



Stormwater

Activity Management Plan

VOLUME 4. 2018



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1.0 ARTHURS PASS STORMWATER SCHEME

1.1 Scheme Summary

Description		Quantity
Scheme Area		23.15ha
Scheme Coverage (as at 1 Jan 2018)	Rating numbers	136
System components	Piped (m)	449.7
	Swales (m)	42
	Drains (m)	621.1
	Manholes/Inspection Chambers (No.)	7
	Treatment	2 (Humeceptor + Oil Interceptor)
	Other	Infiltration trench
Value (\$)	Replacement Cost	\$321,277.21
	Depreciated Replacement Cost	\$268,809.46
Financial	2018/2019 Estimate	\$15,100
	Annual maintenance cost	2.16%
	% of total	
Planning	Stormwater Management Plan	Draft
	No. SDC stormwater consents	2
Demand	Mean Annual Rainfall (mm)	4330
	10% AEP (10 year) 1hr rainfall depth (mm)	37.4
Sustainability	Sustainable drain management practices	Adopted and Encouraged

1.2 Key Issues

The following key issues are associated with the Arthurs Pass Stormwater 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
Area outside the Outdoor Centre floods from the surrounding hillsides during heavy rainfall. Includes septic tank flooding.	Monitor effectiveness of minor improvements made, determine responsibility.
Soakage trench by the Railway underpass has limited capacity and other floods during large rainfall events.	Options analysis undertaken by Opus consultants in 2013 and Community Committee opted to improve maintenance and undertake no capital works.
Costs of undertaking maintenance works in the township are high including proprietary device cleaning due to travel distances.	Continue to work alongside roading contractor and the Community to achieve best value for money maintenance.

1.3 Overview & History

The Arthur's Pass stormwater system services the car and bus parking and public toilet facility at Arthur's Pass. These facilities sit outside the NZTA system. Stormwater from the "bus and car parking area" is directed via kerb and channel to a rock-lined swale, and then piped to a proprietary device before discharging to a gravel soakage trench. Stormwater from the "DoC carpark" is directed via kerb and channel to a petrol and oil interceptor and then discharges via open drain to the same soakage trench.

Arthur's Pass has a high annual rainfall of 4330mm which is the highest in the district.

The community committee raised concerns about the flooding of the underpass when the soakage trench capacity was exceeded (Refer to Photo 3 in Section 1.8). An investigation of options to improve drainage of the soakage trench was undertaken by Opus Consultants in 2013. The community committee opted to remain with the status quo with additional maintenance.

Flooding is known to occur outside the outdoor centre from the drain on private property behind the store, minor improvements to the culvert was made in 2013 by the roading team and will be monitored.

Due to the isolated nature of the community in Arthurs Pass, a high level of communication with the community committee is required to help identify issues and opportunities for improvement.

There are a number of stormwater issues in Arthurs Pass on private property which are outside Council control.

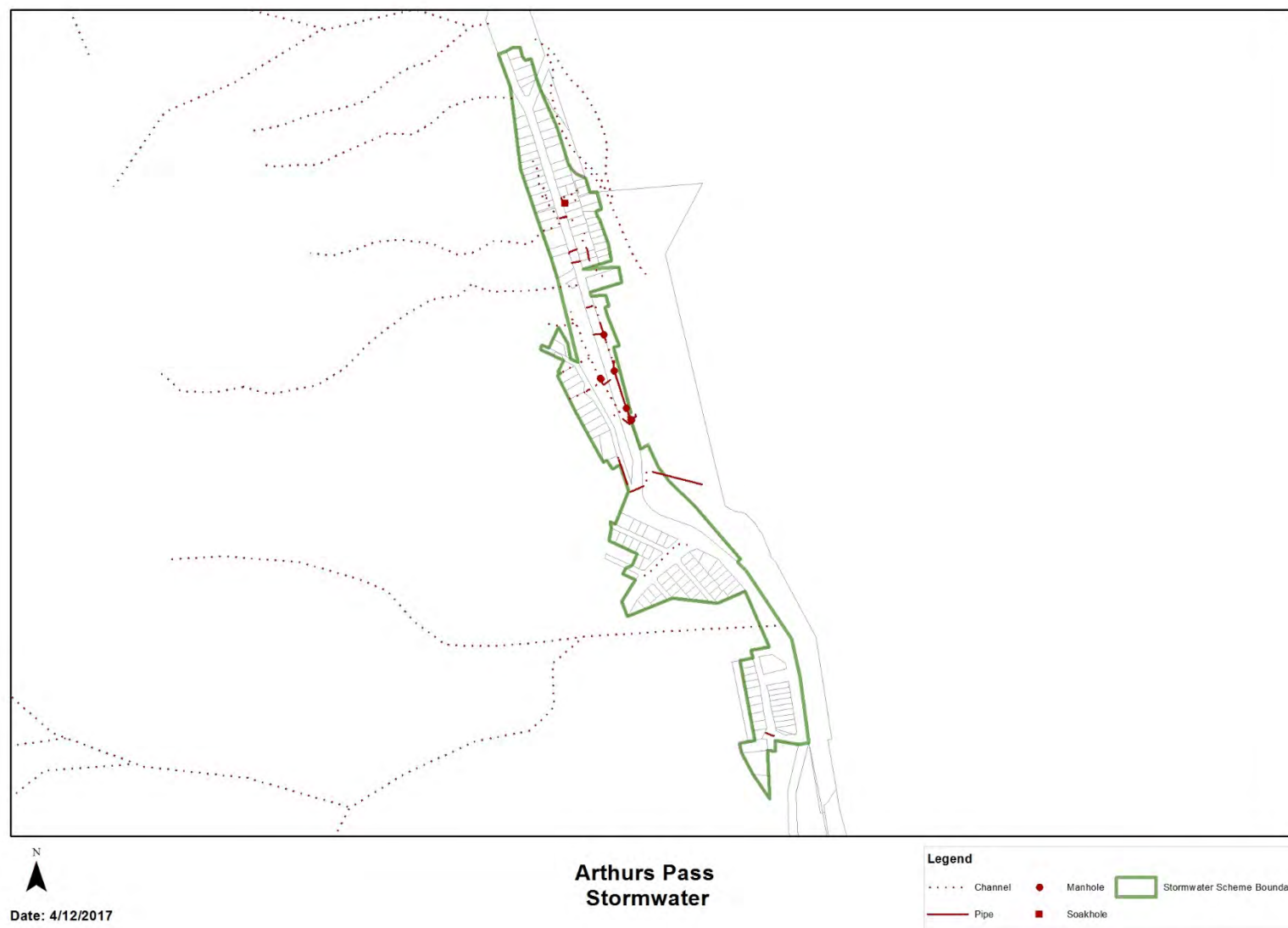


Figure 1-1 Scheme Map

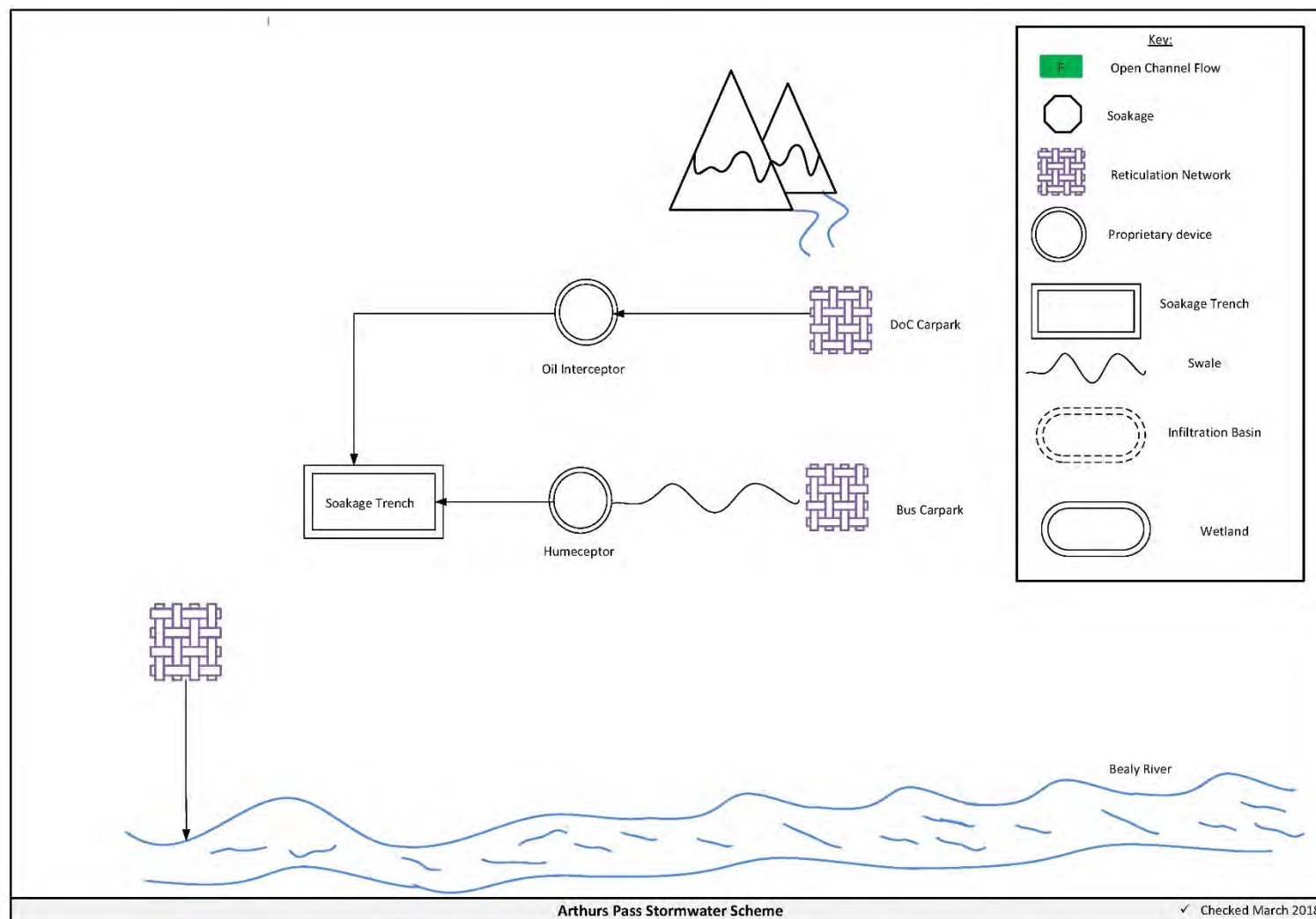


Figure 1-2 Scheme Schematic

1.4 Resource Consents

The Arthurs Pass stormwater scheme has a number of resource consents. Table 1-2 shows the stormwater discharge permitted by the resource consents for this scheme.

Table 1-2 Resource Consents

Consent	Description	Location	Date Issued	Expiry Date
CRC080003 <i>Issued - Active</i>	To discharge stormwater to land from roofing and hardstand	State Highway 73, ARTHURS PASS	30/10/2007	25/10/2042
CRC084392 <i>Issued - Active</i>	To discharge hardstand stormwater to ground.	Cloudesley Road, BEALEY SPUR		

Consent CRC084392 is located outside the stormwater management area but is included for completeness.

1.5 Integrated Stormwater Management Plan

Environment Canterbury's Natural Resources Regional Plan (NRRP) became operative on the 11th June 2011. The plan requires that all non-permitted stormwater discharges have consent application lodged by 11th December 2011 under rules WQL6 and 7 or June 2016 under rule WQL8. Due to the tight timeframes (6 months) under rules WQL 6 and 7 it is proposed to obtain consents under rule WQL8. Under the Provisional Land and Water Regional Plan (PLWRG), the deadline for obtaining network discharge consents to allow discharges to be permitted under rule 5.93 has been extended to June 2018.

An ISMP is required for Arthur's Pass, these application documents are still being developed and will be lodged before June 2018.

1.6 Scheme Assets

Council has a wide variety of stormwater assets within the district. A brief description of the assets within this scheme is provided below:

- Reticulated network – Includes pipes, manholes, sumps. The primary purpose of the reticulated network is to collect and convey stormwater. Historically these systems were designed for the 2 year storm event. Today's engineering standards require the piped network to be designed for a 10 year event with overland flow provision for up to the 50 year event.
- Oil Interceptor – Is a proprietary device which uses baffles to trap and contain hydrocarbons (oils and fuels).
- Humeceptor - Is a hydrodynamic separator which helps to reduce mass sediment load from the discharge, some removal of hydrocarbons is also achieved.
- Swale (Rock lined) – Is a longitudinal open channel which is lined with rocks. The swale both conveys and treats stormwater.
- Soakage trench – Carries out the same function as soakholes but is orientated in a horizontal direction rather than vertically. They are particularly useful in areas with reduced infiltration rates or higher ground water tables.

A summary of material and diameter for channels and pipes, where known, is shown below in Figure 1-3 and Figure 1-4.

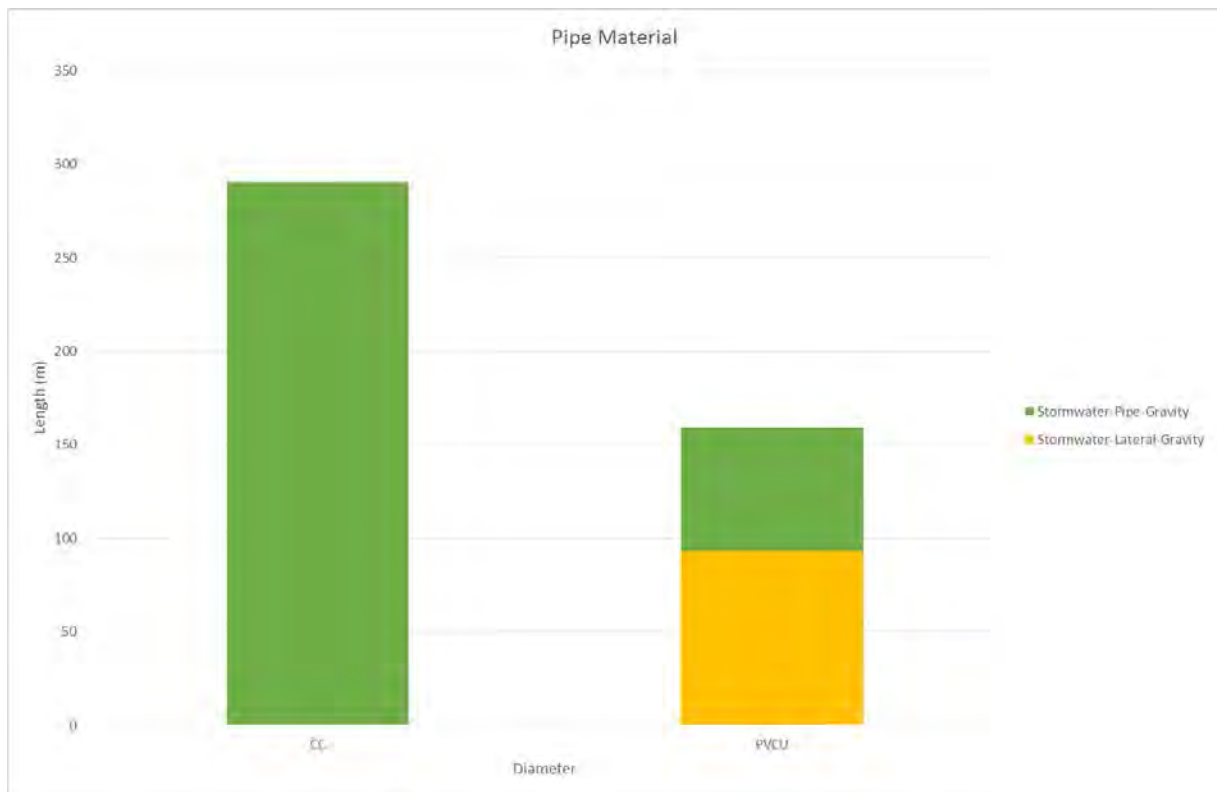


Figure 1-3 Pipe Material – Arthurs Pass

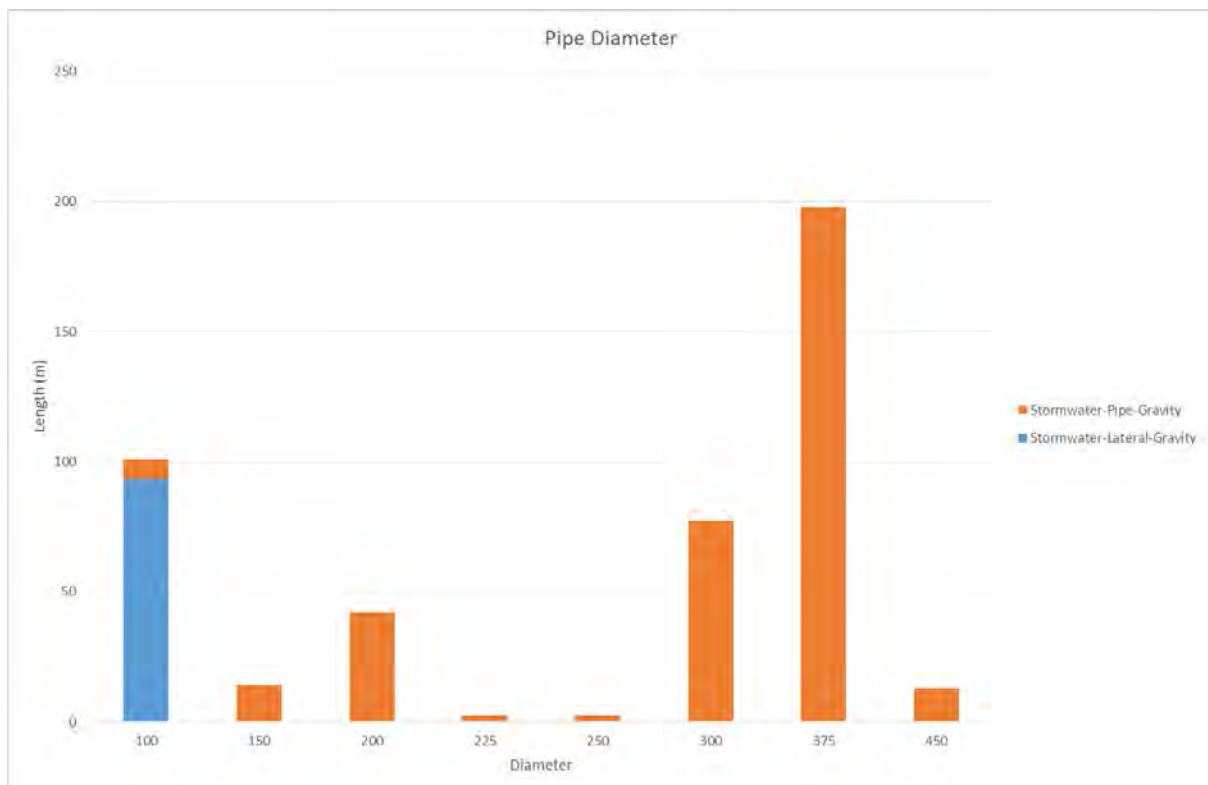


Figure 1-4 Pipe Diameter – Arthurs Pass

1.7 Operational Management

The stormwater network is operated and maintained under two maintenance contracts as follows:

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

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

1.8 Photos of Main Assets

The photos below provide a summary of the types of assets found within this stormwater management area.



Photo 1: Soakage Trench



Photo 2: Rock lined swale

The soakage trench in Photo 1 requires an annual clean of accumulated sediment.



Photo 3: Arthur's Pass in Flood

1.9 Rapid Flood Modelling

The Council has undertaken 'Rapid Flood Hazard Assessment' modelling for its main townships. The modelling uses DHI MIKE 21 to simulate rainfall on grid with the outputs processed through ArcGIS producing maps illustrating a range of flood deeps during different rainfall intensities and durations.

The rapid flood assessment has been generated to provide a high level summary of potential flood and ponding areas across the district during extreme rainfall events. The results from this study are not to be used to set floor levels. The results have not been ground tested and therefore are indicative only.

For a 50 year event, no flooding is expected in Arthurs Pass.

1.10 Risk Assessment

A risk assessment has been undertaken for the Arthurs Pass scheme. The key output from the risk assessment is the identification of any extreme and high risks which need to be mitigated. In order to mitigate these risks they have been included and budgeted for in the projects within this LTP. Table 1-3 details the risk priority matrix and Table 1-4 outlines the risks for this scheme.

Table 1-3 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 1-4 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
Network maintenance	review public / private drains	2017		12	2
Scheme capacity	infiltration basin overflow design + consent	2017		27	12
Scheme capacity	infiltration basin overflow construction	2017		27	12

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

1.11 Asset Valuation Details

The total replacement value of assets within the Arthurs Pass Scheme is \$321,277 as detailed in Table 1-5 below. The majority of value, 40%, is made up of pipes.

Table 1-5 Replacement Value, Arthurs Pass

Asset Class 1	Asset Class 2	Sum of Replacement Value
Stormwater Reticulation	Channel	\$59,116
	Inlet-Outlet-Point	\$16,947
	Lateral	\$21,230
	Management Device	\$52,115
	Manhole	\$43,236
	Pipe	\$128,632

Replacement values for different types (channels, laterals, management devices and pipes) of stormwater assets are shown in Figure 1-5 below.

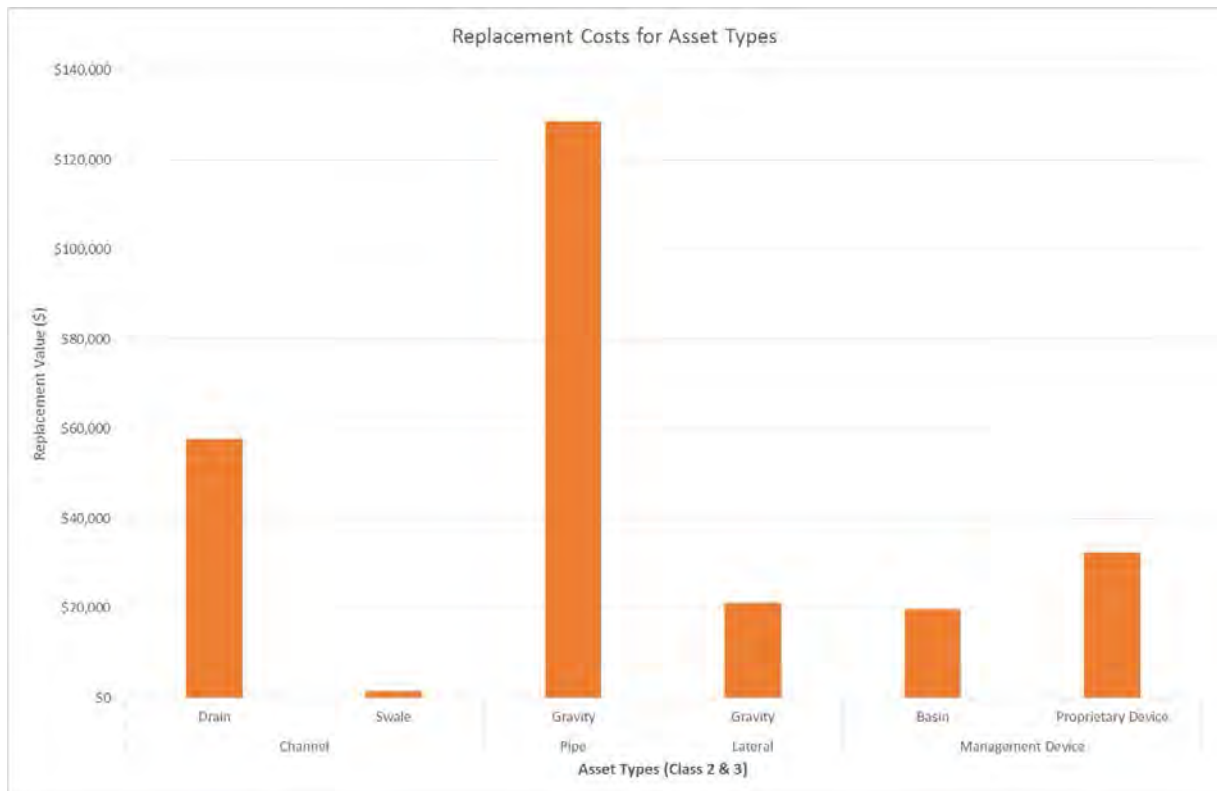


Figure 1-5 Replacement Costs for Arthurs Pass

1.12 Renewals

The renewal profile has been taken from the 2017 5 Waters Valuation. A graph showing the renewals for this scheme are shown by Figure 1-6 below. The majority of assets requiring renewal are culverts/pipes which occur in the year 2040/41.



Figure 1-6 Arthurs Pass Stormwater Renewal Profile

1.13 Critical Assets

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

Table 1-6 Length of Assets per Criticality Level

Criticality Bands		Length (m)
5	Low	1,968
4	Medium-Low	71
3	Medium	148
2	Medium-High	0
1	High	0

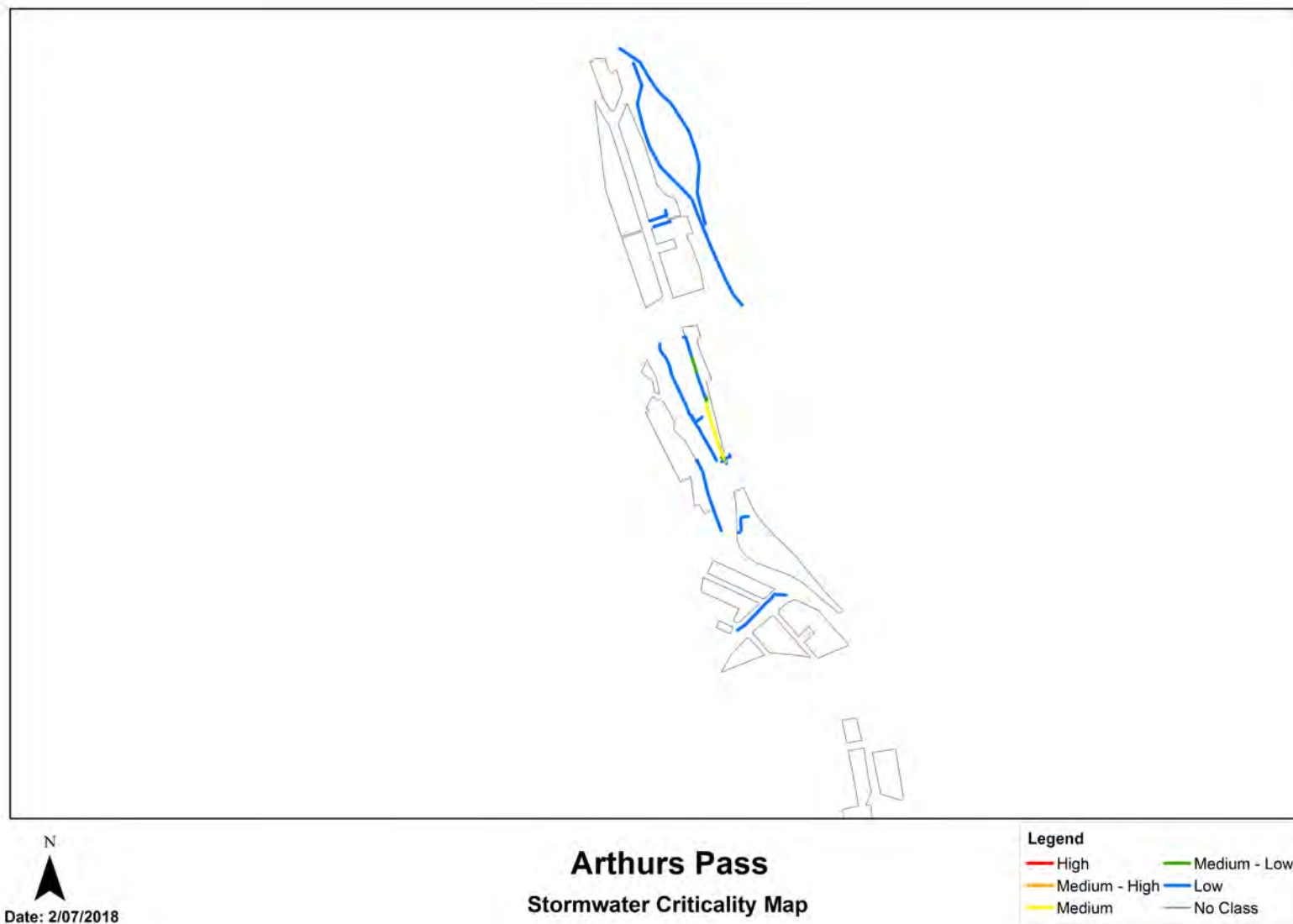


Figure 1-7 Criticality Map

1.14 Asset Condition

The asset condition model was run for Arthurs Pass in 2017. The methodology of the model can be found in 5Waters Activity Management Plan: Volume 1 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.

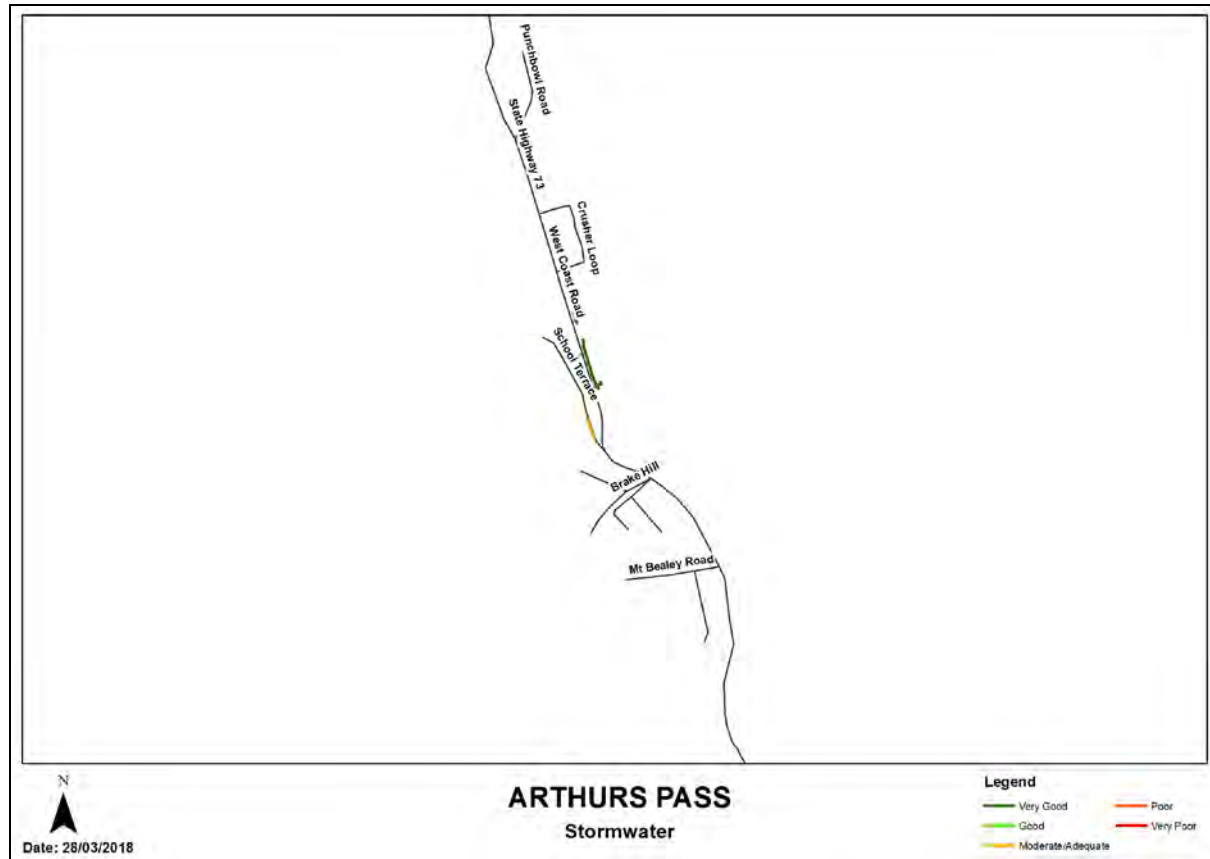


Figure 1-8 Asset Condition – Arthurs Pass

Table 1-7 provides a description of the condition rating used within the condition model.

Table 1-7 Asset Condition Grading

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

1.15 Funding Program

The 10 year budgets for Arthurs Pass are shown by Table 1-8 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 1-8 Arthurs Pass Budget Summary

Years	Expenditure	Renewals	Projects	Capital Projects
2018/2019	\$15,100		\$25,000	\$40,100
2019/2020	\$10,500			\$10,500
2020/2021	\$10,500		\$100,000	\$110,500
2021/2022	\$10,500			\$10,500
2022/2023	\$10,500	\$3,706		\$14,206
2023/2024	\$10,500			\$10,500
2024/2025	\$10,500			\$10,500
2025/2026	\$10,500			\$10,500
2026/2027	\$10,500			\$10,500
2027/2028	\$10,500			\$10,500
Total	\$109,600	\$3,706	\$125,000	\$238,306

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.

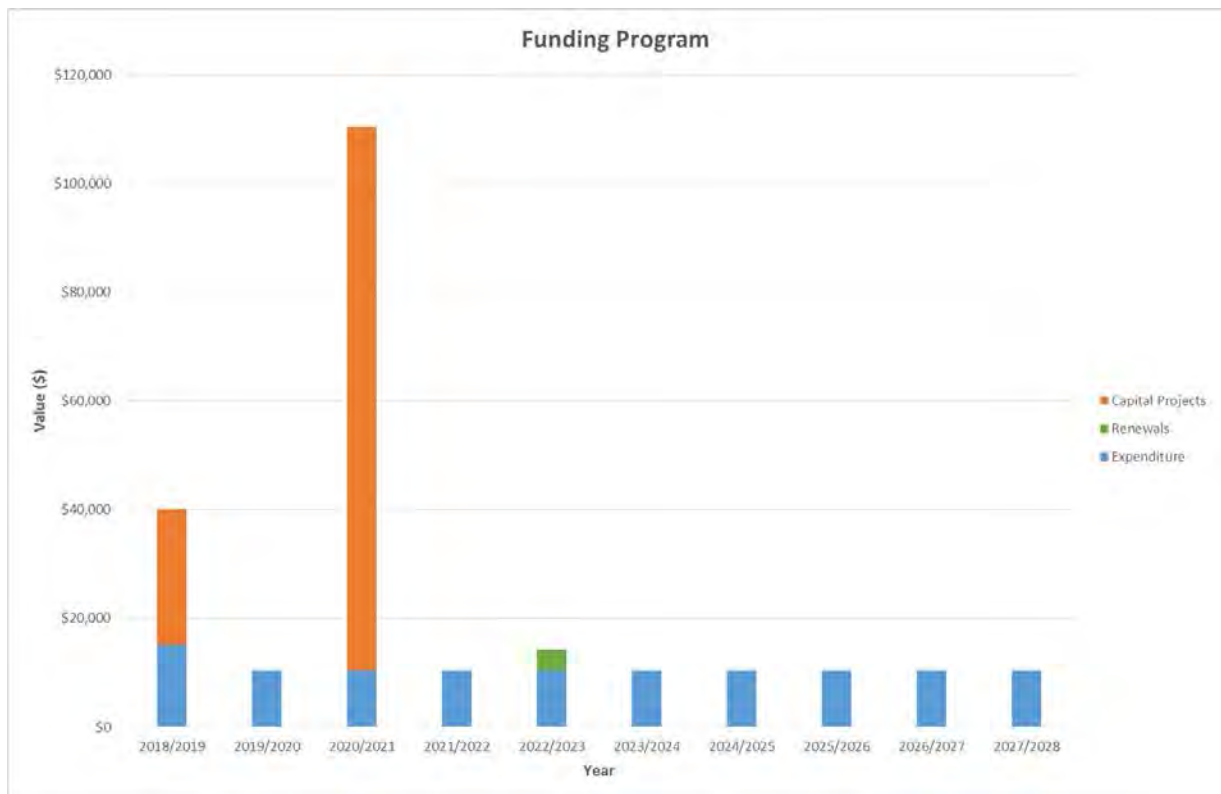


Figure 1-9 Arthurs Pass Funding Summary

There are three major projects for Arthurs Pass Stormwater scheme in the LTP budget.

Table 1-9 Key Projects

Account Label	GL	Description	Year 1 (\$)	Year 2 (\$)	Year 3 (\$)	Years 4 to 10	Funding Split ¹
Capital Projects	440490003	Review public / private classification	\$5,000				100% LoS
Capital Projects	440490004	Infiltration basin overflow design	\$20,000				100% LoS
Capital Projects	440490005	Infiltration basin overflow construction			\$100,000		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.

¹ Where LoS refers to Level of Service and G refers to Growth

2.0 CASTLE HILL STORMWATER SCHEME

2.1 Scheme Summary

Description		Quantity
Scheme Area		28ha
Scheme Coverage (as at 1 Jan 2018)	Rating numbers	187
System components	Piped (m)	1123.51
	Swales (m)	4267.16
	Drains (m)	136
	Manholes/Inspection Chambers (No.)	26
	Treatment	N/A
	Other	Discharge flume + Infiltration trench
Value (\$)	Replacement Cost	\$699,248.18
	Depreciated Replacement Cost	\$595,491.69
Financial	2018/2019 Estimate	\$18,500
	Annual maintenance cost	2.65%
	% of total	
Planning	Stormwater Management Plan	Yes
	No. SDC stormwater consents	2
Demand	Mean Annual Rainfall (mm)	1293
	10% AEP (10 year) 1hr rainfall depth (mm)	19.5
Sustainability	Sustainable drain management practices	Adopted and Encouraged

2.2 Key Issues

The following key issues are associated with the Castle Hill Stormwater 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
Costs of undertaking maintenance works in the township are high including proprietary device cleaning due to travel distances.	Continue to bundle maintenance work to get best value for money for the community.

2.3 Overview & History

The primary stormwater system for the village is a network of roadside swales which convey flows to either the Thomas River (via a stormwater flume) or to a soakage trench. In addition to the swale network there are a number of culvert crossings and relatively short sections of piped network. Maintenance activities in Castle Hill include inspection and clearing of broom at the Thomas river flume.

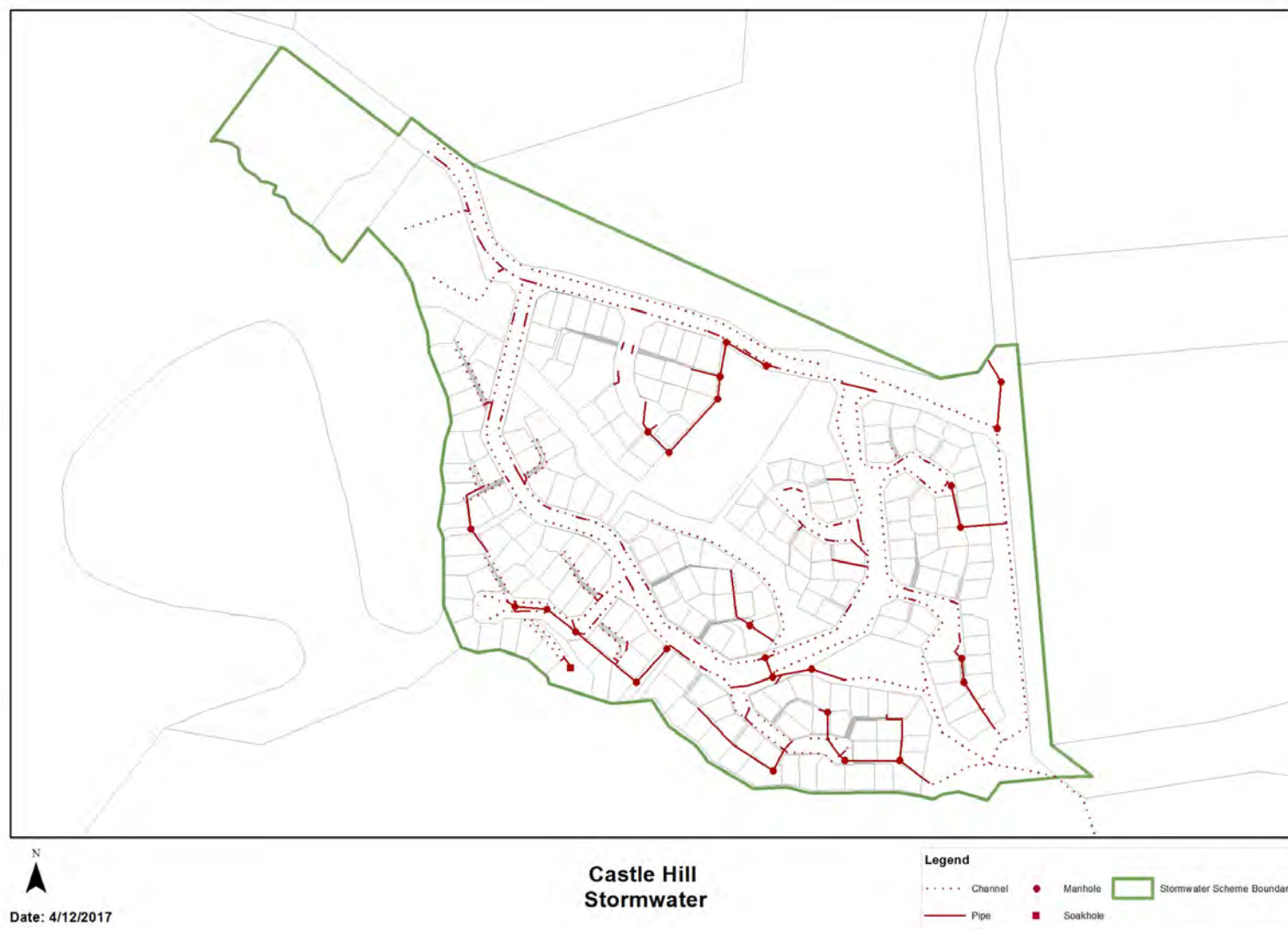


Figure 2-1 Scheme Map

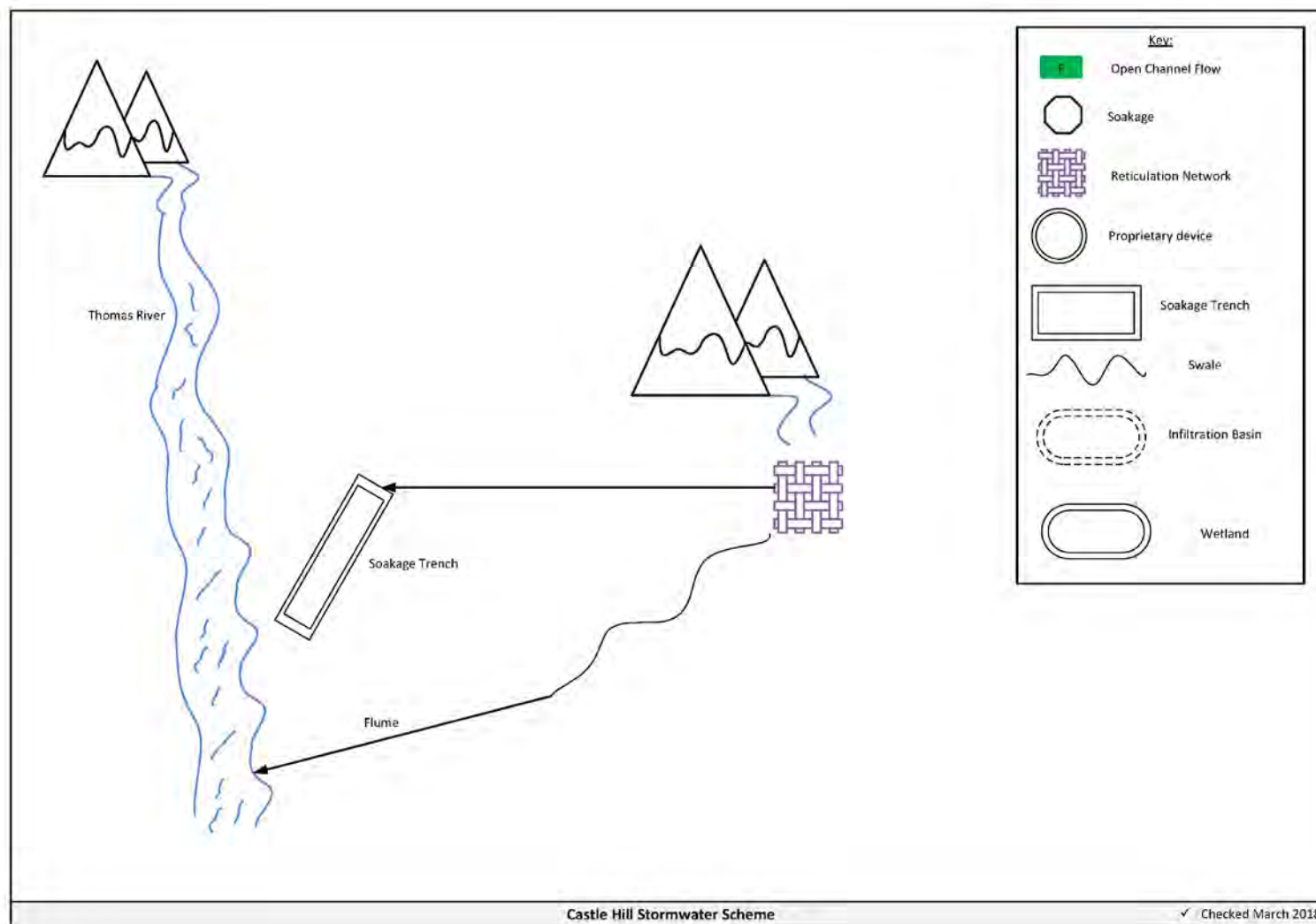


Figure 2-2 Scheme Schematic

2.4 Resource Consents

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

Table 2-2 Resource Consents

Consent	Description	Location	Date Issued	Expiry Date
CRC062414 <i>Issued – Active</i>	The Canterbury Regional Council certifies that the following activity is authorised under Rule 6.2 of the Waimakariri River Regional Plan and condition 3 of the General Authorisation of Stormwater in the Transitional Regional Plan.	Trelissick Loop, CASTLE HILL	31/01/2006	31/01/2011
CRC064128.1 <i>Issued - Active</i>	To discharge stormwater.	Trelissick Loop, CASTLE HILL	13/10/2010	20/10/2041

The requirement to undertake stormwater sampling at Castle Hill was removed in October 2013 following four plus samples with Zinc below trigger levels.

2.5 Integrated Stormwater Management Plan

A global stormwater consent exists for the Castle Hill Village (CRC064128.1).

2.6 Scheme Assets

Council has a wide variety of stormwater assets within the district. A brief description of the assets within this scheme is provided below:

- Swale (Grassed) – Is a longitudinal open channel which is lined with grass. The swale both conveys and treats stormwater.
- Corrugated Flume – is a corrugated half pipe used to convey stormwater in areas which are prone to erosion.

A summary of material and diameter for channels and pipes, where known, is shown below in Figure 2-3 and Figure 2-4.

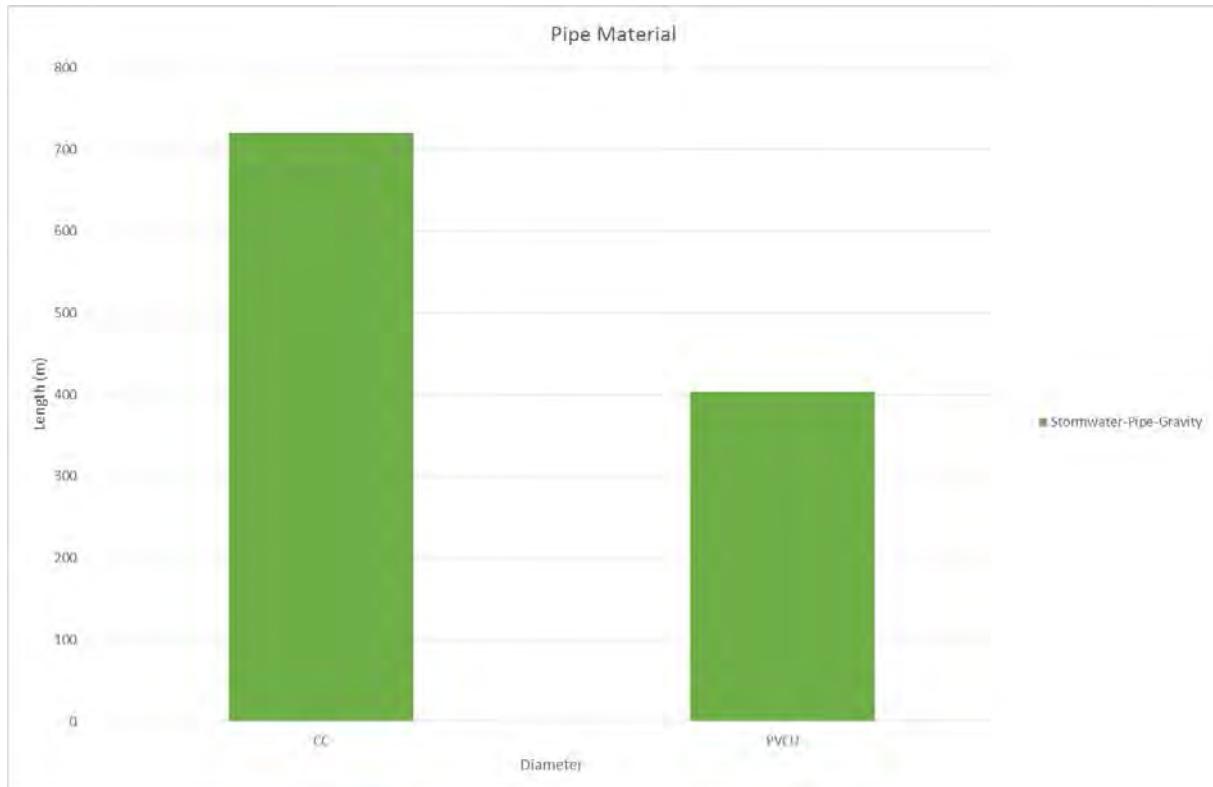


Figure 2-3 Pipe Material – Castle Hill

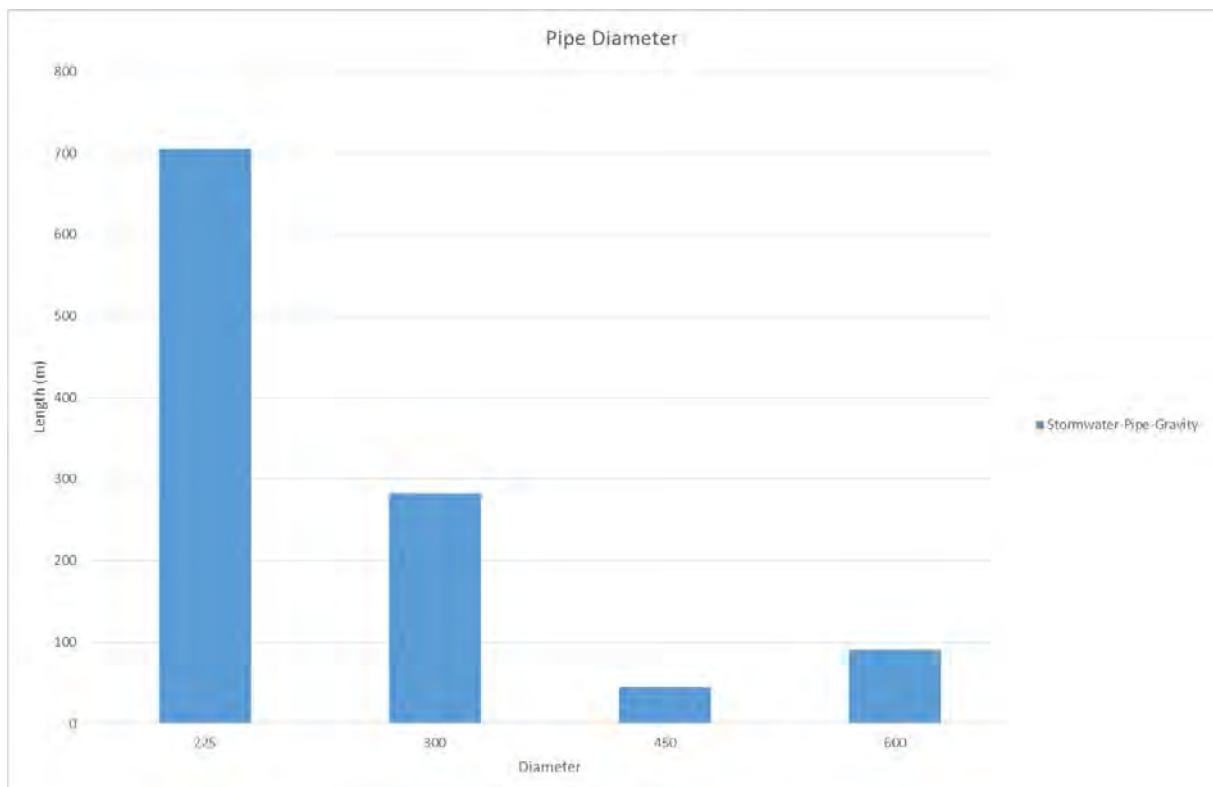


Figure 2-4 Pipe Diameter – Castle Hill

2.7 Operational Management

The stormwater network is operated and maintained under two maintenance contracts as follows:

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

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

2.8 Photos of Main Assets

The photos below provide a summary of the types of assets found within this stormwater management area.



Photo 1: Corrugated Flume



Photo 2: Alpine Swale

2.9 Rapid Flood Modelling

The Council has undertaken 'Rapid Flood Hazard Assessment' modelling for its main townships. The modelling uses DHI MIKE 21 to simulate rainfall on grid with the outputs processed through ArcGIS producing maps illustrating a range of flood depths during different rainfall intensities and durations.

The rapid flood assessment has been generated to provide a high level summary of potential flood and ponding areas across the district during extreme rainfall events. The results from this study are not to be used to set floor levels. The results have not been ground tested and therefore are indicative only.

For a 50 year event, no flooding is expected in Castle Hill.

2.10 Risk Assessment

A risk assessment has been undertaken for the Castle Hill scheme. The key output from the risk assessment is the identification of any extreme and high risks which need to be mitigated. In order to

mitigate these risks they have been included and budgeted for in the projects within this LTP. Table 2-3 details the risk priority rating and Table 2-4 outlines the risks for this scheme.

Table 2-3 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 2-4 Risks – Castle Hill

Risk	Action/Project	Year Identified	2014 Risk Rating	2017 Risk Rating	Residual Risk Rating
Non-consented activities	Renewal of consents	2014	27	27	6

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

2.11 Asset Valuation Details

The total replacement value of assets within the Castle Hill Scheme is \$699,248 as detailed in Table 2-5 below. The majority of value, 51%, is made up of pipes.

Table 2-5 Replacement Value, Castle Hill

Asset Class 1	Asset Class 2	Sum of Replacement Value
Stormwater Reticulation	Channel	\$145,524
	Inlet-Outlet-Point	\$32,989
	Manhole	\$161,252
	Pipe	\$355,695
	Soakhole	\$3,788

Replacement values for different types (channels, laterals, management devices and pipes) of stormwater assets are shown in Figure 2-5 below.

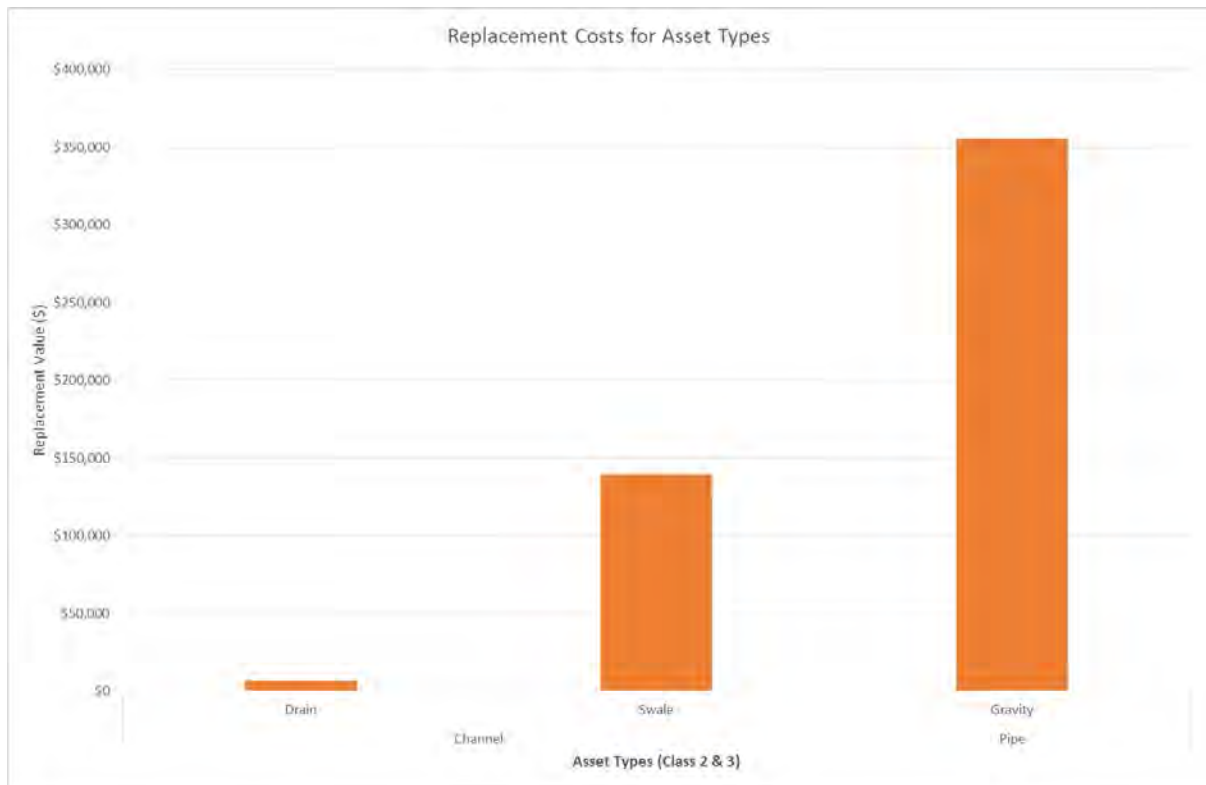


Figure 2-5 Replacement Costs for Castle Hill

2.12 Renewals

The renewal profile has been taken from the 2017 5 Waters Valuation. A graph showing the renewals for this scheme are shown by Figure 2-6 below. The majority of assets requiring renewal are culverts/pipes which occur in the period 2037-2040.

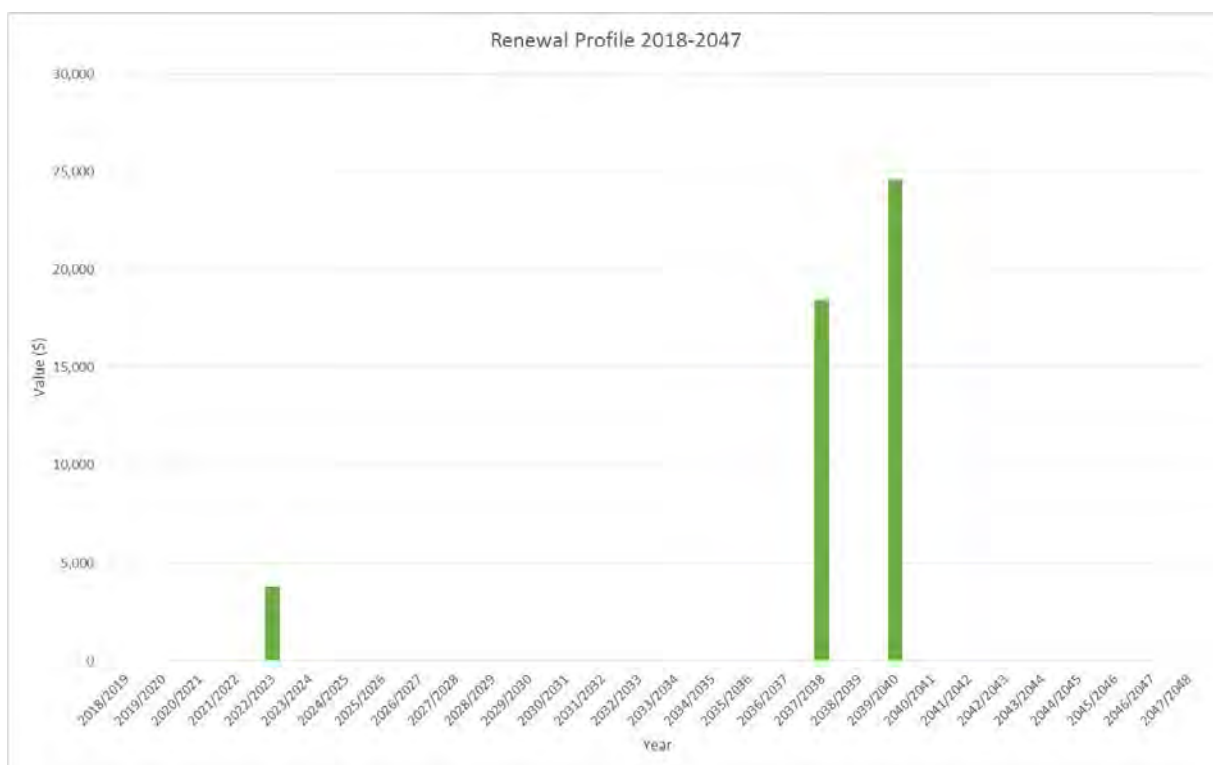


Figure 2-6 Castle Hill Stormwater Renewal Profile

2.13 Critical Assets

The criticality model for Castle Hill has been updated for the 2018 AcMP. The methodology of the criticality model can be found in 5Waters Activity Management Plan: Volume 1 and it provides details of how the criticality has been calculated for the reticulation assets. Table 2-6 and Figure 2-7 below shows the calculated criticality for all of the assets within this scheme that have a recorded known length.

Table 2-6 Length of Assets per Criticality Level

Criticality Bands		Length (m)
5	Low	5456
4	Medium-Low	0
3	Medium	136
2	Medium-High	0
1	High	0

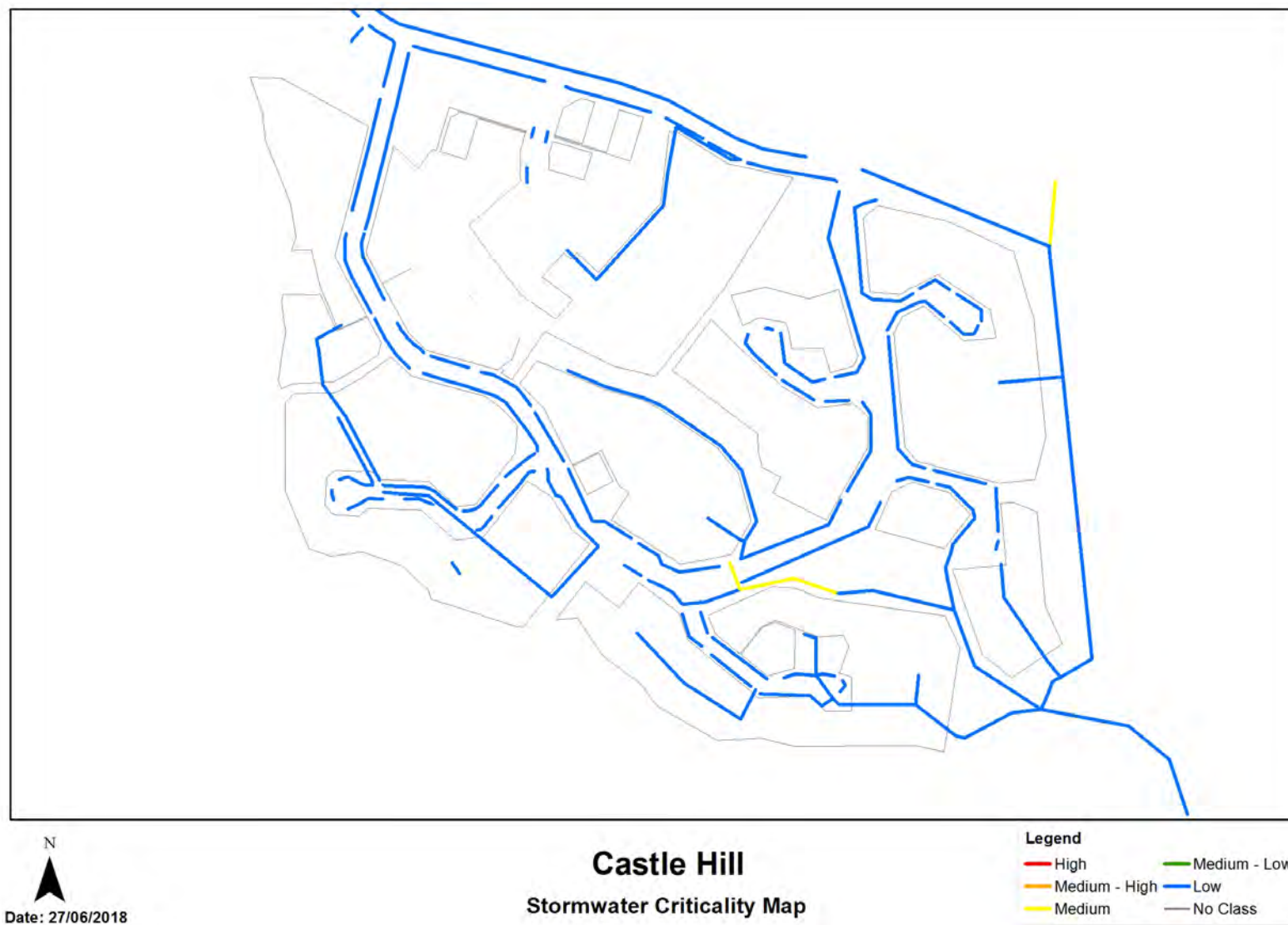


Figure 2-7 Criticality Map

2.14 Asset Condition

The asset condition model was run for Castle Hills 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.

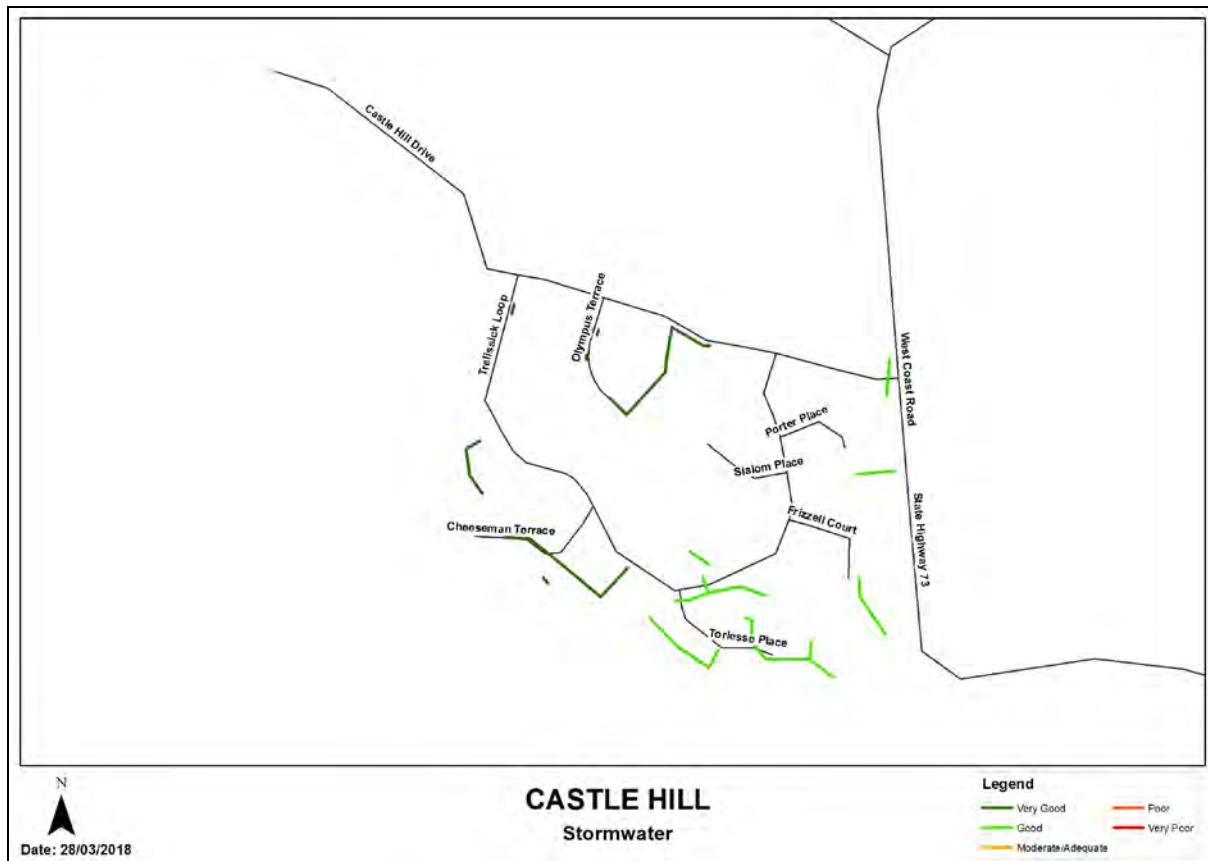


Figure 2-8 Asset Condition – Castle Hill

Table 2-7 provides a description of the condition rating used within the condition model.

Table 2-7 Asset Condition Grading

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

2.15 Funding Program

The 10 year budgets for Castle Hill are shown by Table 2-8 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 2-8 Castle Hill Budget Summary

Years	Expenditure	Renewals	Projects	Capital Projects
2018/2019	\$18,500			
2019/2020	\$14,000			
2020/2021	\$14,000			
2021/2022	\$14,000			
2022/2023	\$14,000	\$3,788		
2023/2024	\$14,000			
2024/2025	\$14,000			
2025/2026	\$14,000			
2026/2027	\$14,000			
2027/2028	\$14,000			
Total	\$144,500	\$3,788		

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.

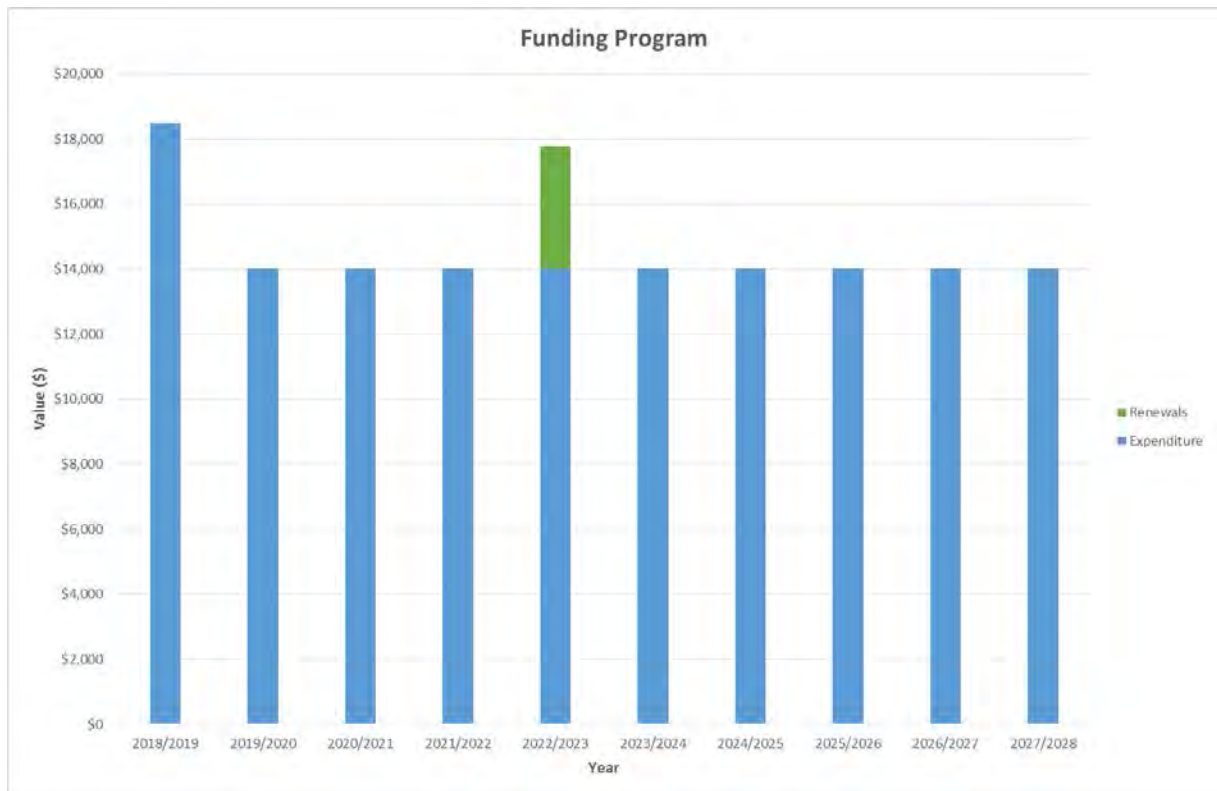


Figure 2-9 Castle Hill Funding Summary

There are no major projects for Castle Hill stormwater scheme in the LTP budget. The list of district wide projects can be found in 5Waters Activity Management Plan: Volume 1.

3.0 CLAREMONT STORMWATER SCHEME

3.1 Scheme Summary

Description		Quantity
Scheme Area		57.61ha
Scheme Coverage (as at 1 Jan 2018)	Rating numbers	58
System components	Piped (m)	N/A
	Swales (m)	3127
	Drains (m)	N/A
	Manholes/Inspection Chambers (No.)	N/A
	Treatment	N/A
	Other	N/A
Value (\$)	Replacement Cost	\$109,117.43
	Depreciated Replacement Cost	\$109,117.43
Financial	2018/2019 Estimate	\$315
	Annual maintenance cost	0.05%
	% of total	
Planning	Stormwater Management Plan	Yes
	No. SDC stormwater consents	1
Demand	Mean Annual Rainfall (mm)	643
	10% AEP (10 year) 1hr rainfall depth (mm)	19.6
Sustainability	Sustainable drain management practices	Adopted and Encouraged

3.2 Key Issues

There are no known issues associated with the Claremont Stormwater Scheme. A list of district wide issues are located in 5Waters Activity Management Plan: Volume 1.

3.3 Overview & History

Claremont is located on SH 1 near Templeton. Stormwater is disposed of to roadside soakholes. Soakholes are maintained by roading.



Figure 3-1 Scheme Map

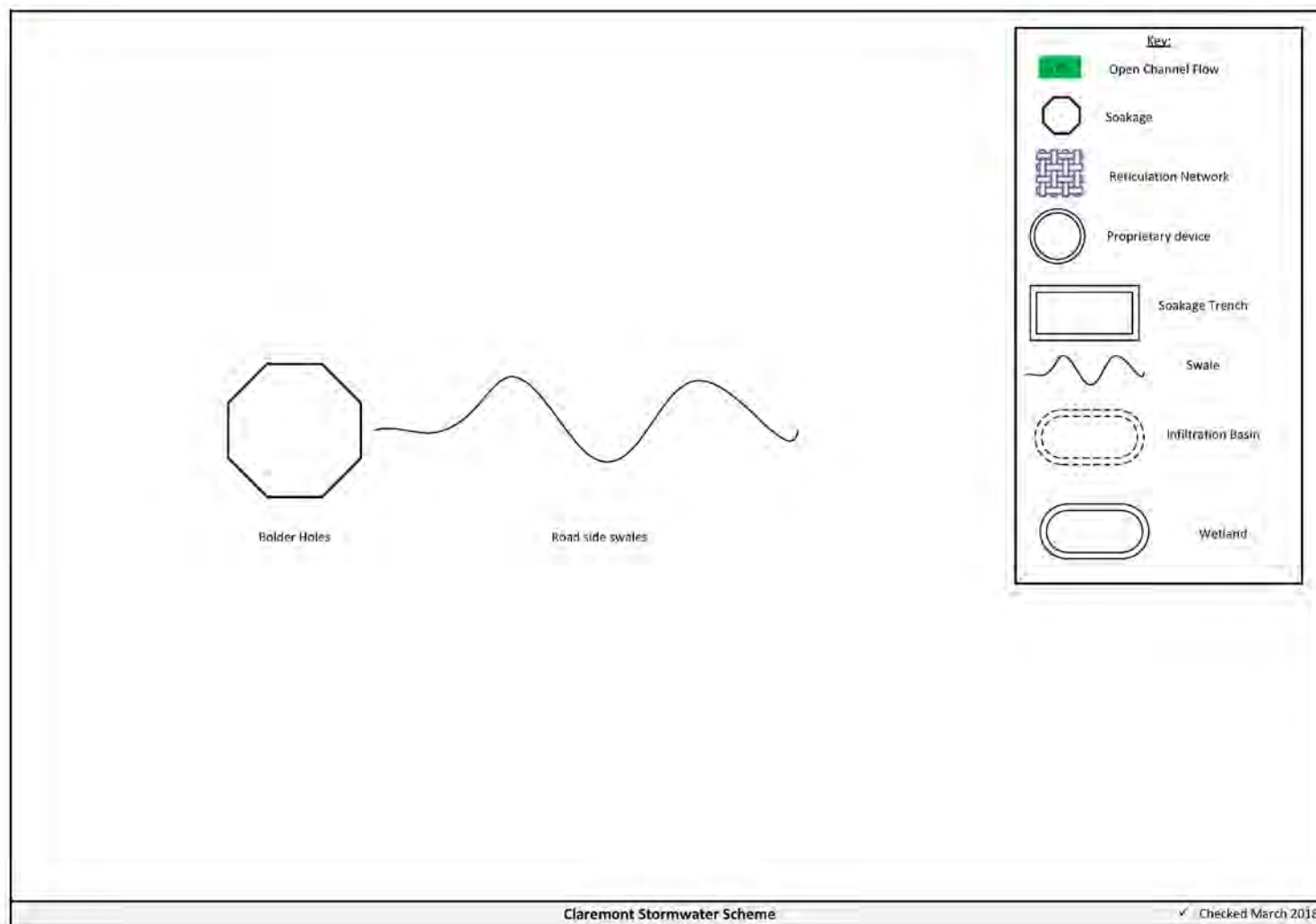


Figure 3-2 Scheme Schematic

3.4 Resource Consents

The Claremont stormwater scheme has a number of resource consents. Table 3-1 shows the stormwater discharge permitted by the resource consents for this scheme.

Table 3-1 Resource Consents

Consent	Description	Location	Date Issued	Expiry Date
CRC050844.1 <i>Issued - Active</i>	To discharge contaminants and water to land, for the purpose of discharging stormwater to land from hardstanding areas, roads and roofing from a residential development	Waterholes Road, TEMPLETON	19/08/2009	30/03/2040

3.5 Integrated Stormwater Management Plan

A global consent has been granted for Claremont (CRC050844.1).

3.6 Scheme Assets

Council has a wide variety of stormwater assets within the district. A brief description of the assets within this scheme is provided below:

- Swale (Grassed) – Is a longitudinal open channel which is lined with grass. The swale both conveys and treats stormwater.
- Soakholes – Are used to dispose of stormwater to ground in areas where the ground water table is low and soil permeability is high.

A summary of material and diameter for channels and pipes is not available for this scheme.

3.7 Operational Management

The stormwater network is operated and maintained under two maintenance contracts as follows:

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

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

3.8 Photos of Main Assets

There are no photos available for this scheme.

3.9 Rapid Flood Modelling

The Council has undertaken 'Rapid Flood Hazard Assessment' modelling for its main townships. The modelling uses DHI MIKE 21 to simulate rainfall on grid with the outputs processed through ArcGIS producing maps illustrating a range of flood depths during different rainfall intensities and durations.

The rapid flood assessment has been generated to provide a high level summary of potential flood and ponding areas across the district during extreme rainfall events. The results from this study are not to be used to set floor levels. The results have not been ground tested and therefore are indicative only.

For a 50 year event, Figure 3-3 shows the predicted flooding for Claremont.

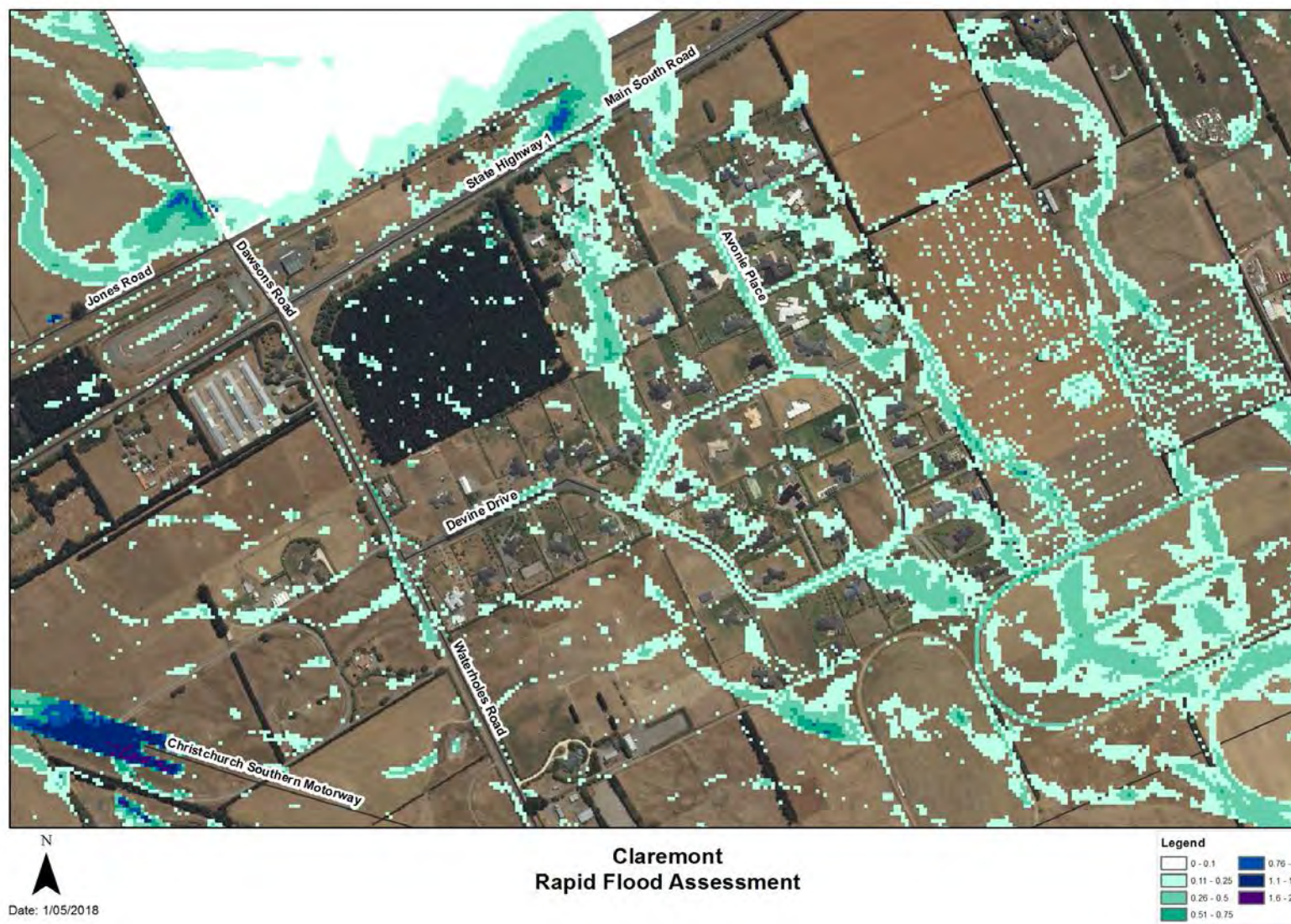


Figure 3-3 Rapid Flood Modelling, Claremont

3.10 Risk Assessment

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

Table 3-2 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 3-3 Risks - Claremont

Risk	Action/Project	Year Identified	2014 Risk Rating	2017 Risk Rating	Residual Risk Rating
Non-consented activities	Renewal of consents	2014	27	27	6

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

3.11 Asset Valuation Details

The total replacement value of assets within the Castle Hill Scheme is \$109,117 as detailed in Table 2-5 below. This scheme has swales as well as soakholes (or boulder pits) which belong to roading.

