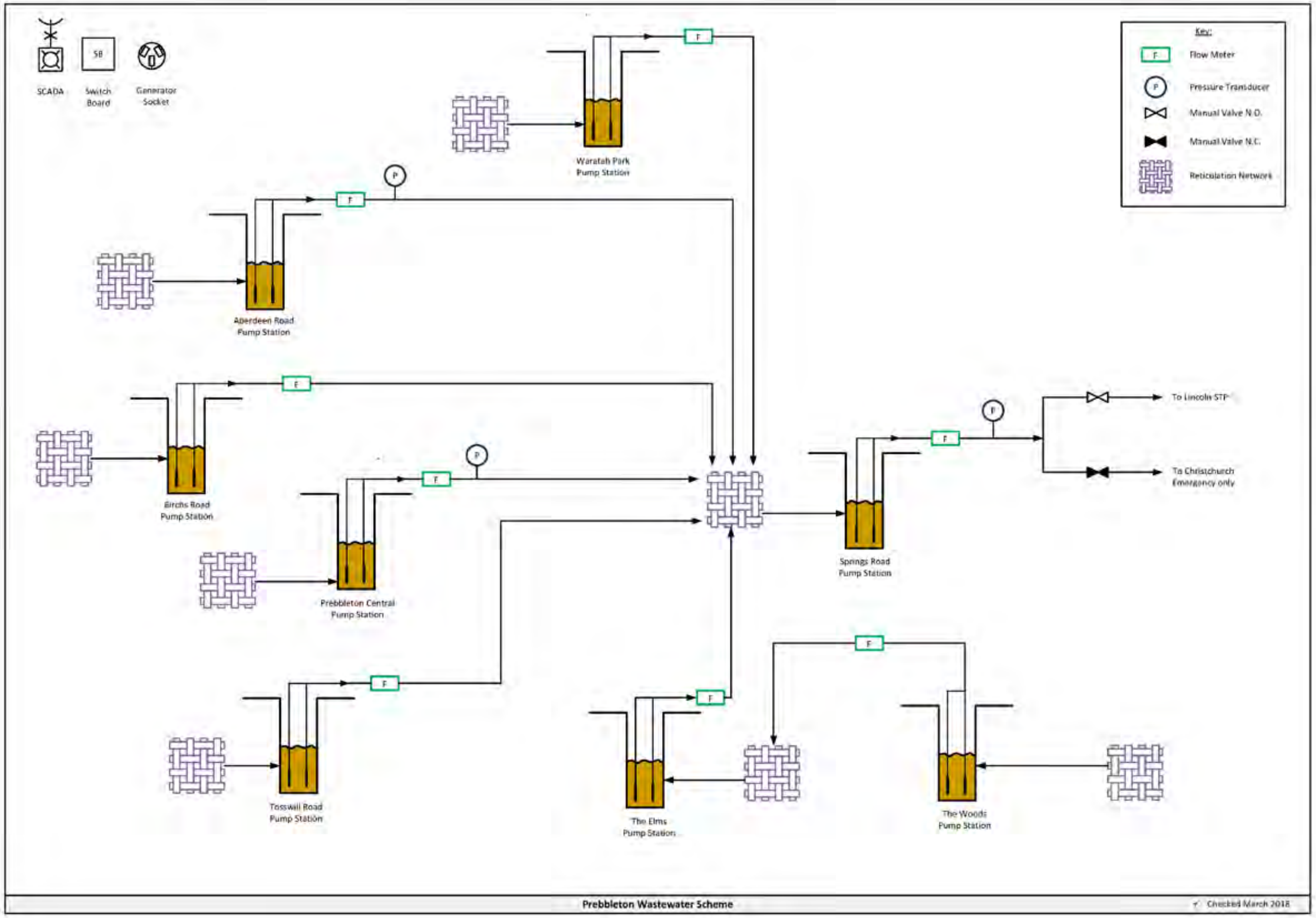


Figure 10-2 Scheme Schematic

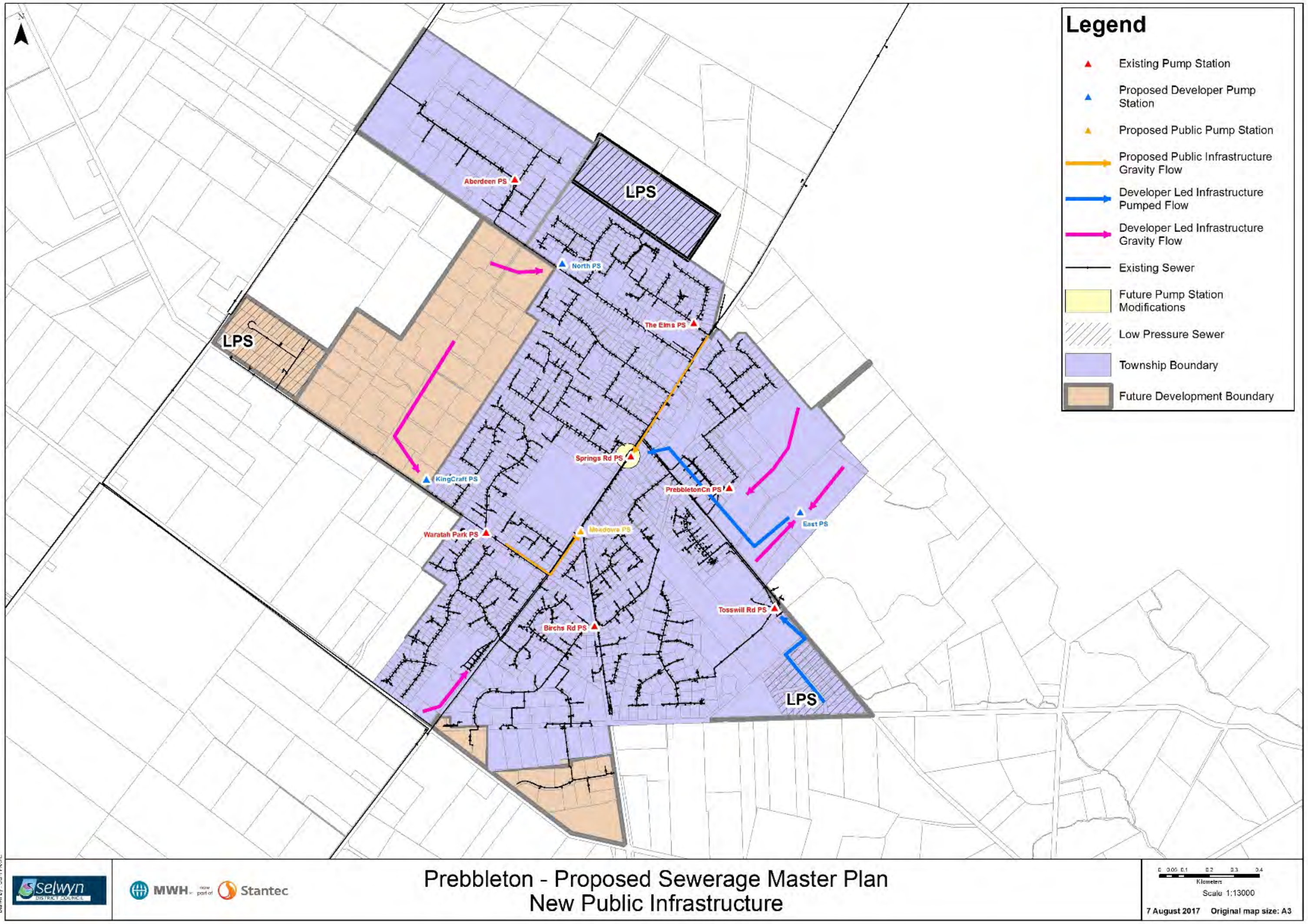


Figure 10-3 Prebbleton Master Plan

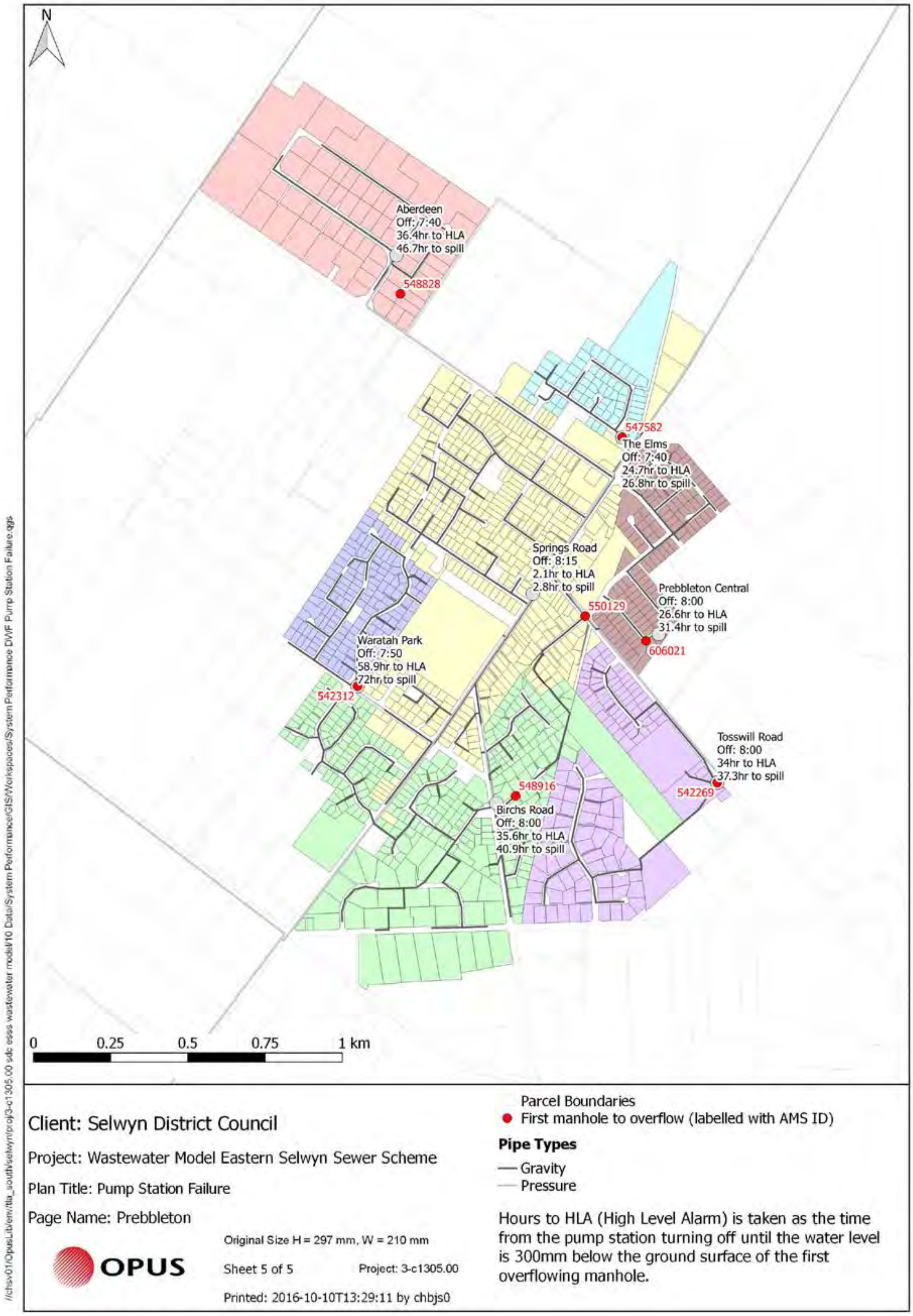


Figure 10-4 Pump Station Failure Map

10.4 System Capacity

A decline in the Industrial/Commercial allocation within the Prebbleton urban area associated with the projected transition of existing business into residential development.

In recent years there has been rapid residential growth in the Prebbleton community. This has placed a strain on the existing wastewater collection system. Therefore, with the implementation of the ESSS, the wastewater system has been expanded in stages to meet the increasing flows. A wastewater master plan has been established to structure the expansion of scheme to meet the timing of new development. The capacity of existing catchment pump stations, while not yet reached, will need to be monitored and upgraded as pump renewals are considered. Figure 10-5 shows the projected growth for the Prebbleton township.

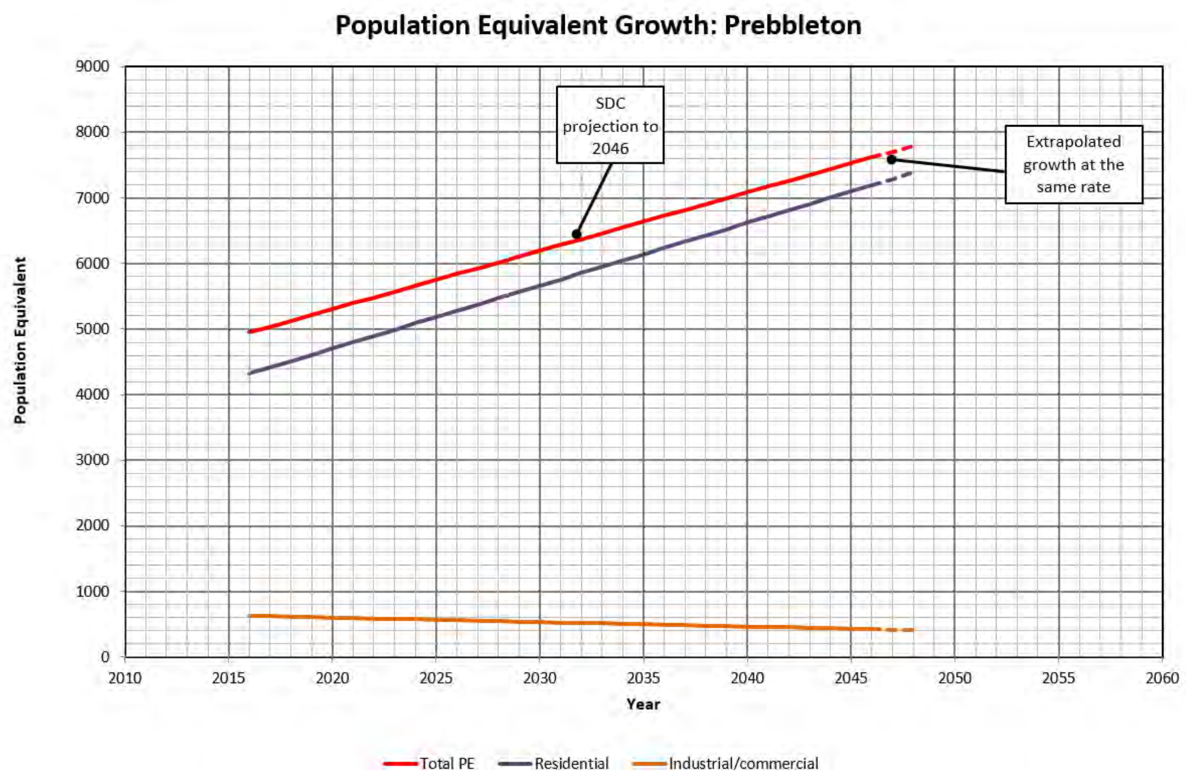


Figure 10-5 Projected PE Growth – Prebbleton

Figure 10-6 Wet Weather Flow Capacity Map

10.5 Resource Consents

Prebbleton township is part of the ESSS scheme. Therefore, all wastewater is pumped to the Pines Treatment Plant located in Rolleston. The resource consents required for this treatment plant are in the ESSS section of this plan.

10.6 Scheme Assets

A summary of the assets within this scheme is outlined in this section.

10.6.1 Reticulation Overview

A summary of material and diameter for pipes is shown in Figure 10-7 and Figure 10-8.

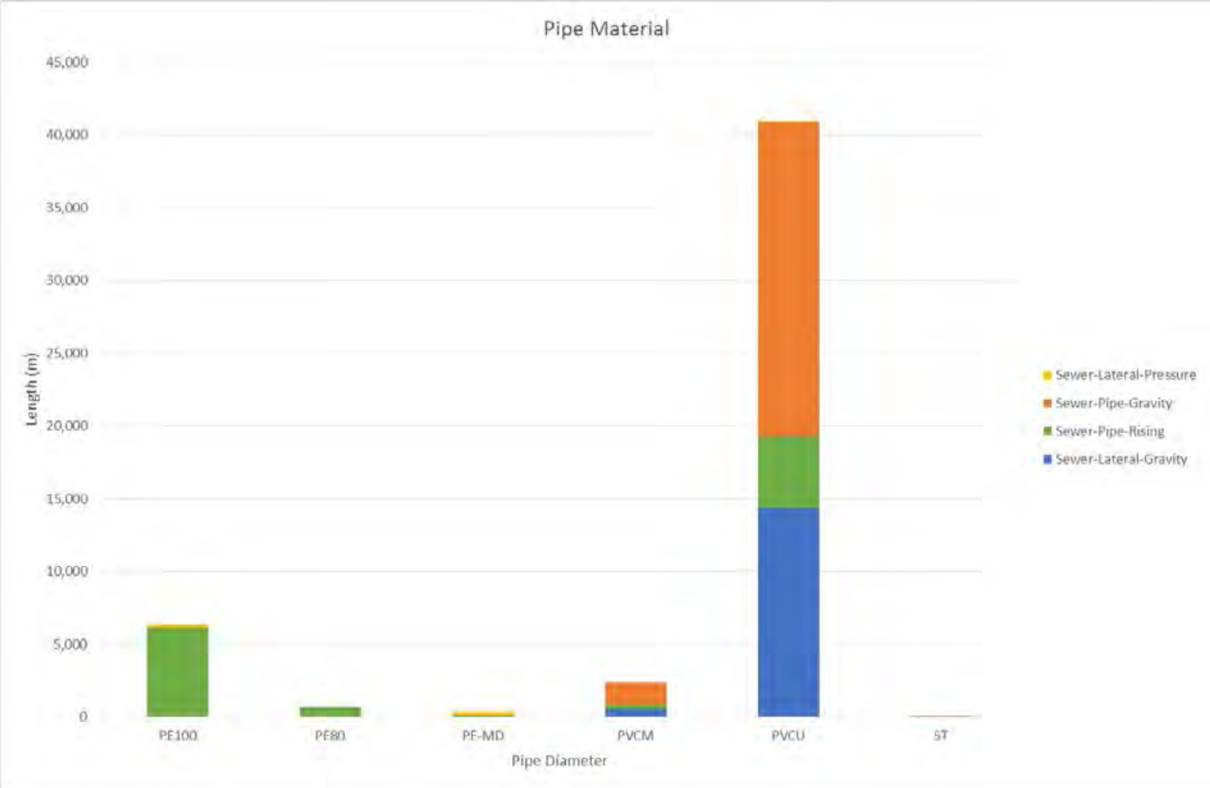


Figure 10-7 Pipe Material – Prebbleton

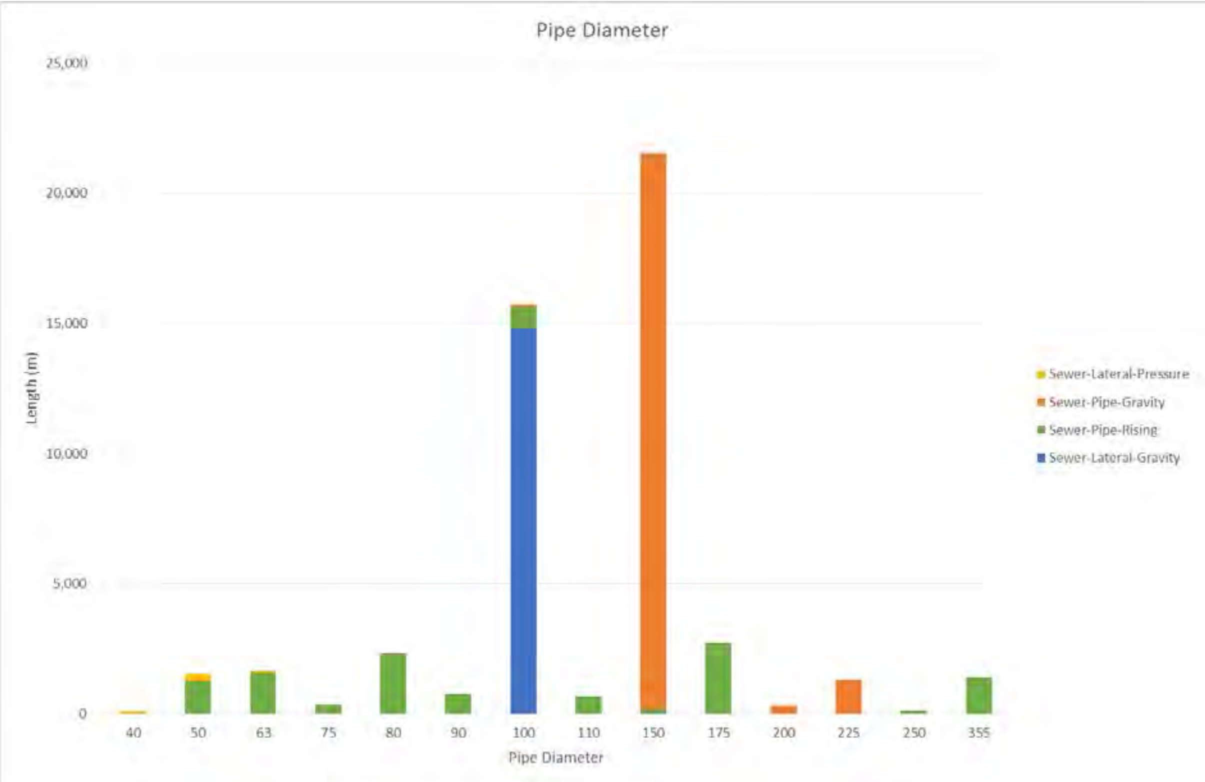


Figure 10-8 Pipe Diameter - Prebbleton

10.6.2 Treatment and Disposal

No treatment is carried out with all wastewater pumped to the Pines WWTP via Lincoln. The long term proposal is for connection to be made to the Selwyn Road PS, Rolleston, directly from a terminal pump station at or about the site of the existing Springs Road PS. The connecting pipeline was completed in August 2017 and the pump station is programmed for completion in 2018.

Further reference to the treatment and disposal of Prebbleton wastewater is described in Section 5.0.

10.6.3 Design

The wastewater collection system has been designed in accordance with the appropriate New Zealand engineering design guidelines at the time of construction and in accordance with the Selwyn District Council Engineering Design Standards. Specific designs for portions of the scheme outside of these standards have been considered where detailed engineering designs have been provided.

10.6.4 Pump Stations

The township reticulation is gravity mains (some very deep) to a main pump station on Springs Road. There are 6 small to medium sized pump stations within the reticulation, these are:

- Tosswill Road which serves the Domain and future development in surrounding area (small pumpstation)
- Birchs Road to serve the southern area (medium size)
- Elms, Aberdeen, Prebbleton Central and Warratah Park (small pumpstations)

The main pump station located on Springs Road pumps the sewage effluent via a 7.5 km pipeline to Lincoln. Details are shown below in Table 10-2.

Pump stations where the standby / assist pump is predicted to start have been highlighted in yellow and red for those that experience a peak wet weather response.

Yellow Pumps are can convey the peak flow without backing up the system

Red Pumps are unable to convey the peak flow causing the system to back up

Table 10-2 Pump Station Overview

Site Name	Wet well dimensions	No of pumps	Pump curve used	Recorded instantaneous pump rate (L/s)	Model Pump Rate (L/s)	ADWF (L/s)	PDWF (L/s)	PWWF 1 in 5 year ARI (L/s)
Prebbleton (S) Aberdeen PS	1800Ø	2	PIRANHA-M85/2	5-7	6.4	0.4	1.1	1.1
Prebbleton (S) Birchs Rd PS	1800Ø	2	Flygt 3102 180 HT252	7	8.9	1.5	4.6	9.5
Prebbleton (S) Central PS	2000Ø	2	Flygt 3127 181 HT487	13	12	0.8	2.4	12.0

Prebbleton (S) Springs Rd PS	2000Ø	2	Flygt 3152 181 HT452	23-39	30	7.2	38.5	53.4
Prebbleton (S) The Elms PS	1800Ø	2	Flygt 3085 182 MT440	10	6.5	0.4	1.3	1.3
Prebbleton (S) Tosswill Rd PS	2000Ø	3	Flygt 3085 182 HT252	7	6.7	0.8	2.5	4.9
Prebbleton (S) Waratah Park PS	1800Ø	2	Flygt 3102 181 MT461	23	24	0.4	1.3	1.3

Table 10-3 Pump Station Storage Time Analysis

Pump Station		Hours until HLA reached	Hours until first spill	Spill Location - AMS ID
Prebbleton (S) Aberdeen PS	Two submersibles pumps to reticulation	36.4	46.7	548828
Prebbleton (S) Birchs Rd PS	Two submersibles - to reticulation	35.6	40.9	548916
Prebbleton (S) Central PS	Two submersibles - to reticulation	26.6	31.4	606021
Prebbleton (S) Springs Rd PS	Three submersibles - to Lincoln	2.1	2.8	550129
Prebbleton (S) The Elms PS	Two submersibles - to reticulation	24.7	26.8	547582
Prebbleton (S) Tosswill Rd PS	Three submersibles - to reticulation via twin mains	34.0	37.3	542269
Prebbleton (S) Waratah Park PS	Two submersibles - to reticulation	58.9	72.0	542312

10.6.5 Rising Mains

Table 10-4 Rising Main Overview

Pump Station	Town	Total Length (m)	Total Volume (m3)	ADWF (L/s)	Uphill Retention Time (hours)	Drain Time (hours)	Total Time (hours)	Model Max Pressure (kPa)	SCADA Max Pressure (kPa)
Prebbleton (S) Aberdeen PS	Prebbleton	728	3.3	0.4	2.6	0.0	2.6	60	No data
Prebbleton (S) Birchs Rd PS	Prebbleton	266	1.4	1.5	0.2	0.0	0.2	165	No data
Prebbleton (S) Central PS	Prebbleton	567	5.0	0.8	1.7	0.0	1.7	130	115 - 145
Prebbleton (S) Springs Rd PS	Prebbleton	9,757	525.8	7.2	7.6	3.0	10.6	120	35 - 185

Prebbleton (S) The Elms PS	Prebbleton	48	0.2	0.4	0.2	0.0	0.2	5	No data
Prebbleton (S) Tosswill Rd PS	Prebbleton	1,293	6.7	0.8	2.3	0.0	2.3	70	No data
Prebbleton (S) Waratah Park PS	Prebbleton	129	2.1	0.4	1.4	0.0	1.4	30	No data

10.7 Operational Management

The wastewater schemes are operated and maintained under the maintenance contract 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.

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

10.8 Photos of Main Assets

Photo 1 – Springs Road Pump Station

Photo 2 – Toswill Rd Pump Station

10.9 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 10-5 details 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. Urgent action to eliminate / mitigate / manage the risk.

		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. Immediate action required to eliminate / mitigate / manage the risk. Document risk and action in the AMP.

Table 10-6 Risks - Prebbleton

Risk	Action/Project	Year Identified	2014 Risk Rating	2017 Risk Rating	Residual Risk Rating
System capacity is exceeded	Springs Road pumpstation requires upgrading	2014	45	45	45
System capacity is exceeded	Install new pipeline to Selwyn Road P.S.	2014	45	45	45
Power outage resulting in loss of pumping capability at pump station(s)	Purchase trailer mounted generator, sized for all Prebbleton pump stations	2014	10	10	10
Infiltration overwhelms network	Infiltration inspections	2017		20	10

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

10.10 Asset Valuation Details

The total replacement value of assets within the Prebbleton Scheme is $18,045,934 as detailed in Table 10-7 below.

Table 10-7 Replacement Value, Prebbleton

Asset Class 1	Asset Class 2	Sum of Replacement Value
Plant and Equipment		$1,129,895
Wastewater Reticulation	Chamber	$19,550
	Lateral	$4,774,922
	Manhole	$2,760,167
	Pipe	$9,249,559
	Valve	$111,841

Replacement values for these different types of assets are shown in Figure 10-9 below.

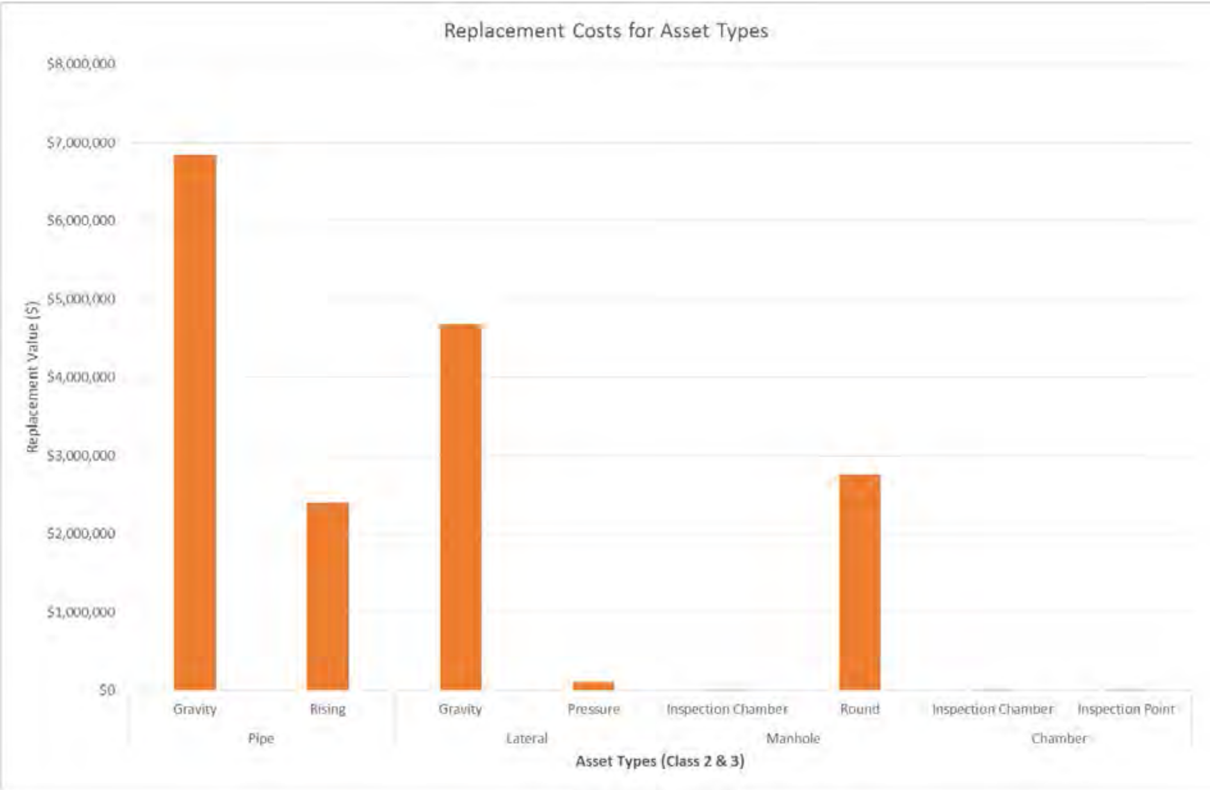


Figure 10-9 Replacement Costs for Prebbleton

10.11 Renewals

The renewal profile has been taken from the 2014 5 Waters Valuation. A graph showing the renewals for this scheme are shown by Figure 10-10 below.

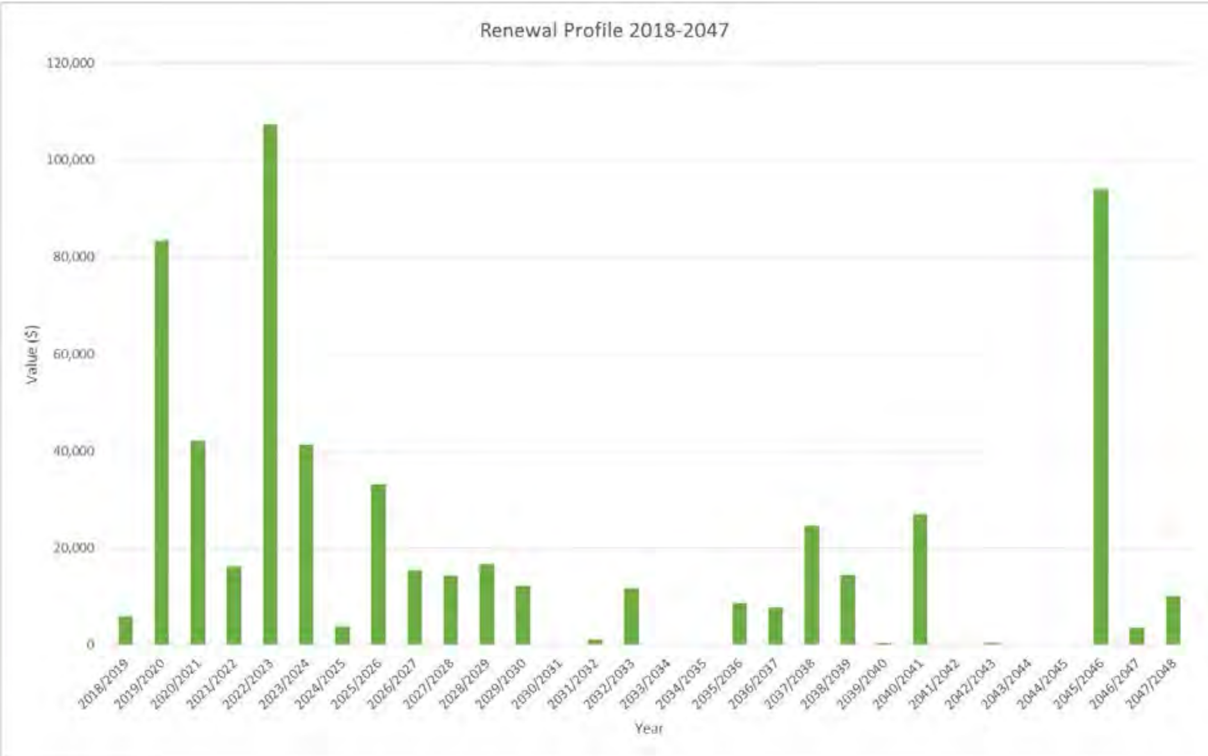


Figure 10-10 Prebbleton Wastewater Renewal Profile

10.12 Critical Assets

The criticality model for Prebbleton 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 10-8 and Figure 10-11 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	43,181
4	Medium-Low	3,579
3	Medium	1,784
2	Medium-High	1,247
1	High	647

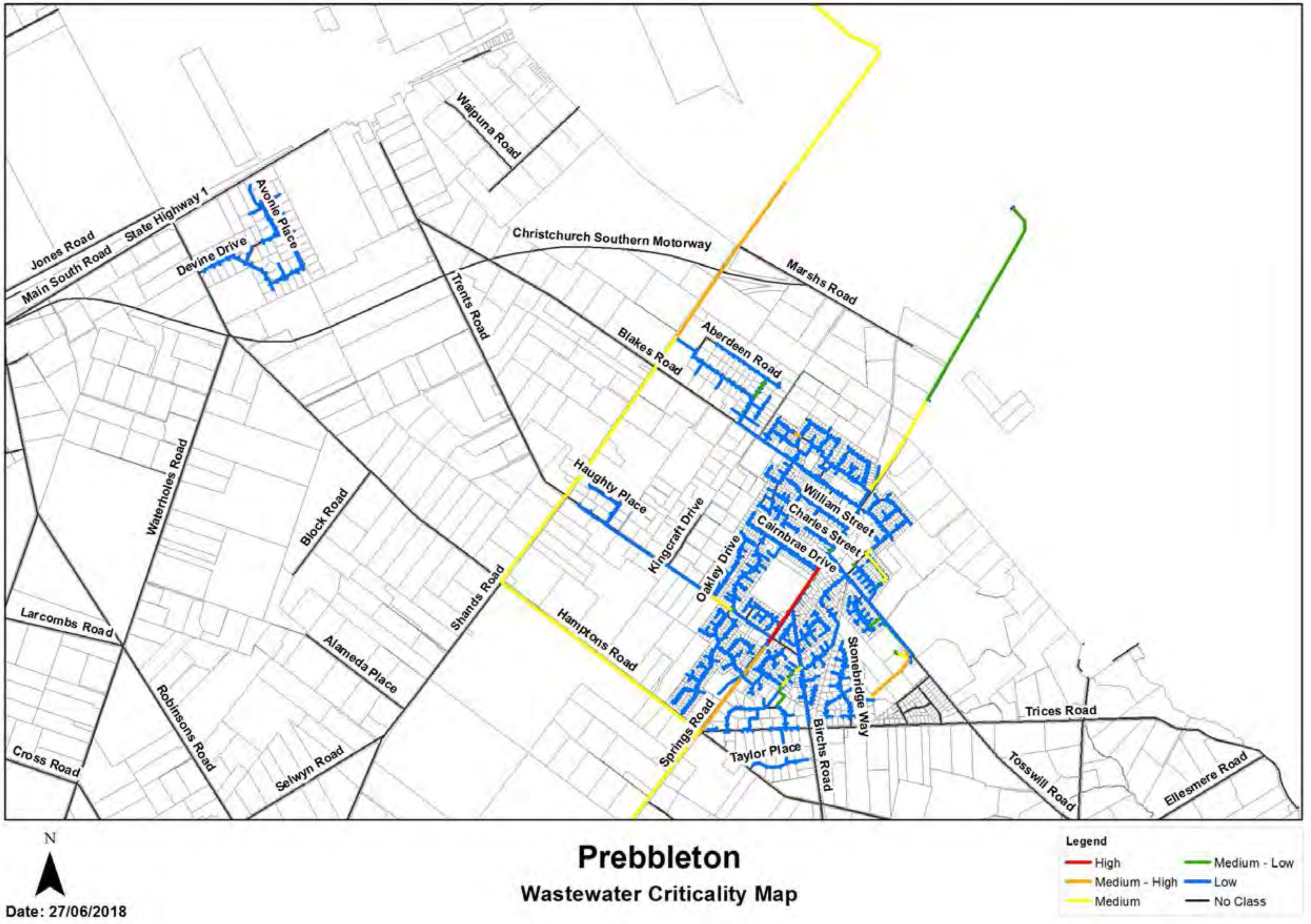


Figure 10-11 Criticality Map

10.13 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 and it provides details of how the model has been calculated for the reticulation assets (particularly pipes). Figure 10-12 below shows the level of asset condition for all of the assets within this scheme that have a recorded known condition.

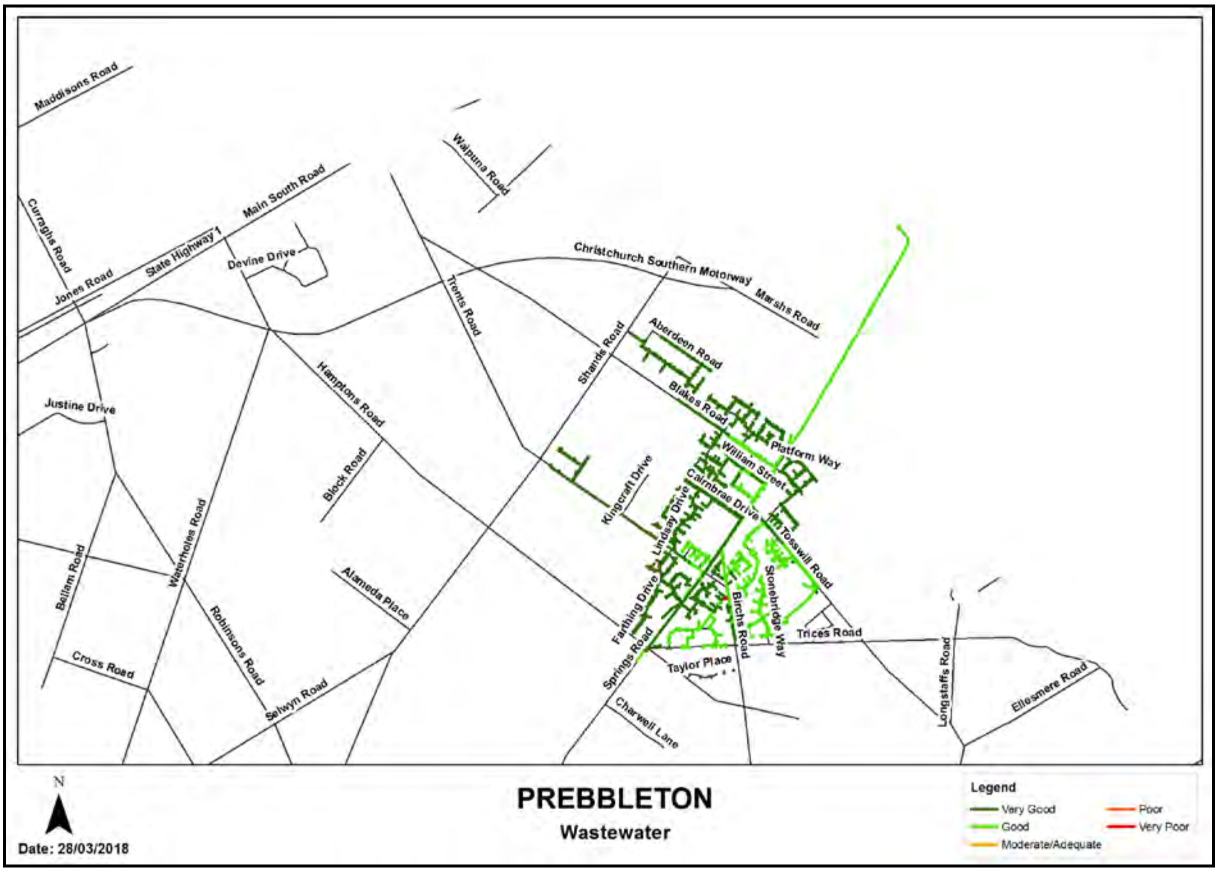


Figure 10-12 Asset Condition - Prebbleton

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

10.14 Funding Program

The 10 year budgets for Prebbleton are shown by Table 10-10 and Figure 10-13. 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 10-10 Prebbleton Budget Summary

Years	Expenditure	Renewals	Projects	Capital Projects
2018/2019	$147,000	$5,903	$30,000	$182,903
2019/2020	$147,776	$83,438		$231,214
2020/2021	$148,548	$42,092		$190,640
2021/2022	$149,318	$16,167		$165,484
2022/2023	$150,084	$107,418		$257,502
2023/2024	$150,999	$41,335		$192,334
2024/2025	$151,910	$3,835		$155,745
2025/2026	$152,817	$33,210		$186,027
2026/2027	$153,720	$15,488		$169,209
2027/2028	$154,620	$14,223		$168,843
Total	$1,506,790	$363,110	$30,000	$1,899,900

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.

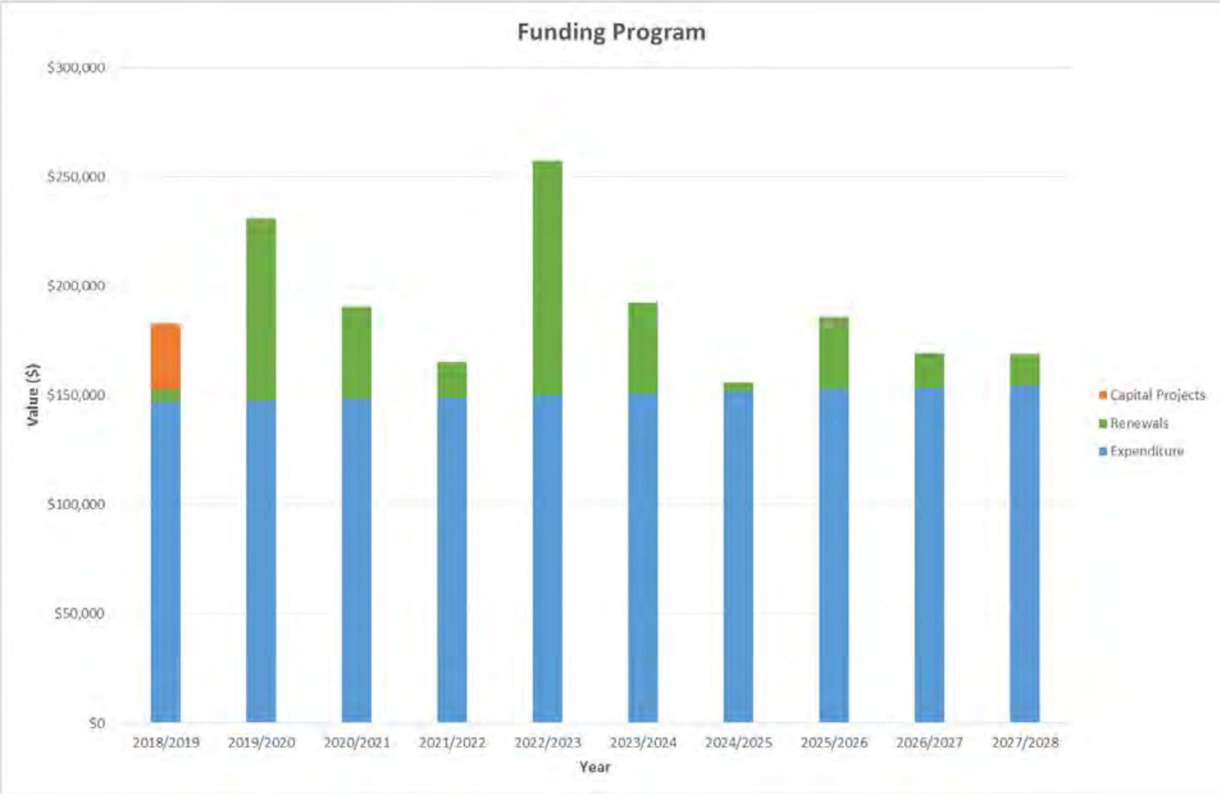


Figure 10-13 Prebbleton Funding Summary

There are a number of major projects for Prebbleton Wastewater 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
Capital Projects	465590020	investigate infiltration	$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.

11.0 ROLLESTON WASTEWATER SCHEME

11.1 Scheme Summary

Description		Quantity
Estimated Population Served		**14,700**
Scheme Coverage (1 Jan 2018)	**Full Charges**	**5,191**
	Half Charges	**937**
	>1 Charges	**59**
System Components	**Piped (m)**	**182225.33**
	Manholes (No.)	**1677**
	Pump Stations (No.)	**7**
	Treatment	**N/A (to Pines WWTP)**
	Disposal	**N/A (to Pines WWTP)**
History	**Original scheme installation date**	**1996**
Value ($)	**Replacement Cost**	**$68,198,063.77**
	Depreciated Replacement Cost	**$60,614,765.32**
Financial	**2018/2019 Estimate** **Annual maintenance cost** **% of total**	**$270,600** **8.47%**
Demand	**Annually (m3)**	
	Average daily (m3)	
	Peak daily (m3)	
	Minimum daily (m3)	
	Infiltration	
Sustainability	**Ultimate discharge point**	**To Pines WWTP**

11.2 Key Issues

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

Table 11-1 Rolleston Scheme Issues

What's the Problem	What we plan to do
Meeting growth requirements	Complete capital upgrade program to meet growth demand.

11.3 Overview & History

For Rolleston, the community was initially developed with onsite treatment and disposal of wastewater via septic tanks. Developers identified the potential for the growth in the town with availability of land for subdivision and proximity to major service routes to Christchurch, and to the west coast.

The town’s original wastewater treatment plant (WWTP), known as the Rolleston (Helpet) WWTP was built by private developers (Helpet Investments Ltd) and commissioned in 1996, with a design population capacity of 4,400 population equivalents - the forecasted town population at that time. Testing of Helpet WWTP revealed the disposal area had a reduced capacity due to soil types and the treatment plant could only manage 3900 population equivalents, utilising grass cut and carry.

Following approval in 2003 to further expand the town to 14,000 population equivalents, additional wastewater treatment and disposal capacity was required. Resource consents for a new WWTP within the Selwyn Plantation (hence the name of ‘Pines’ I WWTP), some 5 km from the town were granted in December 2003. The plant was constructed in 2006 and commissioned in 2007 to provide an additional capacity of 6,000 population equivalents.

All Rolleston wastewater is now treated and disposed of at the Pines Treatment Plant, see Section 5.0 for more details about the treatment plant.

The Helpet WWTP has now been decommissioned from service and being upgraded to provide flow buffer storage. The Helpet pump station was diverted in early 2015 to the west of the site to connect to the new Selwyn Road pump station. A contamination report was commissioned for the site and confirm that the site was appropriate for development.

The IZone industrial park is connected to the Rolleston wastewater network, with the largest customer being Westland Dairy. Ongoing expansion of Westland Dairy and the IZone development will utilise spare capacity in the wastewater network.

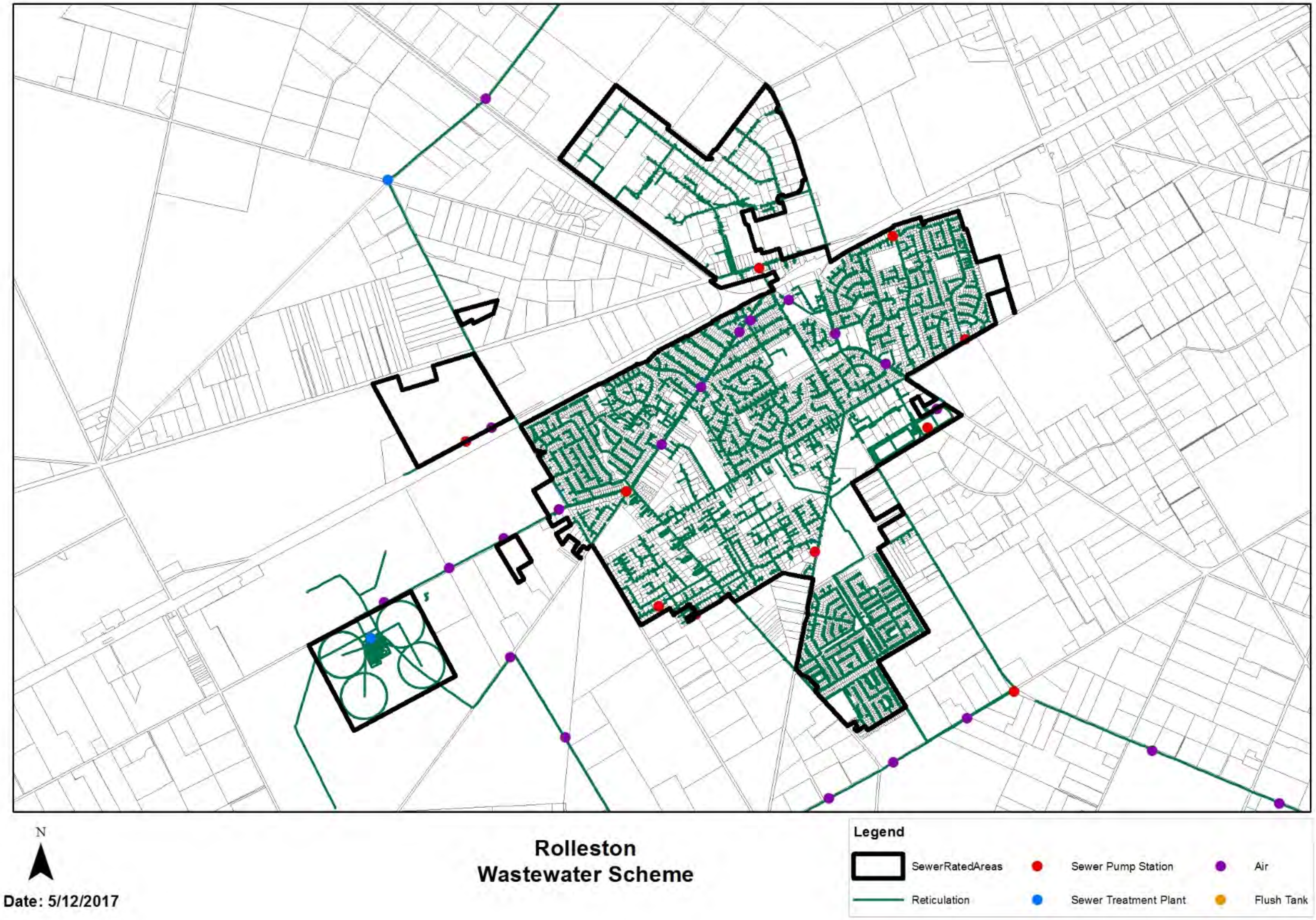


Figure 11-1 Scheme Map

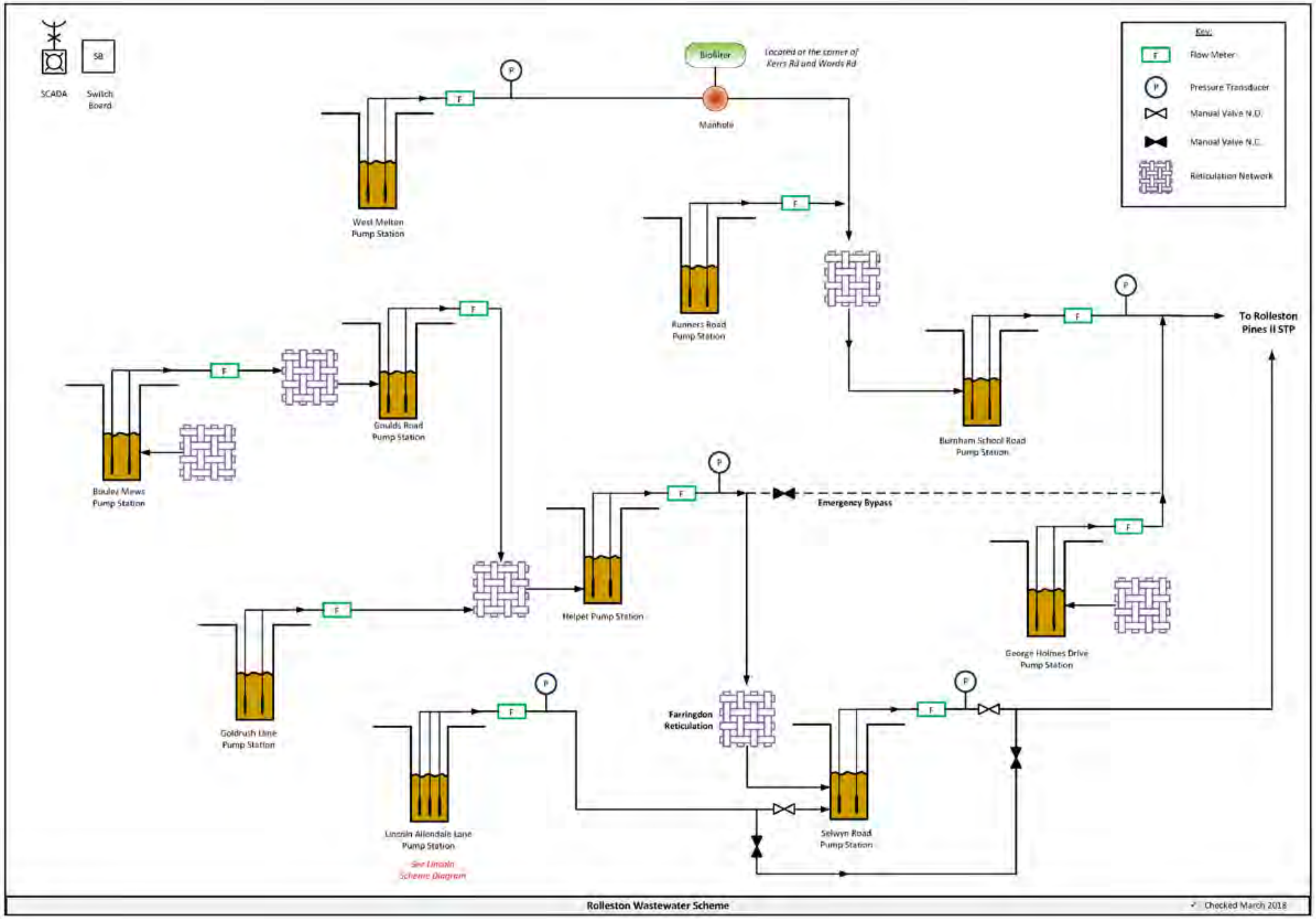


Figure 11-2 Scheme Schematic

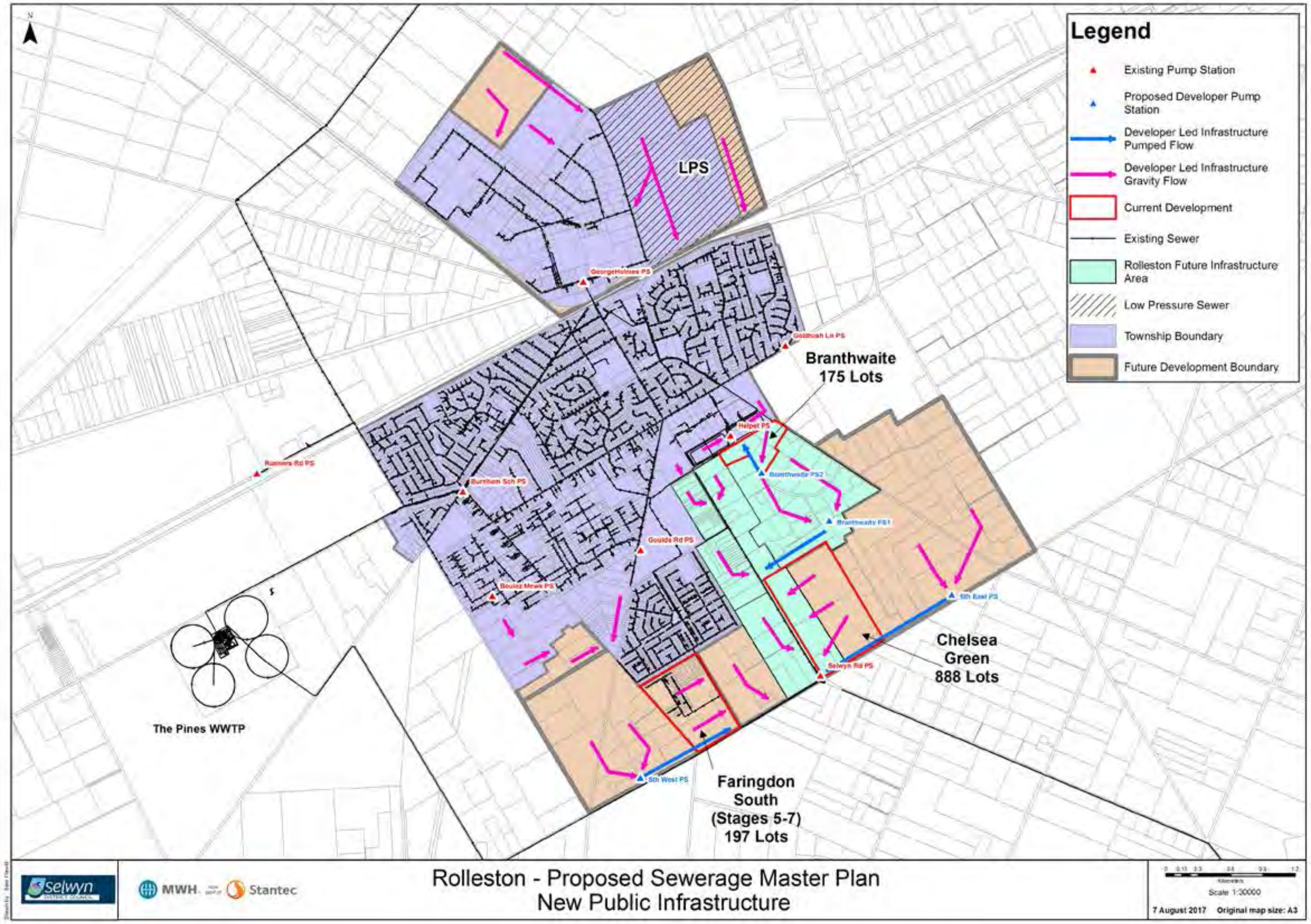


Figure 11-3 Rolleston Master Plan

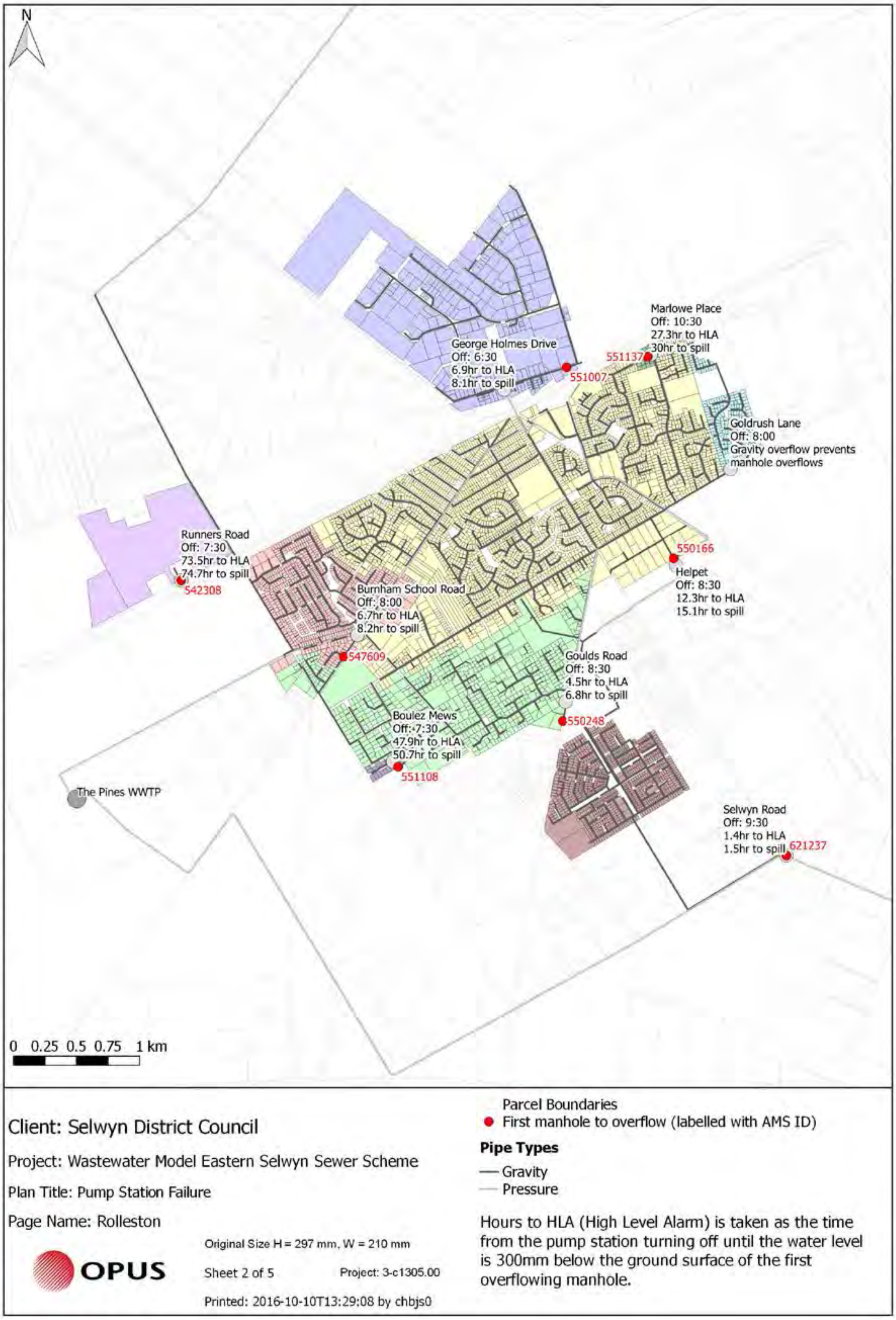


Figure 11-4 Pump Station Failure Map

11.4 System Capacity

In recent years there has been rapid residential growth in the Rolleston and West Melton communities. This has placed a strain on the existing wastewater collection system. Therefore, with the implementation of the ESSS, the wastewater system has been expanded in stages to meet the increasing flows. A wastewater masterplan has been established to structure the expansion of scheme to meet the timing of new development. The capacity of existing catchment pump stations, while not yet reached, will need to be monitored and upgraded as pump renewals are considered. Figure 11-5 below shows the predicted population growth for Rolleston.

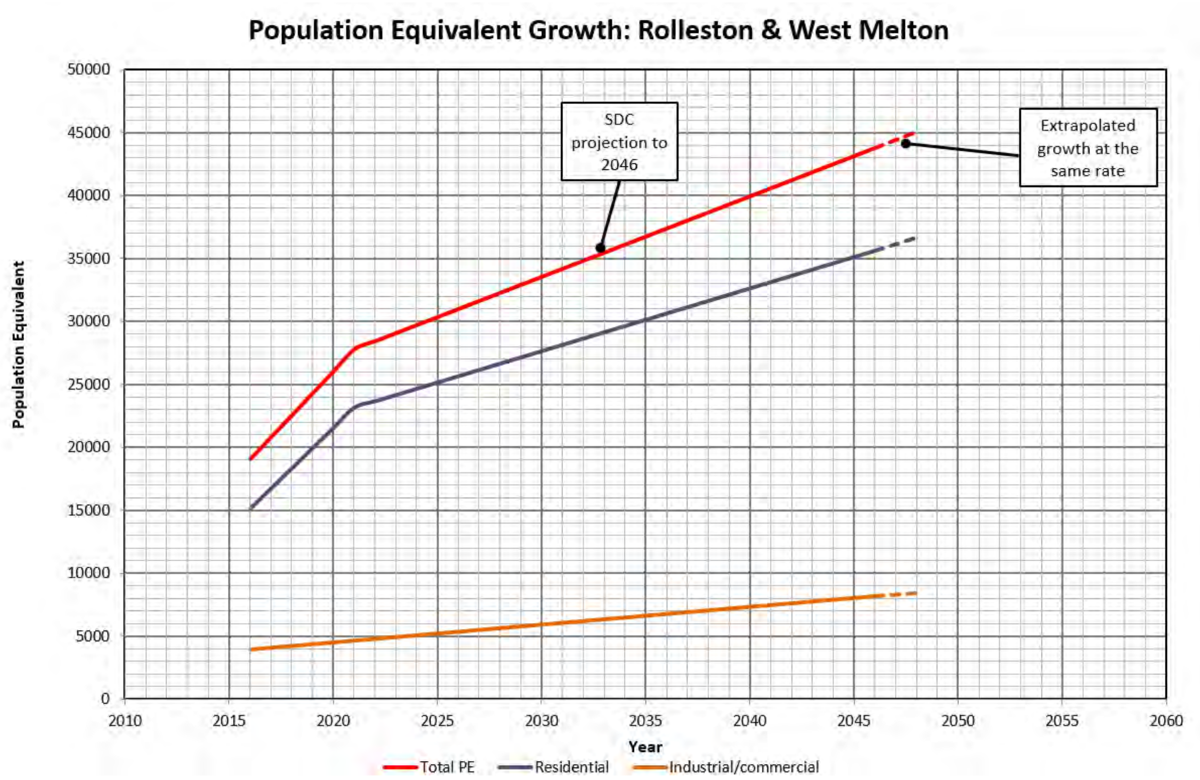


Figure 11-5 Projected PE Growth - Rolleston & West Melton

Figure 11-6 Wet Weather Flow Capacity Map

11.5 Resource Consents

Rolleston township is part of the ESSS scheme. Therefore, all wastewater is pumped to the Pines Treatment Plant. The resource consents required for this treatment plant are in the ESSS section of this plan. Consents for the old treatment plant are still active, however the majority of this site is no longer operational. The consents for the Helpet plant are shown below in Table 11-2.

Table 11-2 Resource Consents

Consent	Description	Location	Date Issued	Expiry Date	Quantities
CRC950311.1 *Issued - Active*	To discharge contaminants (including odours and aerosols) into the air from spray and trickle irrigation of treated domestic sewage effluent onto 13.8 hectares of land, from the storage of sewage screens and sludge from an extended aeration sewage treatment plant located between Springston Rolleston and Lincoln Rolleston Roads, at or about map reference M36:614-337.	BTWN Springston-Rolleston & Springston-Lincoln Roads, ROLLESTON	12-Dec-00	31-Mar-30	
CRC950310.2 *Issued - Active*	To discharge contaminants to land	BTWN Springston-Rolleston & Springston-Lincoln Roads, ROLLESTON	17-Mar-05	31-Mar-30	110

11.6 Scheme Assets

A summary of the assets within this scheme is outlined in this section.

11.6.1 Reticulation Overview

A summary of material and diameter for pipes is shown in Figure 11-7 and Figure 11-8.

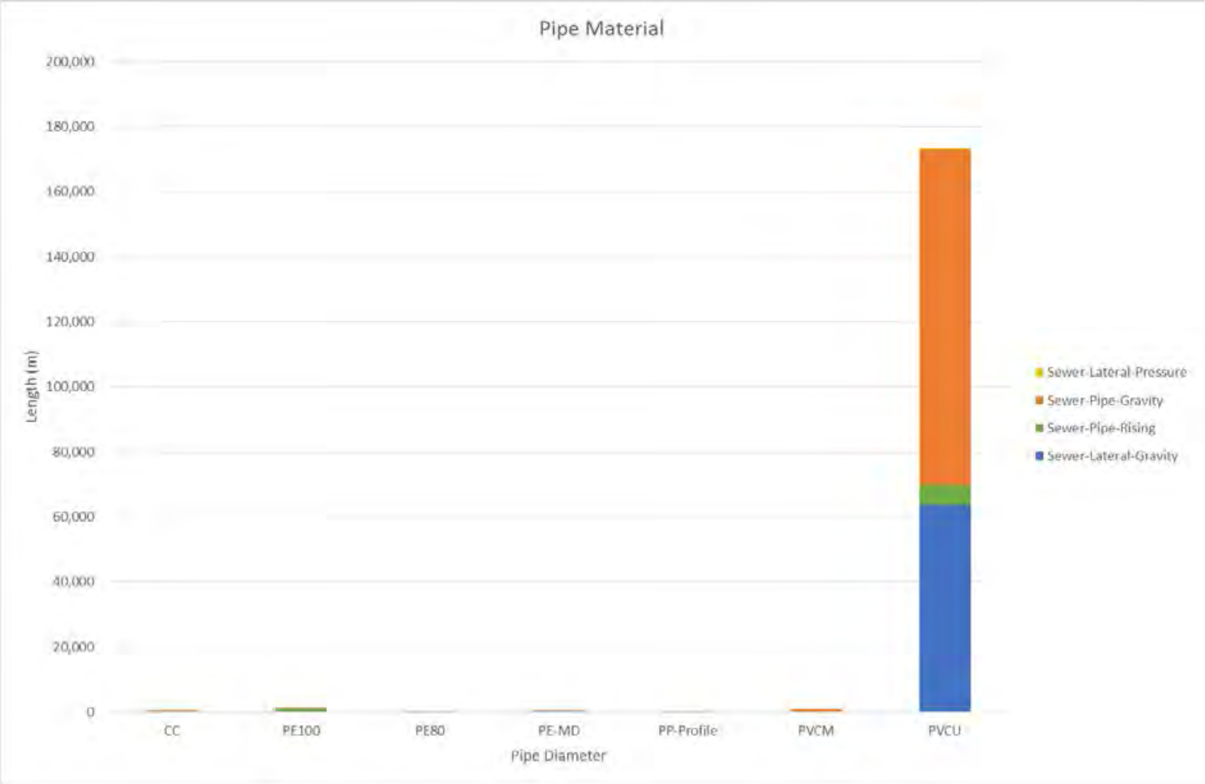


Figure 11-7 Pipe Material - Rolleston

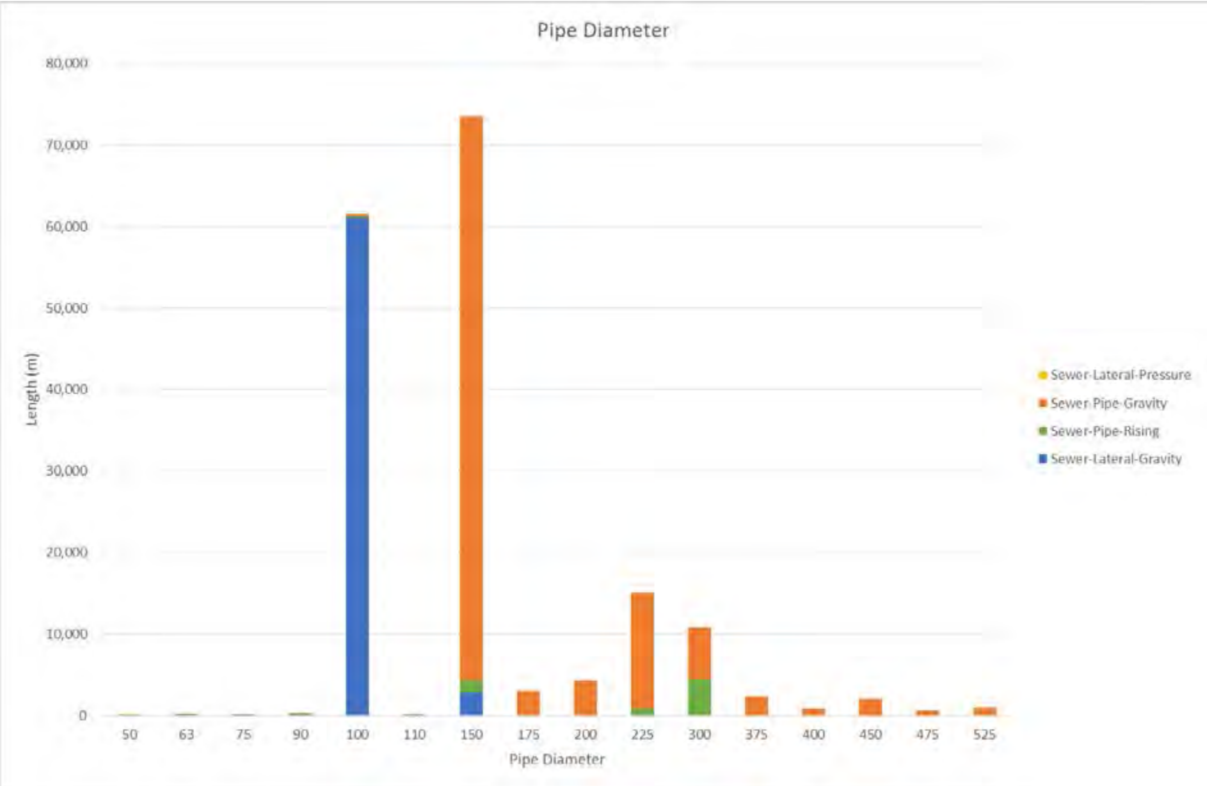


Figure 11-8 Pipe Diameter – Rolleston

11.6.2 Treatment and Disposal

Further reference to the treatment and disposal of Rolleston wastewater is described in Section 5.0.