Table 3-4 Replacement Value, Castle Hill

Asset Class 1	Asset Class 2	Sum of Replacement Value
Stormwater Reticulation	Channel	\$109,117

3.12 Renewals

The renewal profile has been taken from the 2017 5 Waters Valuation. The majority of renewals occur within 2038/2039.



Figure 3-4 Claremont Renewal Profile

3.13 Critical Assets

The criticality model for Castle Hill has been updated for the 2018 AcMP. The methodology of the criticality model can be found in 5Waters Activity Management Plan: Volume 1 and it provides details of how the criticality has been calculated for the reticulation assets. Table 2-6 and Figure 2-7 below shows the calculated criticality for all of the assets within this scheme that have a recorded known length.

Table 3-5 Length of Assets per Criticality Level

Criticality Bands		Length (m)
5	Low	9,466
4	Medium-Low	877
3	Medium	495
2	Medium-High	0
1	High	34

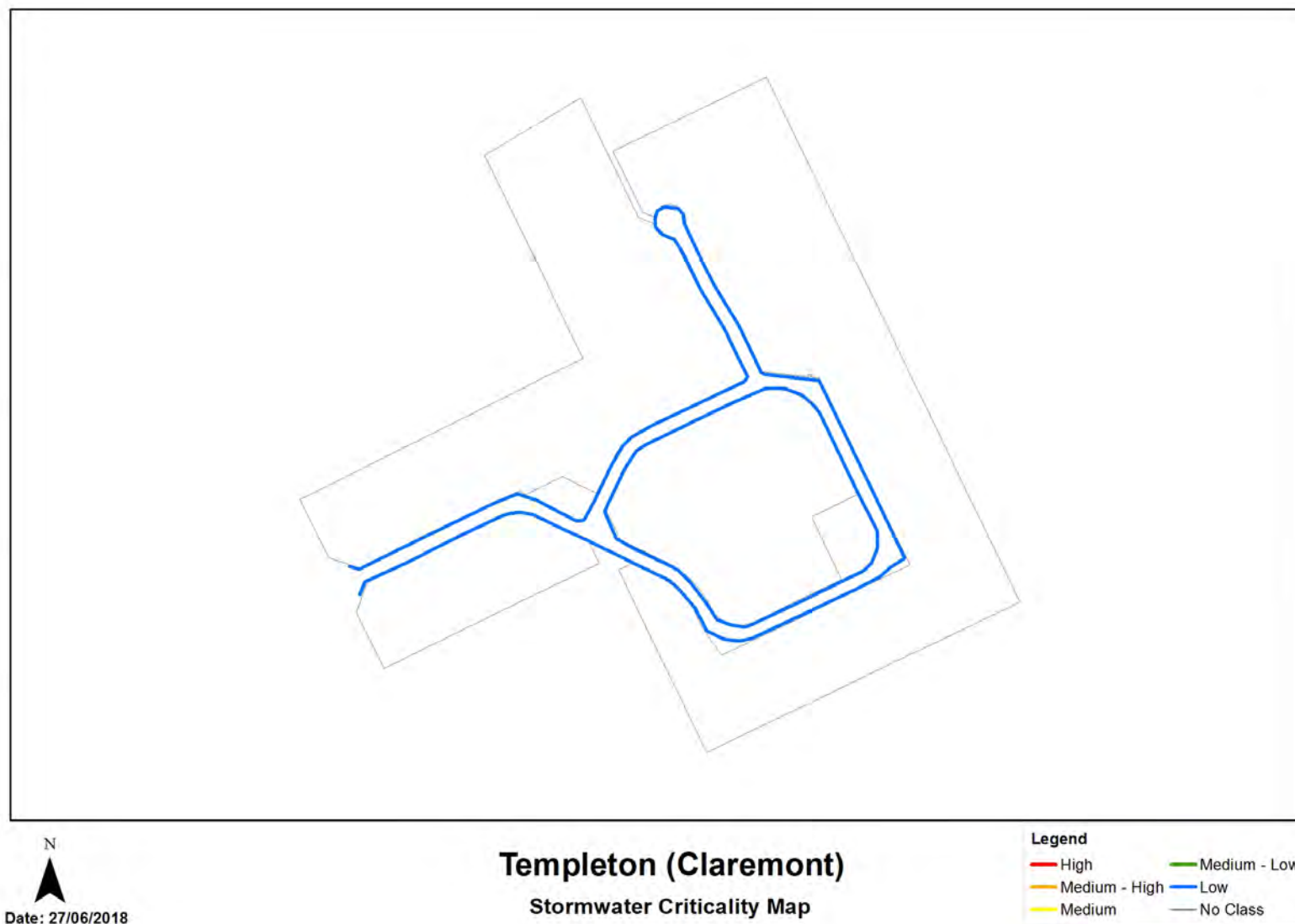


Figure 3-5 Criticality Map

3.14 Asset Condition

The asset condition model was run for Claremont in 2017. The methodology of the model can be found in 5Waters Activity Management Plan: Volume 1 and it provides details of how the model has been calculated for the reticulation assets (particularly pipes). Within this scheme there are no assets that have a recorded known condition.

3.15 Funding Program

The 10 year budgets for Claremont are shown by Table 3-6 and Figure 3-6. 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 3-6 Claremont Budget Summary

Years	Expenditure	Renewals	Projects	Capital Projects
2018/2019	\$315			
2019/2020	\$315			
2020/2021	\$315			
2021/2022	\$315			
2022/2023	\$315			
2023/2024	\$315			
2024/2025	\$315			
2025/2026	\$315			
2026/2027	\$315			
2027/2028	\$315			
Total	\$3,150			

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.

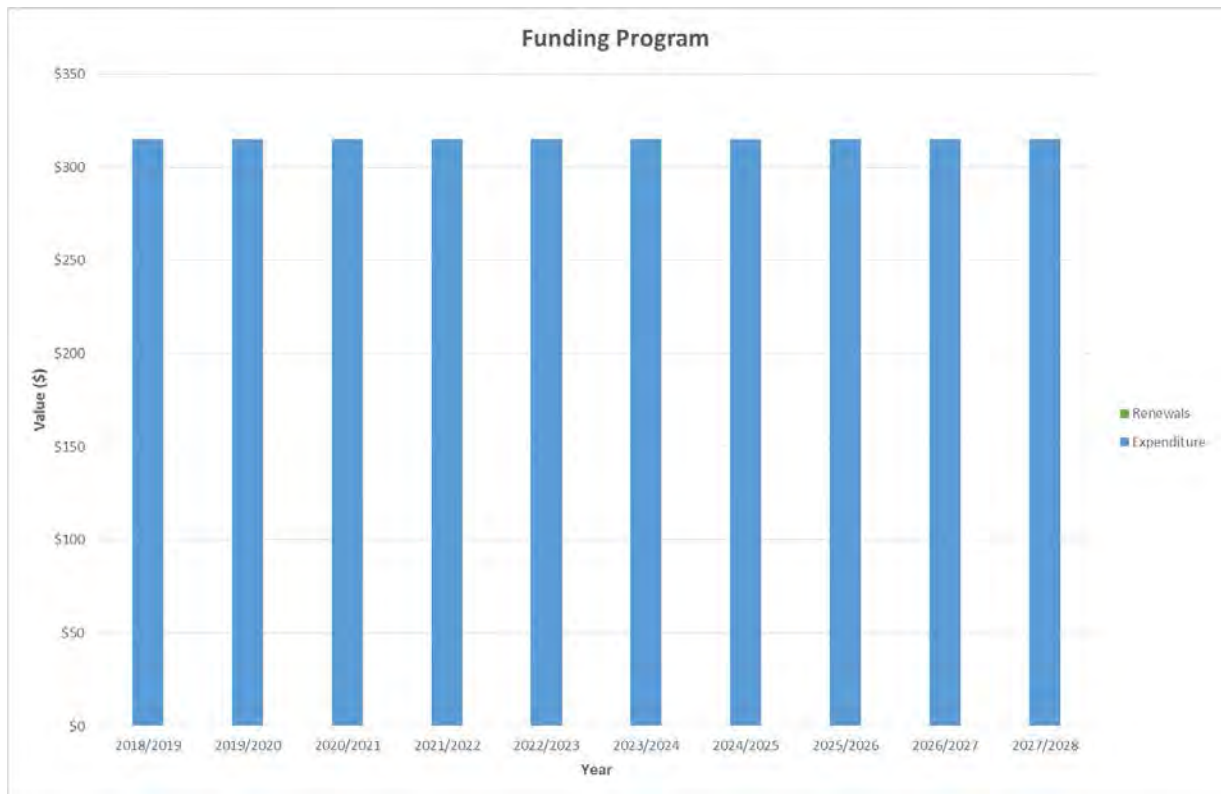


Figure 3-6 Claremont Funding Summary

There are no major projects for Claremont stormwater scheme in the LTP budget. The list of district wide projects can be found in 5Waters Activity Management Plan: Volume 1.

4.0 DARFIELD STORMWATER SCHEME

4.1 Scheme Summary

Description		Quantity
Scheme Area		540ha
Scheme Coverage (as at 1 Jan 2018)	Rating numbers	1061
System components	Piped (m)	467.5
	Swales (m)	8976.1
	Drains (m)	0
	Manholes/Inspection Chambers (No.)	6
	Treatment	1 Oil trap, 1 Humeceptor, 3 Basins
	Other	N/A
Value (\$)	Replacement Cost	\$573,654.69
	Depreciated Replacement Cost	\$543,561.20
Financial	2018/2019 Estimate	\$16,220
	Annual maintenance cost	2.32%
	% of total	
Planning	Stormwater Management Plan	Yes
	No. SDC stormwater consents	2
Demand	Mean Annual Rainfall (mm)	781
	10% AEP (10 year) 1hr rainfall depth (mm)	19.1
Sustainability	Sustainable drain management practices	Adopted and Encouraged

4.2 Key Issues

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

Table 4-1 Darfield Scheme Issues

What's the Problem	What we plan to do
Continued increase in demand on the stormwater network with new development.	Continue to plan for future growth through the SWMP for the township.

4.3 Overview & History

Darfield is located at the junction of West Coast and Bangor Roads. The older stormwater assets generally comprise of sumps discharging to soak pits. Stormwater assets within the newer developments incorporate swales which provide treatment prior to discharging to ground.

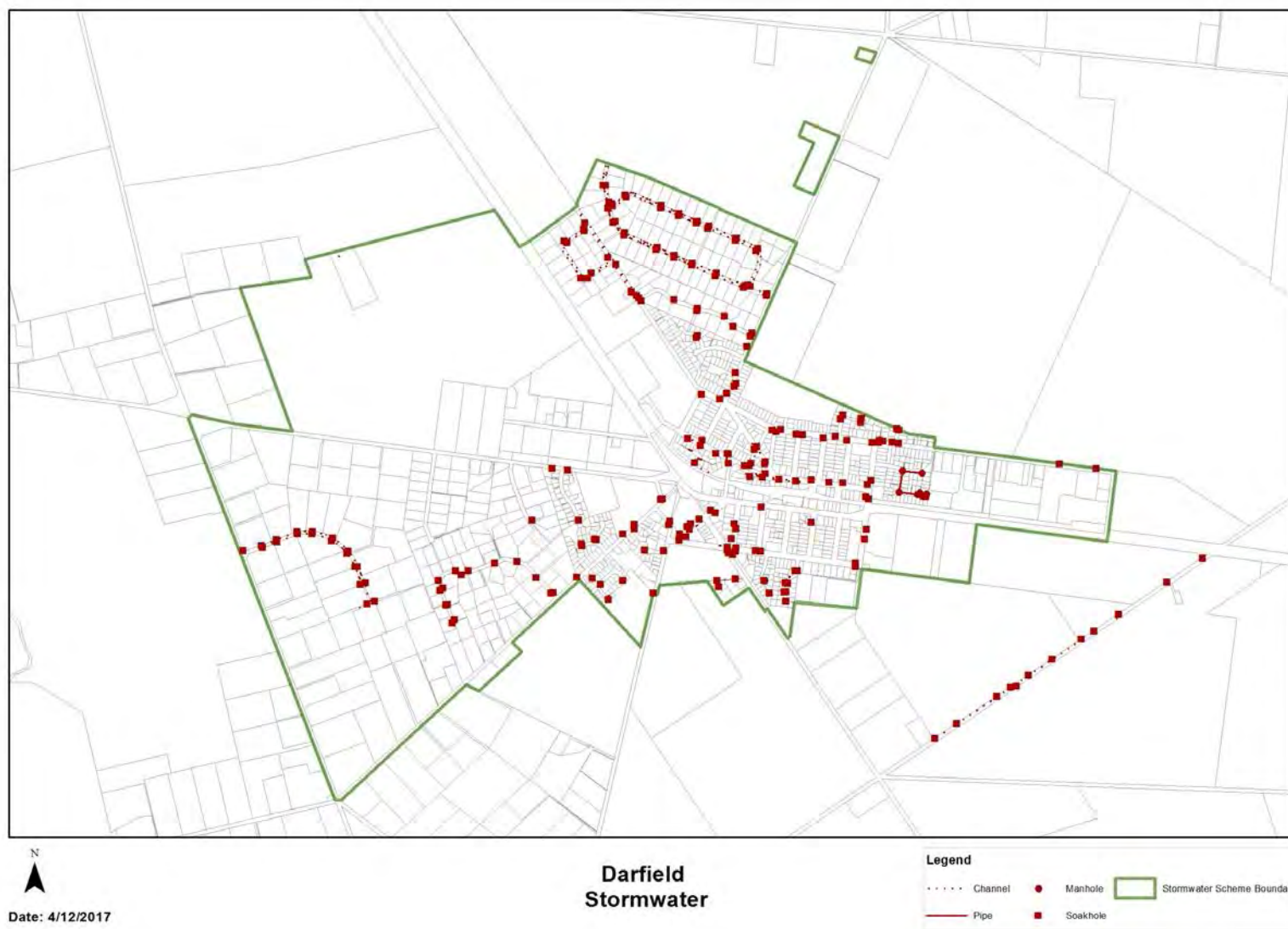


Figure 4-1 Scheme Map

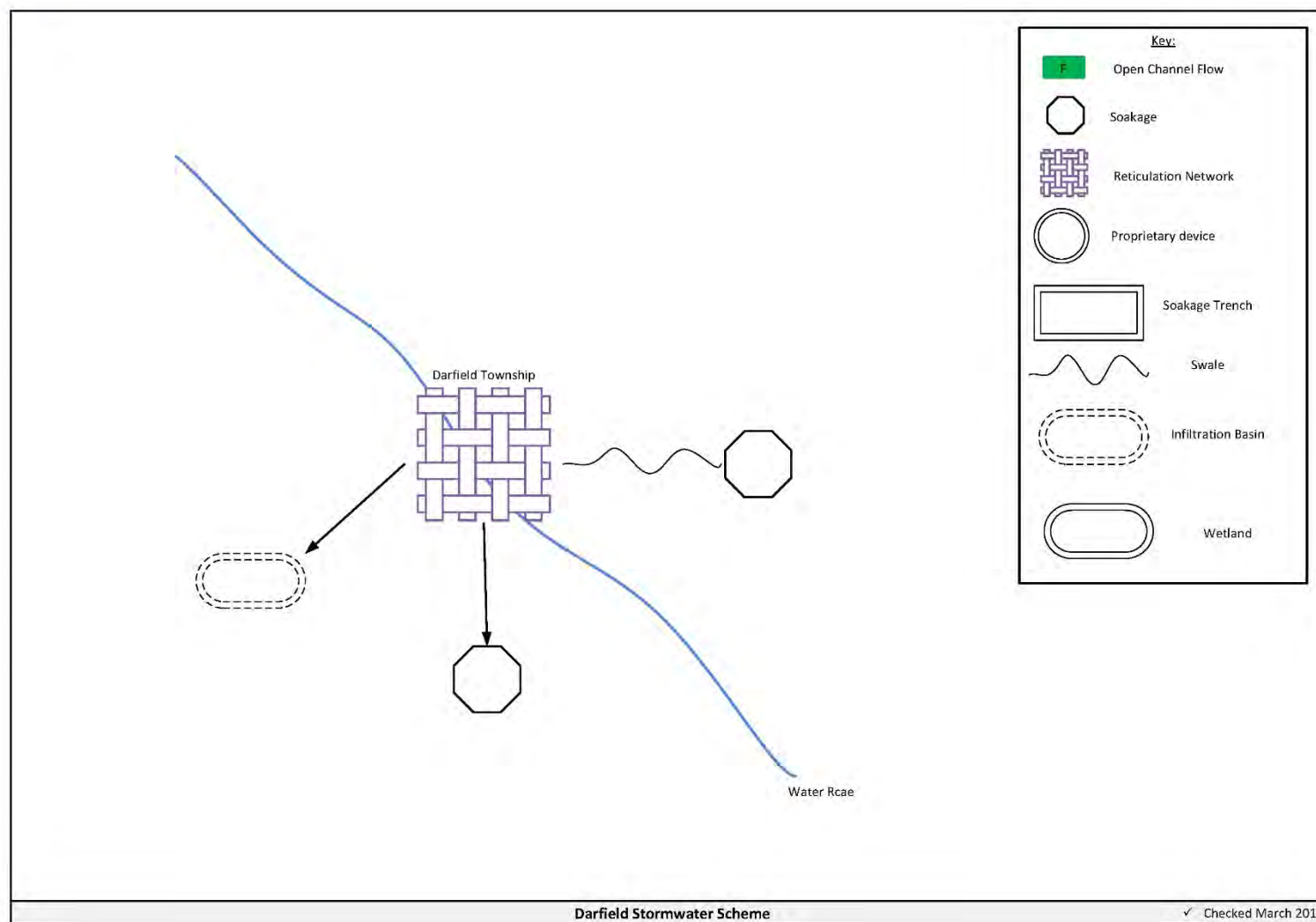


Figure 4-2 Scheme Schematic

4.4 Resource Consents

The Darfield stormwater scheme has a number of resource consents. Table 4-2 shows the stormwater discharge permitted by the resource consents for this scheme.

Table 4-2 Resource Consents

Consent	Description	Location	Date Issued	Expiry Date
CRC167465 <i>Issued - Active</i>	To discharge contaminants into and onto land	Darfield, Selwyn	12/04/2014	12/04/2052
CRC102282 <i>Issued - Active</i>	To discharge stormwater to ground.	Mathias street, DARFIELD		

Stonewood Holdings installed the stormwater basin off Mathias Street (named Darfield 3) in 2009. The basin was non-complying and Council has not to date (2018) accepted transfer of the consent CRC090559. Options were provided to Stonewood Holdings in February 2013.

4.5 Integrated Stormwater Management Plan

An ISMP has been granted for Darfield (CRC167465).

4.6 Scheme Assets

Council has a wide variety of stormwater assets within the district. A brief description of the assets within this scheme is provided below:

- Open drains – are channels used to convey stormwater. They are cost effective means to convey large volumes of water.
- Soakholes – Are used to dispose of stormwater to ground in areas where the ground water table is low and soil permeability is high.

A summary of material and diameter for channels and pipes, where known, is shown below in Figure 4-3 and Figure 4-4.

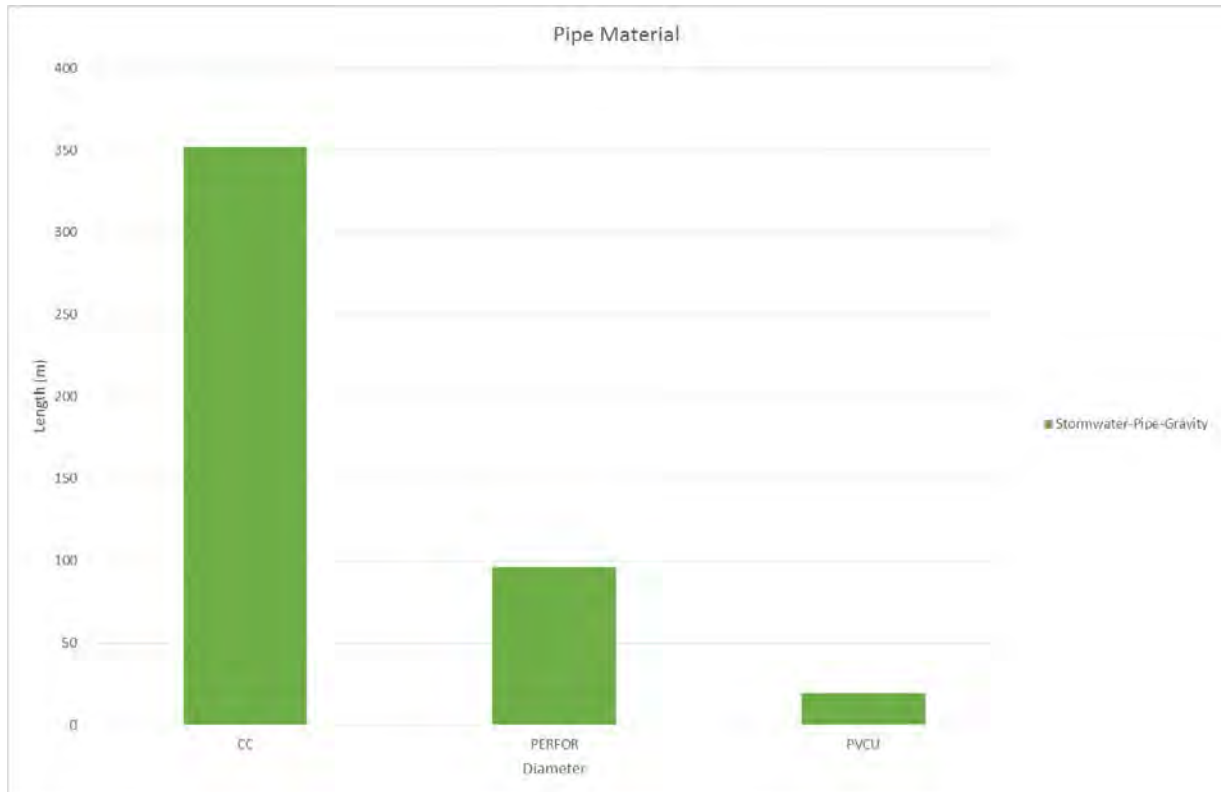


Figure 4-3 Pipe Material - Darfield

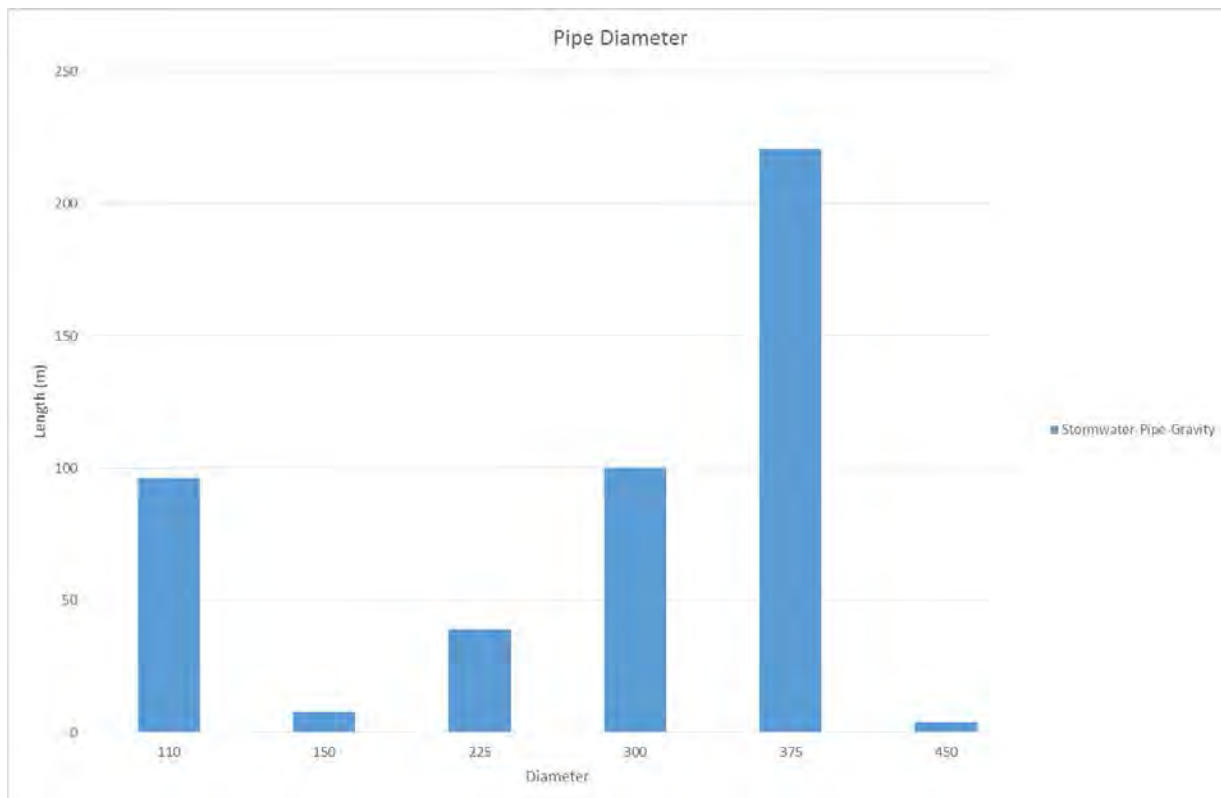


Figure 4-4 Pipe Diameter – Darfield

4.7 Operational Management

The stormwater network is operated and maintained under two maintenance contracts as follows:

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

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

4.8 Photos of Main Assets

The photos below provide a summary of the types of assets found within this stormwater management area.



Photo 1: Typical grassed swale

4.9 Rapid Flood Modelling

The Council has undertaken 'Rapid Flood Hazard Assessment' modelling for its main townships. The modelling uses DHI MIKE 21 to simulate rainfall on grid with the outputs processed through ArcGIS producing maps illustrating a range of flood deeps during different rainfall intensities and durations.

The rapid flood assessment has been generated to provide a high level summary of potential flood and ponding areas across the district during extreme rainfall events. The results from this study are not to be used to set floor levels. The results have not been ground tested and therefore are indicative only.

For a 50 year event, Figure 4-5 shows the predicted flooding for Darfield.

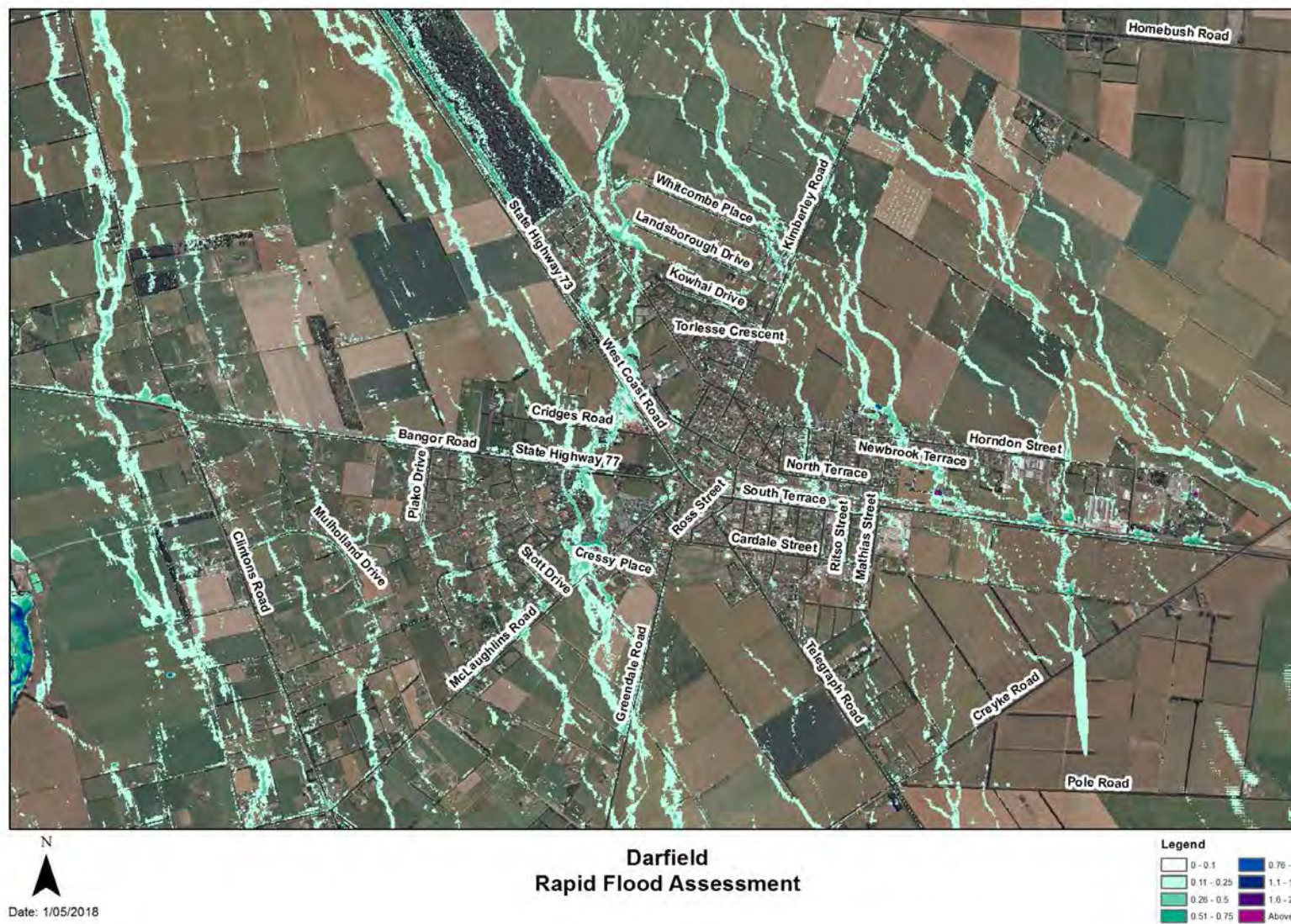


Figure 4-5 Rapid Flood Modelling, Darfield

4.10 Risk Assessment

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

Table 4-3 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 4-4 Risks – Darfield

Risk	Action/Project	Year Identified	2014 Risk Rating	2017 Risk Rating	Residual Risk Rating
Non-consented activities	Renewal of consents	2014	27	27	6

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

4.11 Asset Valuation Details

The total replacement value of assets within the Darfield Scheme is \$573,655 as detailed in Table 4-5 below. The majority of value, 50%, is made up of channels.

Table 4-5 Replacement Value, Darfield

Asset Class 1	Asset Class 2	Sum of Replacement Value
Stormwater Reticulation	Channel	\$285,568
	Inlet-Outlet-Point	\$1,271
	Management Device	\$72,063
	Manhole	\$47,750
	Pipe	\$159,427
	Soakhole	\$7,576

Replacement values for different types (channels, laterals, management devices and pipes) of stormwater assets are shown in Figure 4-6 below.

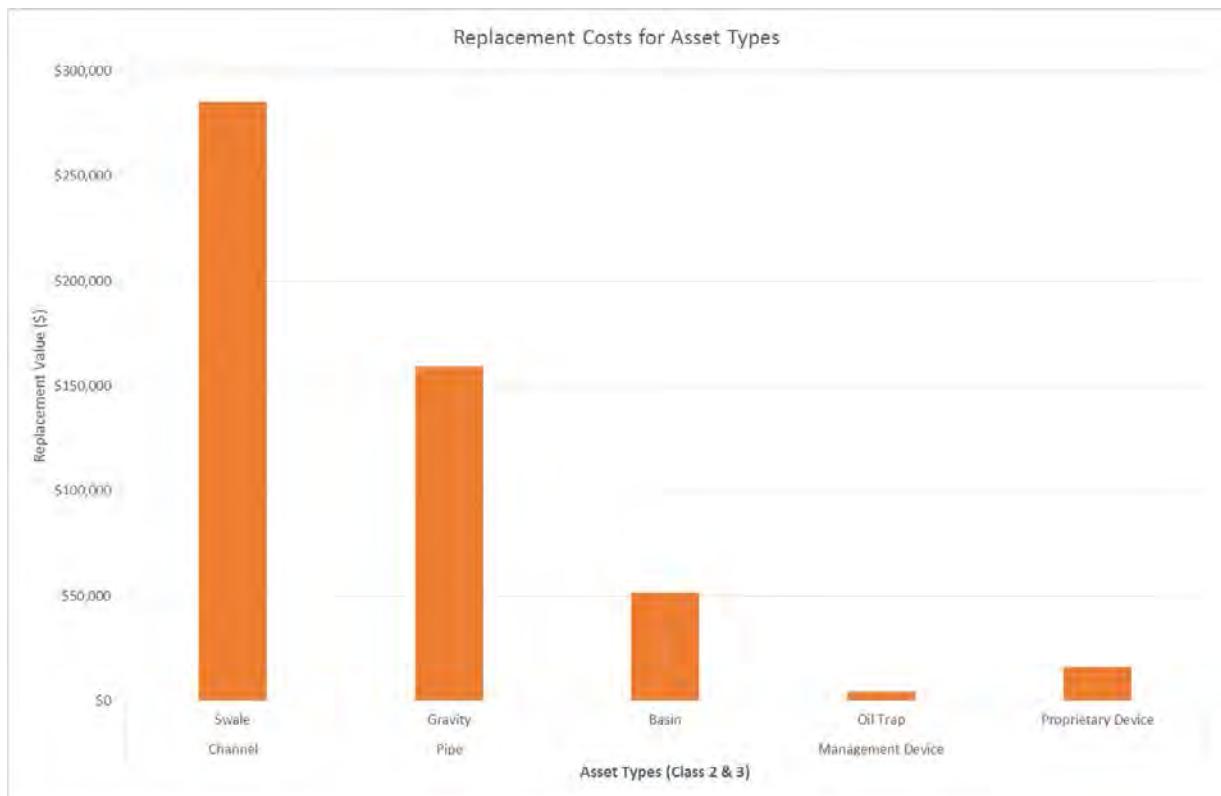


Figure 4-6 Replacement Costs for Darfield

4.12 Renewals

The renewal profile has been taken from the 2017 5 Waters Valuation. A graph showing the renewals for this scheme are shown by Figure 4-7 below. The majority of assets requiring renewal are culverts/pipes which occur in the period 2036-2041.



Figure 4-7 Darfield Stormwater Renewal Profile

4.13 Critical Assets

The criticality model for Darfield has been updated for the 2018 AcMP. The methodology of the criticality model can be found in 5Waters Activity Management Plan: Volume 1 and it provides details of how the criticality has been calculated for the reticulation assets. Table 4-6 and Figure 4-8 below shows the calculated criticality for all of the assets within this scheme that have a recorded known length.

Table 4-6 Length of Assets per Criticality Level

Criticality Bands		Length (m)
5	Low	9071
4	Medium-Low	222
3	Medium	4
2	Medium-High	0
1	High	0

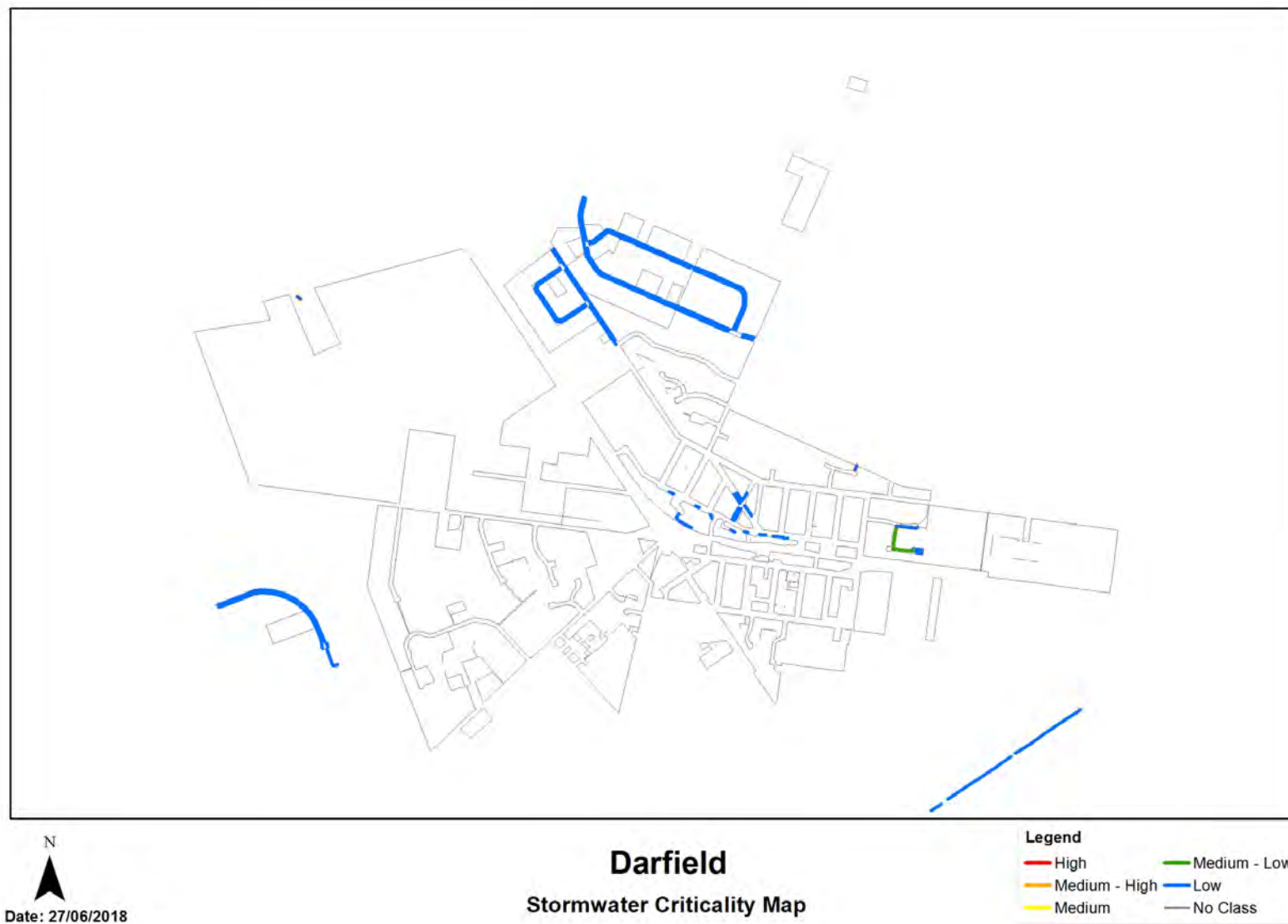


Figure 4-8 Criticality Map

4.14 Asset Condition

The asset condition model was run for Darfield in 2017. The methodology of the model can be found in 5Waters Activity Management Plan: Volume 1 and it provides details of how the model has been calculated for the reticulation assets (particularly pipes). Figure 4-9 below shows the level of asset condition for all of the assets within this scheme that have a recorded known condition.

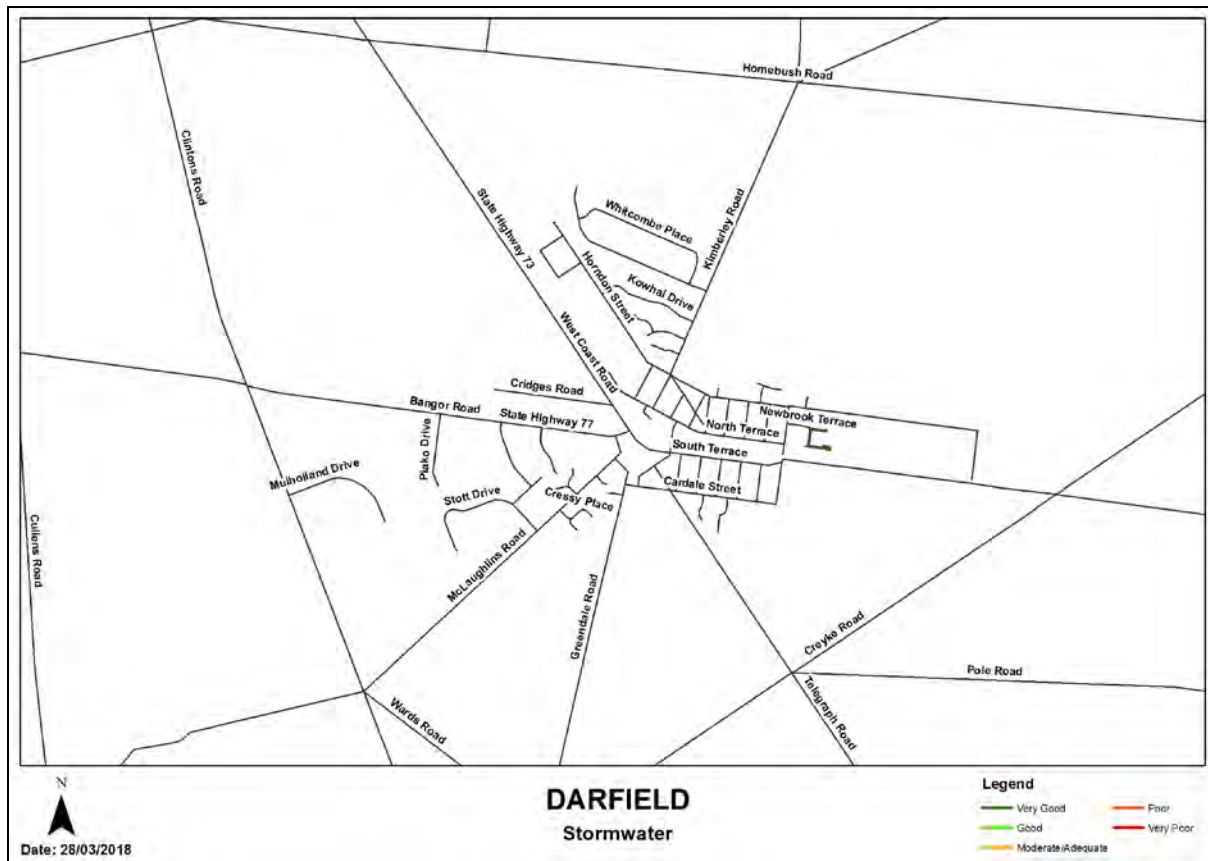


Figure 4-9 Asset Condition - Darfield

Table 4-7 provides a description of the condition rating used within the condition model.

Table 4-7 Asset Condition Grading

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

4.15 Funding Program

The 10 year budgets for Darfield are shown by Table 4-8 and Figure 4-10. Budgets are split into expenditure, renewals, projects and capital projects.

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

Table 4-8 Darfield Budget Summary

Years	Expenditure	Renewals	Projects	Capital Projects
2018/2019	\$16,220			
2019/2020	\$16,220	\$5,279		
2020/2021	\$16,220			
2021/2022	\$16,220			
2022/2023	\$16,220	\$3,788		
2023/2024	\$16,220			
2024/2025	\$16,220			
2025/2026	\$16,220			
2026/2027	\$16,220			
2027/2028	\$16,220			
Total	\$162,200	\$9,067		

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.

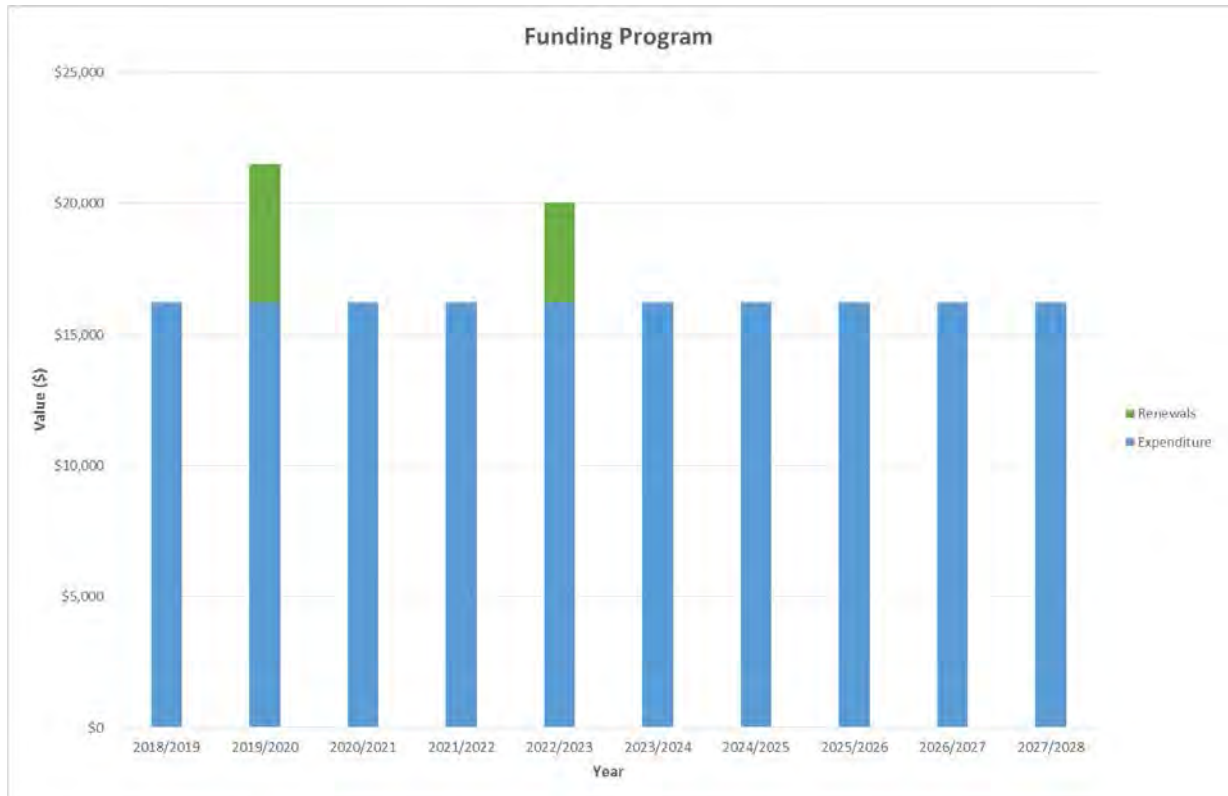


Figure 4-10 Darfield Funding Summary

There are no major projects for Darfield stormwater scheme in the LTP budget. The list of district wide projects can be found in 5Waters Activity Management Plan: Volume 1.

5.0 DOYLESTON STORMWATER SCHEME

5.1 Scheme Summary

Description		Quantity
Scheme Area		44.63ha
Scheme Coverage (as at 1 Jan 2018)	Rating numbers	118
System components	Piped (m)	1241.7
	Swales (m)	135.3
	Drains (m)	2173.87
	Manholes/Inspection Chambers (No.)	14
	Treatment	N/A
	Other	N/A
Value (\$)	Replacement Cost	\$647,141.44
	Depreciated Replacement Cost	\$568,052.96
Financial	2018/2019 Estimate	\$8,345
	Annual maintenance cost	1.19%
	% of total	
Planning	Stormwater Management Plan	Draft
	No. SDC stormwater consents	0
Demand	Mean Annual Rainfall (mm)	629
	10% AEP (10 year) 1hr rainfall depth (mm)	19.2
Sustainability	Sustainable drain management practices	Adopted and Encouraged

5.2 Key Issues

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

Table 5-1 Doyleston Scheme Issues

What's the Problem	What we plan to do
Flooding occurs in the township during heavy rainfall events with classified drains overtopping.	Continue to provide early warning of flooding events. Provide funding for minor upgrades to the network and agree in conjunction with the Community.
Increasing expectations from the community regarding level of service received from stormwater and drainage assets	Increase maintenance budgets to allow for additional maintenance particularly of open drains

5.3 Overview & History

Doyleston is located 2.5km northeast of Leeston. Stormwater runoff is typically conveyed by open channel or piped system to the '82 Drain Road North' land drainage drain. Stormwater runoff from the remaining catchment discharges to Boggy Creek on the northern boundary of the township.

Flooding has been known to occur during heavy rain when drain levels are high e.g. June 2013 when flooding of Greenan Place, Petticoat Lane and Railway Terrace occurred. The local volunteer fire service undertook sand bagging. A level transducer has been installed in the Osbornes Park Drain to provide flood warning. The alarm is mentioned by Sicon. The Swale in Greenan Place is influenced by the classified drain level. The swale underdrain has been repaired and water blasted. The swale is planned to be planted in 2013/14.

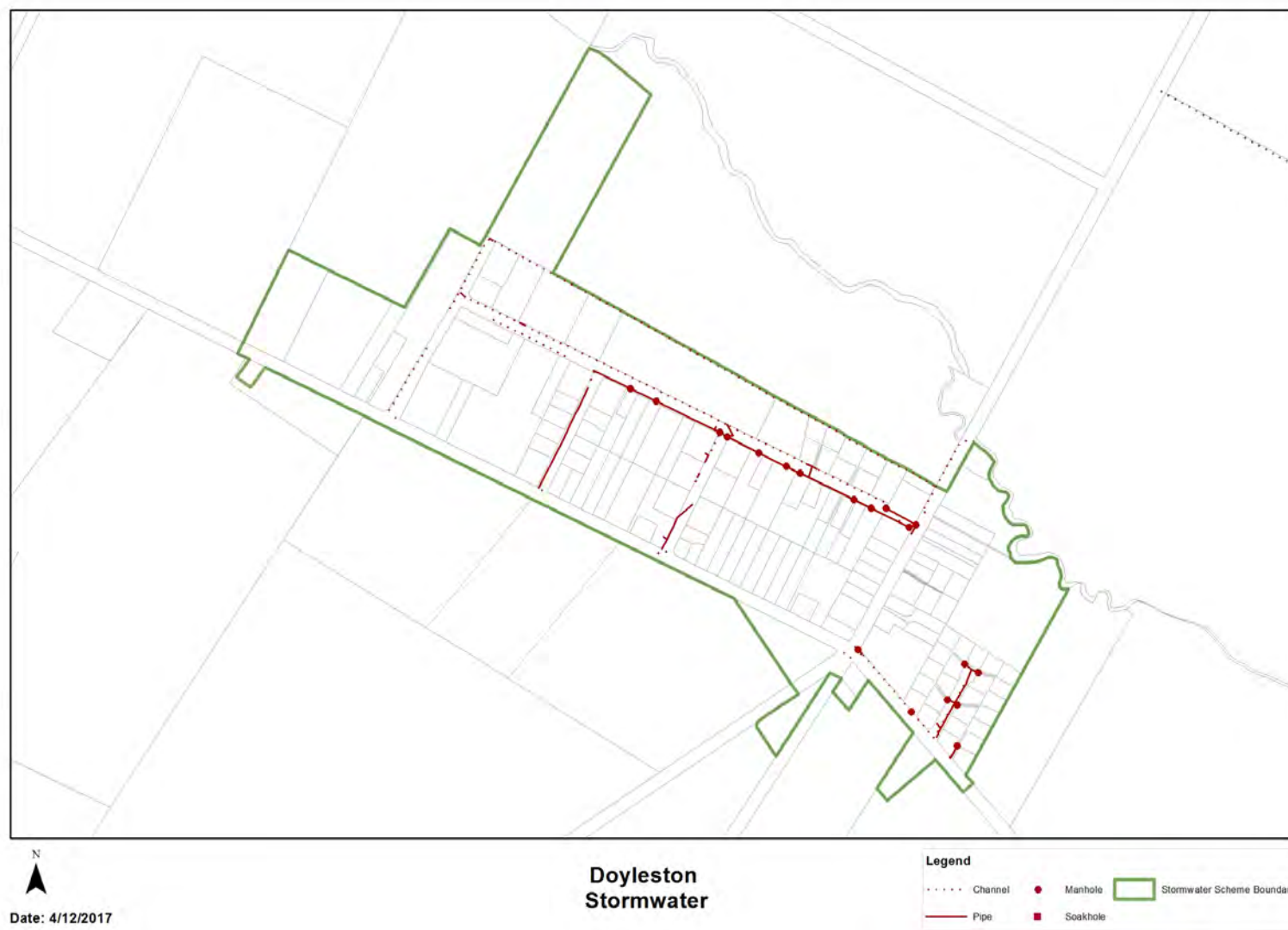


Figure 5-1 Scheme Map

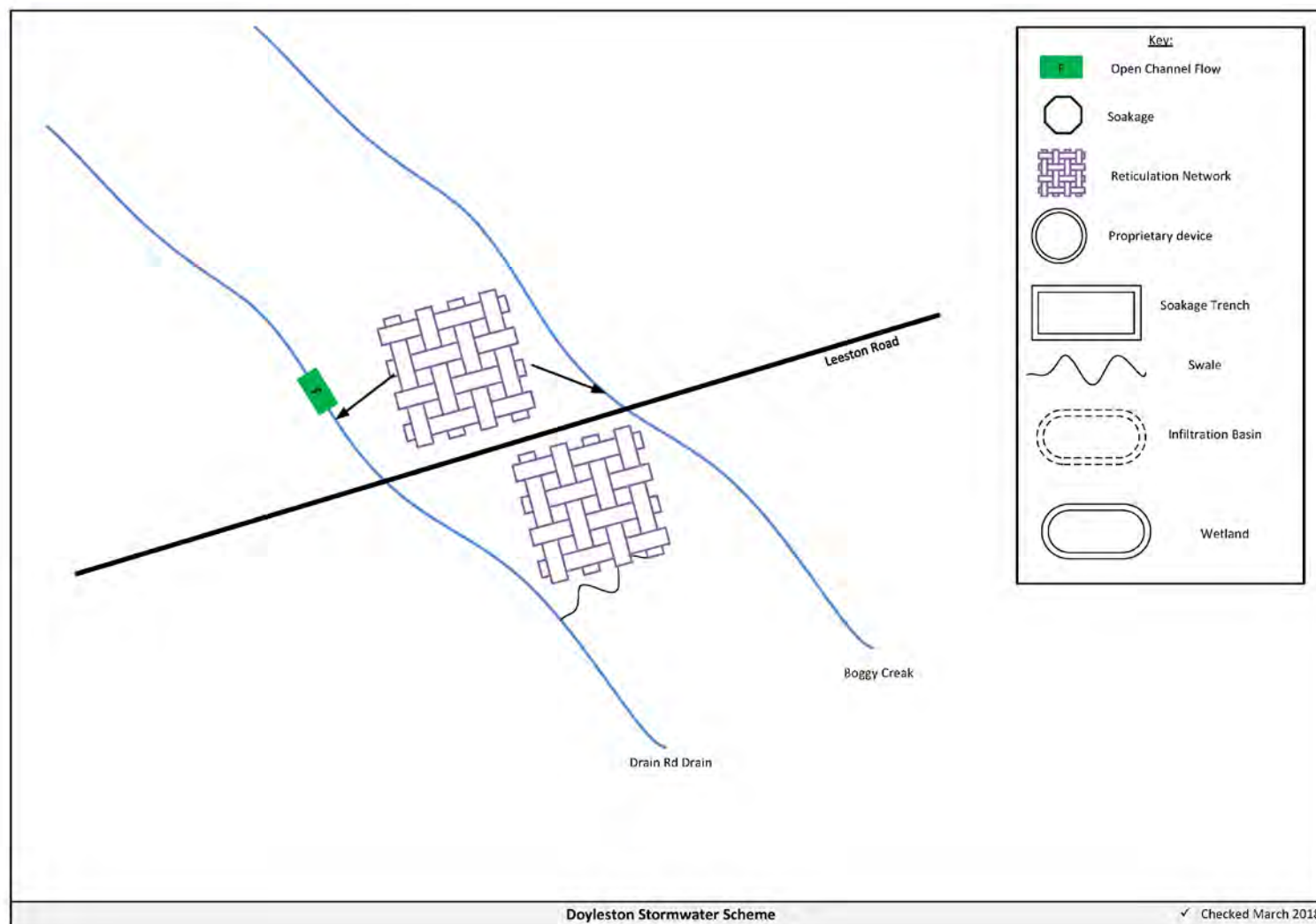


Figure 5-2 Scheme Schematic

5.4 Resource Consents

No resource consents are held by Selwyn District Council for this stormwater management area. Council will actively seek a global consent for this area.

Consent CRC063693 is currently held by Horncastle Homes Limited (the developer) and expires 27-Jul-2041.

5.5 Integrated Stormwater Management Plan

Environment Canterbury's Natural Resources Regional Plan (NRRP) became operative on the 11th June 2011. The plan requires that all non-permitted stormwater discharges have consent application lodged by 11th December 2011 under rules WQL6 and 7 or June 2016 under rule WQL8. Due to the tight timeframes (6 months) under rules WQL 6 and 7 it is proposed to obtain consents under rule WQL8. Under the Provisional Land and Water Regional Plan (PLWRG), the deadline for obtaining network discharge consents to allow discharges to be permitted under rule 5.93 has been extended to June 2018.

An ISMP is required for Doyleston, these application documents are still being developed and will be lodged before June 2018.

5.6 Scheme Assets

Council has a wide variety of stormwater assets within the district. A brief description of the assets within this scheme is provided below:

- a. Swale (Grassed) – Is a longitudinal open channel which is lined with grass. The swale both conveys and treats stormwater.
- b. Swale (Wetland) – Is a longitudinal open channel which is lined with wetland plant species. The swale both conveys and treats stormwater and is particularly useful in areas with high groundwater tables.
- c. Reticulated network – Includes pipes, manholes, sumps. The primary purpose of the reticulated network is to collect and convey stormwater. Historically these systems were designed for the 2 year storm event. Today's engineering standards require the piped network to be designed for a 10 year event with overland flow provision for up to the 50 year event.

A summary of material and diameter for channels and pipes, where known, is shown below in Figure 5-3 and Figure 5-4.

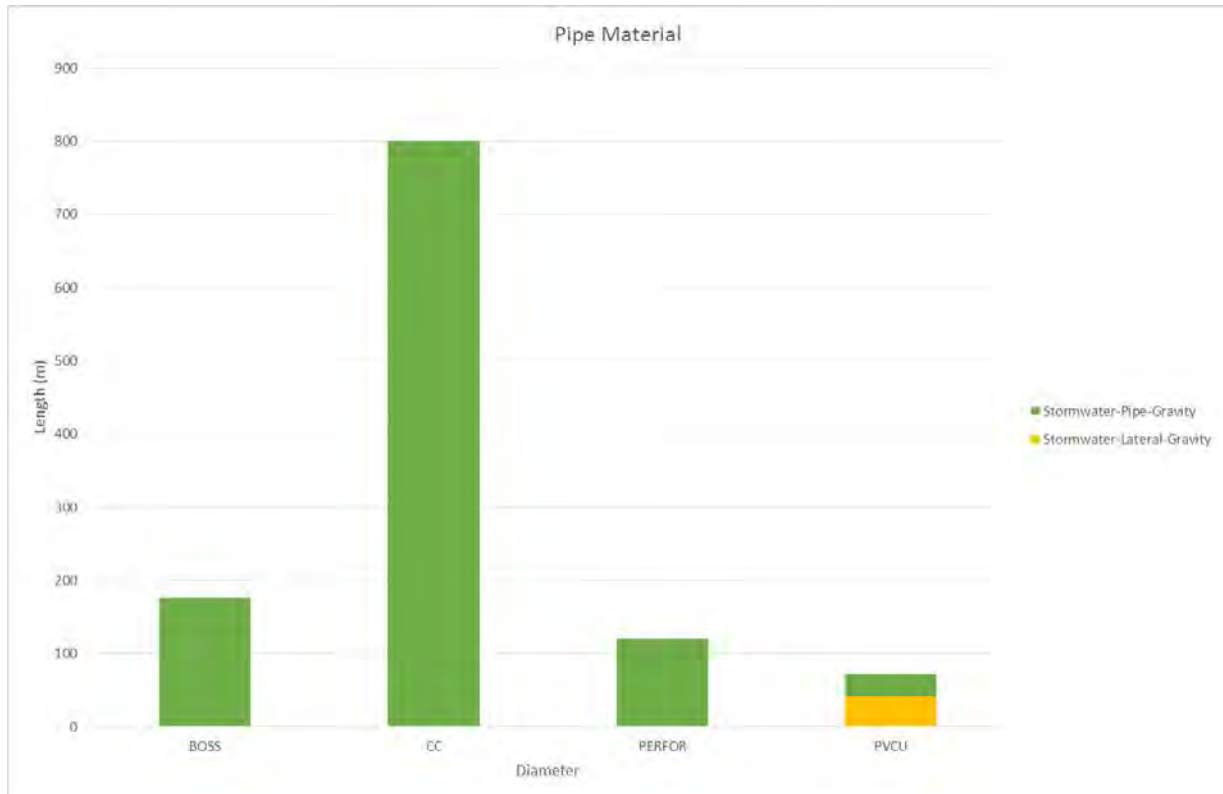


Figure 5-3 Pipe Material - Doyleston

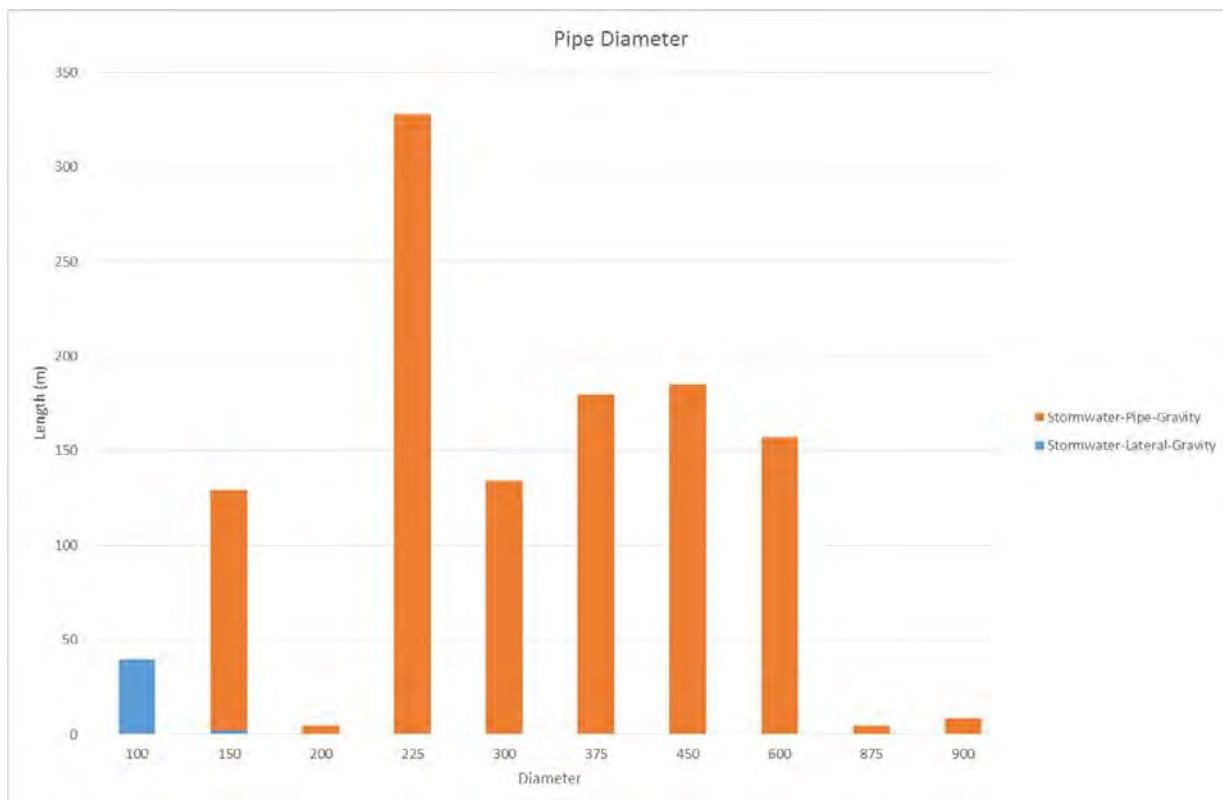


Figure 5-4 Pipe Diameter – Doyleston

5.7 Operational Management

The stormwater network is operated and maintained under two maintenance contracts as follows:

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

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

5.8 Photos of Main Assets

The photos below provide a summary of the types of assets found within this stormwater management area.



Photo 1: Typical swale after light rain

5.9 Rapid Flood Modelling

The Council has undertaken 'Rapid Flood Hazard Assessment' modelling for its main townships. The modelling uses DHI MIKE 21 to simulate rainfall on grid with the outputs processed through ArcGIS producing maps illustrating a range of flood deeps during different rainfall intensities and durations.

The rapid flood assessment has been generated to provide a high level summary of potential flood and ponding areas across the district during extreme rainfall events. The results from this study are not to be used to set floor levels. The results have not been ground tested and therefore are indicative only.

For a 50 year event, Figure 5-5 shows the predicted flooding for Doyleston.

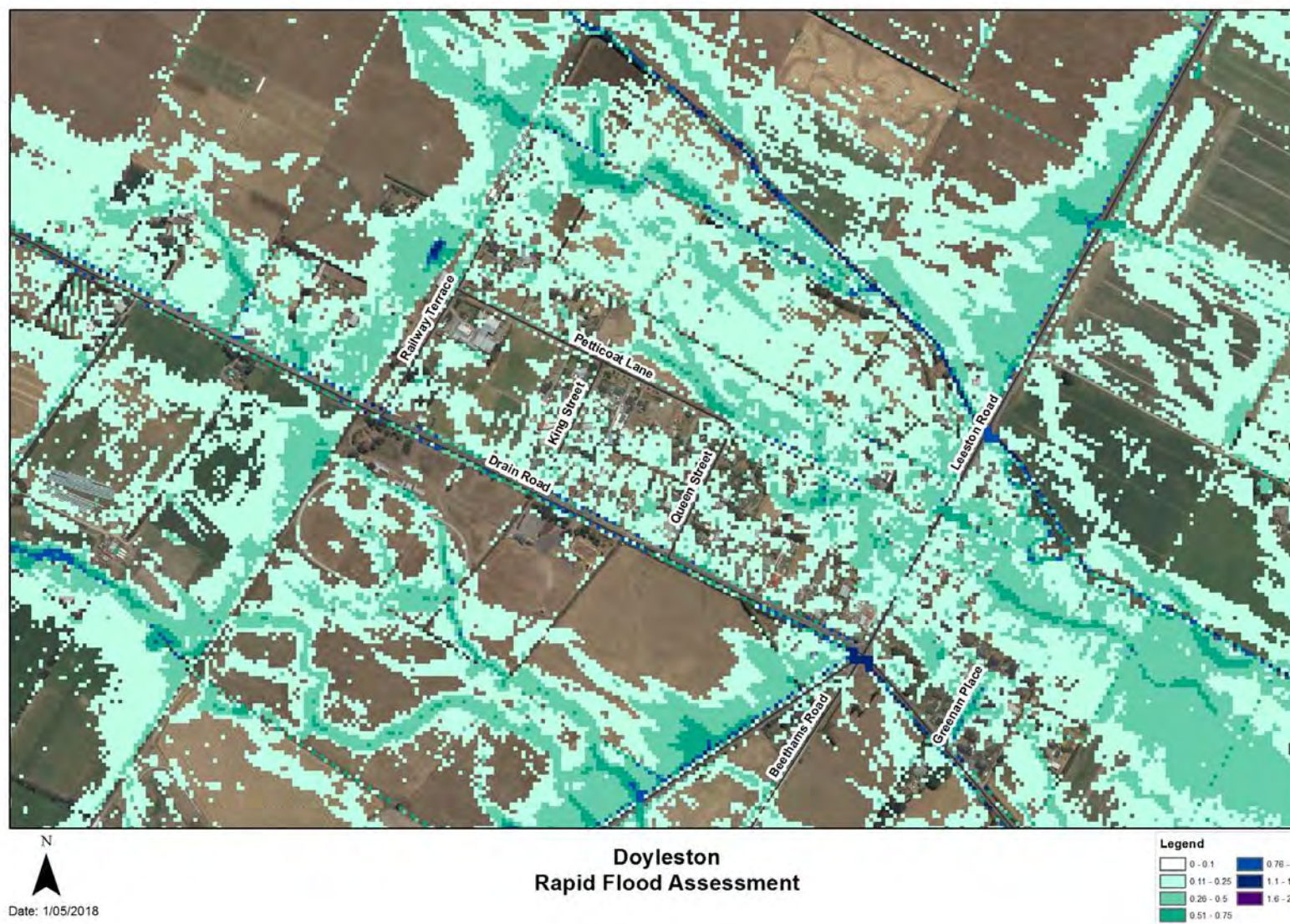


Figure 5-5 Rapid Flood Modelling, Doyleston

5.10 Risk Assessment

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

Table 5-2 Risk Priority Rating

Risk Score	Level of Risk	Risk Response
> 50	Extreme	Awareness of the event to be reported to Council. 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 5-3 Risks – Doyleston

Risk	Action/Project	Year Identified	2014 Risk Rating	2017 Risk Rating	Residual Risk Rating
Major flooding	Review options to reduce flooding	2014	10	10	10
Non-consented activities	Renewal of consents	2014	27	27	6
Major flooding	Upgrades	2017		9	4
Stormwater management	Stormwater management plan	2017		6	2.1

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

5.11 Asset Valuation Details

The total replacement value of assets within the Doyleston Scheme is \$647,141 as detailed in Table 5-4 below. The majority of value, 69%, is made up of pipes.

Table 5-4 Replacement Value, Doyleston

Asset Class 1	Asset Class 2	Sum of Replacement Value
Stormwater Reticulation	Channel	\$103,704

	Inlet-Outlet-Point	\$27,961
	Lateral	\$14,560
	Manhole	\$53,610
	Pipe	\$447,307

Replacement values for different types (channels, laterals, management devices and pipes) of stormwater assets are shown in Table 5-7 below.

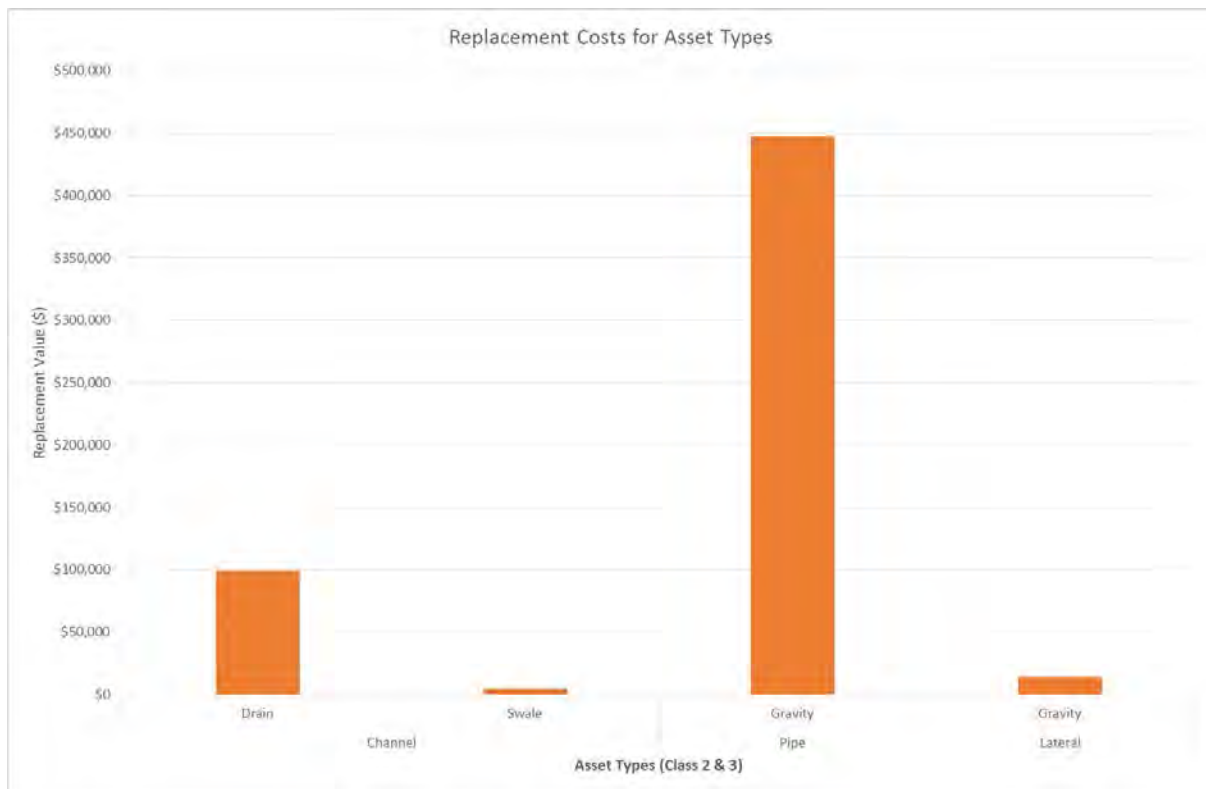


Figure 5-6 Replacement Costs for Doyleston

5.12 Renewals

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

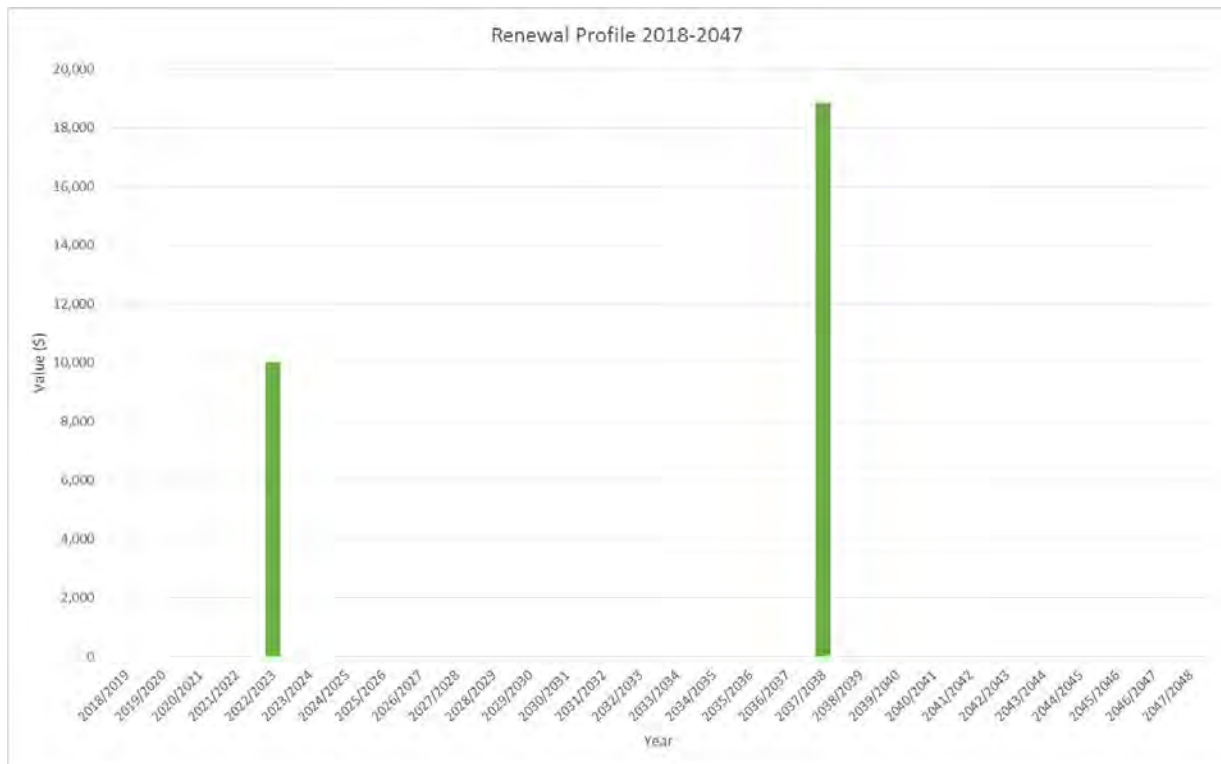


Figure 5-7 Doyleston Stormwater Renewal Profile

5.13 Critical Assets

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

Table 5-5 Length of Assets per Criticality Level

Criticality Bands		Length (m)
5	Low	2939
4	Medium-Low	180
3	Medium	334
2	Medium-High	13
1	High	0

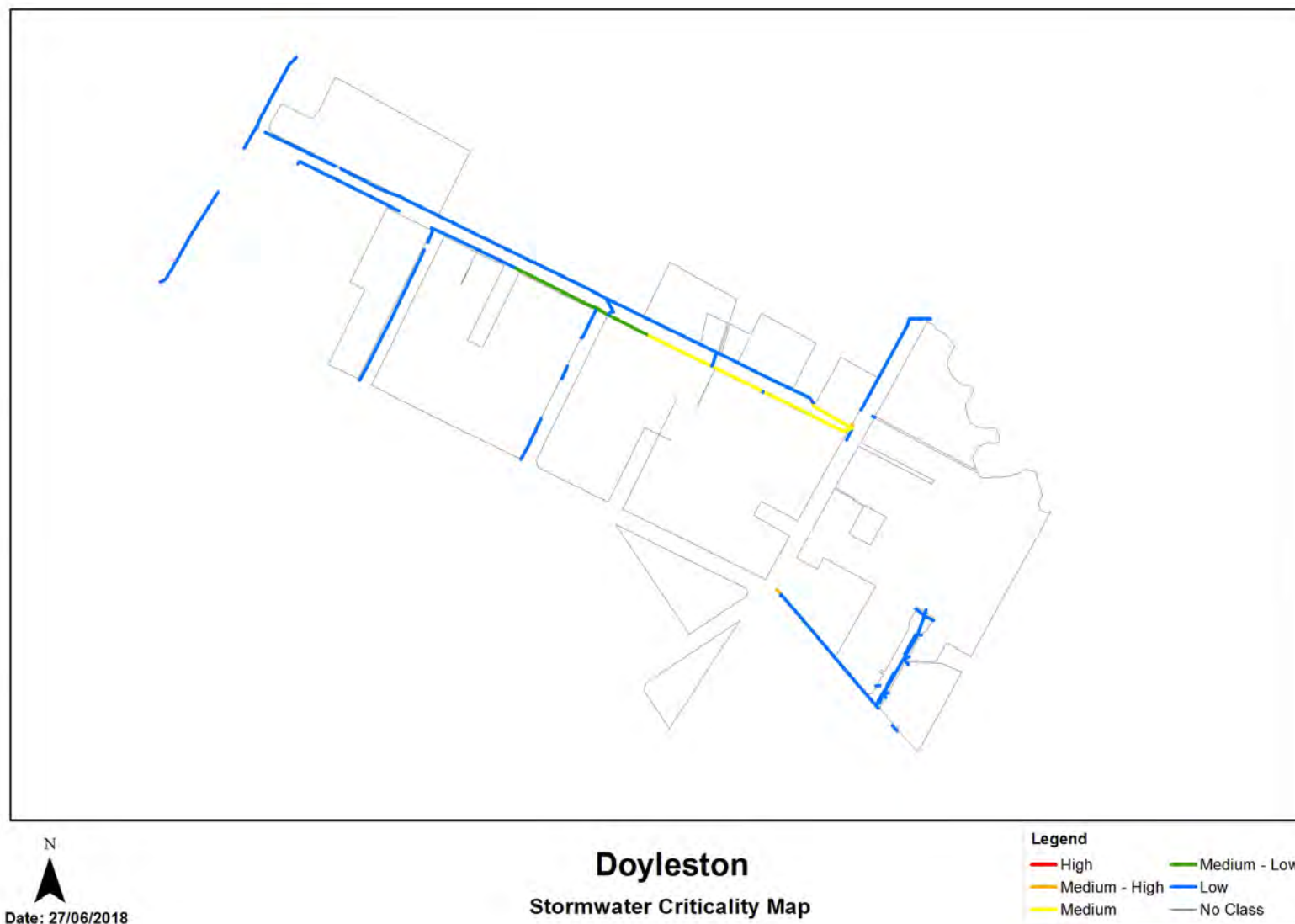


Figure 5-8 Criticality Map

5.14 Asset Condition

The asset condition model was run for Doyleston in 2017. The methodology of the model can be found in 5Waters Activity Management Plan: Volume 1 and it provides details of how the model has been calculated for the reticulation assets (particularly pipes). Figure 5-9 below shows the level of asset condition for all of the assets within this scheme that have a recorded known condition.

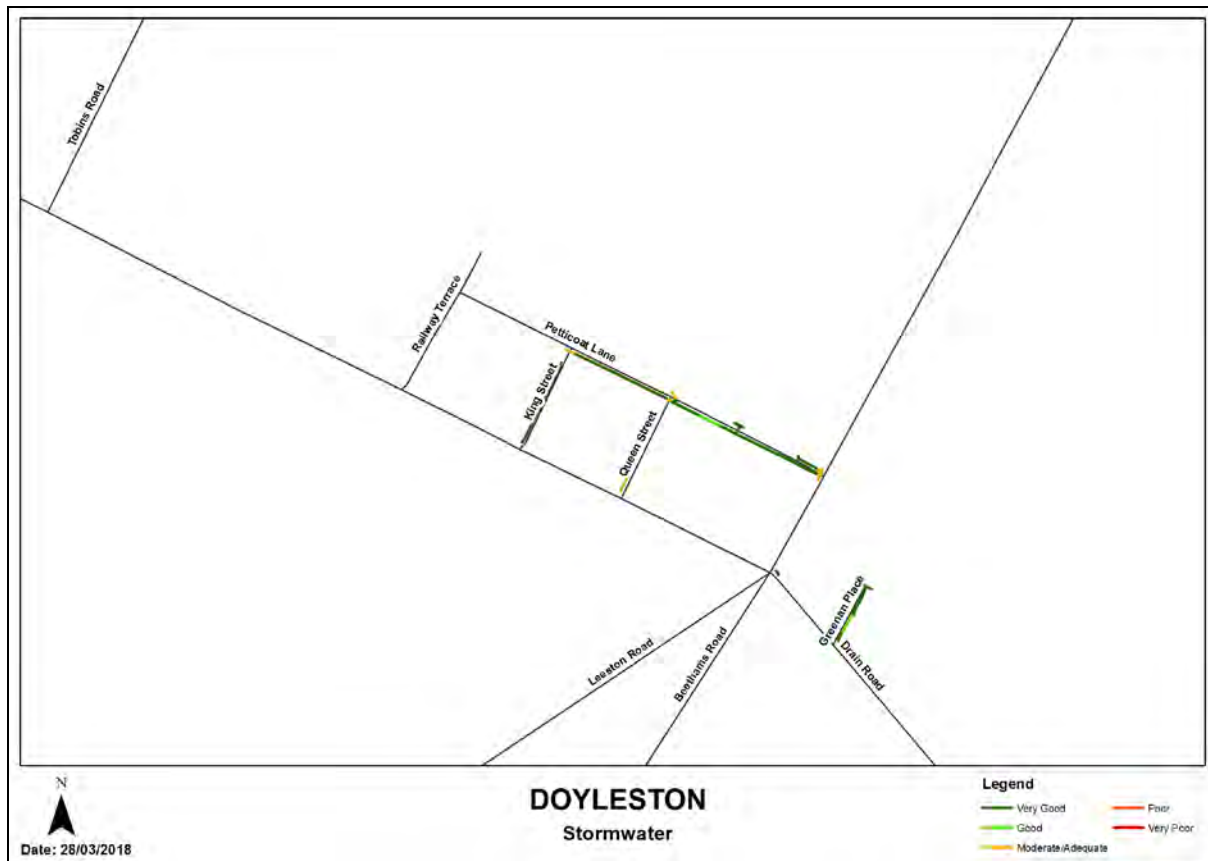


Figure 5-9 Asset Condition - Doyleston

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

Table 5-6 Asset Condition Grading

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

5.15 Funding Program

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

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

Table 5-7 Doyleston Budget Summary

Years	Expenditure	Renewals	Projects	Capital Projects
2018/2019	\$8,345		\$20,000	\$54,000
2019/2020	\$4,045			\$25,000
2020/2021	\$4,045			
2021/2022	\$4,045			
2022/2023	\$4,045	\$10,030		
2023/2024	\$4,045			
2024/2025	\$4,045			
2025/2026	\$4,045			
2026/2027	\$4,045			
2027/2028	\$4,045			
Total	\$44,750	\$10,030	\$20,000	\$79,000

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.

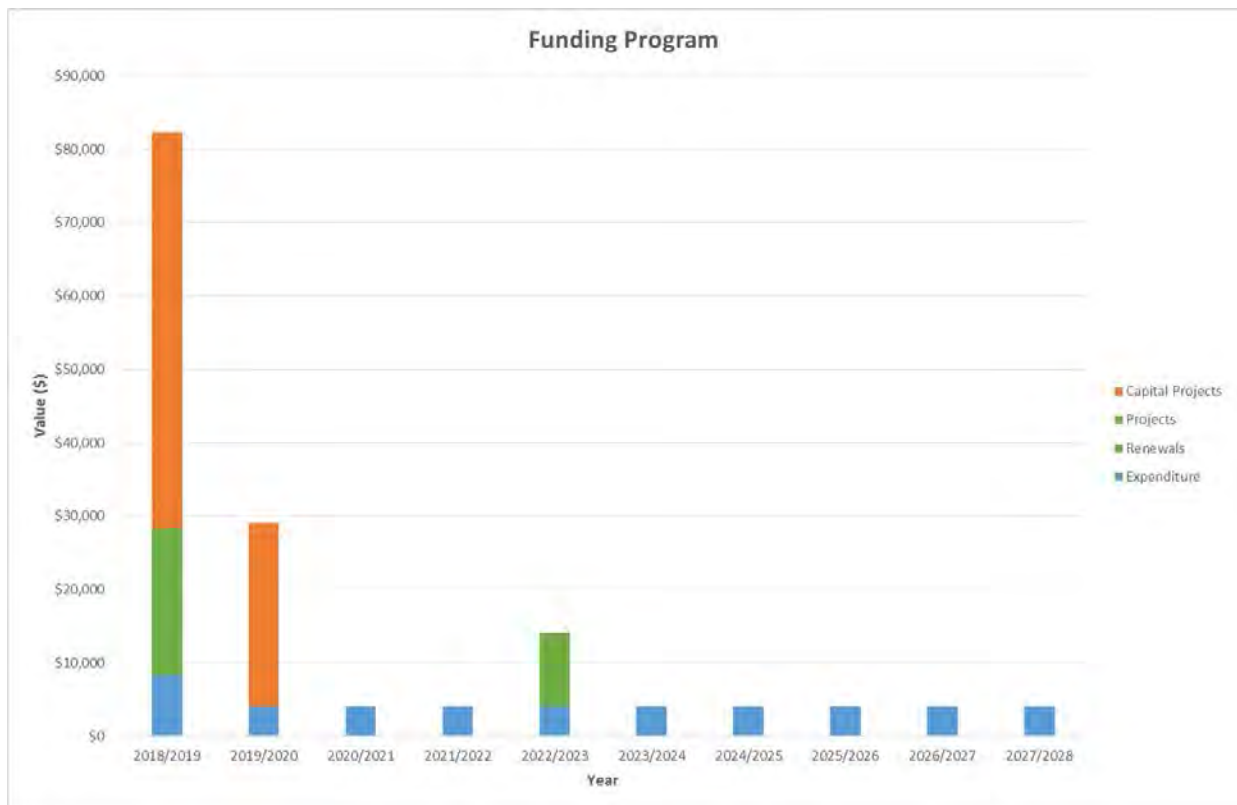


Figure 5-10 Doyleston Funding Summary

There are two major projects for Doyleston Stormwater scheme in the LTP budget.

Table 5-8 Key Projects

Account Label	GL	Description	Year 1 (\$)	Year 2 (\$)	Year 3 (\$)	Years 4 to 10	Funding Split ²
Capital Projects	441990003	Flood reduction works	\$54,000	\$25,000			100% LoS
Projects	4419006	Flood diversion design	\$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.

² Where LoS refers to Level of Service and G refers to Growth

6.0 DUNSANDEL STORMWATER SCHEME

6.1 Scheme Summary

Description		Quantity
Scheme Area		137.63ha
Scheme Coverage (as at 1 Jan 2018)	Rating numbers	177
System components	Piped (m)	356.42
	Swales (m)	986
	Drains (m)	482
	Manholes/Inspection Chambers (No.)	6
	Treatment	N/A
	Other	N/A
Value (\$)	Replacement Cost	\$201,936.66
	Depreciated Replacement Cost	\$139,922.20
Financial	2018/2019 Estimate	\$2,550
	Annual maintenance cost	0.36%
	% of total	
Planning	Stormwater Management Plan	Draft
	No. SDC stormwater consents	0
Demand	Mean Annual Rainfall (mm)	688
	10% AEP (10 year) 1hr rainfall depth (mm)	16.7
Sustainability	Sustainable drain management practices	Adopted and Encouraged

6.2 Key Issues

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

Table 6-1 Dunsandel Scheme Issues

What's the Problem	What we plan to do
Flooding during moderate rainfall events.	Develop a SWMP and undertake catchment management study

6.3 Overview & History

Dunsandel stormwater discharges either to ground or via surface water to a natural waterway on the eastside of town.

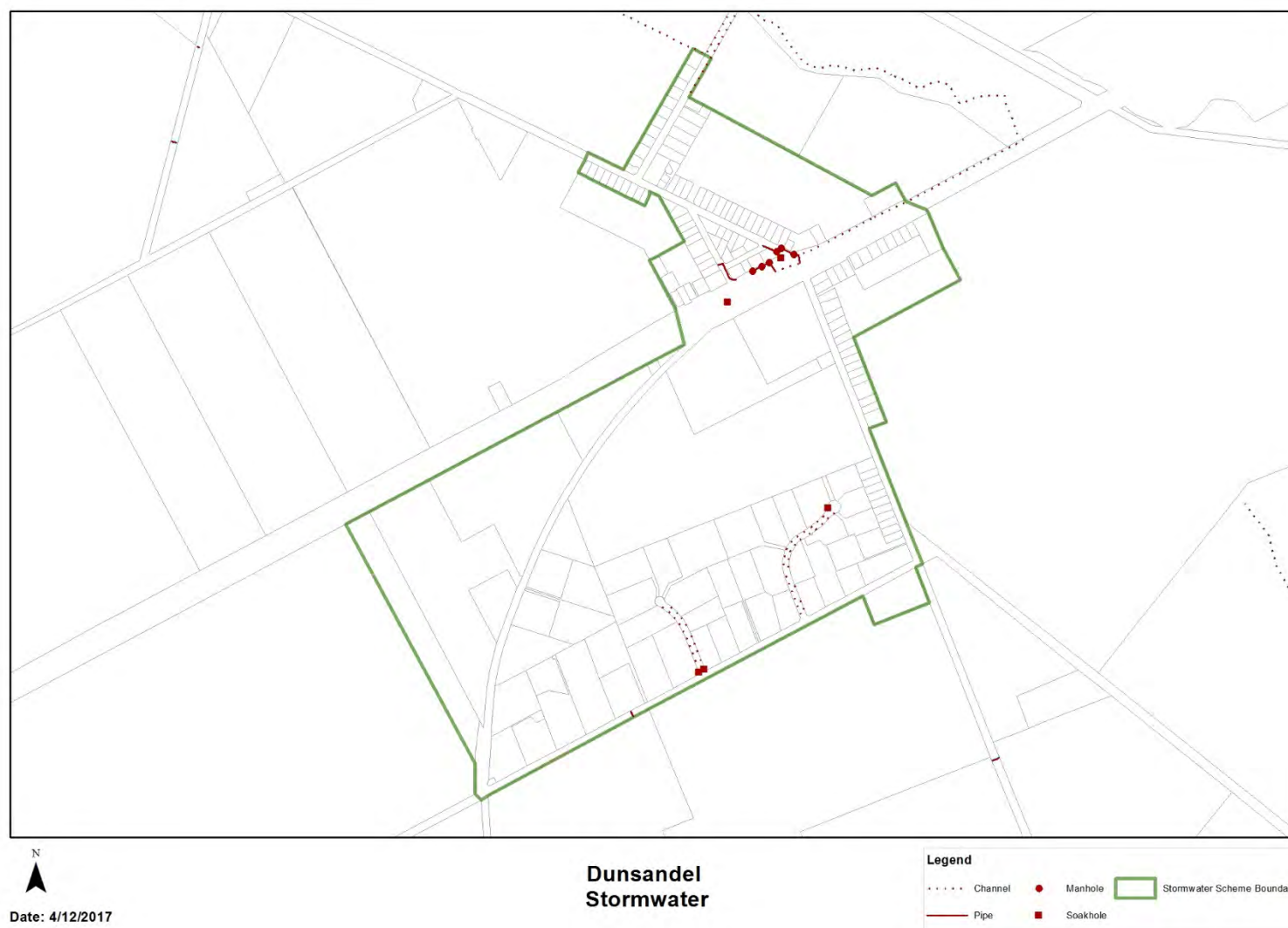


Figure 6-1 Scheme Map

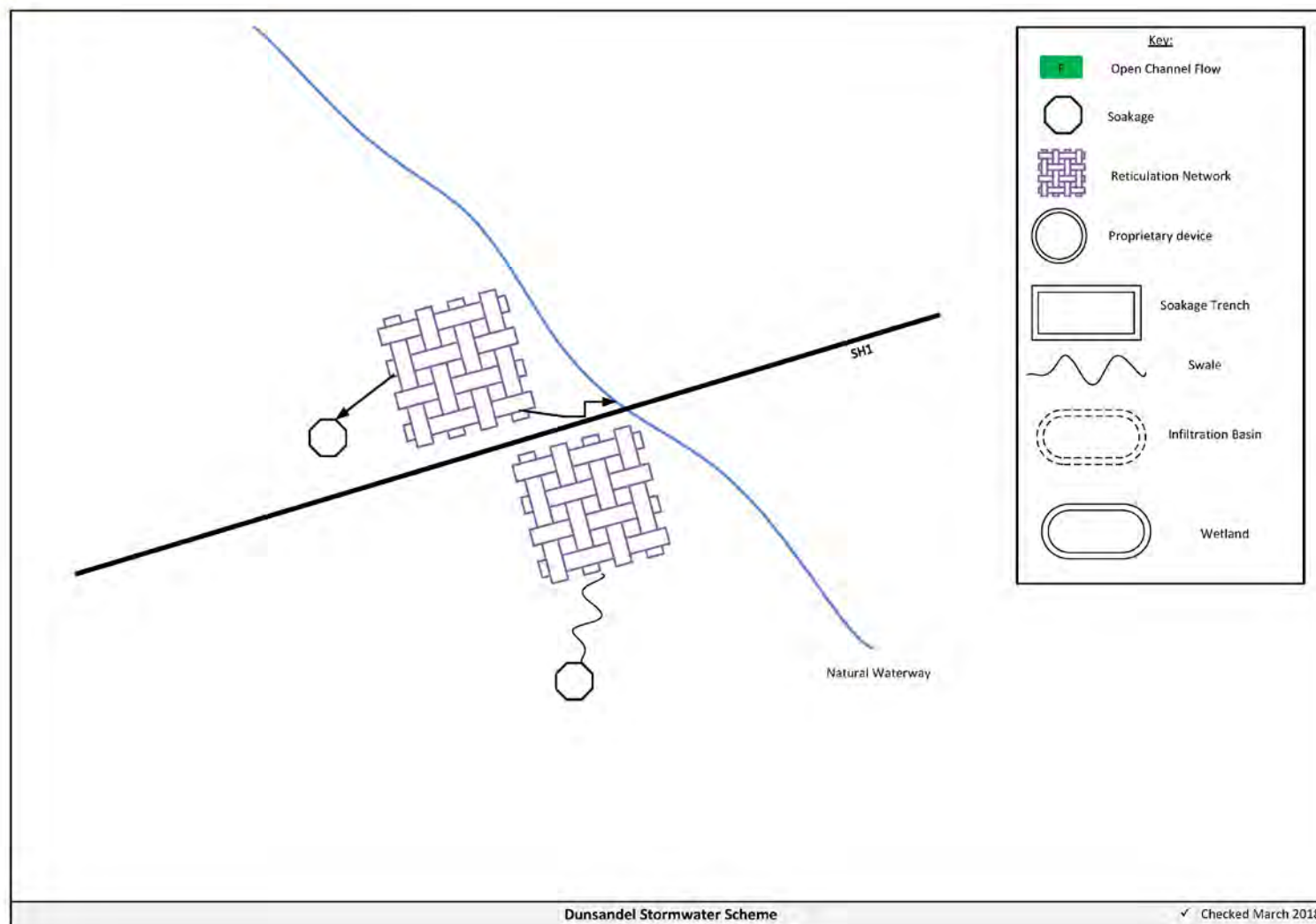


Figure 6-2 Scheme Schematic

6.4 Resource Consents

No resource consents are held by Selwyn District Council for this stormwater management area. Council will actively seek a global consent for this area.

6.5 Integrated Stormwater Management Plan

Environment Canterbury's Natural Resources Regional Plan (NRRP) became operative on the 11th June 2011. The plan requires that all non-permitted stormwater discharges have consent application lodged by 11th December 2011 under rules WQL6 and 7 or June 2016 under rule WQL8. Due to the tight timeframes (6 months) under rules WQL 6 and 7 it is proposed to obtain consents under rule WQL8. Under the Provisional Land and Water Regional Plan (PLWRG), the deadline for obtaining network discharge consents to allow discharges to be permitted under rule 5.93 has been extended to June 2018.

An ISMP is required for Dunsandel, these application documents are still being developed and will be lodged before June 2018.

6.6 Scheme Assets

Council has a wide variety of stormwater assets within the district. A brief description of the assets within this scheme is provided below:

- a. Swale (Grassed) – Is a longitudinal open channel which is lined with grass. The swale both conveys and treats stormwater.
- b. Soakholes – Are used to dispose of stormwater to ground in areas where the ground water table is low and soil permeability is high.
- c. Open drains – are channels used to convey stormwater. They are cost effective means to convey large volumes of water.

A summary of material and diameter for channels and pipes, where known, is shown below in Figure 6-3 and Figure 6-4.

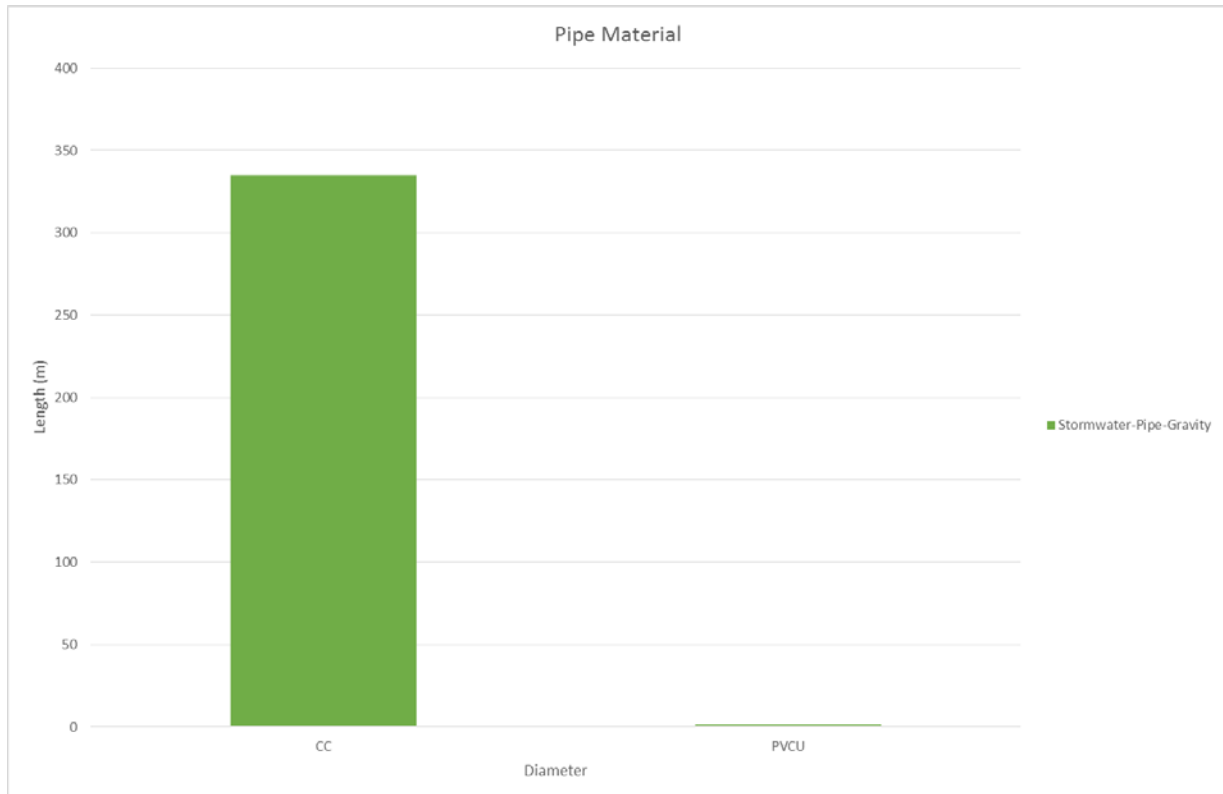


Figure 6-3 Pipe Material - Dunsandel

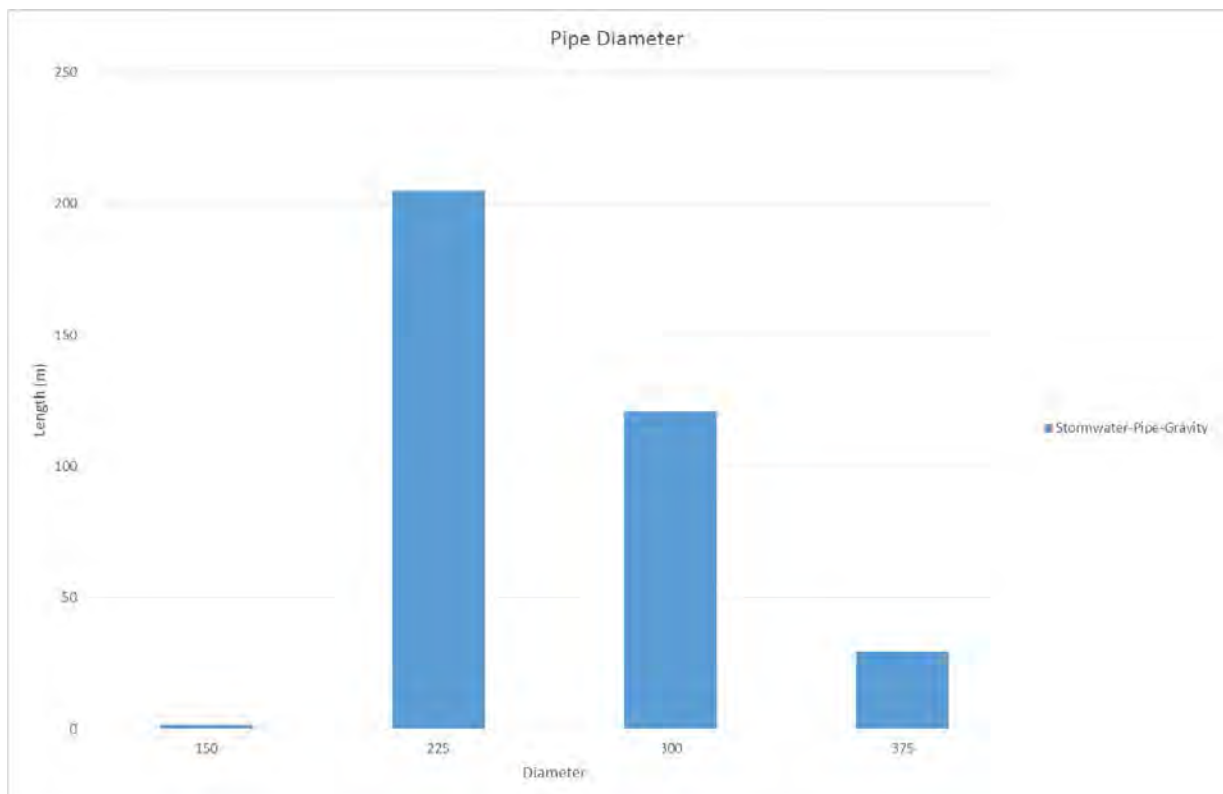


Figure 6-4 Pipe Diameter – Dunsandel

6.7 Operational Management

The stormwater network is operated and maintained under two maintenance contracts as follows:

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

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

6.8 Photos of Main Assets



Photo 1: Typical Drain

6.9 Rapid Flood Modelling

The Council has undertaken 'Rapid Flood Hazard Assessment' modelling for its main townships. The modelling uses DHI MIKE 21 to simulate rainfall on grid with the outputs processed through ArcGIS producing maps illustrating a range of flood depths during different rainfall intensities and durations.

The rapid flood assessment has been generated to provide a high level summary of potential flood and ponding areas across the district during extreme rainfall events. The results from this study are not to be used to set floor levels. The results have not been ground tested and therefore are indicative only.

For a 50 year event, Figure 6-5 shows the predicted flooding for Dunsandel.

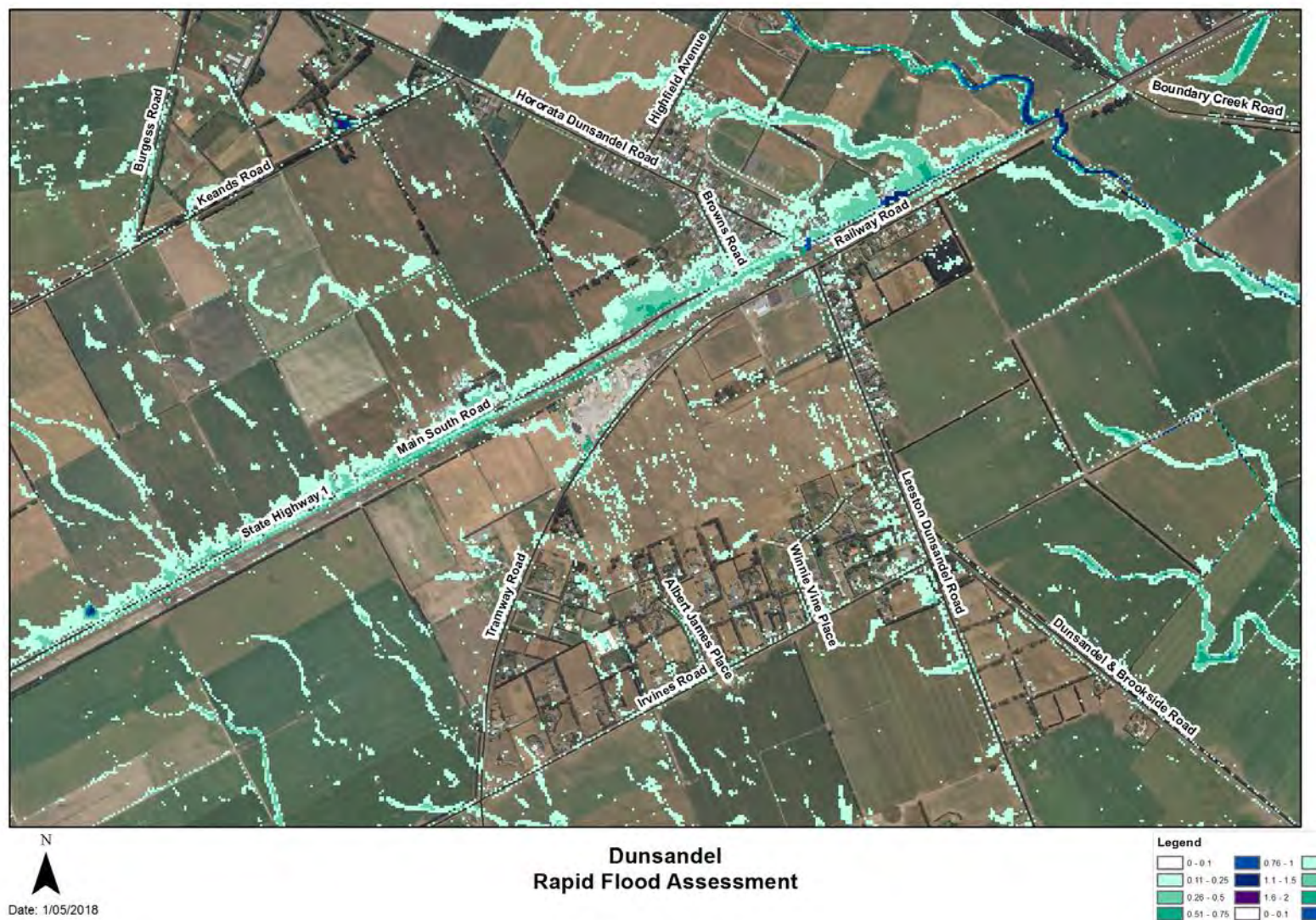


Figure 6-5 Rapid Flood Modelling, Dunsandel

6.10 Risk Assessment

A risk assessment has been undertaken for the Dunsandel scheme. The key output from the risk assessment is the identification of any extreme and high risks which need to be mitigated. In order to mitigate these risks they have been included and budgeted for in the projects within this LTP. Table 6-2 details the risk priority rating and Table 6-3 outlines the risks for this scheme.

Table 6-2 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 6-3 Risks - Dunsandel

Risk	Action/Project	Year Identified	2014 Risk Rating	2017 Risk Rating	Residual Risk Rating
Non-consented activities	Renewal of consents	2014	27	27	6

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

6.11 Asset Valuation Details

The total replacement value of assets within the Dunsandel Scheme is \$201,937 as detailed in Table 6-4 below. The majority of value, 54%, is made up of pipes.

Table 6-4 Replacement Value, Dunsandel

Asset Class 1	Asset Class 2	Sum of Replacement Value
Stormwater Reticulation	Channel	\$56,353
	Manhole	\$37,060
	Pipe	\$108,524

Replacement values for different types (channels, laterals, management devices and pipes) of stormwater assets are shown in Figure 6-6 below.

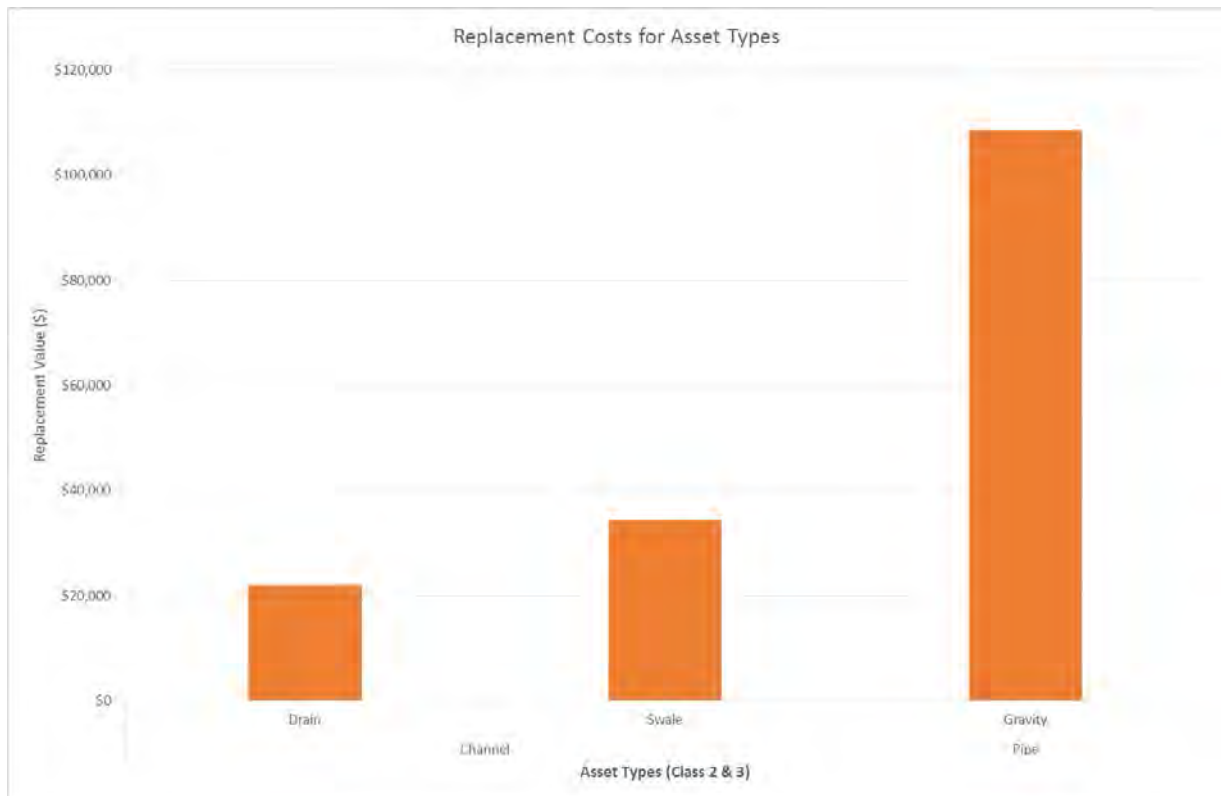


Figure 6-6 Replacement Costs for Dunsandel

6.12 Renewals

The renewal profile has been taken from the 2017 5 Waters Valuation. A graph showing the renewals for this scheme are shown by Figure 6-7 below. The majority of assets requiring renewal are culverts/pipes which occur in the year 2019/20.



Figure 6-7 Dunsandel Stormwater Renewal Profile

6.13 Critical Assets

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

Table 6-5 Length of Assets per Criticality Level

Criticality Bands		Length (m)
5	Low	1772
4	Medium-Low	36
3	Medium	30
2	Medium-High	0
1	High	0

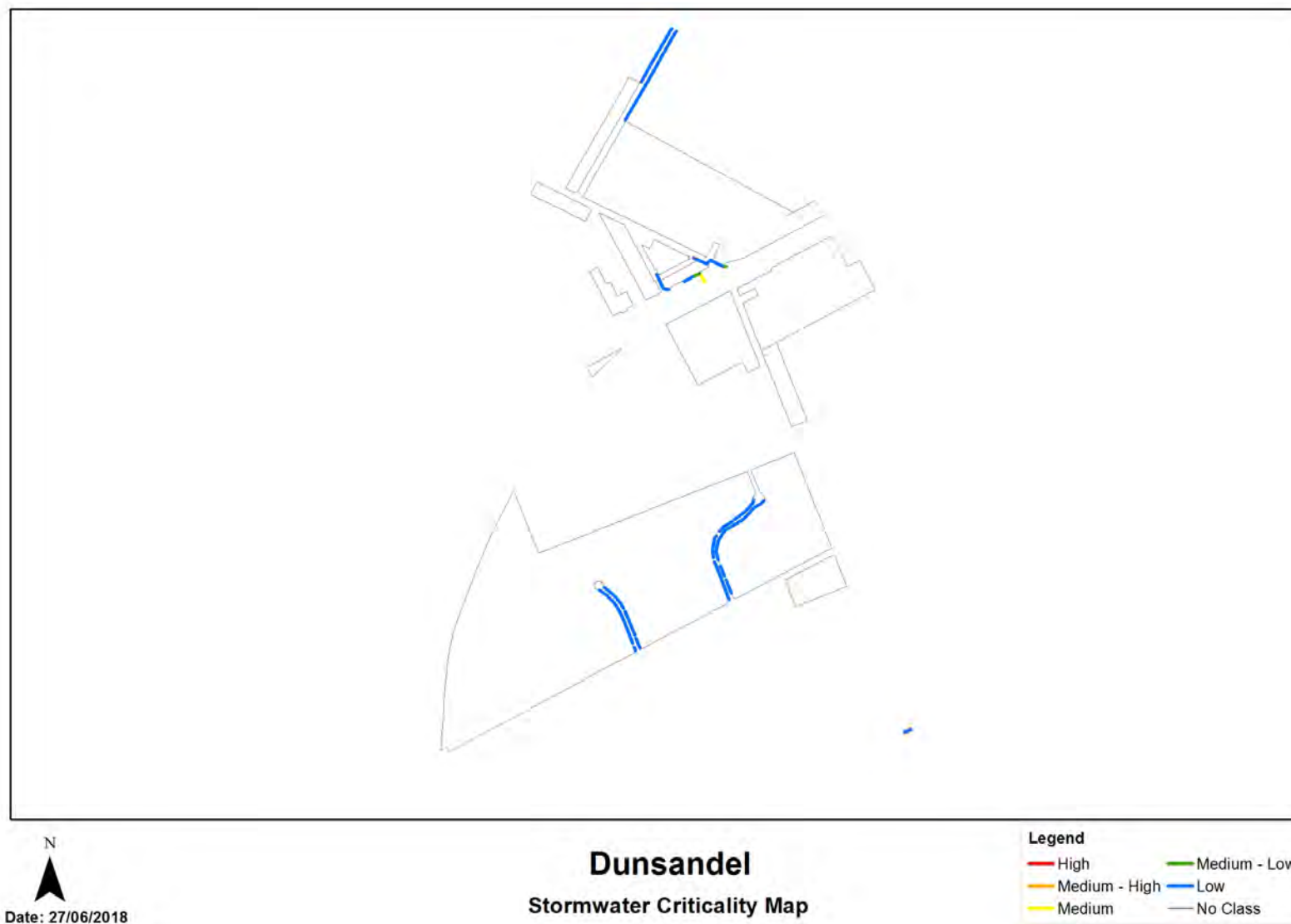


Figure 6-8 Criticality Map

6.14 Asset Condition

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

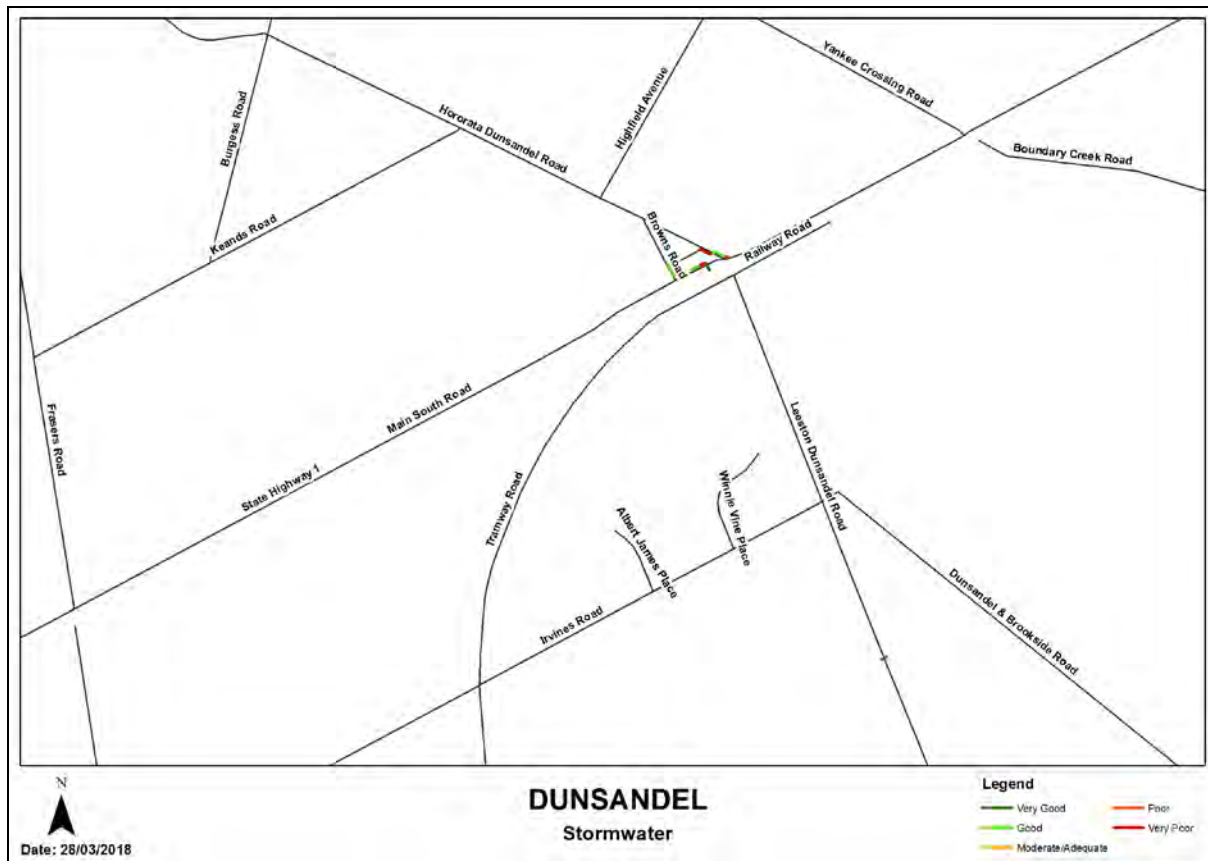


Figure 6-9 Asset Condition - Dunsandel

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

Table 6-6 Asset Condition Grading

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

6.15 Funding Program

The 10 year budgets for Dunsandel are shown by Table 6-7 and Figure 6-10. Budgets are split into expenditure, renewals, projects and capital projects.

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

Table 6-7 Dunsandel Budget Summary

Years	Expenditure	Renewals	Projects	Capital Projects
2018/2019	\$2,550			
2019/2020	\$2,550	\$19,295		
2020/2021	\$2,550			
2021/2022	\$2,550			
2022/2023	\$2,550			
2023/2024	\$2,550			
2024/2025	\$2,550			
2025/2026	\$2,550			
2026/2027	\$2,550			
2027/2028	\$2,550			
Total	\$25,500	\$19,295		

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.

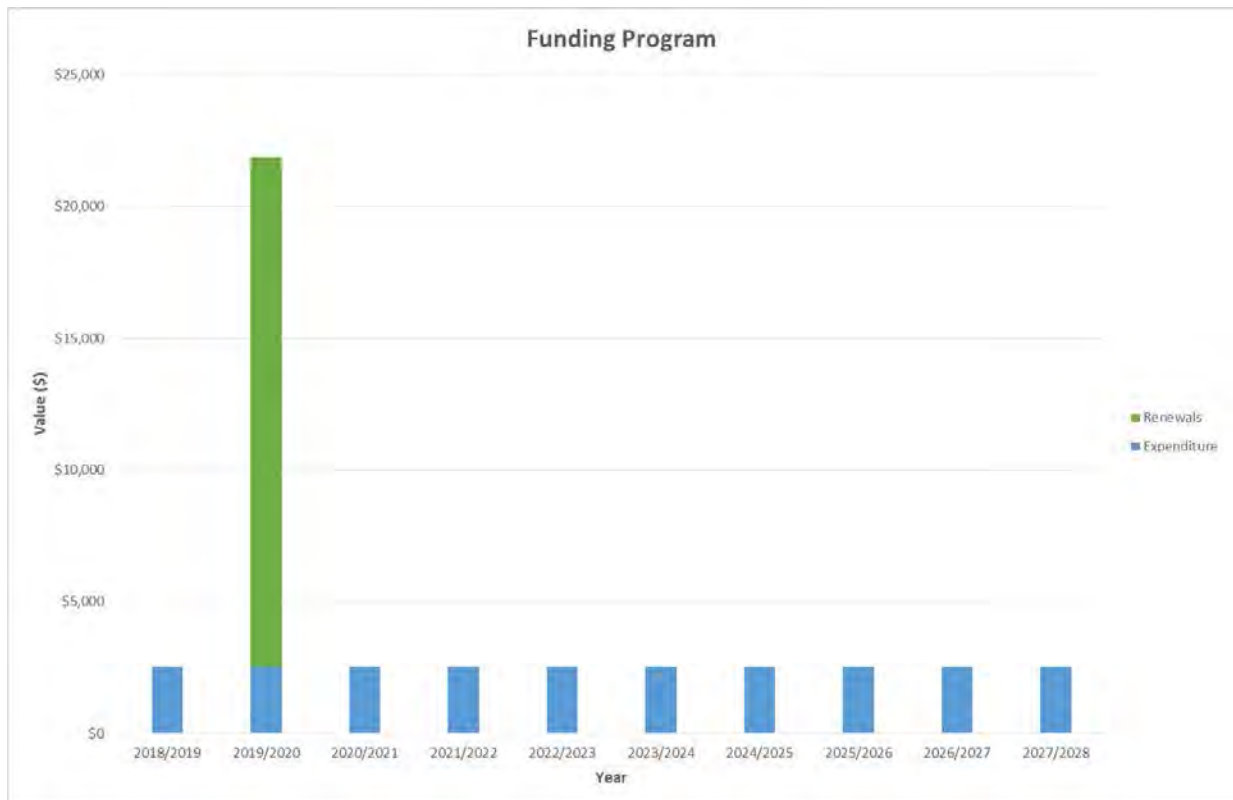


Figure 6-10 Dunsandel Funding Summary

There are no major projects for Dunsandel stormwater scheme in the LTP budget. The list of district wide projects can be found in 5Waters Activity Management Plan: Volume 1.

7.0 GLENTUNNEL STORMWATER SCHEME

7.1 Scheme Summary

Description		Quantity
Scheme Area		102.62ha
Scheme Coverage (as at 1 Jan 2018)	Rating numbers	76
System components	Piped (m)	143.8
	Swales (m)	1467.8
	Drains (m)	396.7
	Manholes/Inspection Chambers (No.)	1
	Treatment	N/A
	Other	Flood diversion channel
Value (\$)	Replacement Cost	\$152,691.29
	Depreciated Replacement Cost	\$137,293.97
Financial	2018/2019 Estimate	\$7,850
	Annual maintenance cost	1.12%
	% of total	
Planning	Stormwater Management Plan	Required
	No. SDC stormwater consents	1
Demand	Mean Annual Rainfall (mm)	839
	10% AEP (10 year) 1hr rainfall depth (mm)	17.7
Sustainability	Sustainable drain management practices	Adopted and Encouraged

7.2 Key Issues

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

Table 7-1 Glentunnel Scheme Issues

What's the Problem	What we plan to do
Costs of undertaking maintenance works in the township are high including clearing minor blockages	Continue to bundle work to get best value for money for the community.
Increased expectation from the community regarding level of service received from the stormwater network	Identify capacity restrictions in the system, design upgrades and budget for physical works.

7.3 Overview & History

The stormwater consists of a roadside network of open and piped drains which ultimately discharge to Surveyors Gully and the Selwyn River. The flood diversion channel at the campground requires regular inspection and cleaning if required.

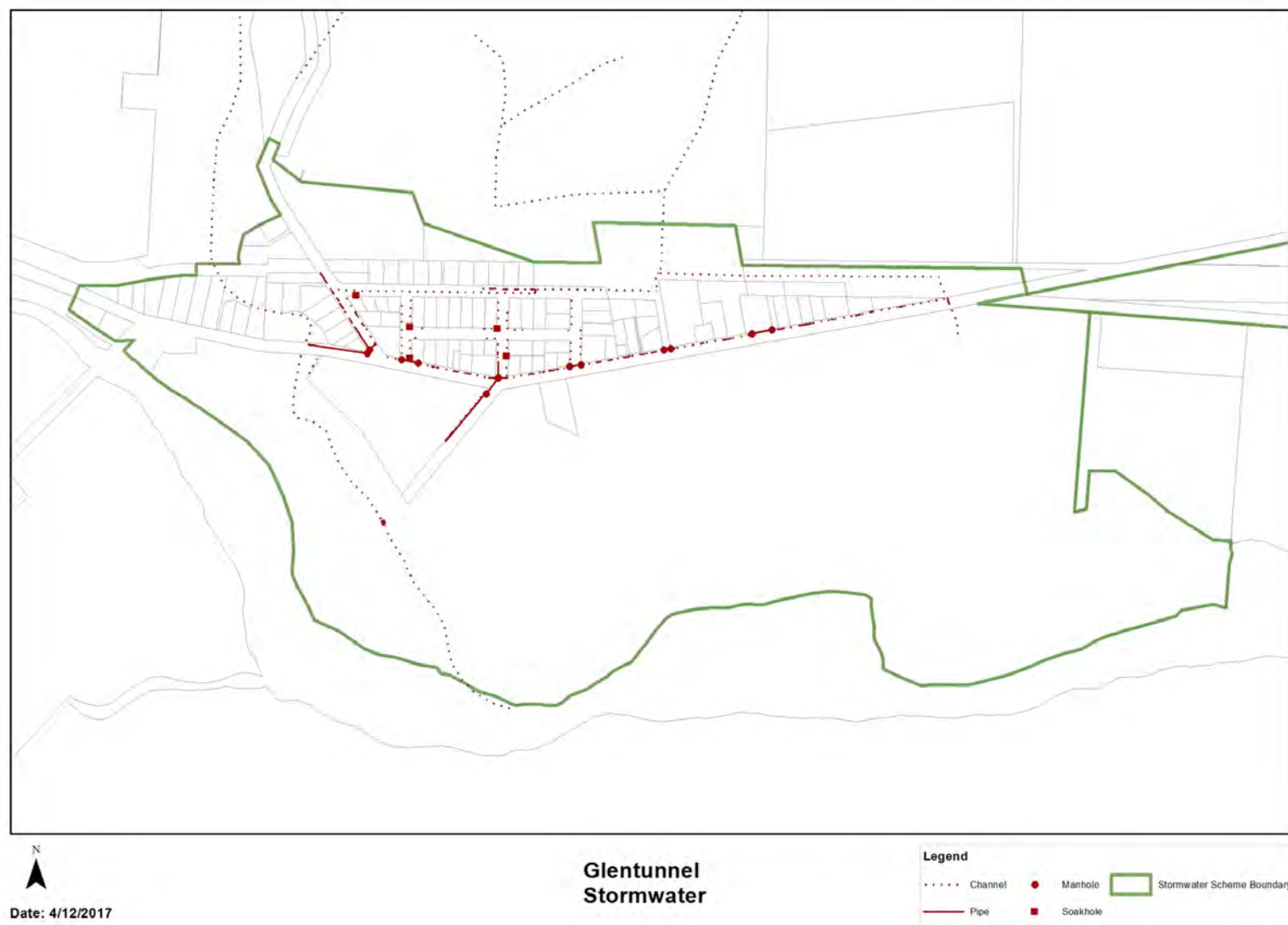


Figure 7-1 Scheme Map

Figure 7-2 Scheme Schematic

7.4 Resource Consents

There are no stormwater discharge consents held by Selwyn District Council for this stormwater management area. Council will actively seek a global consent for this area.

Council holds an earthworks consent to construct and maintain a flood diversion channel around the Glentunnel camping ground, shown in Table 7-2 below.

Table 7-2 Resource Consents

Consent	Description	Location	Date Issued	Expiry Date
CRC031651 <i>Issued - Active</i>	To disturb the bed, place and maintain structures and remove and plant plants	Selwyn Riverbed, GLENTUNNEL	27/06/2003	26/06/2038

7.5 Integrated Stormwater Management Plan

Environment Canterbury's Natural Resources Regional Plan (NRRP) became operative on the 11th June 2011. The plan requires that all non-permitted stormwater discharges have consent application lodged by 11th December 2011 under rules WQL6 and 7 or June 2016 under rule WQL8. Due to the tight timeframes (6 months) under rules WQL 6 and 7 it is proposed to obtain consents under rule WQL8. Under the Provisional Land and Water Regional Plan (PLWRG), the deadline for obtaining network discharge consents to allow discharges to be permitted under rule 5.93 has been extended to June 2018.

An ISMP is required for Glentunnel, these application documents are still being developed and will be lodged before June 2018.

7.6 Scheme Assets

Council has a wide variety of stormwater assets within the district. A brief description of the assets within this scheme is provided below:

- Reticulated network – Includes pipes, manholes, sumps. The primary purpose of the reticulated network is to collect and convey stormwater. Historically these systems were designed for the 2 year storm event. Today's engineering standards require the piped network to be designed for a 10 year event with overland flow provision for up to the 50 year event.
- Flood diversion channel – is a large scale open drain designed to convey flood flows.
- Swale (Grassed) – Is a longitudinal open channel which is lined with grass. The swale both conveys and treats stormwater.

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

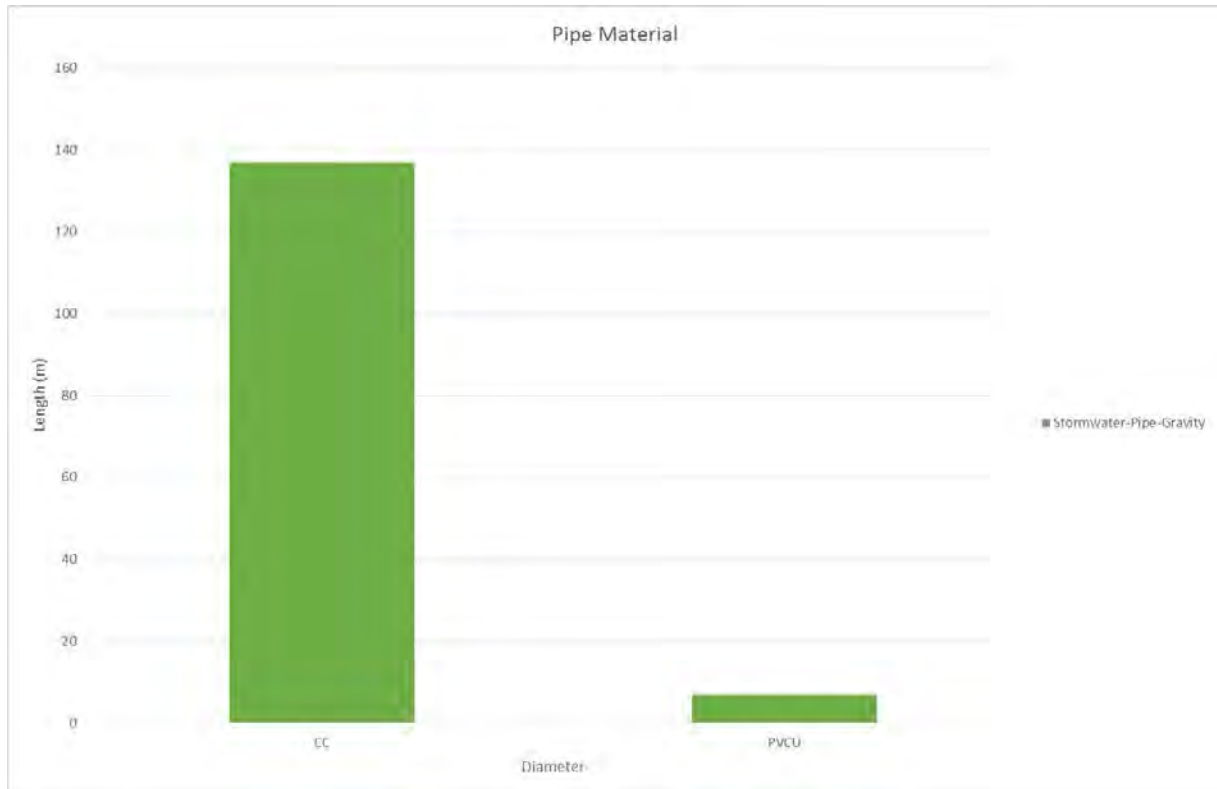


Figure 7-3 Pipe Material - Glentunnel

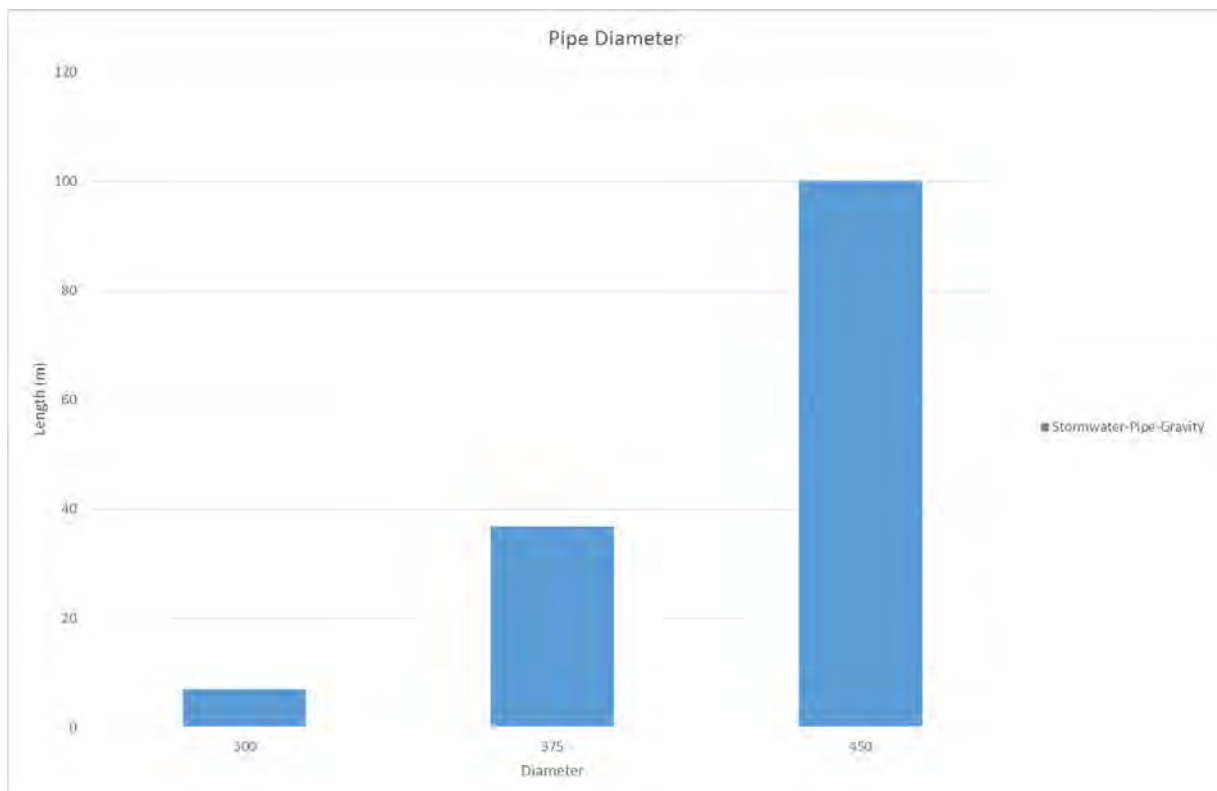


Figure 7-4 Pipe Diameter – Glentunnel

7.7 Operational Management

The stormwater network is operated and maintained under two maintenance contracts as follows:

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

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

7.8 Photos of Main Assets



Photo 1: Flood diversion channel

Note: the flood diversion channel is required to be checked prior to Christmas each year to ensure protection during the holiday season.

7.9 Rapid Flood Modelling

The Council has undertaken 'Rapid Flood Hazard Assessment' modelling for its main townships. The modelling uses DHI MIKE 21 to simulate rainfall on grid with the outputs processed through ArcGIS producing maps illustrating a range of flood deeps during different rainfall intensities and durations.

The rapid flood assessment has been generated to provide a high level summary of potential flood and ponding areas across the district during extreme rainfall events. The results from this study are not to be used to set floor levels. The results have not been ground tested and therefore are indicative only.

For a 50 year event, Figure 7-5 shows the predicted flooding for Glentunnel.

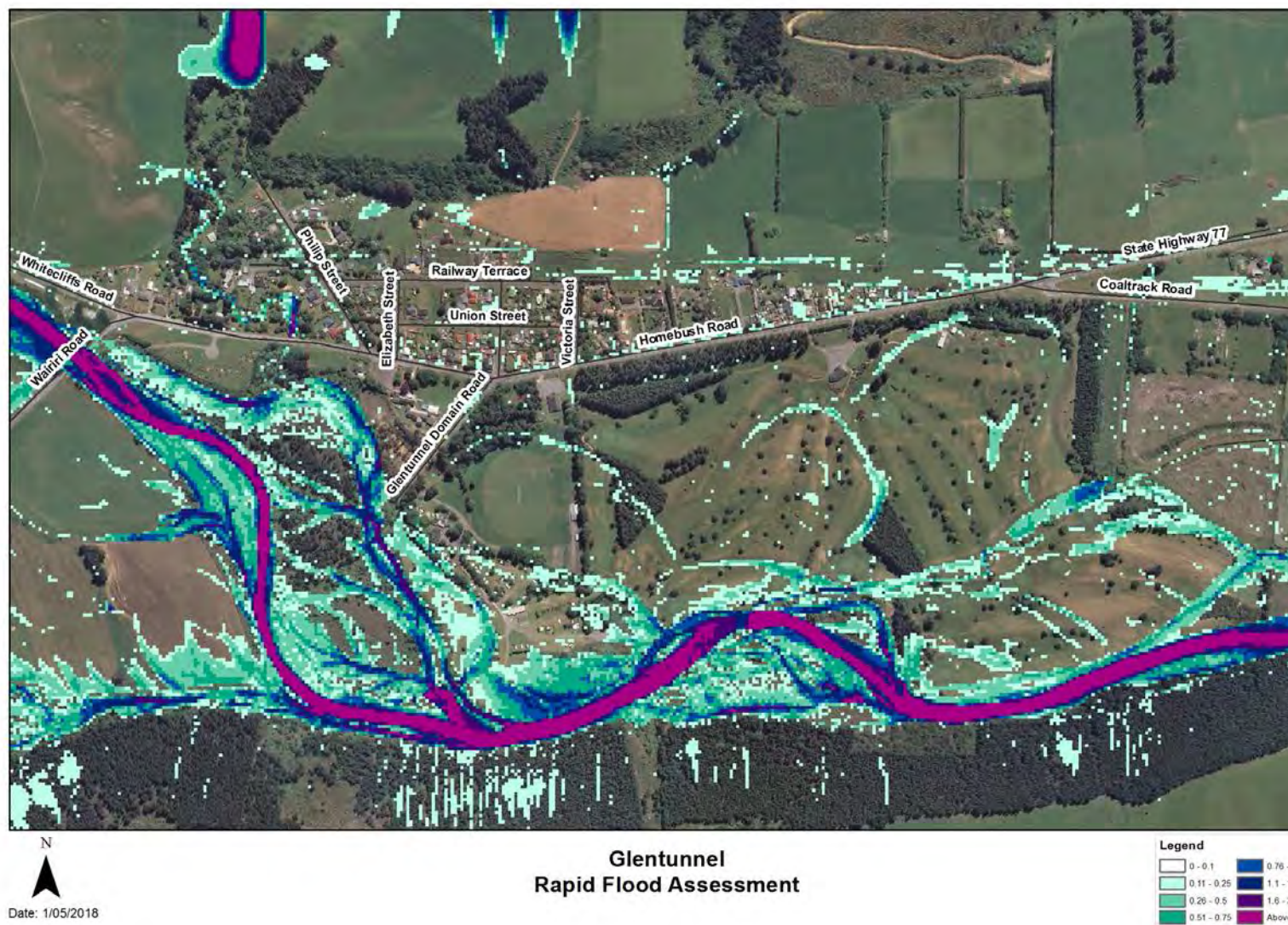


Figure 7-5 Rapid Flood Modelling, Glentunnel

7.10 Risk Assessment

A risk assessment has been undertaken for the Glentunnel 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 7-3 details the risk priority rating and Table 7-4 outlines the risks for this scheme.

Renewal of this consent is budgeted under district projects.

Table 7-3 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 7-4 Risks – Glentunnel

Risk	Action/Project	Year Identified	2014 Risk Rating	2017 Risk Rating	Residual Risk Rating
Drains on private property without easements	Review drainage scheme and requirements for easements	2014	9	9	9
Non-consented activities	Renewal of consents	2014	27	27	6

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

7.11 Asset Valuation Details

The total replacement value of assets within the Glentunnel Scheme is \$152,691 as detailed in Table 7-5 below. The majority of value, 48%, is made up of pipes.

Table 7-5 Replacement Value, Glentunnel

Asset Class 1	Asset Class 2	Sum of Replacement Value
Stormwater Reticulation	Channel	\$69,282
	Inlet-Outlet-Point	\$3,124
	Manhole	\$6,309
	Pipe	\$73,977

Replacement values for different types (channels, laterals, management devices and pipes) of stormwater assets are shown in Figure 7-6 below.

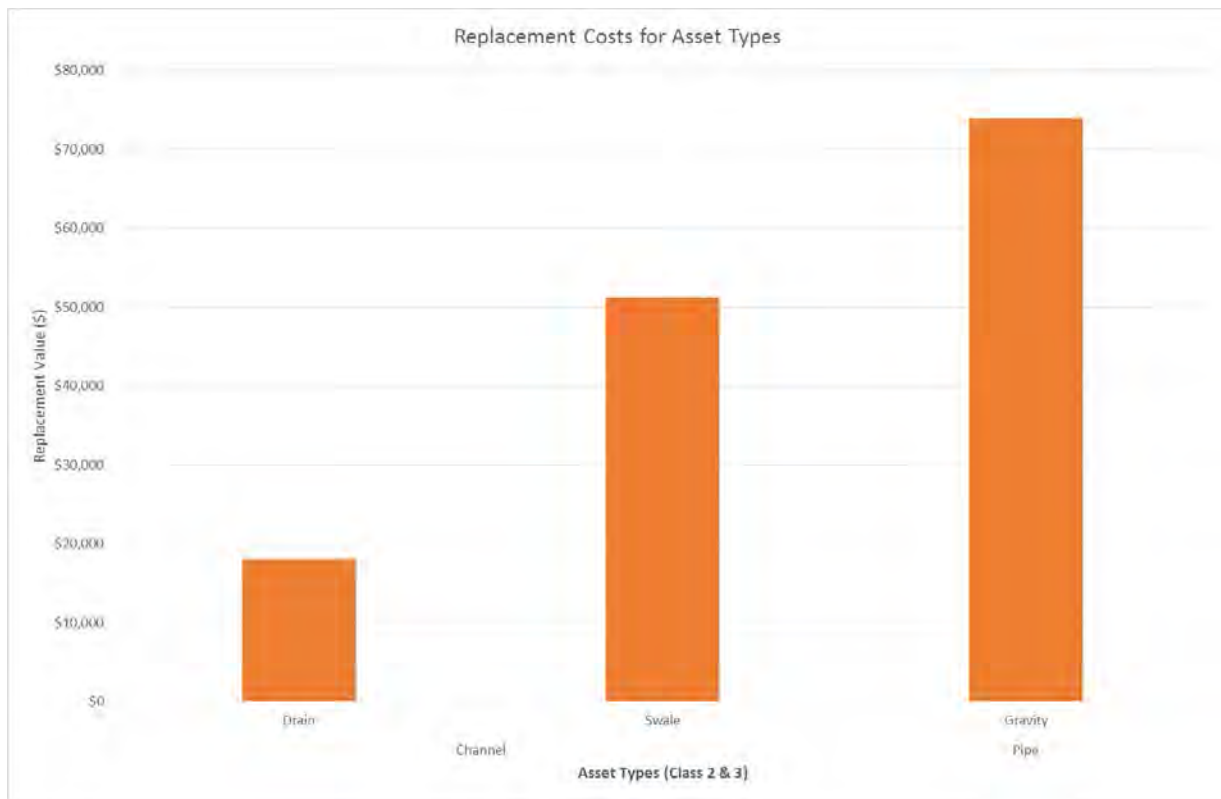


Figure 7-6 Replacement Costs for Glentunnel

7.12 Renewals

The renewal profile has been taken from the 2017 5 Waters Valuation. There are no renewals scheduled for this scheme.

7.13 Critical Assets

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

Table 7-6 Length of Assets per Criticality Level

Criticality Bands		Length (m)
5	Low	1,864
4	Medium-Low	4

3	Medium	133
2	Medium-High	0
1	High	0

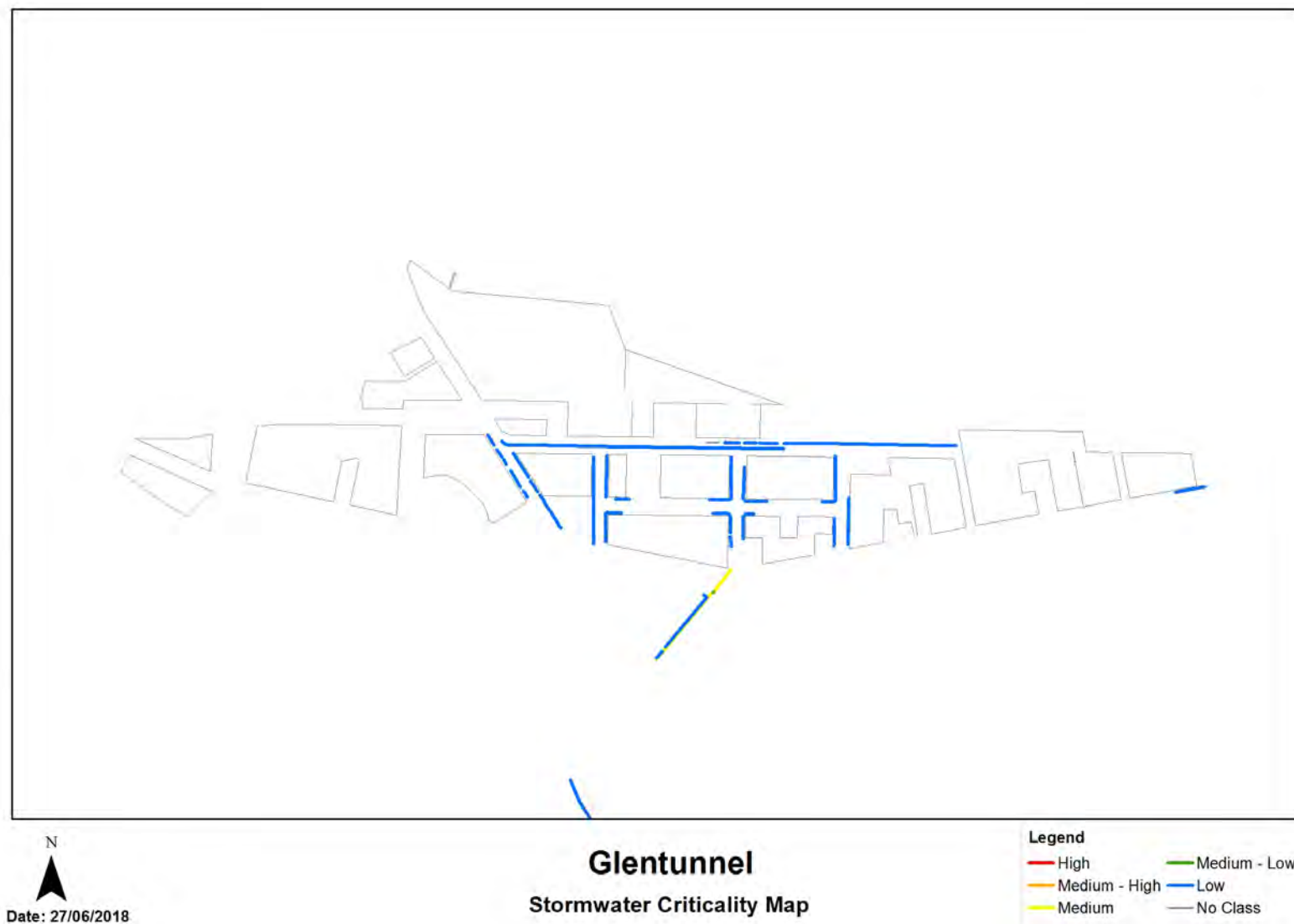


Figure 7-7 Criticality Map

7.14 Asset Condition

The asset condition model was run for Glentunnel 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.

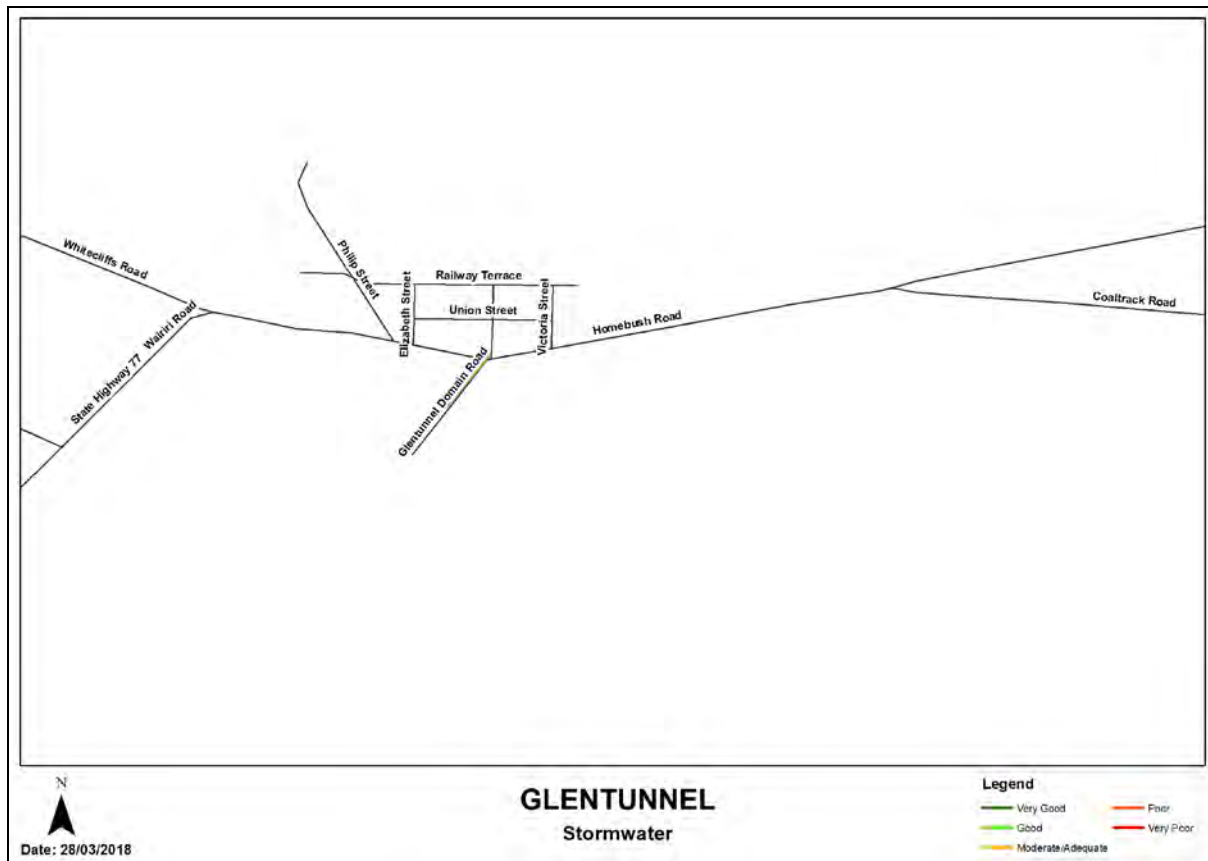


Figure 7-8 Asset Condition - Glentunnel

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

Table 7-7 Asset Condition Grading

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

7.15 Funding Program

The 10 year budgets for Glentunnel are shown by Table 7-8 and 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 7-8 Glentunnel Budget Summary

Years	Expenditure	Renewals	Projects	Capital Projects
2018/2019	\$7,850			
2019/2020	\$3,350			
2020/2021	\$3,350			
2021/2022	\$3,350			
2022/2023	\$3,350			
2023/2024	\$3,350			
2024/2025	\$3,350			
2025/2026	\$3,350			
2026/2027	\$3,350			
2027/2028	\$3,350			
Total	\$38,000			

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.

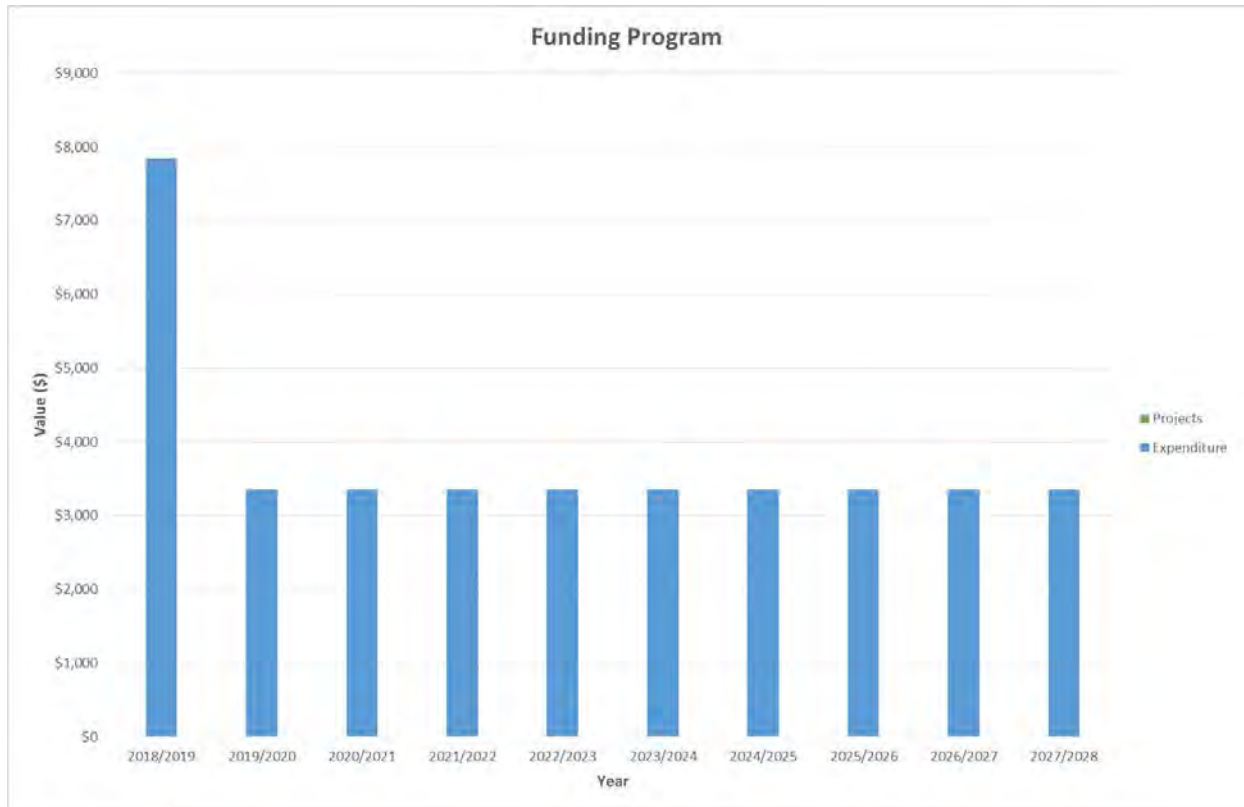


Figure 7-9 Glentunnel Funding Summary

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

8.0 HORORATA STORMWATER SCHEME

8.1 Scheme Summary

Description		Quantity
Scheme Area		290.56ha
Scheme Coverage (as at 1 Jan 2018)	Rating numbers	71
System components	Piped (m)	320.9
	Swales (m)	1439.9
	Drains (m)	2802.3
	Manholes/Inspection Chambers (No.)	1
	Treatment	N/A
	Other	2 Soakage pits
Value (\$)	Replacement Cost	\$301,661.80
	Depreciated Replacement Cost	\$254,512.14
Financial	2018/2019 Estimate	\$7,205
	Annual maintenance cost	1.03%
	% of total	
Planning	Stormwater Management Plan	Draft
	No. SDC stormwater consents	0
Demand	Mean Annual Rainfall (mm)	694
	10% AEP (10 year) 1hr rainfall depth (mm)	16.9
Sustainability	Sustainable drain management practices	Adopted and Encouraged

8.2 Key Issues

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

Table 8-1 Hororata Scheme Issues

What's the Problem	What we plan to do
Flooding of properties between Bealey and Hawkins Roads originating from natural springs.	Options investigated, continue to liaise with community to determine willingness to pay.
Flooding originating from upper catchment impacting on the township	Discuss options with the community to prioritise areas of need and further develop flood relief channel options.
Increased expectation from the community regarding level of service received from the stormwater network	Identify capacity restrictions in the system, design upgrades and budget for physical works.

8.3 Overview & History

The Hororata township predominantly discharges stormwater to a branch of the Hororata River. In addition to the river discharge, there are some discharges to ground. The township is susceptible to flooding from the upper catchment which is conveyed, in part, by a network of abandoned stock water races.

Stormwater is directed to two pits; Scotts Road and in the Domain off Hororata Road. The community has proposed used of another pit off Hawkins Road. Known springs in areas of township occur days after heavy rain. Under disputes tribunal order July 2010 Council is required to arrange and cover the cost of pumping gardens of 373 and 377 Hawkins Road, Pump is stored at fire station and fuel account at the local garage.