11.6.3 Design

The wastewater collection system has been designed in accordance with the appropriate New Zealand engineering design guidelines at the time of construction and in accordance with the Selwyn District Council Engineering Design Standards. Specific designs for portions of the scheme outside of these standards have been considered where detailed engineering designs have been provided.

11.6.4 Pump Stations

There are a total of seven pump stations with the details outlined in Table 11-3 below.

Pump stations where the standby / assist pump is predicted to start have been highlighted in yellow and red for those that experience a peak wet weather response.

Yellow Pumps are can convey the peak flow without backing up the system

Red Pumps are unable to convey the peak flow causing the system to back up

Table 11-3 Pump Station Overview

Site Name	Wet well dimensions	No of pumps	Pump curve used	Recorded instantaneous pump rate (L/s)	Model Pump Rate (L/s)	ADWF (L/s)	PDWF (L/s)	PWWF 1 in 5 year ARI (L/s)
Rolleston (S) Boulez Mews PS	1800Ø	2	Flygt 3068 170 HT216	2.5	3.0	0.1	0.3	0.3
Rolleston (S) George Holmes Dr PS	3050Ø	2	Flygt 3202 180 MT431	70	64	8.4	8.9	8.9
Rolleston (S) Goldrush Ln PS	1800Ø	2	Flygt 3085 183 HT481	20	17	0.6	1.6	1.6
Rolleston (S) Goulds Rd PS	2400Ø	2	Flygt 3127 180 HT481	15	18	4.1	13.6	13.6
Rolleston (S) Helpet PS	3000 x 2500	2	Flygt 3202 180 HT450	110-140	105-135	18.1	51.1	50.8
Rolleston (S) Marlowe Pl PS	1800Ø	2	Flygt 3085 183 MT461	8	8.4	0.2	0.5	0.5
Rolleston (S) Runners Rd PS	2600Ø	2	Flygt 3102 181 MT461	16	17	1.0	2.0	2.0

Table 11-4 Pump Station Storage Time Analysis

Pump Station	Hours until HLA reached	Hours until first spill	Spill Location - AMS ID

Rolleston (S) Boulez Mews PS	Subdivision	47.9	50.7	551108
Rolleston (S) George Holmes Dr PS	Service industrial area - has capacity to service Izone industrial area	6.9	8.1	551007
Rolleston (S) Goldrush Ln PS	Lift station to reticulation flowing to Helpet	NA	NA	NA
Rolleston (S) Goulds Rd PS	Lift station to reticulation flowing to Helpet	4.5	6.8	550248
Rolleston (S) Helpet PS	Lift sewage up to new gravity line to Selwyn Road Pump station	12.3	15.1	550166
Rolleston (S) Marlowe Pl PS	Subdivision	27.3	30.0	551137
Rolleston (S) Runners Rd PS	Services the Department of Corrections and CYFS	73.5	74.7	542308

11.6.5 Helpet Emergency Storage

Since the completion of the upgrade to the Pines WWTP in 2012, the Helpet WWTP is now no longer in service as a treatment facility. The existing site was repurposed as an emergency wastewater storage facility. Figure 11-9 shows the path of the wastewater within the facility.

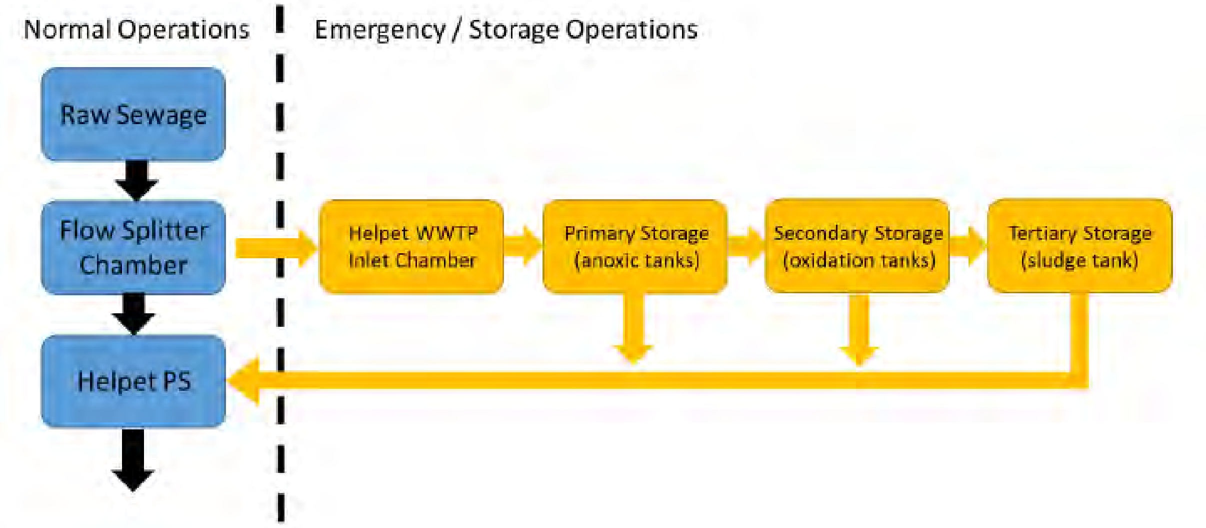


Figure 11-9 Flow Diagram showing path of the wastewater

Under normal operation, wastewater from the upstream catchment enter the site via the flow splitter chamber. Flow is then diverted into the Helpet Pump Station (PS) wet well through a DN375 pipe. The wastewater is then pumped to the Farrington gravity trunk main. Under normal operations, the storage facilities will not be used.

In the event the pumps are unable to match the incoming flow or a mechanical/electrical failure of the Helpet pump station occurs, the water level will rise in the wet well and the flow splitter chamber. If the level rises high enough, it will begin to spill over a fixed weir to the Helpet inlet chamber / pump station and then to the primary storage tanks (previously operating as anoxic tanks under their previous WWTP function).

The tanks will fill sequentially. As each tank reaches its top water level, a steel box weir will convey flows to begin to fill the next tank. Sequential filling minimises the effort required to wash down the tanks after an event. Once the primary tanks are full, flows are then conveyed via a terminal weir to the secondary storage tanks (previously operating as Oxidation tanks under their previous WWTP function). The final chamber within the storage system is the tertiary chamber (previously operating as the sludge storage tank under their previous WWTP function).

A separate circuit of DN150 pipes returns flow back to the pump station. "WaStop" sock type check valves in the return circuit ensure the tanks cannot fill via these pipes. Table 11-5 shows the volume and spill level (slightly below the top water level) of each of the tanks.

Table 11-5 Summary of the volume and assumed safe top weir level of the storage facilities

Existing Tank	Approximate Volume (m3)	Assumed Safe Top Water Level (m)
Old Inlet PS	11.2	45.67
Tank 1	63.5	45.63
Tank 2	61.9	45.62
Tank 3	60.2	45.58
Tank 4	58.56	45.55
Ditch 1 (Sth)	218.9	45.51
Ditch 2 (Sth)	209.2	45.48
Sludge tank	17.8	45.45

11.6.6 Rising Mains

Table 11-6 Rising Main Overview

Pump Station	Town	Total Length (m)	Total Volume (m3)	ADWF (L/s)	Uphill Retention Time (hours)	Drain Time (hours)	Total Time (hours)	Model Max Pressure (kPa)	SCADA Max Pressure (kPa)
Rolleston (S) Boulez Mews PS	Rolleston	94	0.2	0.1	0.5	0.0	0.5	110	No data
Rolleston (S) George Holmes Dr PS	Rolleston	2,501	158.1	8.4	5.2	0.0	5.2	315	No data
Rolleston (S) Goldrush Ln PS	Rolleston	23	0.2	0.6	0.1	0.0	0.1	20	No data
Rolleston (S) Goulds Rd PS	Rolleston	524	8.3	4.1	0.6	0.0	0.6	105	No data
Rolleston (S) Helpet PS	Rolleston	942	27.6	18.1	0.2	1.1	1.3	295	95 – 180**
Rolleston (S) Marlowe Pl PS	Rolleston	160	1.4	0.2	2.1	0.0	2.1	30	No data
Rolleston (S) Runners Rd PS	Rolleston	475	7.9	1.0	2.3	0.0	2.3	40	No data

11.7 Operational Management

The wastewater schemes are operated and maintained under the maintenance contract 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.

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

11.8 Photos of Main Assets

Photo 1 Helpet Pump Station

Photo 2 - Burnham School Road Pump Station

11.9 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 11-7 details 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. Urgent action to eliminate / mitigate / manage the risk. 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. Immediate action required to eliminate / mitigate / manage the risk.

		Document risk and action in the AMP.

Table 11-8 Risks - Rolleston

Risk	Action/Project	Year Identified	2014 Risk Rating	2017 Risk Rating	Residual Risk Rating
Increased loading from development overloads pump station	Upgrade pumps (one) in Goulds Road	2014	45	45	20

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

11.10 Asset Valuation Details

The total replacement value of assets within the Rolleston Scheme is $68,198,064 as detailed in Table 11-9 below. The majority of the reticulation value is made up of pipes.

Table 11-9 Replacement Value, Rolleston

Asset Class 1	Asset Class 2	Sum of Replacement Value
Plant and Equipment		$3,135,984
Wastewater Reticulation	Chamber	$117,240
	Lateral	$19,689,041
	Manhole	$10,338,128
	Pipe	$34,811,173
	Valve	$106,498

Replacement values for these different types of assets are shown in Figure 11-10 below.

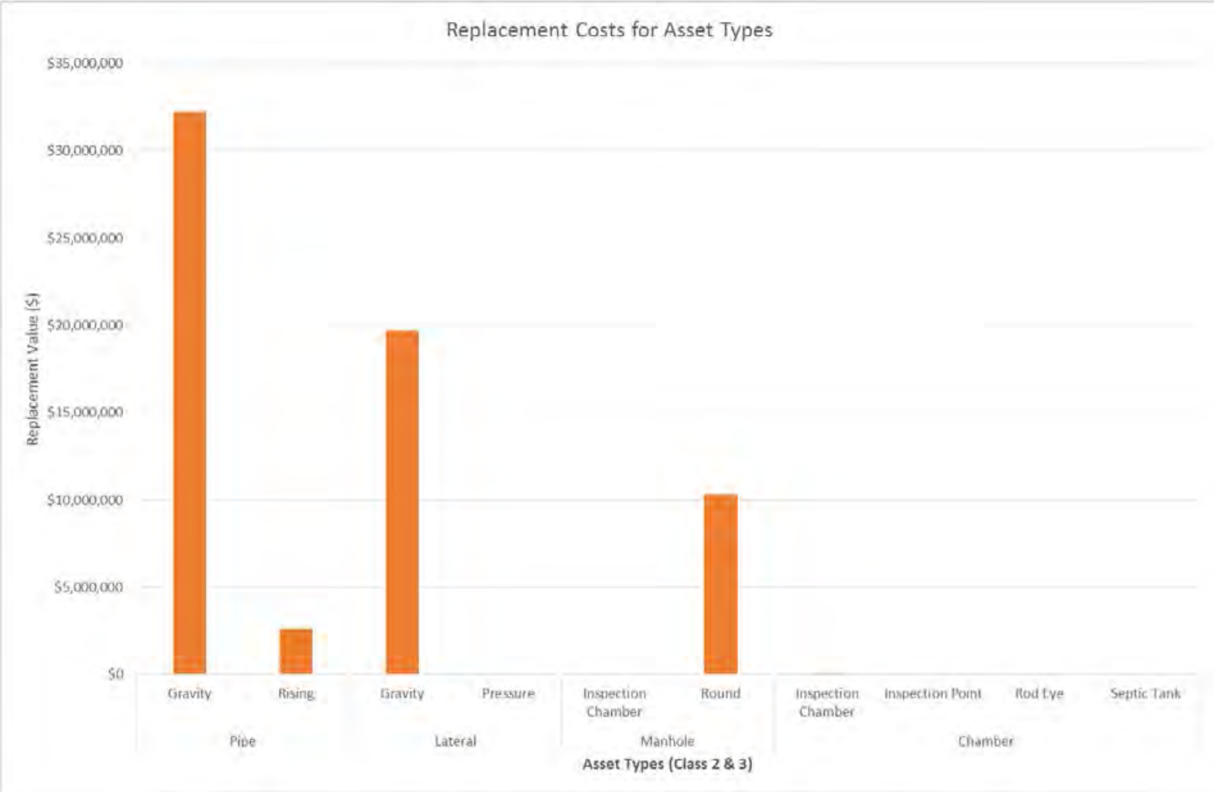


Figure 11-10 Replacement Costs for Rolleston

11.11 Renewals

The renewal profile has been taken from the 2014 5 Waters Valuation. A graph showing the renewals for this scheme are shown by Figure 11-11 below.

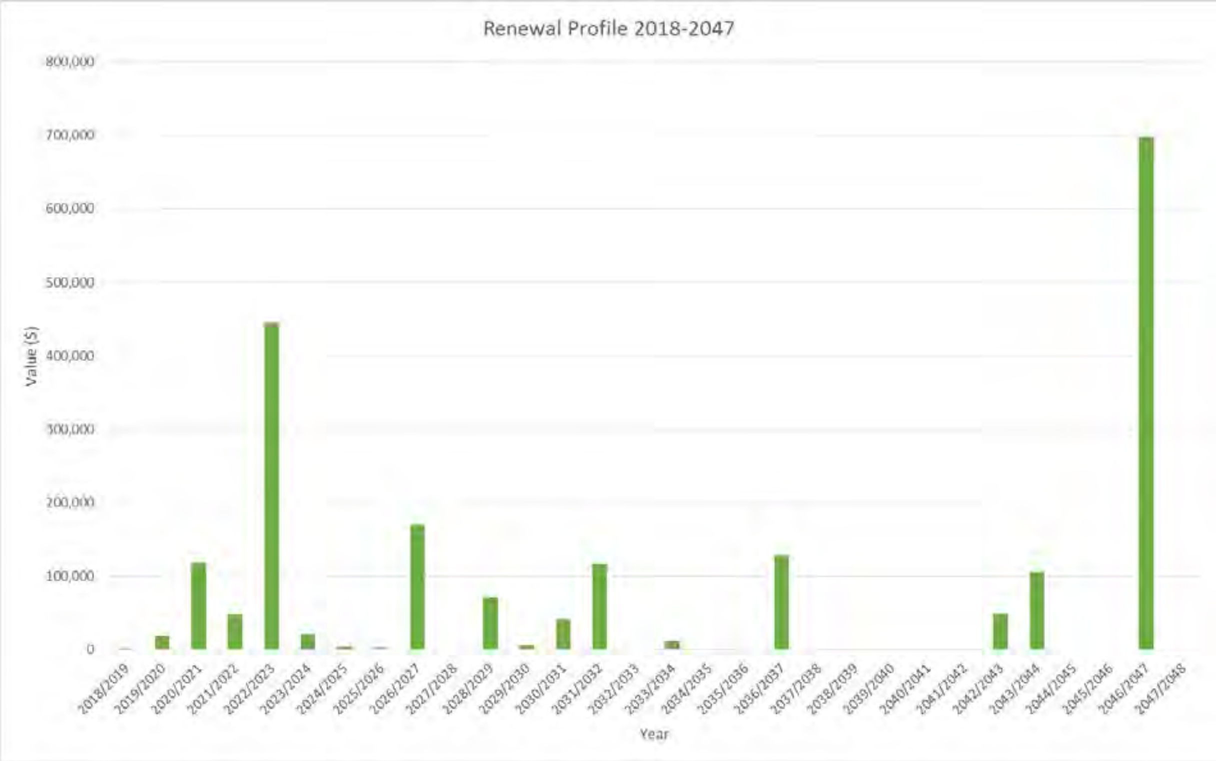


Figure 11-11 Rolleston Wastewater Renewal Profile

11.12 Critical Assets

The criticality model for Rolleston 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 11-10 and Figure 11-12 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	137,791
4	Medium-Low	20,101
3	Medium	5,616
2	Medium-High	13,216
1	High	5,077

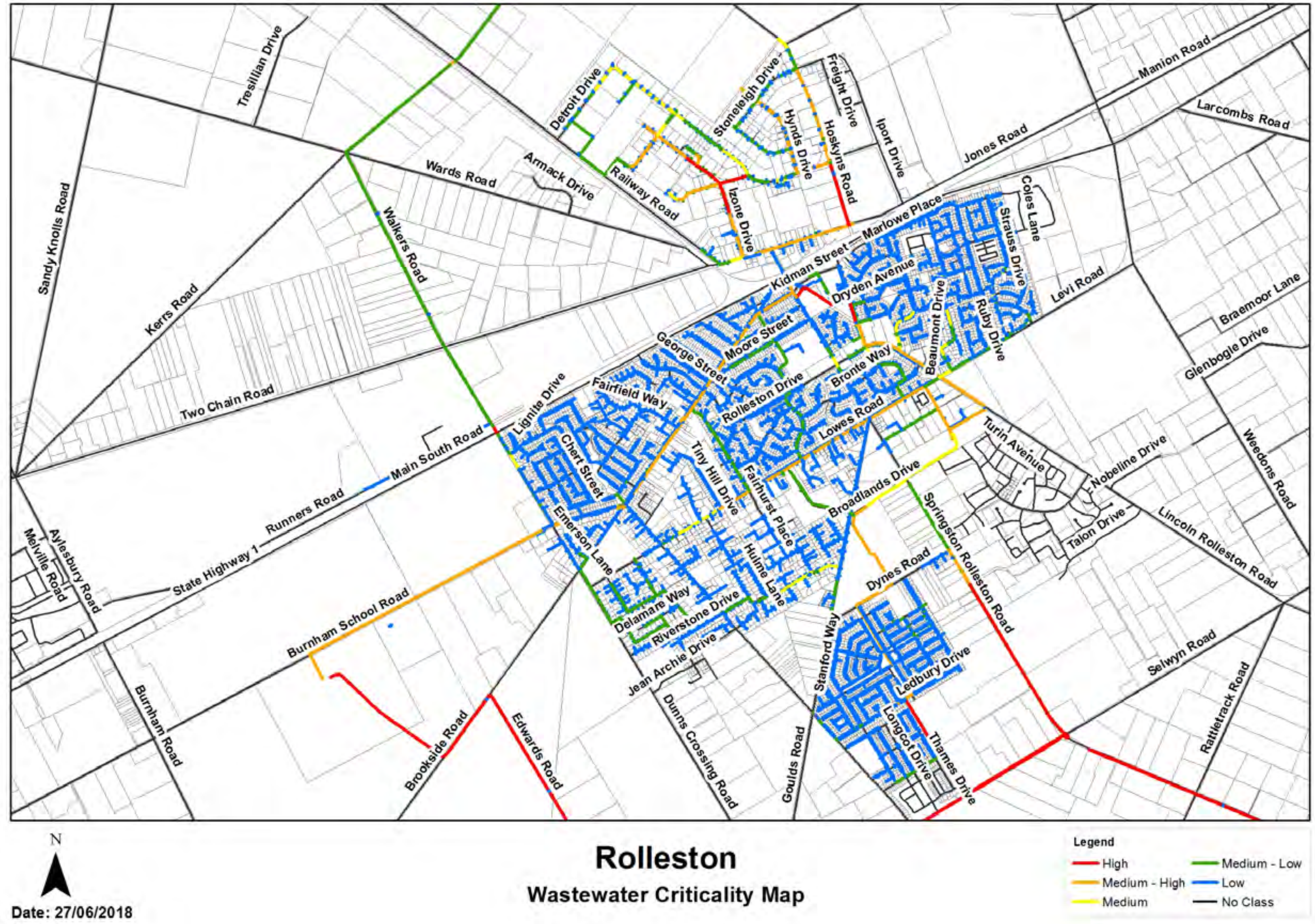


Figure 11-12 Criticality Map

11.13 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 and it provides details of how the model has been calculated for the reticulation assets (particularly pipes). Figure 11-13 below shows the level of asset condition for all of the assets within this scheme that have a recorded known condition.

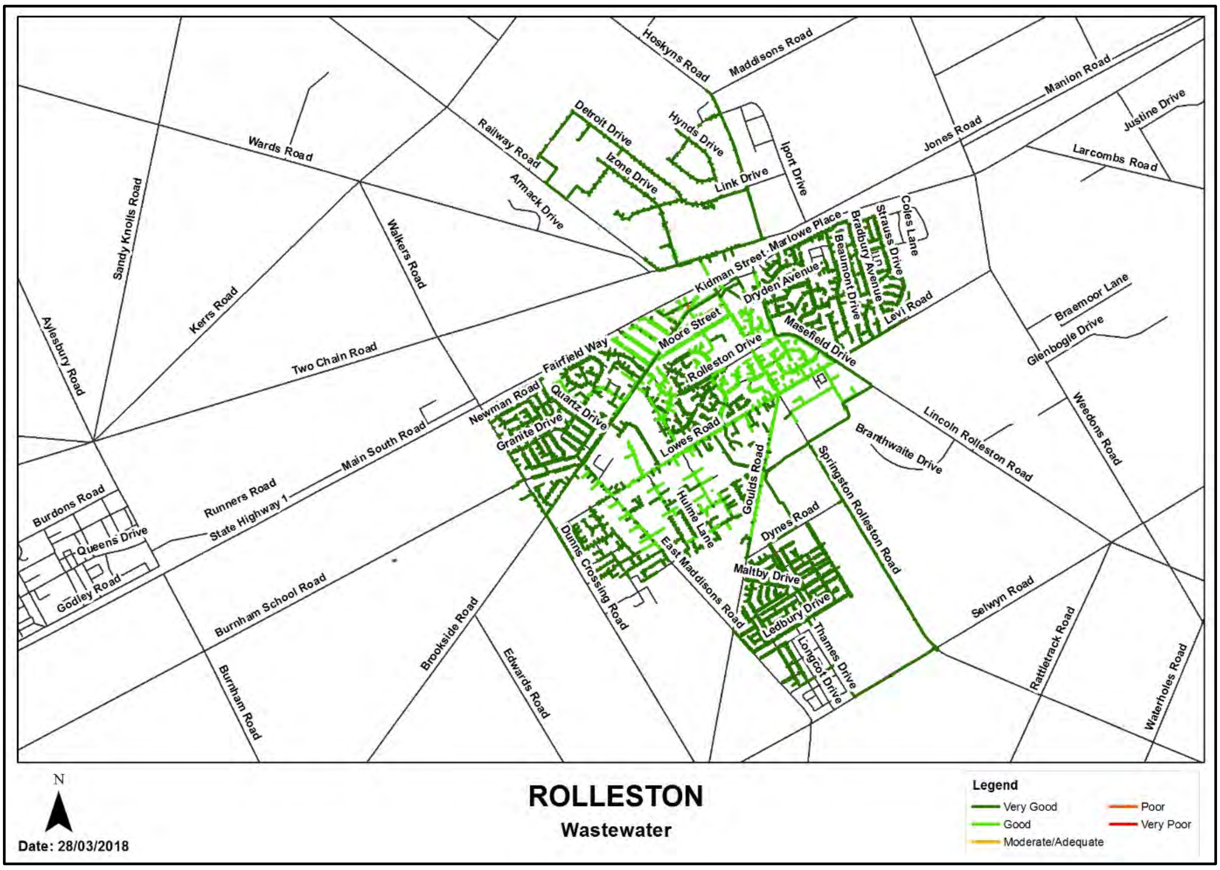


Figure 11-13 Asset Condition - Rolleston

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

11.14 Funding Program

The 10 year budgets for Rolleston 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 Rolleston Budget Summary

Years	Expenditure	Renewals	Projects	Capital Projects
2018/2019	$270,600	$1,496	$15,000	$287,096
2019/2020	$277,700	$18,854		$296,555
2020/2021	$284,543	$118,388		$402,931
2021/2022	$291,163	$48,203		$339,367
2022/2023	$297,589	$445,310		$742,900
2023/2024	$299,849	$21,479		$321,328
2024/2025	$302,087	$3,836		$305,923
2025/2026	$304,306	$2,883		$307,188
2026/2027	$306,506	$170,186		$476,691
2027/2028	$308,687			$308,687
Total	$2,943,030	$830,636	$15,000	$3,788,666

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.

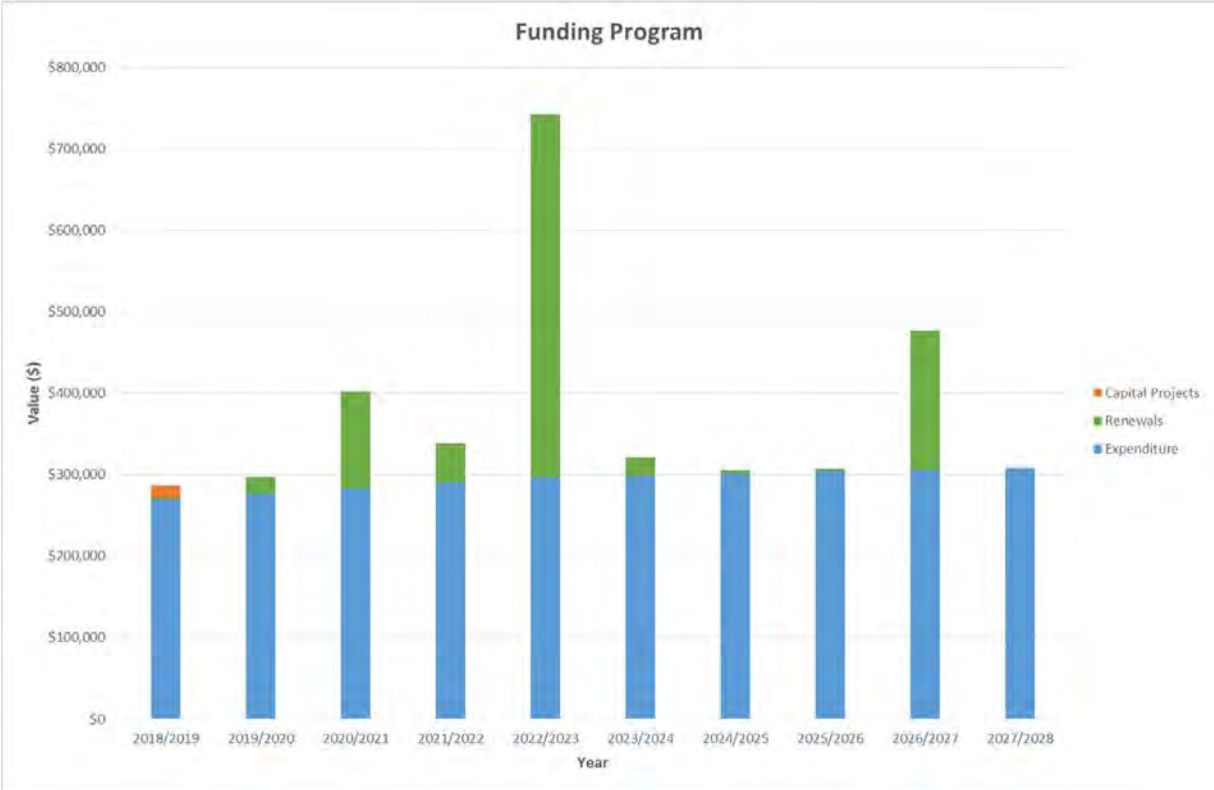


Figure 11-14 Rolleston Funding Summary

There are a number of major projects for Rolleston Wastewater scheme in the LTP budget.

Refer also section 5 for large capital works associated with ESSS

Table 11-13 Key Projects

Account Label	GL	Description	Year 1 ($)	Year 2 ($)	Year 3 ($)	Years 4 to 10	Funding Split
Capital Projects	466690040	Upgrade pumps (one) in Goulds Road	$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.

12.0 SEPTAGE DISPOSAL FACILITIES

12.1 Scheme Summary

Description		Quantity
Estimated Population Served		**N/A**
System Components	**Piped (km)**	**N/A**
	Manholes (No.)	**N/A**
	Pump Stations (No.)	**N/A**
	Treatment	**Sludge drying**
	Disposal	**On site**
History	**Original scheme installation date**	**1996**
Value ($)	**Replacement Cost**	**-**
	Depreciated Replacement Cost	**-**
Financial	**2014/2015 Estimate** **Annual maintenance cost** **% of total**	**-**
Sustainability	**Ultimate discharge point**	**Onsite disposal**

12.2 Key Issues

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

Table 12-1 Septage Sites Scheme Issues

What's the Problem	What we plan to do
Consent expires 2016	Decommission the sites Set up receiving site at Pines WWTP

12.3 Overview & History

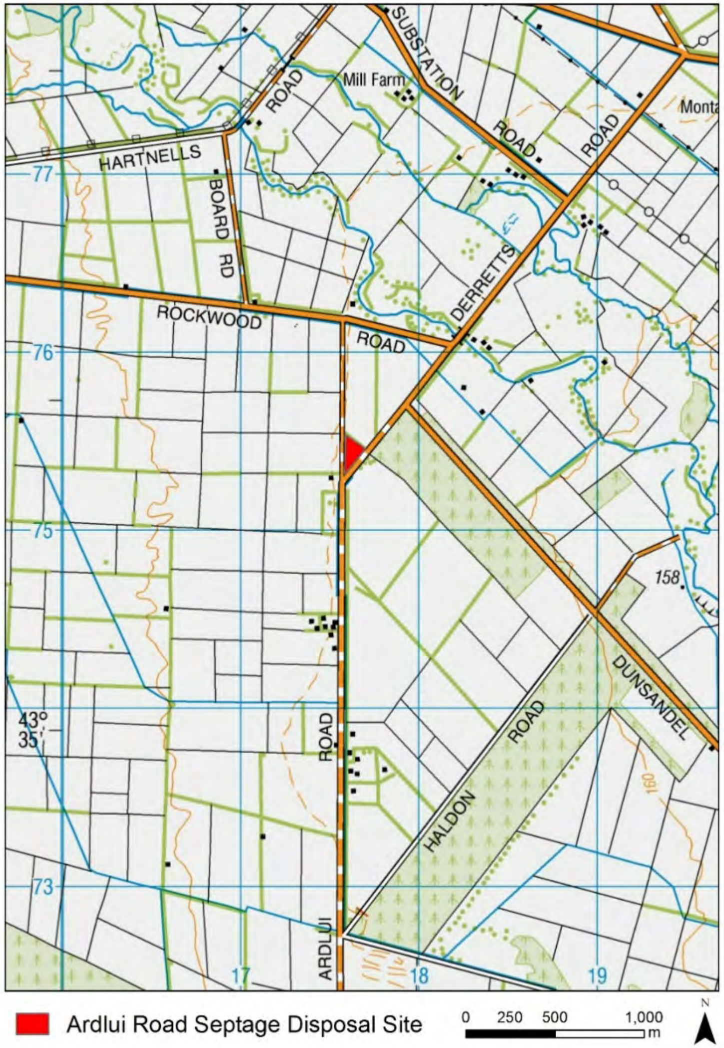
The Ardlui and Bleak House Road septage disposal facilities were commissioned during 1996. The sites were developed to allow disposal of domestic septic tank sludge for the Darfield and Hororata areas. Two other sites were also investigated, Greenpark and Bealey, but were not developed due to land ownership issues and community resistance.

The primary purpose of the septage disposal sites is to allow the controlled discharge of septage and the dewatering of the septage, to facilitate the destruction of harmful bacteria. The original consent allowed dried sludge to be removed after two years and either disposed off-site or spread evenly across the site to a maximum of 400mm. However, this is not now allowed unless the sludge is of Class Aa Biosolids.

The ability to continue use of the sites is limited by heavy metal concentration build-up. Without effective mixing in the ground or the ground reaching consented maximum levels council should find alternative options for community disposal.

The Councils property team manage the site lease and Environment Canterbury reporting. The facilities are reported in the 5 waters AMP due to the nature of the site.

The sites were decommissioned 2016/17.



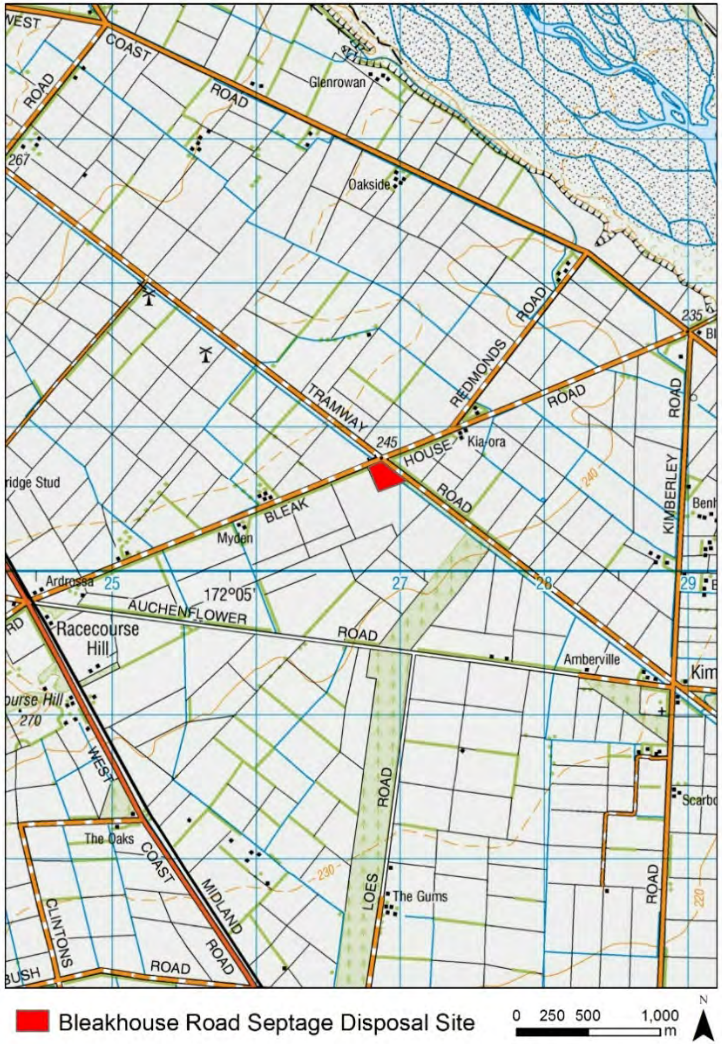


Figure 12-1 Scheme Map

12.4 System Capacity

The Ardlui facility received on average 1,121m^3/year (32%) and the Bleak House facility receives an average of 2,400m^3/year (68%). The Ardlui facility receives only domestic septage, while the Bleak House facility receives on average 76% household domestic, 13% commercial domestic and 11% public toilets septage.

12.5 Resource Consents

The Septage sites have a number of resource consents. Table 12-2 shows the discharge permitted by the resource consents for this scheme.

Table 12-2 Resource Consents

Consent	Description	Location	Date Issued	Expiry Date	Quantities (m^3/month)
CRC062913.1 *Issued – s124 Continuance*	To discharge contaminants onto and into land.	corner of Derretts Road & Ardlui Road, HORORATA	8-Aug-08	18-Sep-16	400
CRC062912.1 *Issued – s124 Continuance*	To discharge contaminants to land	Bleakhouse Road, KIMBERLEY	20-Aug-09	18-Sep-16	400
CRC093487 *Issued - Active*	To build a purpose built septage pond, being a storage facility for septage from domestic tanks.	Bleakhouse Road, KIMBERLEY	28-Jul-09	28-Jul-19	

12.6 Funding Program

The 10 year budgets for Septage Disposal Facilities 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 12-3 Septage Disposal Budget Summary

Years	Expenditure	Renewals	Projects	Capital Projects
2019/2020				$40,000
Total				$40,000

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.

There are two major projects for the Septage Sites in the LTP budget.

Table 12-4 Key Projects

Account Label	GL	Description	Year 1 ($)	Year 2 ($)	Year 3 ($)	Years 4 to 10	Funding Split
Capital Projects	460090006	Remediate site		$20,000			100% LoS
Capital Projects	460090005	Remediate site		$20,000			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.