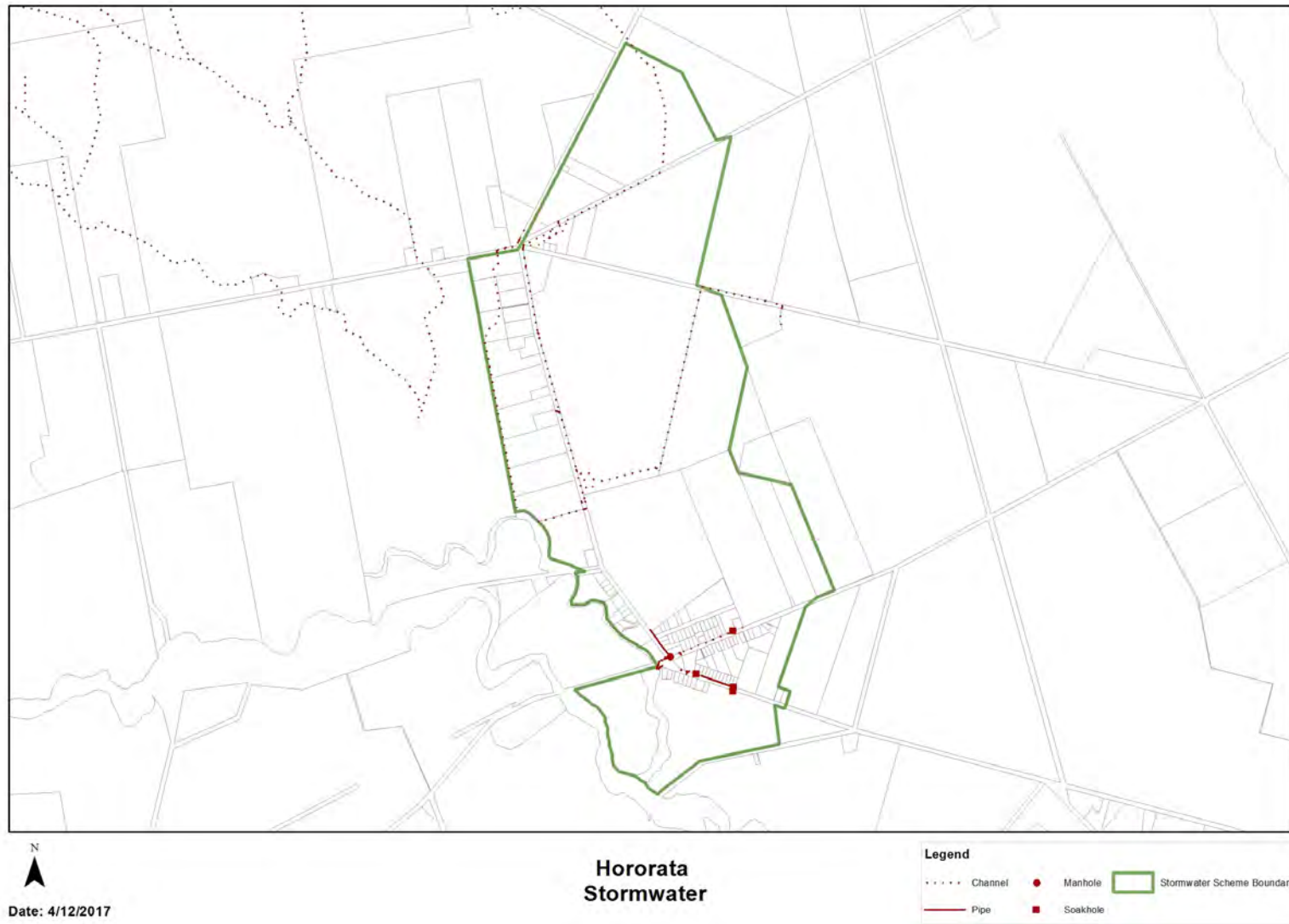


Figure 8-1 Scheme Map

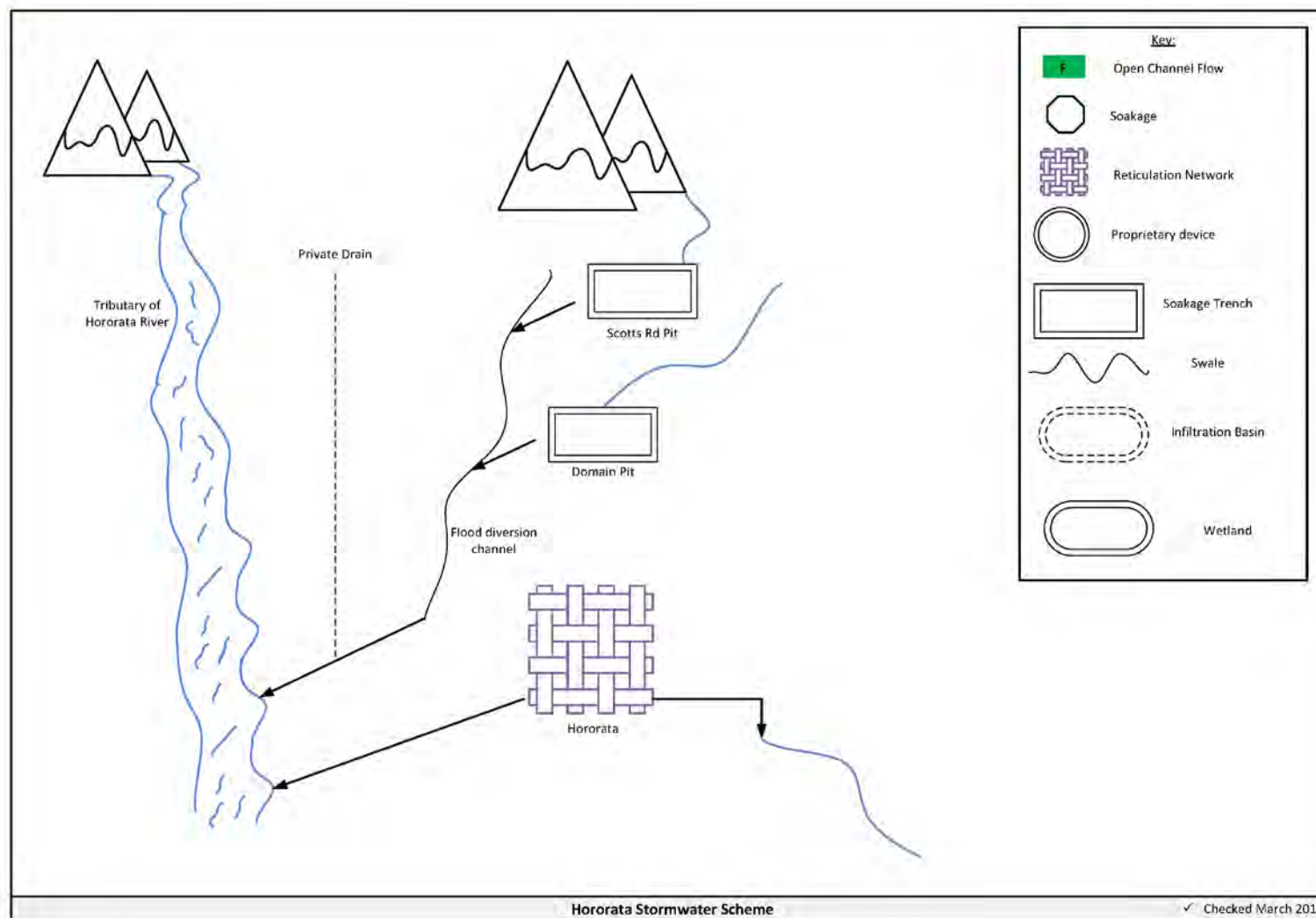


Figure 8-2 Scheme Schematic

8.4 Resource Consents

There is no stormwater discharge consents held by Selwyn District Council for this stormwater management area. Council is actively seeking a global consent for this area.

Table 8-2 Resource Consents

Consent	Description	Location	Date Issued	Expiry Date
CRC167471 <i>Application in Process</i>	To discharge stormwater from the existing stormwater network of Hororata	Hororata, Selwyn		

8.5 Integrated Stormwater Management Plan

An ISMP has been lodged for Hororata. CRC167471

8.6 Scheme Assets

Council has a wide variety of stormwater assets within the district. A brief description of the assets within this scheme is provided below:

- Flood diversion channel – is a large scale open drain designed to convey flood flows.
- Reticulated network – Includes pipes, manholes, sumps. The primary purpose of the reticulated network is to collect and convey stormwater. Historically these systems were designed for the 2 year storm event. Today's engineering standards require the piped network to be designed for a 10 year event with overland flow provision for up to the 50 year event.
- Soakage Pit – these are historic gravel abstraction pits which are used to store and dispose of flood waters.
- Open drains – are channels used to convey stormwater. They are cost effective means to convey large volumes of water.

A summary of material and diameter for channels and pipes, where known, is shown below in Figure 8-3 and Figure 8-4.

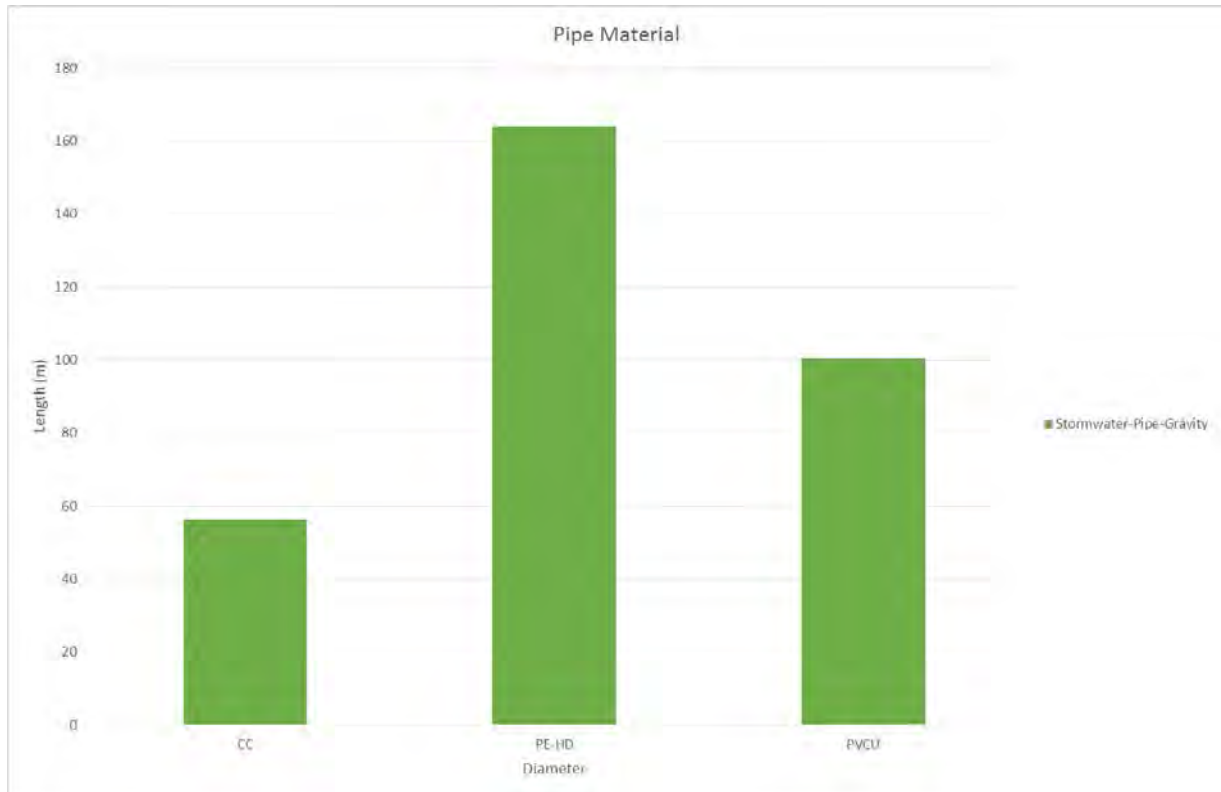


Figure 8-3 Pipe Material - Hororata

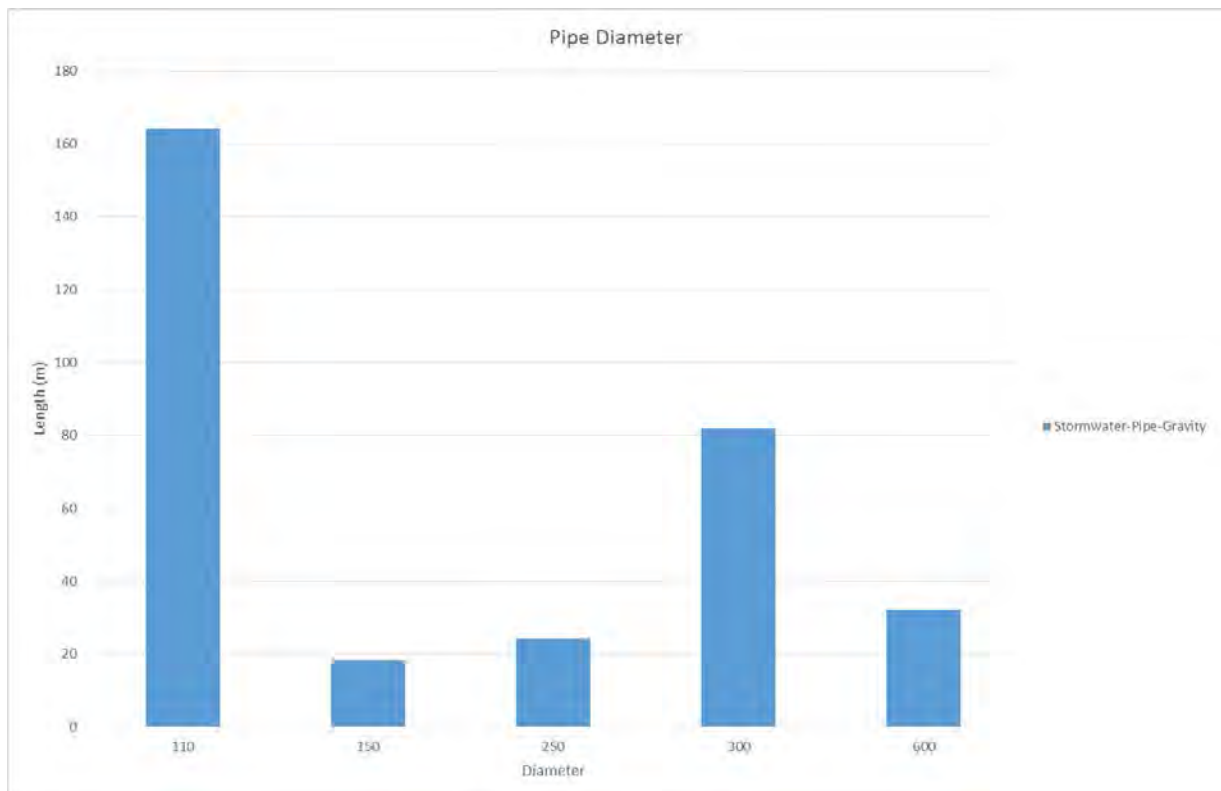


Figure 8-4 Pipe Diameter – Hororata

8.7 Operational Management

The stormwater network is operated and maintained under two maintenance contracts as follows:

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

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

8.8 Photos of Main Assets

The photos below provide a summary of the types of assets found within this stormwater management area.



Photo 1: Flood diversion Channel



Photo 2: Branch of Hororata River

8.9 Rapid Flood Modelling

The Council has undertaken 'Rapid Flood Hazard Assessment' modelling for its main townships. The modelling uses DHI MIKE 21 to simulate rainfall on grid with the outputs processed through ArcGIS producing maps illustrating a range of flood deeps during different rainfall intensities and durations.

The rapid flood assessment has been generated to provide a high level summary of potential flood and ponding areas across the district during extreme rainfall events. The results from this study are not to be used to set floor levels. The results have not been ground tested and therefore are indicative only.

For a 50 year event, Figure 8-5 shows the predicted flooding for Hororata.

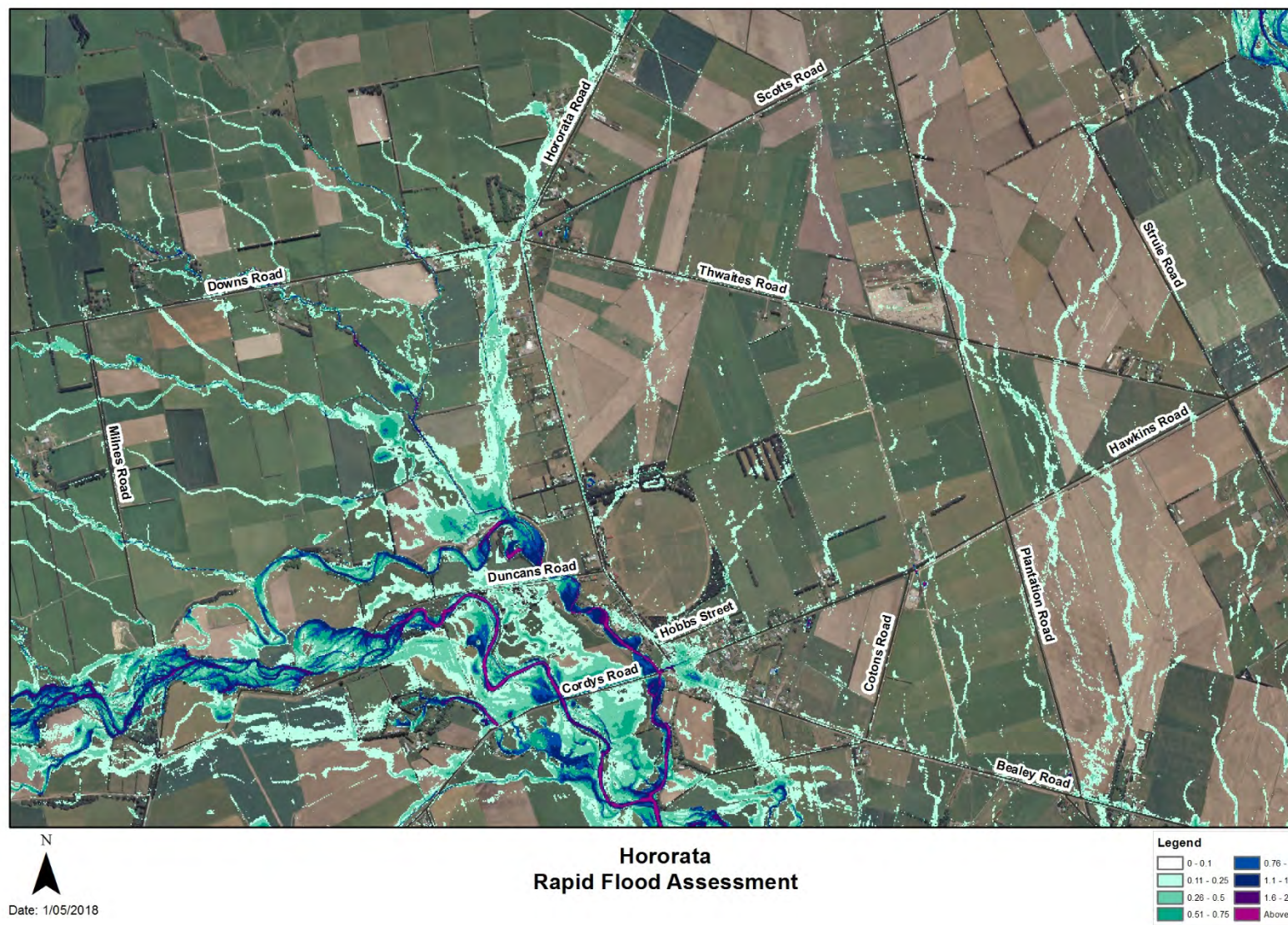


Figure 8-5 Rapid Flood Modelling, Hororata

8.10 Risk Assessment

A risk assessment has been undertaken for the Hororata scheme. The key output from the risk assessment is the identification of any extreme and high risks which need to be mitigated. In order to mitigate these risks they have been included and budgeted for in the projects within this LTP. Table 8-3 details the risk priority rating, Table 8-4 outlines the risks and the list of key projects is found in Table 8-9.

Table 8-3 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 8-4 Risks - Hororata

Risk	Action/Project	Year Identified	2014 Risk Rating	2017 Risk Rating	Residual Risk Rating
Flooding from upper catchment	Develop master plan for stormwater	2014	10	10	10
Non-consented activities	Renewal of consents	2014	27	27	6
Stormwater management	remove river obstruction	2017		6	2.1
Stormwater management	Master plan work	2017		6	2.1

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

8.11 Asset Valuation Details

The total replacement value of assets within the Hororata Scheme is \$301,662 as detailed in Table 8-5 below. The majority of value, 59%, is made up of channels.

Table 8-5 Replacement Value, Hororata

Asset Class 1	Asset Class 2	Sum of Replacement Value
Stormwater Reticulation	Channel	\$178,948

	Inlet-Outlet-Point	\$4,395
	Manhole	\$9,608
	Pipe	\$103,826
	Valve	\$4,885

Replacement values for different types (channels, laterals, management devices and pipes) of stormwater assets are shown in Figure 8-6 below.

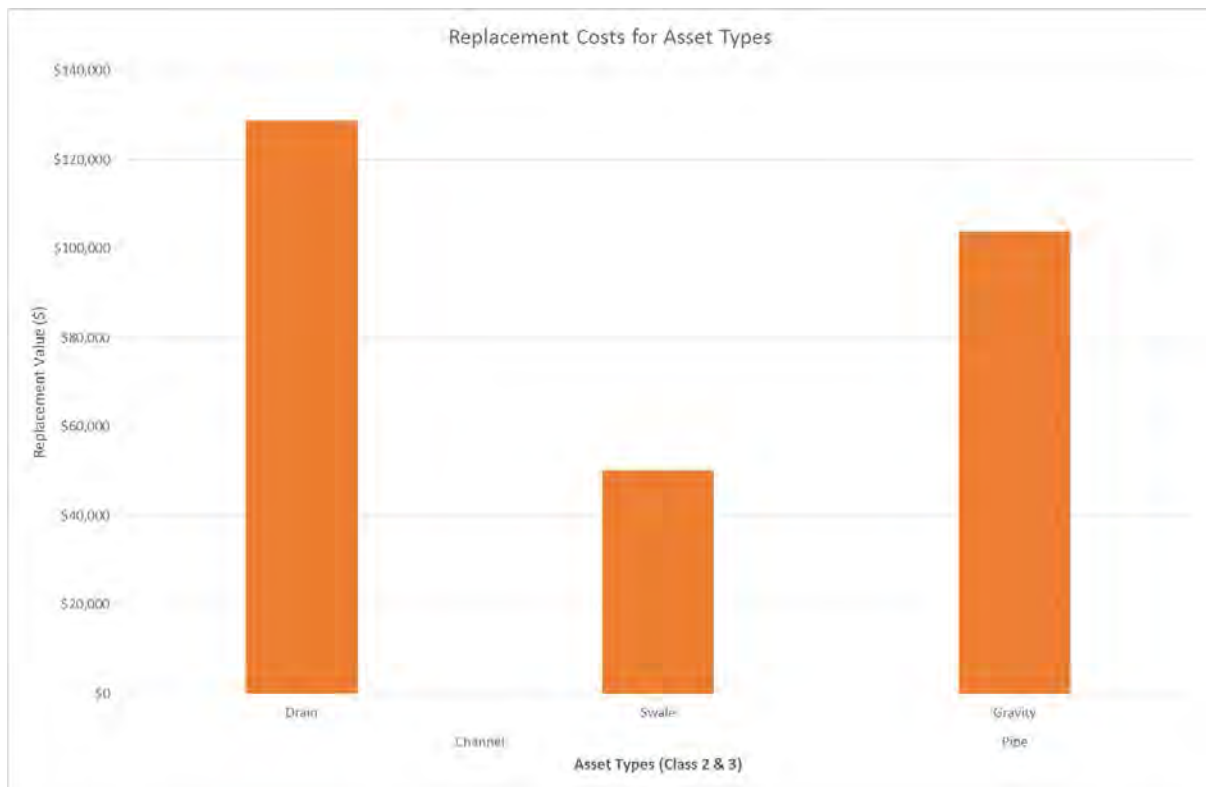


Figure 8-6 Replacement Costs for Hororata

8.12 Renewals

The renewal profile has been taken from the 2017 5 Waters Valuation. There are no renewals scheduled for this scheme.

8.13 Critical Assets

The criticality model for Hororata 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 8-6 and Figure 8-7 below shows the calculated criticality for all of the assets within this scheme that have a recorded known length.

Table 8-6 Length of Assets per Criticality Level

Criticality Bands	Length (m)
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5	Low	4535
4	Medium-Low	0
3	Medium	35
2	Medium-High	0
1	High	0

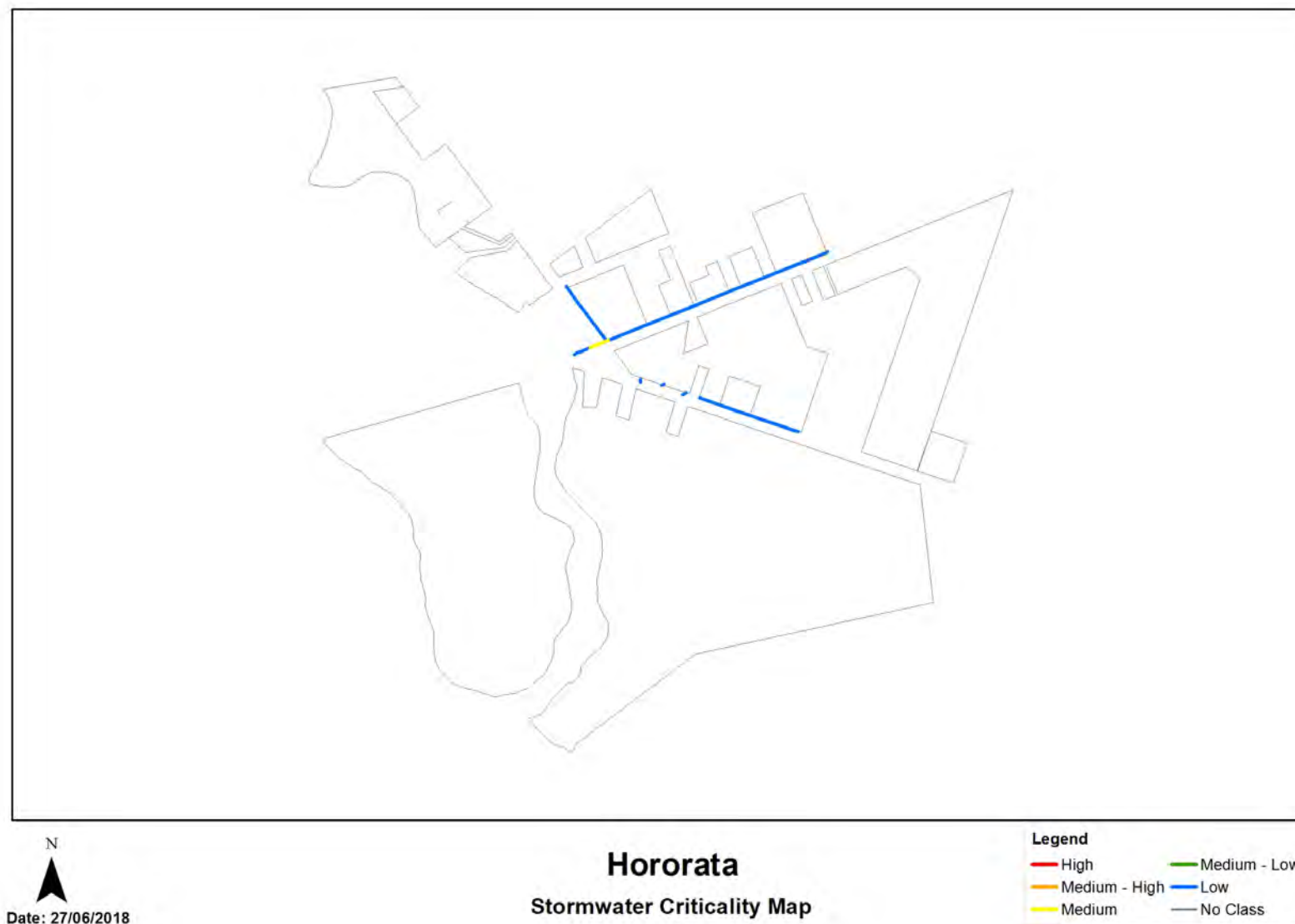


Figure 8-7 Criticality Map

8.14 Asset Condition

The asset condition model was run for Hororata 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 8-8 below shows the level of asset condition for all of the assets within this scheme that have a recorded known condition.

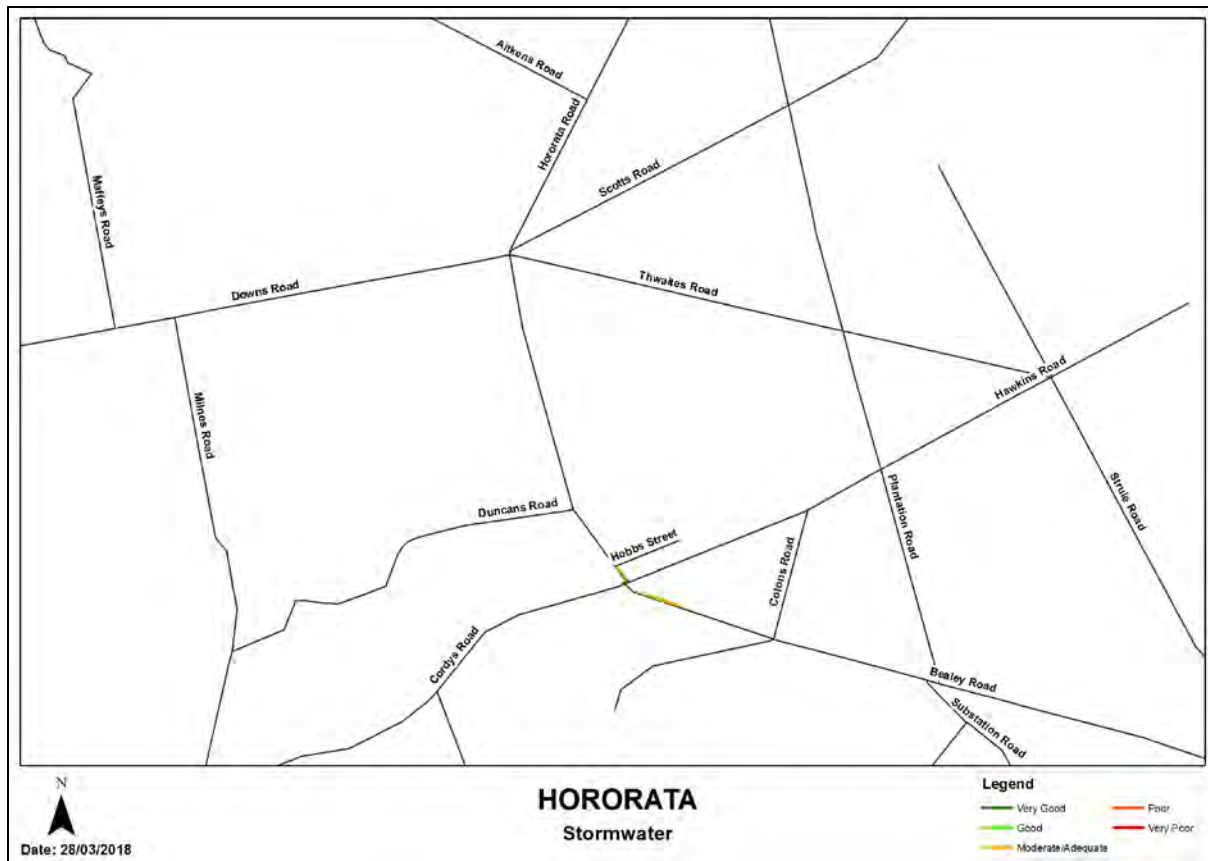


Figure 8-8 Asset Condition - Hororata

Table 8-7 provides a description of the condition rating used within the condition model.

Table 8-7 Asset Condition Grading

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

8.15 Funding Program

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

Years	Expenditure	Renewals	Projects	Capital Projects
2018/2019	\$7,205			\$25,000
2019/2020	\$7,205			\$40,000
2020/2021	\$7,205			
2021/2022	\$7,205			\$39,000
2022/2023	\$7,205			
2023/2024	\$7,205			
2024/2025	\$7,205			
2025/2026	\$7,205			
2026/2027	\$7,205			
2027/2028	\$7,205			
Total	\$72,050			\$104,000

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.

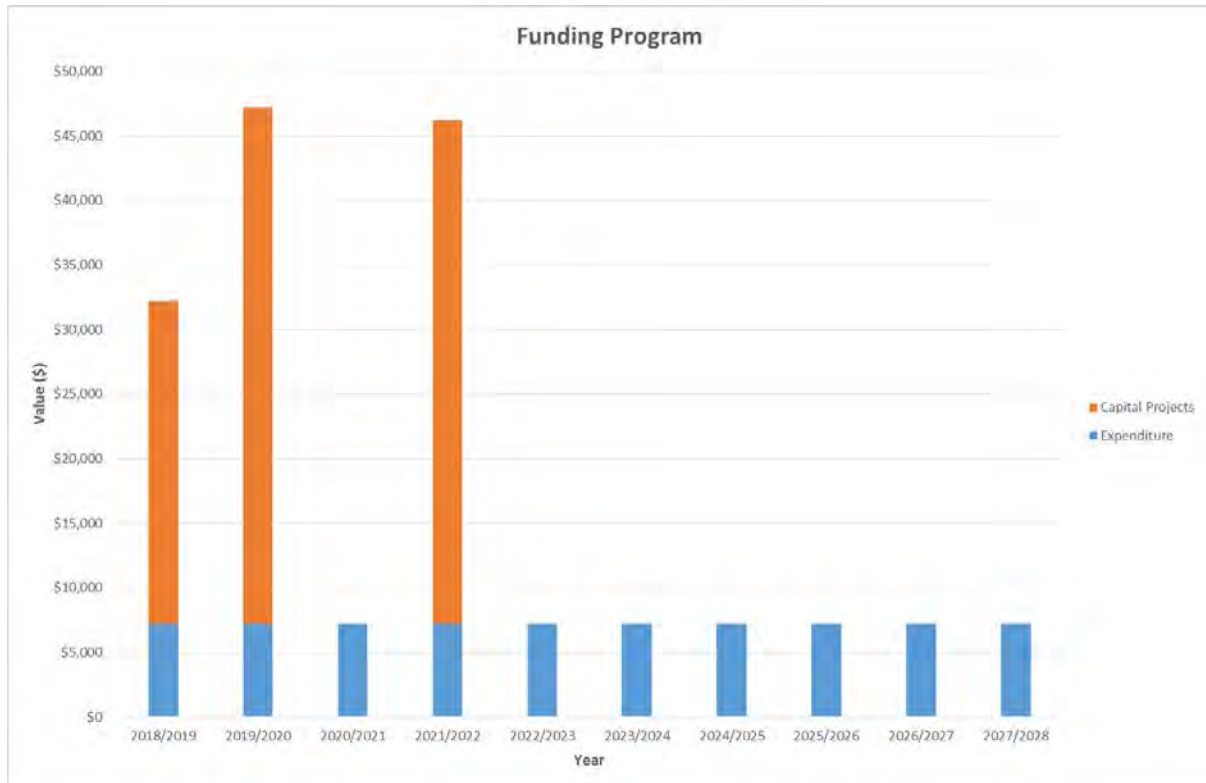


Figure 8-9 Hororata Funding Summary

There are a number of major projects for Hororata stormwater scheme in the LTP budget.

Table 8-9 Key Projects

Account Label	GL	Description	Year 1 (\$)	Year 2 (\$)	Year 3 (\$)	Years 4 to 10	Funding Split ³
Capital Projects	443290006	River obstruction removal	\$17,000				100% LoS
Capital Projects	443290007	Flood works	\$8,000	\$40,000		\$39,000	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 Where LoS refers to Level of Service and G refers to Growth

9.0 KIRWEE STORMWATER SCHEME

9.1 Scheme Summary

Description		Quantity
Scheme Area		199.42ha
Scheme Coverage (as at 1 Jan 2018)	Rating numbers	356
System components	Piped (m)	0
	Swales (m)	3813.3
	Drains (m)	0
	Manholes/Inspection Chambers (No.)	0
	Treatment	2 Rain gardens
	Other	N/A
Value (\$)	Replacement Cost	\$181,953.29
	Depreciated Replacement Cost	\$171,122.76
Financial	2018/2019 Estimate	\$4,210
	Annual maintenance cost	0.60%
	% of total	
Planning	Stormwater Management Plan	Draft
	No. SDC stormwater consents	0
Demand	Mean Annual Rainfall (mm)	663
	10% AEP (10 year) 1hr rainfall depth (mm)	20.1
Sustainability	Sustainable drain management practices	Adopted and Encouraged

9.2 Key Issues

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

Table 9-1 Kirwee Scheme Issues

What's the Problem	What we plan to do
Increased expectation from the community regarding level of service received from the stormwater network	Identify capacity restrictions in the system, design upgrades and budget for physical works.

9.3 Overview & History

Kirwee is located at the junction of West Coast and Tramway Roads. Within the township, stormwater is predominantly conveyed and treated by roadside swales and discharged to ground via soakpits. The exception to this is Glen Oak Drive where treatment is provided by rain gardens.



Figure 9-1 Scheme Map

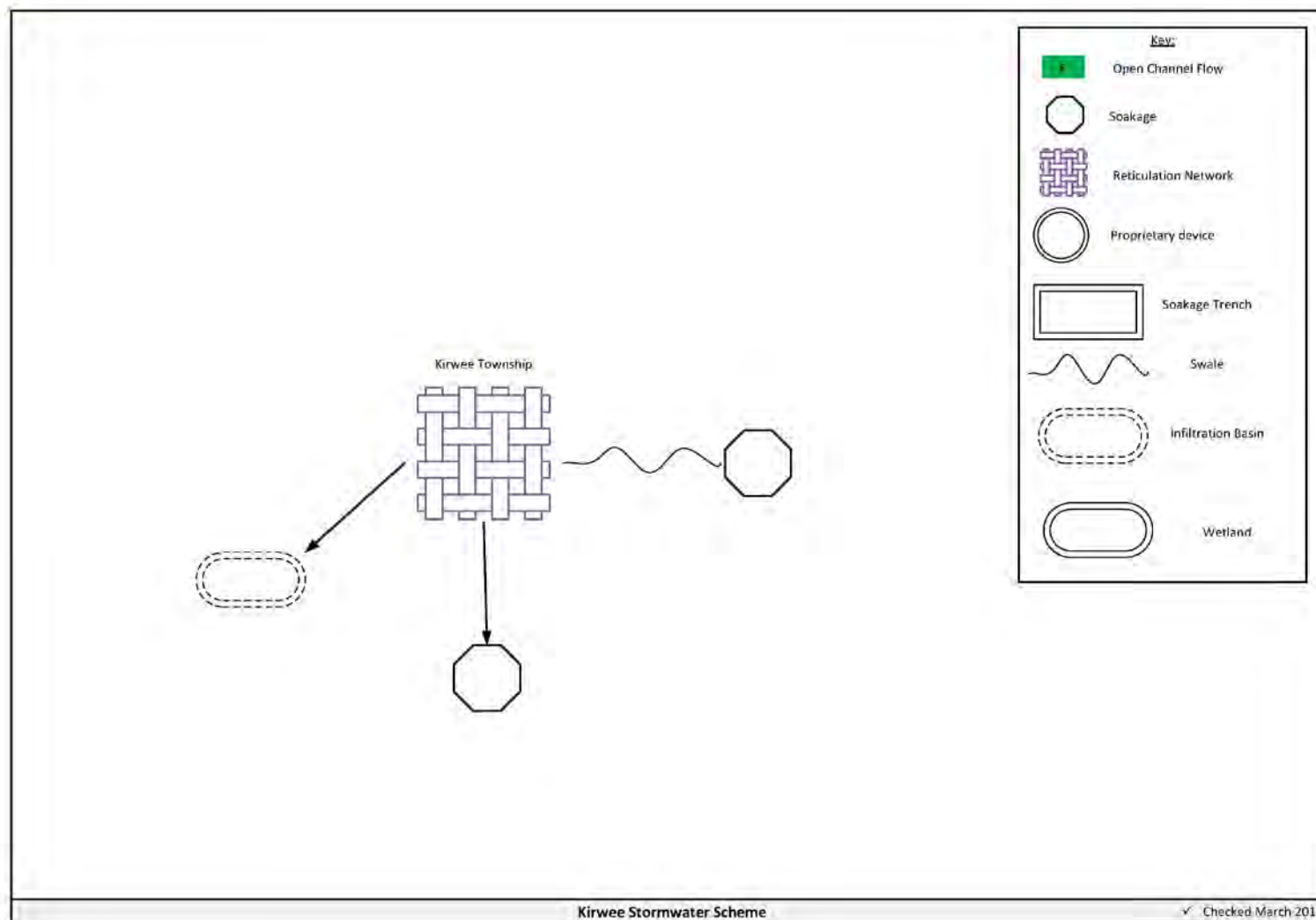


Figure 9-2 Scheme Schematic

9.4 Resource Consents

There is a global discharge consent held by Selwyn District Council for this stormwater management area.

Table 9-2 Resource Consents

Consent	Description	Location	Date Issued	Expiry Date
CRC167466 <i>Issued - Active</i>	To discharge contaminants into and onto land	Kirwee, Selwyn	12/04/2017	12/04/2052

9.5 Integrated Stormwater Management Plan

An ISMP has been granted for Kirwee. CRC167466

9.6 Scheme Assets

Council has a wide variety of stormwater assets within the district. A brief description of the assets within this scheme is provided below:

- Reticulated network – Includes pipes, manholes, sumps. The primary purpose of the reticulated network is to collect and convey stormwater. Historically these systems were designed for the 2 year storm event. Today's engineering standards require the piped network to be designed for a 10 year event with overland flow provision for up to the 50 year event.
- Open drains – are channels used to convey stormwater. They are cost effective means to convey large volumes of water.
- Swale (Grassed) – Is a longitudinal open channel which is lined with grass. The swale both conveys and treats stormwater.
- Soakholes – Are used to dispose of stormwater to ground in areas where the ground water table is low and soil permeability is high.

A summary of pipe diameter is not available for this scheme.

9.7 Operational Management

The stormwater network is operated and maintained under two maintenance contracts as follows:

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

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

9.8 Photos of Main Assets



Photo 1: Typical stormwater basin

9.9 Rapid Flood Modelling

The Council has undertaken 'Rapid Flood Hazard Assessment' modelling for its main townships. The modelling uses DHI MIKE 21 to simulate rainfall on grid with the outputs processed through ArcGIS producing maps illustrating a range of flood deeps during different rainfall intensities and durations.

The rapid flood assessment has been generated to provide a high level summary of potential flood and ponding areas across the district during extreme rainfall events. The results from this study are not to be used to set floor levels. The results have not been ground tested and therefore are indicative only.

For a 50 year event, Figure 9-3 shows the predicted flooding for Kirwee.

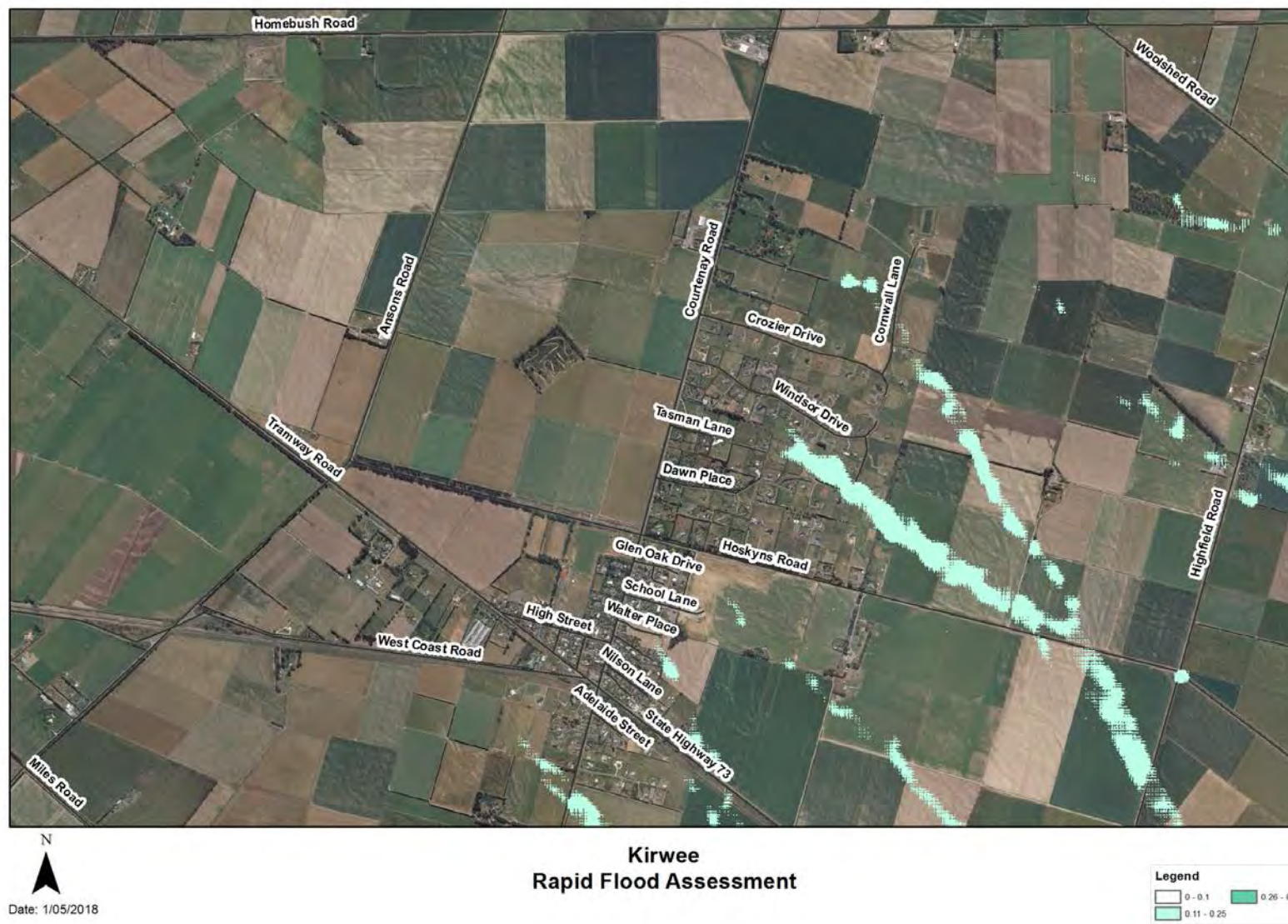


Figure 9-3 Rapid Flood Modelling, Kirwee

9.10 Risk Assessment

A risk assessment has been undertaken for the Kirwee scheme. The key output from the risk assessment is the identification of any extreme and high risks which need to be mitigated. In order to mitigate these risks they have been included and budgeted for in the projects within this LTP. Table 8-3 details the risk priority rating and Table 9-4 outlines the risks for this scheme.

Renewal of this consent is budgeted under district projects.

Table 9-3 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 9-4 Risks - Kirwee

Risk	Action/Project	Year Identified	2014 Risk Rating	2017 Risk Rating	Residual Risk Rating
Non-consented activities	Renewal of consents	2014	27	27	6

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

9.11 Asset Valuation Details

The total replacement value of assets within the Kirwee Scheme is \$181,953 as detailed in Table 9-5 below.

Table 9-5 Replacement Value, Kirwee

Asset Class 1	Asset Class 2	Sum of Replacement Value
Stormwater Reticulation	Channel	\$133,066
	Management Device	\$35,452
	Pipe	\$5,860
	Soakhole	\$7,576

Replacement values for different types (channels, laterals, management devices and pipes) of stormwater assets are shown in Figure 9-4 below.

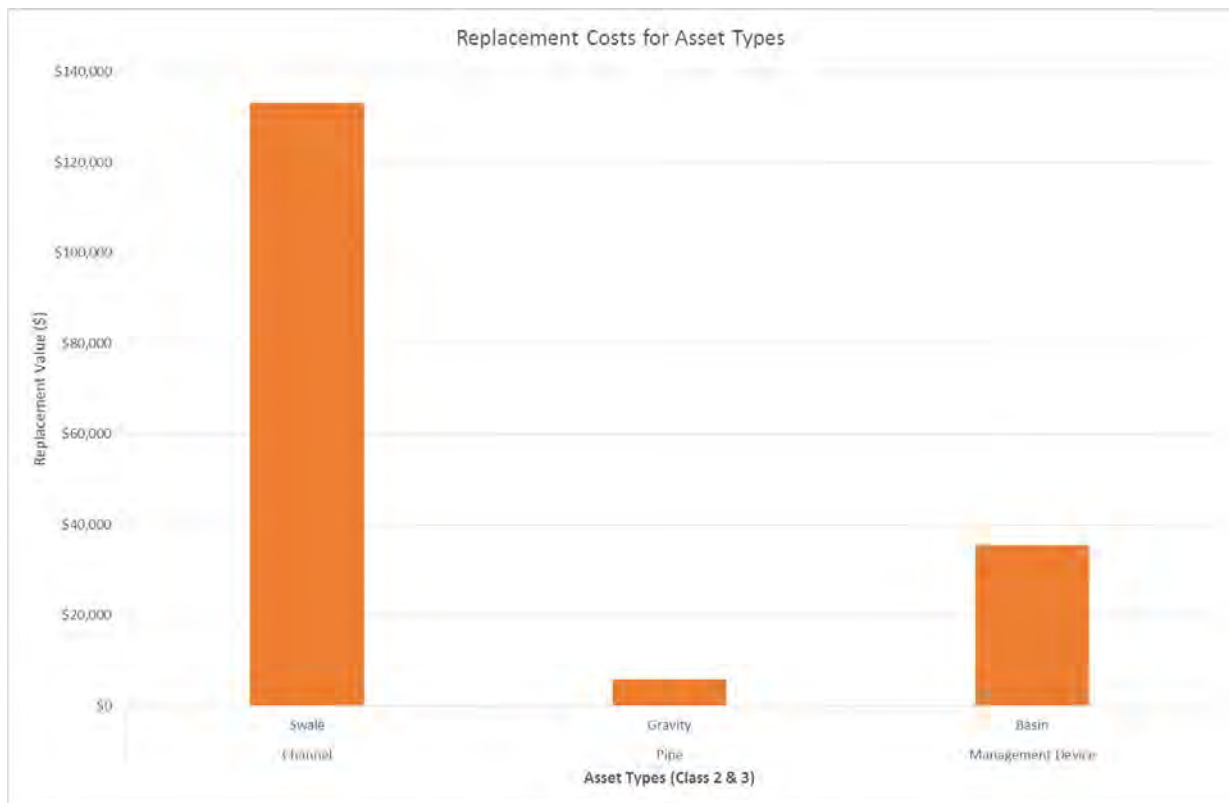


Figure 9-4 Replacement Costs for Kirwee

9.12 Renewals

The renewal profile has been taken from the 2017 5 Waters Valuation. A graph showing the renewals for this scheme are shown by Figure 9-5 below. The majority of assets requiring renewal are culverts which occur in the year 2019/20.

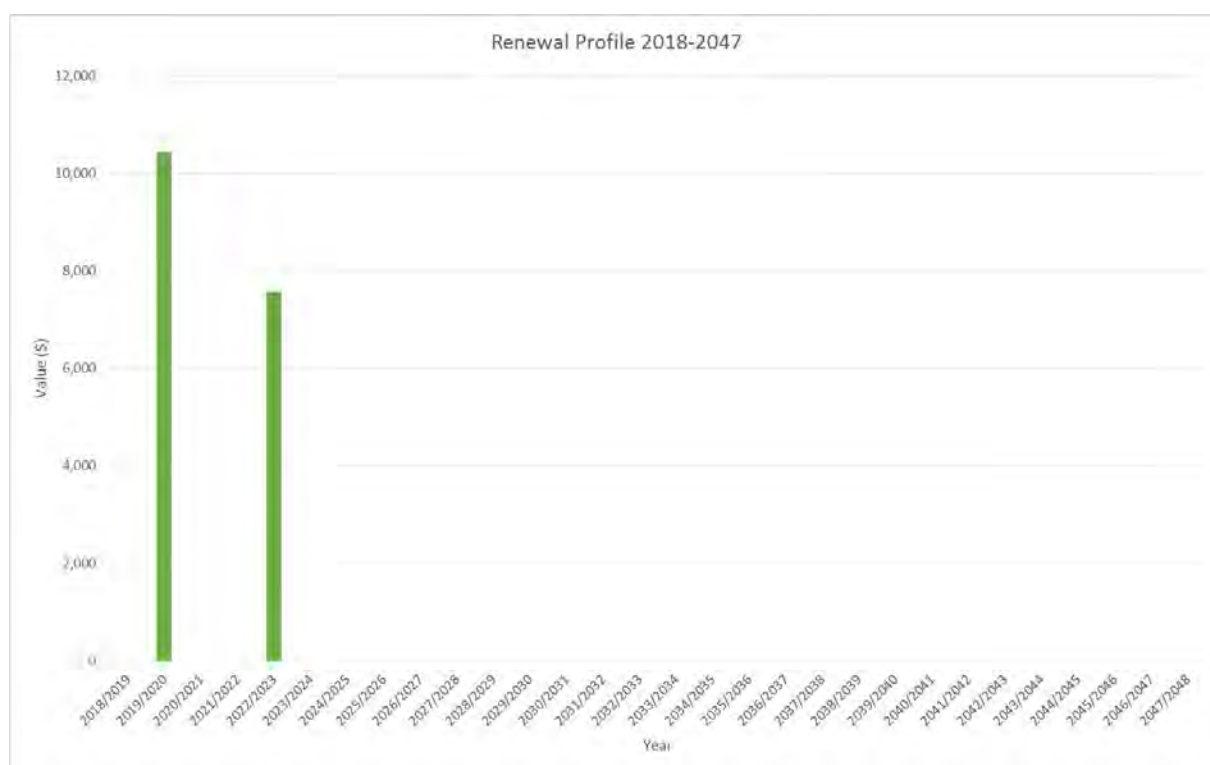


Figure 9-5 Kirwee Stormwater Renewal Profile

9.13 Critical Assets

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

Table 9-6 Length of Assets per Criticality Level

Criticality Bands		Length (m)
5	Low	3847
4	Medium-Low	0
3	Medium	0
2	Medium-High	0
1	High	0

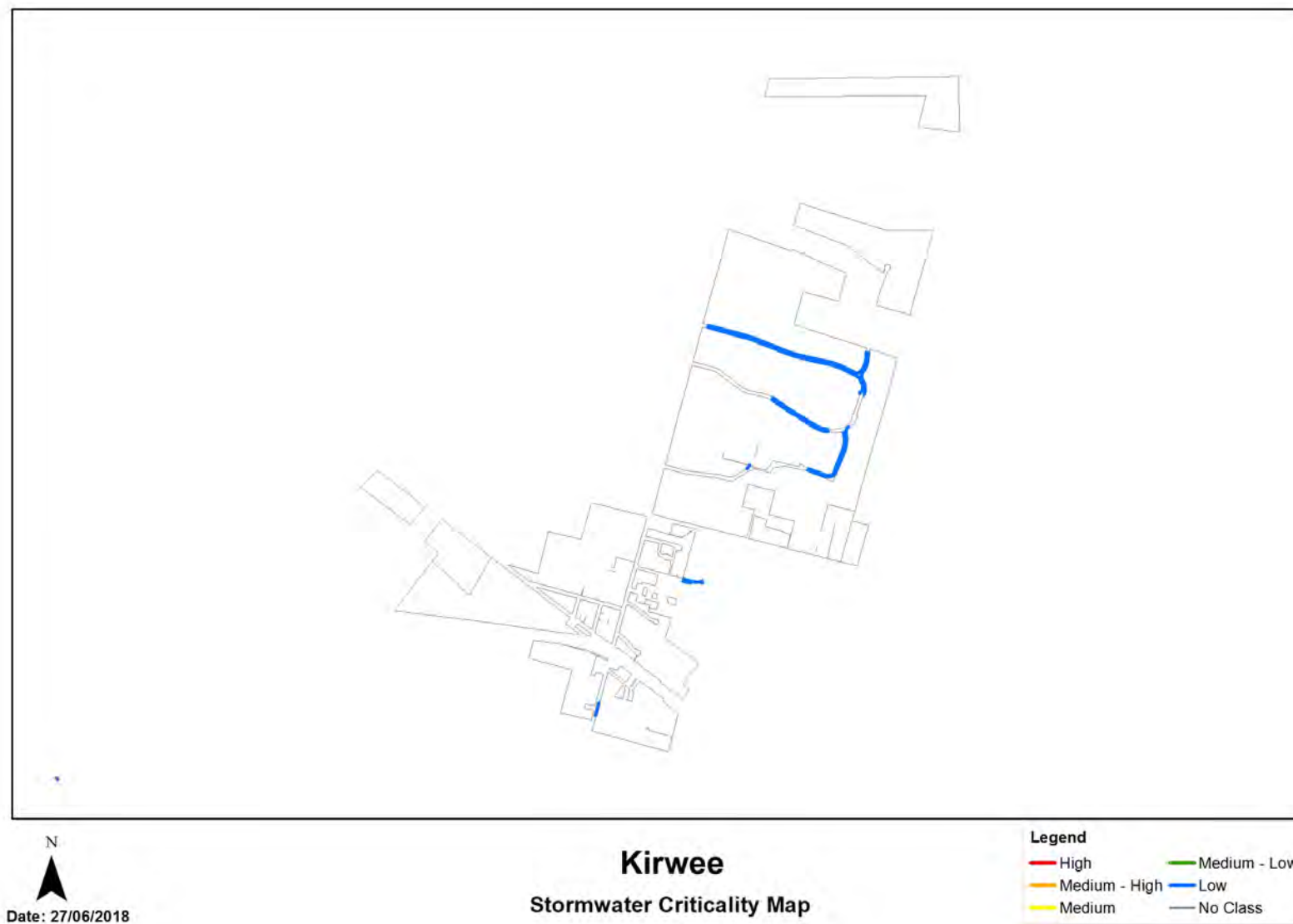


Figure 9-6 Criticality Map

9.14 Asset Condition

The asset condition model was run for Kirwee 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). Within this scheme there are no assets that have a recorded known condition.

9.15 Funding Program

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

Years	Expenditure	Renewals	Projects	Capital Projects
2018/2019	\$4,210			
2019/2020	\$4,210	\$10,435		
2020/2021	\$4,210			
2021/2022	\$4,210			
2022/2023	\$4,210	\$7,576		
2023/2024	\$4,210			
2024/2025	\$4,210			
2025/2026	\$4,210			
2026/2027	\$4,210			
2027/2028	\$4,210			
Total	\$42,100	\$18,011		

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.

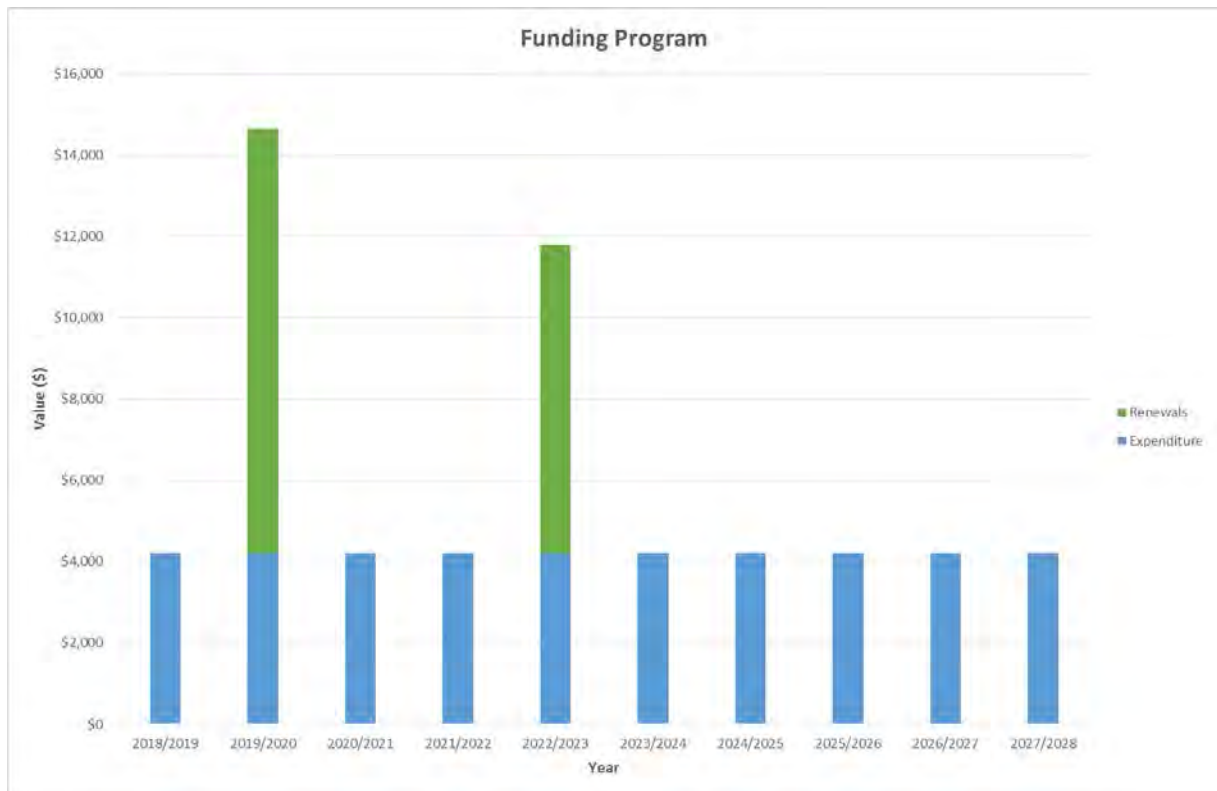


Figure 9-7 Kirwee Funding Summary

There are no major projects for Kirwee stormwater scheme in the LTP budget. The list of district wide projects can be found in 5Waters Activity Management Plan: Volume 1.

10.0 LAKE COLERIDGE STORMWATER SCHEME

10.1 Scheme Summary

Description		Quantity
Scheme Area		21.74ha
Scheme Coverage (as at 1 Jan 2018)	Rating numbers	69
System components	Piped (m)	302.3
	Swales (m)	81.3
	Drains (m)	0
	Manholes/Inspection Chambers (No.)	0
	Treatment	N/A
	Other	N/A
Value (\$)	Replacement Cost	\$108,483.20
	Depreciated Replacement Cost	\$66,767.28
Financial	2018/2019 Estimate	\$7,130
	Annual maintenance cost	1.02%
	% of total	
Planning	Stormwater Management Plan	Draft
	No. SDC stormwater consents	0
Demand	Mean Annual Rainfall (mm)	820
	10% AEP (10 year) 1hr rainfall depth (mm)	14.8
Sustainability	Sustainable drain management practices	Adopted and Encouraged

10.2 Key Issues

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

Table 10-1 Lake Coleridge Scheme Issues

What's the Problem	What we plan to do
Increased expectation from the community regarding level of service received from the stormwater network	Identify capacity restrictions in the system, design upgrades and budget for physical.
Soakholes in Ryton Place do not have the capacity to take moderate rainfall events resulting in road flooding. Ground in this area is not free draining.	Investigate other options for SW detention.
Surface ponding outside some properties in Harper Place.	Discuss options with the community to prioritise areas of need. Budget for works to resolve.

10.3 Overview & History

The stormwater scheme comprises a number of relatively short sections of pipework discharging either to ground or surface water (ultimately the Rakaia River).

Soakholes in Ryton Place do not cope with significant rainfall. New soakholes were attempted to be installed in 2013 but at 3.5m no free draining material was found, only clay. Bore logs show sediments between 16 - 75m. Localised flooding occurs on Harper Place and piping is proposed to main behind affected properties.

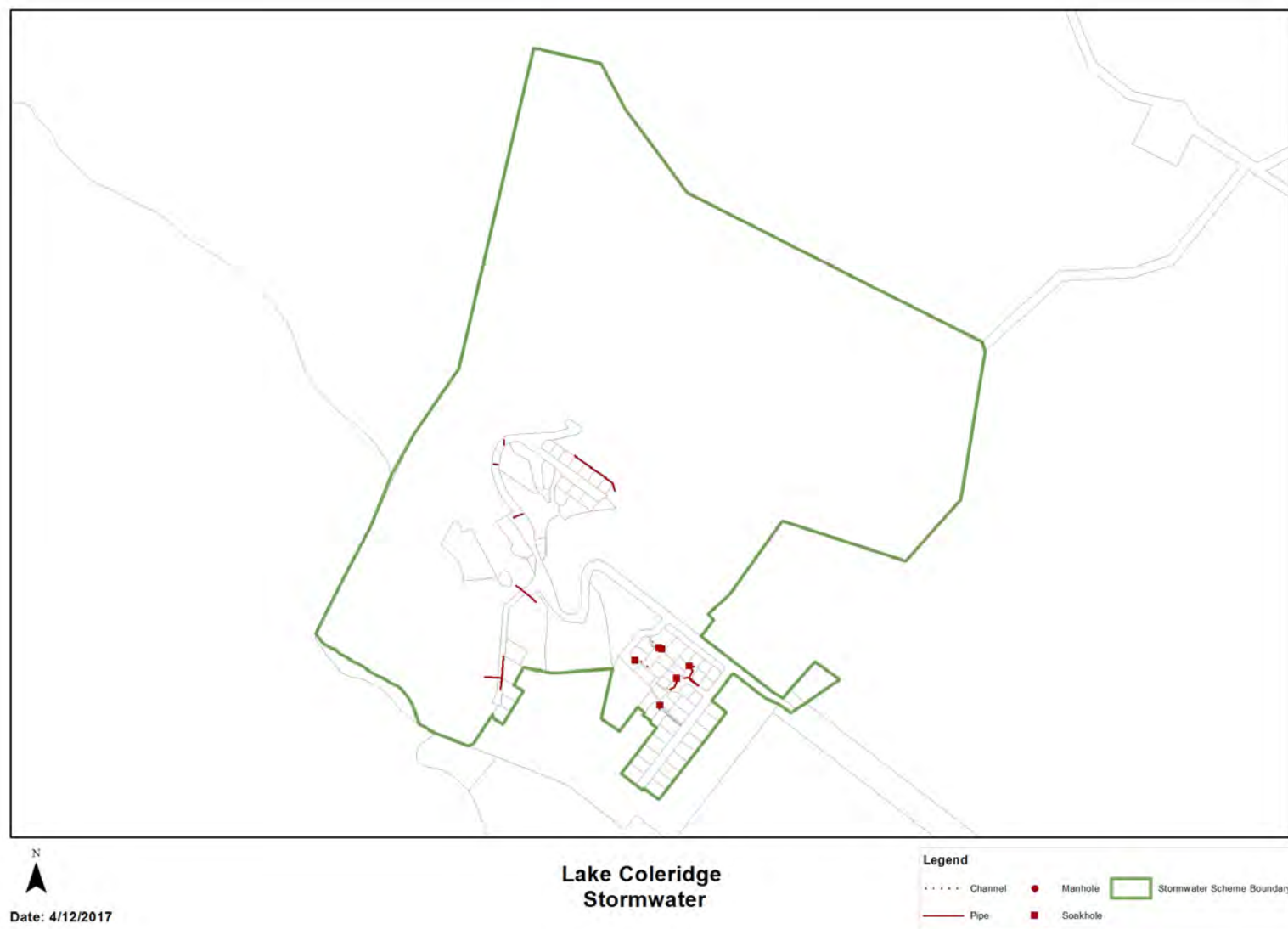


Figure 10-1 Scheme Map

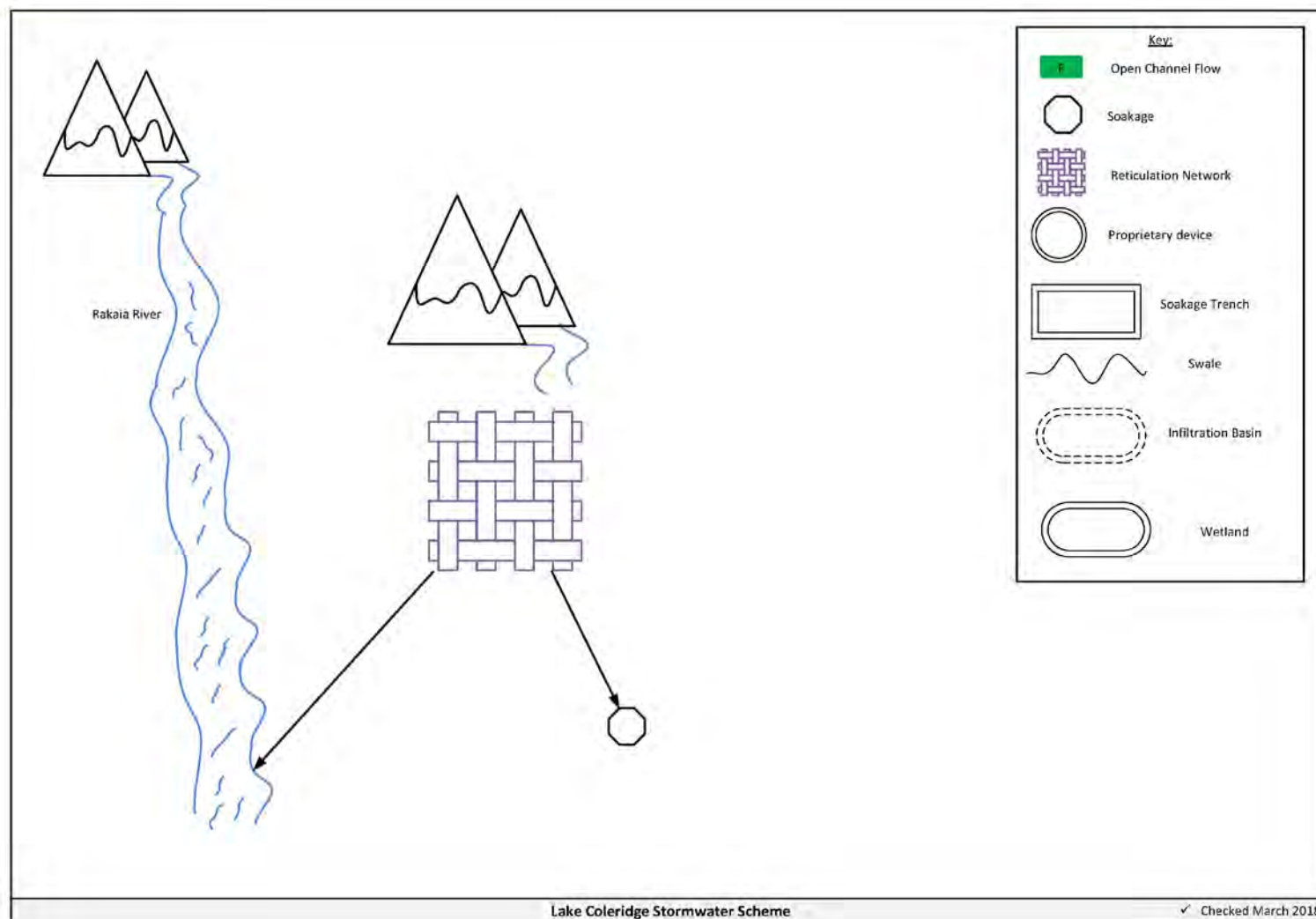


Figure 10-2 Scheme Schematic

10.4 Resource Consents

No resource consents are held by Selwyn District council for this stormwater management area. Council will actively seek a global consent for this area.

10.5 Integrated Stormwater Management Plan

Environment Canterbury's Natural Resources Regional Plan (NRRP) became operative on the 11th June 2011. The plan requires that all non-permitted stormwater discharges have consent application lodged by 11th December 2011 under rules WQL6 and 7 or June 2016 under rule WQL8. Due to the tight timeframes (6 months) under rules WQL 6 and 7 it is proposed to obtain consents under rule WQL8. Under the Provisional Land and Water Regional Plan (PLWRG), the deadline for obtaining network discharge consents to allow discharges to be permitted under rule 5.93 has been extended to June 2018.

An ISMP is required for Lake Coleridge, these application documents are still being developed and will be lodged before June 2018.

10.6 Scheme Assets

Council has a wide variety of stormwater assets within the district. A brief description of the assets within this scheme is provided below:

- a. Reticulated network – Includes pipes, manholes, sumps. The primary purpose of the reticulated network is to collect and convey stormwater. Historically these systems were designed for the 2 year storm event. Today's engineering standards require the piped network to be designed for a 10 year event with overland flow provision for up to the 50 year event.
- b. Soakholes – Are used to dispose of stormwater to ground in areas where the ground water table is low and soil permeability is high.

A summary of diameter for channels and pipes, where known, is shown below in Figure 10-3. All asset in this scheme, where known, are of material PVCU.

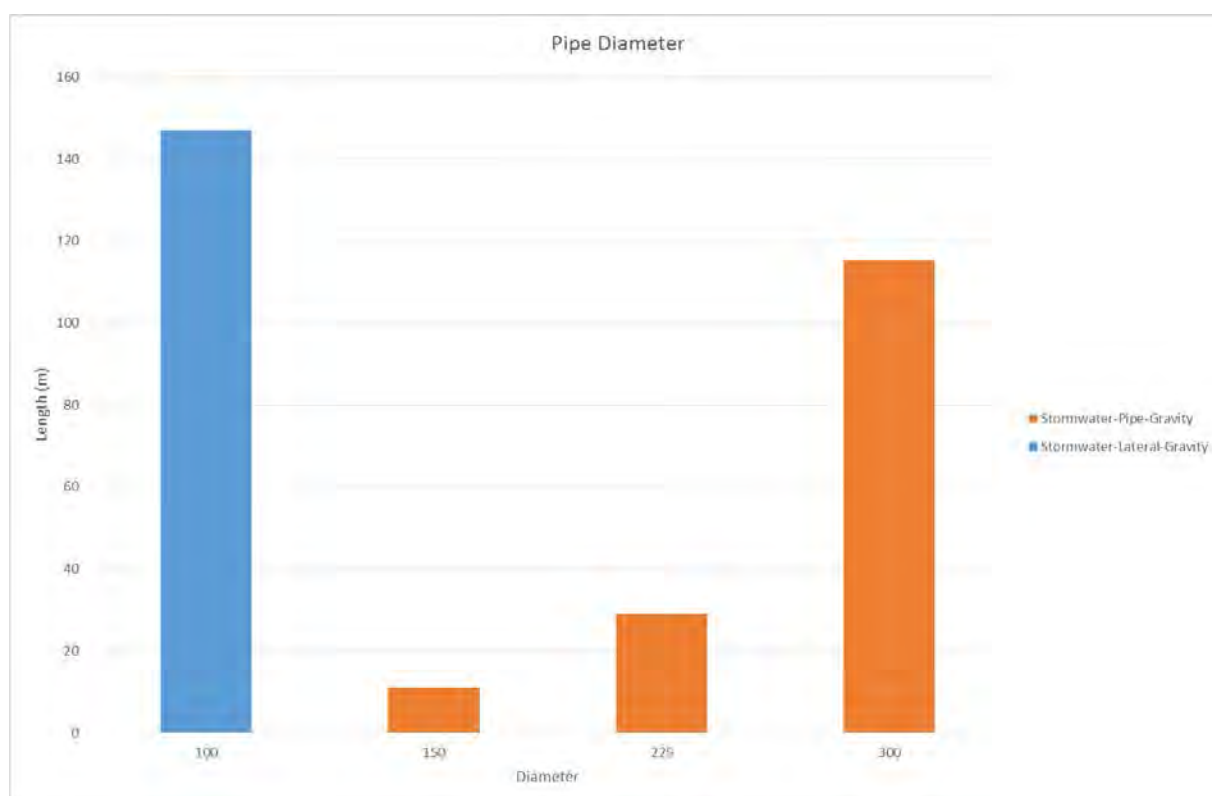


Figure 10-3 Pipe Diameter – Lake Coleridge

10.7 Operational Management

The stormwater network is operated and maintained under two maintenance contracts as follows:

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

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

10.8 Photos of Main Assets

No photos are available for Lake Coleridge.

10.9 Rapid Flood Modelling

The Council has undertaken ‘Rapid Flood Hazard Assessment’ modelling for its main townships. The modelling uses DHI MIKE 21 to simulate rainfall on grid with the outputs processed through ArcGIS producing maps illustrating a range of flood deeps during different rainfall intensities and durations.

The rapid flood assessment has been generated to provide a high level summary of potential flood and ponding areas across the district during extreme rainfall events. The results from this study are not to be used to set floor levels. The results have not been ground tested and therefore are indicative only.

For a 50 year event, no flooding is expected in Lake Coleridge.

10.10 Risk Assessment

A risk assessment has been undertaken for the Lake Coleridge scheme. The key output from the risk assessment is the identification of any extreme and high risks which need to be mitigated. In order to mitigate these risks they have been included and budgeted for in the projects within this LTP. Table 10-2 details the risk rating priority, Table 10-3 outlines the risks and the list of key projects is found in Table 10-8.

Table 10-2 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 10-3 Risks – Lake Coleridge

Risk	Action/Project	Year Identified	2014 Risk Rating	2017 Risk Rating	Residual Risk Rating
Poor drainage	Investigate stormwater disposal options	2014	12	12	12
Non-consented activities	Renewal of consents	2014	27	27	6

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

10.11 Asset Valuation Details

The total replacement value of assets within the Lake Coleridge Scheme is \$108,483 as detailed in Table 10-4 below. The majority of value, 60%, is made up of pipes.

Table 10-4 Replacement Value, Lake Coleridge

Asset Class 1	Asset Class 2	Sum of Replacement Value
Stormwater Reticulation	Channel	\$2,837
	Inlet-Outlet-Point	\$16,608
	Lateral	\$33,450
	Pipe	\$51,800
	Soakhole	\$3,788

Replacement values for different types (channels, laterals, management devices and pipes) of stormwater assets are shown in Figure 10-4 below.

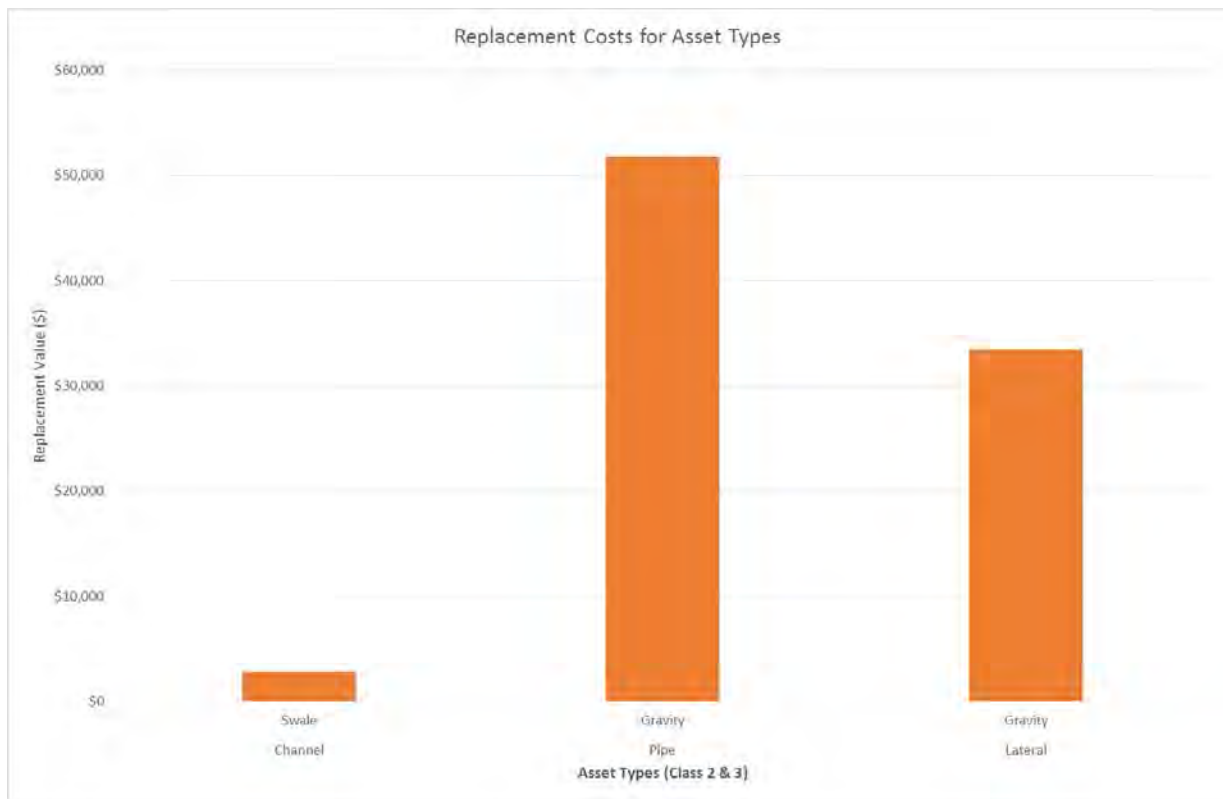


Figure 10-4 Replacement Costs for Lake Coleridge

10.12 Renewals

The renewal profile has been taken from the 2017 5 Waters Valuation. A graph showing the renewals for this scheme are shown by Figure 10-5 below. The majority of assets requiring renewal are culverts/pipes which occur in the year 2019/20.



Figure 10-5 Lake Coleridge Stormwater Renewal Profile

10.13 Critical Assets

The criticality model for Lake Coleridge has been updated for the 2018 AcMP. The methodology of the criticality model can be found in 5Waters Activity Management Plan: Volume 1 and it provides details of how the criticality has been calculated for the reticulation assets. Table 10-5 and Figure 10-6 below shows the calculated criticality for all of the assets within this scheme that have a recorded known length.

Table 10-5 Length of Assets per Criticality Level

Criticality Bands		Length (m)
5	Low	387
4	Medium-Low	0
3	Medium	0
2	Medium-High	0
1	High	0

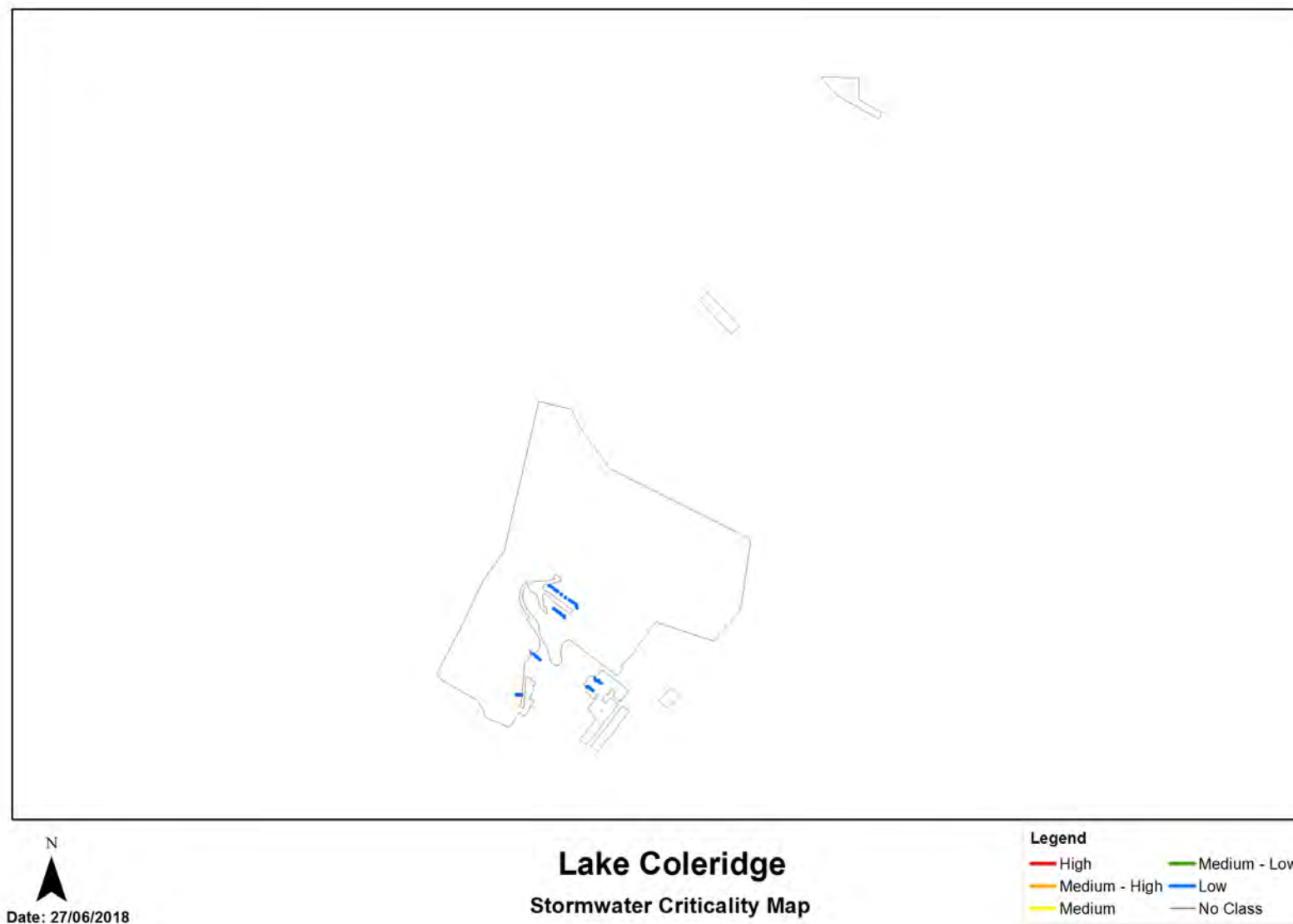


Figure 10-6 Criticality Map

10.14 Asset Condition

The asset condition model was run for Lake Coleridge in 2017. The methodology of the model can be found in 5Waters Activity Management Plan: Volume 1 and it provides details of how the model has been calculated for the reticulation assets (particularly pipes). Figure 10-7 below shows the level of asset condition for all of the assets within this scheme that have a recorded known condition.

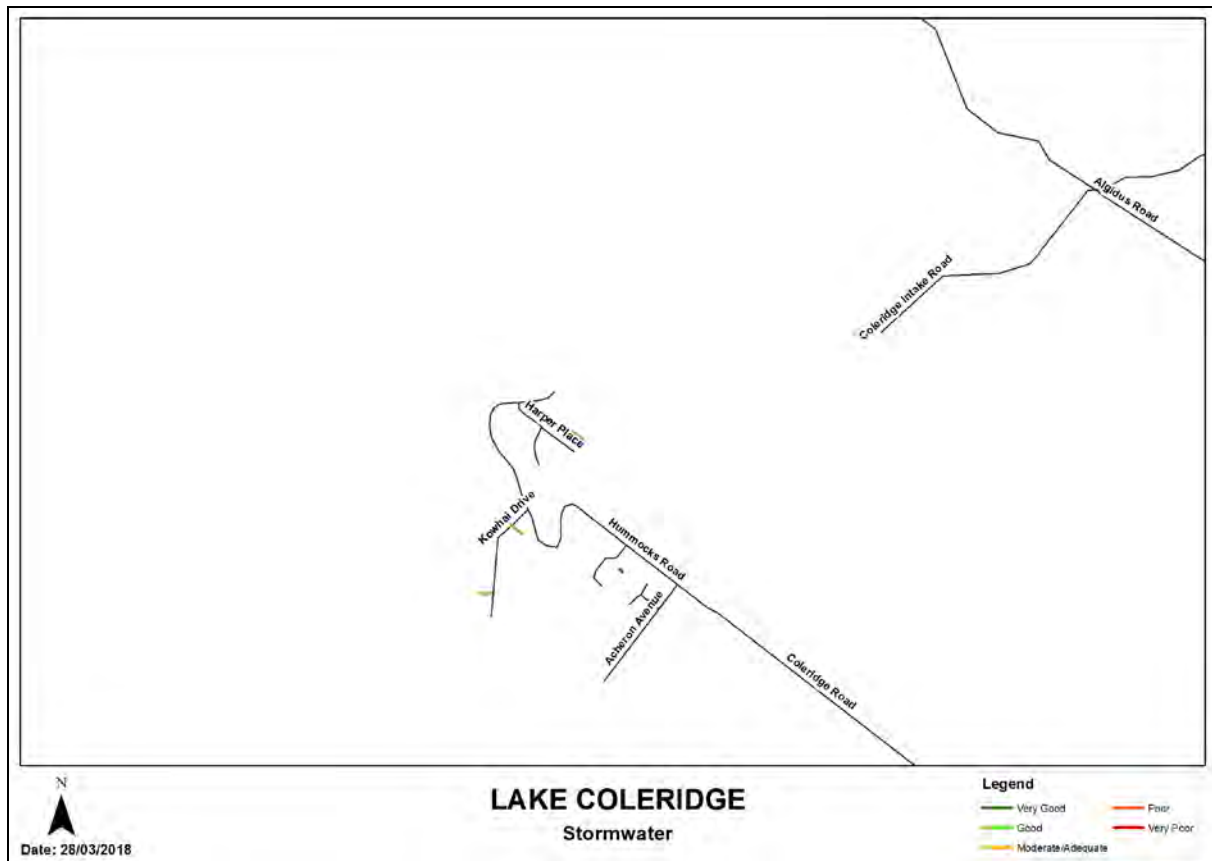


Figure 10-7 Asset Condition – Lake Coleridge

Table 10-6 provides a description of the condition rating used within the condition model.

Table 10-6 Asset Condition Grading

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

10.15 Funding Program

The 10 year budgets for Lake Coleridge are shown by Figure 10-4 and Figure 10-8. 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 10-7 Lake Coleridge Budget Summary

Years	Expenditure	Renewals	Projects	Capital Projects
2018/2019	\$7,130			\$10,000
2019/2020	\$2,630			\$15,000
2020/2021	\$2,630			
2021/2022	\$2,630			
2022/2023	\$2,630	\$3,788		\$63,000
2023/2024	\$2,630			
2024/2025	\$2,630			
2025/2026	\$2,630			
2026/2027	\$2,630			
2027/2028	\$2,630			
Total	\$30,800	\$3,788		\$88,000

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

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

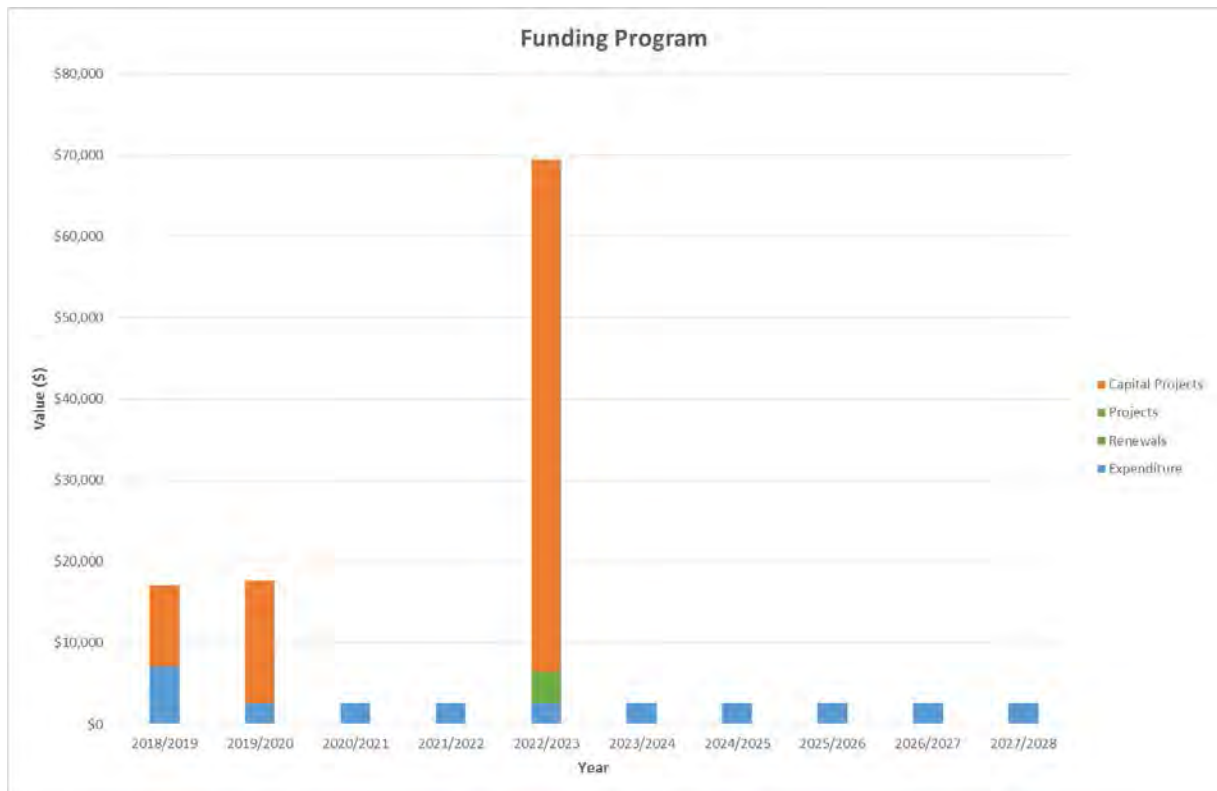


Figure 10-8 Lake Coleridge Funding Summary

There is one minor project for Lake Coleridge stormwater scheme in the LTP budget.

Table 10-8 Key Projects

Account Label	GL	Description	Year 1 (\$)	Year 2 (\$)	Year 3 (\$)	Years 4 to 10	Funding Split ⁴
Capital Projects	444190003	flood works	\$10,000	\$15,000		\$ 63,000	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 Where LoS refers to Level of Service and G refers to Growth

11.0 LEESTON STORMWATER SCHEME

11.1 Scheme Summary

Description		Quantity
Scheme Area		182.26ha
Scheme Coverage (as at 1 Jan 2018)	Rating numbers	889
System components	Piped (m)	11445.52
	Swales (m)	2689.9
	Drains (m)	4891.65
	Manholes/Inspection Chambers (No.)	86
	Treatment	2 Humeceptors and 1 Wetland (+ future dry basins)
	Other	N/A
Value (\$)	Replacement Cost	\$6,288,618.84
	Depreciated Replacement Cost	\$4,918,994.63
Financial	2018/2019 Estimate	\$59,226
	Annual maintenance cost	8.48%
	% of total	
Planning	Stormwater Management Plan	Draft
	No. SDC stormwater consents	5
Demand	Mean Annual Rainfall (mm)	628
	10% AEP (10 year) 1hr rainfall depth (mm)	19.2
Sustainability	Sustainable drain management practices	Adopted and Encouraged

11.2 Key Issues

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

Table 11-1 Leeston Scheme Issues

What's the Problem	What we plan to do
Township flooding from upper catchment draining into Leeston Creek.	Continue to consult with the Community regarding options including the Leeston North Stormwater Bypass.
Township flooding from local run off	Discuss township modelling with the Community to identify reticulation upgrades required to reduce localised ponding during rainfall events.

11.3 Overview & History

The Leeston stormwater system is predominantly a piped network with some swales and open drains. The discharge of this network is mainly to the Leeston Creek, with parts of the catchment discharging to other land drainage systems. Leeston Creek is spring feed and flows on to Te Waihora (Lake Ellesmere), 6 kilometres south-east of Leeston.

A Stormwater Management Plan 'Leeston Stormwater Management Plan, January 2006' has been prepared for the proposed subdivision located to the north of Leeston adjacent to Manses Road.

Over the 15-17 and 19-22 June 2013, 254 mm property flooding of rainfall fell resulting in significant surface flooding of a number of properties. In Leeston town originating from a number of classified drains including Leeston Creek. Sand bagging was undertaken by the volunteer fire service.

Following the flooding a community meeting and drop in session was in July 2013 and 9 options proposed by Council to the community committee in November 2013. These options included the Leeston North Bypass (including upgrade of the showground culverts) and extension and upgrade of drain 40 on Harmans Road, additional piping in the township and township modelling. These options will be further investigated and community consultation undertaken in 2014.

A level transducer has been installed in Leeston Creek linked to SCADA. The transducer is located on the culvert of the corner of Gallipoli and Selwyn Street.

The community agreed to fund the bypass works as part of the 2015-25LTP consultation process. The first stage of the bypass is complete.

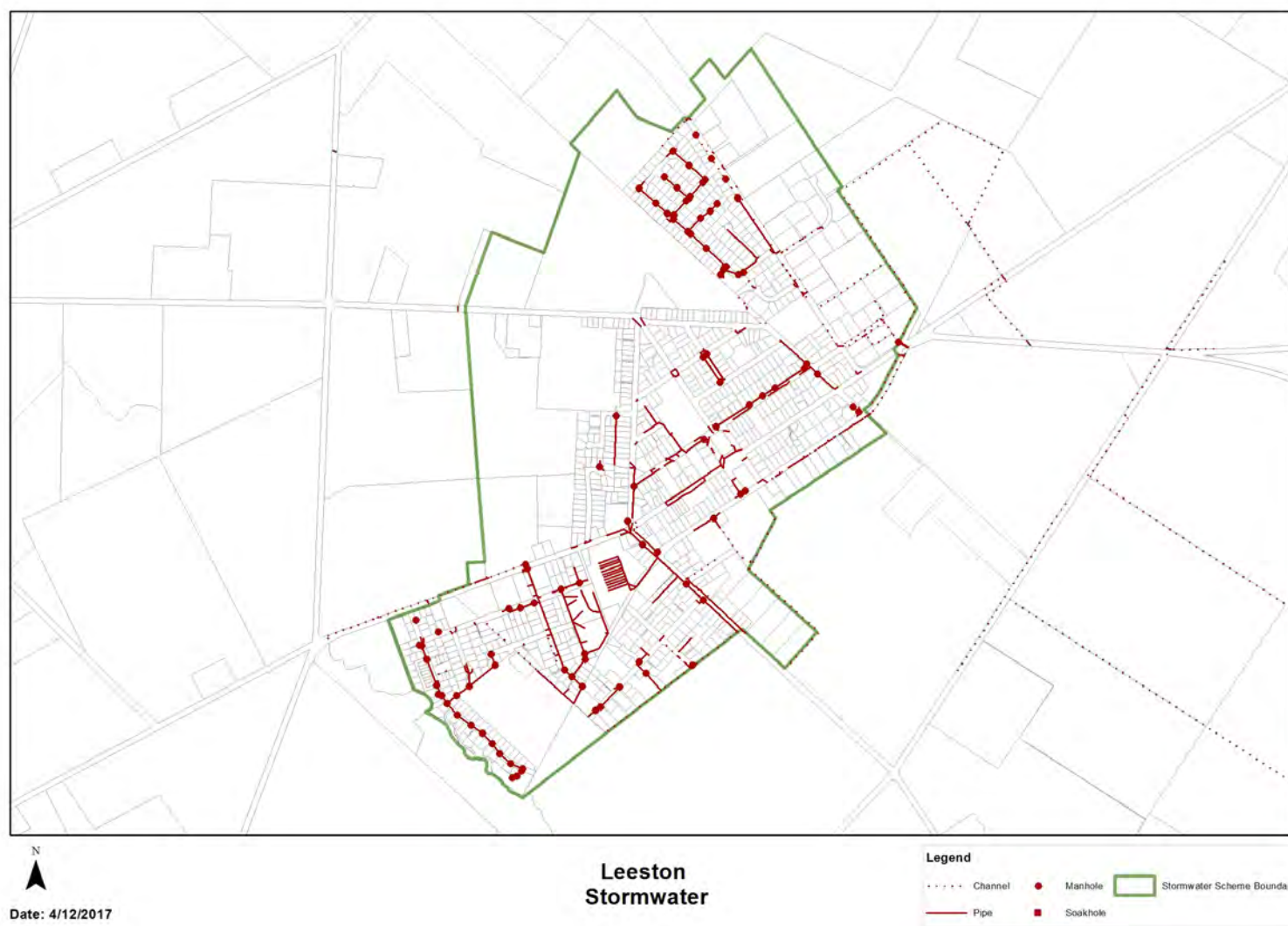


Figure 11-1 Scheme Map

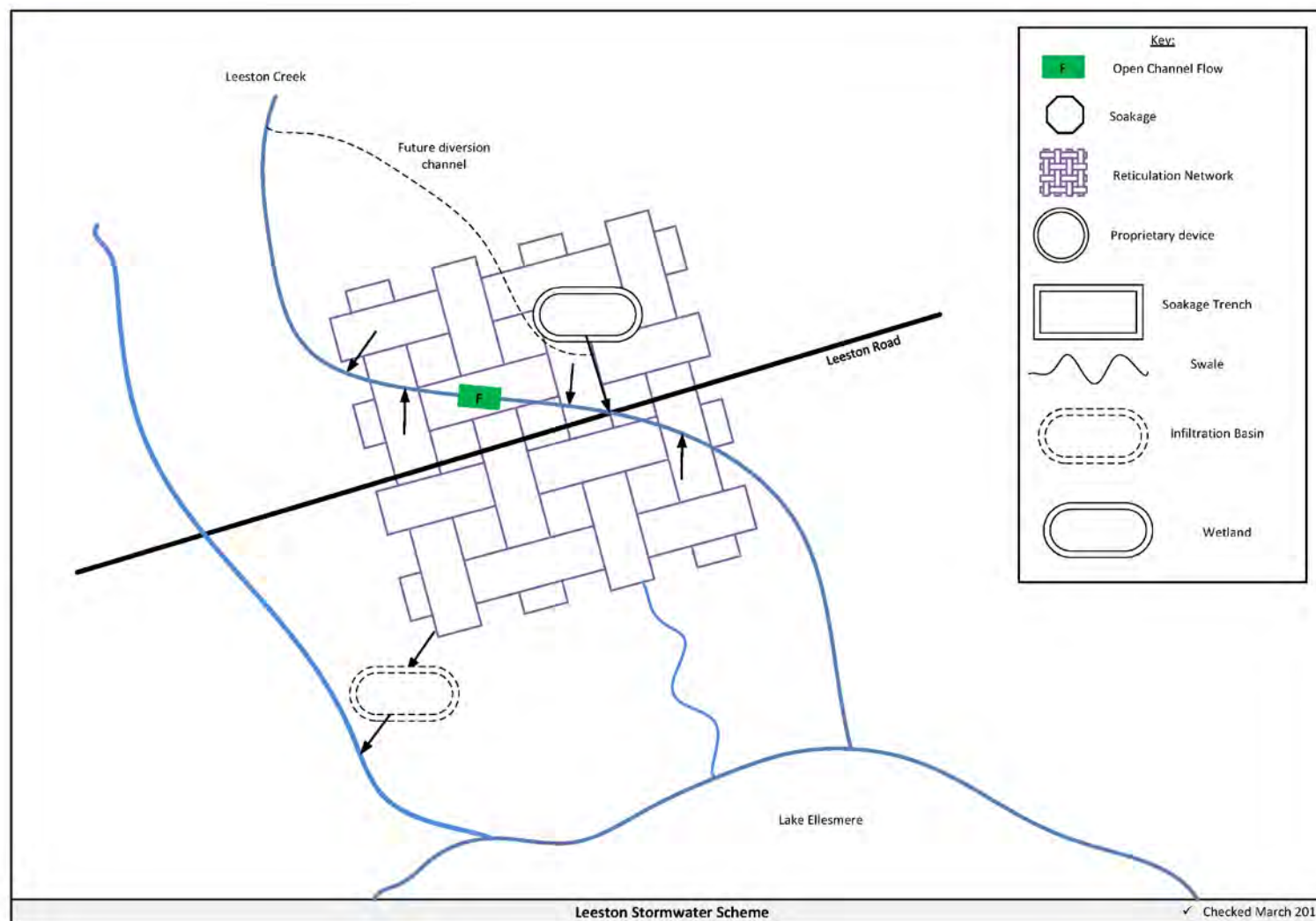


Figure 11-2 Scheme Schematic

11.4 Resource Consents

The Leeston stormwater scheme has a number of resource consents. Table 11-2 shows the stormwater discharge permitted by the resource consents for this scheme.

Consent, CRC930163, is to divert Leeston creek to Tramway reserve road (July 2029). This is linked to CRC930165.1 which is the consent used when groundwater is too high to irrigate sewage at Ellesmere treatment plant and to divert water for Doyleston when required to Tramway Reserve.

Table 11-2 Resource Consents

Consent	Description	Location	Date Issued	Expiry Date
CRC143914* <i>Issued - Active</i>	To change conditions 3, 4, 5 and 6 of CRC071838.2 - to discharge contaminants into surface water	Pound Road Leeston, Dunsandel Road & Manses Road, LEESTON	22/01/2014	24/08/2042
CRC930163 <i>Issued - Active</i>	To dam Leeston Creek by means of an existing concrete structure and to divert flow to Tramway Reserve Drain.	Leeston And Springston Roads, LEESTON	29/08/1995	28/07/2029

Resource Consents for the Bypass:

CRC072300 <i>Issued - Active</i>	To excavate soil from over a confined aquifer for the creation of a new channel and wetland at or about map reference.	Pound Road Leeston, Dunsandel Road & Manses Road, LEESTON	11/09/2007	24/08/2042
CRC071840 <i>Issued - Active</i>	To undertake works in a watercourse to establish the overflow for the flood overflow channel in Leeston Creek as part of a proposed residential subdivision comprising of approximately 330 lots on land which has been rezoned Living 2 and Living LXA under the Selwyn District Plan	Pound Road Leeston, Dunsandel Road & Manses Road, LEESTON	11/09/2007	24/08/2042
CRC071839 <i>Issued - Active</i>	To divert a watercourse, being the flood overflow channel of Leeston Creek as part of a proposed residential subdivision comprising of approximately 330 lots on land which has been rezoned Living 2 and Living LXA under the Selwyn District Plan	Pound Road Leeston, Dunsandel Road & Manses Road, LEESTON	11/09/2007	24/08/2042

New subdivisions at 28 Manse Road (CRC136091) and Corner of Manse Road and High Streets discharge (CRC136819 and CRC131889) to open drain as a permitted activity.

*Note this consent requires installation of roof water infiltration tanks. A consent variation was submitted to remove this condition in 2013, awaiting decision. This consent also includes a requirement to upgrade the capacity of Leeston Creek.

11.5 Integrated Stormwater Management Plan

Environment Canterbury's Natural Resources Regional Plan (NRRP) became operative on the 11th June 2011. The plan requires that all non-permitted stormwater discharges have consent application lodged by 11th December 2011 under rules WQL6 and 7 or June 2016 under rule WQL8. Due to the tight timeframes (6 months) under rules WQL 6 and 7 it is proposed to obtain consents under rule WQL8. Under the Provisional Land and Water Regional Plan (PLWRG), the deadline for obtaining network discharge consents to allow discharges to be permitted under rule 5.93 has been extended to June 2018.

An ISMP is required for Leeston, these application documents are still being developed and will be lodged before June 2018.

11.6 Scheme Assets

Council has a wide variety of stormwater assets within the district. A brief description of the assets within this scheme is provided below:

- a. Humeceptor - Is a hydrodynamic separator which helps to reduce mass sediment load from the discharge, some removal of hydrocarbons is also achieved.
- b. Swale (Grassed) – Is a longitudinal open channel which is lined with grass. The swale both conveys and treats stormwater.
- c. Infiltration basin – is a stormwater management device which is used to store, treat and dispose of stormwater to the ground via soakage.
- d. Wetland - is a stormwater management device which is used to attenuate, treat and dispose of stormwater. Discharge from a wetland is to surface water (open drains or streams). Wetlands have high biodiversity value and are best suited in areas where the ground water table is high.
- e. Open drains – are channels used to convey stormwater. They are cost effective means to convey large volumes of water.
- f. Flood diversion channel – is a large scale open drain designed to convey flood flows.

A summary of material and diameter for channels and pipes, where known, is shown below in Figure 11-3 and Figure 11-4.

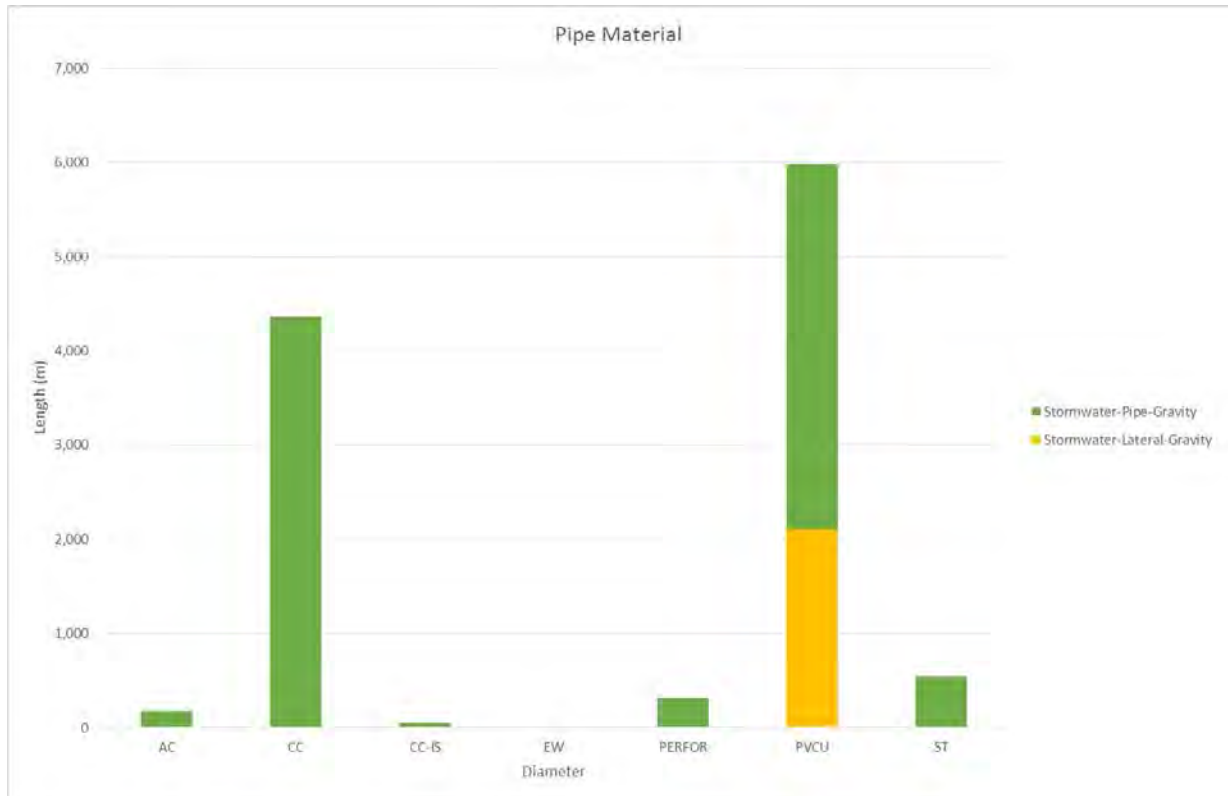


Figure 11-3 Pipe Material - Leeston

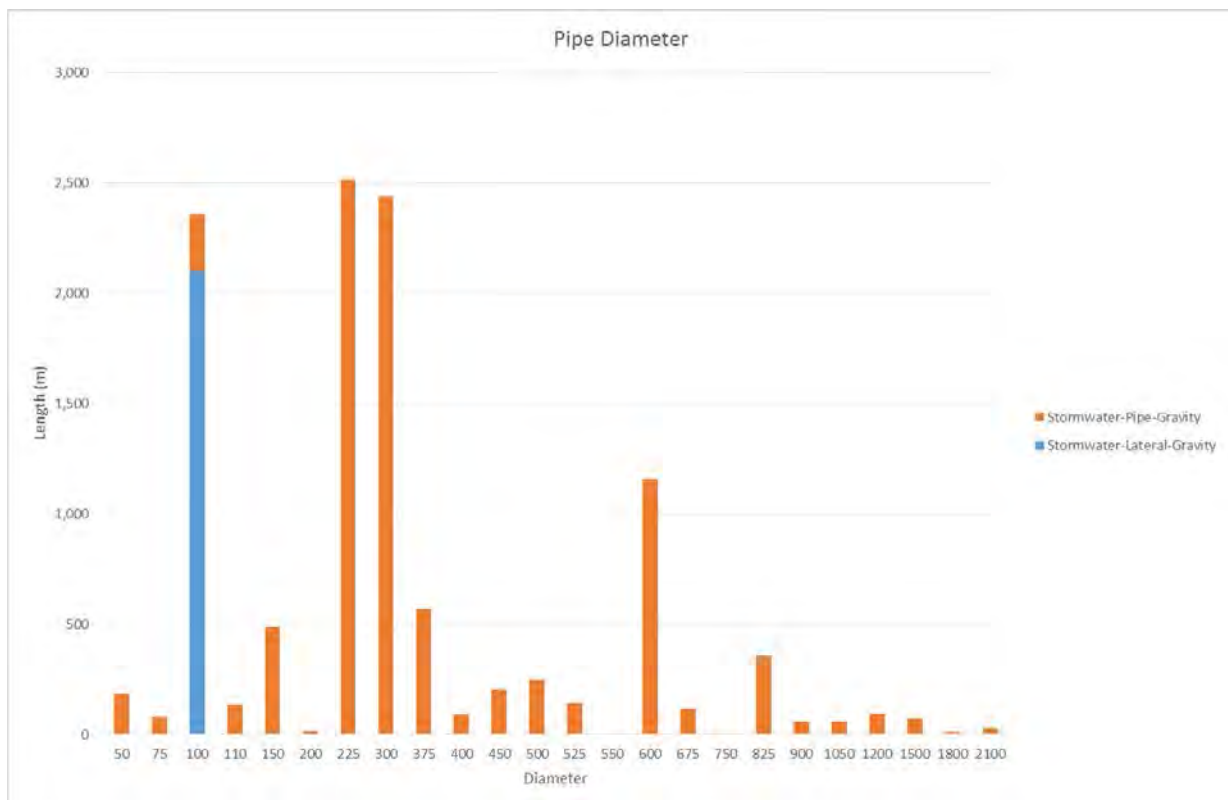


Figure 11-4 Pipe Diameter – Leeston

11.7 Operational Management

The stormwater network is operated and maintained under two maintenance contracts as follows:

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

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

11.8 Photos of Main Assets

The photos below provide a summary of the types of assets found within this stormwater management area.



Photo 1 & 2 – Leeston North Wetland



Photo 3 – Humeceptor



Photo 4 - Millbridge

11.9 Rapid Flood Modelling

The Council has undertaken 'Rapid Flood Hazard Assessment' modelling for its main townships. The modelling uses DHI MIKE 21 to simulate rainfall on grid with the outputs processed through ArcGIS producing maps illustrating a range of flood deeps during different rainfall intensities and durations.

The rapid flood assessment has been generated to provide a high level summary of potential flood and ponding areas across the district during extreme rainfall events. The results from this study are not to be used to set floor levels. The results have not been ground tested and therefore are indicative only.

For a 50 year event, Figure 11-5 shows the predicted flooding for Leeston.

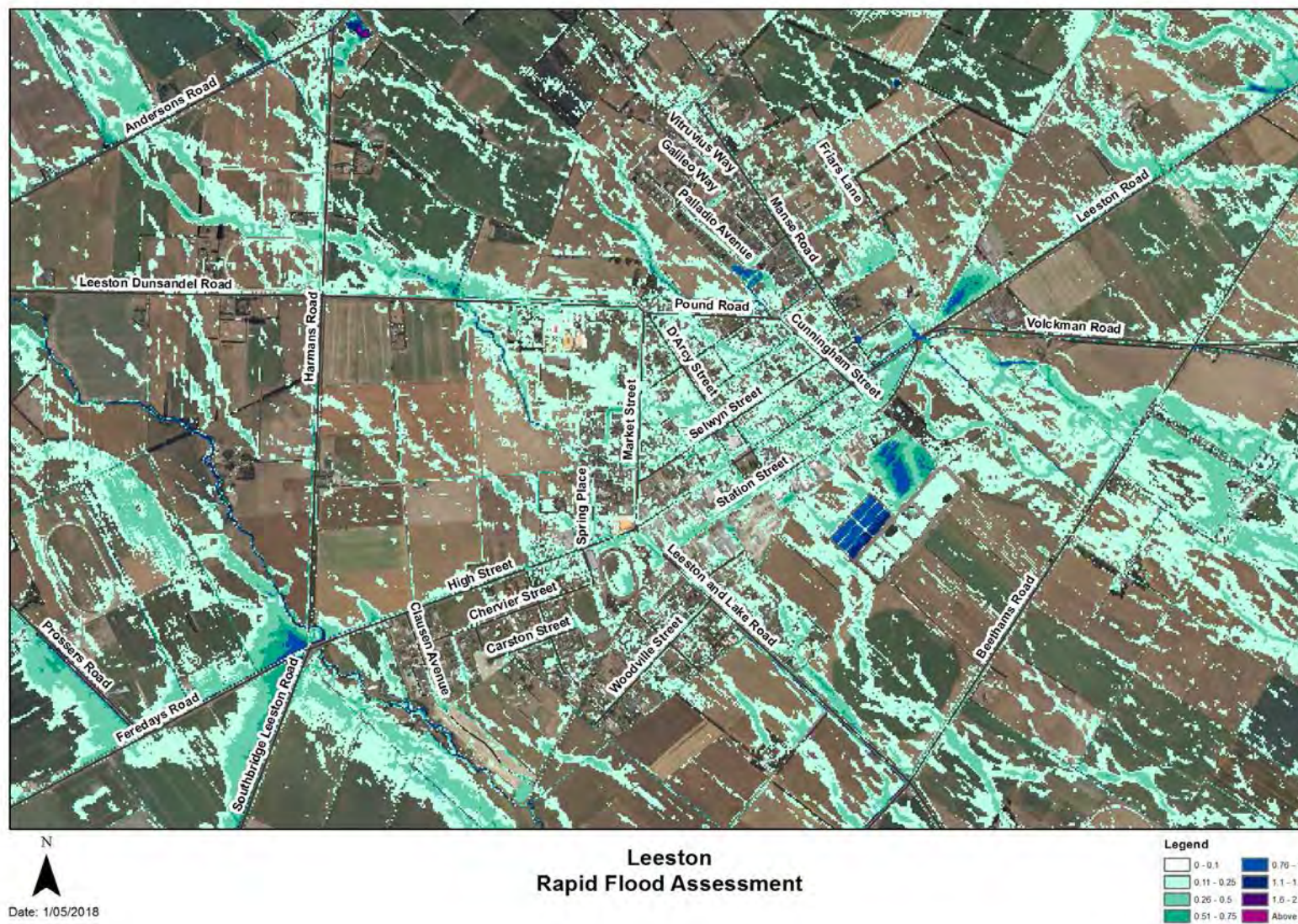


Figure 11-5 Rapid Flood Modelling, Leeston

11.10 Risk Assessment

A risk assessment has been undertaken for the Leeston scheme. The key output from the risk assessment is the identification of any extreme and high risks which need to be mitigated. In order to mitigate these risks they have been included and budgeted for in the projects within this LTP. Table 11-3 details the risk priority rating and Table 11-4 outlines the risks and the list of key projects is found in Table 11-9.

Table 11-3 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 11-4 Risks - Leeston

Risk	Action/Project	Year Identified	2014 Risk Rating	2017 Risk Rating	Residual Risk Rating
Flooding	Show ground culvert upgrade, Manse Road upgrade	2014	20	20	20
Lack of asset data	Collect asset data	2014	9	2	2
Non-consented activities	Renewal of consents	2014	27	27	6

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

11.11 Asset Valuation Details

The total replacement value of assets within the Leeston Scheme is \$6,288,619 as detailed in Table 11-5 below. The majority of value, 69%, is made up of pipes.

Table 11-5 Replacement Value, Leeston

Asset Class 1	Asset Class 2	Sum of Replacement Value
Stormwater Reticulation	Chamber	\$81,341
	Channel	\$316,595
	Inlet-Outlet-Point	\$125,805

	Lateral	\$579,199
	Management Device	\$233,581
	Manhole	\$585,036
	Pipe	\$4,349,077
	Valve	\$17,986

Replacement values for different types (channels, laterals, management devices and pipes) of stormwater assets are shown in Table 11-5 below.

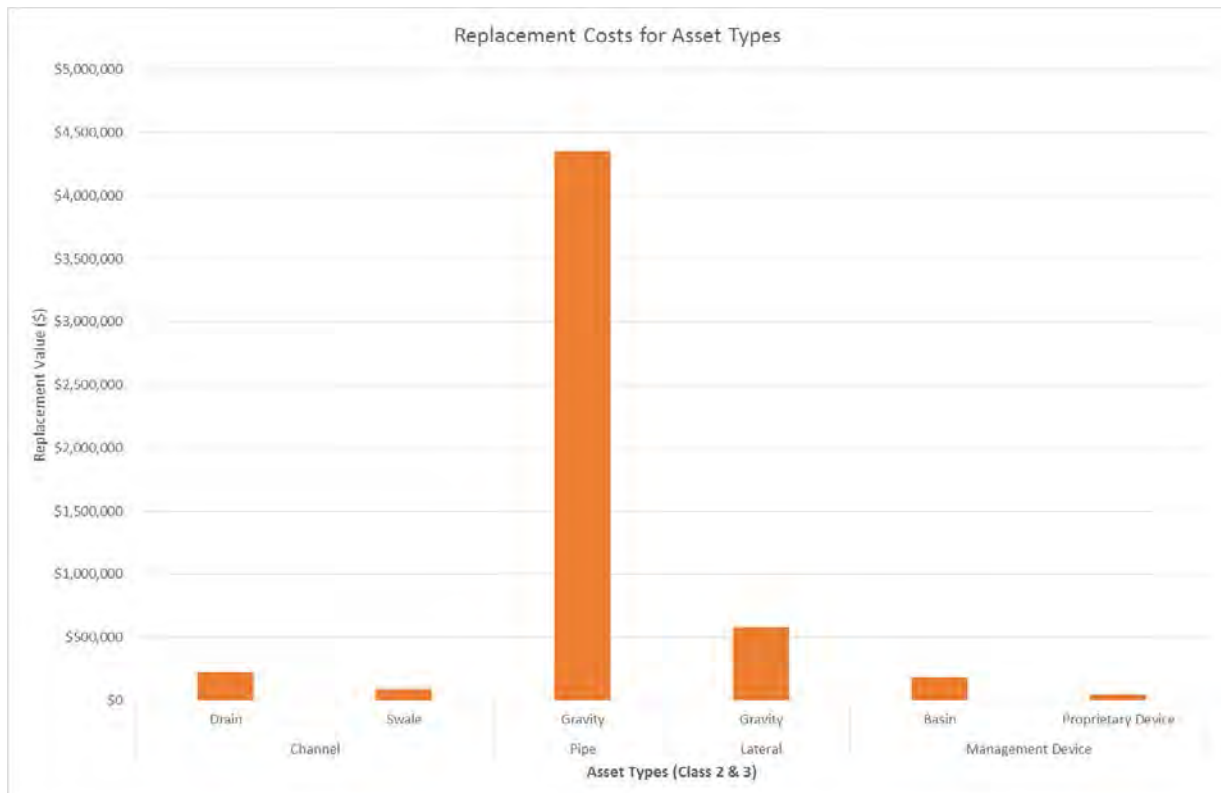


Figure 11-6 Replacement Costs for Leeston

11.12 Renewals

The renewal profile has been taken from the 2017 5 Waters Valuation. A graph showing the renewals for this scheme are shown by Table 11-8 below. The majority of assets requiring renewal are culverts/pipes which occur in the year 2040/41.

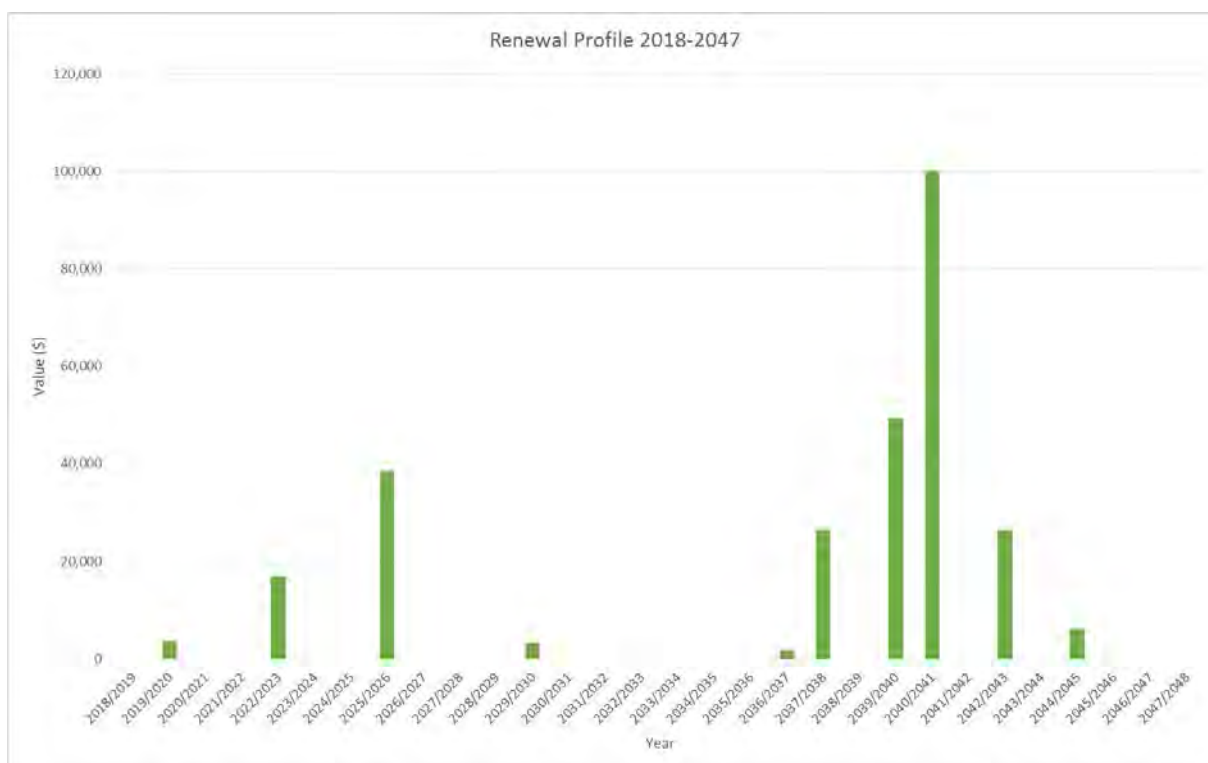


Figure 11-7 Leeston Stormwater Renewal Profile

11.13 Critical Assets

The criticality model for Leeston has been updated for the 2018 AcMP. The methodology of the criticality model can be found in 5Waters Activity Management Plan: Volume 1 and it provides details of how the criticality has been calculated for the reticulation assets. Table 11-6 and Figure 11-8 below shows the calculated criticality for all of the assets within this scheme that have a recorded known length.

Table 11-6 Length of Assets per Criticality Level

Criticality Bands		Length (m)
5	Low	15,370
4	Medium-Low	560
3	Medium	1760
2	Medium-High	703
1	High	186



Figure 11-8 Criticality Map

11.14 Asset Condition

The asset condition model was run for Leeston in 2017. The methodology of the model can be found in 5Waters Activity Management Plan: Volume 1 and it provides details of how the model has been calculated for the reticulation assets (particularly pipes). Figure 11-9 below shows the level of asset condition for all of the assets within this scheme that have a recorded known condition.

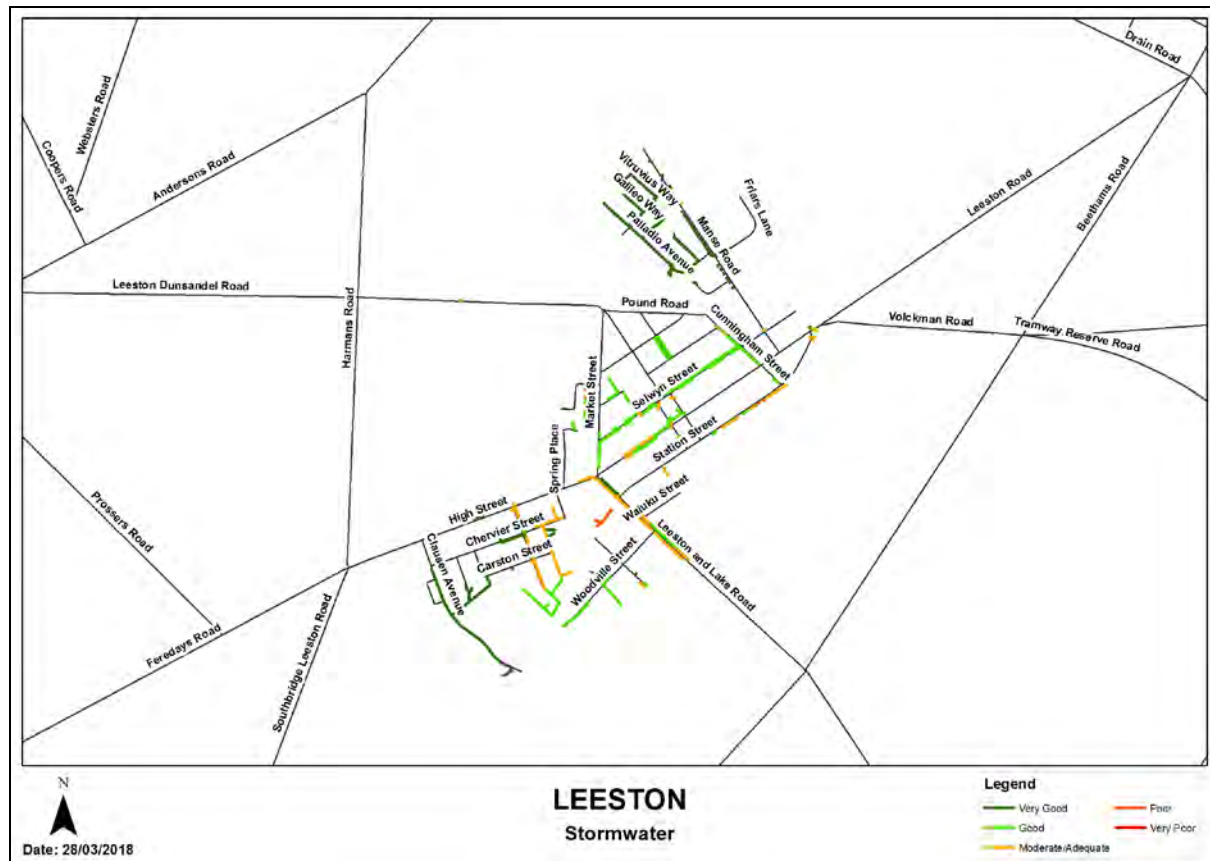


Figure 11-9 Asset Condition - Leeston

Table 11-7 provides a description of the condition rating used within the condition model.

Table 11-7 Asset Condition Grading

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

11.15 Funding Program

The 10 year budgets for Leeston are shown by Table 11-8 and Figure 11-10. Budgets are split into expenditure, renewals, projects and capital projects.

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

Table 11-8 Leeston Budget Summary

Years	Expenditure	Renewals	Projects	Capital Projects
2018/2019	\$59,226		\$5,000	\$800,000
2019/2020	\$60,462	\$3,706		\$200,000
2020/2021	\$66,693			
2021/2022	\$67,631			
2022/2023	\$68,555	\$17,004		
2023/2024	\$69,615			
2024/2025	\$70,659			
2025/2026	\$71,687	\$38,580		
2026/2027	\$72,699			
2027/2028	\$73,697			
Total	\$680,925	\$59,290	\$5,000	\$1,000,000

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

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

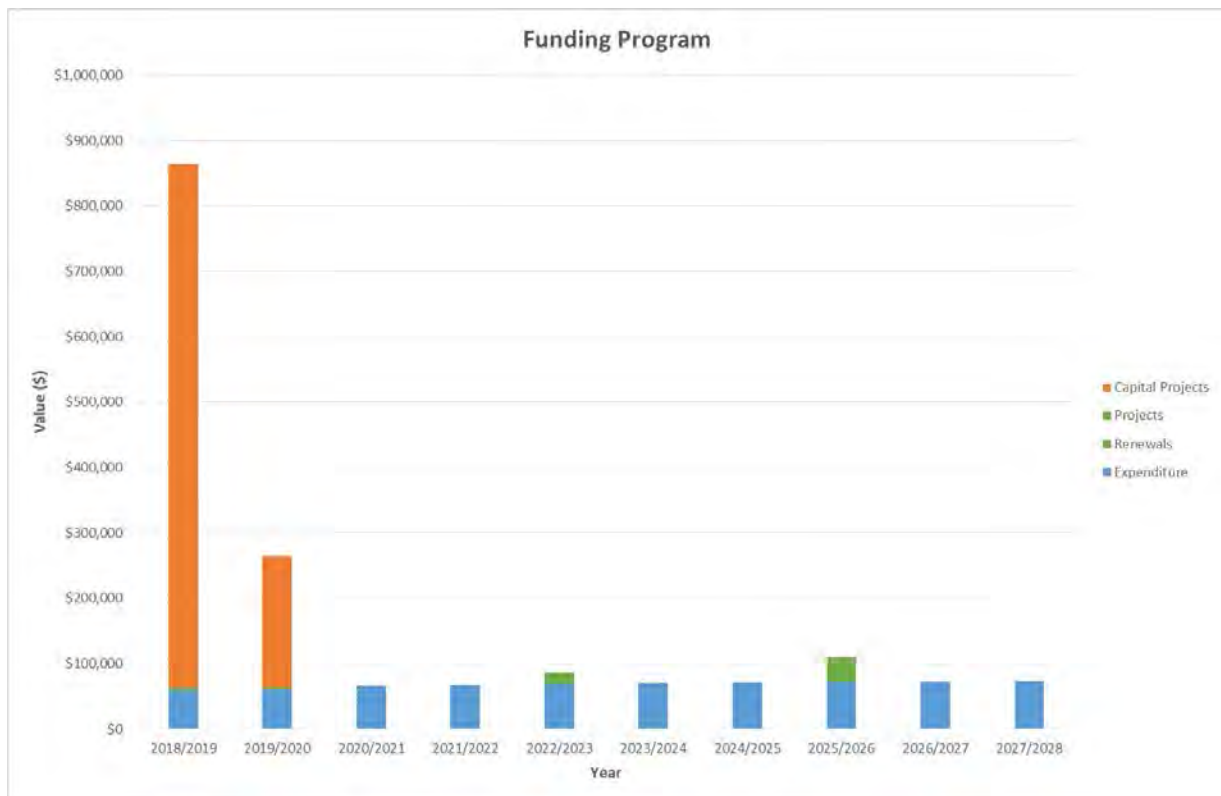


Figure 11-10 Leeston Funding Summary

There are a number of projects for Leeston stormwater scheme in the LTP budget.

Table 11-9 Key Projects

Account Label	GL	Description	Year 1 (\$)	Year 2 (\$)	Year 3 (\$)	Years 4 to 10	Funding Split ⁵
Capital Projects	444490005	Township Flood Diversion	\$800,000	\$200,000			100% LoS
Projects	4444007	Drain capacities review	\$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.

⁵ Where LoS refers to Level of Service and G refers to Growth

12.0 LINCOLN STORMWATER SCHEME

12.1 Scheme Summary

Description		Quantity
Scheme Area		2019.72ha
Scheme Coverage (as at 1 Jan 2018)	Rating numbers	2015
System components	Piped (m)	49249
	Swales (m)	5557
	Drains (m)	8988
	Manholes/Inspection Chambers (No.)	510
	Treatment	27 Wetlands / Infiltration basins
	Other	2 Filter beds
Value (\$)	Replacement Cost	\$28,002,257.68
	Depreciated Replacement Cost	\$25,968,964.93
Financial	2018/2019 Estimate	\$219,400
	Annual maintenance cost	31.40%
	% of total	
Planning	Stormwater Management Plan	Yes
	No. SDC stormwater consents	4
Demand	Mean Annual Rainfall (mm)	600
	10% AEP (10 year) 1hr rainfall depth (mm)	18.2
Sustainability	Sustainable drain management practices	Adopted and Encouraged

12.2 Key Issues

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

Table 12-1 Lincoln Scheme Issues

What's the Problem	What we plan to do
Requirement to pipe open drains in expanding urban areas leaving remnant short sections of open drain.	Council to budget to pipe sections of open drain remnants as required.

12.3 Overview & History

There are multiple waterways that flow through and/or border the township of Lincoln. These include:

- i. The L-1 Creek which flows through the centre of the township;
- ii. The L-2 River which starts from a spring source at the eastern limits of the township
- iii. The Lincoln Main Drain on the western boundary; and
- iv. Todds Drain on the east, all of which discharge to the L2 river with the ultimate discharge to Lake Ellesmere (Te Waihora).

There are a large number of new stormwater facilities being installed in Lincoln within the new subdivisions including:

- Te Whariki (Lincoln Land Developments) – Wetlands and Wet Ponds
- Liffey Springs – Wetlands
- Rosemerryn – Dry infiltration Basins
- Flemington – Dry infiltration and discharge to drain.
- BHL – To rapid soakage chamber

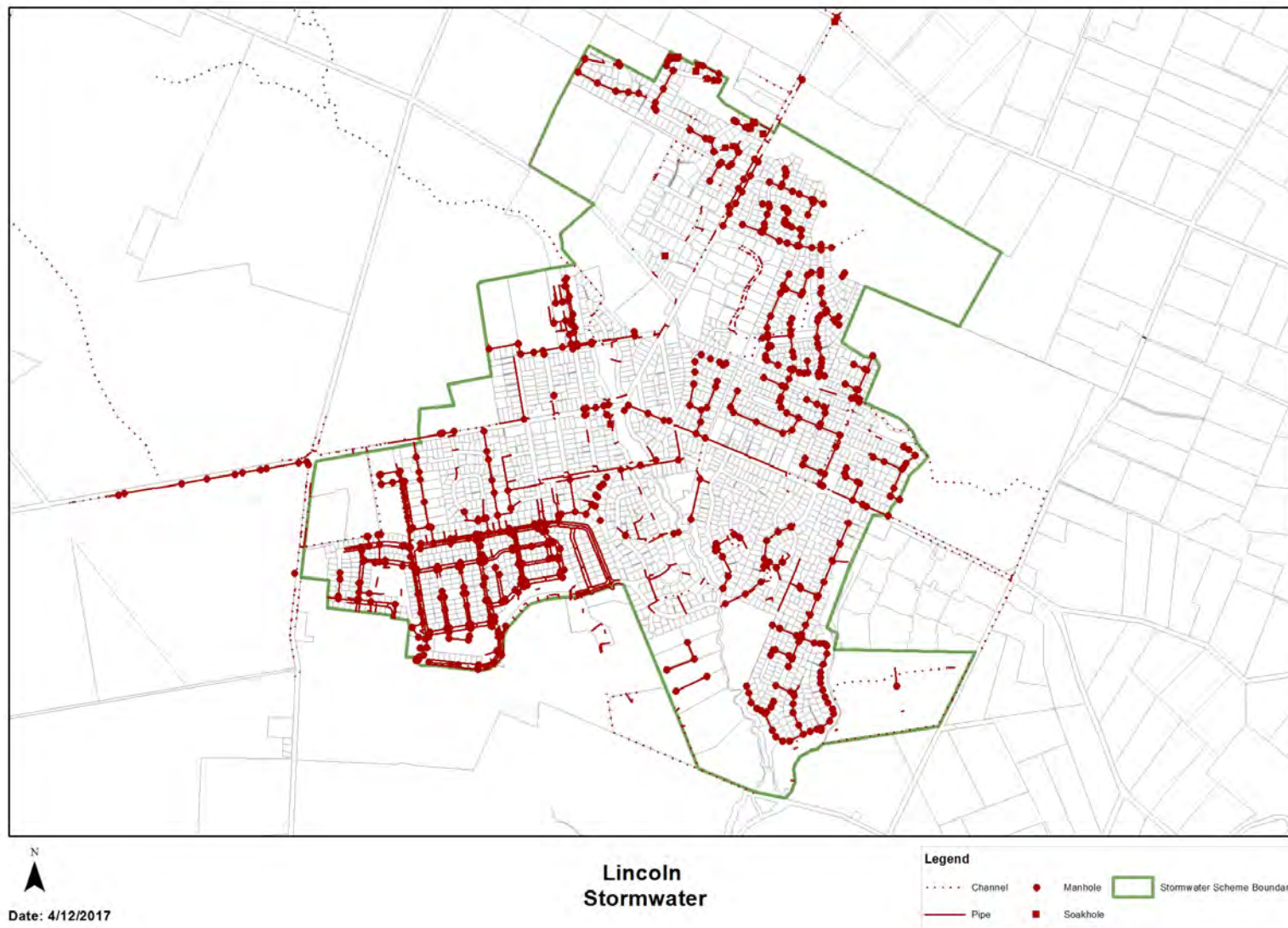


Figure 12-1 Scheme Map

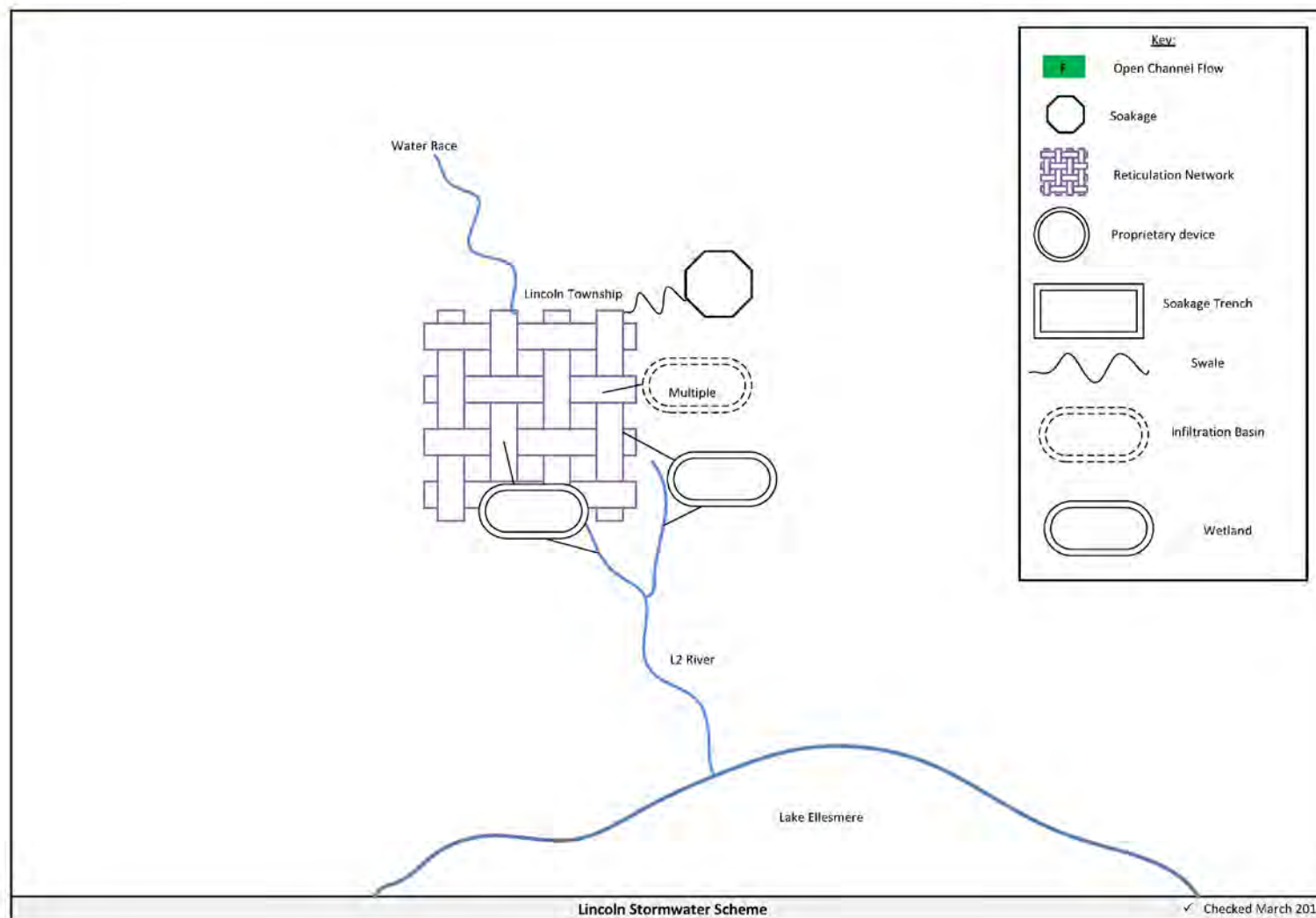


Figure 12-2 Scheme Schematic

12.4 Resource Consents

Council hold a global stormwater consent, CRC111663.1, for Lincoln. Previous resource consents were surrendered. All new subdivisions in Lincoln are required to obtain their own resource consent for construction and operation of their stormwater systems and subdivision and earthworks. Once installations are compliant and approved Council will bring them under global consent. Table 12-2 shows the stormwater discharge and earthworks permitted by the resource consents for this scheme.

Table 12-2 Resource Consents

Consent	Description	Location	Date Issued	Expiry Date
CRC151652 <i>Issued - Active</i>	To discharge stormwater onto land and into surface water from Lincoln Township.	Global consent Lincoln area, bounded by Shands/Tancred's/Raineys/E llesmere/Collin, LINCOLN	18/09/2014	7/10/2046
CRC111698 <i>Issued - Active</i>	To carry out works in and adjacent to a waterway, to install and maintain associated structures, and clear vegetation, associated with the construction and maintenance of the communal stormwater system	Global consent Lincoln area, bounded by Shands/Tancred's/Raineys/E llesmere/Collin, LINCOLN	11/10/2011	7/10/2046
CRC111699 <i>Issued - Active</i>	To excavate land to construct stormwater treatment ponds	Global consent Lincoln area, bounded by Shands/Tancred's/Raineys/E llesmere/Collin, LINCOLN	11/10/2011	7/10/2046
CRC111697 <i>Issued - Active</i>	To divert groundwater and surface water associated with construction and operation of the communal stormwater system	Global consent Lincoln area, bounded by Shands/Tancred's/Raineys/E llesmere/Collin, LINCOLN	11/10/2011	7/10/2046

It is noted that there are five consents that Council is aware of with developers in this area.

12.5 Integrated Stormwater Management Plan

An Integrated Stormwater Management Plan (ISMP) was prepared for Lincoln in May 2007. This plan is titled 'Lincoln ISMP: Stormwater Management Options Report'. The plan was resubmitted to Environment Canterbury on 12th March 2011 and consented on the 7th of October 2011.

12.6 Scheme Assets

Council has a wide variety of stormwater assets within the district. A brief description of the assets within this scheme is provided below:

- a) Swale (Grassed) – Is a longitudinal open channel which is lined with grass. The swale both conveys and treats stormwater.

- b) Swale (Wetland) – Is a longitudinal open channel which is lined with wetland plant species. The swale both conveys and treats stormwater and is particularly useful in areas with high groundwater tables.
- c) Reticulated network – Includes pipes, manholes, sumps. The primary purpose of the reticulated network is to collect and convey stormwater. Historically these systems were designed for the 2 year storm event. Today's engineering standards require the piped network to be designed for a 10 year event with overland flow provision for up to the 50 year event.
- d) Infiltration basin – is a stormwater management device which is used to store, treat and dispose of stormwater to the ground via soakage.
- e) Wetland - is a stormwater management device which is used to attenuate, treat and dispose of stormwater. Discharge from a wetland is to surface water (open drains or streams). Wetlands have high biodiversity value and are best suited in areas where the ground water table is high.
- f) Soakholes – Are used to dispose of stormwater to ground in areas where the ground water table is low and soil permeability is high.
- g) Open drains – are channels used to convey stormwater. They are cost effective means to convey large volumes of water.

A summary of material and diameter for channels and pipes, where known, is shown below in Figure 12-3 and Figure 12-4.

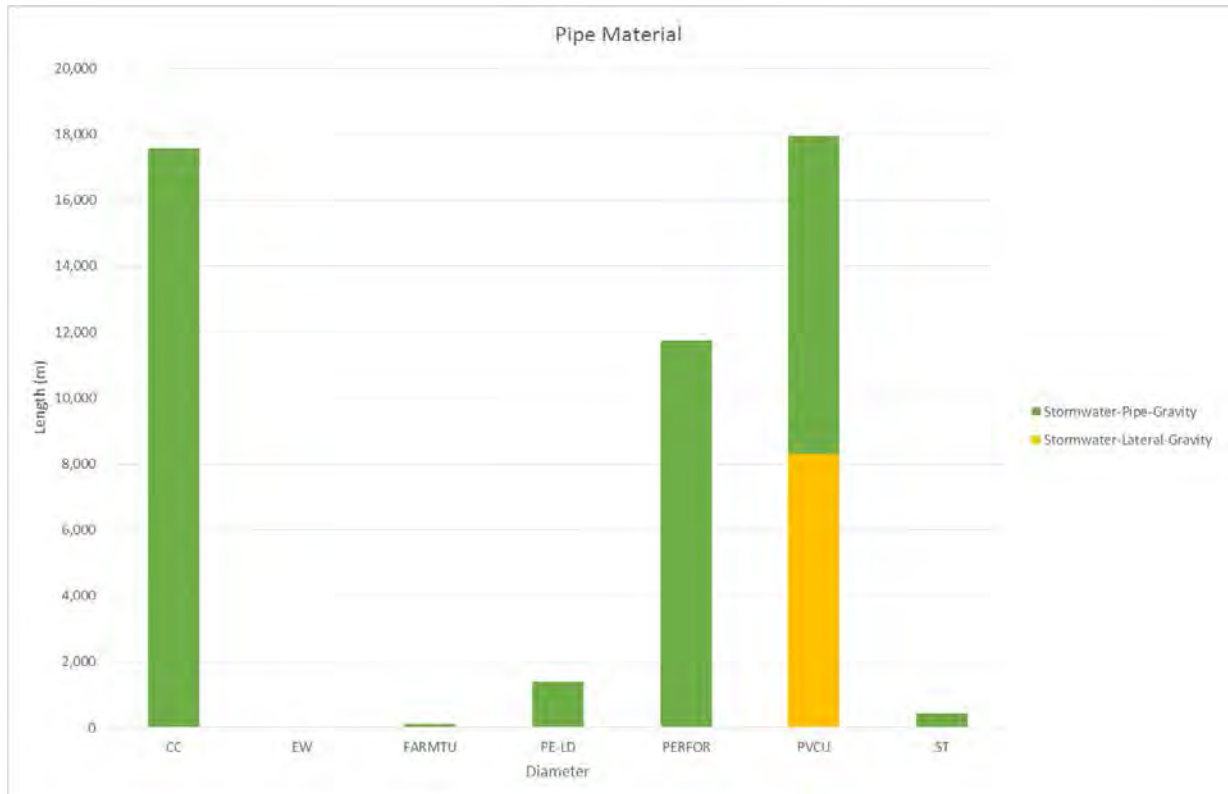


Figure 12-3 Pipe Material - Lincoln

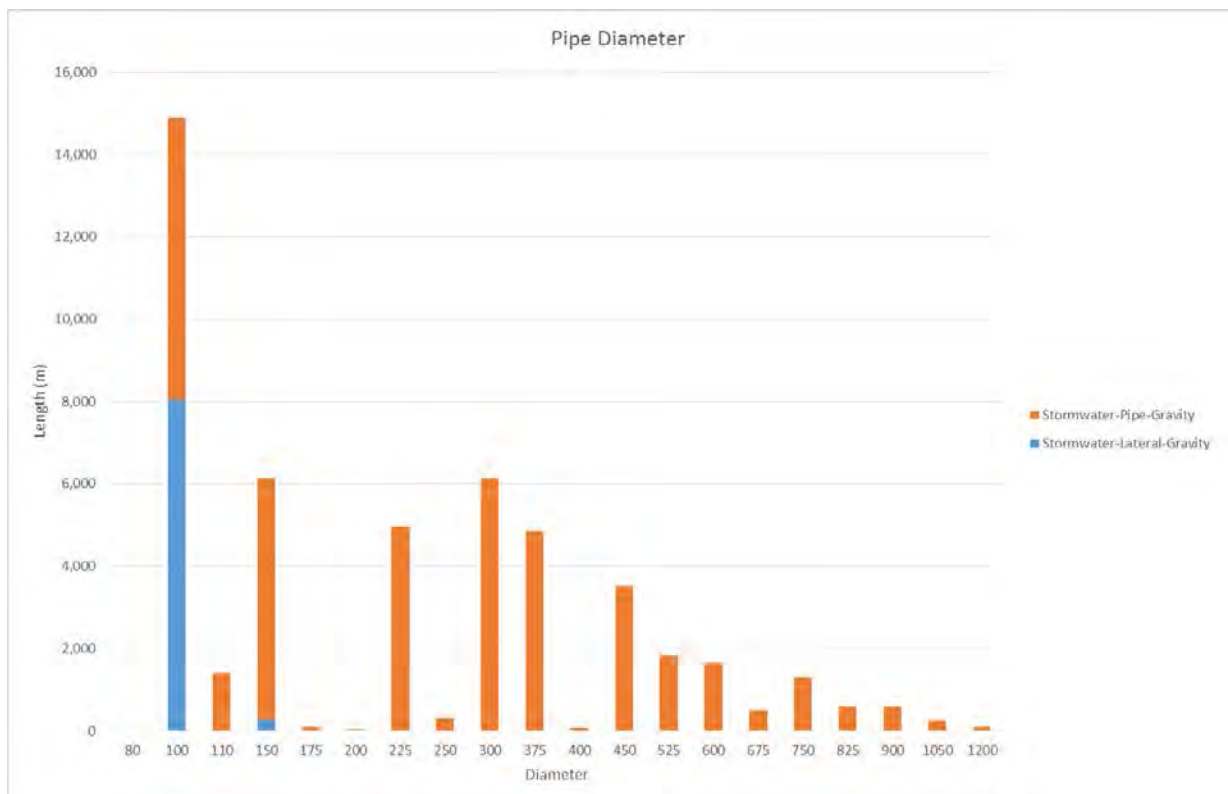


Figure 12-4 Pipe Diameter – Lincoln

12.7 Operational Management

The stormwater network is operated and maintained under two maintenance contracts as follows:

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

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

12.8 Photos of Main Assets

The photos below provide a summary of the types of assets found within this stormwater management area.



Photo 1: Wetland Swale



Photo 2: Dry Infiltration System

12.9 Rapid Flood Modelling

The Council has undertaken 'Rapid Flood Hazard Assessment' modelling for its main townships. The modelling uses DHI MIKE 21 to simulate rainfall on grid with the outputs processed through ArcGIS producing maps illustrating a range of flood depths during different rainfall intensities and durations.

The rapid flood assessment has been generated to provide a high level summary of potential flood and ponding areas across the district during extreme rainfall events. The results from this study are not to be used to set floor levels. The results have not been ground tested and therefore are indicative only.

For a 50 year event, Figure 12-5 shows the predicted flooding for Lincoln.

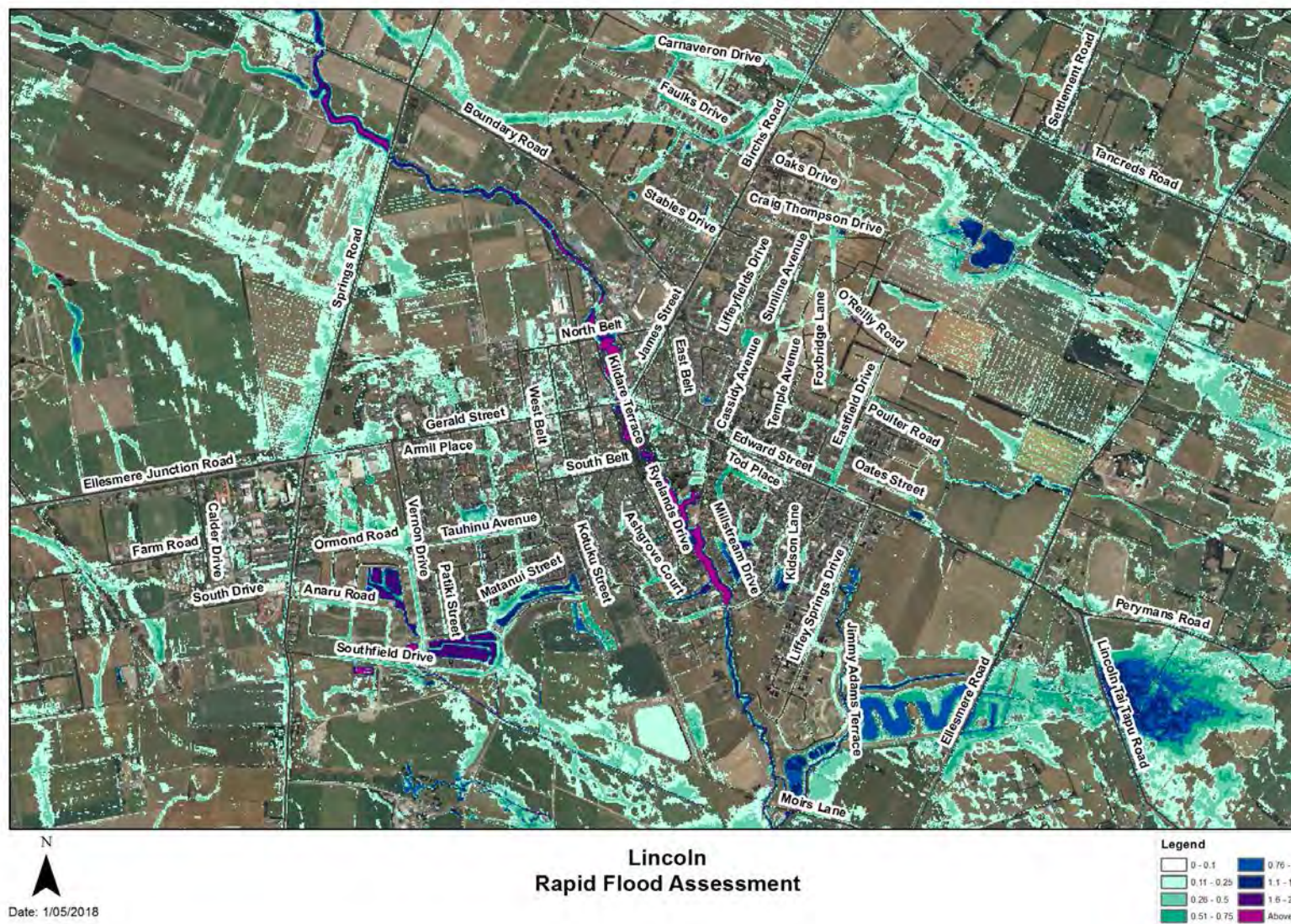


Figure 12-5 Rapid Flood Modelling, Lincoln

12.10 Risk Assessment

A risk assessment has been undertaken for the Lincoln scheme. The key output from the risk assessment is the identification of any extreme and high risks which need to be mitigated. In order to mitigate these risks they have been included and budgeted for in the projects within this LTP. Table 12-3 details the risk priority rating, Table 12-4 outlines the risks and the list of key projects is found in Table 12-9.

Table 12-3 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 12-4 Risks - Lincoln

Risk	Action/Project	Year Identified	2014 Risk Rating	2017 Risk Rating	Residual Risk Rating
Higher risk of pollution than anywhere else	Review spill control - buy spill kit	2014	6	6	6
Planting in wetland unsuccessful	Review wetland planting design approaches and maintenance needs	2014	12	2	2
Stormwater system discharges impact on ecology unknown	Invertebrate and Sediment sampling	2014	6	6	6
Stormwater system discharges impact on ecology unknown	Invertebrate and Sediment sampling	2014	6	6	6
Open drain safety - possible drowning	Pipe open drains	2014	7	2	2
Non-consented activities	Renewal of consents	2014	27	27	6

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

12.11 Asset Valuation Details

The total replacement value of assets within the Lincoln Stormwater Scheme is \$28,002,258 as detailed in Table 12-5 below. The majority of value, 59%, is made up of pipes.

Table 12-5 Replacement Value, Lincoln

Asset Class 1	Asset Class 2	Sum of Replacement Value
Stormwater Reticulation	Chamber	\$123,334
	Channel	\$623,770
	Inlet-Outlet-Point	\$614,188
	Lateral	\$1,894,416
	Management Device	\$4,746,880
	Manhole	\$3,518,211
	Pipe	\$16,397,350
	Soakhole	\$37,878
	Valve	\$46,230

Replacement values for different types (channels, laterals, management devices and pipes) of stormwater assets are shown in Figure 12-6 below.

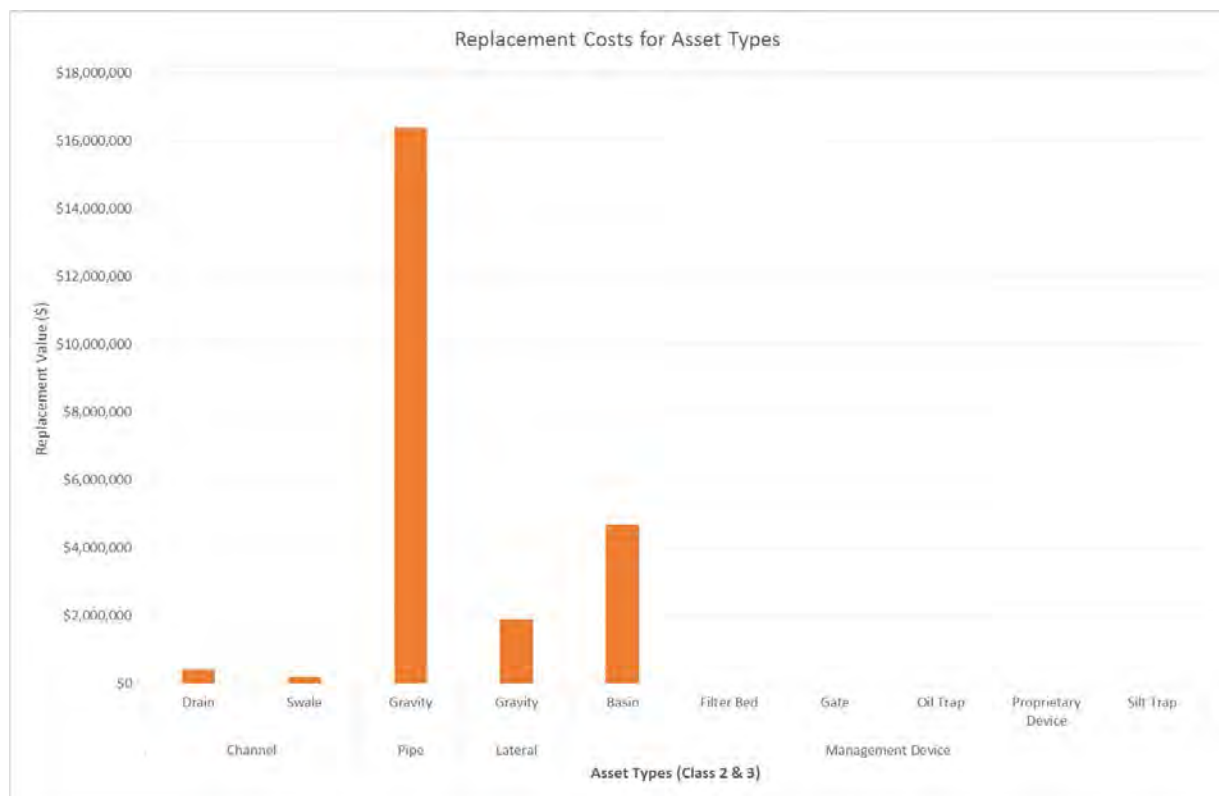


Figure 12-6 Replacement Costs for Lincoln

12.12 Renewals

The renewal profile has been taken from the 2017 5 Waters Valuation. A graph showing the renewals for this scheme are shown by Figure 12-7 below. The majority of assets requiring renewal are culverts/pipes which occur in the period 2040-2046.

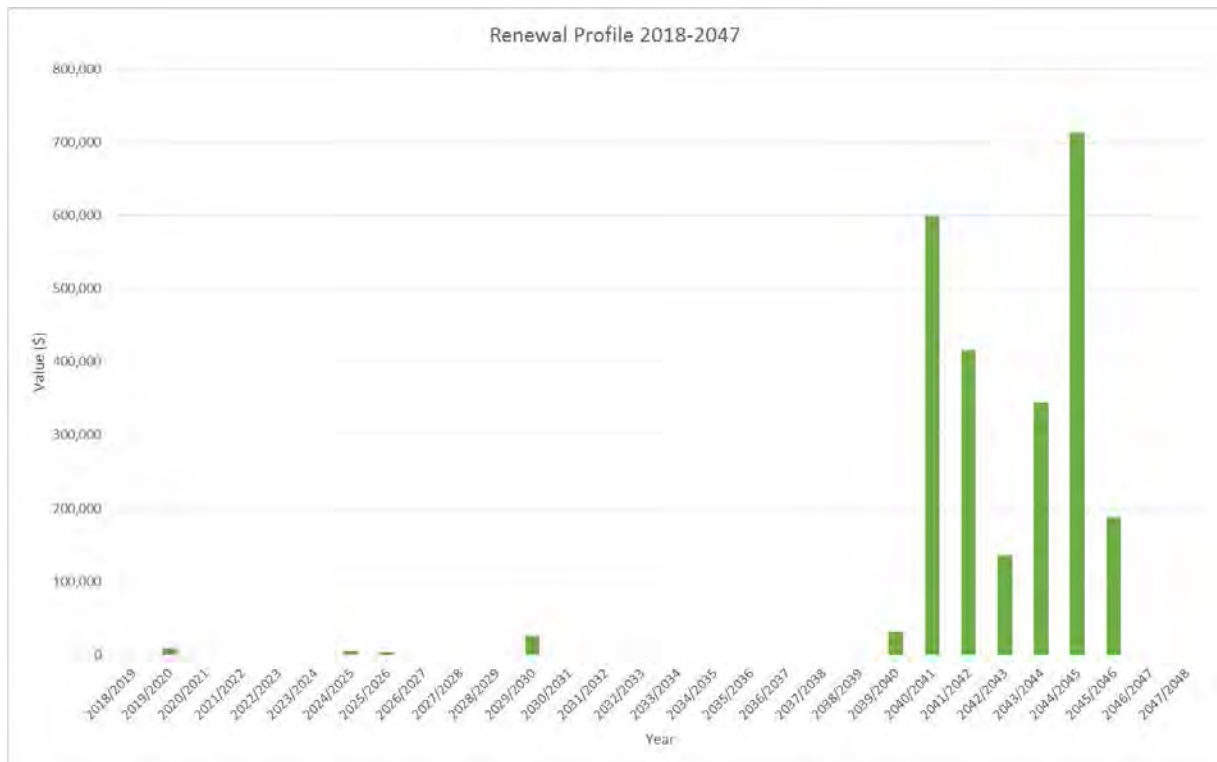


Figure 12-7 Lincoln Stormwater Renewal Profile

12.13 Critical Assets

The criticality model for Lincoln has been updated for the 2018 AcMP. The methodology of the criticality model can be found in 5Waters Activity Management Plan: Volume 1 and it provides details of how the criticality has been calculated for the reticulation assets. Table 12-6 and Figure 12-8 below shows the calculated criticality for all of the assets within this scheme that have a recorded known length.