13.0 SOUTHBRIDGE WASTEWATER SCHEME

13.1 Scheme Summary

Description		Quantity
Estimated Population Served		**930**
Scheme Coverage (1 Jan 18)	**Full Charges**	**329**
	Half Charges	**68**
	>1 Charges	**3**
System Components	**Piped (m)**	**22807**
	Manholes (No.)	**97**
	Pump Stations (No.)	**1**
	Treatment	**N/A (to Ellesmere STP)**
	Disposal	**N/A (to Ellesmere STP)**
History	**Original scheme installation date**	**2004**
Value ($)	**Replacement Cost**	**$7,153,359.98**
	Depreciated Replacement Cost	**$6,168,993.49**
Financial	**2018/2019 Estimate** **Annual maintenance cost** **% of total**	**$55,630** **1.74%**
Demand	**Annually (m3)**	**66,801**
	Average daily (m3)	**183**
	Peak daily (m3)	**364**
	Minimum daily (m3)	**146**
	Infiltration	**-**
Sustainability	**Ultimate discharge point**	**To Leeston WWTP**

13.2 Key Issues

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

Table 13-1 Southbridge Scheme Issues

What's the Problem	What we plan to do
Potential for future infiltration issues as scheme ages	Monitor groundwater levels and daily flows. Investigate issues as required

13.3 Overview & History

Southbridge is connected to the Leeston WWTP. This was approved in 2003 with construction starting in early 2004. The Southbridge sewerage scheme was commissioned in December 2004. Prior to this individual properties were services by septic tank.

The majority of the township is reticulated by gravity sewers but the low density outlying areas of the township are serviced by a pressurised sewerage system. There are 5 flush manholes located within the system that need to be operated on a weekly basis. Scour valves are located on 4 of the pressure mains that are operated on an “as required” basis.

Figure 13-1 Scheme Map

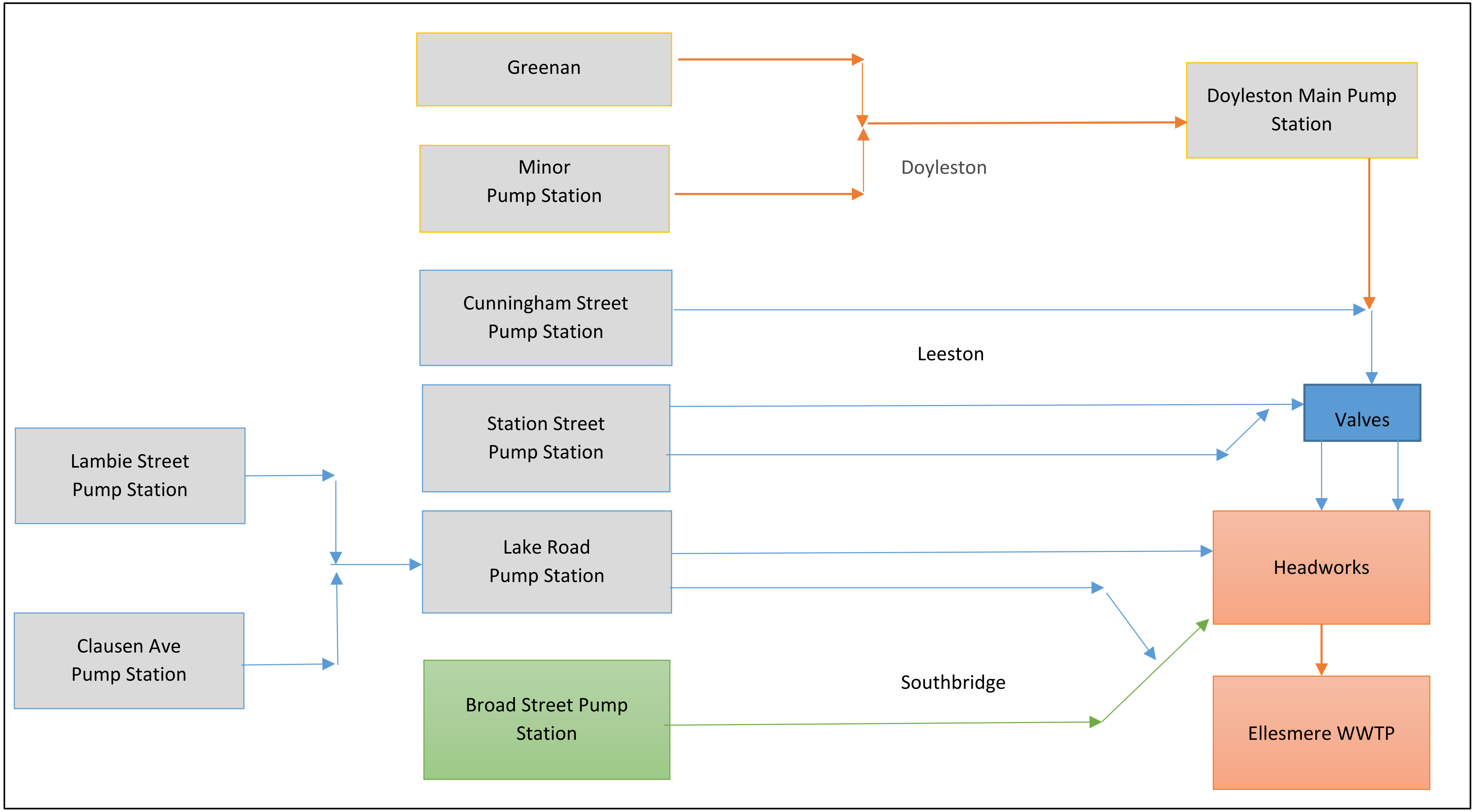


Figure 13-2 Scheme Schematic

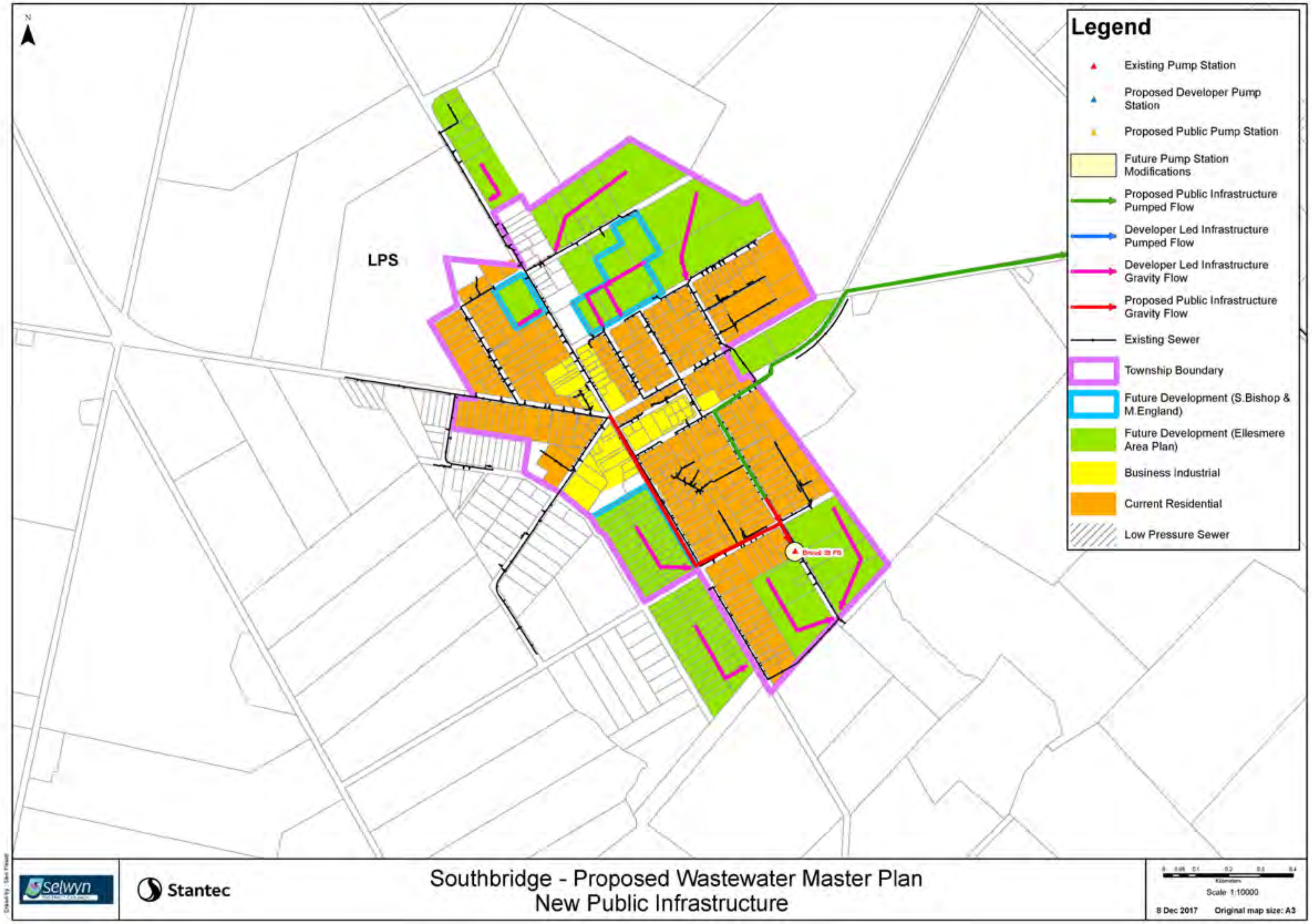


Figure 13-3 SouthbridgeMaster Plan

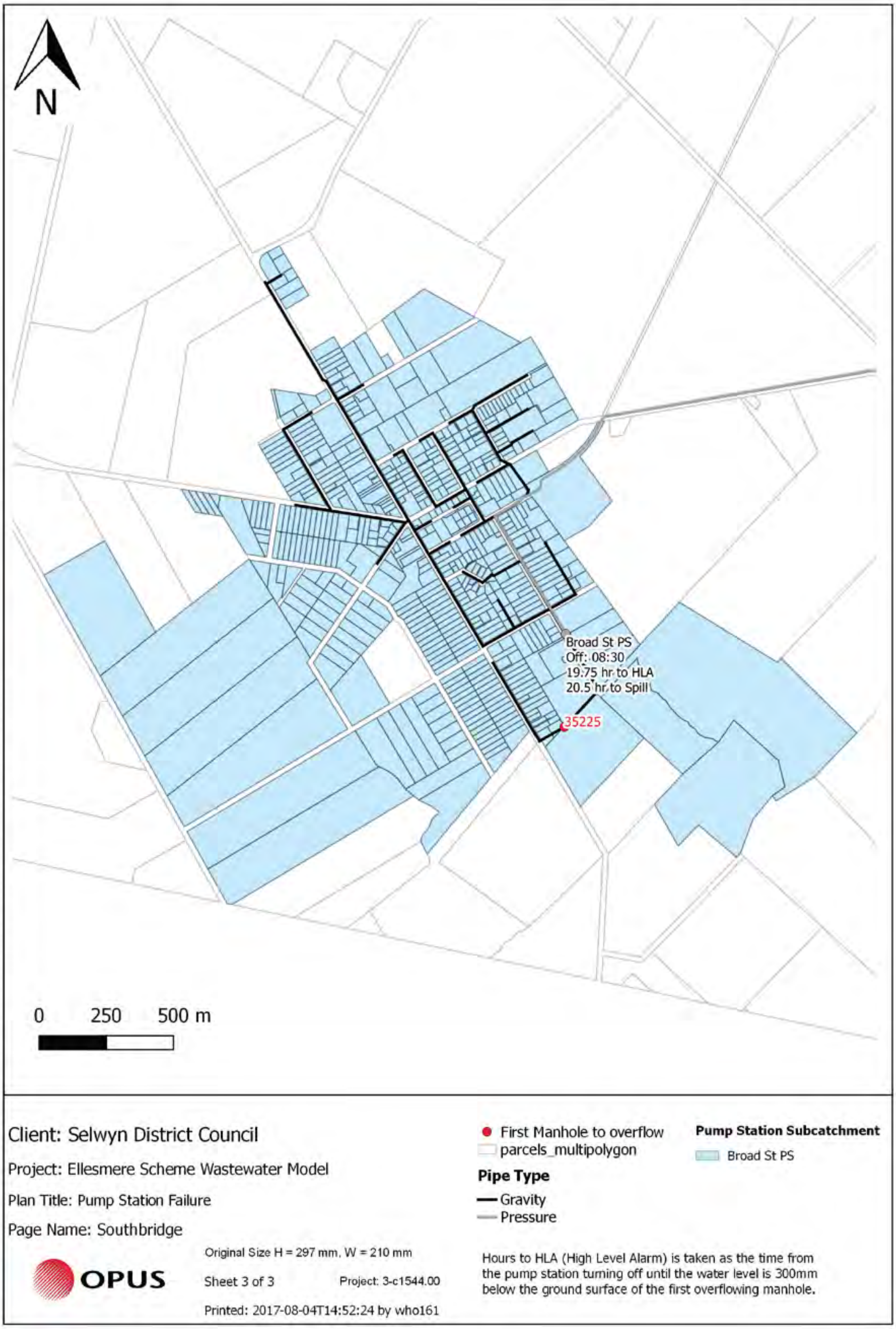


Figure 13-4 Pump Station Failure Map

13.4 System Capacity

The scheme is operating within the maximum design limits occasionally reaching the design flow maximum for the current population.

A small increase of capacity could potentially be achieved by duplicating the higher capacity flush pump, allowing up to a total of 466 properties to be serviced by the pump station.

Refer section 13.6.3 and the Master Plan in Figure 13-3

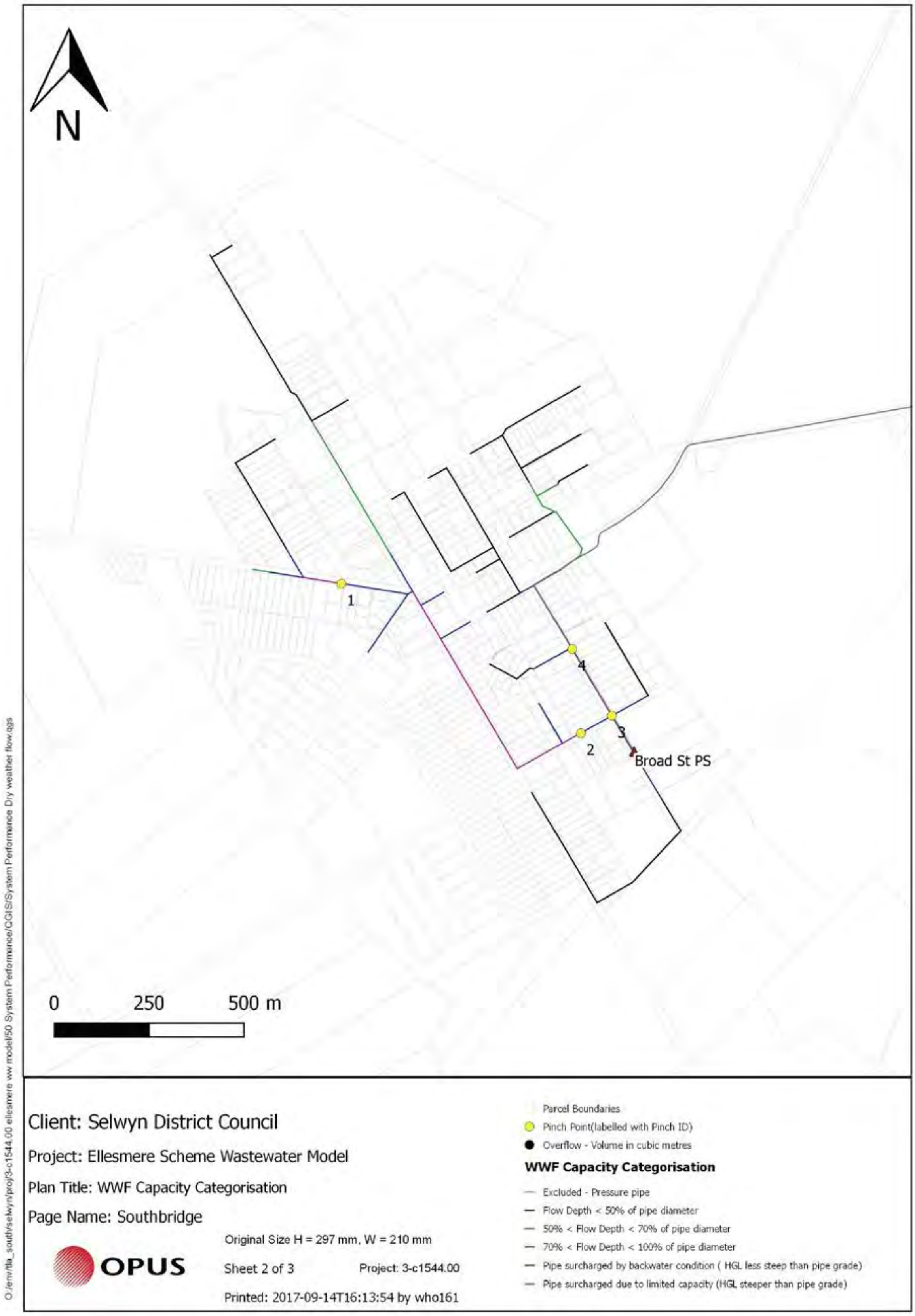


Figure 13-5 Wet Weather Flow Capacity Map

13.5 Resource Consents

Southbridge township is part of the Ellesmere scheme. Therefore, all wastewater is pumped to the Ellesmere Treatment Plant located in Leeston. The resource consents required for this treatment plant are in the Ellesmere section of this plan.

13.6 Scheme Assets

A summary of the assets within this scheme is outlined in this section.

13.6.1 Reticulation Overview

A summary of material and diameter for pipes is shown in Figure 13-6 and Figure 13-7.

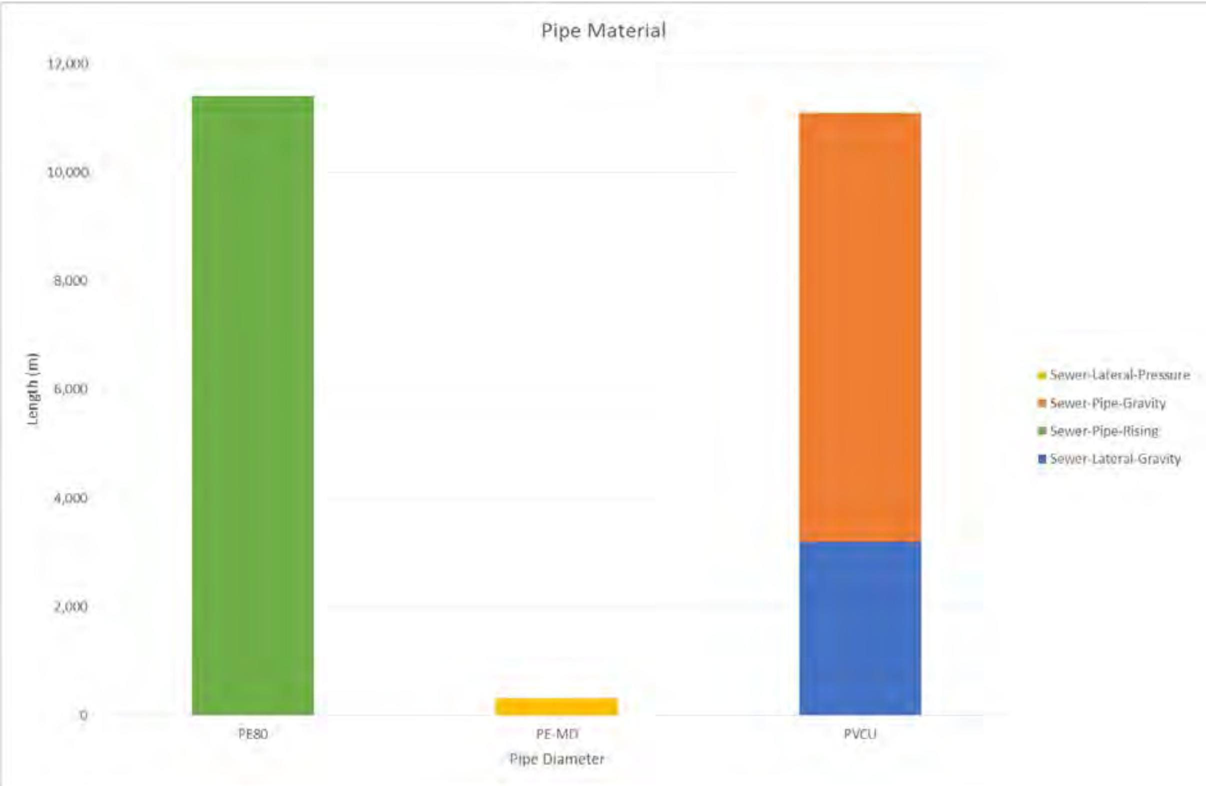


Figure 13-6 Pipe Material – Southbridge

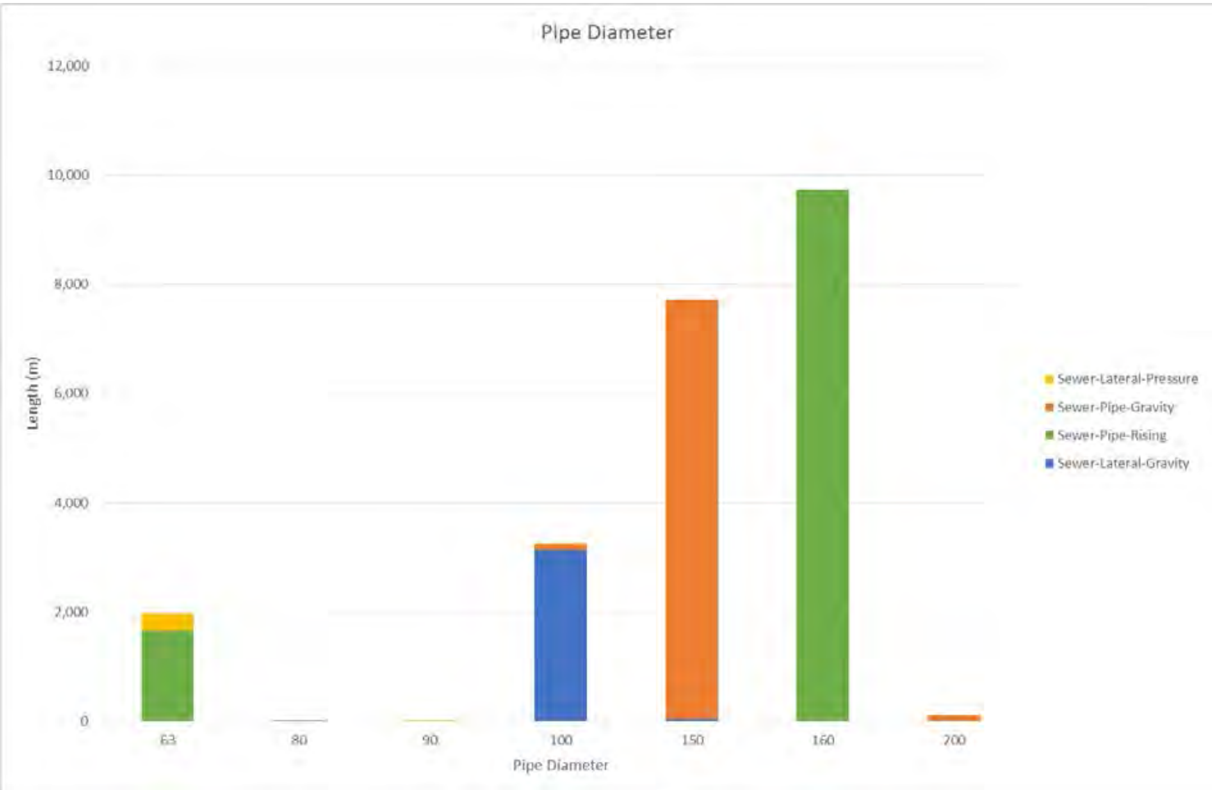


Figure 13-7 Pipe Diameter – Southbridge

13.6.2 Treatment and Disposal

No treatment is carried out with all wastewater pumped to Leeston WWTP.

13.6.3 Pump Stations

There is one pump station in Southbridge, shown in Table 13-2 below.

Table 13-2 Pump Stations

Site Name	Wet well dimensions	Wet Well area (m^2)	Wet Well Depth (m)	No of pumps	Pump curve used	Recorded Flow (L/s)	Model Pump Rate (L/s)	ADWF (L/s)	PDWF (L/s)
Southbridge (S) Broad St	2300 Ø	4.2	5	2	ABS AFP1048 Mono CE122	11	10.4	2.2	5.6

Table 13-3 Pump Station Storage Time Analysis

Pump Station	Town	Morning Peak Time	PS off time	Hours until HLA reached	Hours until first spill	Spill Level (m AD)	Spill Location – Model ID
Southbridge (S) Broad St	Southbridge	9:00	8:30	23	25.5	20.4	35225

The duty pump capacity is 12.2 L/s @ 490 kPa. The flush pump can deliver 16 L/s @ 780 kPa and operates every 14 pump cycles or after 12 hours.

The current dry weather flow is well in excess of the average dry weather flow assumed for design. This is likely to be associated with groundwater infiltration given the high ground water table. However, the actual peaking factor is less than that assumed for design so the peak flow per connection is less than that adopted for design purposes.

13.6.4 Rising Mains

Site Name	Material	Pressure Rating	Internal diameter (mm)	Comment
Southbridge (S) Broad St to Lake Road Rising Main	PE80	PN10	135	

13.7 Operational Management

The wastewater schemes are operated and maintained under the maintenance contract 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.

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

13.8 Photos of Main Assets

Photo 1 – Broad Street Pump Station

13.9 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. There were no risks identified for this scheme.

13.10 Asset Valuation Details

The total replacement value of assets within the Southbridge Scheme is $7,153,360 as detailed in Table 13-4 below. The majority of reticulation value is made up of pipes.

Table 13-4 Replacement Value, Southbridge

Asset Class 1	Asset Class 2	Sum of Replacement Value
Plant and Equipment		$304,896
Wastewater Reticulation	Chamber	$324,762
	Lateral	$1,113,590
	Manhole	$711,485
	Pipe	$4,521,356
	Valve	$177,271

Replacement values for these different types of assets are shown in Figure 13-8 below.

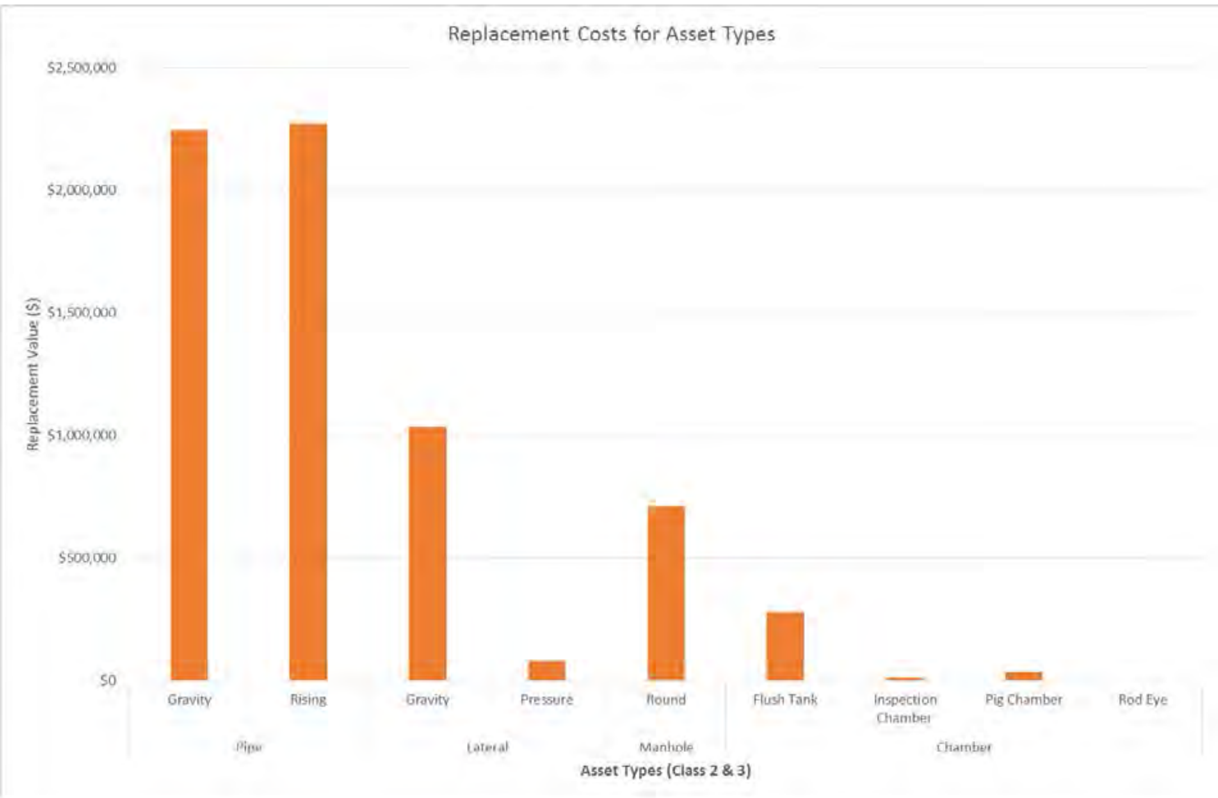


Figure 13-8 Replacement Costs for Southbridge

13.11 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.

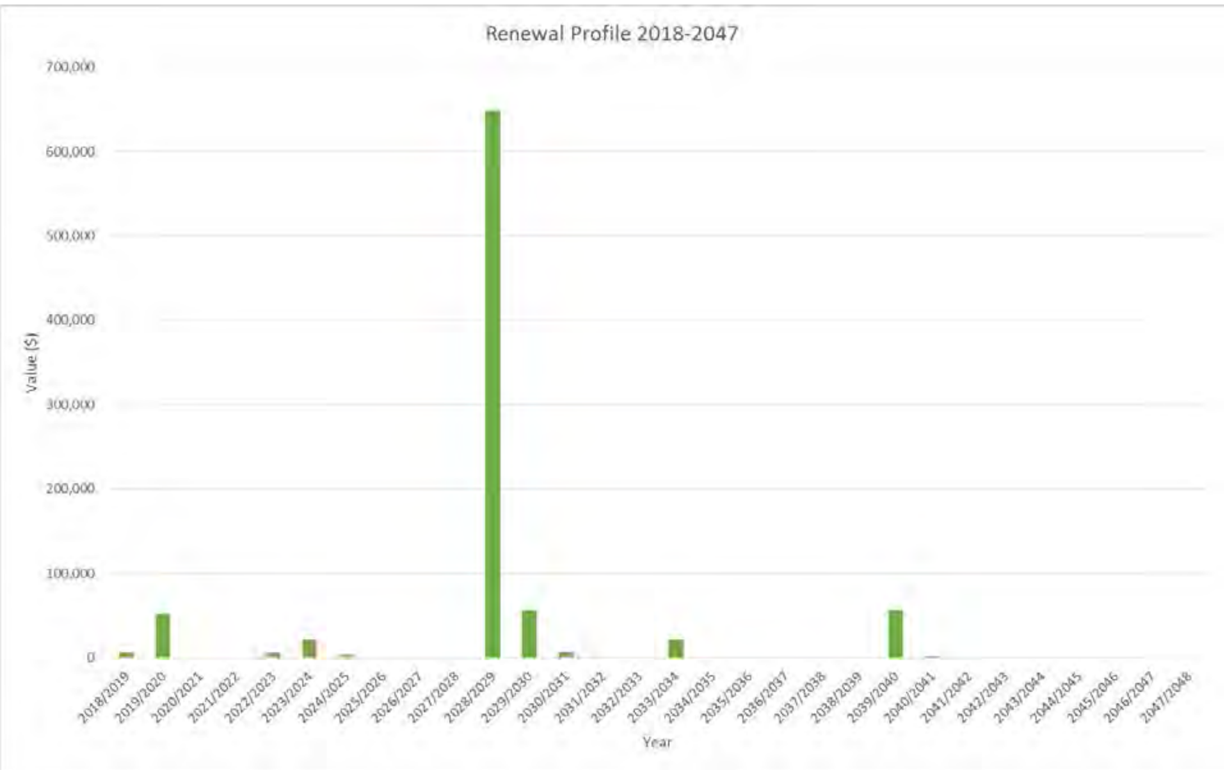


Figure 13-9 Southbridge Wastewater Renewal Profile

13.12 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 13-5 and Figure 13-10 below shows the calculated criticality for all of the assets within this scheme that have a recorded known length.

Table 13-5 Length of Assets per Criticality Level

Criticality Bands		Length (m)
5	Low	11,716
4	Medium-Low	10,689
3	Medium	412
2	Medium-High	0
1	High	0

Figure 13-10 Criticality Map

13.13 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 and it provides details of how the model has been calculated for the reticulation assets (particularly pipes). Figure 13-11 below shows the level of asset condition for all of the assets within this scheme that have a recorded known condition.

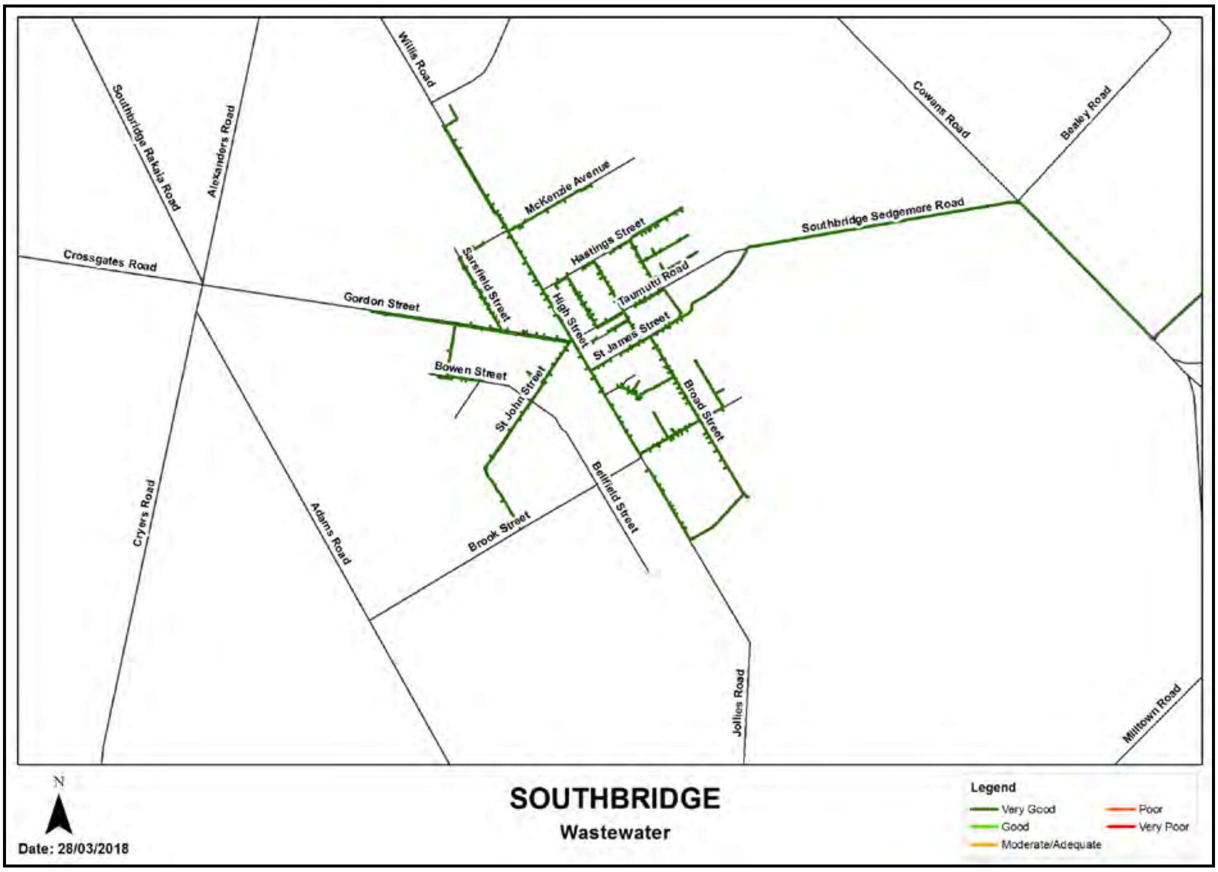


Figure 13-11 Asset Condition - Southbridge

Table 13-6 provides a description of the condition rating used within the condition model.

Table 13-6 Asset Condition Grading

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

13.14 Funding Program

The 10 year budgets for Southbridge are shown by Table 13-7 and Figure 13-12. 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 13-7 Southbridge Budget Summary

Years	Expenditure	Renewals	Projects	Capital Projects
2018/2019	$55,630	$6,178		$33,162
2019/2020	$55,630	$51,725		$283,511
2020/2021	$55,630			
2021/2022	$55,630			
2022/2023	$55,630	$6,808		
2023/2024	$55,630	$21,738		
2024/2025	$55,630	$4,009		
2025/2026	$55,630			
2026/2027	$55,630			
2027/2028	$55,630			
Total	$556,300	$90,458		$316,673

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.

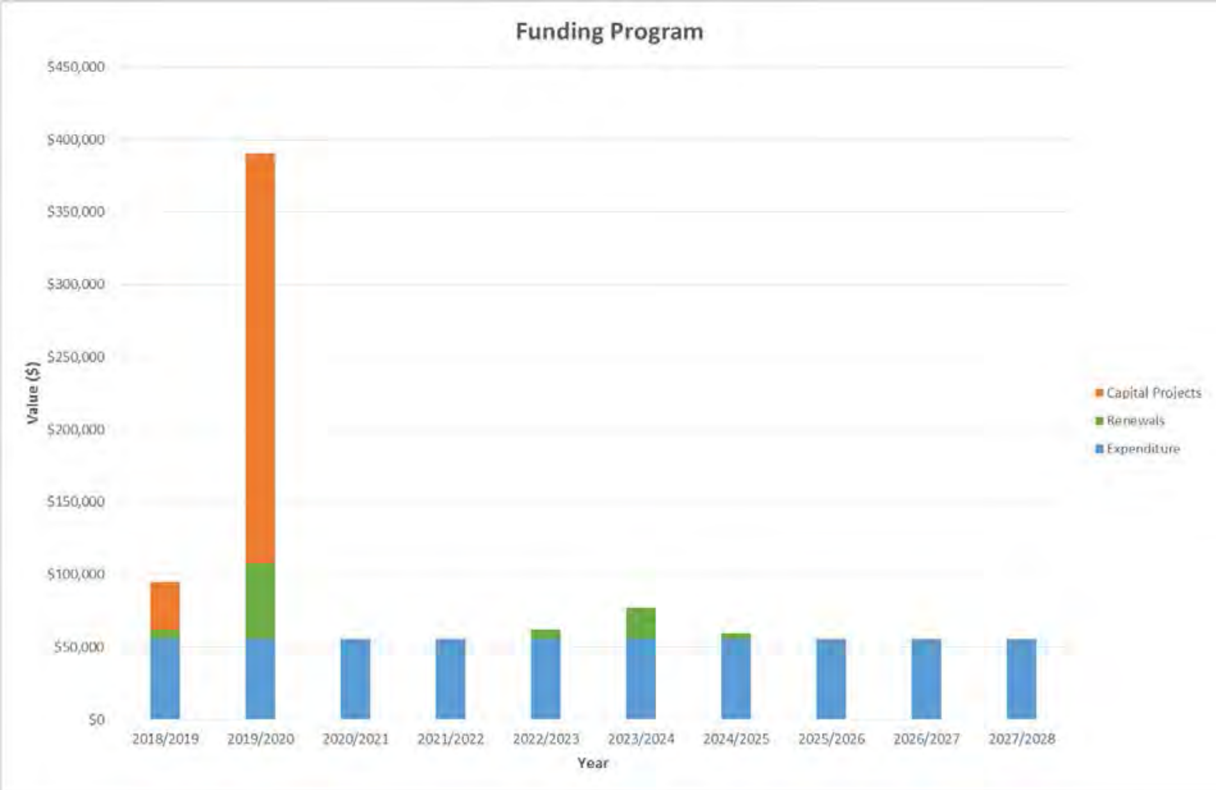


Figure 13-12 Southbridge Funding Summary

There is one project for Southbridge in the LTP budget.

Table 13-8 Key Projects

Account Label	GL	Description	Year 1 ($)	Year 2 ($)	Year 3 ($)	Years 4 to 10	Funding Split
Capital Projects	467790013	Pipeline Upgrade	$33,162	$283,511			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.

14.0 SPRINGSTON WASTEWATER SCHEME

14.1 Scheme Summary

Description		Quantity
Estimated Population Served		501
Scheme Coverage (1 Jan 2018)	Full Charges	177
	Half Charges	14
	>1 Charges	2
System Components	Piped (m)	9109.86
	Manholes (No.)	45
	Pump Stations (No.)	1
	Treatment	N/A (to Pines WWTP)
	Disposal	N/A (to Pines WWTP)
History	Original scheme installation date	1998
Value ($)	Replacement Cost	$3,142,639.99
	Depreciated Replacement Cost	$2,547,151.78
Financial	2018/2019 Estimate Annual maintenance cost % of total	$22,330 0.7%
Demand	Annually (m3)	33,039
	Average daily (m3)	90.77
	Peak daily (m3)	178.10
	Minimum daily (m3)	65.70
	Infiltration	Yes
Sustainability	Ultimate discharge point	To Pines WWTP

14.2 Key Issues

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

Table 14-1 Springston Scheme Issues

What's the Problem	What we plan to do
The pump station equipment has a high degree of sophistication with macerators and high head pumps.	Review pump setup at time of renewal. One pump has been replaced with a submersible pump as a trial.
Significant infiltration and inflow is experienced during wet weather	Target renewals to address infiltration and investigate sources of infiltration

14.3 Overview & History

A sewer reticulation system was installed into Springston Township in 1998, following agreement with Christchurch City permitting 24 hour pumping of raw sewage at a maximum flow rate of 6L/s to Christchurch City.

The reticulated sewer discharges to a single pump station on Leeston/Springston Road. Wastewater is pumped via a 100 mm diameter rising main to Springs and Ellesmere Junction road corner where it joins into the 250 mm diameter rising main from the Lincoln WWTP to Christchurch.

In early 2002 a developer (Aylesford Management Ltd) requested if the spare allocation could be used for a development on Blakes and Shands Roads, Prebbleton. Council agreed and accepted that a maximum of 246 connections could be sustained, provided that short and long term infiltration of groundwater is minimised.

In April 2006, Aylesford Management obtained the necessary approvals to develop their land, and hence take up 59 of Springston's sewer connections.

Subsequent to development of the Springston wastewater scheme a portion (equivalent to 59 connections) of the permitted discharge capacity was allocated to a residential development (Aylesford Management Ltd) at Blakes and Shands Roads, Prebbleton, as the Prebbleton scheme capacity is fully allocated.

From December 2012 Springston township wastewater treatment and disposal was undertaken at the Rolleston Pines as part of the Eastern Selwyn Sewerage Scheme.

2010/2011 Earthquakes

The 2010/2011 earthquakes had a minor impact on the scheme's below ground infrastructure. Several deep lateral connections separated but were repaired. Based on visual assessment (CCTV and qualified staff) no other damage to the below ground infrastructure or resulting effects e.g. blockages have been detected. There may however be long term but intangible impact on maintenance and renewals programmes.

Figure 14-1 Scheme Map

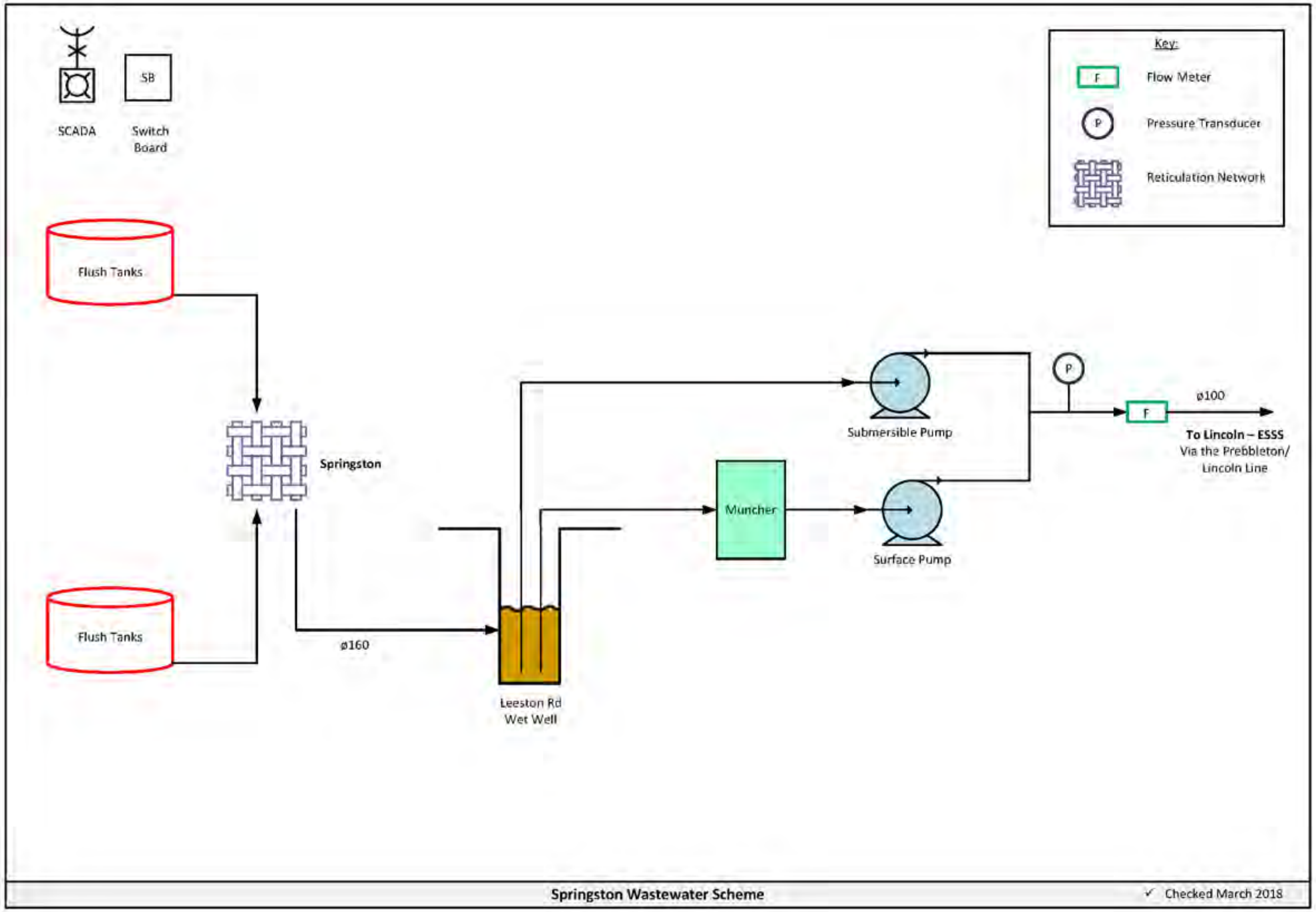


Figure 14-2 Scheme Schematic

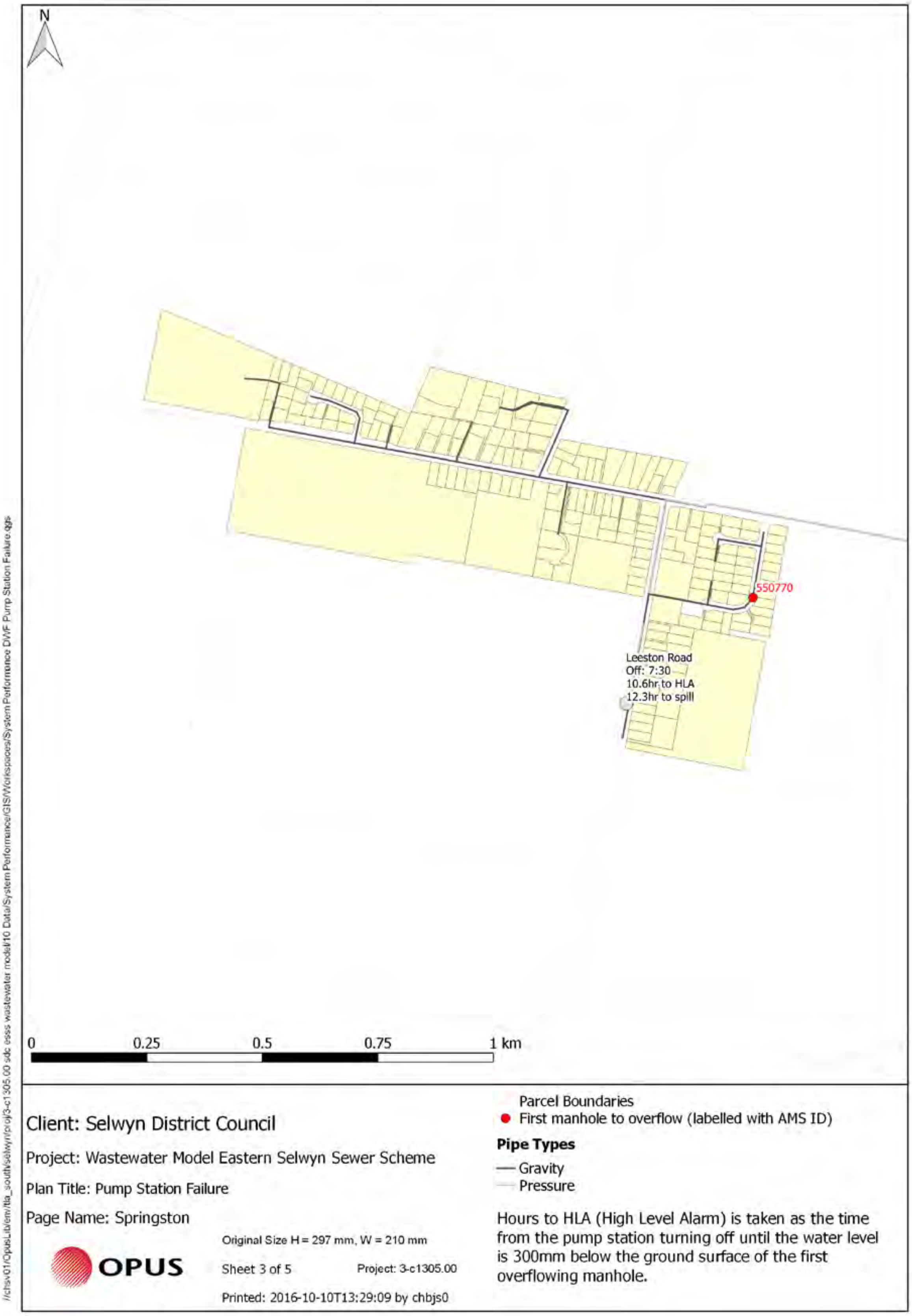


Figure 14-3 Pump Station Failure Map

14.4 System Capacity

The current Springston sewage flows are consistent with the design flows for the current number of connected properties.

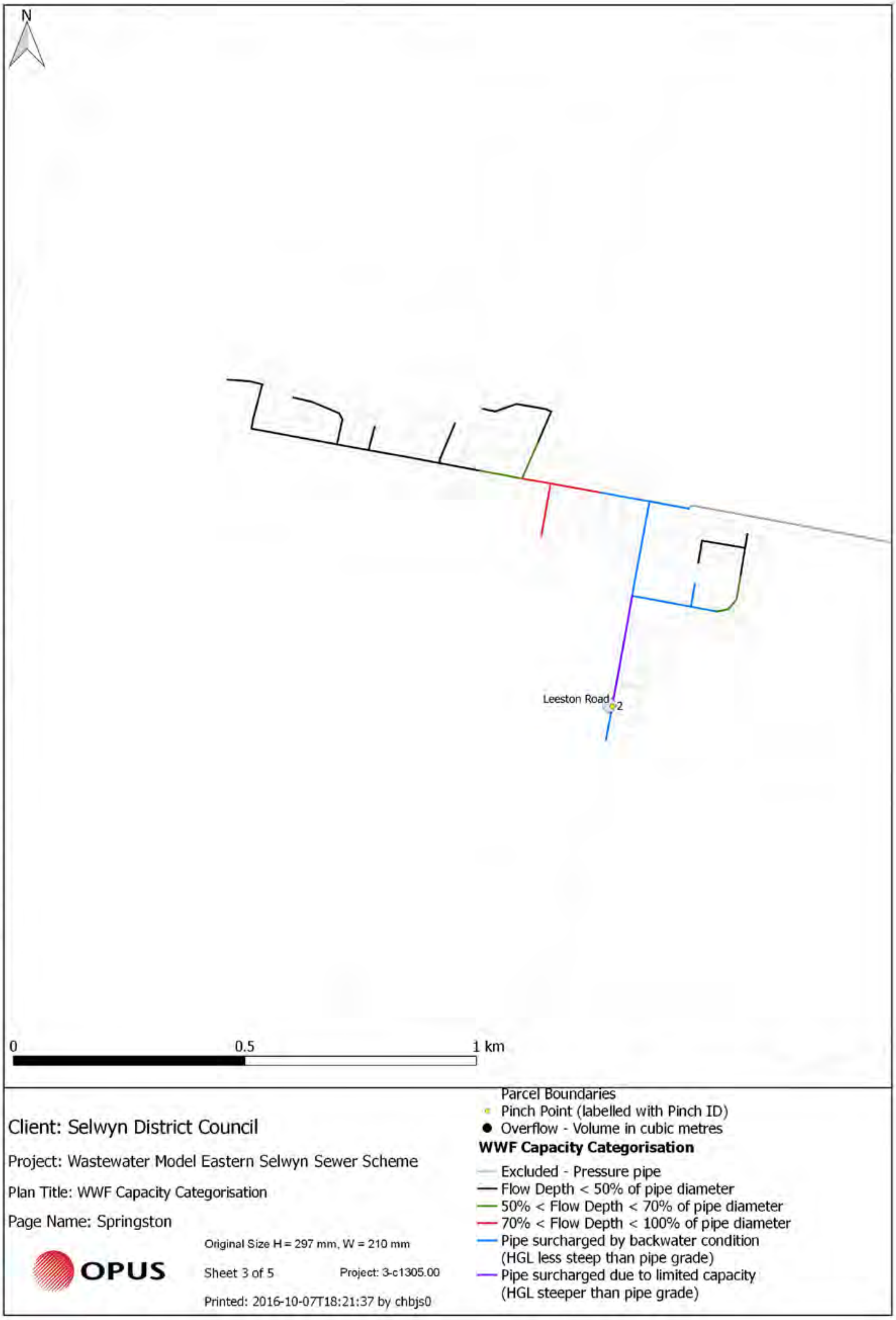


Figure 14-4 Wet Weather Flow Capacity Map

14.5 Resource Consents

Springston township is part of the ESSS scheme. Therefore, all wastewater is pumped to the Pines Treatment Plant located in Rolleston. The resource consents required for this treatment plant are in the ESSS section of this plan.

14.6 Scheme Assets

A summary of the assets within this scheme is outlined in this section.

14.6.1 Reticulation Overview

A summary of material and diameter for pipes is shown in Figure 14-5 and Figure 14-6.

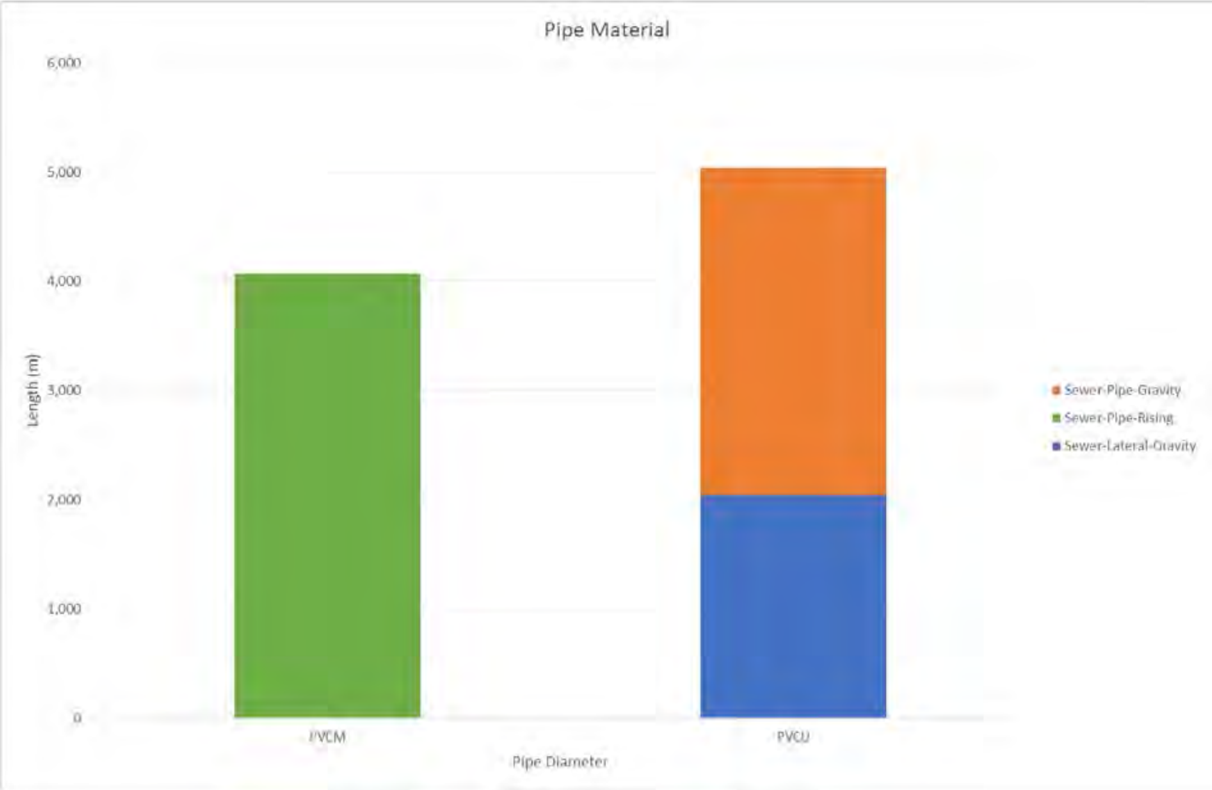


Figure 14-5 Pipe Material - Springston

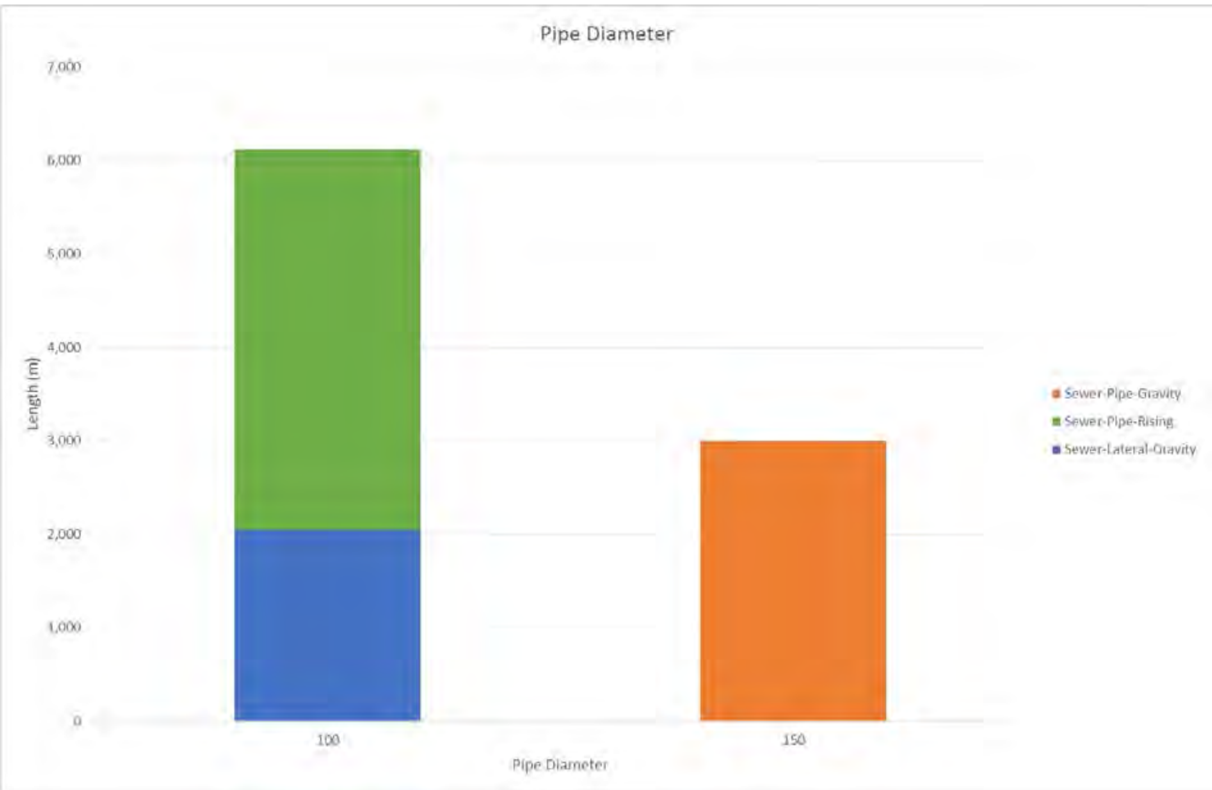


Figure 14-6 Pipe Diameter - Springston

14.6.2 Treatment and Disposal

Further reference to the treatment and disposal of Springfield wastewater is described in Section 5.0.

14.6.3 Pump Stations

There is only one pump station within the Springston network. This pump stations collects all the sewage and pumps it into the ESSS network, shown in Table 14-2.

Pump stations where the standby / assist pump is predicted to start have been highlighted in yellow and red for those that experience a peak wet weather response.

Yellow Pumps are can convey the peak flow without backing up the system

Red Pumps are unable to convey the peak flow causing the system to back up

Table 14-2 Pump Station Overview

Site Name	Wet well dimensions	No of pumps	Pump curve used	Recorded instantaneous pump rate (L/s)	Model Pump Rate (L/s)	ADWF (L/s)	PDWF (L/s)	PWWF 1 in 5 year ARI (L/s)
Springston (S) Leeston Rd Ps	2200Ø	2	Mono CEO72 progressive cavity	7.8	7.8	1.2	2.9	11.1

Table 14-3 Pump Station Storage Time Analysis

Pump Station		Hours until HLA reached	Hours until first spill	Spill Location - AMS ID
Springston (S) Leeston Rd Ps	Two surface mounted mono pumps with munches (mechanical screens before pumping)	10.6	12.3	550770

14.6.4 Rising Mains

Table 14-4 Rising Main Overview

Pump Station	Town	Total Length (m)	Total Volume (m3)	ADWF (L/s)	Uphill Retention Time (hours)	Drain Time (hours)	Total Time (hours)	Model Max Pressure (kPa)	SCADA Max Pressure (kPa)
Springston (S) Leeston Rd Ps	Springston	4,093	35.2	1.2	6.7	0.0	6.7	395	75 - 280 - 370

Although not currently used, the agreement between Selwyn District Council and Christchurch City Council, allows for untreated wastewater from Springston to be pumped 24 hours a day at a maximum flow rate of 6 L/s into the Christchurch System. The maximum volume of discharge is 75,000m^3 in each financial year.

14.7 Operational Management

The wastewater schemes are operated and maintained under the maintenance contract 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.

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

14.8 Photos of Main Assets

Photo 1 - Springston Pump Station

14.9 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 14-5 details the risk priority rating, Table 14-6 outlines the risks for this scheme.

Table 14-5 Risk Priority Rating

Risk Score	Level of Risk	Risk Response
> 50	Extreme	Awareness of the event to be reported to Council. Urgent action to eliminate / mitigate / manage the risk. 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. Immediate action required to eliminate / mitigate / manage the risk. Document risk and action in the AMP.

Table 14-6 Risks - Springston

Risk	Action/Project	Year Identified	2014 Risk Rating	2017 Risk Rating	Residual Risk Rating
Pump selection does not take advantage of new technology and changes to the pressure main alignment.	Renewal project: take 2 monopumps out and replace with submersible pumps	2014	27	27	6

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

14.10 Asset Valuation Details

The total replacement value of assets within the Springston Scheme is $3,142,640 as detailed in Table 14-7 below. The majority of the reticulation value is made up of pipes.

Table 14-7 Replacement Value, Springston

Asset Class 1	Asset Class 2	Sum of Replacement Value
Plant and Equipment		$181,102
Wastewater Reticulation	Chamber	$245,794
	Lateral	$648,698
	Manhole	$312,394
	Pipe	$1,731,794
	Valve	$22,859

Replacement values for these different types of assets are shown in Figure 14-7 below.

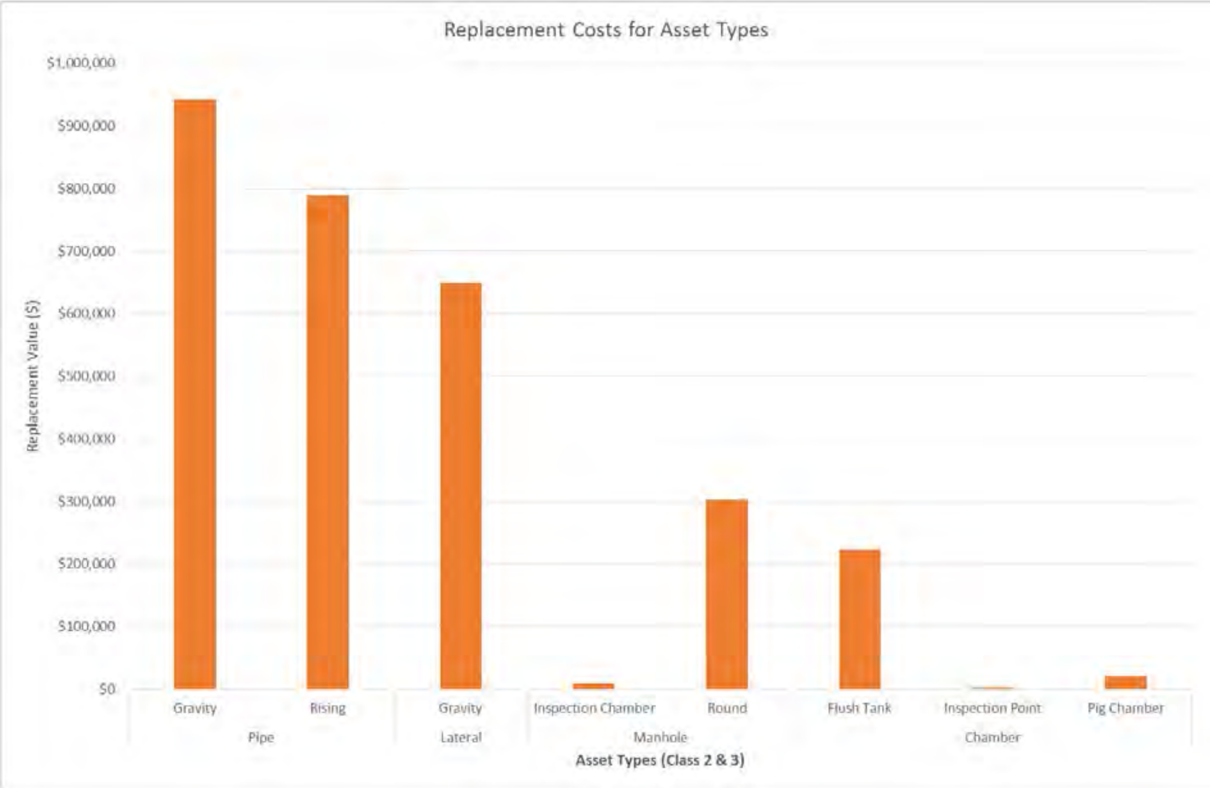


Figure 14-7 Replacement Costs for Springston

14.11 Renewals

The renewal profile has been taken from the 2014 5 Waters Valuation. A graph showing the renewals for this scheme are shown by Figure 14-8 below.

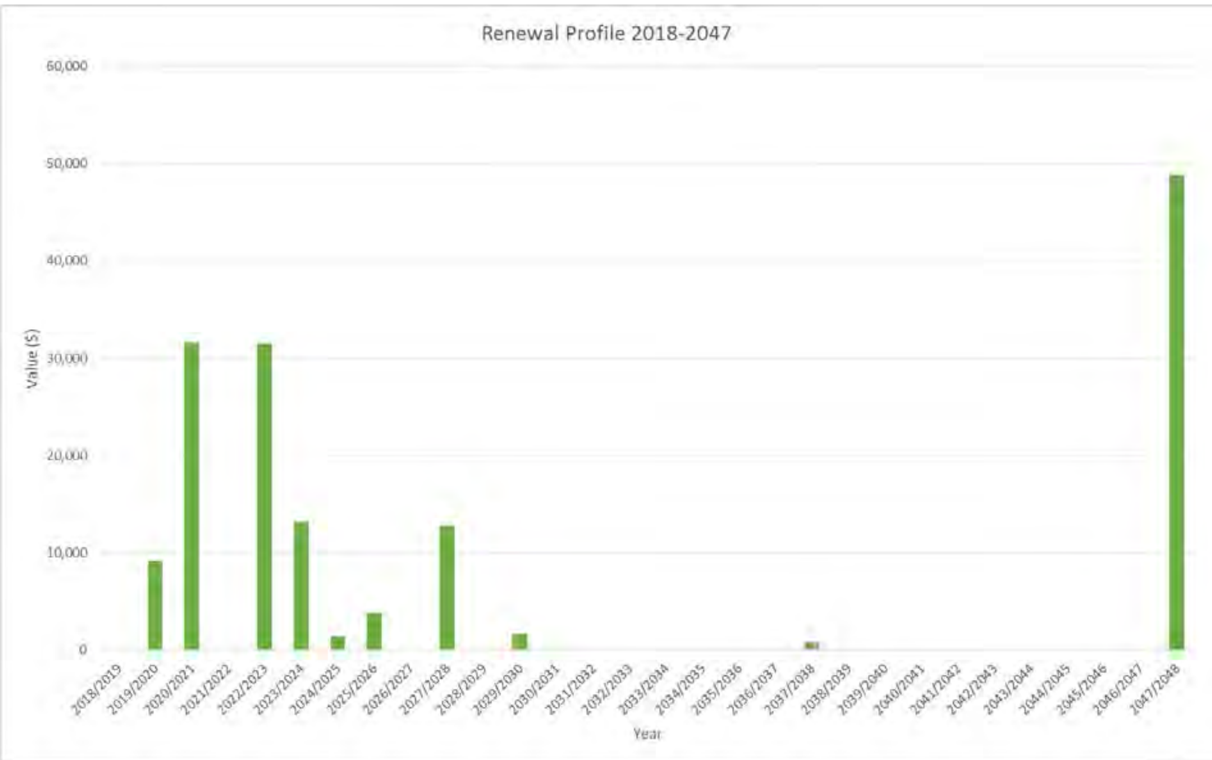


Figure 14-8 Springston Wastewater Renewal Profile

14.12 Critical Assets

The criticality model for Springston 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 14-8 and Figure 14-9 below shows the calculated criticality for all of the assets within this scheme that have a recorded known length.

Table 14-8 Length of Assets per Criticality Level

Criticality Bands		Length (m)
5	Low	6,461
4	Medium-Low	26,689
3	Medium	0
2	Medium-High	0
1	High	0

Figure 14-9 Criticality Map

14.13 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 and it provides details of how the model has been calculated for the reticulation assets (particularly pipes). Figure 14-10 below shows the level of asset condition for all of the assets within this scheme that have a recorded known condition.

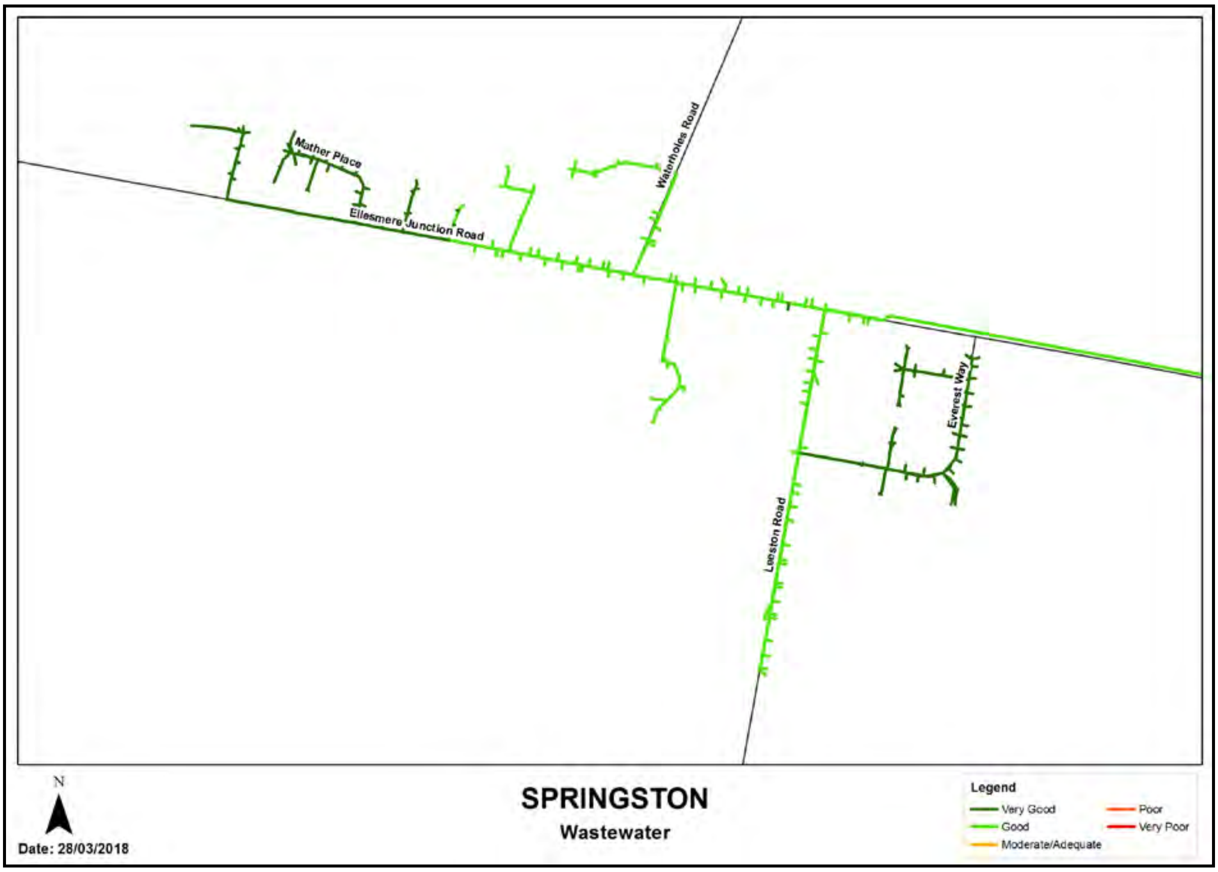


Figure 14-10 Asset Condition - Springston

Table 14-9 provides a description of the condition rating used within the condition model.