Table 12-6 Length of Assets per Criticality Level

Criticality Bands		Length (m)
5	Low	50,237
4	Medium-Low	4,969
3	Medium	6,987
2	Medium-High	3,091
1	High	101

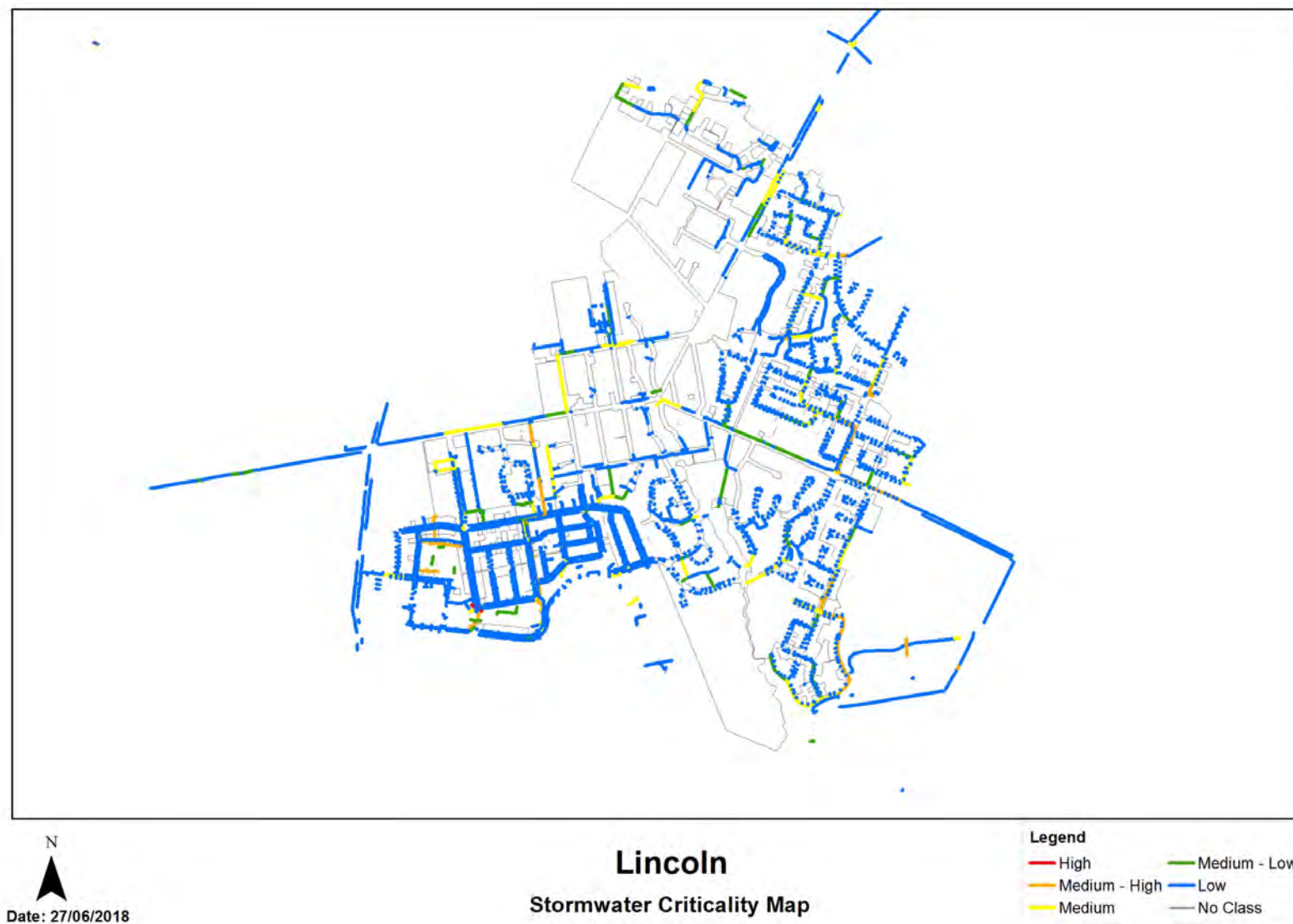


Figure 12-8 Criticality Map

12.14 Asset Condition

The asset condition model was run for Lincoln in 2017. The methodology of the model can be found in 5Waters Activity Management Plan: Volume 1 and it provides details of how the model has been calculated for the reticulation assets (particularly pipes). Figure 12-9 below shows the level of asset condition for all of the assets within this scheme that have a recorded known condition.

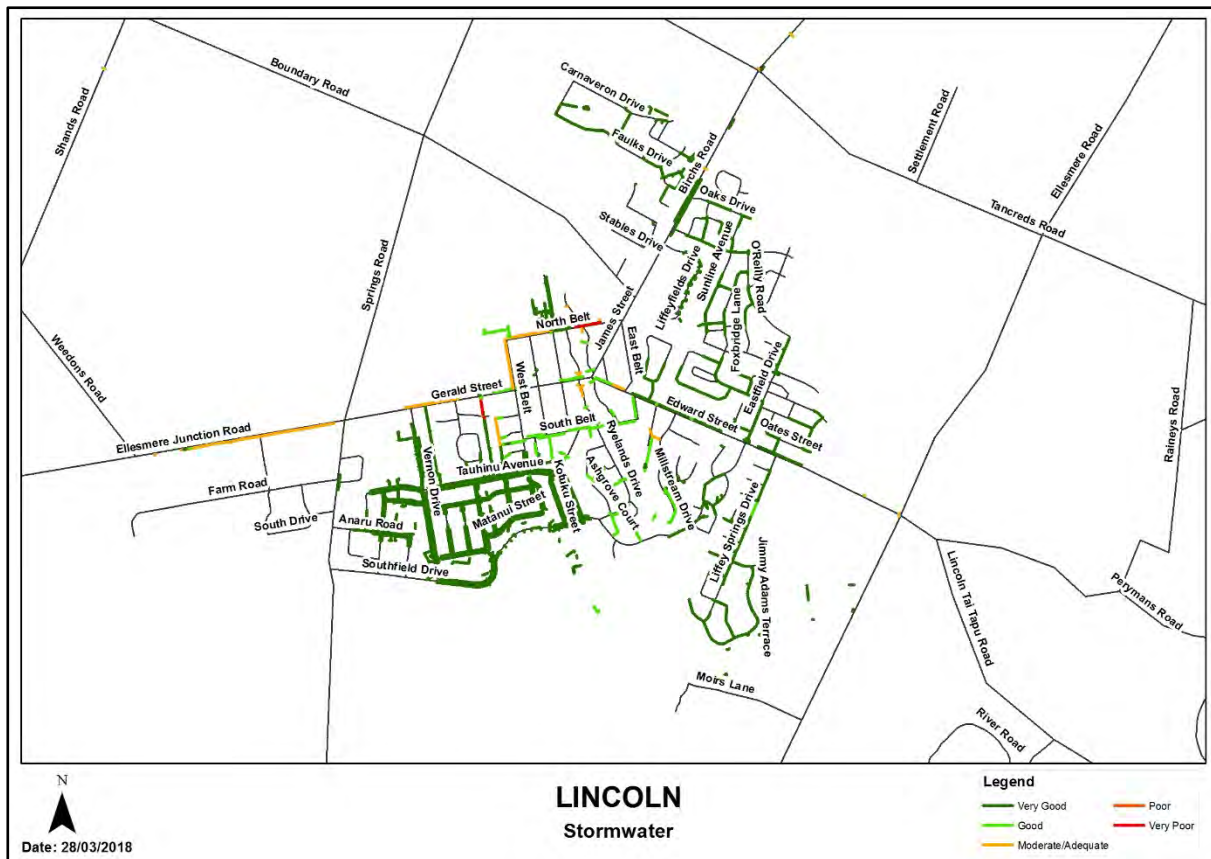


Figure 12-9 Asset Condition - Lincoln

Table 12-7 provides a description of the condition rating used within the condition model.

Table 12-7 Asset Condition Grading

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

12.15 Funding Program

The 10 year budgets for Lincoln Stormwater are shown by Table 12-8 and Figure 12-10 Budgets are split into expenditure, renewals, projects and capital projects.

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

Table 12-8 Lincoln Budget Summary

Years	Expenditure	Renewals	Projects	Capital Projects
2018/2019	\$219,400			
2019/2020	\$236,900	\$8,447		
2020/2021	\$270,063			
2021/2022	\$255,444		\$22,000	
2022/2023	\$261,127			
2023/2024	\$264,141			
2024/2025	\$287,685	\$6,177		
2025/2026	\$269,963	\$3,286		
2026/2027	\$272,780		\$22,000	
2027/2028	\$275,538			
Total	\$2,613,041	\$17,910	\$44,000	

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

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

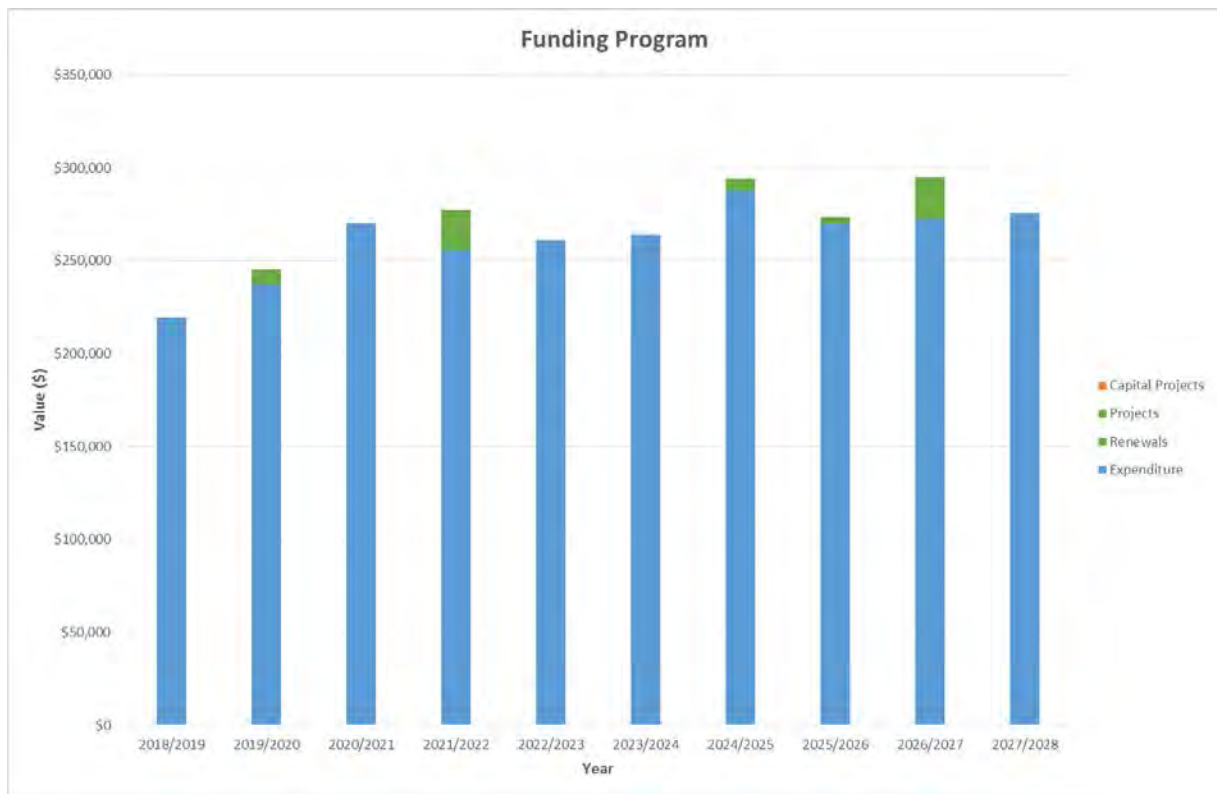


Figure 12-10 Lincoln Funding Summary

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

Table 12-9 Key Projects

Account Label	GL	Description	Year 1 (\$)	Year 2 (\$)	Year 3 (\$)	Years 4 to 10	Funding Split ⁶
Projects	4447005	Invertebrate and Sediment sampling				\$44,000	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.

⁶ Where LoS refers to Level of Service and G refers to Growth

13.0 PREBBLETON STORMWATER SCHEME

13.1 Scheme Summary

Description		Quantity
Scheme Area		226.67ha
Scheme Coverage (as at 1 Jan 2018)	Rating numbers	1457
System components	Piped (m)	10254.43
	Swales (m)	2747.4
	Drains (m)	2318.6
	Manholes/Inspection Chambers (No.)	196
	Treatment	10 Infiltration basins / wetlands
	Other	1 Oil interceptor + 3 Proprietary
Value (\$)	Replacement Cost	\$6,389,215.81
	Depreciated Replacement Cost	\$5,917,906.85
Financial	2018/2019 Estimate	\$84,850
	Annual maintenance cost	12.14%
	% of total	
Planning	Stormwater Management Plan	Draft
	No. SDC stormwater consents	3
Demand	Mean Annual Rainfall (mm)	645
	10% AEP (10 year) 1hr rainfall depth (mm)	19.6
Sustainability	Sustainable drain management practices	Adopted and Encouraged

13.2 Key Issues

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

Table 13-1 Prebbleton Scheme Issues

What's the Problem	What we plan to do
Changing community expectations regarding presence of open drains in urban areas.	Plan for piping of key open drains.

13.3 Overview & History

The Prebbleton catchment largely drains to ground or in the lower catchment in Dawsons creek and tributaries. The older parts of the network are predominantly piped with surface and ground discharges will little to no pre-treatment. Newer developments within Prebbleton typically include stormwater basins for treatment before disposal to ground or surface water.

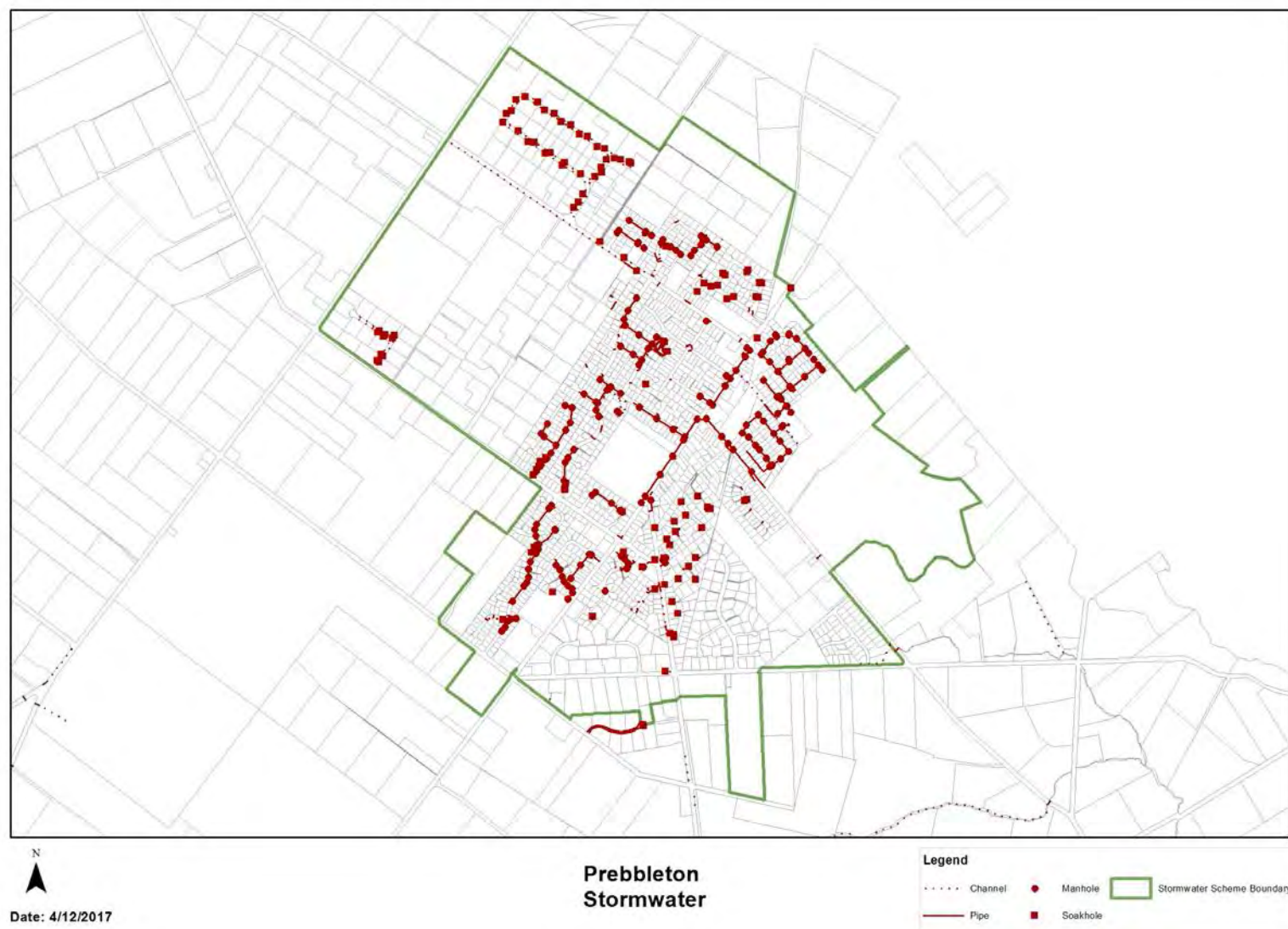


Figure 13-1 Scheme Map

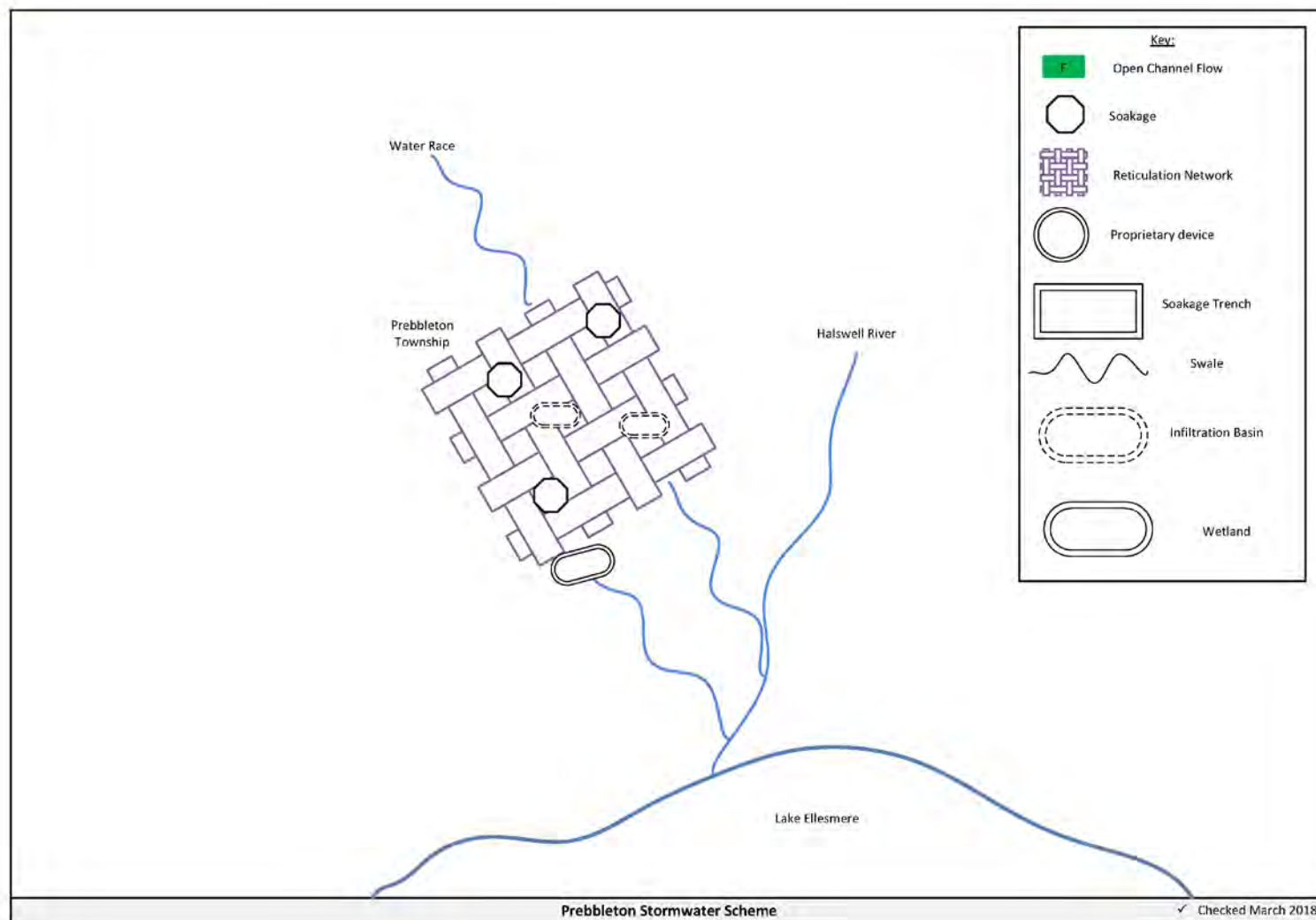


Figure 13-2 Scheme Schematic

13.4 Resource Consents

The Prebbleton stormwater scheme has a number of resource consents. Table 13-2 shows the stormwater discharge permitted by the resource consents for this scheme.

Table 13-2 Resource Consents

Consent	Description	Location	Date Issued	Expiry Date
CRC070867.1 <i>Issued - Active</i>	To discharge contaminants into land	Trents Road, PREBBLETON	3/09/2010	1/12/2041
CRC101788 <i>Issued - InActive</i>	To discharge contaminants into land and water.	Corner Blakes and Springs Road, PREBBLETON	15/02/2010	12/02/2045
CRC167469 <i>Application in Process</i>	To discharge stormwater from the existing stormwater network of Prebbleton	Prebbleton, Selwyn		

There are a number of other resource consents held by developers for this scheme.

13.5 Integrated Stormwater Management Plan

An ISMP has been lodged for Prebbleton. CRC167469

13.6 Scheme Assets

Council has a wide variety of stormwater assets within the district. A brief description of the assets within this scheme is provided below:

- Oil Interceptor – Is a proprietary device which uses baffles to trap and contain hydrocarbons (oils and fuels).
- Swale (Grassed) – Is a longitudinal open channel which is lined with grass. The swale both conveys and treats stormwater.
- Reticulated network – Includes pipes, manholes, sumps. The primary purpose of the reticulated network is to collect and convey stormwater. Historically these systems were designed for the 2 year storm event. Today's engineering standards require the piped network to be designed for a 10 year event with overland flow provision for up to the 50 year event.
- Infiltration basin – is a stormwater management device which is used to store, treat and dispose of stormwater to the ground via soakage.
- Soakholes – Are used to dispose of stormwater to ground in areas where the ground water table is low and soil permeability is high.
- Open drains – are channels used to convey stormwater. They are cost effective means to convey large volumes of water.

A summary of material and diameter for channels and pipes, where known, is shown below in Figure 13-3 and Figure 13-4.

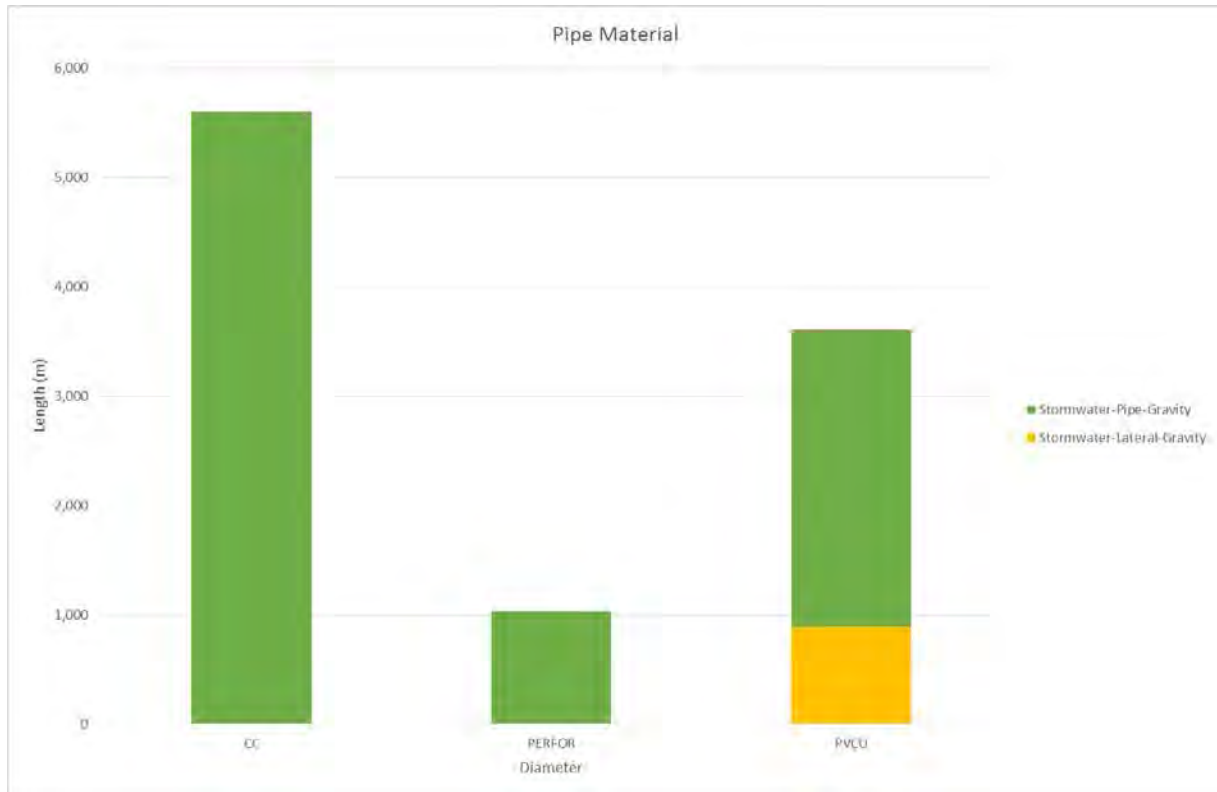


Figure 13-3 Pipe Material - Prebbleton

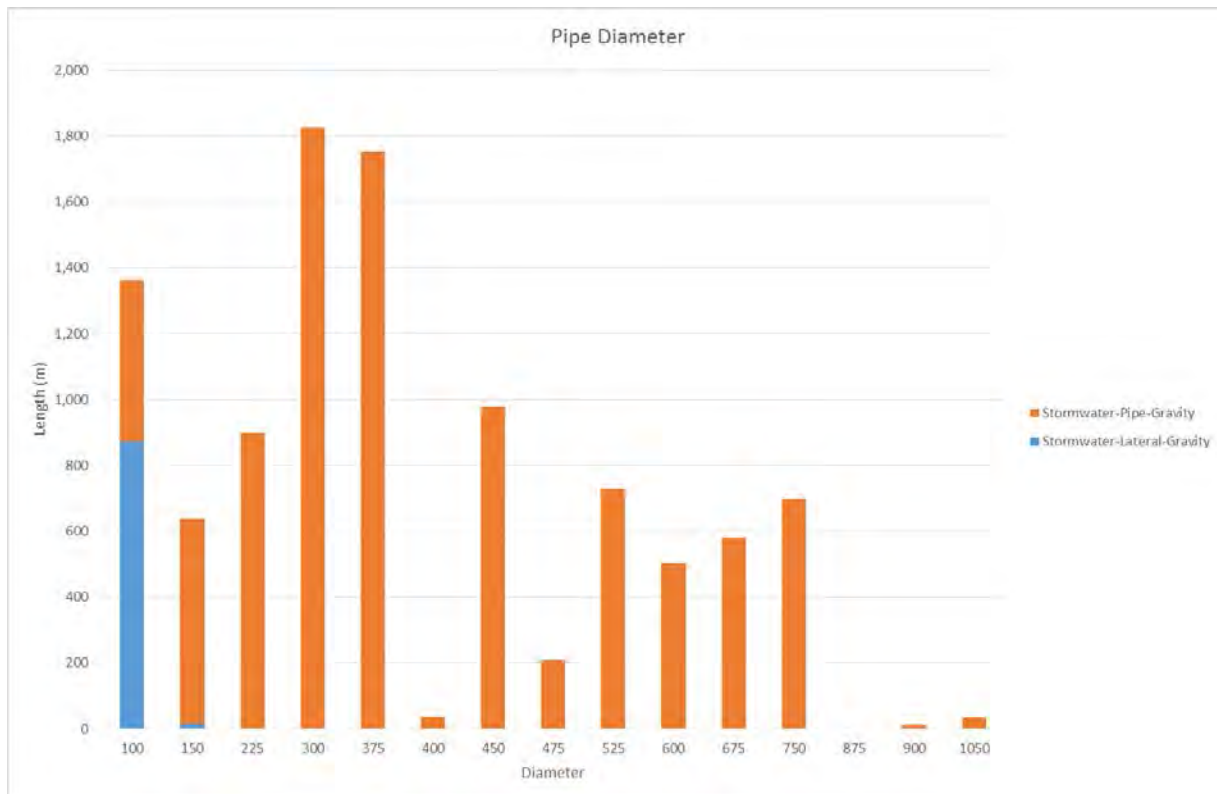


Figure 13-4 Pipe Diameter – Prebbleton

13.7 Operational Management

The stormwater network is operated and maintained under two maintenance contracts as follows:

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

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

13.8 Photos of Main Assets

The photos below provide a summary of the types of assets found within this stormwater management area.



Photo 1: Typical Stormwater Infiltration Basin

13.9 Rapid Flood Modelling

The Council has undertaken 'Rapid Flood Hazard Assessment' modelling for its main townships. The modelling uses DHI MIKE 21 to simulate rainfall on grid with the outputs processed through ArcGIS producing maps illustrating a range of flood deeps during different rainfall intensities and durations.

The rapid flood assessment has been generated to provide a high level summary of potential flood and ponding areas across the district during extreme rainfall events. The results from this study are not to be used to set floor levels. The results have not been ground tested and therefore are indicative only.

For a 50 year event, Figure 13-5 shows the predicted flooding for Prebbleton.

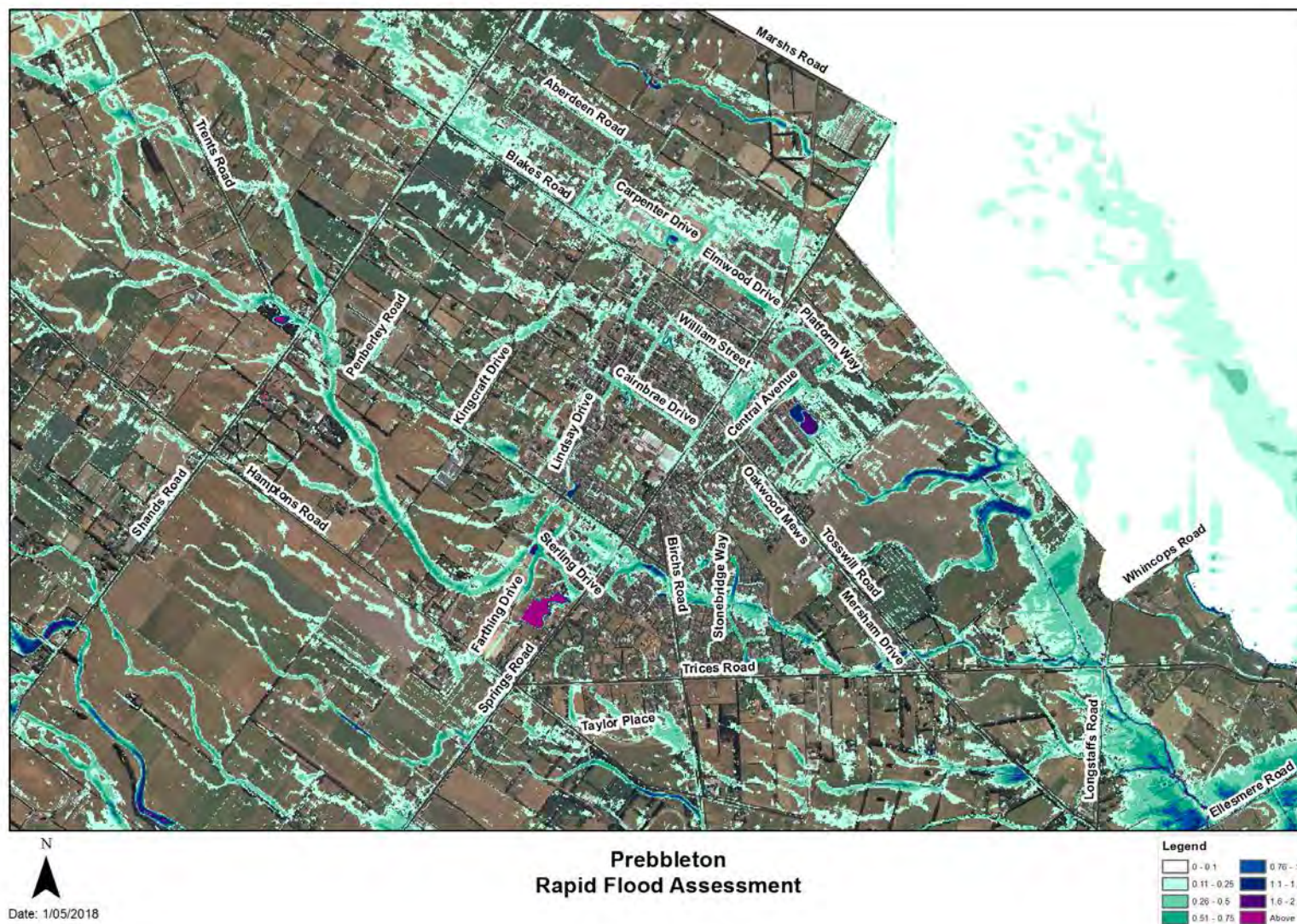


Figure 13-5 Rapid Flood Modelling, Prebbleton

13.10 Risk Assessment

A risk assessment has been undertaken for the Prebbleton scheme. The key output from the risk assessment is the identification of any extreme and high risks which need to be mitigated. In order to mitigate these risks they have been included and budgeted for in the projects within this LTP. Table 13-3 details the risk priority rating, Table 13-4 outlines the risks and the list of key projects is found in Table 13-9.

Table 13-3 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 13-4 Risks - Prebbleton

Risk	Action/Project	Year Identified	2014 Risk Rating	2017 Risk Rating	Residual Risk Rating
Non-consented activities	Renewal of consents	2014	27	27	6

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

13.11 Asset Valuation Details

The total replacement value of assets within the Prebbleton Scheme is \$6,389,216 as detailed in Table 13-5 below. The majority of value, 63%, is made up of pipes.

Table 13-5 Replacement Value, Prebbleton

Asset Class 1	Asset Class 2	Sum of Replacement Value
Stormwater Reticulation	Chamber	\$22,875
	Channel	\$346,163
	Inlet-Outlet-Point	\$126,022
	Lateral	\$324,972
	Management Device	\$347,425
	Manhole	\$1,129,980
	Pipe	\$4,034,961
	Soakhole	\$56,817

Replacement values for different types (channels, laterals, management devices and pipes) of stormwater assets are shown in Figure 13-6 below.

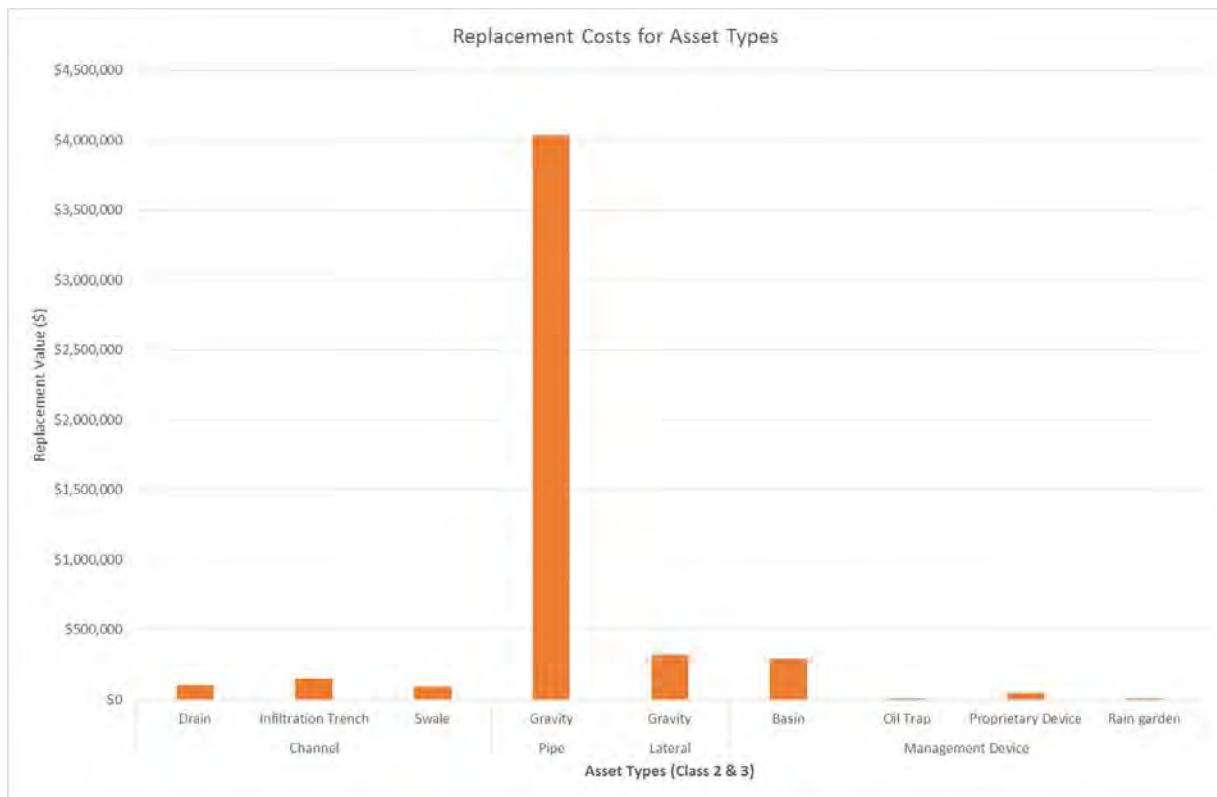


Figure 13-6 Replacement Costs for Prebbleton

13.12 Renewals

The renewal profile has been taken from the 2017 5 Waters Valuation. A graph showing the renewals for this scheme are shown by Figure 13-7 below. The majority of assets requiring renewal are culverts/pipes which occur in the year 2037/38.

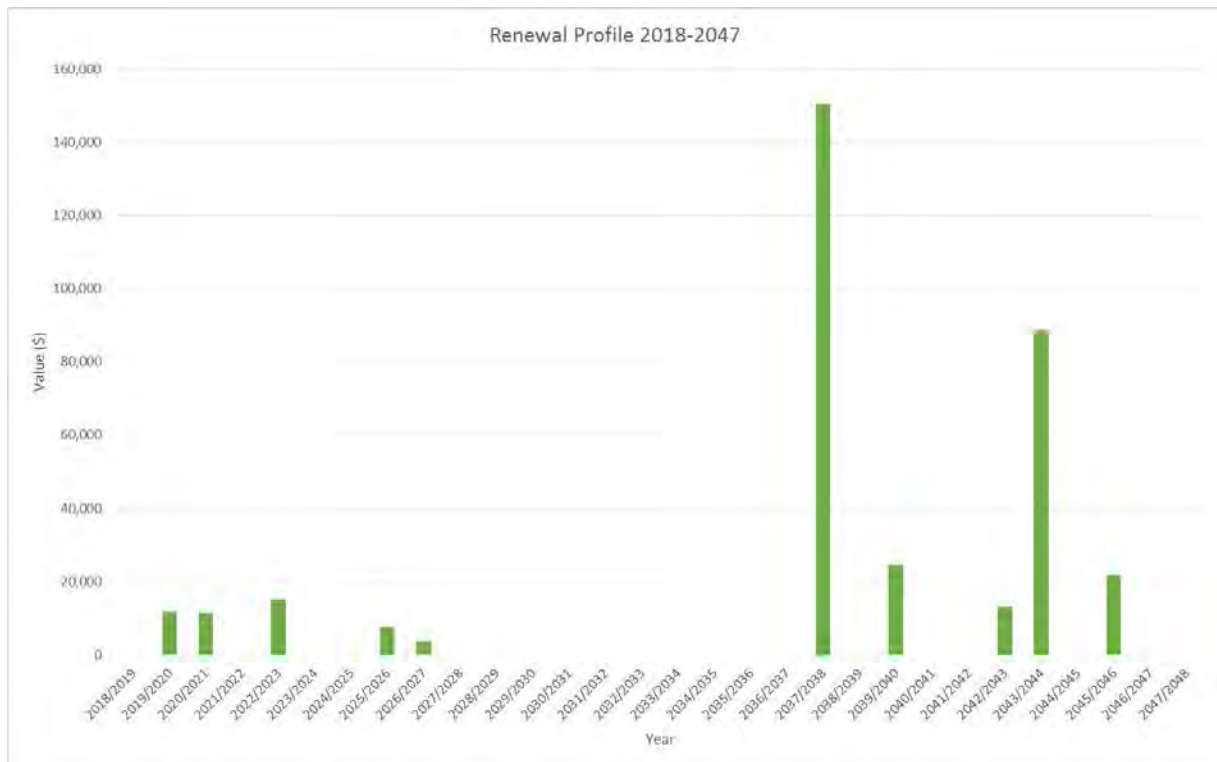


Figure 13-7 Prebbleton Stormwater Renewal Profile

13.13 Critical Assets

The criticality model for Prebbleton has been updated for the 2018 AcMP. The methodology of the criticality model can be found in 5Waters Activity Management Plan: Volume 1 and it provides details of how the criticality has been calculated for the reticulation assets. Table 13-6 and Figure 13-8 below shows the calculated criticality for all of the assets within this scheme that have a recorded known length.

Table 13-6 Length of Assets per Criticality Level

Criticality Bands		Length (m)
5	Low	12,213
4	Medium-Low	1,569
3	Medium	2,504
2	Medium-High	772
1	High	0

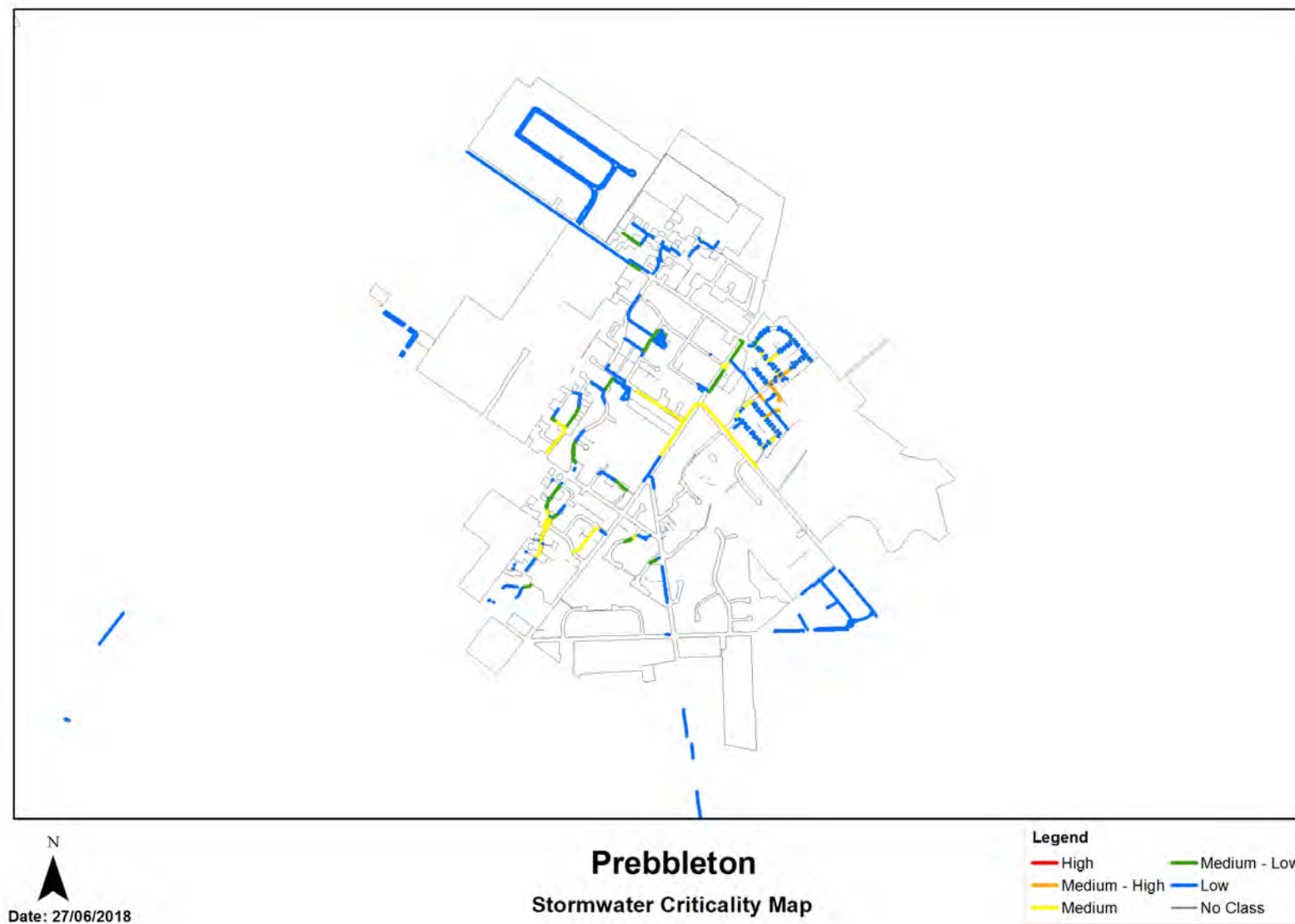


Figure 13-8 Criticality Map

13.14 Asset Condition

The asset condition model was run for Prebbleton in 2017. The methodology of the model can be found in 5Waters Activity Management Plan: Volume 1 and it provides details of how the model has been calculated for the reticulation assets (particularly pipes). Figure 13-9 below shows the level of asset condition for all of the assets within this scheme that have a recorded known condition.

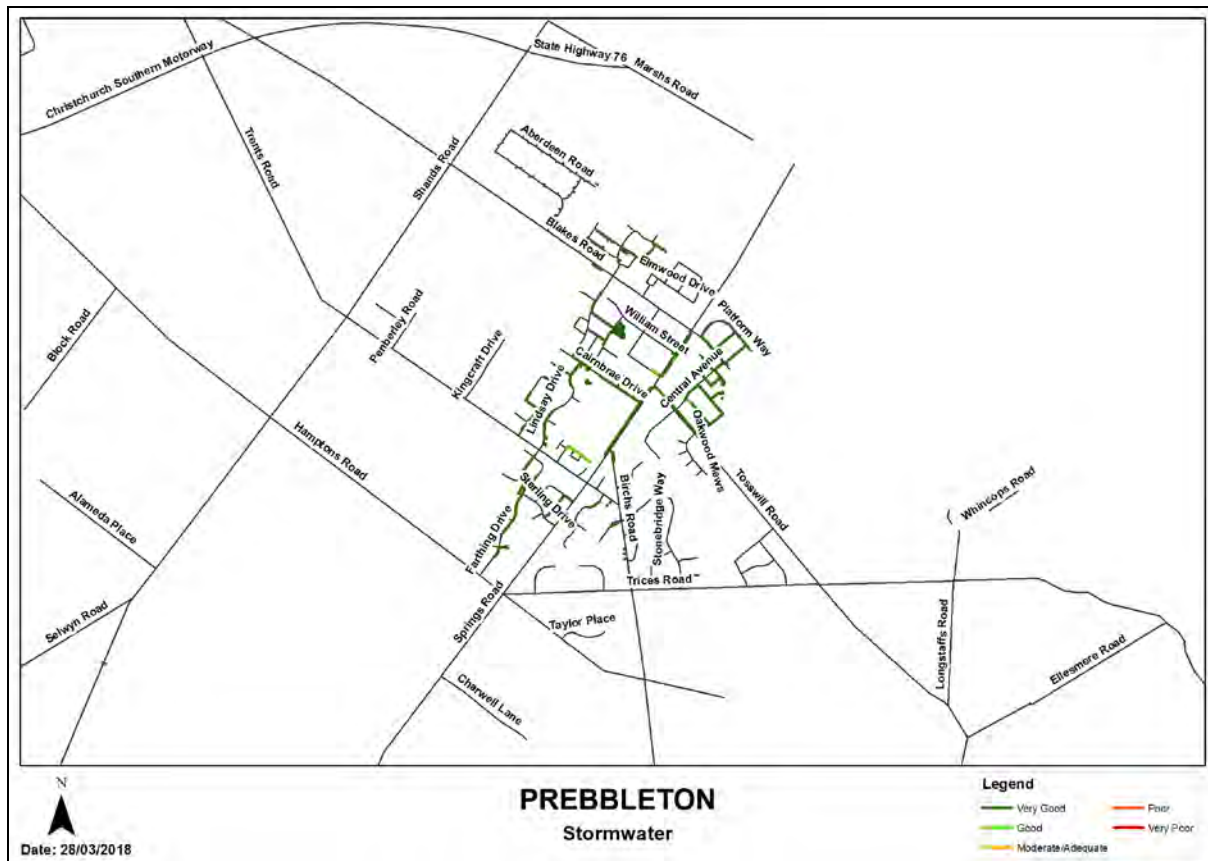


Figure 13-9 Asset Condition - Prebbleton

Table 13-7 provides a description of the condition rating used within the condition model.

Table 13-7 Asset Condition Grading

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

13.15 Funding Program

The 10 year budgets for Prebbleton are shown by Table 13-8 and Figure 13-10. Budgets are split into expenditure, renewals, projects and capital projects.

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

Table 13-8 Prebbleton Budget Summary

Years	Expenditure	Renewals	Projects	Capital Projects
2018/2019	\$84,850			
2019/2020	\$83,790	\$11,614		\$300,000
2020/2021	\$85,730	\$11,363		\$200,000
2021/2022	\$87,591			
2022/2023	\$89,452	\$15,151		
2023/2024	\$91,682			
2024/2025	\$93,911			
2025/2026	\$96,114	\$7,576		
2026/2027	\$98,317	\$3,788		
2027/2028	\$100,519			
Total	\$911,956	\$49,492		\$500,000

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.

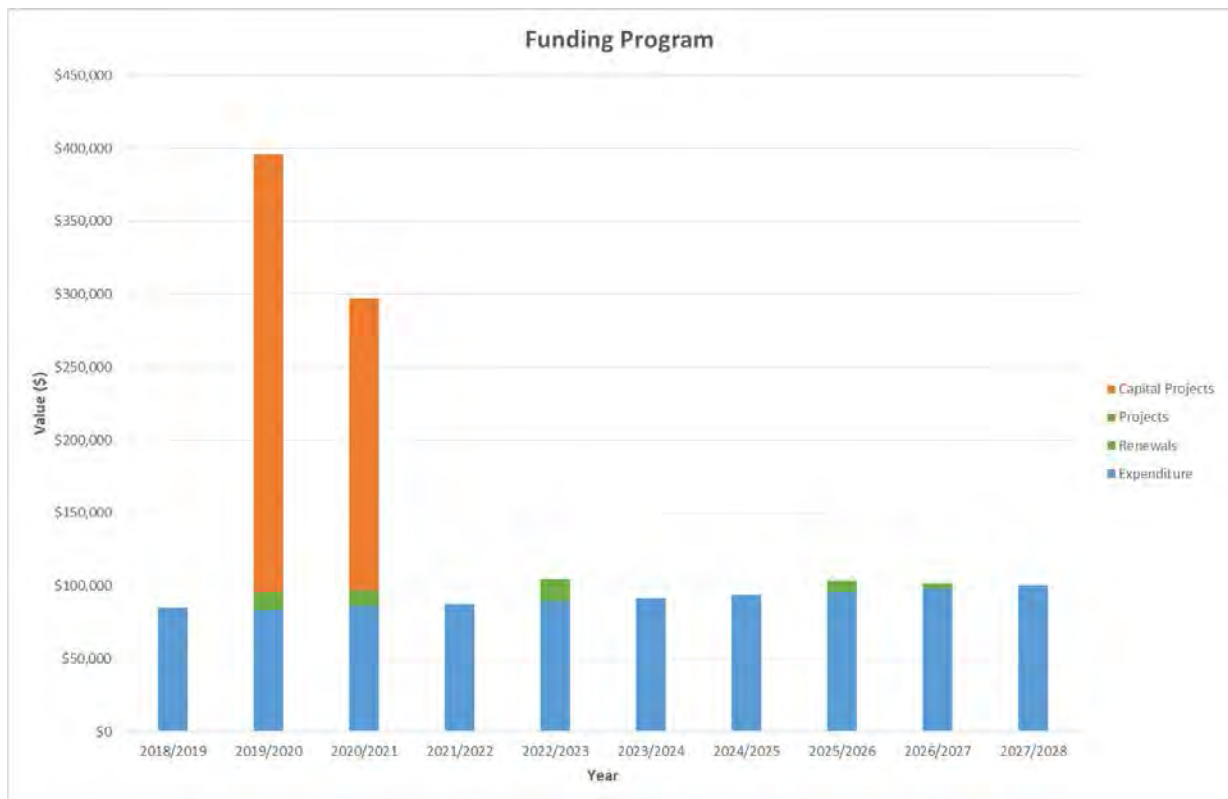


Figure 13-10 Prebbleton Funding Summary

There are a number of major projects for Prebbleton stormwater scheme in the LTP budget.

Table 13-9 Key Projects

Account Label	GL	Description	Year 1 (\$)	Year 2 (\$)	Year 3 (\$)	Years 4 to 10	Funding Split ⁷
Capital Projects	445590006	Pipe Open drain		\$300,000	\$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.

⁷ Where LoS refers to Level of Service and G refers to Growth

14.0 RAKAIA HUTS STORMWATER SCHEME

14.1 Scheme Summary

Description		Quantity
Scheme Area		27.69ha
Scheme Coverage (as at 1 Jan 2018)	Rating numbers	114
System components	Piped (m)	637.3
	Swales (m)	0
	Drains (m)	0
	Manholes/Inspection Chambers (No.)	7
	Treatment	N/A
	Other	N/A
Value (\$)	Replacement Cost	\$268,749.56
	Depreciated Replacement Cost	\$191,712.87
Financial	2018/2019 Estimate	\$1,195
	Annual maintenance cost	0.17%
	% of total	
Planning	Stormwater Management Plan	Not required
	No. SDC stormwater consents	0
Demand	Mean Annual Rainfall (mm)	613
	10% AEP (10 year) 1hr rainfall depth (mm)	18.6
Sustainability	Sustainable drain management practices	Adopted and Encouraged

14.2 Key Issues

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

Table 14-1 Rakaia Huts Scheme Issues

What's the Problem	What we plan to do
Flooding from upper catchment	Development of a stormwater catchment plan.

14.3 Overview & History

The stormwater system is a pipe network which mainly services the Ocean View Place catchment. Stormwater is conveyed by the pipe network discharging to the coastal environment.

Foreshore Protection

An area of foreshore at the end of Pacific Drive is subject to coastal erosion. Council were asked in 2013 to undertake protection works to the foreshore. The land is crown land managed by the Department of Conservation. In general terms Environment Canterbury is responsible for coastal erosion however there is no requirement to provide such protection. Coastal protection measures have previously been undertaken by the community. Little Rakaia Boating club hold the consent for the boat ramp and are responsible for its maintenance.

Rakaia River Mouth Opening

Flooding and property damage occurred in Rakaia Huts in 1992, 2008 and 2012 as a result of heavy rainfall in the headwaters and location of the river mouth. Environment Canterbury is working towards lodging a global consent to manage rivers in Canterbury including the Rakaia River mouth. This process has yet to be completed and as a result interim process has been put in place to open the Rakaia River mouth when there is potential to endanger property and life in Rakaia Huts. A standard operating procedure has been developed by Council for initiating the temporary river mouth opening procedure. Physical river mouth opening is undertaken by Environment Canterbury.



Figure 14-1 Scheme Map

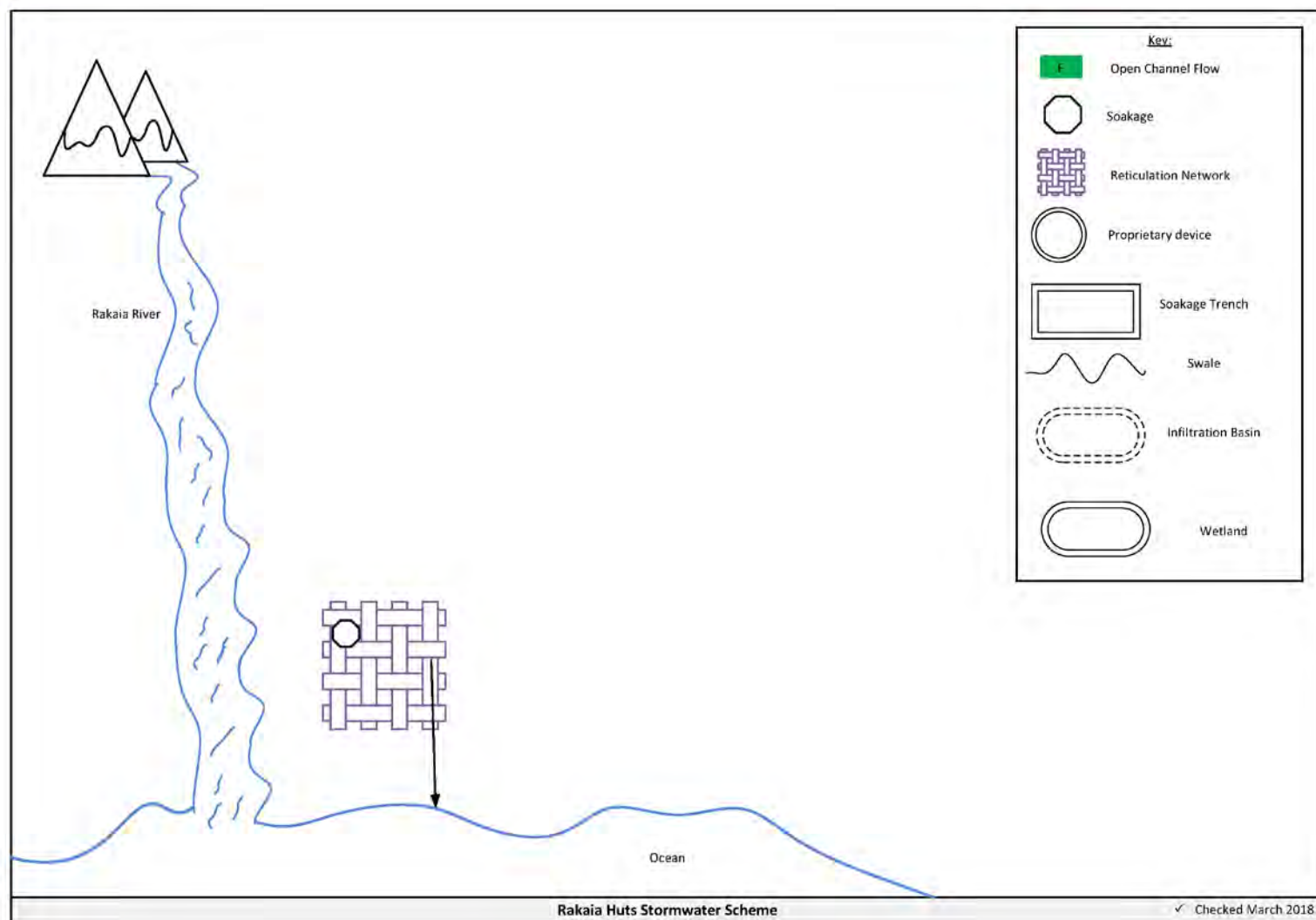


Figure 14-2 Scheme Schematic

14.4 Resource Consents

No resource consents are held by Selwyn District Council for this stormwater management area. Council will actively seek a global consent for this area.

14.5 Integrated Stormwater Management Plan

An ISMP is required for Rakaia Huts.

14.6 Scheme Assets

Council has a wide variety of stormwater assets within the district. A brief description of the assets within this scheme is provided below:

- a. Reticulated network – Includes pipes, manholes, sumps. The primary purpose of the reticulated network is to collect and convey stormwater. Historically these systems were designed for the 2 year storm event. Today's engineering standards require the piped network to be designed for a 10 year event with overland flow provision for up to the 50 year event.

A summary of diameter for channels and pipes, where known, is shown below in Figure 14-3. All assets in this scheme are of material PVCU.

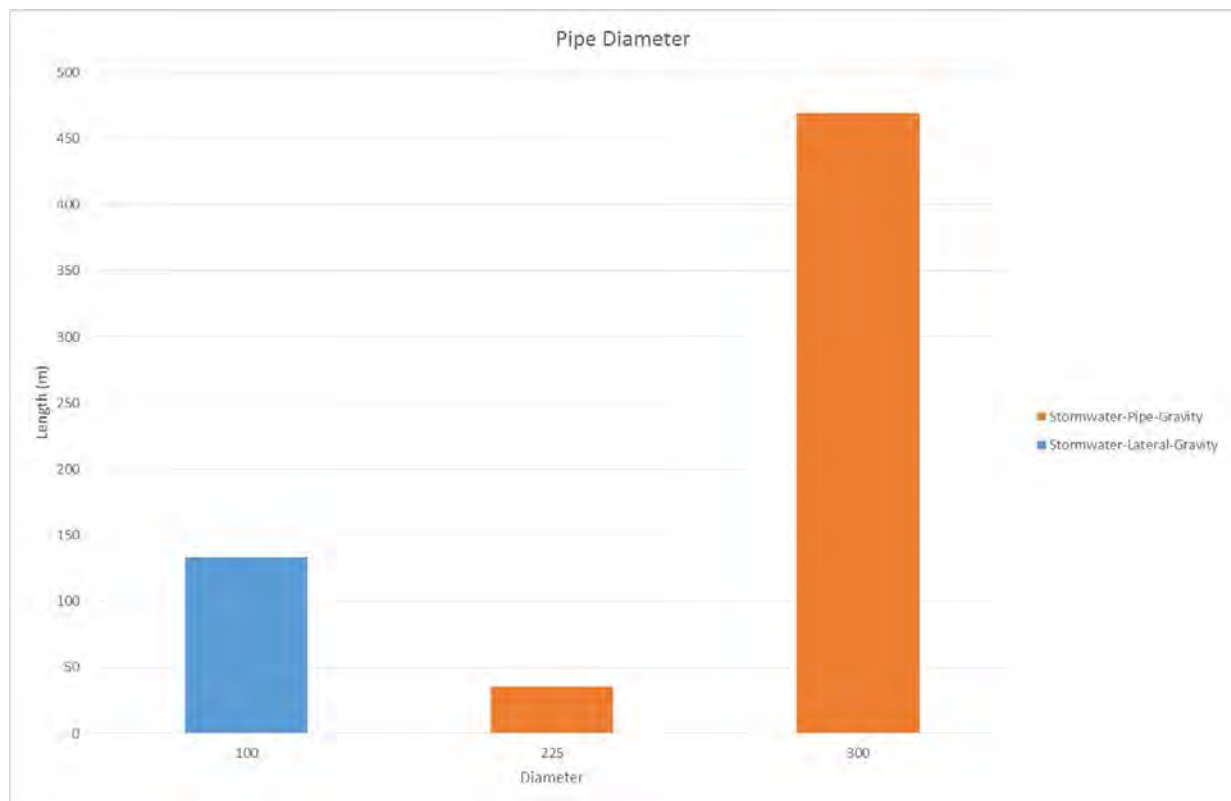


Figure 14-3 Pipe Diameter – Rakaia Huts

14.7 Operational Management

The stormwater network is operated and maintained under two maintenance contracts as follows:

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

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

14.8 Photos of Main Assets



Photo 1: Rakaia River in flood

14.9 Rapid Flood Modelling

The Council has undertaken 'Rapid Flood Hazard Assessment' modelling for its main townships. The modelling uses DHI MIKE 21 to simulate rainfall on grid with the outputs processed through ArcGIS producing maps illustrating a range of flood deeps during different rainfall intensities and durations.

The rapid flood assessment has been generated to provide a high level summary of potential flood and ponding areas across the district during extreme rainfall events. The results from this study are not to be used to set floor levels. The results have not been ground tested and therefore are indicative only.

For a 50 year event, XX shows the predicted flooding for Rakaia Huts.



Figure 14-4 Rapid Flood Assessment, Rakaia Huts

14.10 Risk Assessment

A risk assessment has been undertaken for the Rakaia Huts scheme. The key output from the risk assessment is the identification of any extreme and high risks which need to be mitigated. In order to mitigate these risks they have been included and budgeted for in the projects within this LTP. Table 14-2 details the risk rating priority and Table 14-3 outlines the risks for this scheme.

Table 14-2 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 14-3 Risks – Rakaia Huts

Risk	Action/Project	Year Identified	2014 Risk Rating	2017 Risk Rating	Residual Risk Rating
Storm surges block pipe	Review culvert outlet design from Camping ground	2014	4	2	2
Non-consented activities	Renewal of consents	2014	27	27	6

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

14.11 Asset Valuation Details

The total replacement value of assets within the Rakaia Huts Scheme is \$268,750 as detailed in Table 14-4 below. The majority of value, 72%, is made up of pipes.

Table 14-4 Replacement Value, Rakaia Huts

Asset Class 1	Asset Class 2	Sum of Replacement Value
Stormwater Reticulation	Inlet-Outlet-Point	\$853
	Lateral	\$31,500
	Manhole	\$43,764
	Pipe	\$192,633

Replacement values for different types (channels, laterals, management devices and pipes) of stormwater assets are shown in Figure 14-5 below.

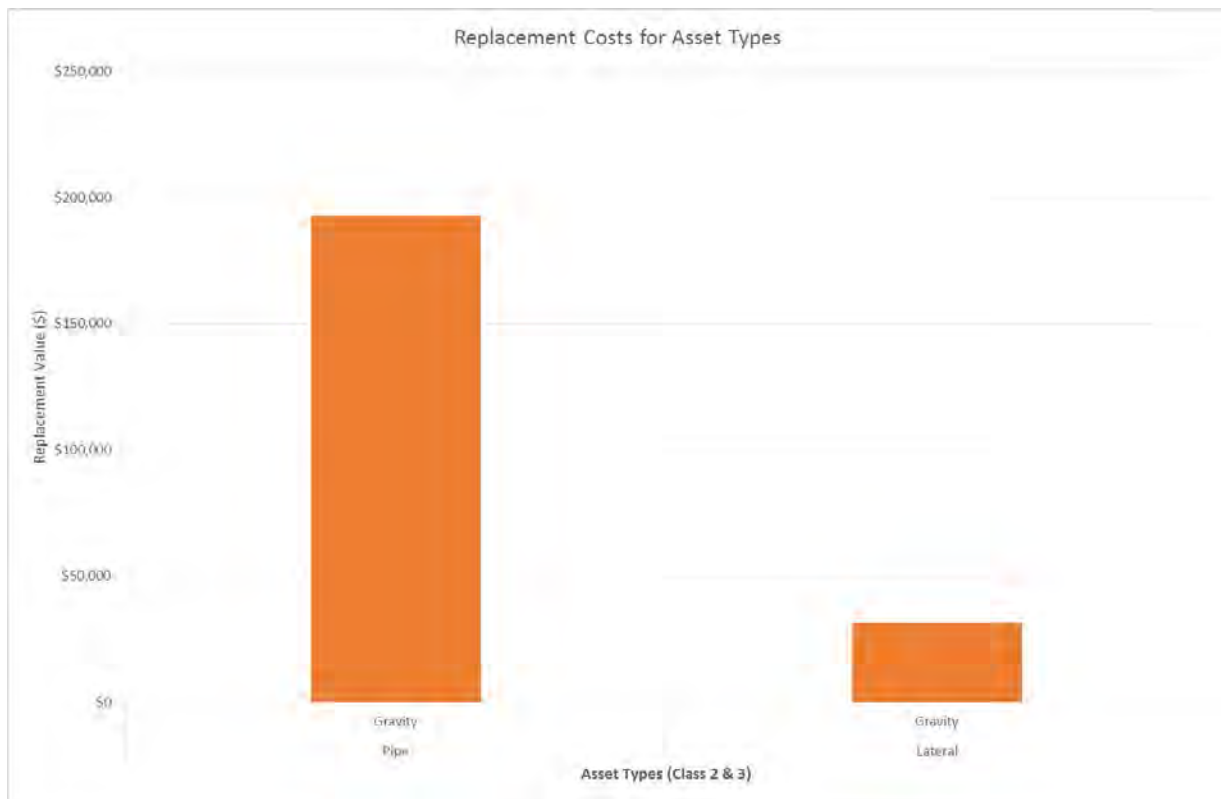


Figure 14-5 Replacement Costs for Rakaia Huts

14.12 Renewals

The renewal profile has been taken from the 2017 5 Waters Valuation. There are no renewals scheduled for this scheme.

14.13 Critical Assets

The criticality model for Rakaia Huts has been updated for the 2018 AcMP. The methodology of the criticality model can be found in 5Waters Activity Management Plan: Volume 1 and it provides details of how the criticality has been calculated for the reticulation assets. Table 14-5 and Figure 14-6 below shows the calculated criticality for all of the assets within this scheme that have a recorded known length.

Table 14-5 Length of Assets per Criticality Level

Criticality Bands		Length (m)
5	Low	666
4	Medium-Low	0
3	Medium	0
2	Medium-High	0

1	High	0
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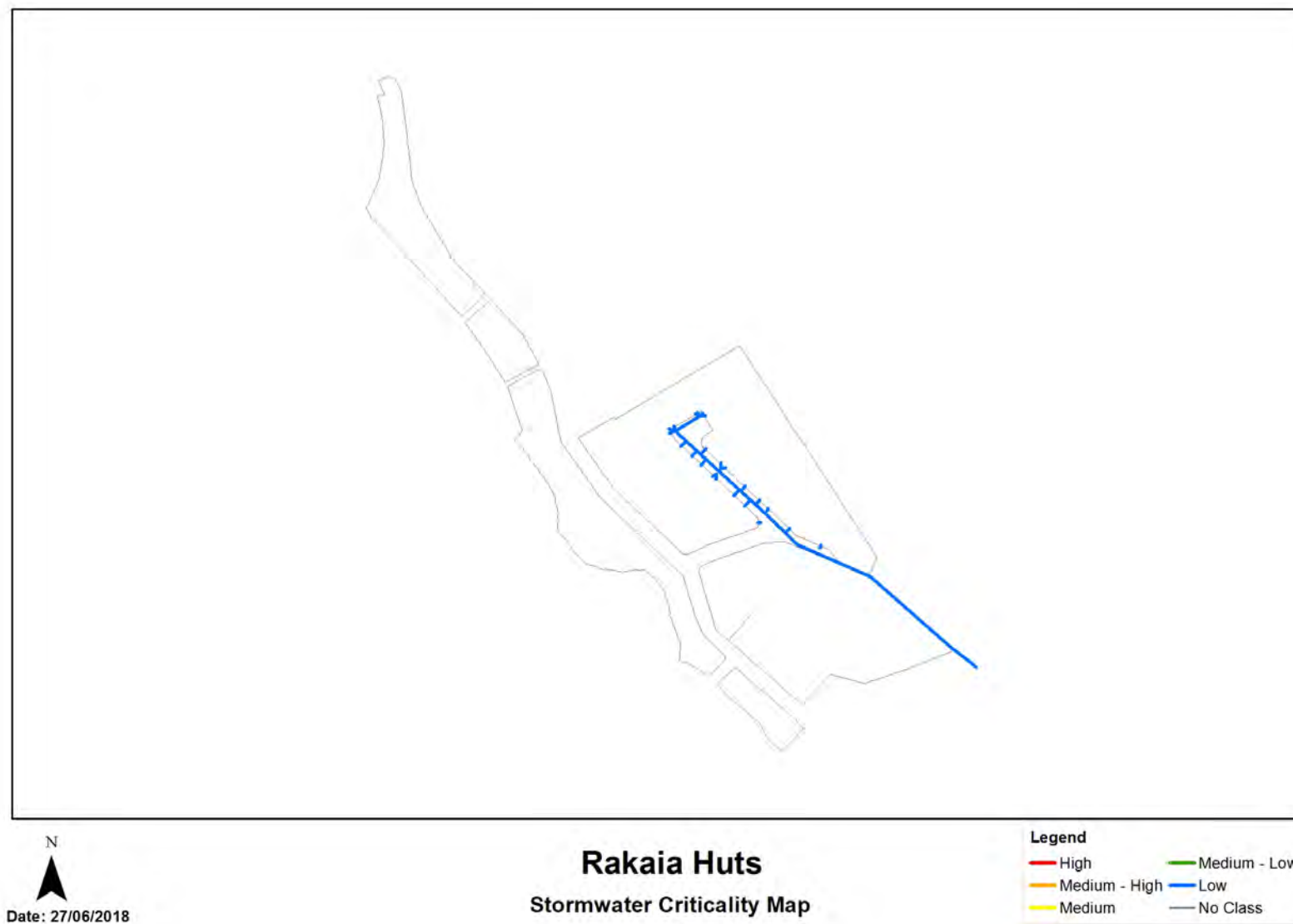


Figure 14-6 Criticality Map

14.14 Asset Condition

The asset condition model was run for Rakaia Huts in 2017. The methodology of the model can be found in 5Waters Activity Management Plan: Volume 1 and it provides details of how the model has been calculated for the reticulation assets (particularly pipes). Figure 14-7 below shows the level of asset condition for all of the assets within this scheme that have a recorded known condition.

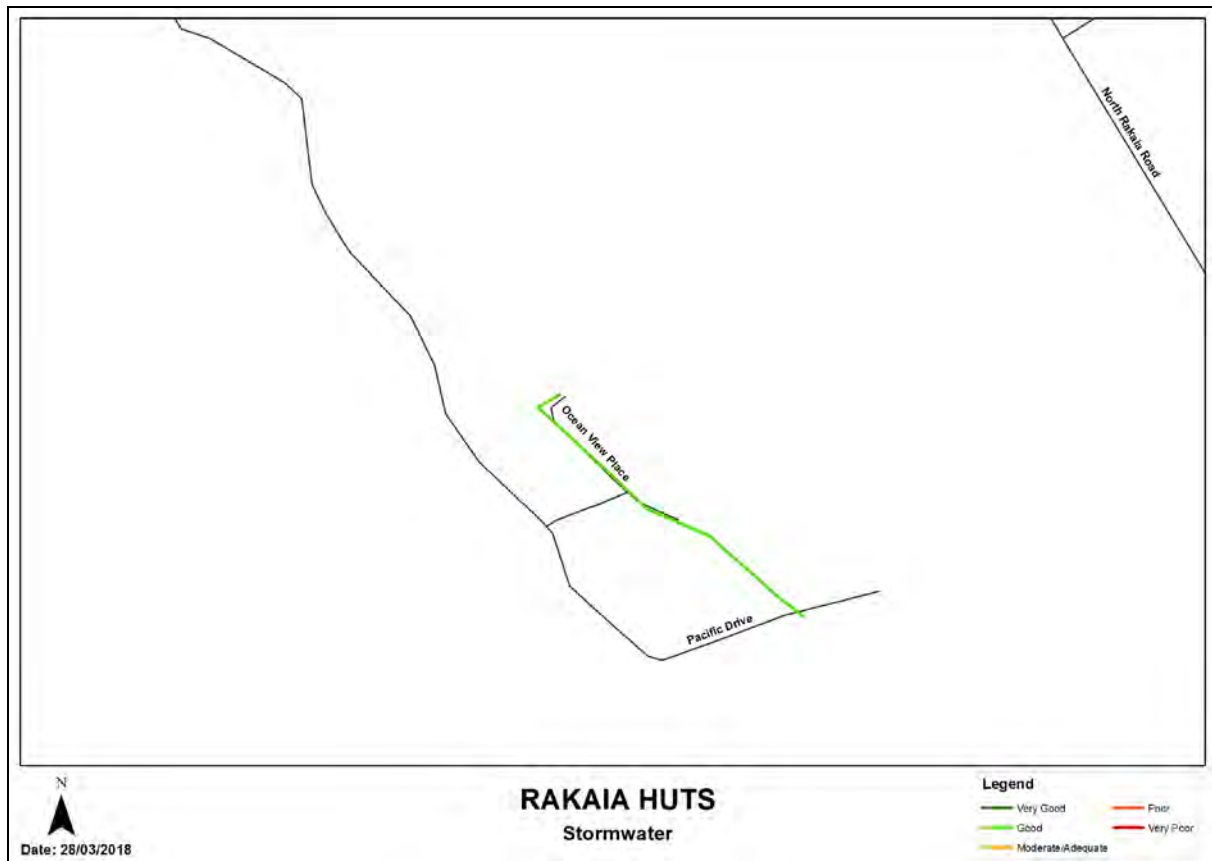


Figure 14-7 Asset Condition – Rakaia Huts

Table 14-6 provides a description of the condition rating used within the condition model.

Table 14-6 Asset Condition Grading

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

14.15 Funding Program

The 10 year budgets for Rakaia Huts are shown by Table 14-7 and Figure 14-8. 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 14-7 Rakaia Huts Budget Summary

Years	Expenditure	Renewals	Projects	Capital Projects
2018/2019	\$1,195			
2019/2020	\$1,195			
2020/2021	\$1,195			
2021/2022	\$1,195			
2022/2023	\$1,195			
2023/2024	\$1,195			
2024/2025	\$1,195			
2025/2026	\$1,195			
2026/2027	\$1,195			
2027/2028	\$1,195			
Total	\$11,950			

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.

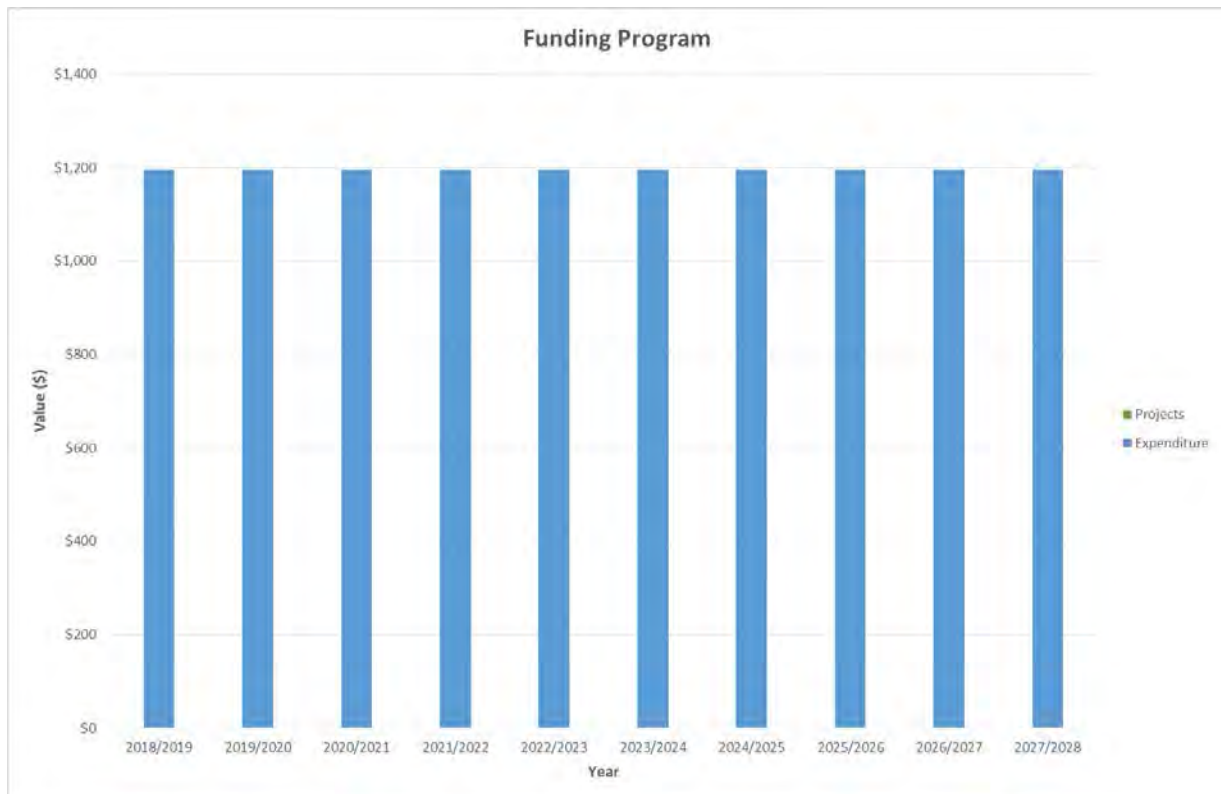


Figure 14-8 Rakaia Huts Funding Summary

There are no major projects for Rakaia stormwater scheme in the LTP budget.

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

15.0 ROLLESTON STORMWATER SCHEME

15.1 Scheme Summary

Description		Quantity
Scheme Area		908.18ha
Scheme Coverage (as at 1 Jan 2018)	Rating numbers	5289
System components	Piped (m)	5794.72
	Swales (m)	5927.4
	Drains (m)	27.8
	Manholes/Inspection Chambers (No.)	142
	Treatment	25 Infiltration basins, 51 Proprietary devices
	Other	Versitanks
Value (\$)	Replacement Cost	\$4,640,713.84
	Depreciated Replacement Cost	\$4,233,011.62
Financial	2018/2019 Estimate	\$134,500
	Annual maintenance cost	19.25%
	% of total	
Planning	Stormwater Management Plan	Yes
	No. SDC stormwater consents	20
Demand	Mean Annual Rainfall (mm)	643
	10% AEP (10 year) 1hr rainfall depth (mm)	19.6
Sustainability	Sustainable drain management practices	Adopted and Encouraged

15.2 Key Issues

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

Table 15-1 Rolleston Scheme Issues

What's the Problem	What we plan to do
Capacity upgrades which are a result from increasing expectations from ratepayers that a higher level of service LOS is provided.	Identify capacity restrictions in the system, design upgrades and budget for physical works in LTP.

15.3 Overview & History

Due to the relatively free draining soils which underlie the township of Rolleston, the stormwater system generally consists of roadside sumps discharging directly to soak holes.

A number of the newer subdivisions have incorporated soakage basins as part of the overall stormwater management. The Izone industrial area also incorporates a number of proprietary treatment devices.