Table 14-9 Asset Condition Grading

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

14.14 Funding Program

The 10 year budgets for Springston are shown by Table 14-10 and Figure 14-11. 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 14-10 Springston Budget Summary

Years	Expenditure	Renewals	Projects	Capital Projects
2018/2019	$22,330			$5,000
2019/2020	$22,430	$9,125		
2020/2021	$22,530	$31,649		
2021/2022	$22,630			
2022/2023	$22,730	$31,569		
2023/2024	$22,730	$13,191		
2024/2025	$22,730	$1,416		
2025/2026	$22,730	$3,836		
2026/2027	$22,730			
2027/2028	$22,730	$12,743		
Total	$226,300	$103,529		$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.

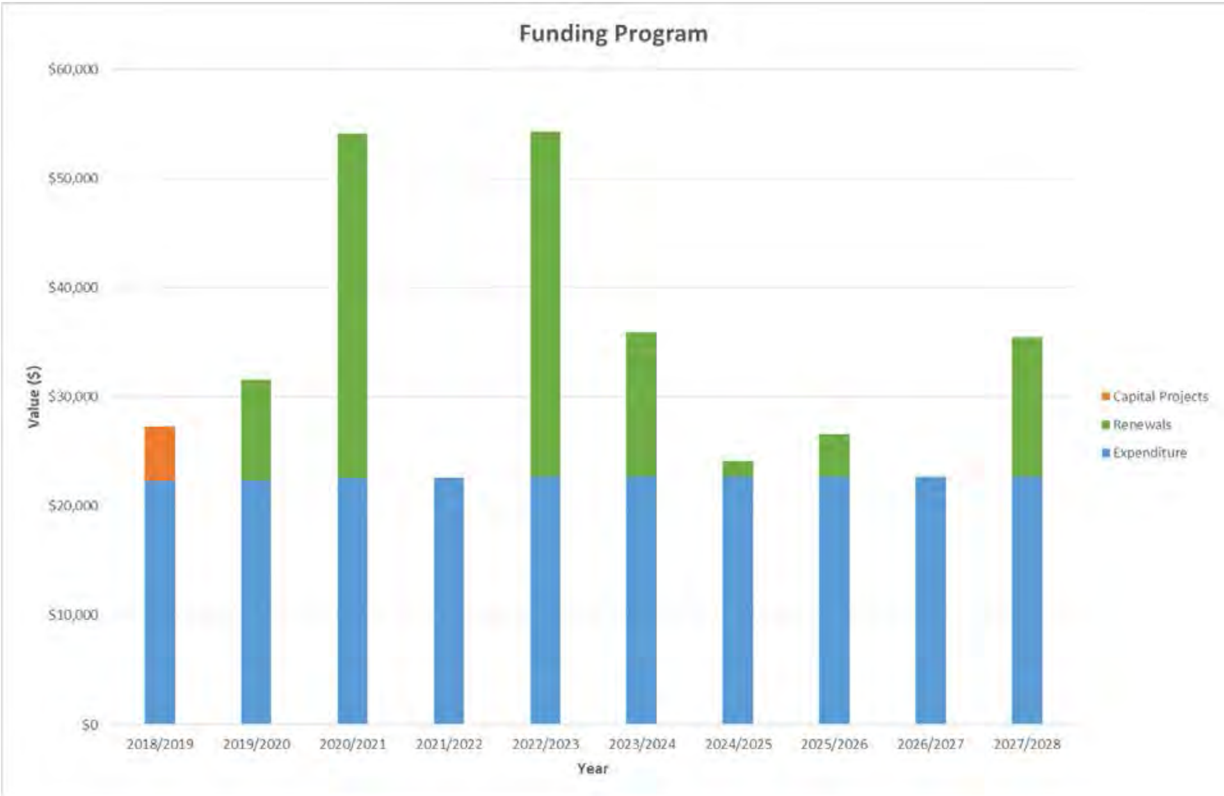


Figure 14-11 Springston Funding Summary

There is one project for Springston in the LTP budget.

Table 14-11 Key Projects

Account Label	GL	Description	Year 1 ($)	Year 2 ($)	Year 3 ($)	Years 4 to 10	Funding Split
Capital Projects	468290017	Private stormwater pump education	$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.

15.0 TAI TAPU WASTEWATER SCHEME

15.1 Scheme Summary

Description		Quantity
Estimated Population Served		**521**
Scheme Coverage (1 Jan 18)	**Full Charges**	**182**
	Half Charges	**34**
	>1 Charges	**4**
System Components	**Piped (m)**	**16904.28**
	Manholes (No.)	**54**
	Pump Stations (No.)	**1**
	Treatment	**To Christchurch**
	Disposal	**To Christchurch**
History	**Original scheme installation date**	**1998**
Value ($)	**Replacement Cost**	**$4,923,687.67**
	Depreciated Replacement Cost	**$4,001,279.20**
Financial	**2018/2019 Estimate** **Annual maintenance cost** **% of total**	**$59,365** **1.86%**
Demand	**Annually (m3)**	**37,665**
	Average daily (m3)	**103**
	Peak daily (m3)	**188**
	Minimum daily (m3)	**80**
	Infiltration	**Yes**
Sustainability	**Ultimate discharge point**	**To Christchurch city network**

15.2 Key Issues

The following key issues are associated with the Tai Tapu Wastewater Scheme. A list of district wide issues are located in 5Waters Activity Management Plan: Volume 1.

Table 15-1 Tai Tapu Scheme Issues

What's the Problem	What we plan to do
Significant infiltration and inflow is experienced during wet weather	Target renewals to address infiltration and investigate sources of infiltration
Discharge capacity (via CCC agreement) is limited.	Discuss options with Christchurch City to increase discharge allocation. And investigate options to pump to the ESSS network.

15.3 Overview & History

An agreement with Christchurch City Council allows the pumping of raw sewage to Christchurch City reticulation, up to a maximum flow of 7.5 Litres/sec with a maximum discharge volume of 90,000m^3 in each financial year – (24 hours/day pumping is raw sewage).

Following the September 2010 and February 2011 earthquakes, liquefaction was observed throughout the Tai Tapu township and over to Halswell. Inspection of the PVC sewer pipes did not reveal any acute damage though change in pipe grades if any have not been confirmed. In November 2011 the Department of Building and Housing stated the land was classified as TP2 – Foundation Technical Category 2 for the purpose of vertical infrastructure works. This recognises that minor-moderate and damage from liquefaction occurs during large earthquakes and strengthening of floors and foundations are required. Any future renewals, repairs and capital works on the horizontal infrastructure will be required at a higher construction standard.

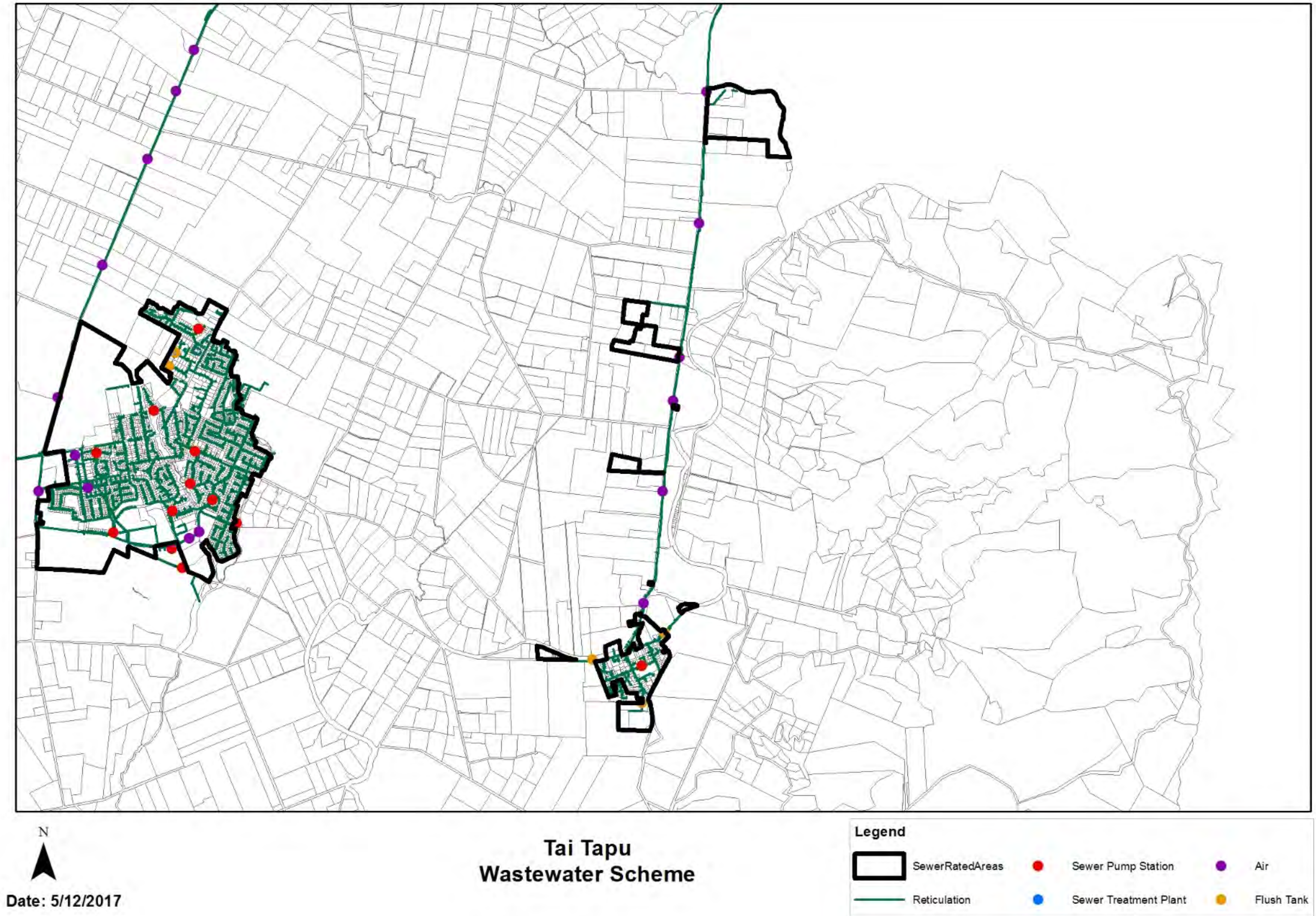


Figure 15-1 Scheme Map

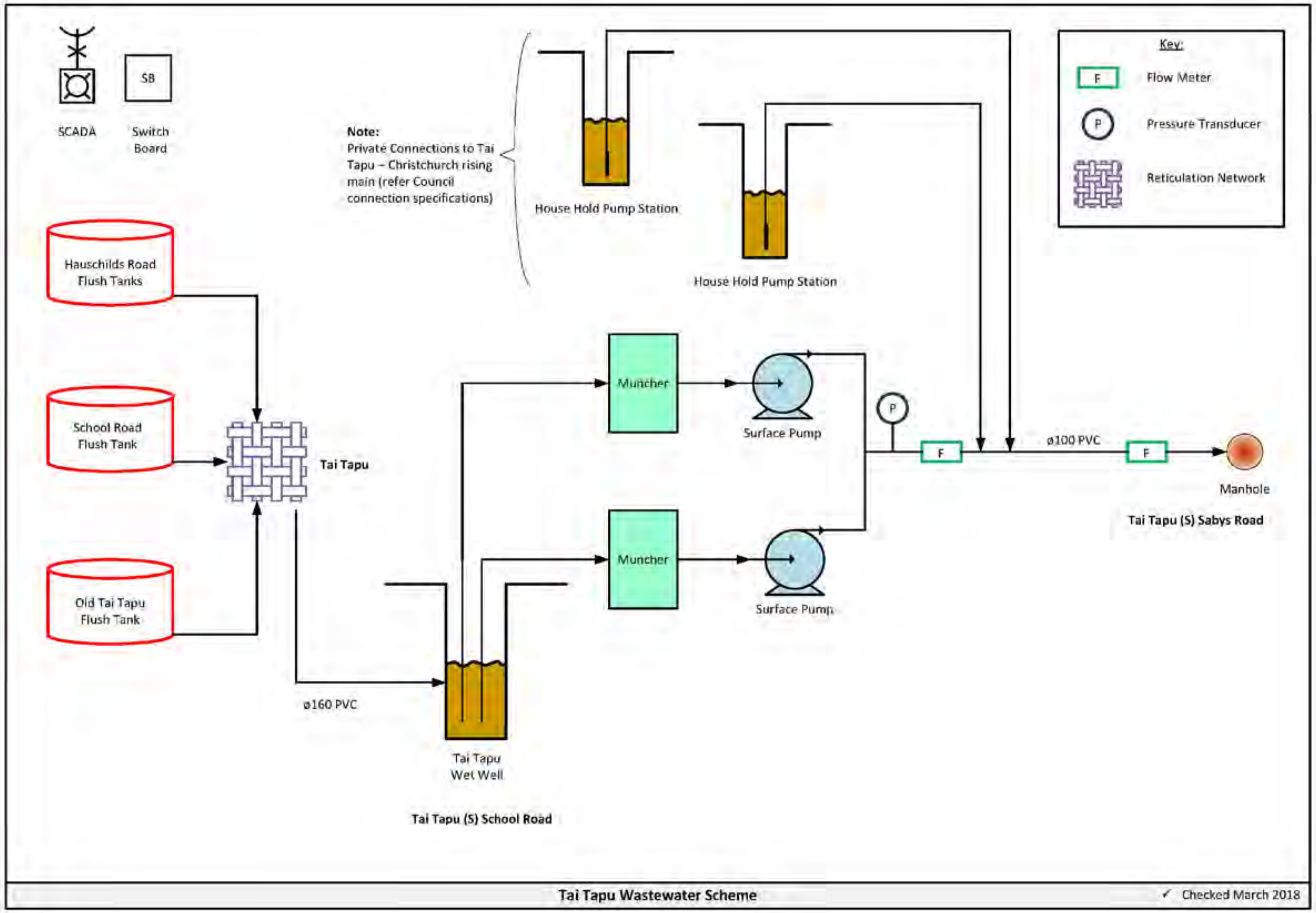


Figure 15-2 Scheme Schematic

15.4 System Capacity

The report presented to Council on 13 July 2005 summaries the situation best. Originally the Tai Tapu scheme was designed for 232 Lots. A public excluded report to Council 6 October 2004 recommended that the limit of serviced properties be extended to 279 domestic connections – the information from this report has since been made public.

Currently there are 182 properties connected to the scheme.

The remaining connections are held under Council policy W304 which can be found at the following link http://www.selwyn.govt.nz/council-info/council/council-policies

15.5 Resource Consents

No consents are required for the Tai Tapu discharge as this is covered by the Christchurch City Council consents.

15.6 Scheme Assets

A summary of the assets within this scheme is outlined in this section.

15.6.1 Reticulation Overview

A summary of material and diameter for pipes is shown in Figure 15-3 and Figure 15-4.

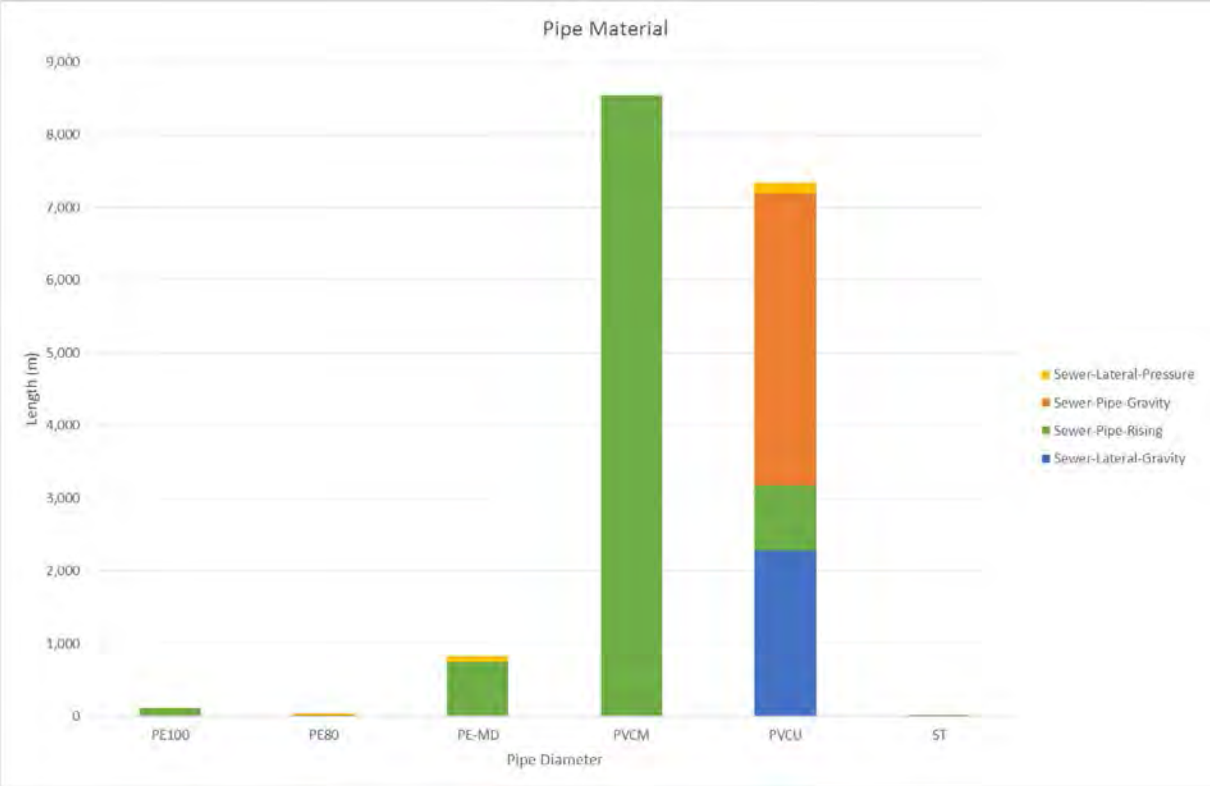


Figure 15-3 Pipe Material – Tai Tapu

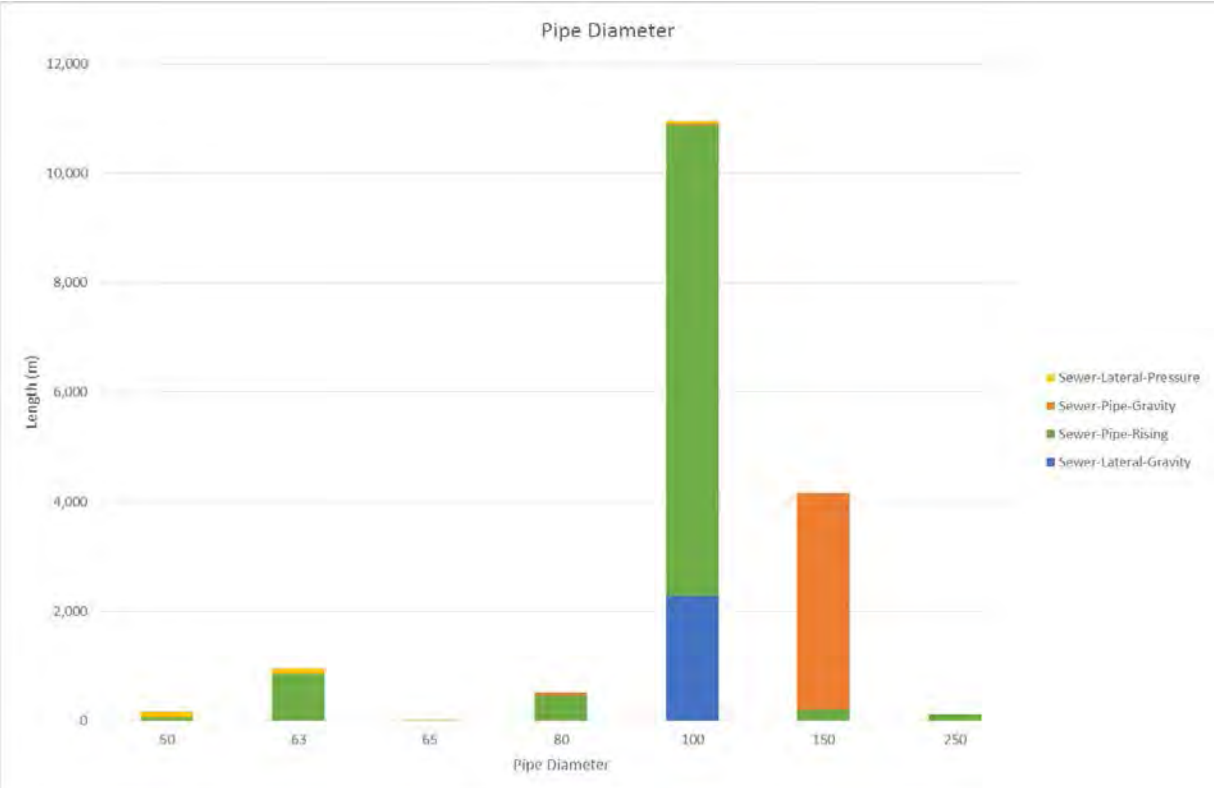


Figure 15-4 Pipe Diameter – Tai Tapu

15.6.2 Treatment and Disposal

No treatment is carried out with all wastewater pumped to Christchurch City.

15.6.3 Pump Stations

There is only one pump station within the Tai Tapu system. This pump station pumps wastewater to the Christchurch City network, described in Table 15-2 below.

Table 15-2 Pump Stations

Description	Year Installed /Upgraded	Capacity (l/s)
Two surface mounted mono pumps with munchers (mechanical screens before pumping)	1998	7.5

15.7 Operational Management

The wastewater schemes are operated and maintained under the maintenance contract 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.

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

15.8 Photos of Main Assets

Photo 1 – Pump Station

15.9 Risk Assessment

A risk assessment has been undertaken for the Tai Tapu 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 15-3 details the risk priority rating, Table 15-4 outlines the risks and the list of key projects is found in Table 15-9.

Table 15-3 Risk Priority Rating

Risk Score	Level of Risk	Risk Response
> 50	Extreme	Awareness of the event to be reported to Council. Urgent action to eliminate / mitigate / manage the risk. 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. Immediate action required to eliminate / mitigate / manage the risk. Document risk and action in the AMP.

Table 15-4 Risks – Tai Tapu

Risk	Action/Project	Year Identified	2014 Risk Rating	2017 Risk Rating	Residual Risk Rating
High risk of infiltration	Investigate the source of infiltration	2014	45	45	20
inadequate capacity	Pump to Lincoln	2017		20	10

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

15.10 Asset Valuation Details

The total replacement value of assets within the Tai Tapu Scheme is $4,923,688 as detailed in Table 15-5 below. The majority of value is made up of pipes.

Table 15-5 Replacement Value, Tai Tapu

Asset Class 1	Asset Class 2	Sum of Replacement Value
Plant and Equipment		$199,927
Wastewater Reticulation	Chamber	$204,676
	Lateral	$744,791
	Manhole	$353,532
	Pipe	$3,395,191
	Valve	$25,571

Replacement values for these different types of assets are shown in Figure 15-5 below.

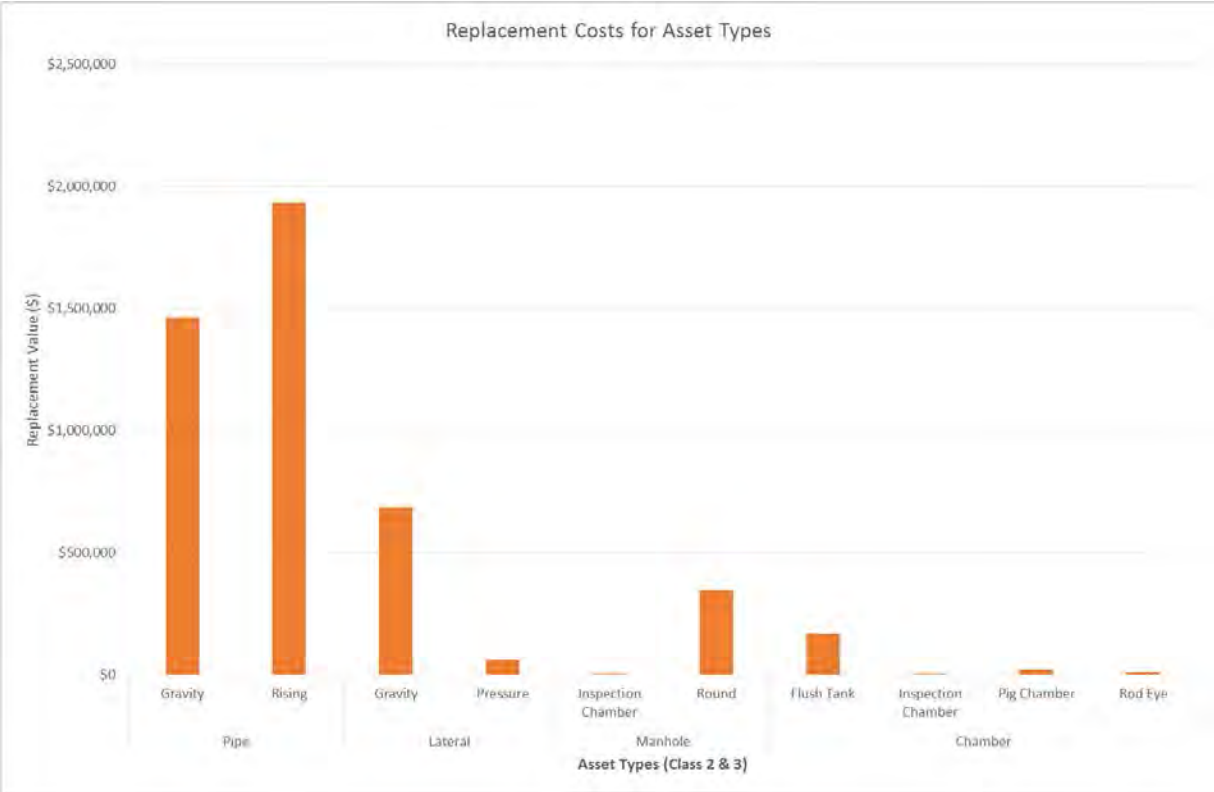


Figure 15-5 Replacement Costs for Tai Tapu

15.11 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 15-6 below.

Figure 15-6 Tai Tapu Wastewater Renewal Profile

15.12 Critical Assets

The criticality model for Tai Tapu 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 15-6 and Figure 15-7 below shows the calculated criticality for all of the assets within this scheme that have a recorded known length.

Table 15-6 Length of Assets per Criticality Level

Criticality Bands		Length (m)
5	Low	7,176
4	Medium-Low	8,585
3	Medium	619
2	Medium-High	209
1	High	0

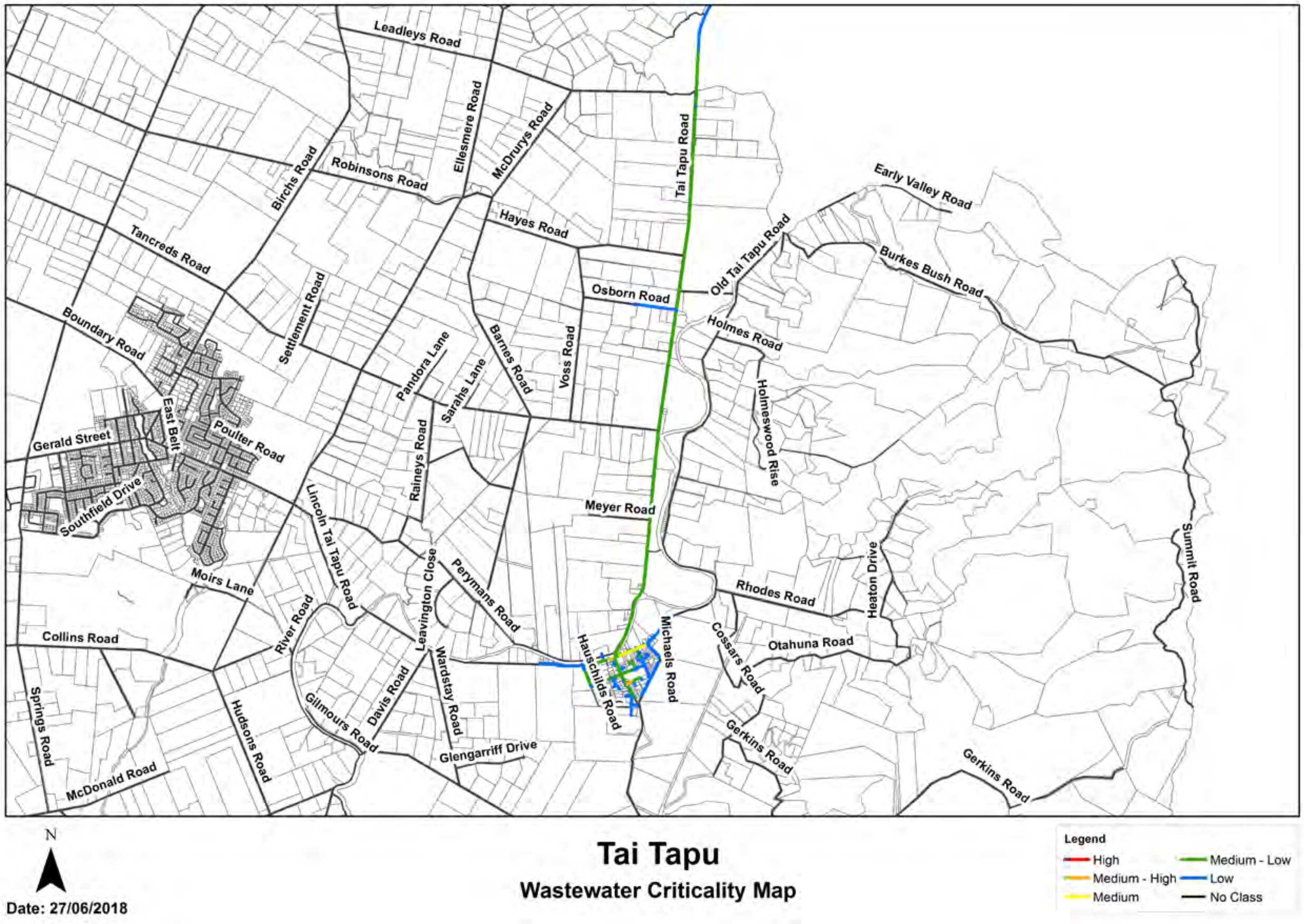


Figure 15-7 Criticality Map

15.13 Asset Condition

The asset condition model was run for Tai Tapu in 2017. The methodology of the model can be found in 5Waters Activity Management Plan: Volume 1 and it provides details of how the model has been calculated for the reticulation assets (particularly pipes). Figure 15-8 below shows the level of asset condition for all of the assets within this scheme that have a recorded known condition.

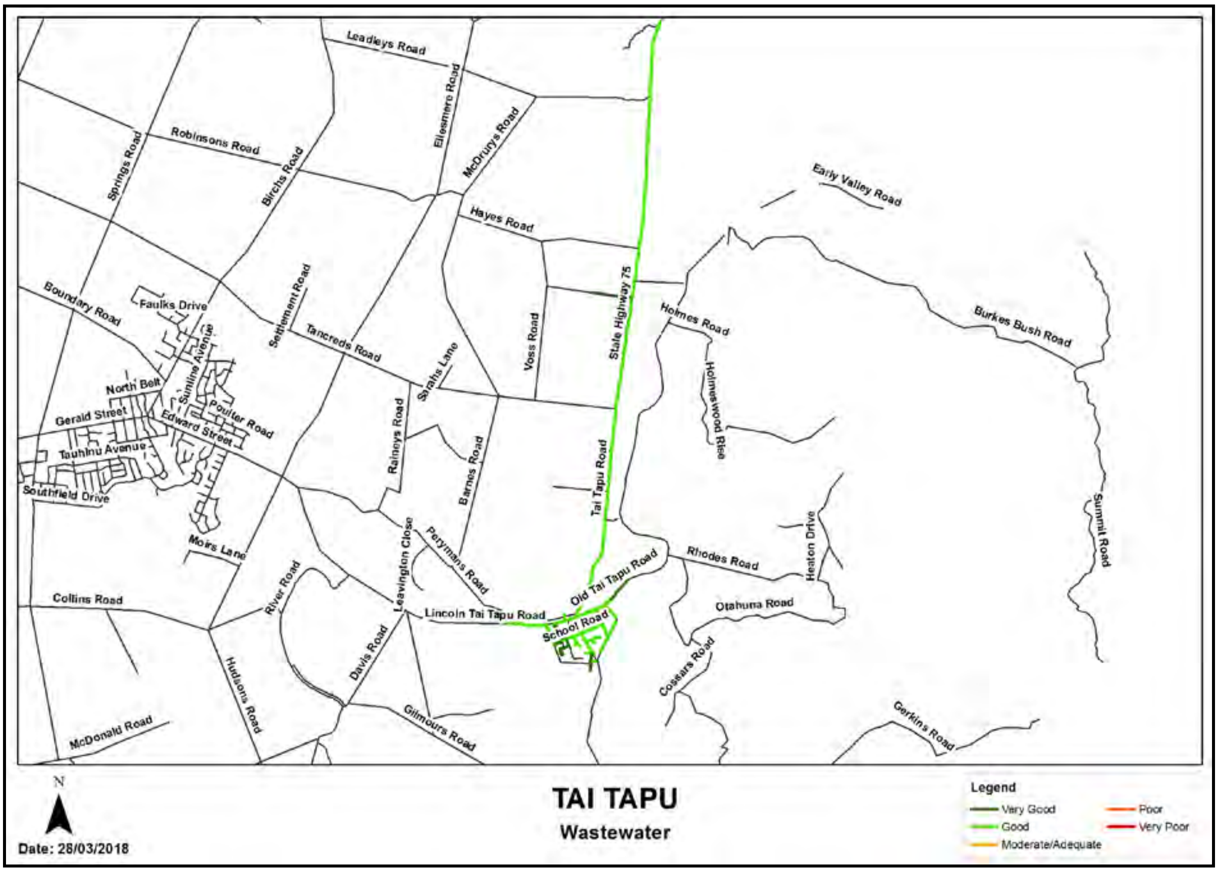


Figure 15-8 Asset Condition – Tai Tapu

Table 15-7 provides a description of the condition rating used within the condition model.

Table 15-7 Asset Condition Grading

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

15.14 Funding Program

The 10 year budgets for Tai Tapu are shown by Table 15-8 and Figure 15-9. 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 15-8 Tai Tapu Budget Summary

Years	Expenditure	Renewals	Projects	Capital Projects
2018/2019	$59,365		$15,000	
2019/2020	$59,365	$15,538		
2020/2021	$59,365	$32,458		
2021/2022	$59,365			
2022/2023	$59,365	$36,920		
2023/2024	$59,365	$16,130		
2024/2025	$59,365			
2025/2026	$59,365			
2026/2027	$59,365			
2027/2028	$59,365	$12,915		
Total	$593,650	$113,962	$15,000	

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.