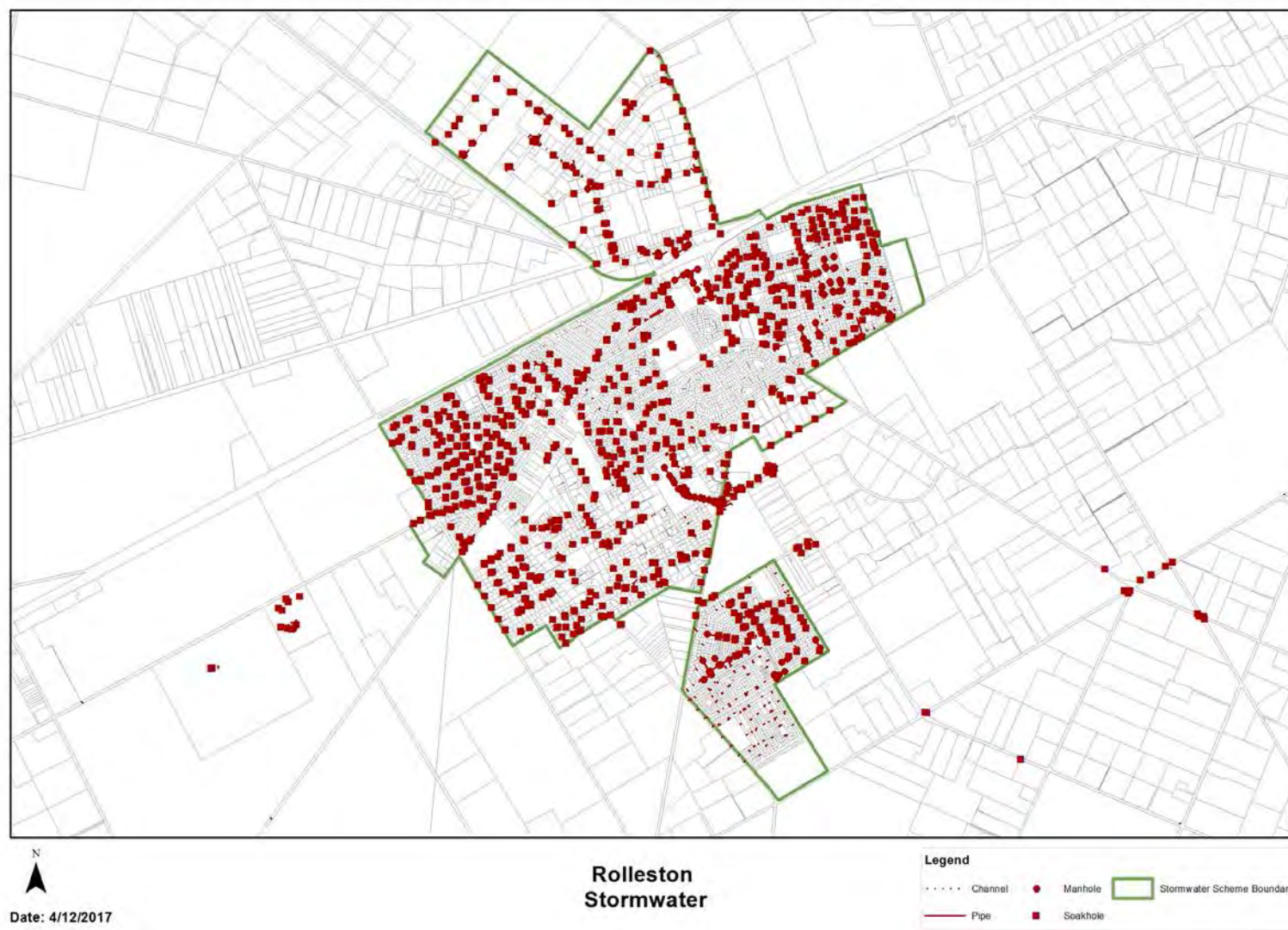


Figure 15-1 Scheme Map

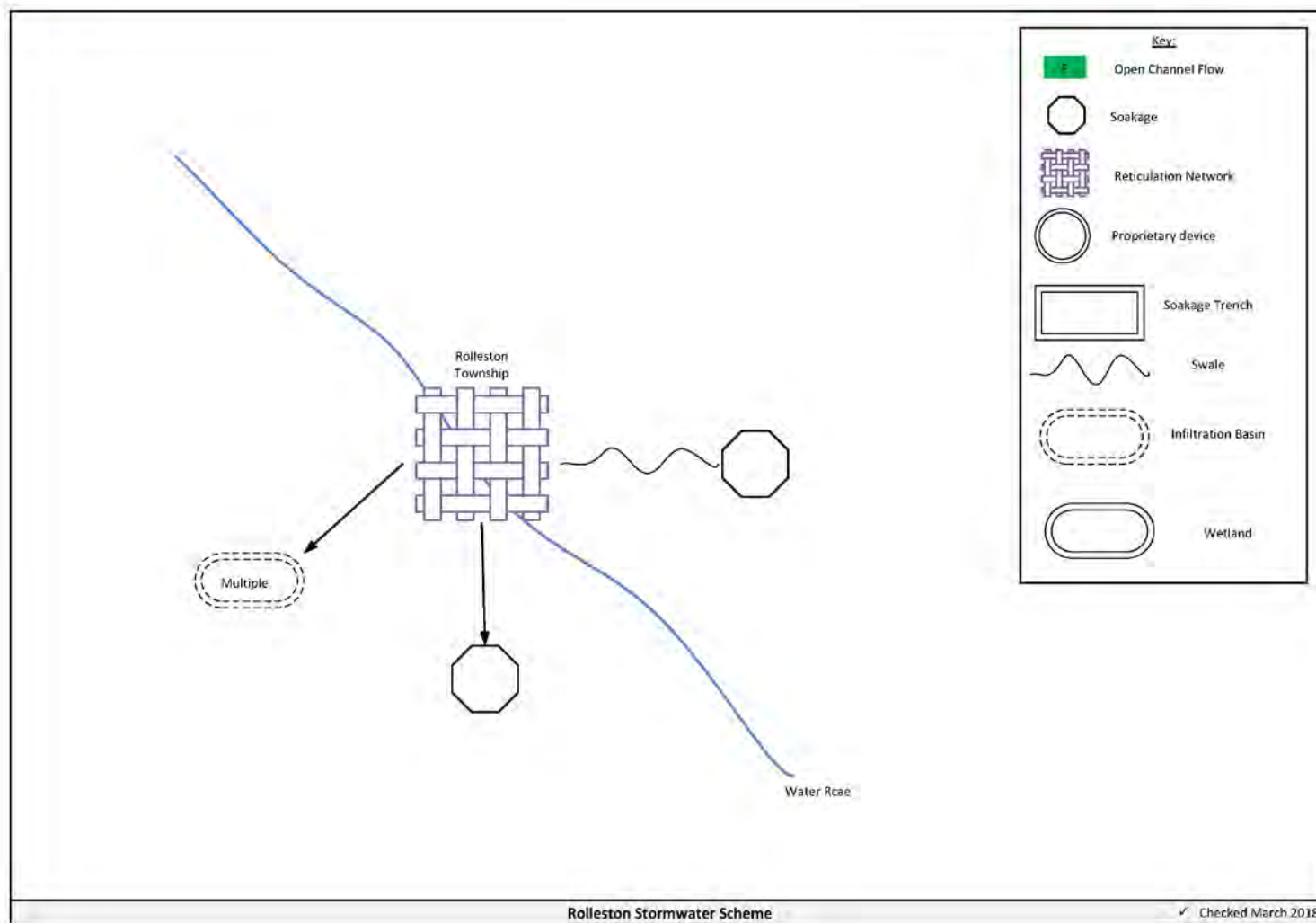


Figure 15-2 Scheme Schematic

15.4 Resource Consents

The Rolleston stormwater scheme has a number of resource consents. Table 15-2 shows the stormwater discharge permitted by the resource consents for this scheme.

Table 15-2 Resource Consents

Consent	Description	Location	Date Issued	Expiry Date
CRC054637 <i>Issued - Active</i>	To discharge stormwater on to land	Burnham School Road, ROLLESTON	5/10/2005	30/09/2040
CRC050265.2 <i>Issued - Active</i>	To discharge stormwater from roads and residential hard-stand areas into land via sumps and soak pits - by altering the monitoring condition relating to the location, depth and position of the screens in the monitoring bores	Rolleston Drive and State Highway 1, ROLLESTON	21/01/2010	10/02/2041
CRC091220.2 <i>Issued - Active</i>	To discharge contaminants into land.	Hoskyns Road, ROLLESTON	9/11/2010	28/06/2041
CRC091824.1 <i>Issued - Active</i>	To discharge contaminants into land.	Hoskyns Road, ROLLESTON	15/04/2009	28/06/2041
CRC100025 <i>Issued - Active</i>	To discharge contaminants into land.	Izone Drive, ROLLESTON	15/05/2009	28/06/2041
CRC100027 <i>Issued - Active</i>	To discharge contaminants into land.	Izone Drive, ROLLESTON	15/05/2009	28/06/2041
CRC100057 <i>Issued - Active</i>	To discharge contaminants into land.	Izone Drive, ROLLESTON	15/05/2009	28/06/2041
CRC100069 <i>Issued - Active</i>	To discharge contaminants into land.	Izone Drive, ROLLESTON	15/05/2009	28/06/2041
CRC100072 <i>Issued - Active</i>	To discharge contaminants into land.	Izone Drive, ROLLESTON	15/05/2009	28/06/2041
CRC100073 <i>Issued - Active</i>	To discharge contaminants into land.	Izone Drive, ROLLESTON	15/05/2009	28/06/2041
CRC100076 <i>Issued - Active</i>	To discharge contaminants into land.	Izone Drive, ROLLESTON	15/05/2009	28/06/2041
CRC100078 <i>Issued - Active</i>	To discharge contaminants into land.	Izone Drive, ROLLESTON	15/05/2009	28/06/2041

CRC110923 <i>Issued - Active</i>	To discharge contaminants into land.	Izone Drive, ROLLESTON	24/06/2011	28/06/2041
CRC133608 <i>Issued - Active</i>	To discharge contaminants into land.	10 George Holmes Road, ROLLESTON	1/02/2013	1/02/2043
CRC092526 <i>Issued - Active</i>	To discharge contaminants to land.	228 Lowes Road, ROLLESTON	23/01/2009	22/01/2044
CRC100819.1 <i>Issued - InActive</i>	To discharge contaminants into land.	Railway Road, ROLLESTON	18/02/2010	19/11/2044
CRC100886.1 <i>Issued - InActive</i>	To discharge contaminants into land.	Railway Road, ROLLESTON	18/02/2010	19/11/2044
CRC135804 <i>Issued - InActive</i>	To discharge contaminants into land.	Detroit Drive, ROLLESTON	3/10/2012	24/06/2046
CRC132527 <i>Issued - Active</i>	To discharge stormwater to land	Rolleston Township, Selwyn District	16/01/2014	16/01/1949
CRC145959 <i>Issued - InActive</i>	To discharge contaminants into land.	Izone Industrial Park, ROLLESTON	1/07/2013	24/06/2046

Council obtained a global stormwater consent for the existing township stormwater disposal in January 2014 – CRC132527. Eleven residential consents were surrendered. The consent requires treatment in specific areas and excludes all industrial and commercial developments.

15.5 Integrated Stormwater Management Plan

An Integrated Stormwater Management Plan (ISMP) was prepared for Rolleston as part of Council's global discharge consent application in November 2012. The consent was granted January 2014.

15.6 Scheme Assets

Council has a wide variety of stormwater assets within the district. A brief description of the assets within this scheme is provided below:

- Humeceptor - Is a hydrodynamic separator which helps to reduce mass sediment load from the discharge, some removal of hydrocarbons is also achieved.
- Swale (Grassed) – Is a longitudinal open channel which is lined with grass. The swale both conveys and treats stormwater.
- Reticulated network – Includes pipes, manholes, sumps. The primary purpose of the reticulated network is to collect and convey stormwater. Historically these systems were designed for the 2 year storm event. Today's engineering standards require the piped

network to be designed for a 10 year event with overland flow provision for up to the 50 year event.

- d. Infiltration basin – is a stormwater management device which is used to store, treat and dispose of stormwater to the ground via soakage.
- e. Soakholes – Are used to dispose of stormwater to ground in areas where the ground water table is low and soil permeability is high.

A summary of material and diameter for channels and pipes, where known, is shown below in Figure 15-3 and Figure 15-4.

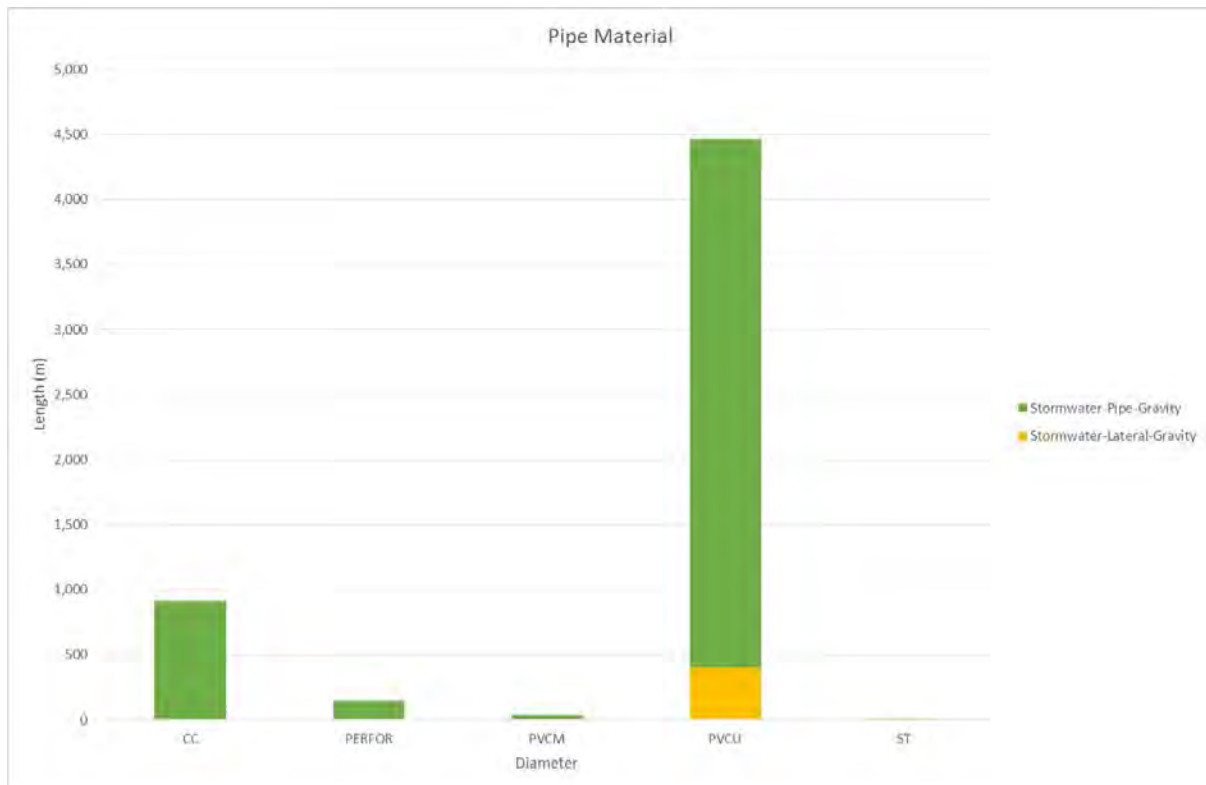


Figure 15-3 Pipe Material – Rolleston

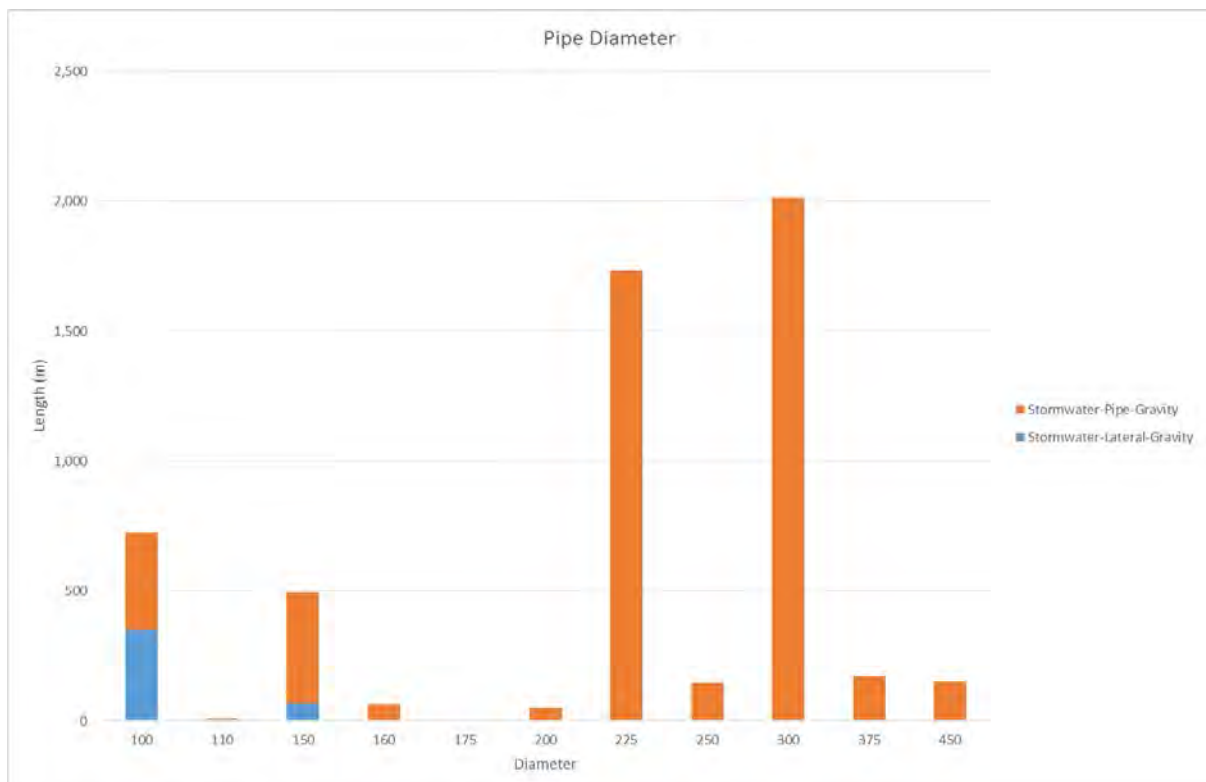


Figure 15-4 Pipe Diameter – Rolleston

15.7 Operational Management

The stormwater network is operated and maintained under two maintenance contracts as follows:

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

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

15.8 Photos of Main Assets

The photos below provide a summary of the types of assets found within this stormwater management area.



Photo 1: Stormwater Basin



Photo 2: Stormwater Basin

15.9 Rapid Flood Modelling

The Council has undertaken 'Rapid Flood Hazard Assessment' modelling for its main townships. The modelling uses DHI MIKE 21 to simulate rainfall on grid with the outputs processed through ArcGIS producing maps illustrating a range of flood deeps during different rainfall intensities and durations.

The rapid flood assessment has been generated to provide a high level summary of potential flood and ponding areas across the district during extreme rainfall events. The results from this study are not to be used to set floor levels. The results have not been ground tested and therefore are indicative only.

For a 50 year event, Figure 15-5 shows the predicted flooding for Rolleston.

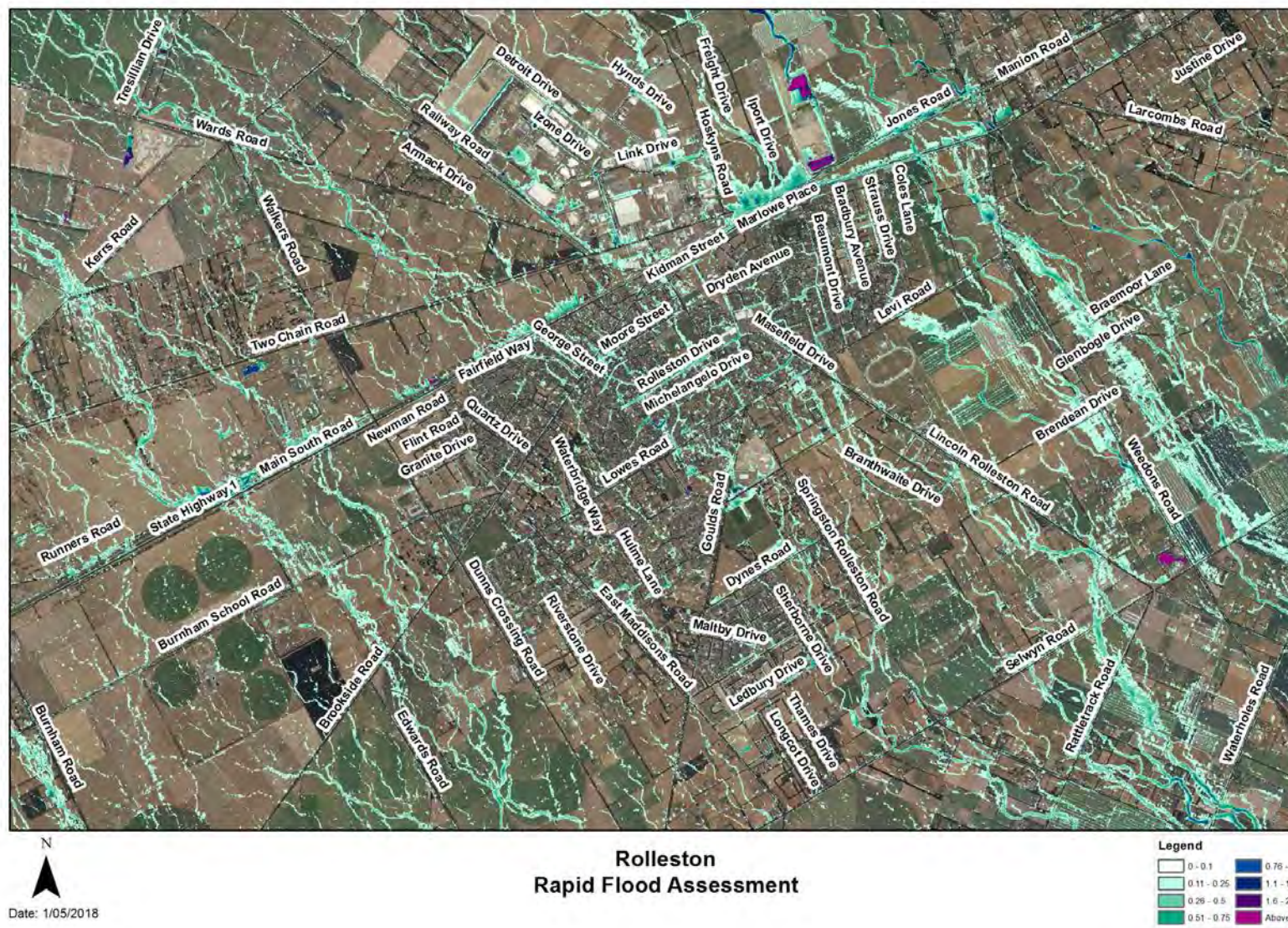


Figure 15-5 Rapid Flood Modelling, Rolleston

15.10 Risk Assessment

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

Risk	Action/Project	Year Identified	2014 Risk Rating	2017 Risk Rating	Residual Risk Rating
Complaints about appearance of stormwater basins	Beautify stormwater basins	2014	4	4	2
Soil contamination	Basin sediment sampling	2014	12	12	6
Non-consented activities	Renewal of consents	2014	27	27	6

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

15.11 Asset Valuation Details

The total replacement value of assets within the Rolleston Scheme is \$4,640,714 as detailed in Table 15-5 below. The majority of value, 33%, is made up of pipes.

Table 15-5 Replacement Value, Rolleston

Asset Class 1	Asset Class 2	Sum of Replacement Value
Stormwater Reticulation	Chamber	\$10,242
	Channel	\$385,065
	Inlet-Outlet-Point	\$403,504

	Lateral	\$127,159
	Management Device	\$975,962
	Manhole	\$824,155
	Pipe	\$1,600,240
	Soakhole	\$314,387

Replacement values for different types (channels, laterals, management devices and pipes) of stormwater assets are shown in Figure 15-6 below.

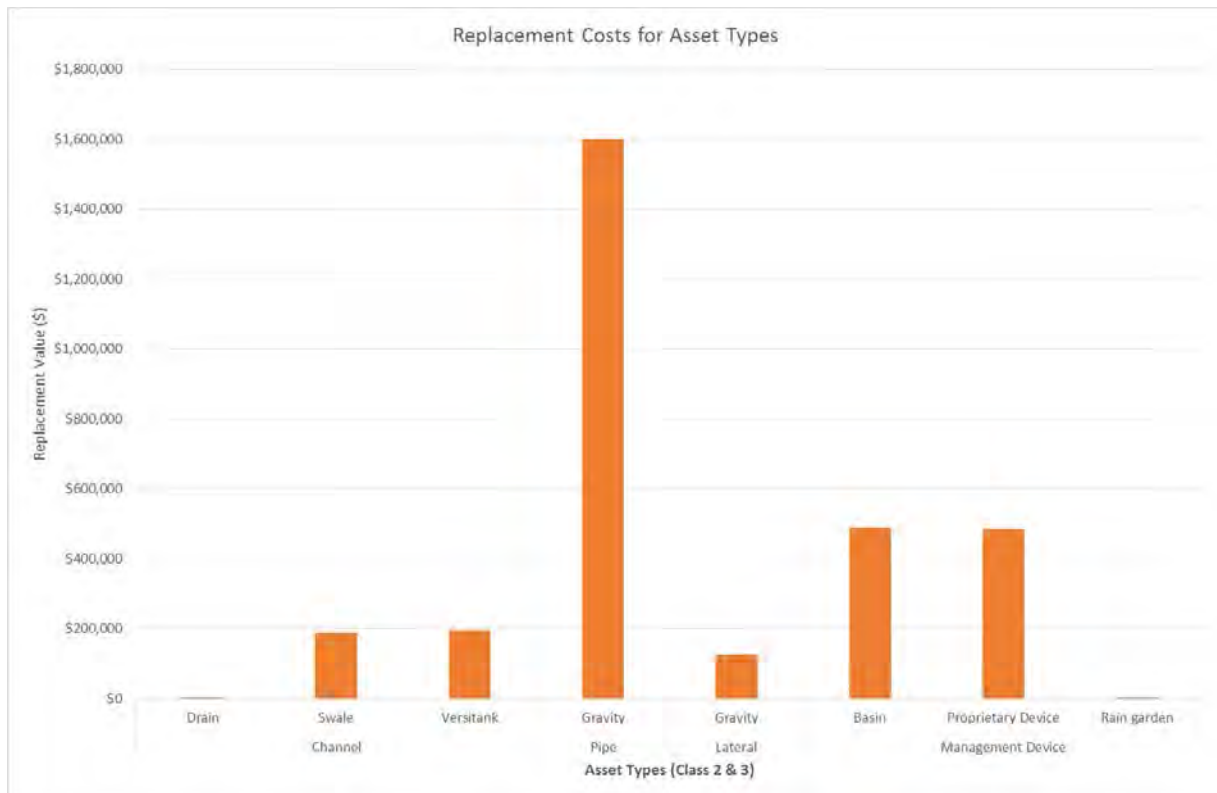


Figure 15-6 Replacement Costs for Rolleston

15.12 Renewals

The renewal profile has been taken from the 2017 5 Waters Valuation. A graph showing the renewals for this scheme are shown by Figure 15-7 below. The majority of assets requiring renewal are culverts/pipes which occur in the year 2025/26.

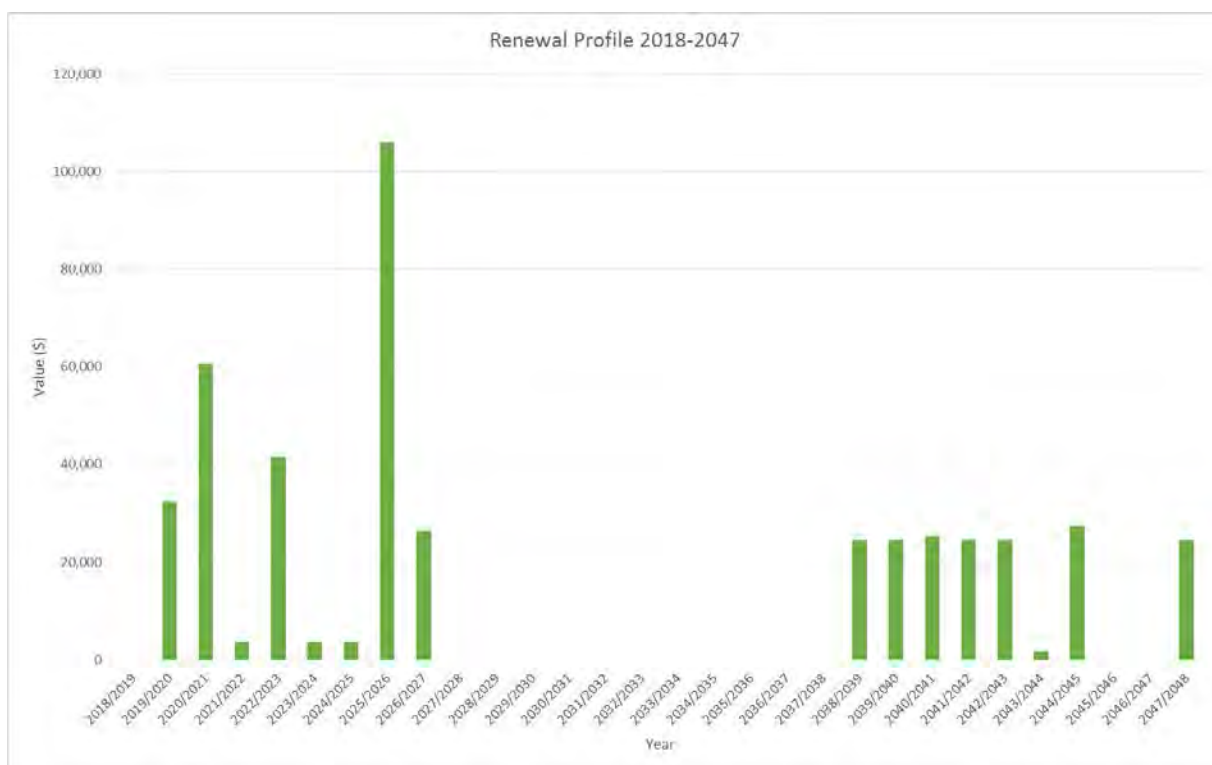


Figure 15-7 Rolleston Stormwater Renewal Profile

15.13 Critical Assets

The criticality model for Rolleston has been updated for the 2018 AcMP. The methodology of the criticality model can be found in 5Waters Activity Management Plan: Volume 1 and it provides details of how the criticality has been calculated for the reticulation assets. Table 15-6 and Figure 15-8 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	12445
4	Medium-Low	819
3	Medium	116
2	Medium-High	0
1	High	0

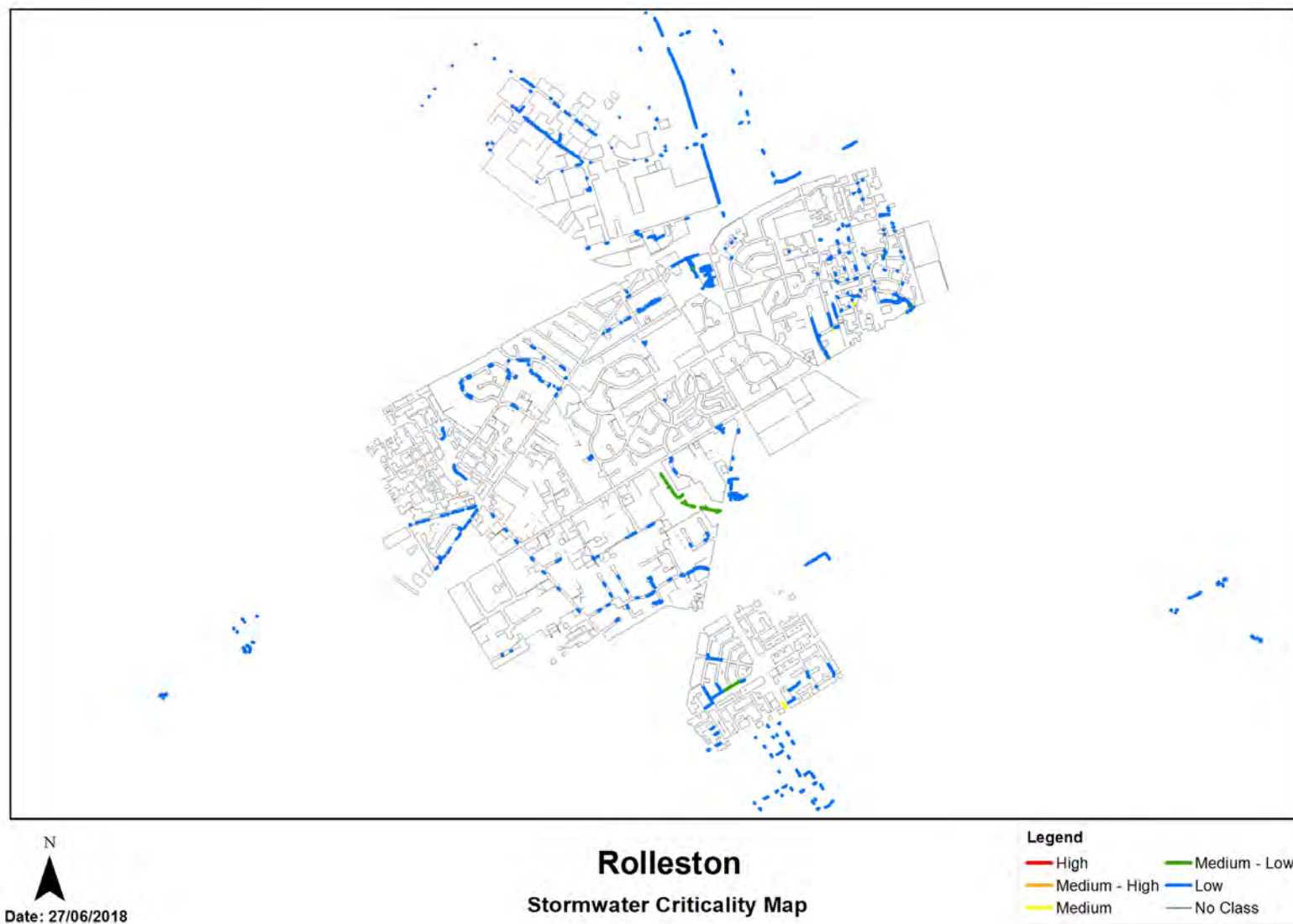


Figure 15-8 Criticality Map

15.14 Asset Condition

The asset condition model was run for Rolleston in 2017. The methodology of the model can be found in 5Waters Activity Management Plan: Volume 1 and it provides details of how the model has been calculated for the reticulation assets (particularly pipes). Figure 15-9 below shows the level of asset condition for all of the assets within this scheme that have a recorded known condition.

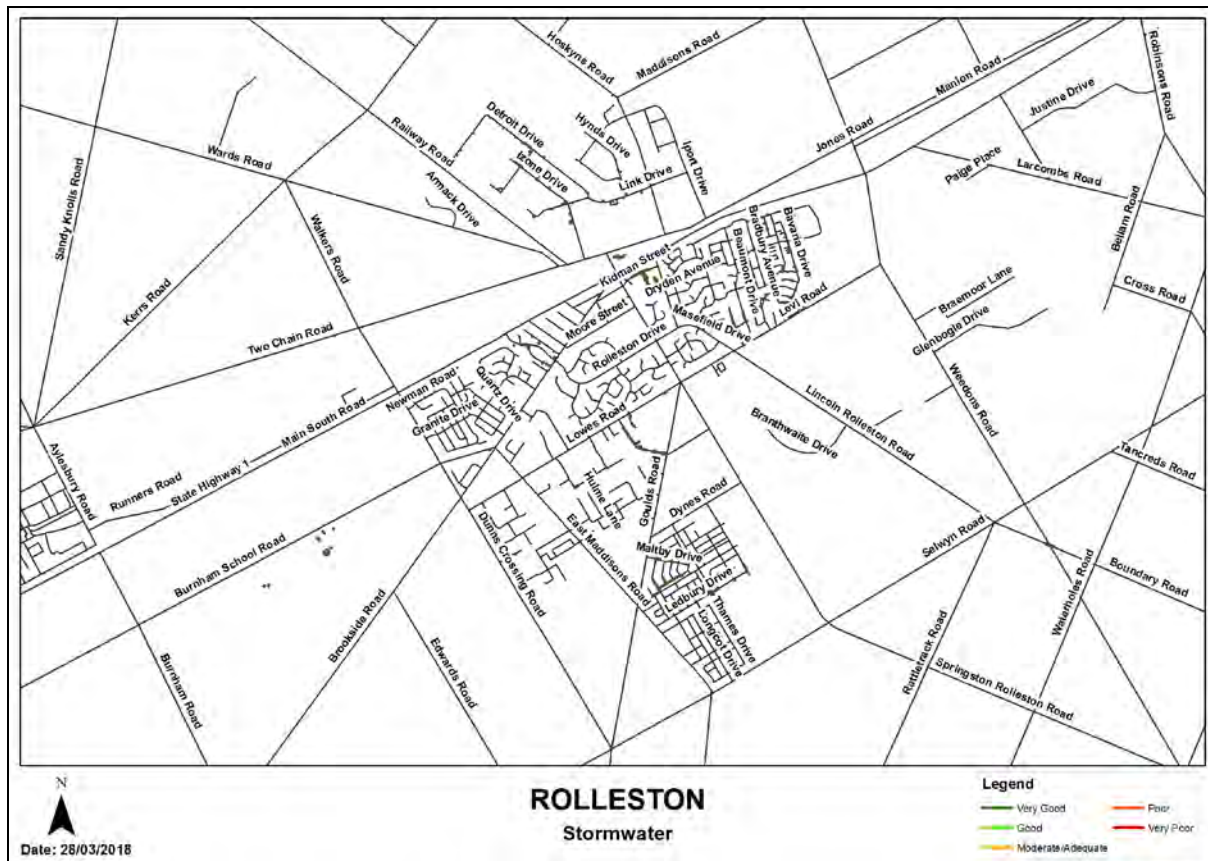


Figure 15-9 Asset Condition - Rolleston

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

15.15 Funding Program

The 10 year budgets for Rolleston are shown by Table 15-8 and Figure 15-10. Budgets are split into expenditure, renewals, projects and capital projects.

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

Table 15-8 Rolleston Budget Summary

Years	Expenditure	Renewals	Projects	Capital Projects
2018/2019	\$134,500		\$15,000	
2019/2020	\$140,500	\$32,493		
2020/2021	\$144,790	\$60,605		
2021/2022	\$148,101	\$3,788		
2022/2023	\$151,255	\$41,666		
2023/2024	\$152,344	\$3,788		
2024/2025	\$153,416	\$3,788		
2025/2026	\$154,472	\$106,058		
2026/2027	\$155,512	\$26,515		
2027/2028	\$156,537			
Total	\$1,491,429	\$278,700	\$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.

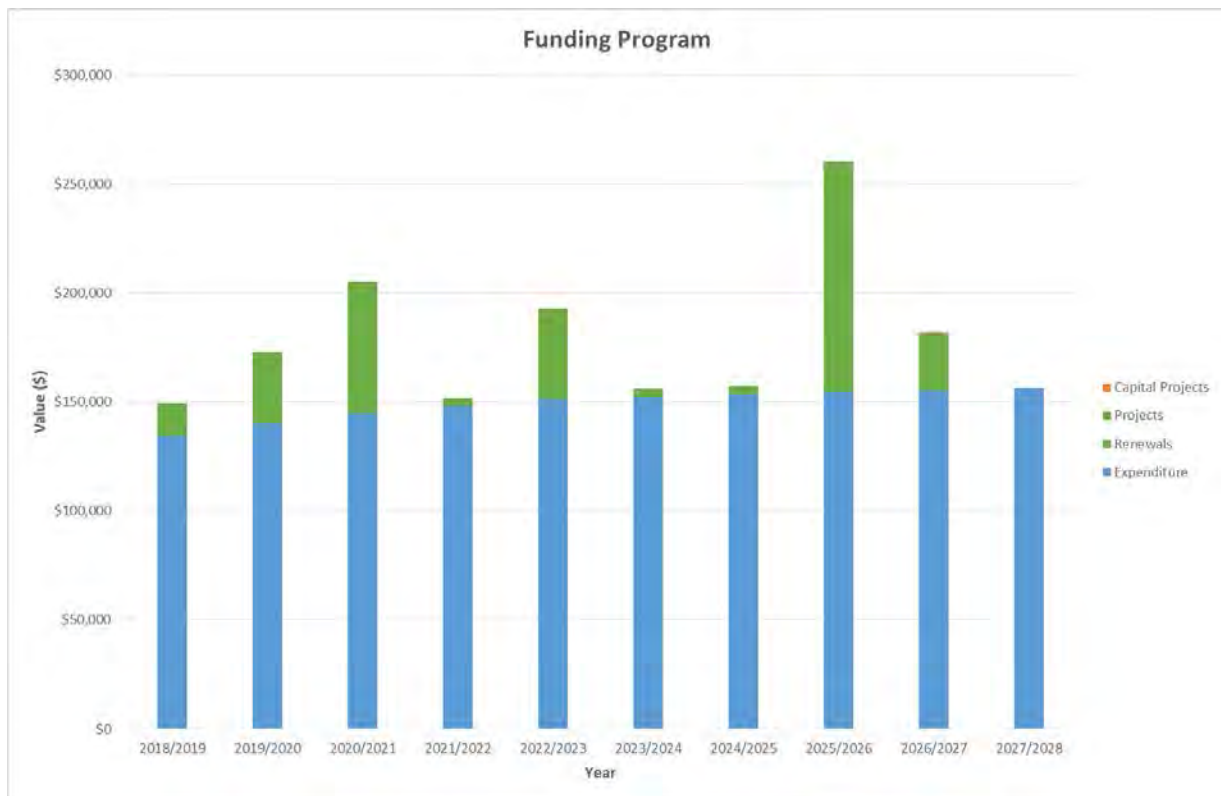


Figure 15-10 Rolleston Funding Summary

There are a number of major projects for Rolleston stormwater 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 ⁸
Projects	446690006	Basin sediment sampling	\$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.

⁸ Where LoS refers to Level of Service and G refers to Growth

16.0 SOUTHBRIDGE STORMWATER SCHEME

16.1 Scheme Summary

Description		Quantity
Scheme Area		155.72ha
Scheme Coverage (as at 1 Jan 2018)	Rating numbers	365
System components	Piped (m)	1868.96
	Swales (m)	1521.1
	Drains (m)	1975.5
	Manholes/Inspection Chambers (No.)	15
	Treatment	N/A
	Other	N/A
Value (\$)	Replacement Cost	\$957,167.02
	Depreciated Replacement Cost	\$769,184.96
Financial	2018/2019 Estimate	\$16,770
	Annual maintenance cost	2.4%
	% of total	
Planning	Stormwater Management Plan	Draft
	No. SDC stormwater consents	0
Demand	Mean Annual Rainfall (mm)	613
	10% AEP (10 year) 1hr rainfall depth (mm)	18.6
Sustainability	Sustainable drain management practices	Adopted and Encouraged

16.2 Key Issues

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

Table 16-1 Southbridge Scheme Issues

What's the Problem	What we plan to do
Flooding of properties on O'Connell Street from run off from the upper catchment.	Continue to work with the community to identify affordable solutions.
Changing community expectations regarding levels of service and funding of stormwater services.	Continue to work with the community to prioritise improvement programme.

16.3 Overview & History

There are limited stormwater records for the Southbridge township. Ultimate discharge of stormwater runoff is to the Waikewai Creek / Lee Stream. Water races fed from the Lower Rakaia have historically run through the township. The tentburn flood waters are often conveyed by these remnant channels.

Flooding

Flooding occurred in Southbridge in 2013 as a result of 254 mm rain during June. Overland flow from paddocks affected O'Connell Street and other areas impacted included Bowen, Sarsfield and St. John Street.

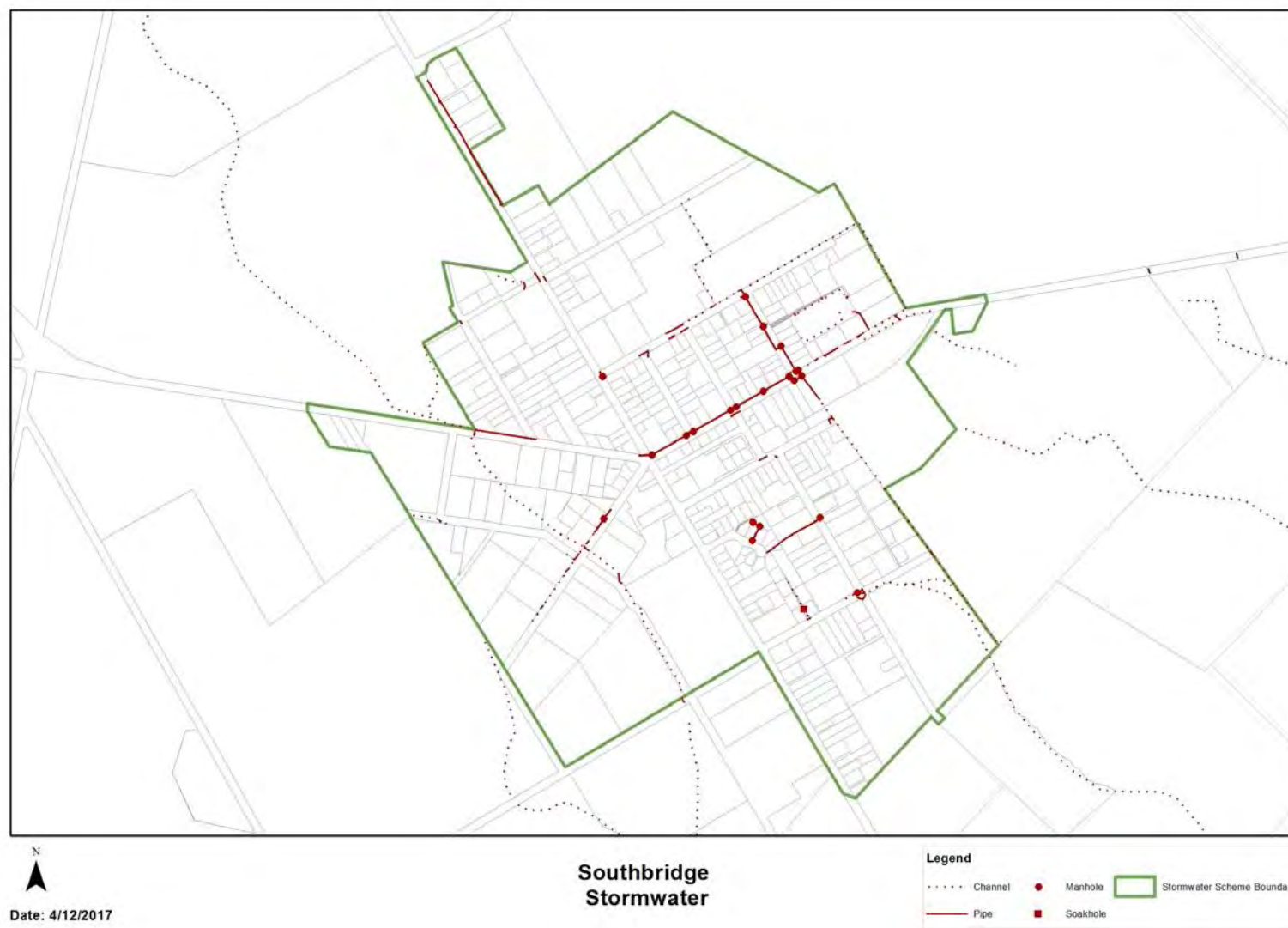


Figure 16-1 Scheme Map

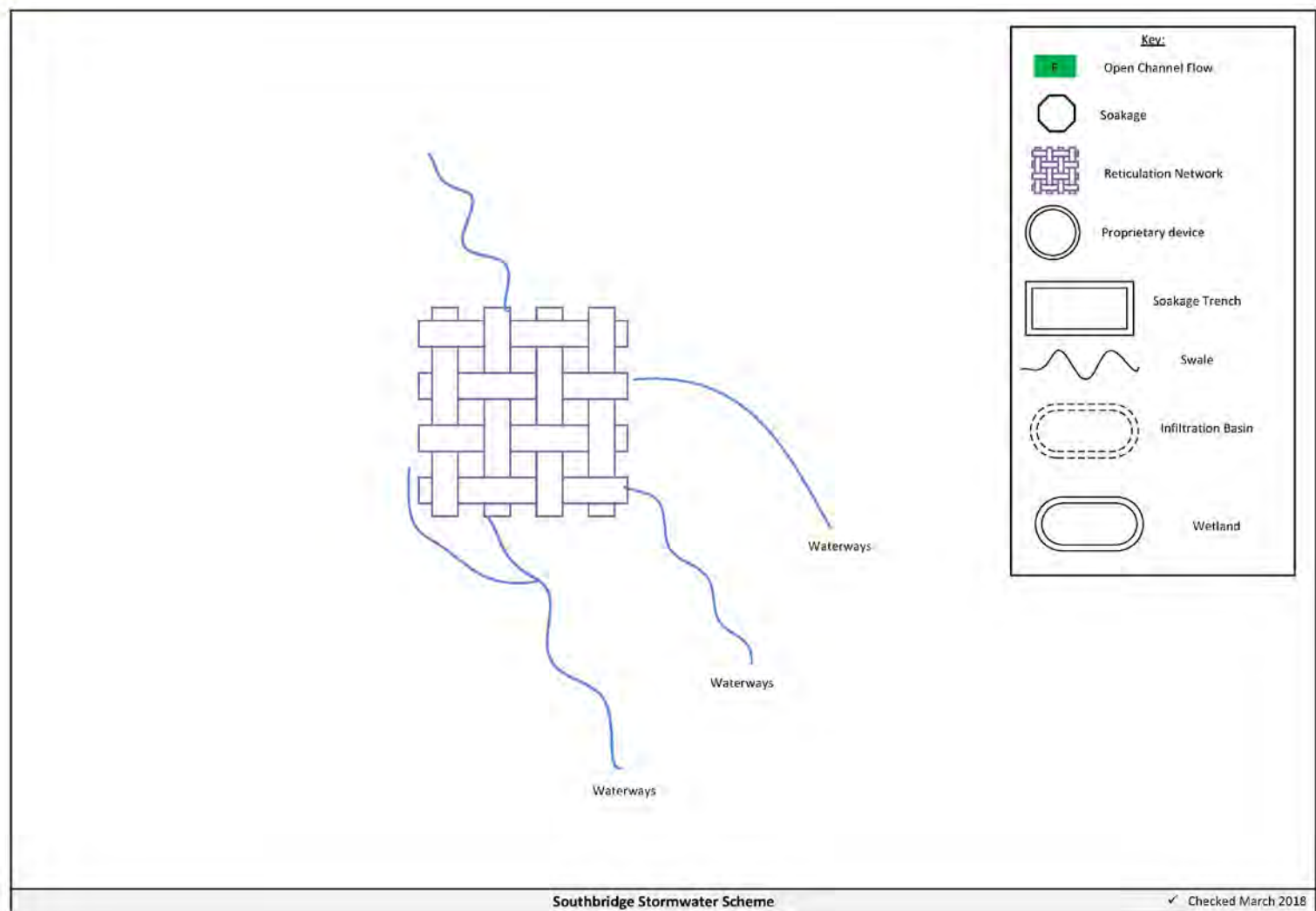


Figure 16-2 Scheme Schematic

16.4 Resource Consents

There is no stormwater discharge consents held by Selwyn District Council for this stormwater management area. Council is actively seeking a global consent for this area.

Table 16-2 Resource Consents

Consent	Description	Location	Date Issued	Expiry Date
CRC167470 <i>Application in Process</i>	to discharge stormwater from the existing stormwater network of Southbridge	Southbridge, Selwyn		

16.5 Integrated Stormwater Management Plan

An ISMP is required for Southbridge. CRC167470

16.6 Scheme Assets

Council has a wide variety of stormwater assets within the district. A brief description of the assets within this scheme is provided below:

- Swale (Grassed) – Is a longitudinal open channel which is lined with grass. The swale both conveys and treats stormwater.
- Reticulated network – Includes pipes, manholes, sumps. The primary purpose of the reticulated network is to collect and convey stormwater. Historically these systems were designed for the 2 year storm event. Today's engineering standards require the piped network to be designed for a 10 year event with overland flow provision for up to the 50 year event.
- Soakholes – Are used to dispose of stormwater to ground in areas where the ground water table is low and soil permeability is high.
- Open drains – are channels used to convey stormwater. They are cost effective means to convey large volumes of water.

A summary of material and diameter for channels and pipes, where known, is shown below in Figure 16-3 and Figure 16-4.

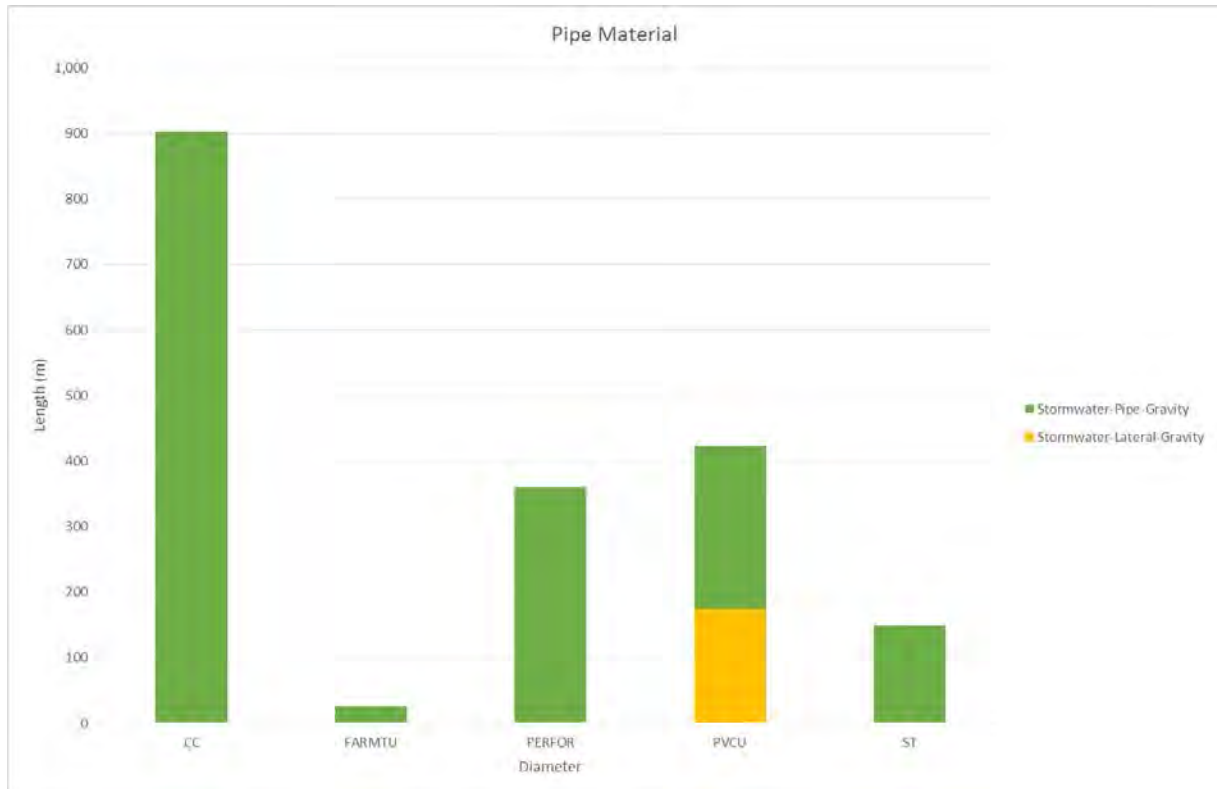


Figure 16-3 Pipe Material - Southbridge

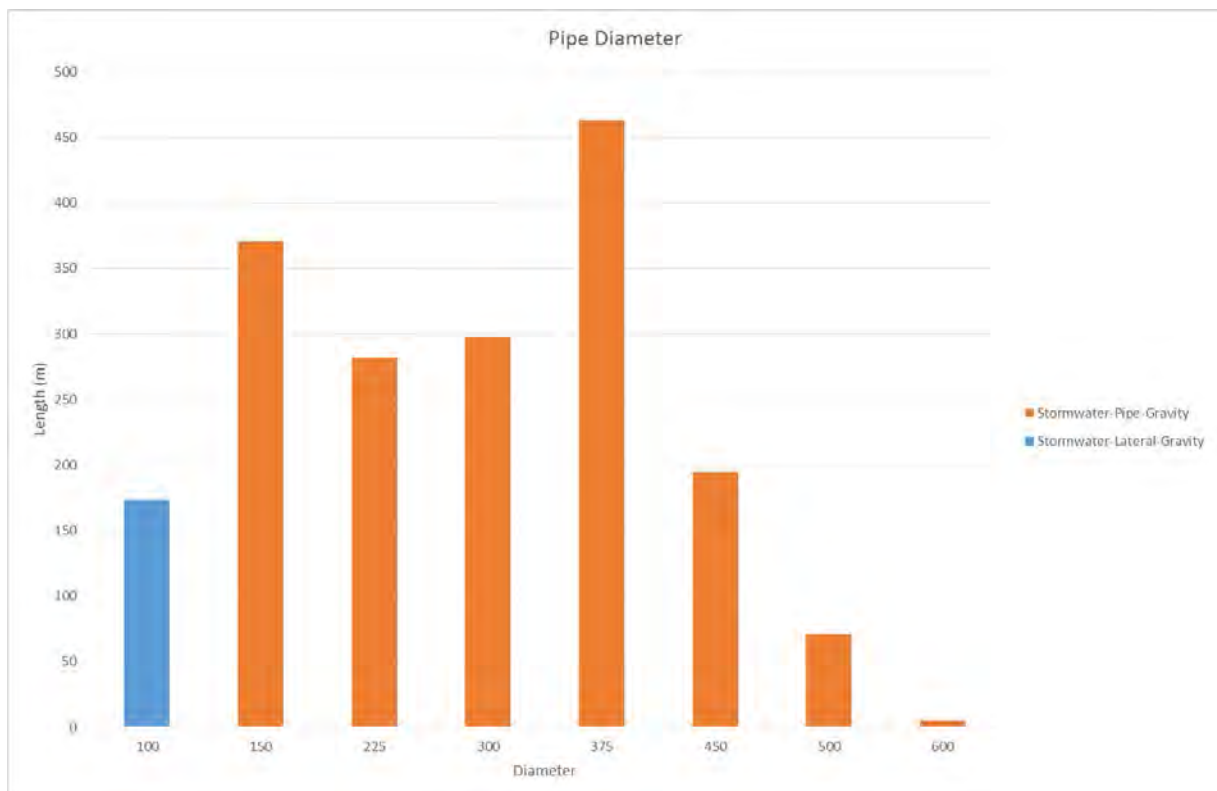


Figure 16-4 Pipe Diameter – Southbridge

16.7 Operational Management

The stormwater network is operated and maintained under two maintenance contracts as follows:

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

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

16.8 Photos of Main Assets



Photos: Flood conveyance swales

16.9 Rapid Flood Modelling

The Council has undertaken 'Rapid Flood Hazard Assessment' modelling for its main townships. The modelling uses DHI MIKE 21 to simulate rainfall on grid with the outputs processed through ArcGIS producing maps illustrating a range of flood depths during different rainfall intensities and durations.

The rapid flood assessment has been generated to provide a high level summary of potential flood and ponding areas across the district during extreme rainfall events. The results from this study are not to be used to set floor levels. The results have not been ground tested and therefore are indicative only.

For a 50 year event, Figure 16-5 shows the predicted flooding for Southbridge.

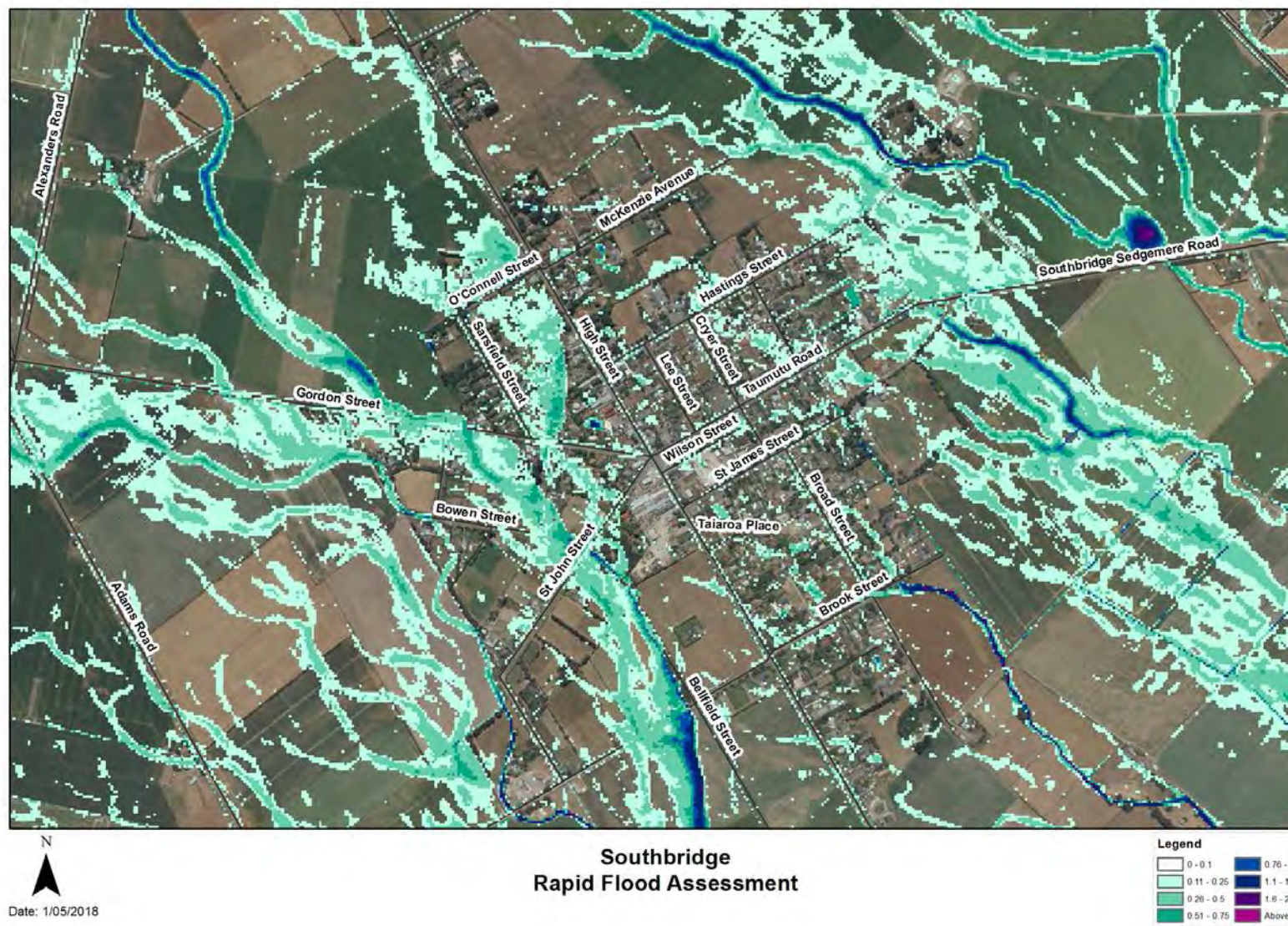


Figure 16-5 Rapid Flood Modelling, Southbridge

16.10 Risk Assessment

A risk assessment has been undertaken for the Southbridge scheme. The key output from the risk assessment is the identification of any extreme and high risks which need to be mitigated. In order to mitigate these risks they have been included and budgeted for in the projects within this LTP. Table 16-3 details the risk priority rating, Table 16-4 outlines the risks and the list of key projects is found in Table 16-9.

Table 16-3 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 16-4 Risks - Southbridge

Risk	Action/Project	Year Identified	2014 Risk Rating	2017 Risk Rating	Residual Risk Rating
Flooding of O'Connell Street properties from the upper catchment	Develop stormwater strategy	2014	3.5	3.5	3.5
Lack of asset data	Collect asset data	2014	4	4	2
Changing expectations as new residents move to Southbridge	Define appropriate LoS Stormwater	2014	12	12	6
Non-consented activities	Renewal of consents	2014	27	27	6
Stormwater management	Master plan work	2017		6	2.1

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 Southbridge Scheme is \$957,167 as detailed in Table 16-5 below. The majority of value, 71%, is made up of pipes.

Table 16-5 Replacement Value, Southbridge

Asset Class 1	Asset Class 2	Sum of Replacement Value
Stormwater Reticulation	Channel	\$143,029
	Inlet-Outlet-Point	\$40,740
	Lateral	\$59,137
	Manhole	\$113,924
	Pipe	\$600,336

Replacement values for different types (channels, laterals, management devices and pipes) of stormwater assets are shown in Figure 16-6 below.

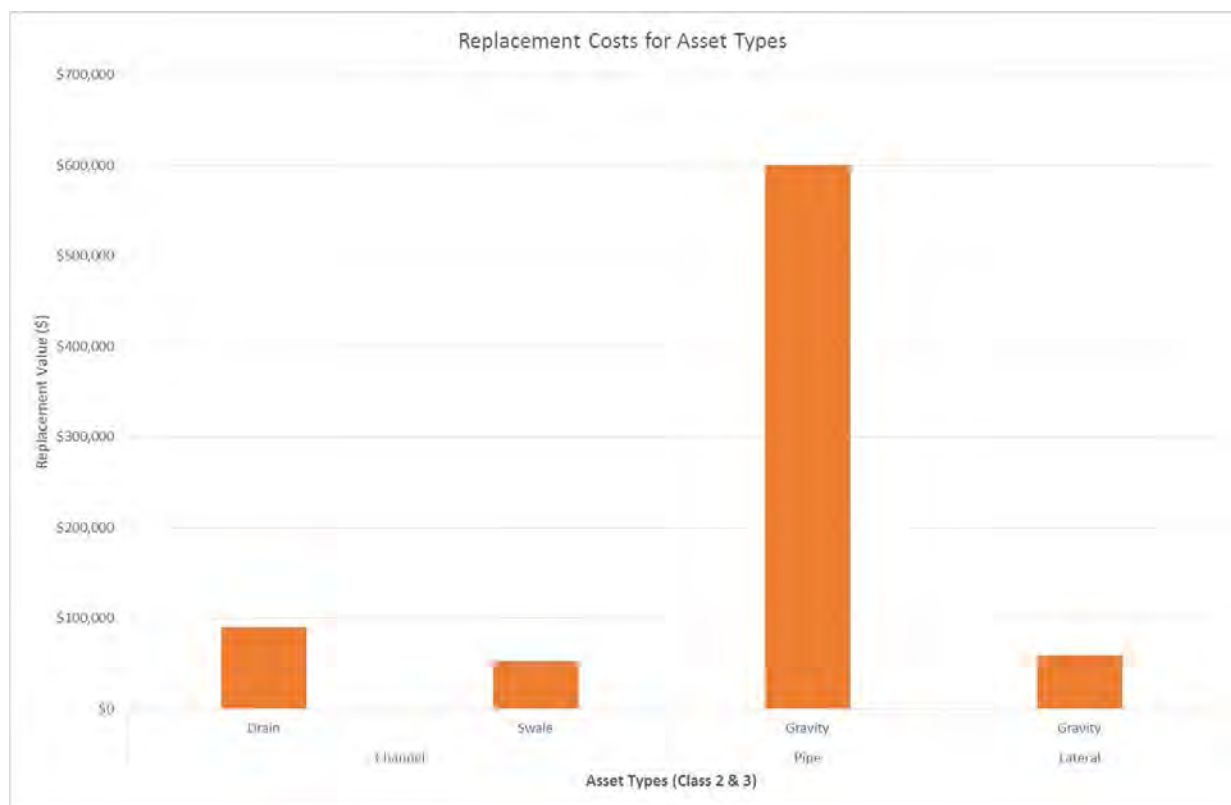


Figure 16-6 Replacement Costs for Southbridge

16.12 Renewals

The renewal profile has been taken from the 2017 5 Waters Valuation. A graph showing the renewals for this scheme are shown by Figure 16-7 below. The majority of assets requiring renewal are culverts/pipes which occur in the year 2040/41.

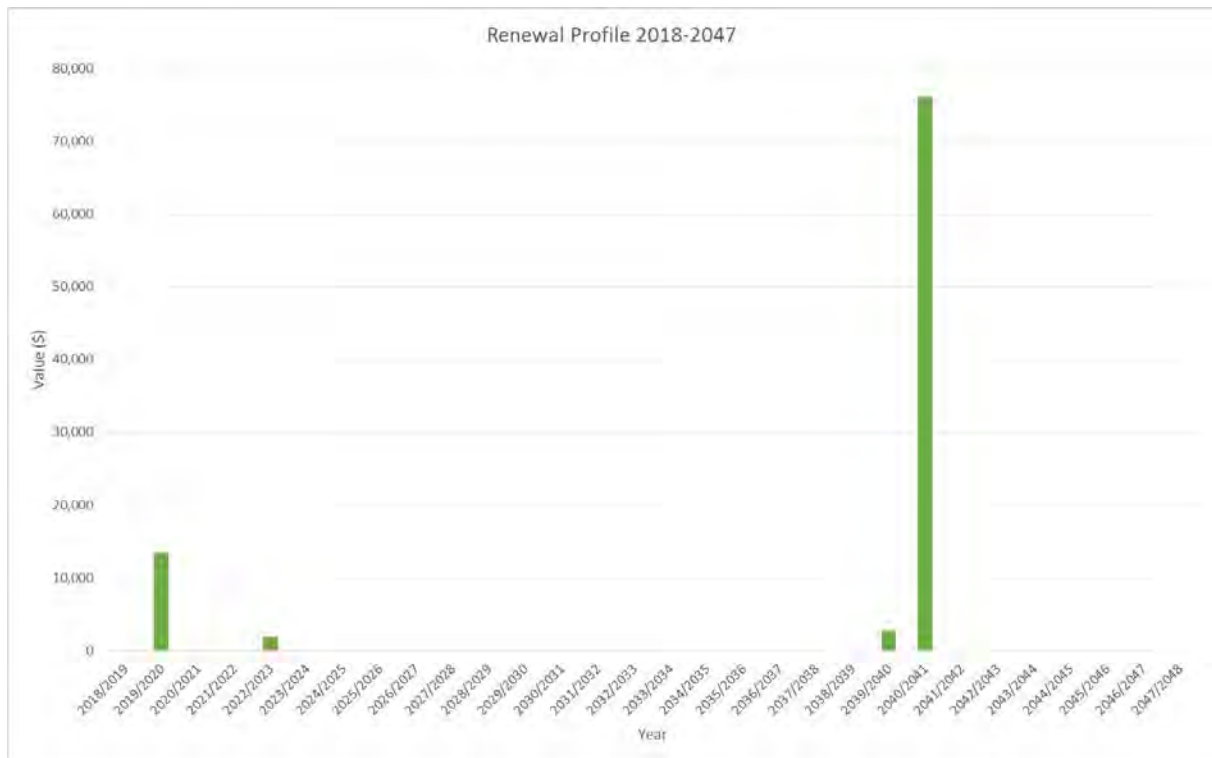


Figure 16-7 Southbridge Stormwater Renewal Profile

16.13 Critical Assets

The criticality model for Southbridge has been updated for the 2018 AcMP. The methodology of the criticality model can be found in 5Waters Activity Management Plan: Volume 1 and it provides details of how the criticality has been calculated for the reticulation assets. Table 16-6 and Figure 16-8 below shows the calculated criticality for all of the assets within this scheme that have a recorded known length.

Table 16-6 Length of Assets per Criticality Level

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



Figure 16-8 Criticality Map

16.14 Asset Condition

The asset condition model was run for Southbridge in 2017. The methodology of the model can be found in 5Waters Activity Management Plan: Volume 1 and it provides details of how the model has been calculated for the reticulation assets (particularly pipes). Figure 16-9 below shows the level of asset condition for all of the assets within this scheme that have a recorded known condition.

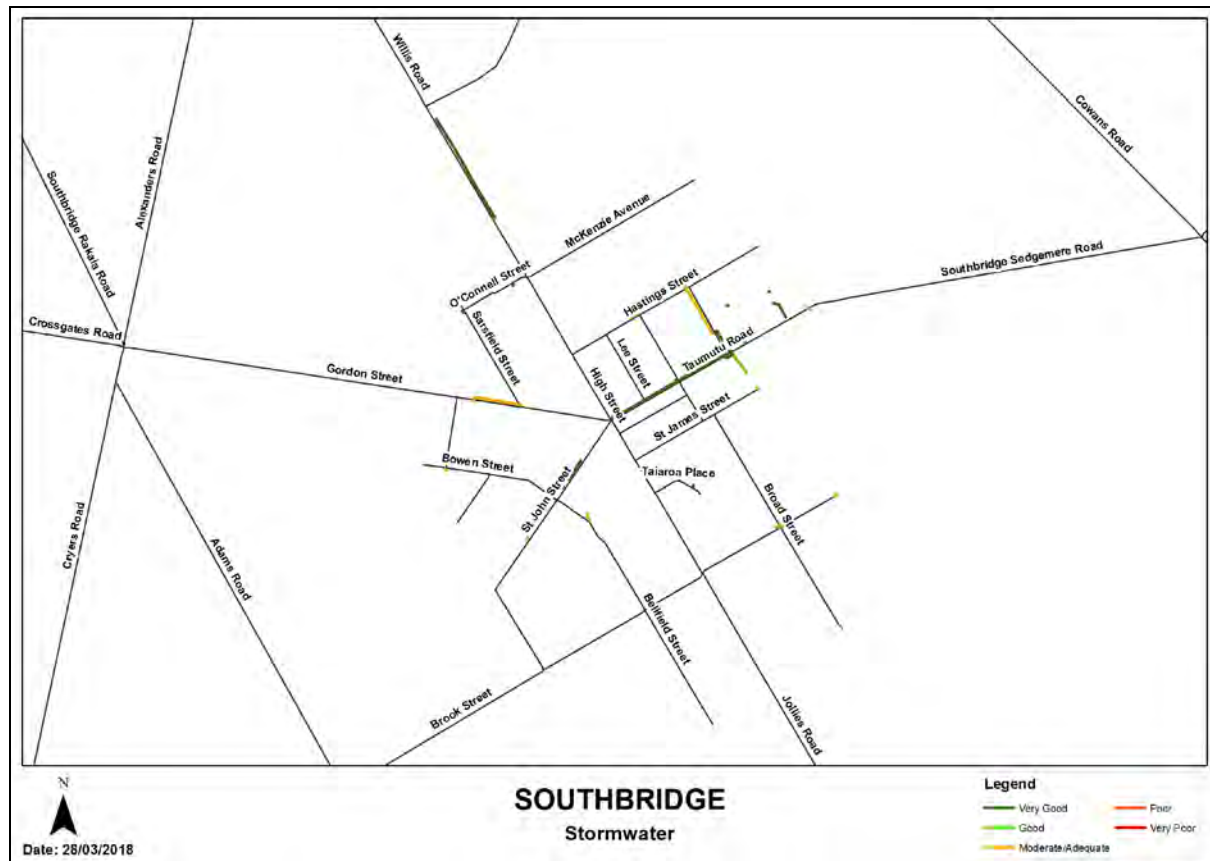


Figure 16-9 Asset Condition - Southbridge

Table 16-7 provides a description of the condition rating used within the condition model.

Table 16-7 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 Southbridge are shown by Table 16-8 and Figure 16-10. Budgets are split into expenditure, renewals, projects and capital projects.

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

Table 16-8 Southbridge Budget Summary

Years	Expenditure	Renewals	Projects	Capital Projects
2018/2019	\$16,770			\$21,000
2019/2020	\$12,270	\$13,472	\$30,000	\$71,000
2020/2021	\$12,270			
2021/2022	\$12,270			\$130,000
2022/2023	\$12,270	\$1,853		\$146,000
2023/2024	\$12,270			
2024/2025	\$12,270			
2025/2026	\$12,270			
2026/2027	\$12,270			
2027/2028	\$12,270			
Total	\$127,200	\$15,325	\$30,000	\$368,000

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.

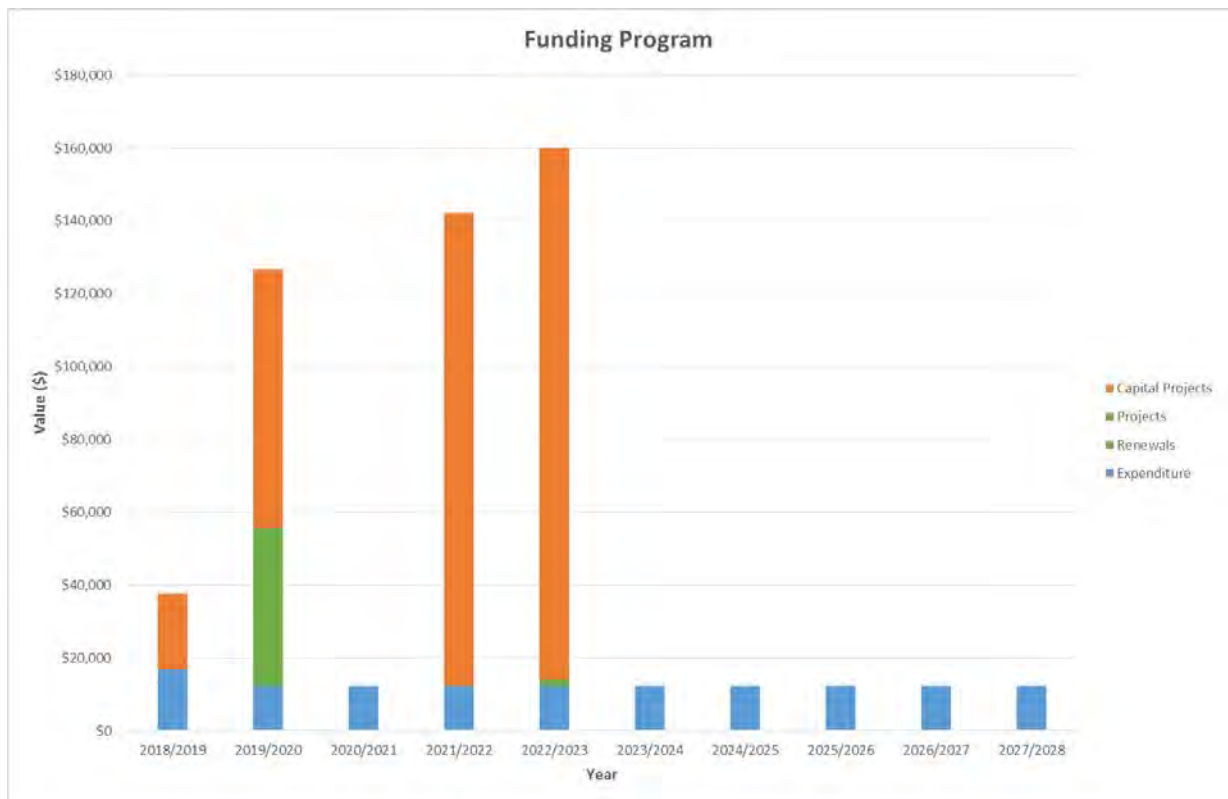


Figure 16-10 Southbridge Funding Summary

There are a number of major projects for Southbridge stormwater scheme in the LTP budget.

Table 16-9 Key Projects

Account Label	GL	Description	Year 1 (\$)	Year 2 (\$)	Year 3 (\$)	Years 4 to 10	Funding Split ⁹
Capital Projects	447790003	Flood works	\$21,000	\$71,000		\$276,000	100% LoS
Projects	4477006	Flood works design		\$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.

⁹ Where LoS refers to Level of Service and G refers to Growth

17.0 SPRINGFIELD STORMWATER SCHEME

17.1 Scheme Summary

Description		Quantity
Scheme Area		38.89ha
Scheme Coverage (as at 1 Jan 2018)	Rating numbers	136
System components	Piped (m)	0
	Swales (m)	1159.8
	Drains (m)	0
	Manholes/Inspection Chambers (No.)	0
	Treatment	N/A
	Other	N/A
Value (\$)	Replacement Cost	\$40,471.42
	Depreciated Replacement Cost	\$40,471.42
Financial	2018/2019 Estimate	\$1,215
	Annual maintenance cost	0.17%
	% of total	
Planning	Stormwater Management Plan	Required
	No. SDC stormwater consents	0
Demand	Mean Annual Rainfall (mm)	
	10% AEP (10 year) 1hr rainfall depth (mm)	
Sustainability	Sustainable drain management practices	Adopted and Encouraged

17.2 Key Issues

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

Table 17-1 Springfield Scheme Issues

What's the Problem	What we plan to do
Stormwater discharge is a non-consented activity	Development of a stormwater catchement consent.

17.3 Overview & History

Springfield is located on SH73 near the foot hills. Stormwater is disposed of to roadside soakholes. Soakholes are maintained by roading however a stormwater budget line exists for Environment Canterbury compliance and consenting.