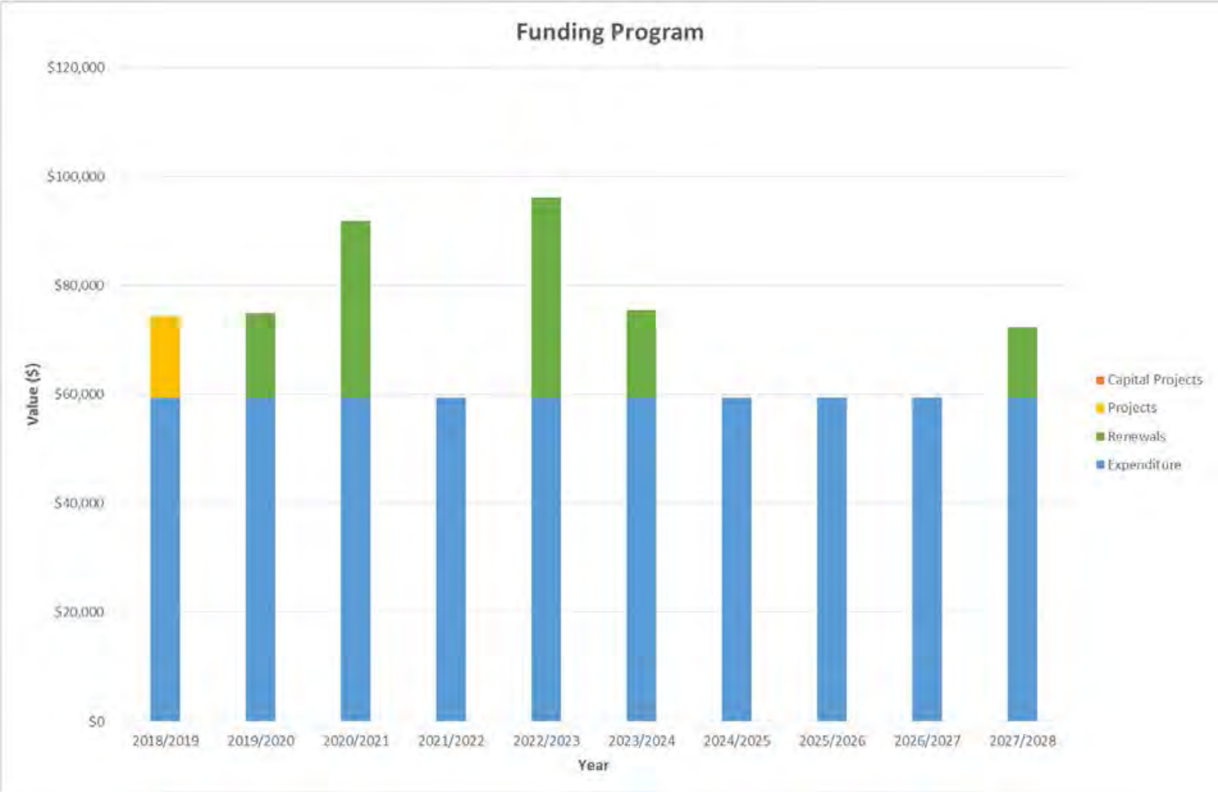


Figure 15-9 Tai Tapu Funding Summary

There are is one project for Tai Tapu Wastewater scheme in the LTP budget.

Table 15-9 Key Projects

Account Label	GL	Description	Year 1 ($)	Year 2 ($)	Year 3 ($)	Years 4 to 10	Funding Split
Projects	4683028	Investigate the source of infiltration	$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.

16.0 UPPER SELWYN HUTS WASTEWATER SCHEME

16.1 Scheme Summary

Description		Quantity
Estimated Population Served		**-**
Scheme Coverage (1 Jan 2018)	**Full Charges**	**-**
	Half Charges	**-**
	>1 Charges	**-**
System Components	**Piped (m)**	**1671**
	Manholes (No.)	**23**
	Pump Stations (No.)	**1**
	Treatment	**Septic tank followed by oxidation pond**
	Disposal	**Border Dyke**
History	**Original scheme installation date**	**1920's**
Value ($)	**Replacement Cost**	**$1,122,644.09**
	Depreciated Replacement Cost	**$309,936.29**
Financial	**2014/2015 Estimate** **Annual maintenance cost** **% of total**	**$22,000** **0.69%**
Demand	**Annually (m3)**	**-**
	Average daily (m3)	**-**
	Peak daily (m3)	**Unknown (No SCADA)**
	Minimum daily (m3)	**Unknown (No SCADA)**
	Infiltration	**Unknown (No SCADA)**
Sustainability	**Ultimate discharge point**	**Border dyke Irrigation**

16.2 Key Issues

The following key issues are associated with the Upper Selwyn Huts Wastewater Scheme. A list of district wide issues are located in 5Waters Activity Management Plan: Volume 1.

Table 16-1 Upper Selwyn Huts Scheme Issues

What's the Problem	What we plan to do
High flows may at times breach resource consent conditions	Monitor recently Installed SCADA system
Consent expires 2020	Progress short term consent application

16.3 Overview & History

Selwyn Huts is a settlement of 97 dwellings.

The settlement is located on Council reserve land and the day to day operation of the settlement is managed by the council. This change occurred in June 2011, as a result of local reserve committee governance issues.

The Selwyn Huts reticulated sewerage scheme was initially installed in the 1920s with the overflow from the septic tanks discharged into the Selwyn River. A new sewage treatment and land disposal scheme was constructed in 1988. In the upgraded system, sewage discharges from the reticulation into a septic tank. The sewage from the septic tank then discharges to an adjacent pumping chamber via a 65mm diameter main to an oxidation pond located east of the township. Treated effluent is thereafter discharged into a pipeline linked to six irrigation control boxes and is released onto 0.88 hectares of border dyked irrigation area. In emergency situations or when the ground is too wet for border dyke irrigation, the treated effluent could be discharged into the Selwyn River.

Based on records received, there is a strong correlation between winter groundwater levels/rainfall and increased sewage flows into the ponds. Given the sustained periods of elevated winter sewage flows, the major component is infiltration i.e. leaky pipes, rather than Wastewater via rainfall.

The peak wet weather flow was recorded at 914 m^3/day in August 2010. This is 42 times of the consented daily volume and breaches consent conditions.

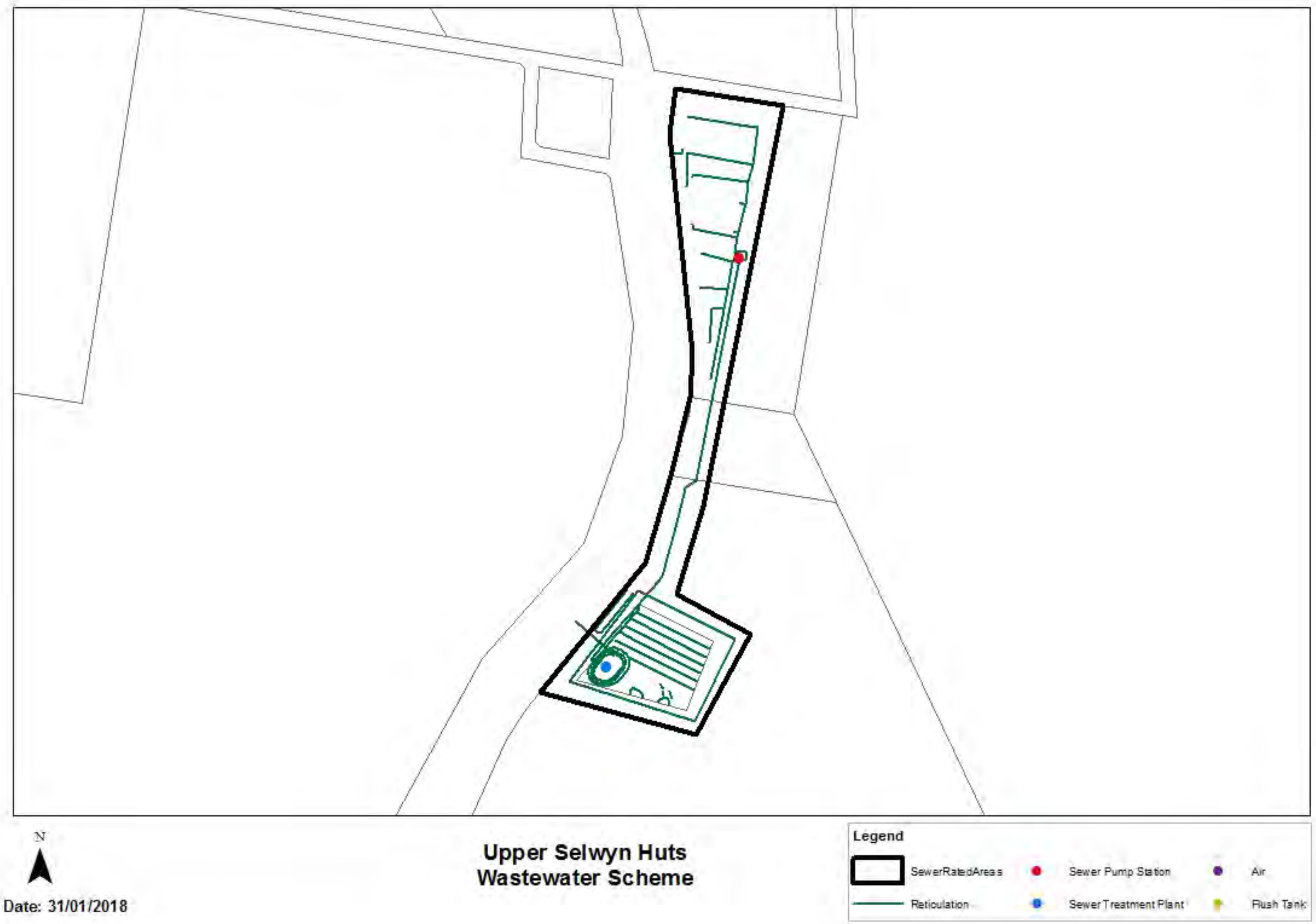


Figure 16-1 Scheme Map

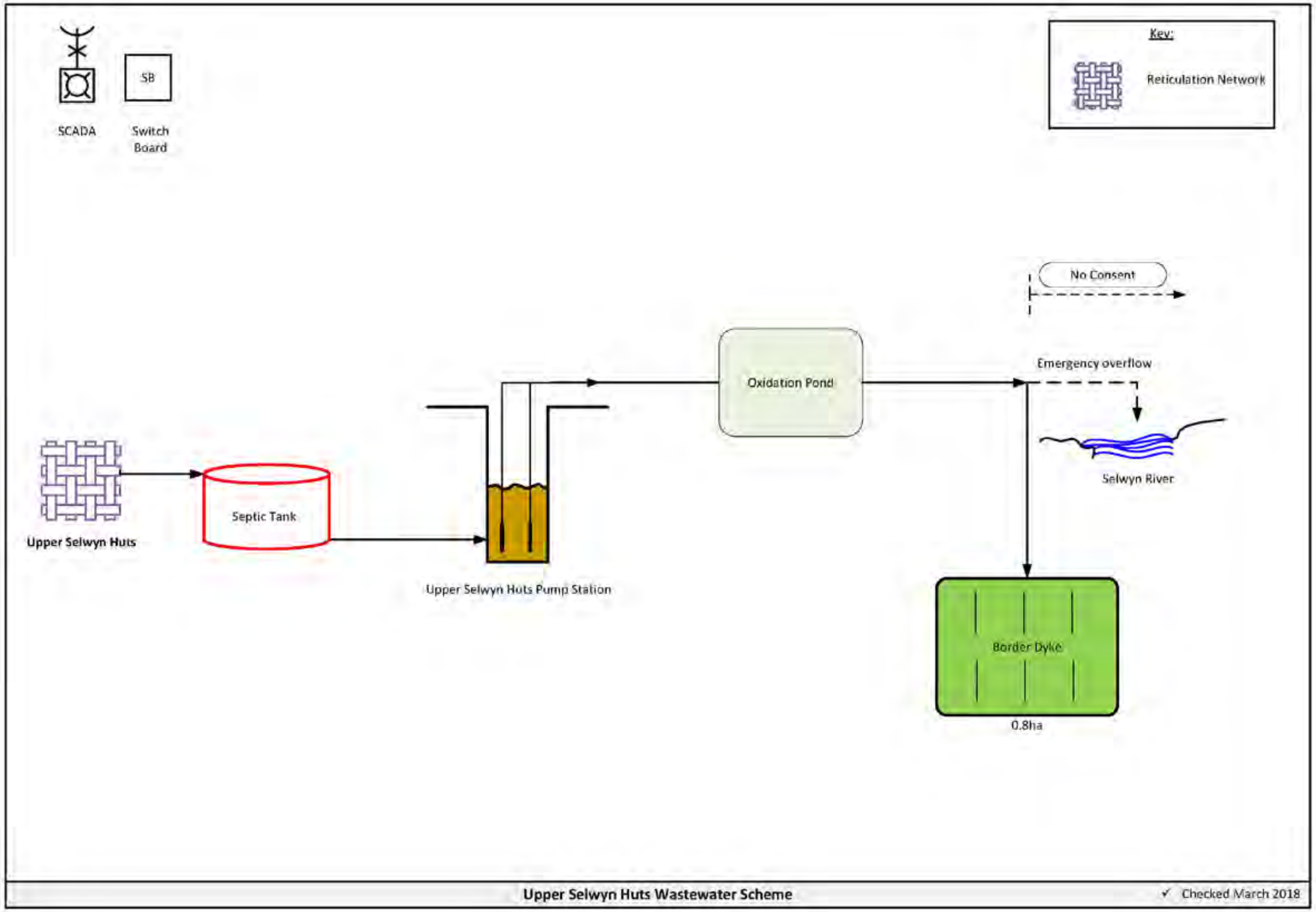


Figure 16-2 Scheme Schematic

16.4 System Capacity

High wet weather flows (groundwater and Wastewater) dominated flows.

There is not expected to be significant growth in the area serviced by this scheme and scheme expansion is not expected to be required over the planning horizon of this AcMP.

16.5 Resource Consents

The Upper Selwyn Huts wastewater scheme has one resource consent. Table 16-2 shows the discharge permitted by the resource consents for this scheme.

Table 16-2 Resource Consents

Consent	Description	Location	Date Issued	Expiry Date	Quantities
CRC991634 *Issued - Active*	To discharge oxidation pond effluent to land	Days Road, Selwyn huts	22/06/2000	20/06/2020	650 m^3/month

Consent, CRC991634, expires during 2020.

16.6 Scheme Assets

A summary of the assets within this scheme is outlined in this section.

16.6.1 Reticulation Overview

A summary of material and diameter for pipes is shown in Figure 16-3 and Figure 16-4.

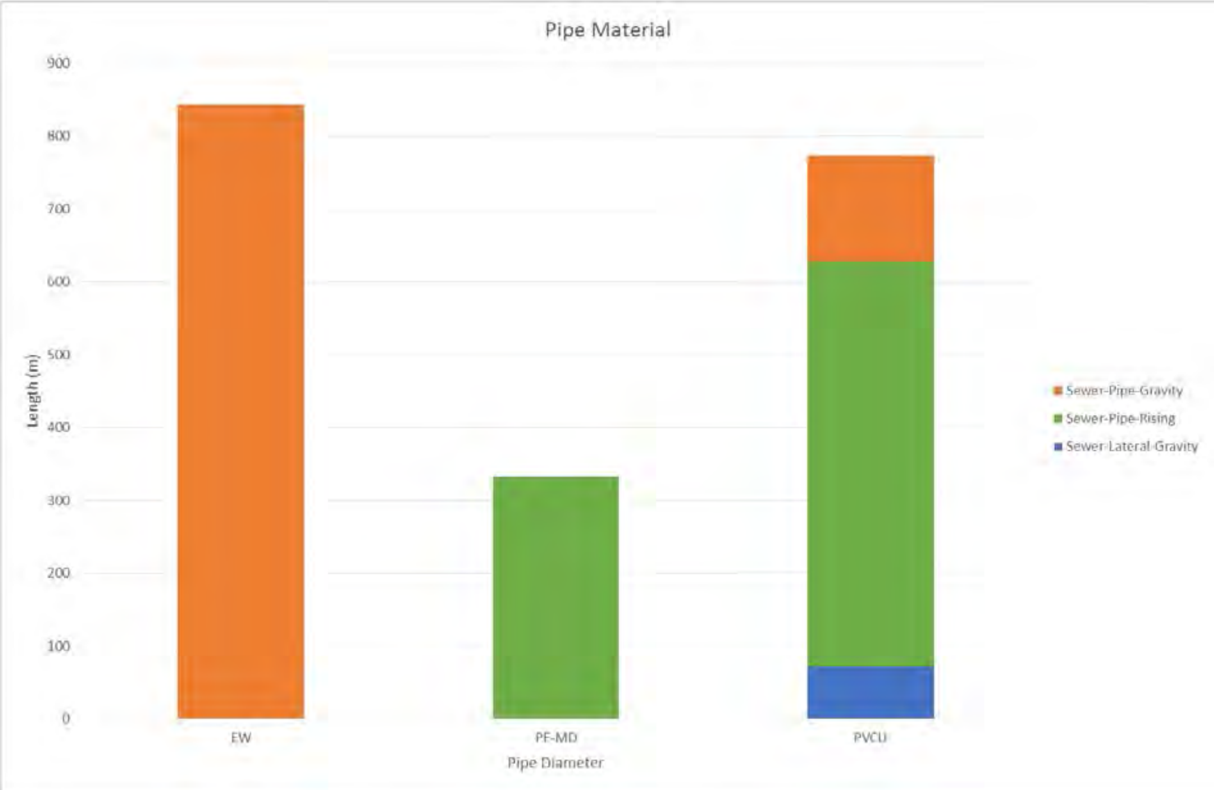


Figure 16-3 Pipe Material – Upper Selwyn Huts

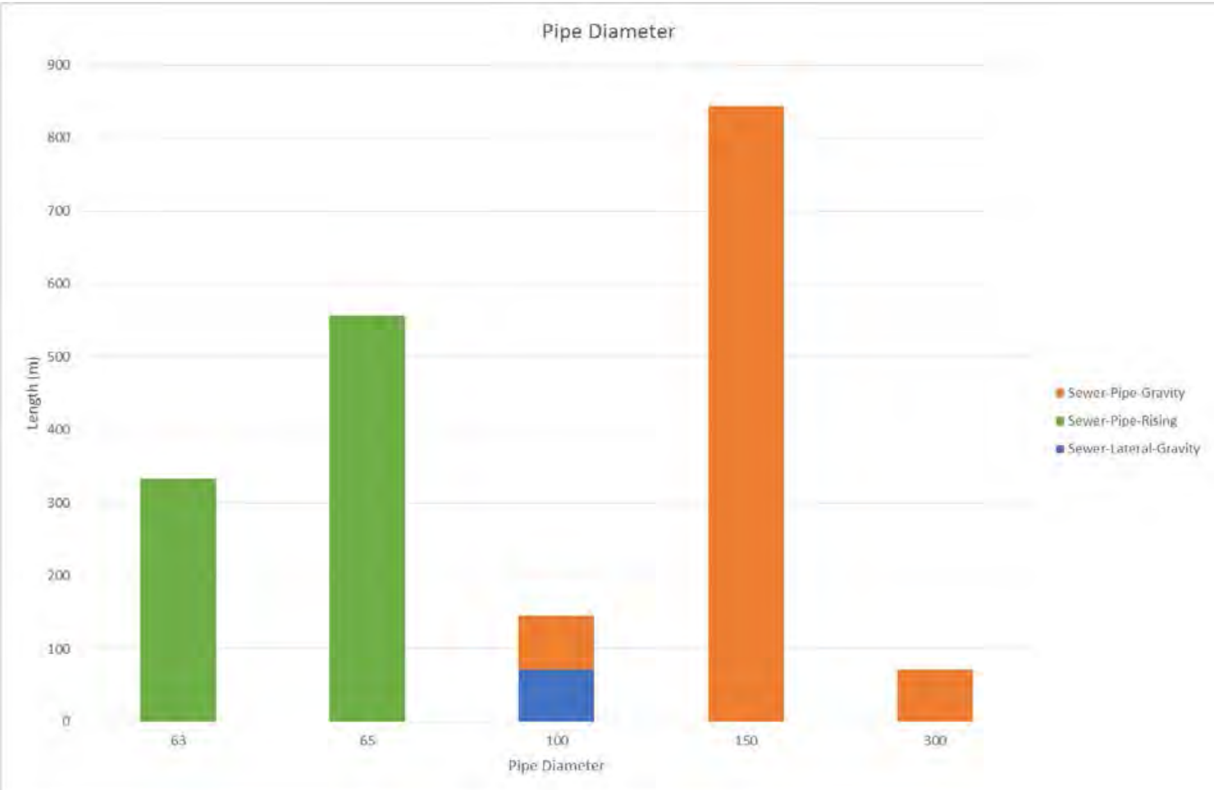


Figure 16-4 Pipe Diameter – Upper Selwyn Huts

16.6.2 Treatment and Disposal

The Upper Selwyn Huts treatment and disposal facilities are detailed below in Table 16-3.

Table 16-3 Upper Selwyn Huts Treatment and Disposal Facilities

System	Description	Year Installed/ Upgraded
Septic tank	Sewage from reticulation discharges into septic tank then discharges to adjacent pumping chamber and is pumped via 65mm dia main to oxidation pond	1925
Oxidation pond	The two celled oxidation pond is located east of township	1988
Border dyke irrigation	Treated sewage is discharge into a pipeline linked to 6 irrigation control boxes and released into 0.88ha of border dyke irrigation area	1988
Emergency discharge	In emergency situations or when ground water too wet for border dyke irrigation, the treated sewage is discharge via 100mm dia main into the Selwyn River	1988

16.6.3 Pump Stations

There is one pump station in Upper Selwyn Huts, this is described in Table 16-4 below.

Table 16-4 Pump Stations

Pump Station	Description	Year Installed /Upgraded	Capacity (l/s)
Selwyn Huts	Two submersible pumps (duty/standby)	1988 & 2000	2.4

16.7 Future Options

The existing wastewater consent expires in 2020. In order for that consent to be renewed, there are potentially significant enhancements which will need to be undertaken. The MWH report appendix 4 and ecoEng Brief Report appendix 5 references a number of management and upgrade options. The main options are summarised as follows:

- Do nothing
- Replace the existing collection reticulation system
  - Gravity sewer
  - Gravity sewer and six pump stations
  - Pressure sewer
- Install a package treatment plant
  - 60m ecoTrench + 4800m2 drip irrigation
  - 320m ecoTrench

  - o 20,000m2 drip irrigation
- Transfer flows to treatment at the Pines Wastewater Treatment Plant
- Increase existing pond volume

There is a strong indication from hut owners that pumping to Lincoln is the most favourable long term option with a package plant being the second preference. With either option, renewal of the wastewater reticulation network will be required.

Reticulation upgrade.

Ref	Options	Cost (GST Excl)
a.	Gravity sewer and six pump stations	$1,128,680 ($806,200 + 40%)
b.	Gravity sewer	$1,500,000
c.	Pressure sewer	$1,690,000 ($1,300,000 + 30%)

Further work is required to identify the optimum solution. For budgeting purposes, a cost of $1,500,000 is assumed.

Treatment options

Ref	Options	Cost (GST Excl)
a.	Land Application - 60m ecoTrench + 4800m2 drip irrigation	$1,281,000 ($985,400 + 30%)
b.	Land Application - 320m ecoTrench	$1,893,700 (1,456,700 + 30%
c.	Land Application – 20,000m2 drip irrigation	$1,210,000 ($930,800 + 30%)
d.	Pump to ESSS	$3,784,800 ($2,911,400 + 30%)

The preferred options are either (a) or (d)

16.8 Operational Management

The wastewater schemes are operated and maintained under the maintenance contract 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.

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

16.9 Photos of Main Assets

Photo 1 – Treatment Pond

Photo 2 – Border Dykes

16.10 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 16-5 details the risk priority rating and Table 16-6 outlines the risks for this scheme.

Table 16-5 Risk Priority Rating

Risk Score	Level of Risk	Risk Response
> 50	Extreme	Awareness of the event to be reported to Council. Urgent action to eliminate / mitigate / manage the risk. 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. Immediate action required to eliminate / mitigate / manage the risk. Document risk and action in the AMP.

Table 16-6 Risks – Upper Selwyn Huts

Risk	Action/Project	Year Identified	2014 Risk Rating	2017 Risk Rating	Residual Risk Rating
Breaching of consent requirements	Review consent conditions and apply for variation (Short Term)	2014	27	27	45
Breaching of consent requirements	Install monitoring and SCADA equipment	2014	27	27	27
Consent due to expire in 2020?	Document alternative options	2014	12	12	12
Non-consented activities	Renewal of consents	2014	12	12	6

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 Upper Selwyn Huts Scheme is $1,122,644 as detailed in Table 16-7 below.

Table 16-7 Replacement Value, Upper Selwyn Huts

Asset Class 1	Asset Class 2	Sum of Replacement Value
Plant and Equipment		$646,014

Wastewater Reticulation	Chamber	$2,842
	Lateral	$21,863
	Manhole	$127,201
	Pipe	$324,724
	Valve	$2,842

Replacement values for these different types of assets are shown in Figure 16-5 below.

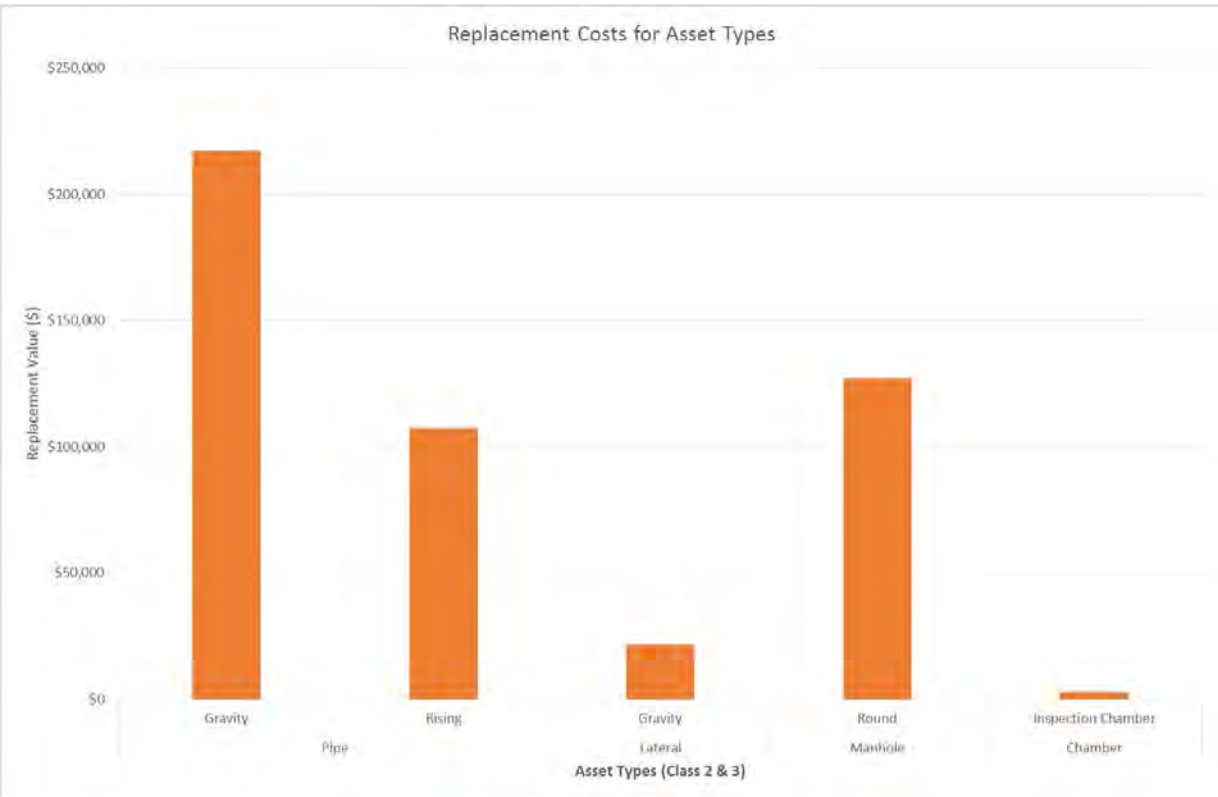


Figure 16-5 Replacement Costs for Upper Selwyn Huts

16.12 Renewals

The renewal profile has been taken from the 2014 5 Waters Valuation. A graph showing the renewals for this scheme are shown by Figure 16-6 below.

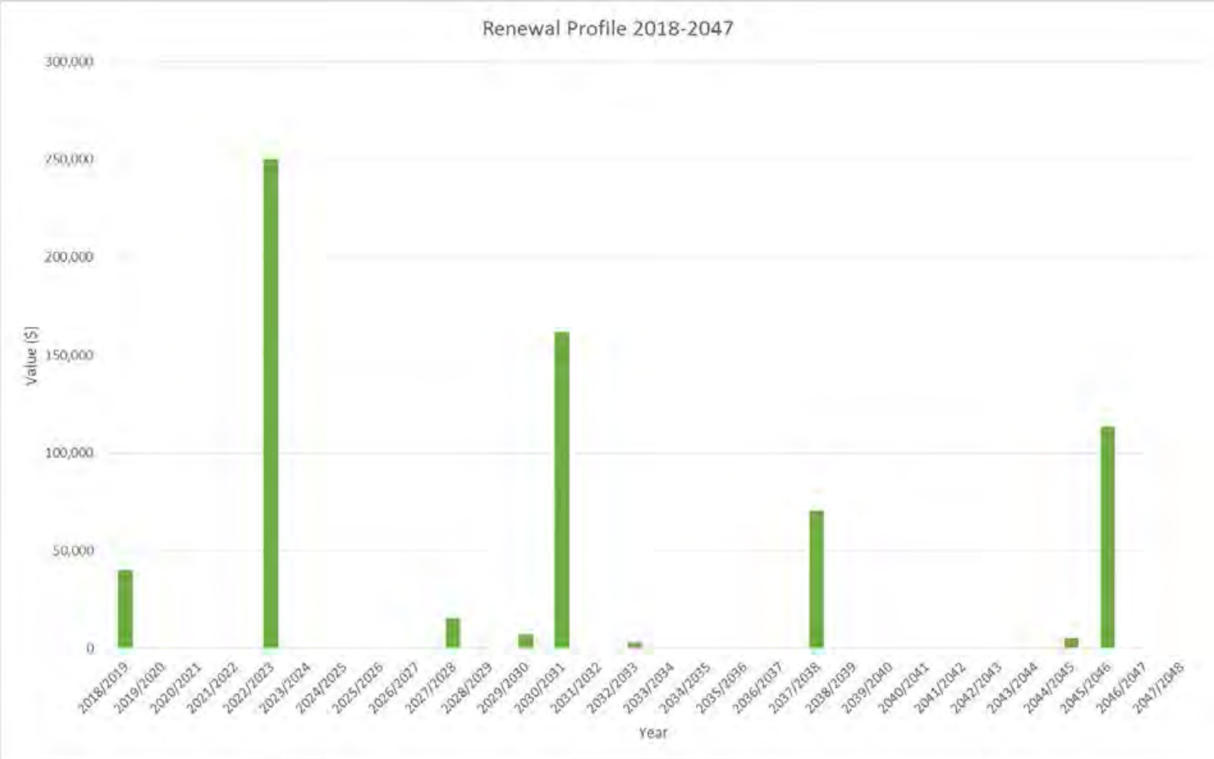


Figure 16-6 Upper Selwyn Huts Wastewater Renewal Profile

16.13 Critical Assets

The criticality model for Upper Selwyn Huts 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 16-8 and Figure 16-7 below shows the calculated criticality for all of the assets within this scheme that have a recorded known length.

Table 16-8 Length of Assets per Criticality Level

Criticality Bands		Length (m)
5	Low	755
4	Medium-Low	844
3	Medium	0
2	Medium-High	72
1	High	0

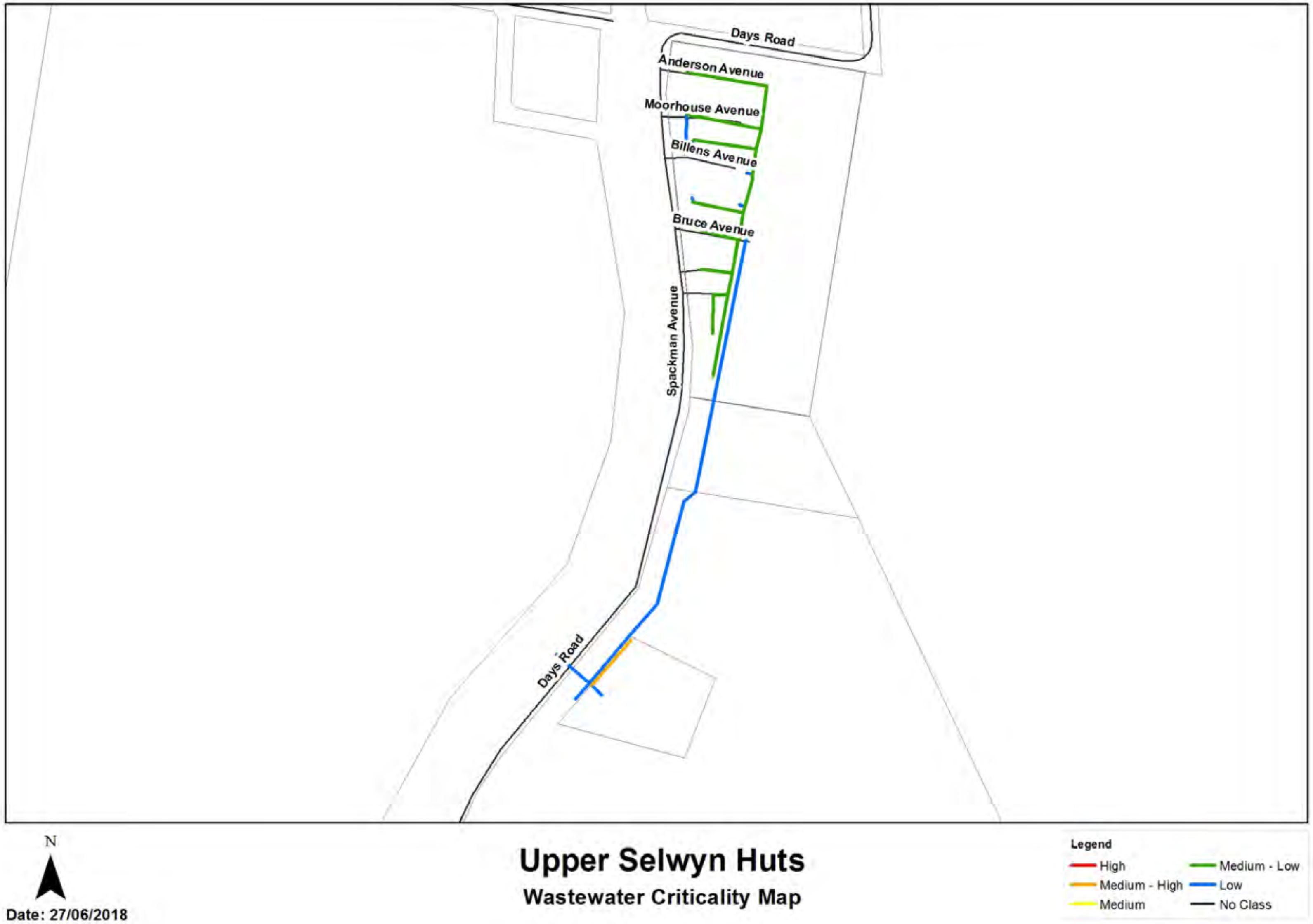


Figure 16-7 Criticality Map

16.14 Asset Condition

The asset condition model was run for Upper Selwyn Huts in 2017. The methodology of the model can be found in 5Waters Activity Management Plan: Volume 1 and it provides details of how the model has been calculated for the reticulation assets (particularly pipes). Figure 16-8 below shows the level of asset condition for all of the assets within this scheme that have a recorded known condition.

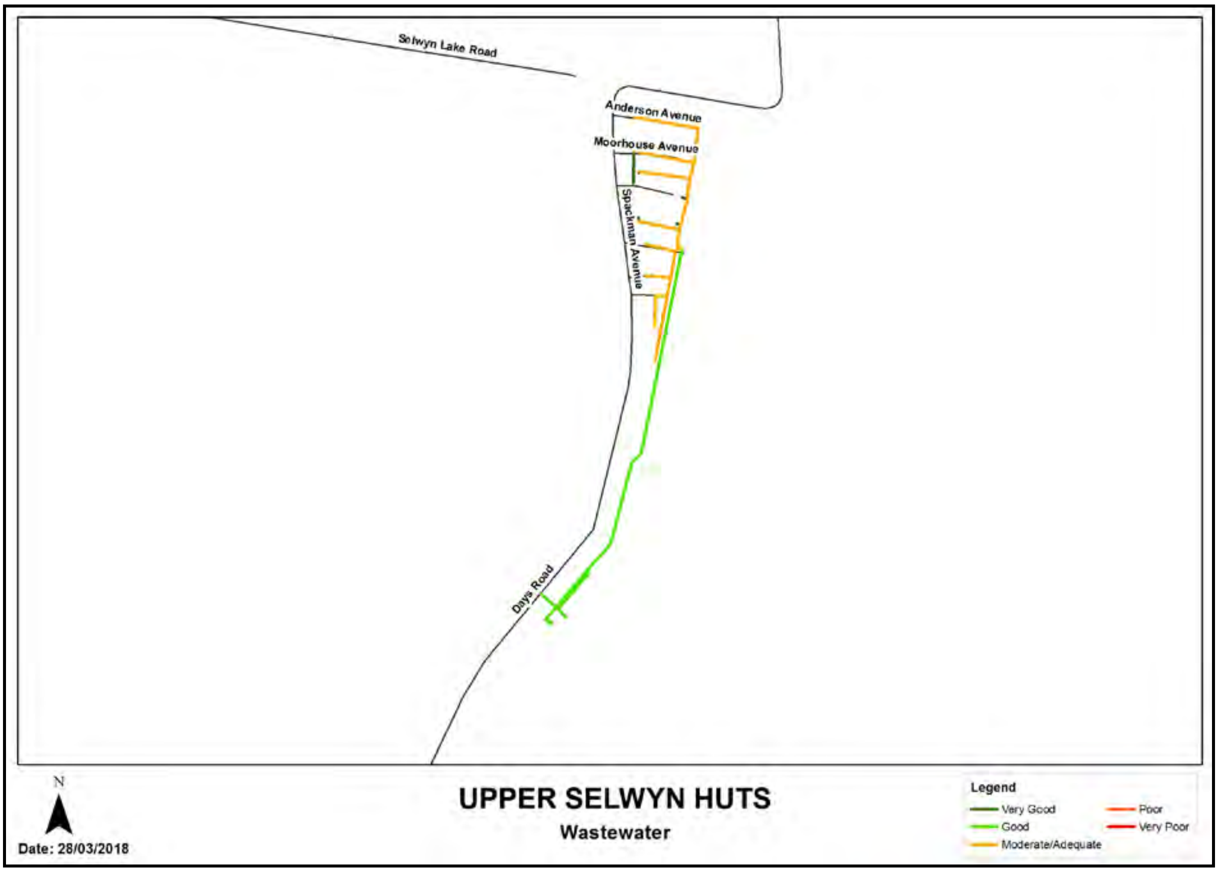


Figure 16-8 Asset Condition – Upper Selwyn Huts

Table 16-9 provides a description of the condition rating used within the condition model.

Table 16-9 Asset Condition Grading

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

16.15 Funding Program

The 10 year budgets for Upper Selwyn Huts are shown by Table 16-10 and Figure 16-9. 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 16-10 Upper Selwyn Huts Budget Summary

Years	Expenditure	Renewals	Projects	Capital Projects
2018/2019	$22,000	$40,000		
2019/2020	$24,000			
2020/2021	$25,000			
2021/2022	$26,000			
2022/2023	$27,000	$250,278		
2023/2024	$27,000			
2024/2025	$27,000			
2025/2026	$27,000			
2026/2027	$27,000			
2027/2028	$27,000	$15,632		
Total	$259,000	$305,910		

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.

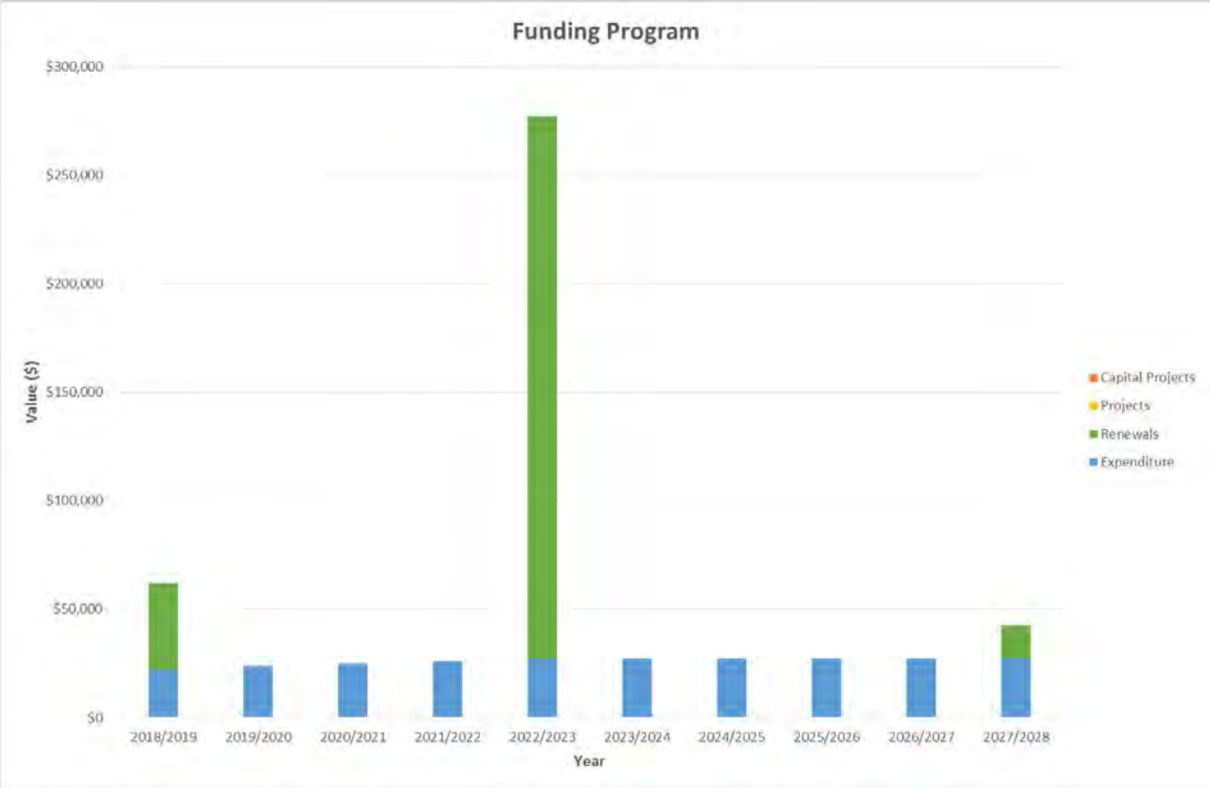


Figure 16-9 Upper Selwyn Huts Funding Summary

There are no projects for Upper Selwyn Huts Wastewater scheme in the LTP budget.

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

17.0 WEST MELTON WASTEWATER SCHEME

17.1 Scheme Summary

Description		Quantity
Estimated Population Served		**1,686**
Scheme Coverage (1 Jan 2018)	**Full Charges**	**598**
	Half Charges	**202**
	>1 Charges	**4**
System Components	**Piped (m)**	**25261.22**
	Manholes (No.)	**252**
	Pump Stations (No.)	**2**
	Treatment	**N/A (to Pines WWTP)**
	Disposal	**N/A (to Pines WWTP)**
History	**Original scheme installation date**	**2007**
Value ($)	**Replacement Cost**	**$9,761,455.54**
	Depreciated Replacement Cost	**$9,170,650.04**
Financial	**2018/2019 Estimate Annual maintenance cost % of total**	**$48,000 1.50%**
Demand	**Annually (m3)**	**113,934**
	Average daily (m3)	**314**
	Peak daily (m3)	**426**
	Minimum daily (m3)	**210**
	Infiltration	**No**
Sustainability	**Ultimate discharge point**	**To Pines WWTP**

17.2 Key Issues

The following key issues are associated with the West Melton Wastewater Scheme. A list of district wide issues are located in 5Waters Activity Management Plan: Volume 1.

Table 17-1 West Melton Scheme Issues

What's the Problem	What we plan to do
System discharge capacity is limited by Rolleston reticulation	All future development shall be required to assess remaining capacity and mitigate peak flows.

17.3 Overview & History

Prior to 2010, the established area of West Melton relied on individual household on-site treatment systems (septic tanks).

A sewage system was developed to serve the Gainsborough subdivision and future developments. Untreated sewage is pumped via a rising/gravity main to Council's Eastern Sewerage Scheme, the Pines Treatment Plant. As a result of significant earthquake damage to septic tanks and Preston Downs development, connection to the reticulated sewerage scheme by the majority of the township has now occurred.

The PE rising main crosses the main slip/shear fault rupture line produced by the September 2010 Greendale earthquakes. Potholing did not reveal any damage to this pipe.

Figure 17-1 Scheme Map

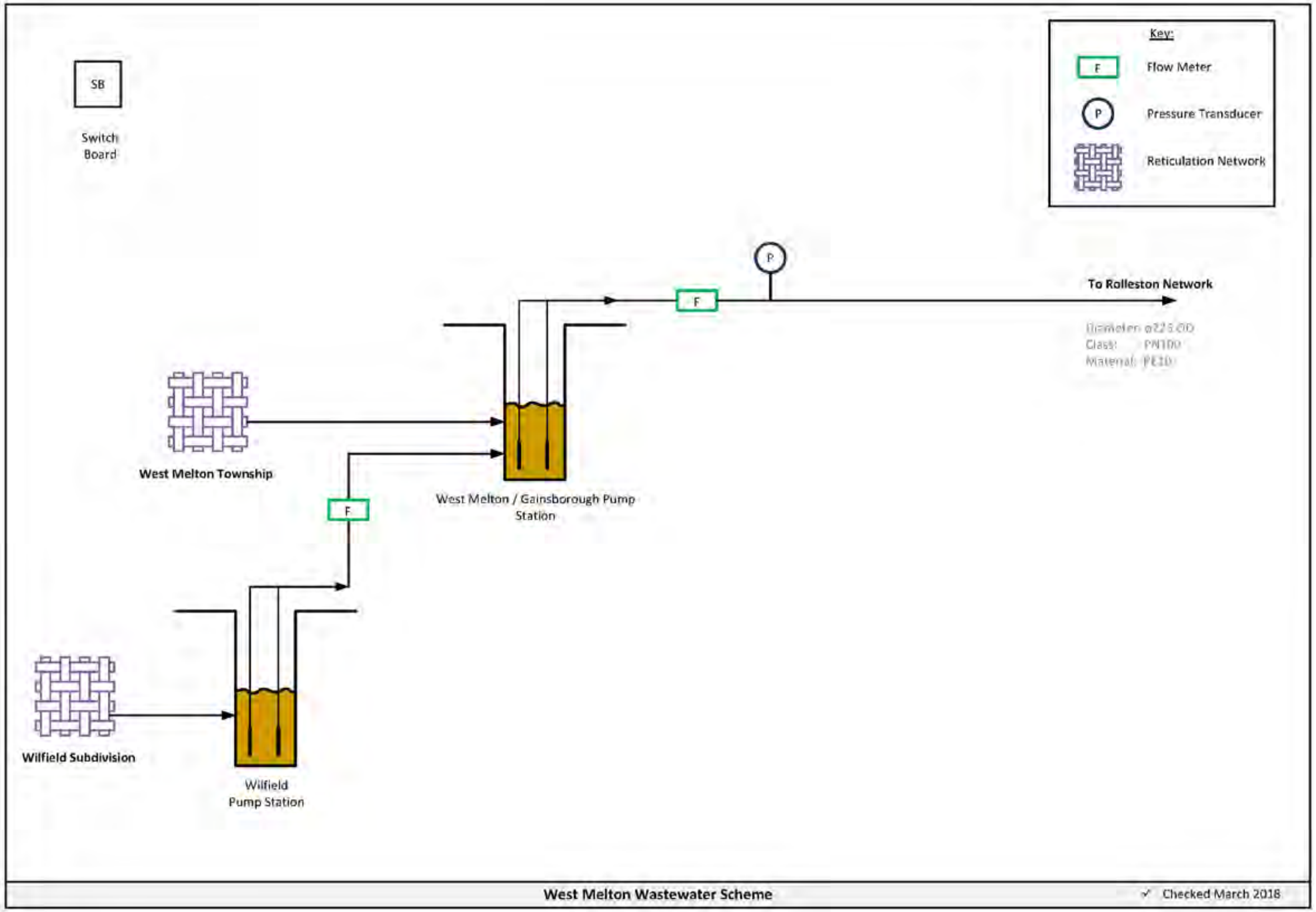


Figure 17-2 Scheme Schematic

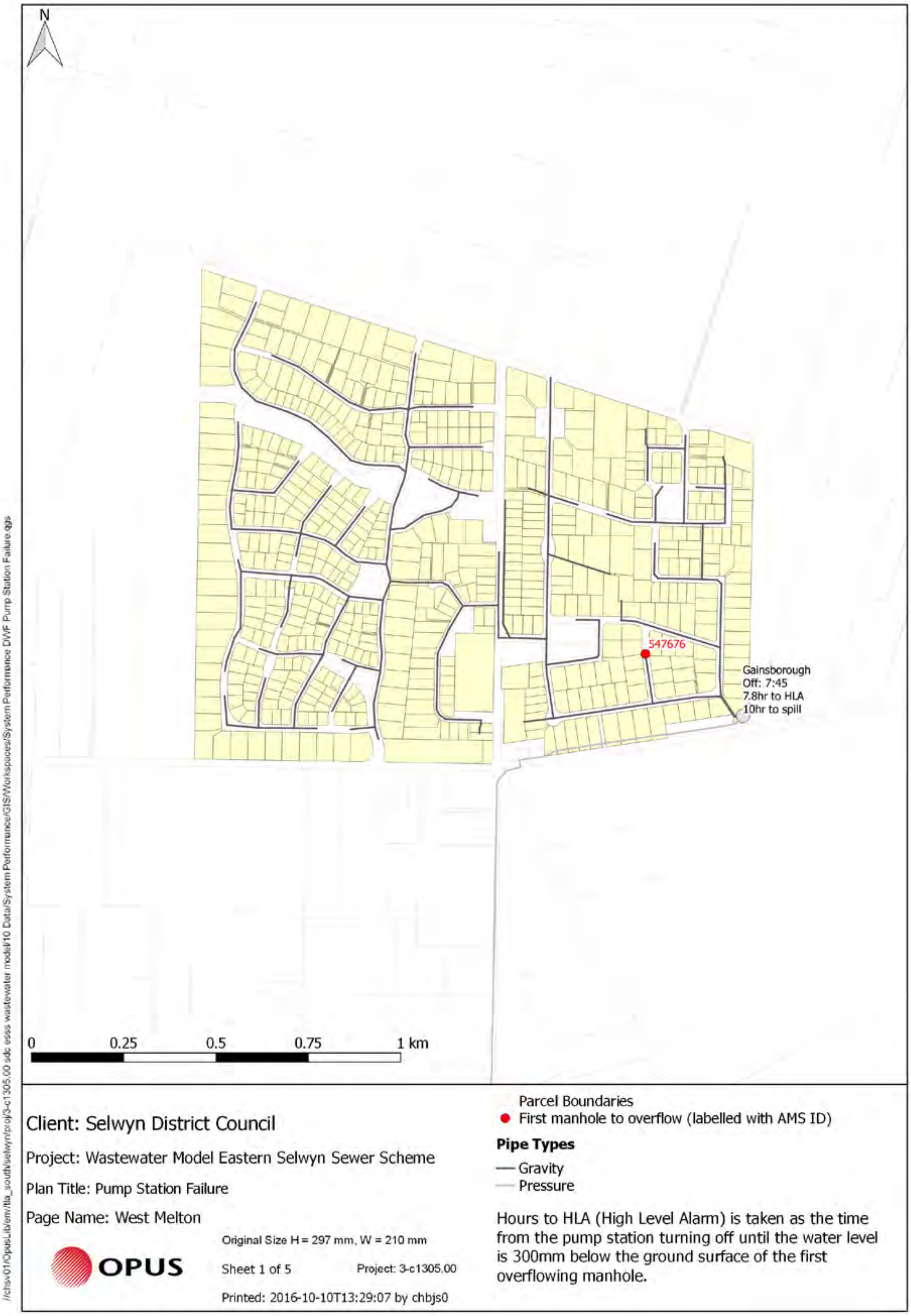


Figure 17-3 Pump Station Failure Map

17.4 System Capacity

The scheme is currently within system capacity. Future development will require special assessment. Refer to Section 17.6.3, Design, for further information.

Figure 17-4 Wet Weather Flow Capacity Map

17.5 Resource Consents

West Melton township is part of the ESSS scheme. Therefore, all wastewater is pumped to the Pines Treatment Plant located in Rolleston. The resource consents required for this treatment plant are in the ESSS section of this plan.

17.6 Scheme Assets

A summary of the assets within this scheme is outlined in this section.

17.6.1 Reticulation Overview

A summary of material and diameter for pipes is shown below in Figure 17-5 and Figure 17-6.

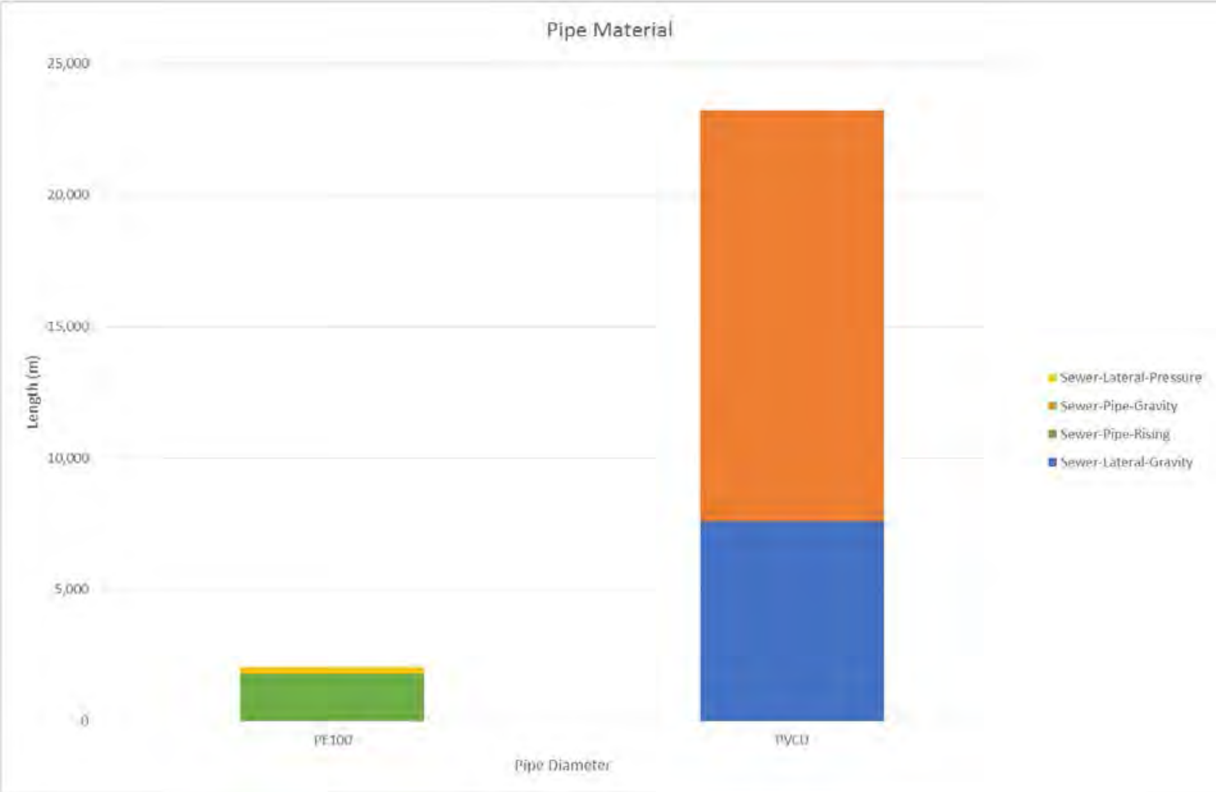


Figure 17-5 Pipe Material – West Melton

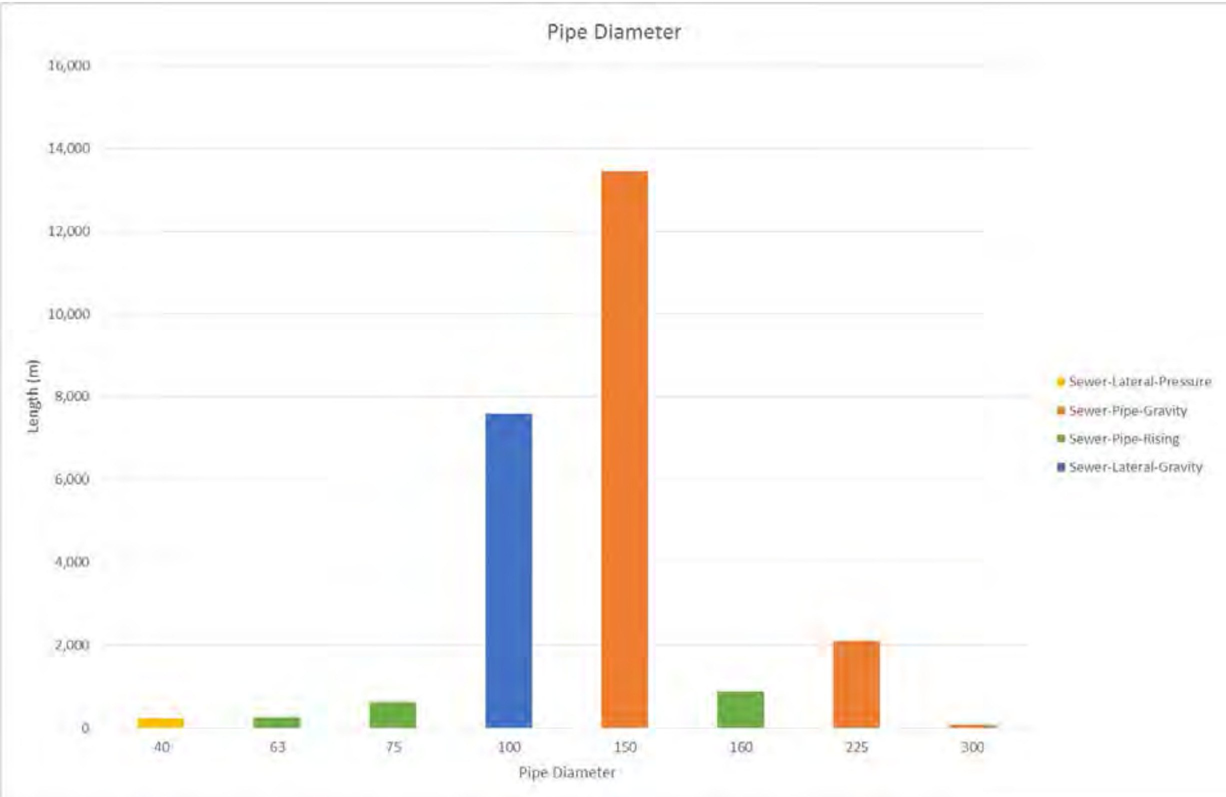


Figure 17-6 Pipe Diameter – West Melton

17.6.2 Treatment and Disposal

No treatment is carried out with all sewage pumped to the Rolleston network.

17.6.3 Design

The scheme was installed by developers following rejection of land based treatment. The critical constraint is where PE rising main discharges to the gravity sewer to Rolleston.

The system has been designed and constructed to serve approximately 730 residential properties.

The limitation of the system as designed are:

- Rising main capacity of 44l/s (Design)
- Gravity main (225mmPE) capacity of 26 l/s (Design)

Future additional capacity up to 1000 households could be provided following capacity upgrades.

17.6.4 Pump Stations

The specifications of the pumps are outlined in Table 17-2 below.

Pump stations where the standby / assist pump is predicted to start have been highlighted in yellow and red for those that experience a peak wet weather response.

Yellow Pumps are can convey the peak flow without backing up the system

Red Pumps are unable to convey the peak flow causing the system to back up

Table 17-2 Pump Station Overview

Site Name	Wet well dimensions	No of pumps	Pump curve used	Recorded instantaneous pump rate (L/s)	Model Pump Rate (L/s)	ADWF (L/s)	PDWF (L/s)	PWWF 1 in 5 year ARI (L/s)
West Melton (S) Gainsborough PS	3300Ø	2	Flygt 3202 180 HT452	52-59	62	3.3	8.3	8.3

Table 17-3 Pump Station Storage Time Analysis

Pump Station		Hours until HLA reached	Hours until first spill	Spill Location - AMS ID
West Melton (S) Gainsborough PS	Main Pump	7.8	10.0	547676

17.6.5 Rising Mains

Table 17-4 Rising Main Overview

Pump Station	Town	Total Length (m)	Total Volume (m3)	ADWF (L/s)	Uphill Retention Time (hours)	Drain Time (hours)	Total Time (hours)	Model Max Pressure (kPa)	SCADA Max Pressure (kPa)
West Melton (S) Gainsborough PS	West Melton	8,088	248.3	3.3	1.9	8.9	10.8	325	-

17.7 Operational Management

The wastewater schemes are operated and maintained under the maintenance contract 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.

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

17.8 Photos of Main Assets

Photo 1: Wet Well

17.9 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. There were no risks identified for this scheme.

17.10 Asset Valuation Details

The total replacement value of assets within the West Melton Scheme is $9,761,456 as detailed in Table 17-5 below. The majority of value is made up of pipes.

Table 17-5 Replacement Value, West Melton

Asset Class 1	Asset Class 2	Sum of Replacement Value
Plant and Equipment		$246,906
Wastewater Reticulation	Chamber	$111,330
	Lateral	$2,485,364
	Manhole	$1,617,731
	Pipe	$5,238,081
	Valve	$62,044

Replacement values for these different types of assets are shown in Figure 17-7 below.

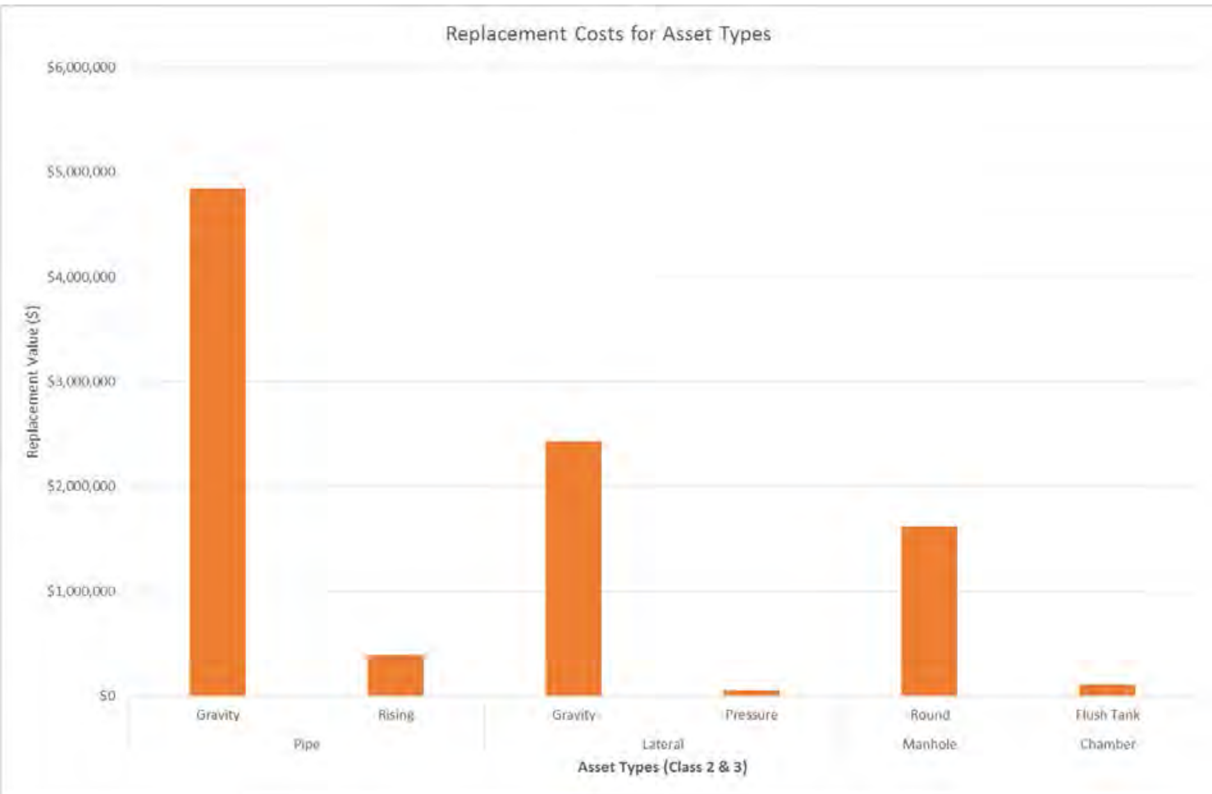


Figure 17-7 Replacement Costs for West Melton

17.11 Renewals

The renewal profile has been taken from the 2014 5 Waters Valuation. A graph showing the renewals for this scheme are shown by Figure 17-8 below.

Figure 17-8 West Melton Wastewater Renewal Profile

17.12 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 17-6 and Figure 17-9 below shows the calculated criticality for all of the assets within this scheme that have a recorded known length.

Table 17-6 Length of Assets per Criticality Level

Criticality Bands		Length (m)
5	Low	23667
4	Medium-Low	2144
3	Medium	938
2	Medium-High	151
1	High	0

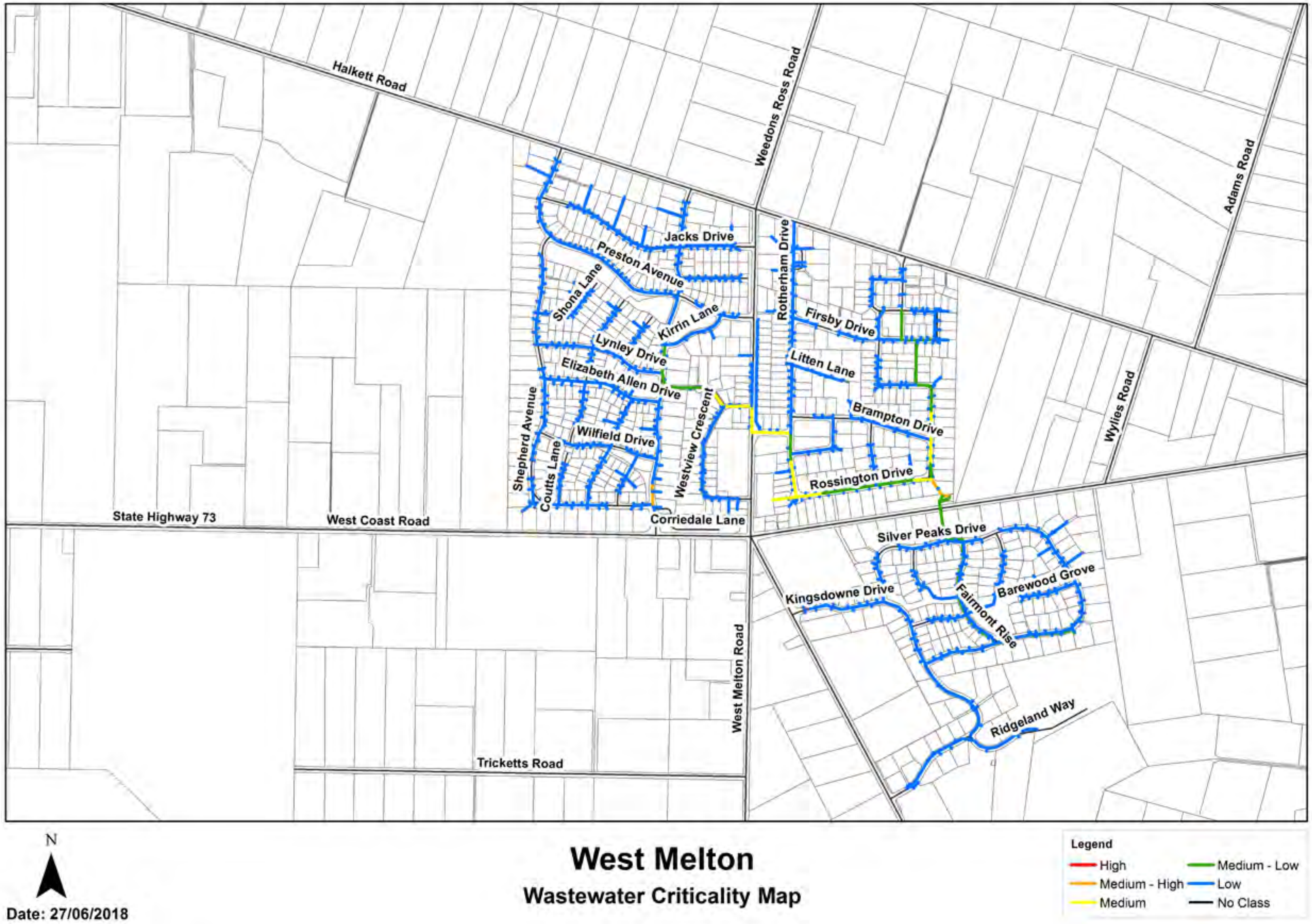


Figure 17-9 Criticality Map

17.13 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 and it provides details of how the model has been calculated for the reticulation assets (particularly pipes). Figure 17-10 below shows the level of asset condition for all of the assets within this scheme that have a recorded known condition.

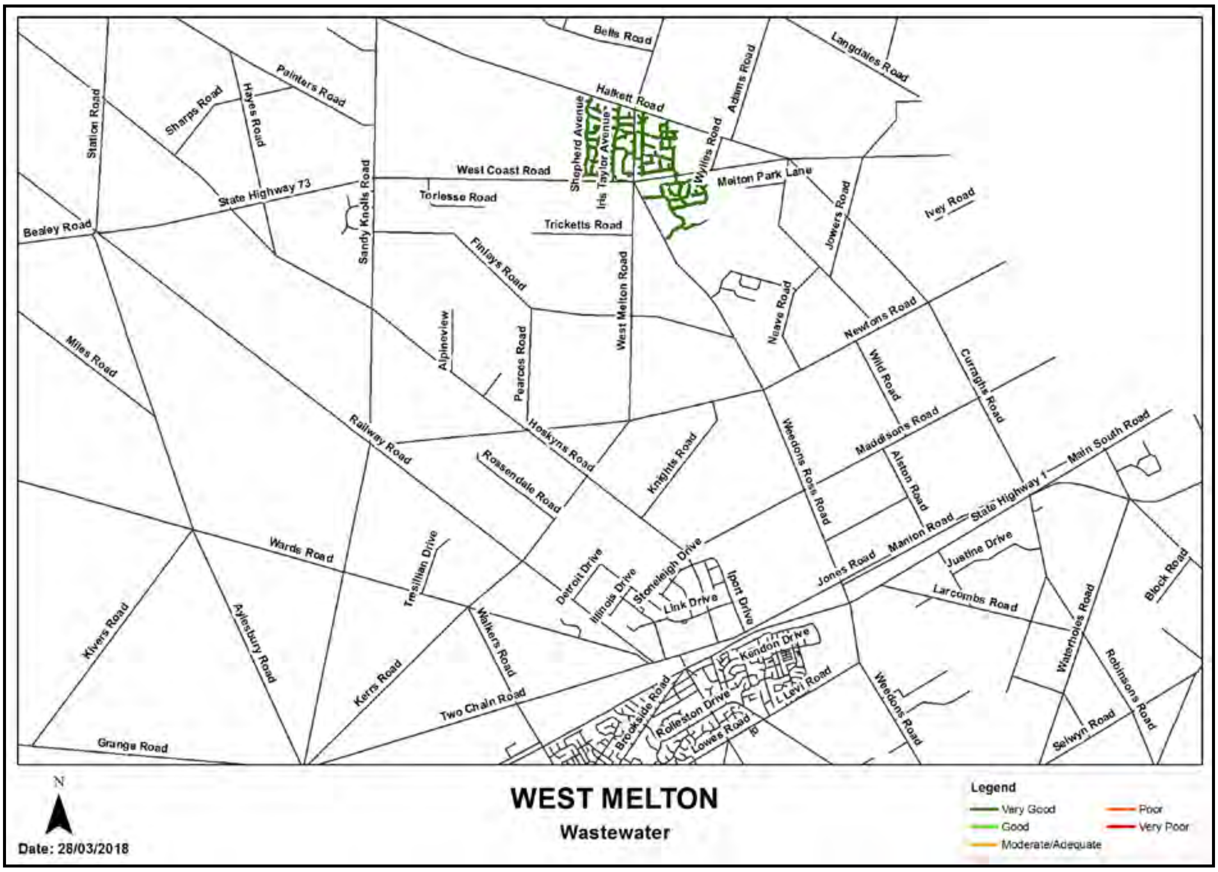


Figure 17-10 Asset Condition – West Melton

Table 17-7 provides a description of the condition rating used within the condition model.

Table 17-7 Asset Condition Grading

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

17.14 Funding Program

The 10 year budgets for West Melton are shown by Table 17-8 and Figure 17-11. 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 17-8 West Melton Budget Summary

Years	Expenditure	Renewals	Projects	Capital Projects
2018/2019	$48,000			
2019/2020	$49,313			
2020/2021	$50,925	$24,073		
2021/2022	$51,145			
2022/2023	$51,365	$4,817		
2023/2024	$51,658			
2024/2025	$51,951			
2025/2026	$52,244			
2026/2027	$52,537			
2027/2028	$52,830	$20,428		
Total	$511,968	$49,317		

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 17-11 West Melton Funding Summary

There are no major projects for West Melton Wastewater scheme in the LTP budget.

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