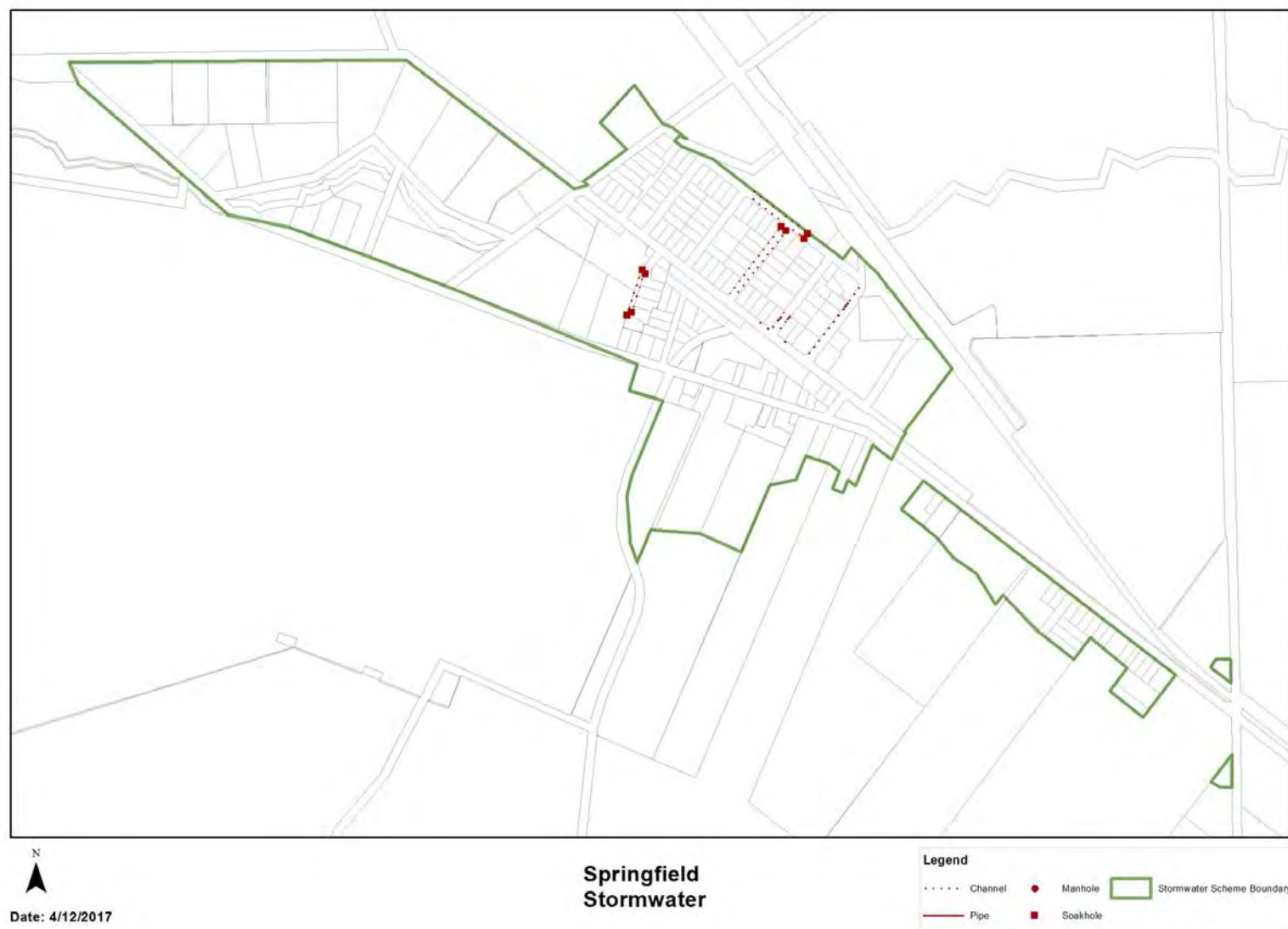


Figure 17-1 Scheme Map

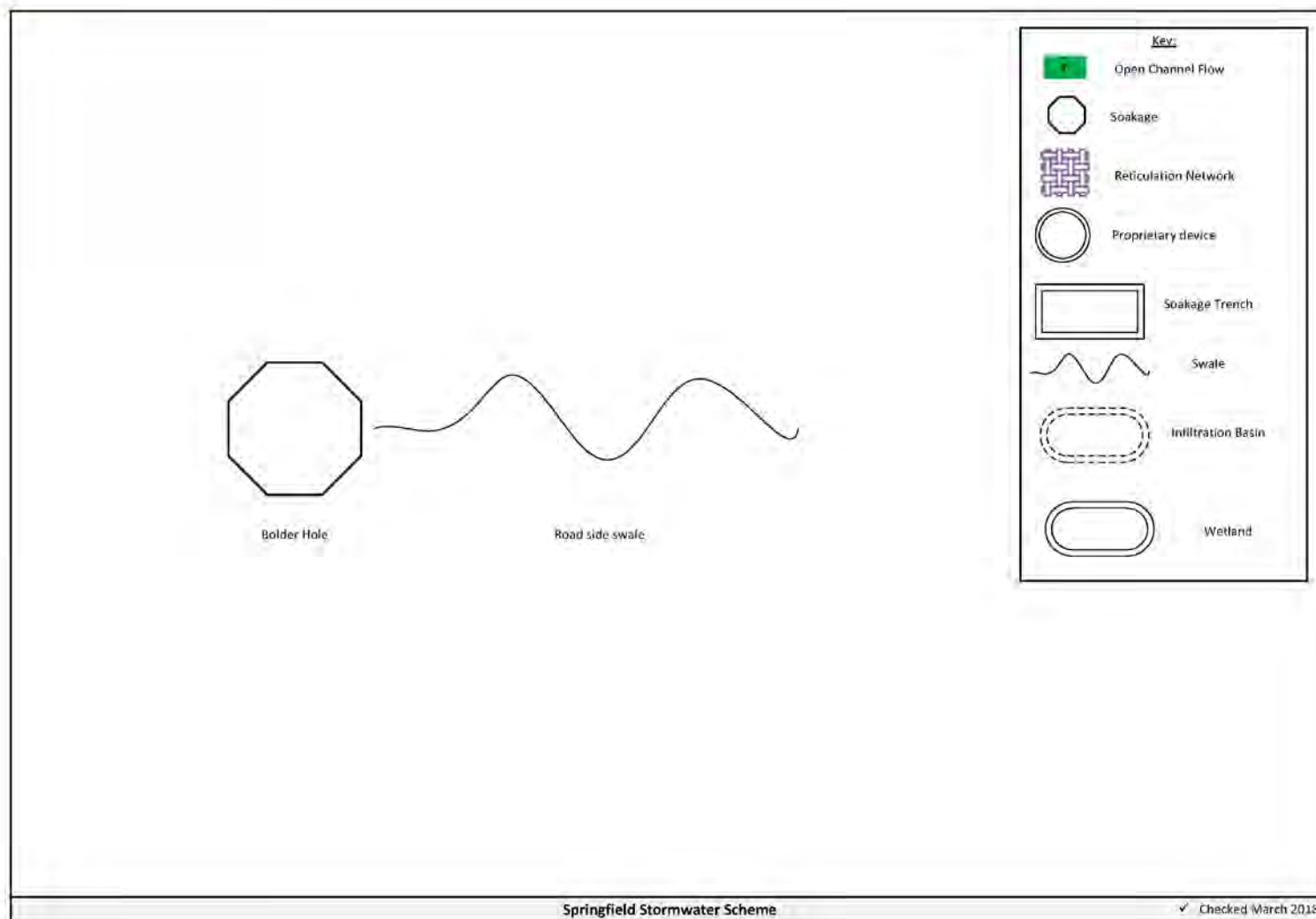


Figure 17-2 Scheme Schematic

17.4 Resource Consents

No resource consents are held by Selwyn District Council for this stormwater management area. Council will actively seek a global consent for this area.

17.5 Integrated Stormwater Management Plan

Environment Canterbury's Natural Resources Regional Plan (NRRP) became operative on the 11th June 2011. The plan requires that all non-permitted stormwater discharges have consent application lodged by 11th December 2011 under rules WQL6 and 7 or June 2016 under rule WQL8. Due to the tight timeframes (6 months) under rules WQL 6 and 7 it is proposed to obtain consents under rule WQL8. Under the Provisional Land and Water Regional Plan (PLWRG), the deadline for obtaining network discharge consents to allow discharges to be permitted under rule 5.93 has been extended to June 2018.

An ISMP is required for Springfield, these application documents are still being developed and will be lodged before June 2018.

17.6 Scheme Assets

Council has a wide variety of stormwater assets within the district. A brief description of the assets within this scheme is provided below:

- a. Swale (Grassed) – Is a longitudinal open channel which is lined with grass. The swale both conveys and treats stormwater.
- b. Infiltration basin – is a stormwater management device which is used to store, treat and dispose of stormwater to the ground via soakage.
- c. Soakholes – Are used to dispose of stormwater to ground in areas where the ground water table is low and soil permeability is high.

A summary of material and diameter for channels and pipes is not available for this scheme.

17.7 Operational Management

The stormwater network is operated and maintained under two maintenance contracts as follows:

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

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

17.8 Photos of Main Assets

There were no photos available for this scheme.

17.9 Rapid Flood Modelling

The Council has undertaken 'Rapid Flood Hazard Assessment' modelling for its main townships. The modelling uses DHI MIKE 21 to simulate rainfall on grid with the outputs processed through ArcGIS producing maps illustrating a range of flood depths during different rainfall intensities and durations.

The rapid flood assessment has been generated to provide a high level summary of potential flood and ponding areas across the district during extreme rainfall events. The results from this study are not to be used to set floor levels. The results have not been ground tested and therefore are indicative only.

For a 50 year event, XX shows the predicted flooding for Springfield.

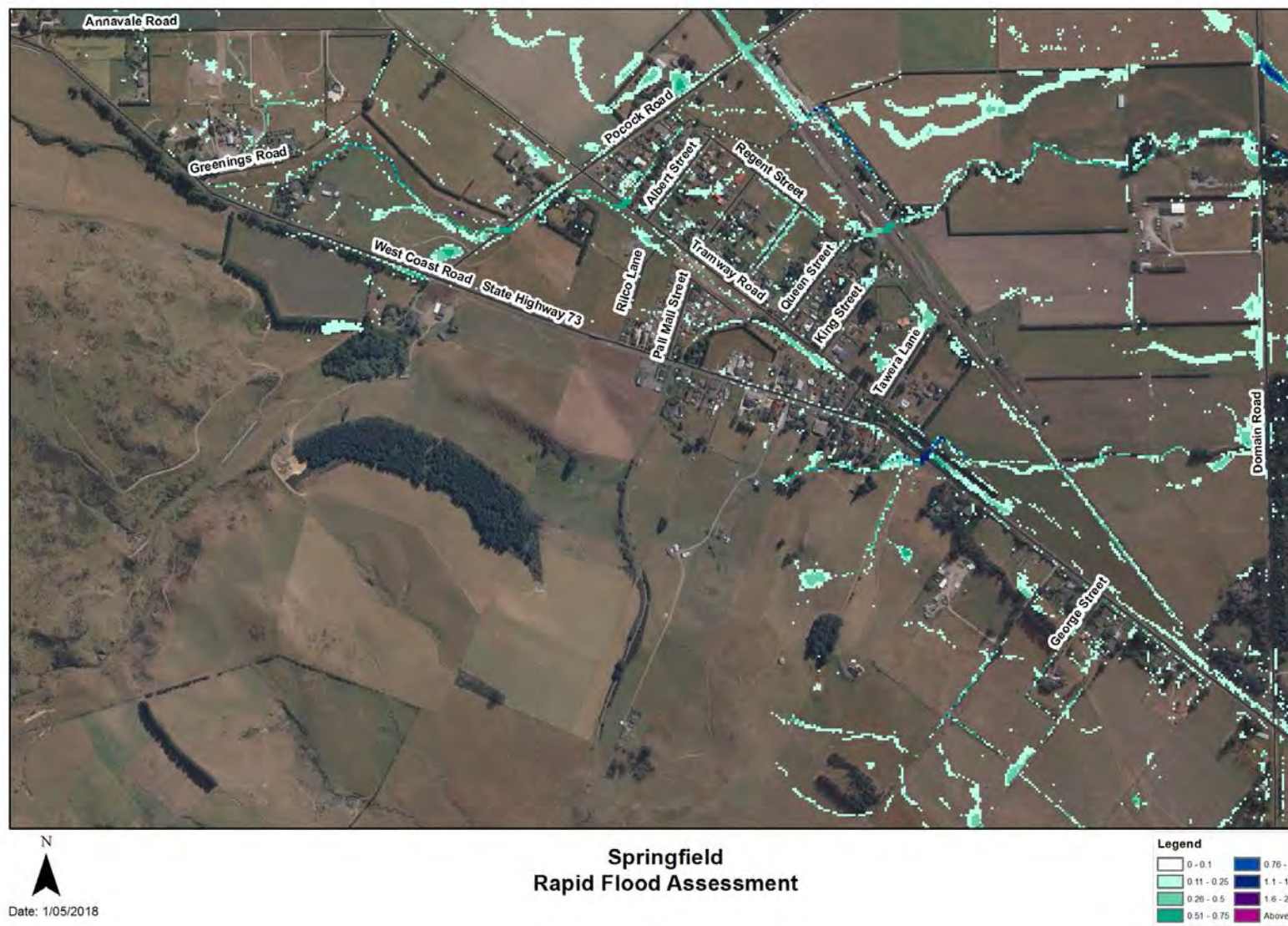


Figure 17-3 Rapid Flood Modelling, Springfield

17.10 Risk Assessment

A risk assessment has been undertaken for the Springfield scheme. The key output from the risk assessment is the identification of any extreme and high risks which need to be mitigated. In order to mitigate these risks they have been included and budgeted for in the projects within this LTP. Table 17-2 details the risk priority rating and Table 17-3 outlines the risks for this scheme.

Table 17-2 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 17-3 Risks - Springfield

Risk	Action/Project	Year Identified	2014 Risk Rating	2017 Risk Rating	Residual Risk Rating
Non-consented activities	Renewal of consents	2014	27	27	6

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

17.11 Asset Valuation Details

The total replacement value of assets within the Springfield Scheme is \$40,471 as detailed in Table 17-4 below. All of value is made up of channels.

Table 17-4 Replacement Value, Springfield

Asset Class 1	Asset Class 2	Sum of Replacement Value
Stormwater Reticulation	Channel	\$40,471

17.12 Renewals

The renewal profile has been taken from the 2017 5 Waters Valuation. There are no renewals scheduled for this scheme.

17.13 Critical Assets

The criticality model for Springfield 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 17-5 and Figure 17-4 below shows the calculated criticality for all of the assets within this scheme that have a recorded known length.

Table 17-5 Length of Assets per Criticality Level

Criticality Bands		Length (m)
5	Low	4,569
4	Medium-Low	461
3	Medium	272
2	Medium-High	0
1	High	0



Figure 17-4 Criticality Map

17.14 Asset Condition

The asset condition model was run for Springfield in 2017. The methodology of the model can be found in 5Waters Activity Management Plan: Volume 1 and it provides details of how the model has been calculated for the reticulation assets (particularly pipes). Figure 17-5 below shows the level of asset condition for all of the assets within this scheme that have a recorded known condition.

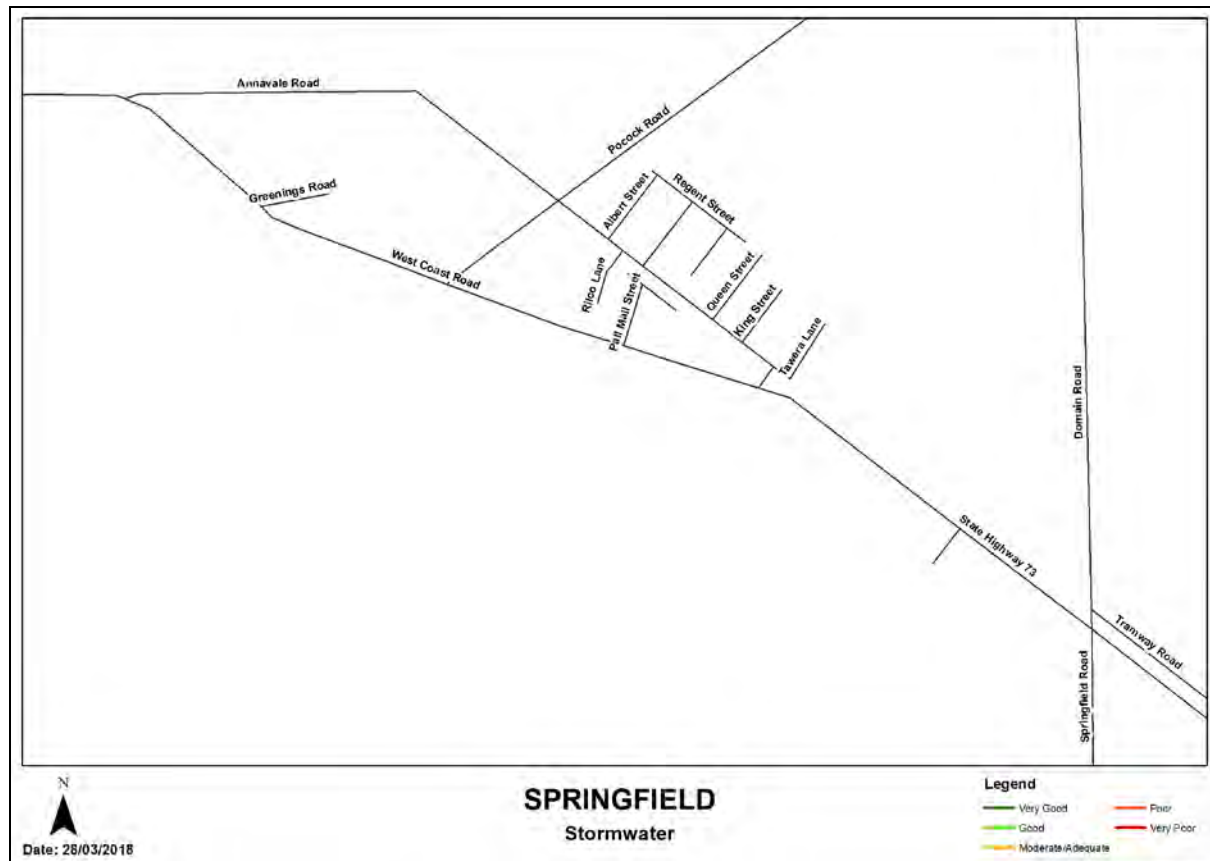


Figure 17-5 Asset Condition - Springfield

Table 17-6 provides a description of the condition rating used within the condition model.

Table 17-6 Asset Condition Grading

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

Figure 17-6 Replacement Costs for Springfield

17.15 Funding Program

The 10 year budgets for Springfield are shown by Table 17-7 and Figure 17-7. 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 17-7 Springfield Budget Summary

Years	Expenditure	Renewals	Projects	Capital Projects
2018/2019	\$1,215			
2019/2020	\$1,215			
2020/2021	\$1,215			
2021/2022	\$1,215			
2022/2023	\$1,215			
2023/2024	\$1,215			
2024/2025	\$1,215			
2025/2026	\$1,215			
2026/2027	\$1,215			
2027/2028	\$1,215			
Total	\$12,150			

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.

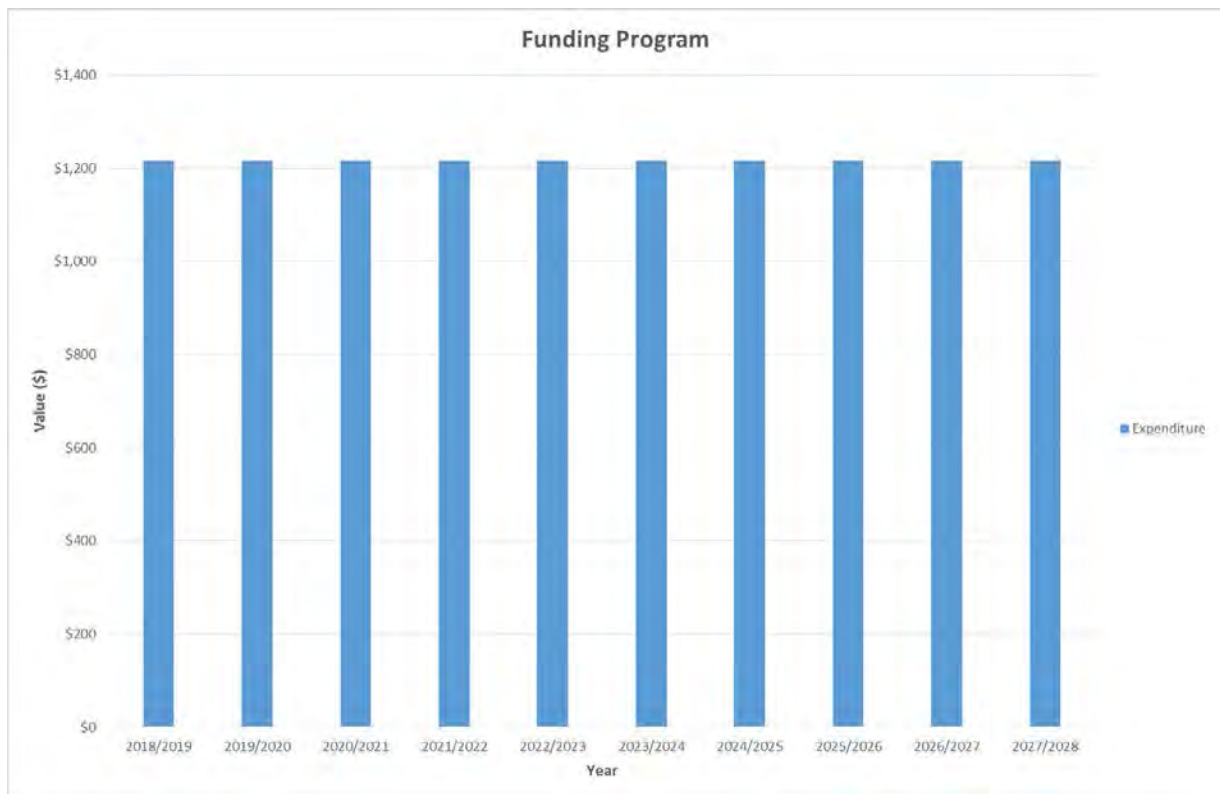


Figure 17-7 Springfield Funding Summary

There are no major projects for Springfield stormwater scheme in the LTP budget. The list of district wide projects can be found in 5Waters Activity Management Plan: Volume 1.

18.0 SPRINGTON STORMWATER SCHEME

18.1 Scheme Summary

Description		Quantity
Scheme Area		37.16ha
Scheme Coverage (as at 1 Jan 2018)	Rating numbers	195
System components	Piped (m)	1653.72
	Swales (m)	570.26
	Drains (m)	3659.5
	Manholes/Inspection Chambers (No.)	10
	Treatment	1 Basin
	Other	N/A
Value (\$)	Replacement Cost	\$894,139.74
	Depreciated Replacement Cost	\$725,138.98
Financial	2018/2019 Estimate	\$11,730
	Annual maintenance cost	1.68%
	% of total	
Planning	Stormwater Management Plan	Required
	No. SDC stormwater consents	1
Demand	Mean Annual Rainfall (mm)	614
	10% AEP (10 year) 1hr rainfall depth (mm)	18.8
Sustainability	Sustainable drain management practices	Adopted and Encouraged

18.2 Key Issues

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

Table 18-1 Springston Stormwater Scheme Issues

What's the Problem	What we plan to do
Increased expectation from the community regarding level of service received from the stormwater network.	Identify capacity restrictions in the system, design upgrades and budget for physical works.

18.3 Overview & History

Stormwater runoff is discharged either to the Leeston Road Drain or Sargents New Drain with the ultimate discharge to Te Waihora/Lake Ellesmere.

The Everest Way subdivision manages the stormwater (water quality and quantity) via a dry attenuation basin. The basin has been retrofitted with a spring flow outlet control structure which operates via a float. And can be locked open manually in the event of sustained presence of spring water.

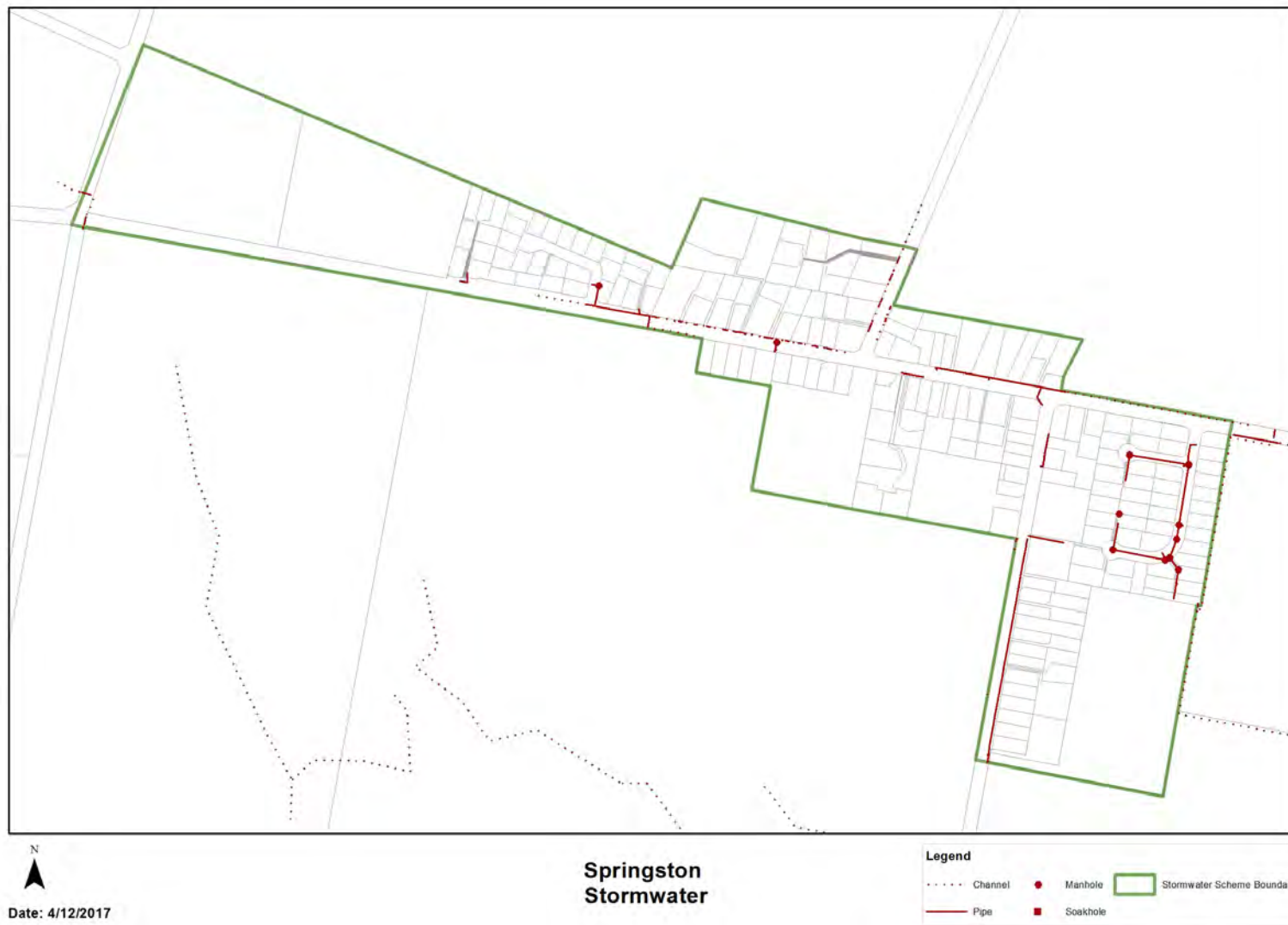


Figure 18-1 Scheme Map

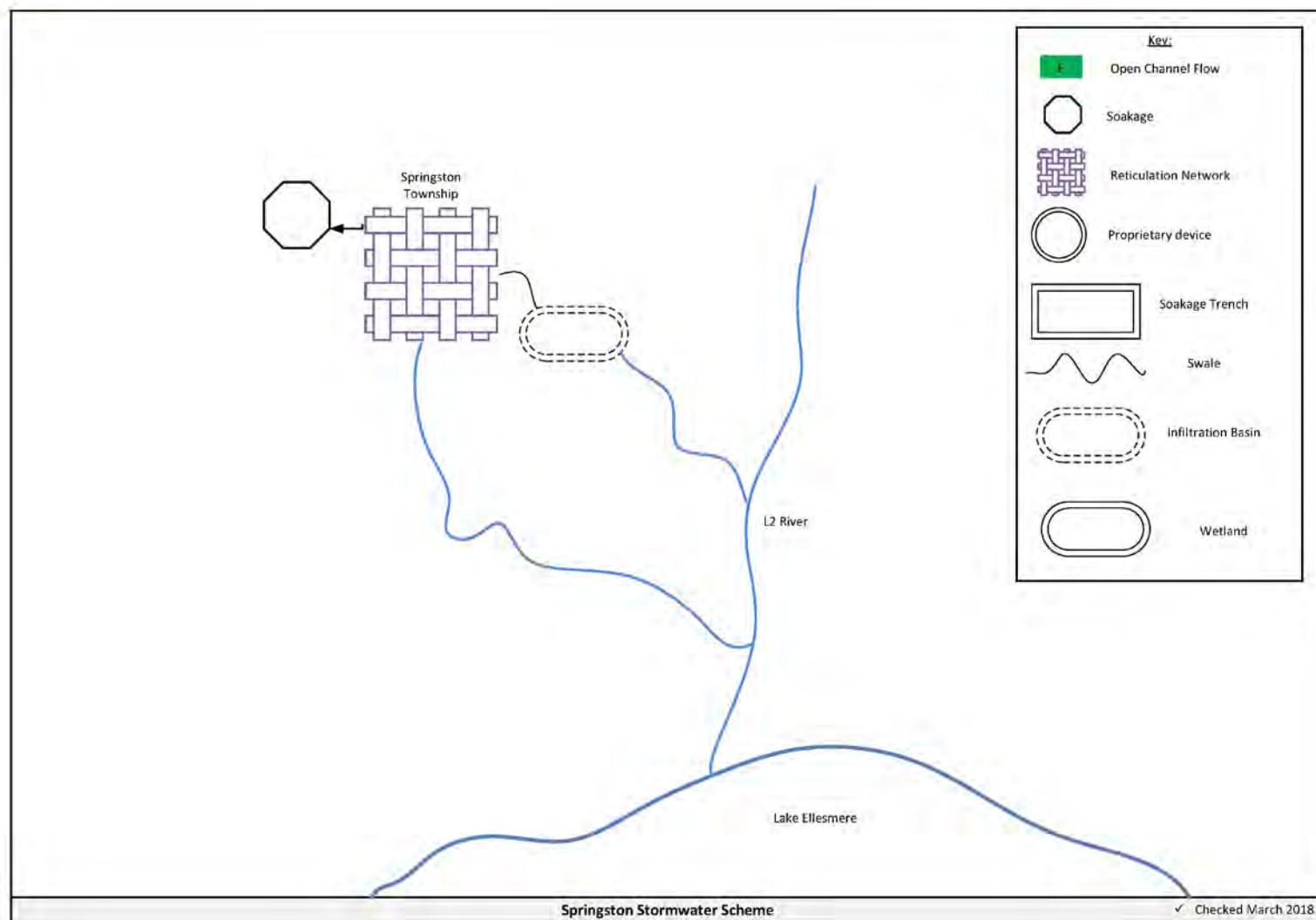


Figure 18-2 Scheme Schematic

18.4 Resource Consents

There is one stormwater discharge consents held by Selwyn District Council for this stormwater management area. Council is actively seeking a global consent for this area.

The discharge of stormwater from Everest Way which was transferred to Council in January 2014. The spring water outlet was not constructed as per consent plans however a compliance monitoring report was issued by Environment Canterbury on 29 June 2010 stating that revised plans were reviewed by Environment Canterbury and consent criteria have been achieved.

Table 18-2 Resource Consents

Consent	Description	Location	Date Issued	Expiry Date
CRC155154 <i>Issued - Active</i>	to discharge contaminants to water	Junction of Leeston Road and Ellesmere Junction Road, SPRINGSTON	22/06/2013	20/06/2040

18.5 Integrated Stormwater Management Plan

Environment Canterbury's Natural Resources Regional Plan (NRRP) became operative on the 11th June 2011. The plan requires that all non-permitted stormwater discharges have consent application lodged by 11th December 2011 under rules WQL6 and 7 or June 2016 under rule WQL8. Due to the tight timeframes (6 months) under rules WQL 6 and 7 it is proposed to obtain consents under rule WQL8. Under the Provisional Land and Water Regional Plan (PLWRG), the deadline for obtaining network discharge consents to allow discharges to be permitted under rule 5.93 has been extended to June 2018.

An ISMP is required for Springston, these application documents are still being developed and will be lodged before June 2018.

18.6 Scheme Assets

Council has a wide variety of stormwater assets within the district. A brief description of the assets within this scheme is provided below:

- Swale (Grassed) – Is a longitudinal open channel which is lined with grass. The swale both conveys and treats stormwater.
- Swale (Wetland) – Is a longitudinal open channel which is lined with wetland plant species. The swale both conveys and treats stormwater and is particular useful in areas with high groundwater tables.
- Reticulated network – Includes pipes, manholes, sumps. The primary purpose of the reticulated network is to collect and convey stormwater. Historically these systems were designed for the 2 year storm event. Today's engineering standards require the piped network to be designed for a 10 year event with overland flow provision for up to the 50 year event.
- Infiltration basin – is a stormwater management device which is used to store, treat and dispose of stormwater to the ground via soakage.
- Soakholes – Are used to dispose of stormwater to ground in areas where the ground water table is low and soil permeability is high.

- f. Open drains – are channels used to convey stormwater. They are cost effective means to convey large volumes of water.

A summary of material and diameter for channels and pipes, where known, is shown below in Figure 18-3 and Figure 18-4.

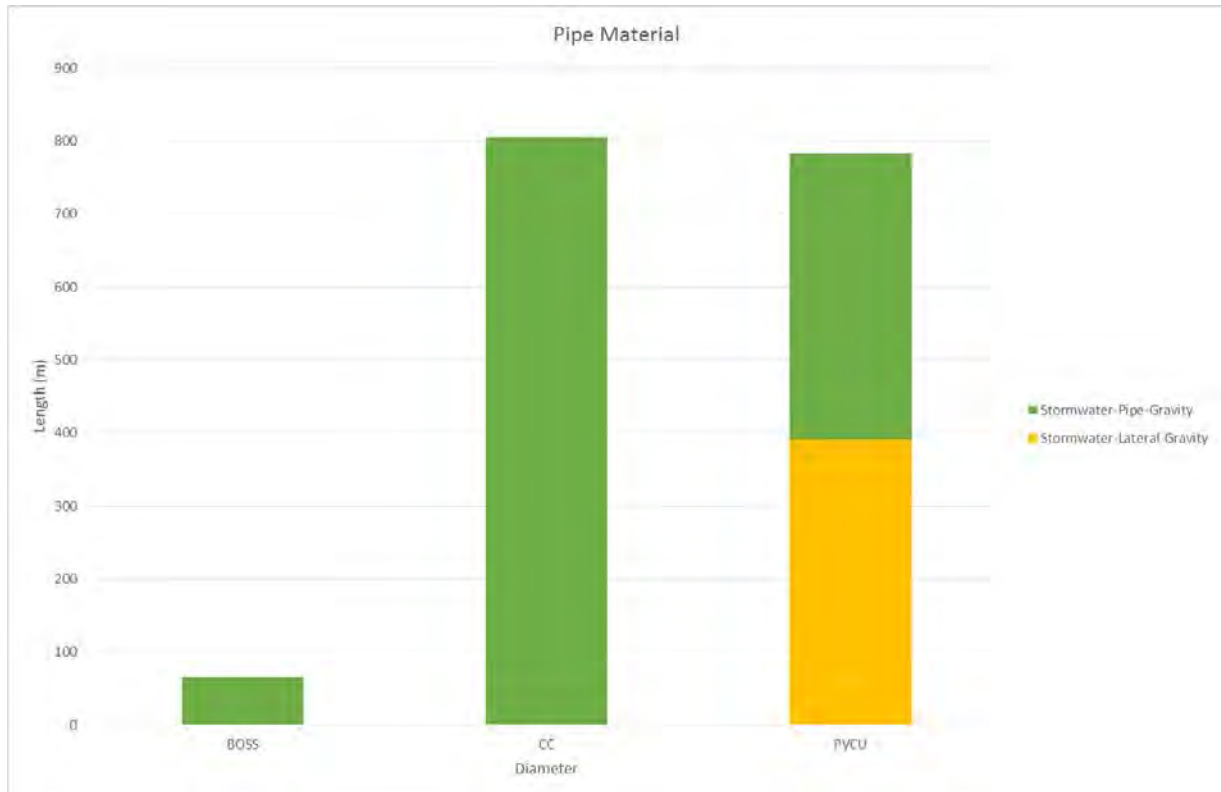


Figure 18-3 Pipe Material - Springston

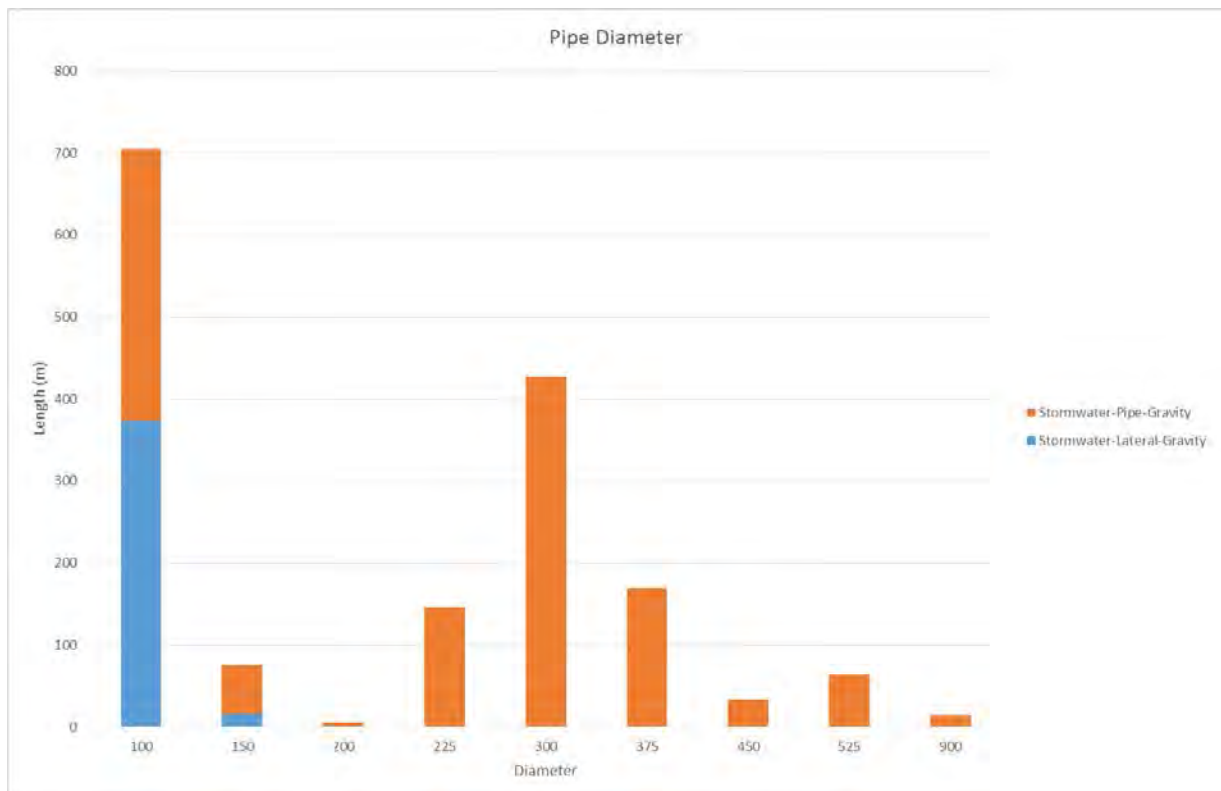


Figure 18-4 Pipe Diameter – Springston

18.7 Operational Management

The stormwater network is operated and maintained under two maintenance contracts as follows:

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

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

18.8 Photos of Main Assets

The photos below provide a summary of the types of assets found within this stormwater management area.



Photo 1 – Everest Way Basin



Photo 2 – Everest Way Basin in flood

18.9 Rapid Flood Modelling

The Council has undertaken ‘Rapid Flood Hazard Assessment’ modelling for its main townships. The modelling uses DHI MIKE 21 to simulate rainfall on grid with the outputs processed through ArcGIS producing maps illustrating a range of flood deeps during different rainfall intensities and durations.

The rapid flood assessment has been generated to provide a high level summary of potential flood and ponding areas across the district during extreme rainfall events. The results from this study are not to be used to set floor levels. The results have not been ground tested and therefore are indicative only.

For a 50 year event, Figure 18-5 shows the predicted flooding for Springston.

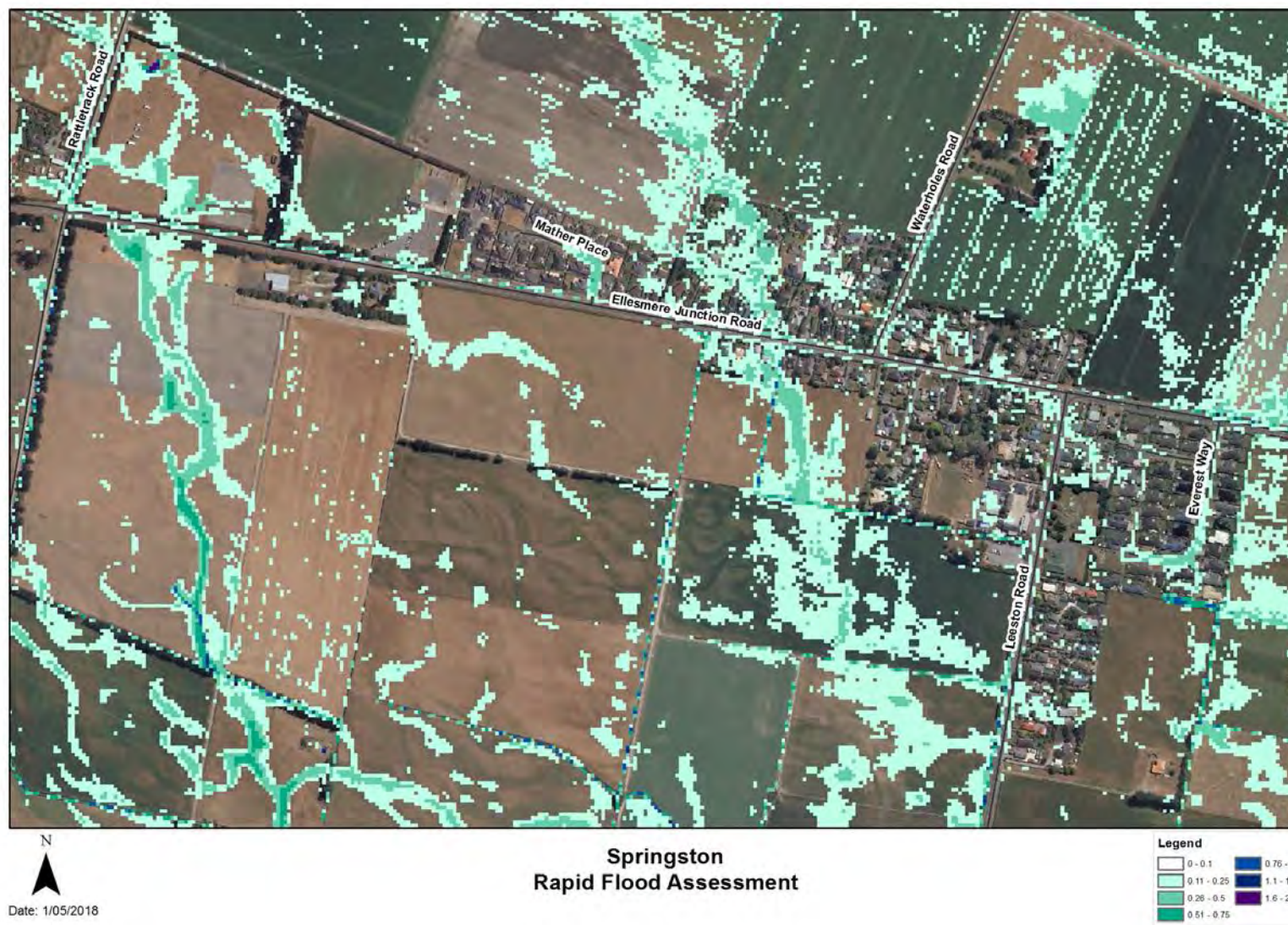


Figure 18-5 Rapid Flood Modelling, Springston

18.10 Risk Assessment

A risk assessment has been undertaken for the Springston scheme. The key output from the risk assessment is the identification of any extreme and high risks which need to be mitigated. In order to mitigate these risks they have been included and budgeted for in the projects within this LTP. Table 18-3 details the risk priority rating and Table 18-4 outlines the risks for this scheme.

Table 18-3 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 18-4 Risks - Springston

Risk	Action/Project	Year Identified	2014 Risk Rating	2017 Risk Rating	Residual Risk Rating
Groundwater issues (water bubbling up, basin was full all 2013 winter)	Review basin upgrade options	2014	12	4	4
Stormwater management	education on where to pump flood water	2017		6	2.1
Non-consented activities	Renewal of consents	2014	27	27	6

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

18.11 Asset Valuation Details

The total replacement value of assets within the Springston Scheme is \$894,140 as detailed in Table 18-5 below. The majority of value, 49%, is made up of pipes.

Table 18-5 Replacement Value, Springston

Asset Class 1	Asset Class 2	Sum of Replacement Value
Stormwater Reticulation	Chamber	\$11,437

	Channel	\$186,526
	Inlet-Outlet-Point	\$28,352
	Lateral	\$136,408
	Management Device	\$28,752
	Manhole	\$62,558
	Pipe	\$440,107

Replacement values for different types (channels, laterals, management devices and pipes) of stormwater assets are shown in Figure 18-6 below.

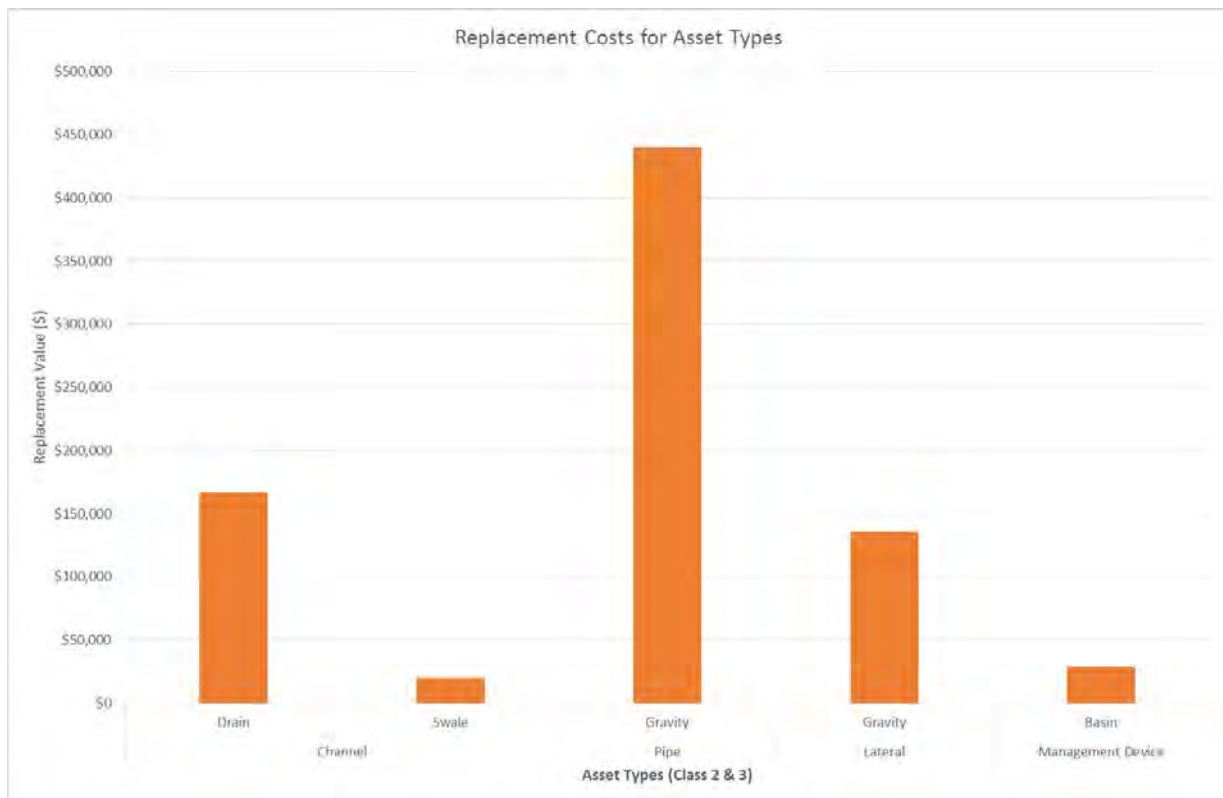


Figure 18-6 Replacement Costs for Springton

18.12 Renewals

The renewal profile has been taken from the 2017 5 Waters Valuation. A graph showing the renewals for this scheme are shown by Figure 18-7 below. The majority of assets requiring renewal are culverts/pipes which occur in the year 2038/39.

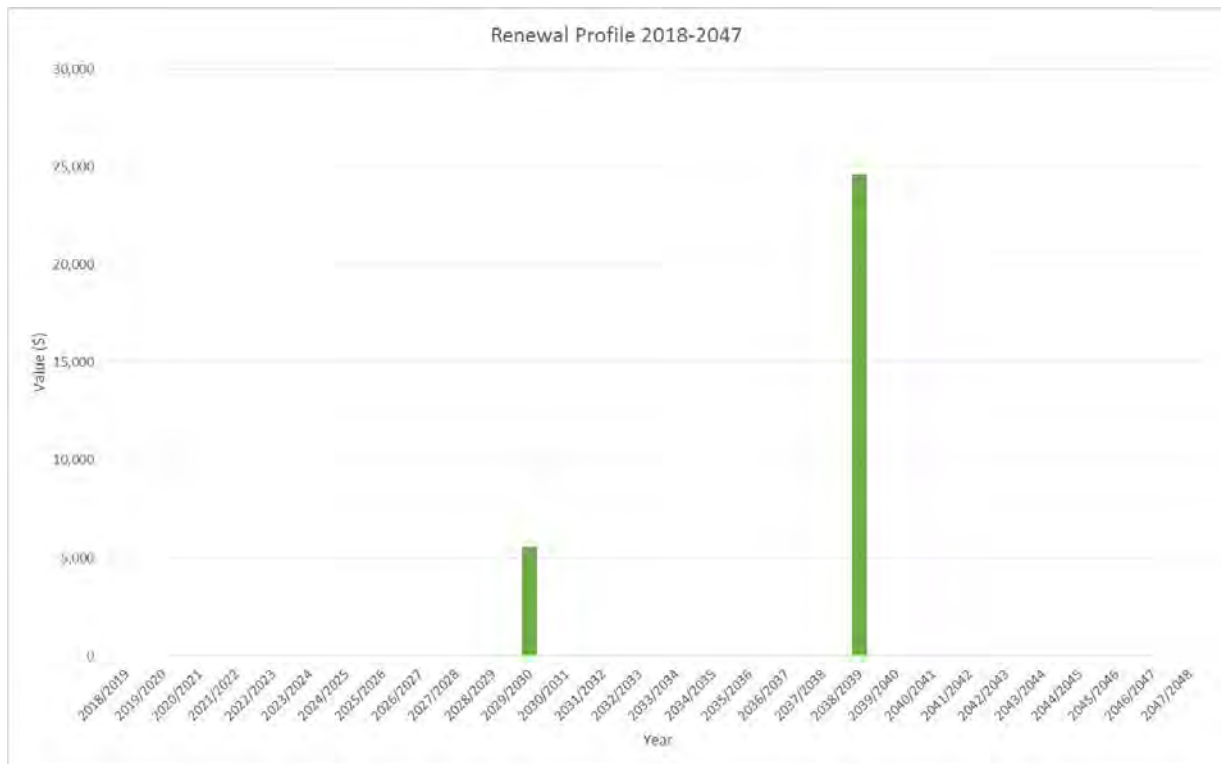


Figure 18-7 Springston Stormwater Renewal Profile

18.13 Critical Assets

The criticality model for Springston has been updated for the 2018 AcMP. The methodology of the criticality model can be found in 5Waters Activity Management Plan: Volume 1 and it provides details of how the criticality has been calculated for the reticulation assets. Table 18-6 and Figure 18-8 below shows the calculated criticality for all of the assets within this scheme that have a recorded known length.

Table 18-6 Length of Assets per Criticality Level

Criticality Bands		Length (m)
5	Low	4,691
4	Medium-Low	57
3	Medium	212
2	Medium-High	15
1	High	0



Figure 18-8 Criticality Map

18.14 Asset Condition

The asset condition model was run for Springston in 2017. The methodology of the model can be found in 5Waters Activity Management Plan: Volume 1 and it provides details of how the model has been calculated for the reticulation assets (particularly pipes). Figure 18-9 below shows the level of asset condition for all of the assets within this scheme that have a recorded known condition.



Figure 18-9 Asset Condition - Springston

Table 18-7 provides a description of the condition rating used within the condition model.

Table 18-7 Asset Condition Grading

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

18.15 Funding Program

The 10 year budgets for Springston are shown by Table 18-8 and Figure 18-10. Budgets are split into expenditure, renewals, projects and capital projects.

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

Table 18-8 Springston Budget Summary

Years	Expenditure	Renewals	Projects	Capital Projects
2018/2019	\$11,730			
2019/2020	\$5,530			
2020/2021	\$5,530			
2021/2022	\$5,530			
2022/2023	\$5,530			
2023/2024	\$5,530			
2024/2025	\$5,530			
2025/2026	\$5,530			
2026/2027	\$5,530			
2027/2028	\$5,530			
Total	\$61,500			

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

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

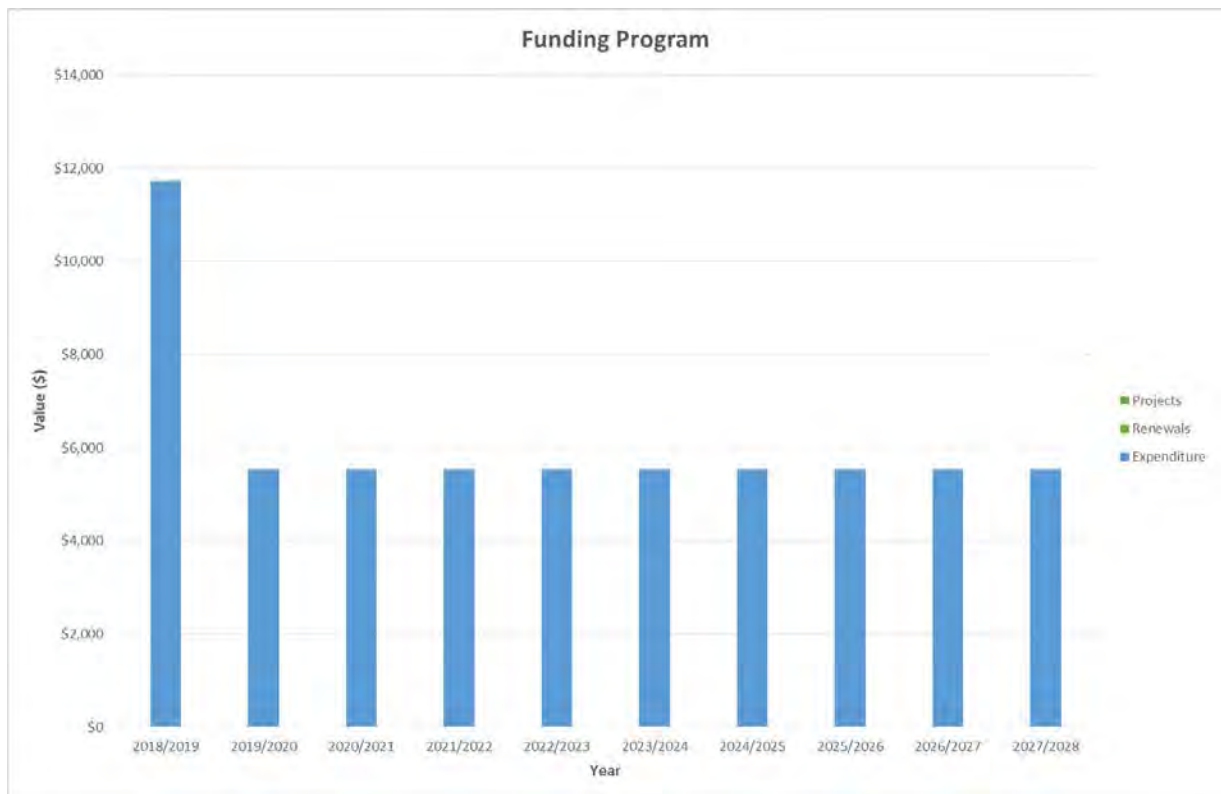


Figure 18-10 Springston Funding Summary

There are no projects for Springston stormwater scheme in the LTP budget.

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

19.0 TAI TAPU STORMWATER SCHEME

19.1 Scheme Summary

Description		Quantity
Scheme Area		33.97ha
Scheme Coverage (as at 1 Jan 2018)	Rating numbers	183
System components	Piped (m)	3688.88
	Swales (m)	4801
	Drains (m)	1221.9
	Manholes/Inspection Chambers (No.)	41
	Treatment	2 Attenuation basin
	Other	Pump chamber
Value (\$)	Replacement Cost	\$2,051,896.22
	Depreciated Replacement Cost	\$1,798,948.20
Financial	2018/2019 Estimate	\$24,912
	Annual maintenance cost	3.56%
	% of total	
Planning	Stormwater Management Plan	Draft
	No. SDC stormwater consents	1
Demand	Mean Annual Rainfall (mm)	608
	10% AEP (10 year) 1hr rainfall depth (mm)	18.6
Sustainability	Sustainable drain management practices	Adopted and Encouraged

19.2 Key Issues

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

Table 19-1 Tai Tapu Scheme Issues

What's the Problem	What we plan to do
Flooding of the Tai Tapu township including property flooding during moderate rainfall events when the Halswell River level prevents gravity discharge.	New flood pump helps minimise flooding. Continue to investigate alternative pumping options and discuss with the community.

19.3 Overview & History

The stormwater network is a predominantly piped system discharging to the Halswell River (managed by Environment Canterbury) which runs along the townships northern boundary. Some piping is located in State Highway 75 (SH75) and therefore maintained by the New Zealand Transport Agency (NZTA).

A large stormwater basin, located on the eastern side of SH75 (School Road) was constructed in 2002. This serves as a temporary retention area during large events, taking upper catchment (Otahuna) stormwater and protecting Tai Tapu urban property. Regular general maintenance is undertaken on this basin.

When the level of the Halswell River cover the stormwater outlet at the Soliders Memorial, temporary overpumping is required during rainfall events.

A level transducer in the School Road basin is alarmed for activation of pumping. A tractor powered pump stored at the Environment Canterbury depot in Tai Tapu is part owned by the Council for use in this location. In 2015 Council purchased a new civil defence pump that has priority use for stormwater pumping in Tai Tapu. This pump has a capacity of approximately 190 CIS at 10m head. OPUS calculated maximum inflow to the Soliders memorial manhole at 400 l/s. Additional pumps are required to supplement this pump in a large event. Operations and maintenance manuals, a standard operating procedure and memorandum of understanding have been created for the use of the civil defence pump and associated notification procedures.

Flooding occurred in June 2013. Additional pumps were hired to supplement the tractor powered pump.

New flood pump is now available for use on this scheme.

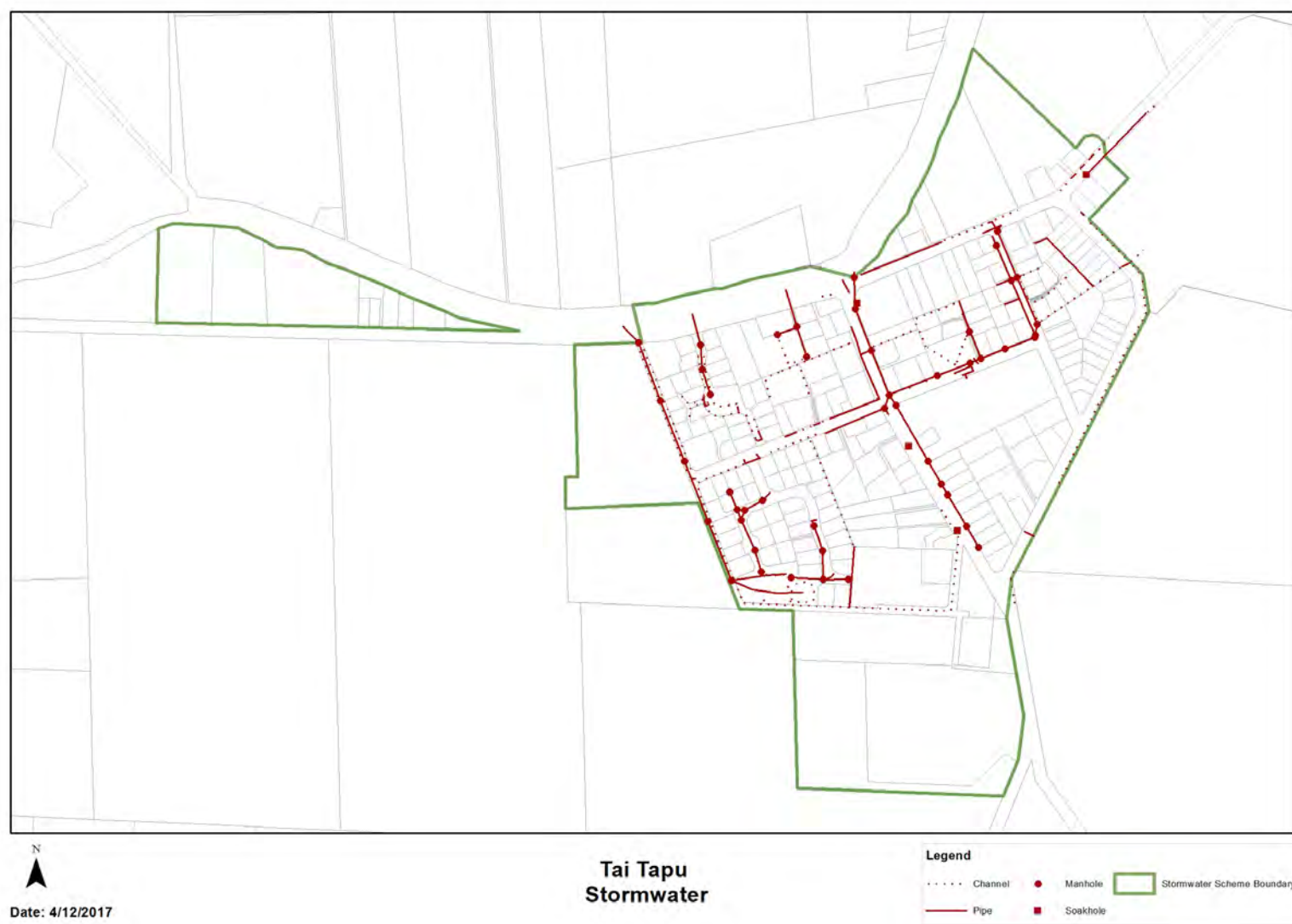


Figure 19-1 Scheme Map

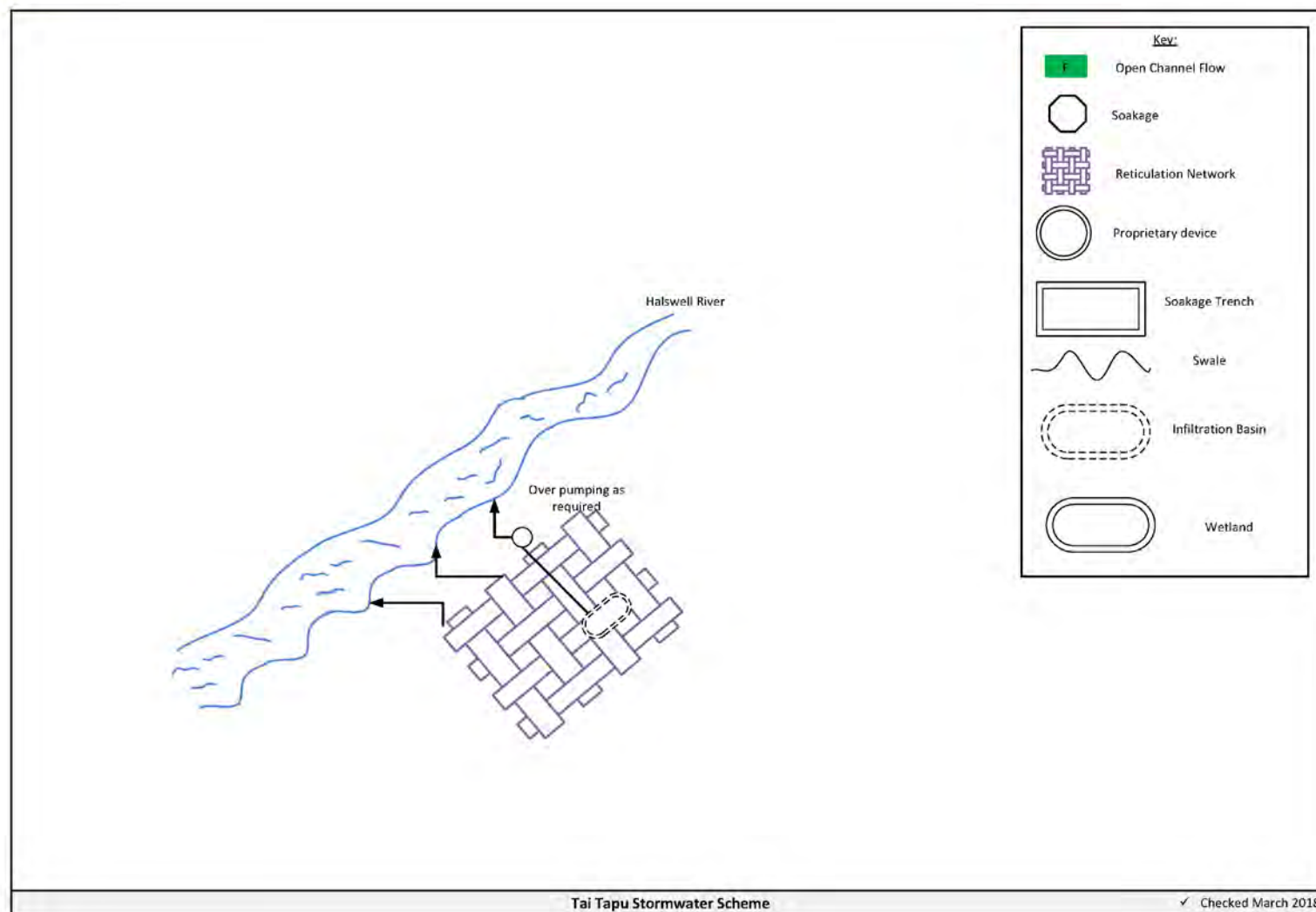


Figure 19-2 Scheme Schematic

19.4 Resource Consents

The Tai Tapu stormwater scheme has a number of resource consents. Table 20-5 shows the stormwater discharge permitted by the resource consents for this scheme. Council is actively seeking a global consent.

Table 19-2 Resource Consents

Consent	Description	Location	Date Issued	Expiry Date
CRC020099 <i>Issued - Active</i>	To pump floodwater from Tai tapu township to the Halswell River when gravity drainage is cut off by high river levels and flooding of roads and property is occurring.	Halswell River, INTERSECTN TAITAPU ROAD & SH75	14/12/2001	
CRC167468 <i>Application in Process</i>	To discharge contaminants to water.	Tai tapu, Selwyn		

CRC020099 is a certificate of compliance, therefore has no expiry date.

There are two consents held by developers for this area.

19.5 Integrated Stormwater Management Plan

An ISMP has been lodged for Tai Tapu. CRC167468

19.6 Scheme Assets

Council has a wide variety of stormwater assets within the district. A brief description of the assets within this scheme is provided below:

- Reticulated network – Includes pipes, manholes, sumps. The primary purpose of the reticulated network is to collect and convey stormwater. Historically these systems were designed for the 2 year storm event. Today's engineering standards require the piped network to be designed for a 10 year event with overland flow provision for up to the 50 year event.
- Infiltration basin – is a stormwater management device which is used to store, treat and dispose of stormwater to the ground via soakage.
- Open drains – are channels used to convey stormwater. They are cost effective means to convey large volumes of water.

A summary of material and diameter for channels and pipes, where known, is shown below in Figure 19-3 and Figure 19-4.

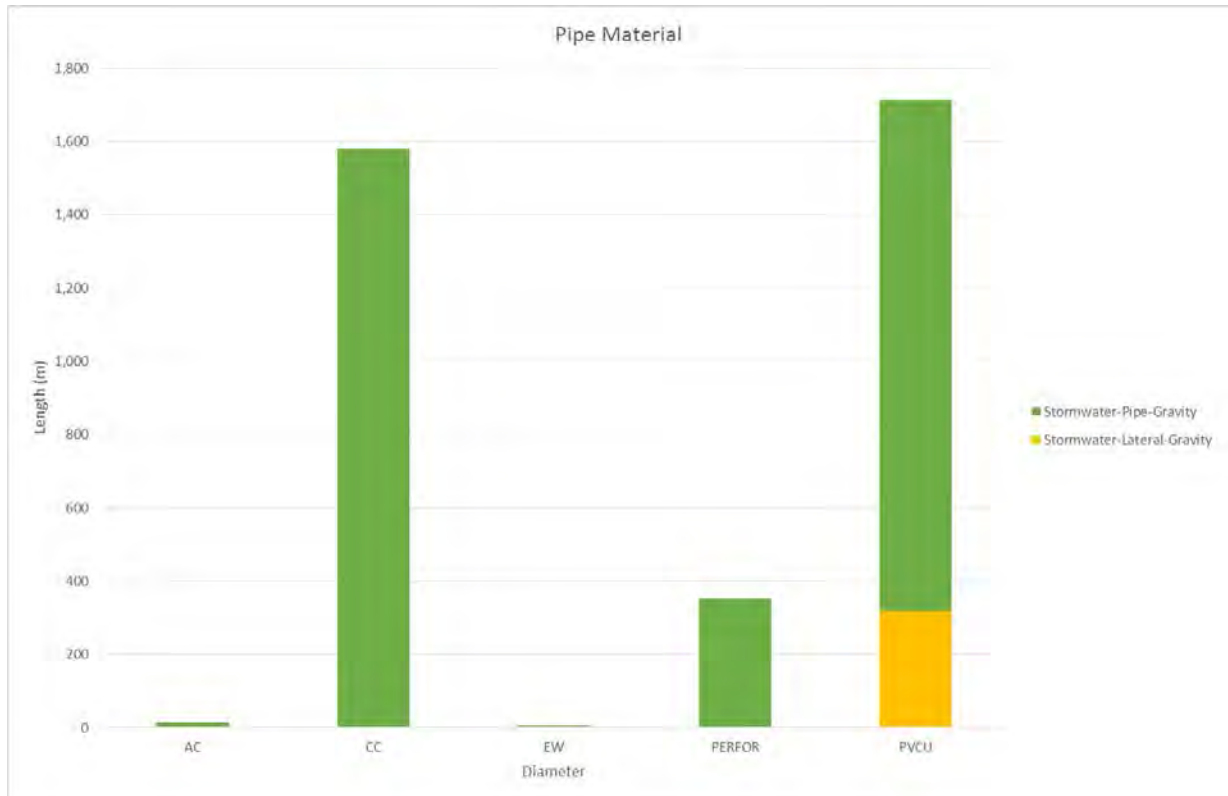


Figure 19-3 Pipe Material – Tai Tapu

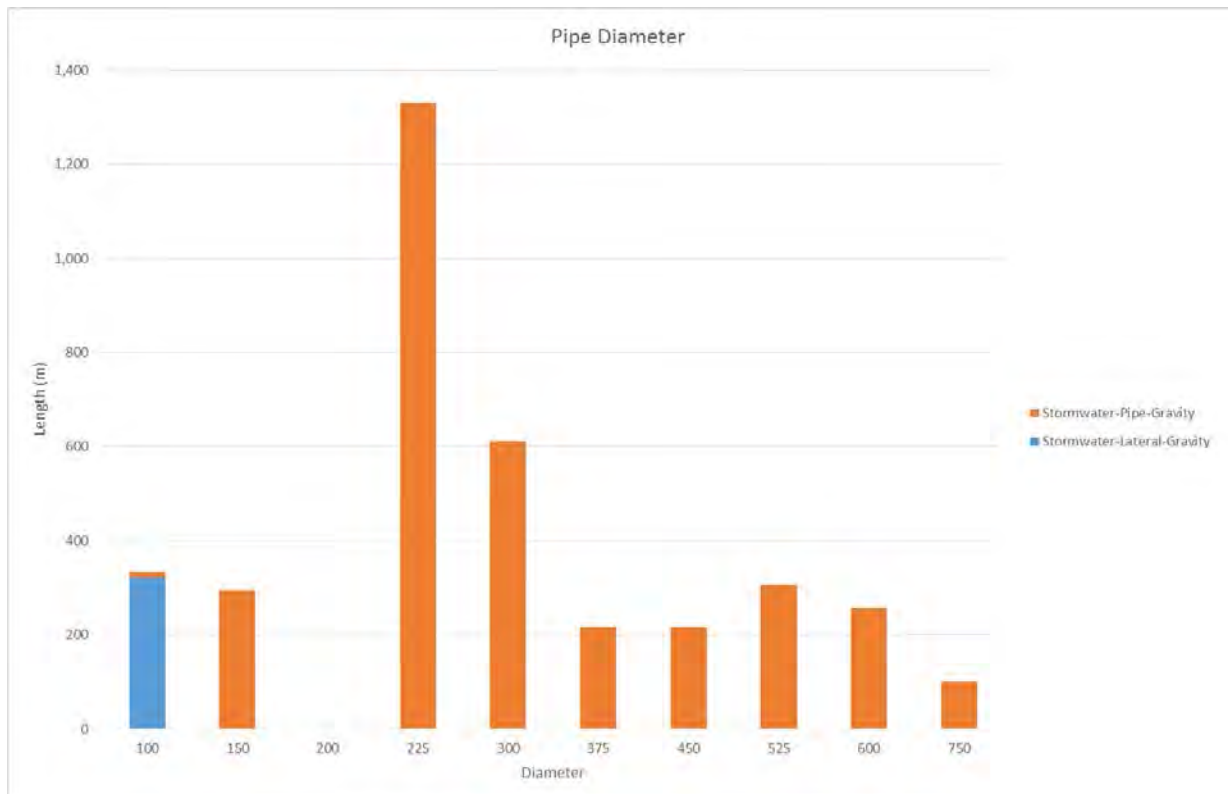


Figure 19-4 Pipe Diameter – Tai Tapu

19.7 Operational Management

The stormwater network is operated and maintained under two maintenance contracts as follows:

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

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

19.8 Photos of Main Assets

The photos below provide a summary of the types of assets found within this stormwater management area.



Photo 1 – School Road Basin

19.9 Rapid Flood Modelling

The Council has undertaken ‘Rapid Flood Hazard Assessment’ modelling for its main townships. The modelling uses DHI MIKE 21 to simulate rainfall on grid with the outputs processed through ArcGIS producing maps illustrating a range of flood deeps during different rainfall intensities and durations.

The rapid flood assessment has been generated to provide a high level summary of potential flood and ponding areas across the district during extreme rainfall events. The results from this study are not to be used to set floor levels. The results have not been ground tested and therefore are indicative only.

For a 50 year event, Figure 19-5 shows the predicted flooding for Tai Tapu.

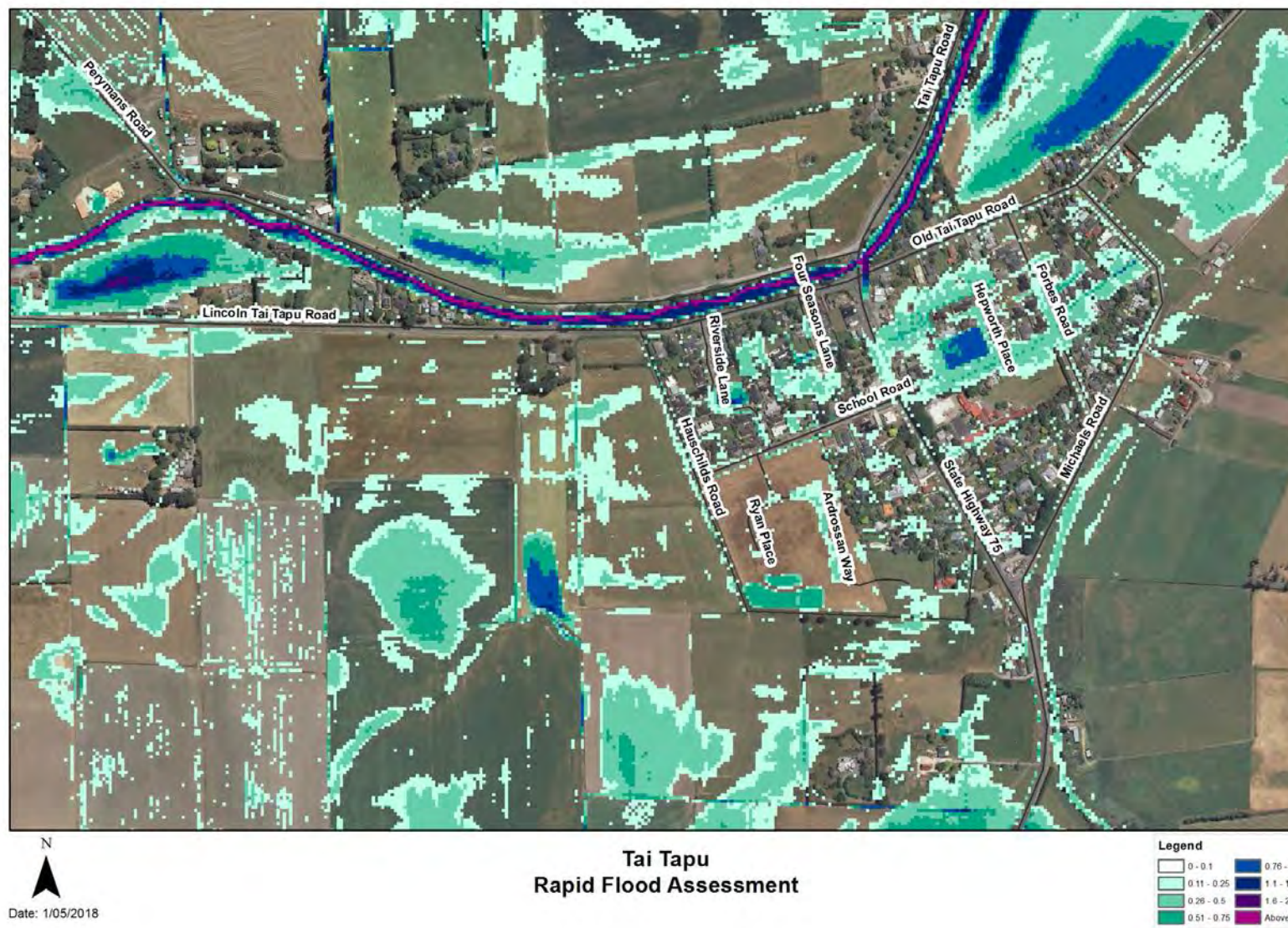


Figure 19-5 Rapid Flood Modelling, Tai Tapu

19.10 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 19-3 details the risk priority rating and Table 19-4 outlines the risks for this scheme.

Table 19-3 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 19-4 Risks – Tai Tapu

Risk	Action/Project	Year Identified	2014 Risk Rating	2017 Risk Rating	Residual Risk Rating
Otahuna - formalising overland flow paths (neighbourly disputes)	Otahuna - review and confirm overland flow paths	2014	12	12	6
Pump doesn't have enough capacity	New portable pump	2014	20	10	10

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

19.11 Asset Valuation Details

The total replacement value of assets within the Tai Tapu Scheme is \$2,051,896 as detailed in Table 19-5 below. The majority of value, 62%, is made up of pipes.

Table 19-5 Replacement Value, Tai Tapu

Asset Class 1	Asset Class 2	Sum of Replacement Value
Stormwater Reticulation	Channel	\$223,168
	Inlet-Outlet-Point	\$80,230
	Lateral	\$54,654
	Management Device	\$159,023
	Manhole	\$231,181

	Pipe	\$1,276,949
	Soakhole	\$26,691

Replacement values for different types (channels, laterals, management devices and pipes) of stormwater assets are shown in Figure 19-6 below.

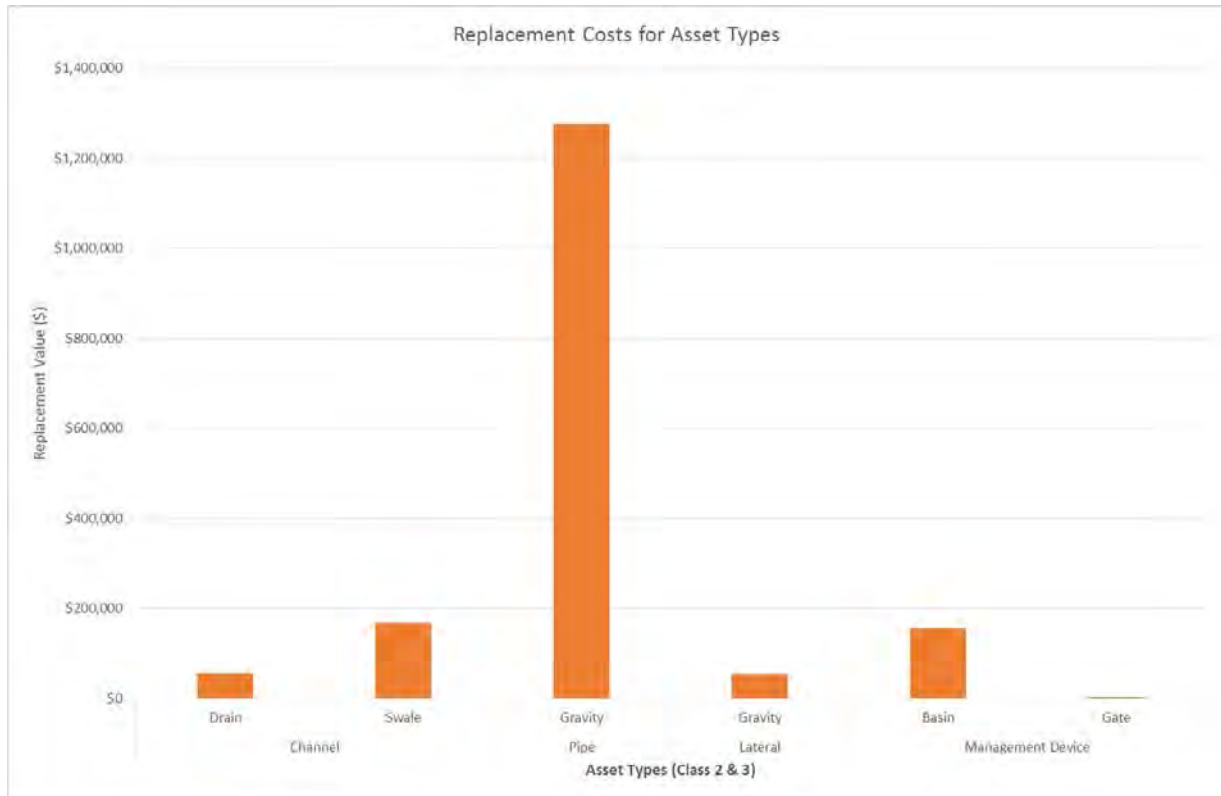


Figure 19-6 Replacement Costs for Tai Tapu

19.12 Renewals

The renewal profile has been taken from the 2017 5 Waters Valuation. A graph showing the renewals for this scheme are shown by Figure 19-7 below. The majority of assets requiring renewal are culverts/pipes which occur in the period 2043 to 2047.



Figure 19-7 Tai Tapu Stormwater Renewal Profile

19.13 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 19-6 and Figure 19-8 below shows the calculated criticality for all of the assets within this scheme that have a recorded known length.

Table 19-6 Length of Assets per Criticality Level

Criticality Bands		Length (m)
5	Low	8,586
4	Medium-Low	377
3	Medium	483
2	Medium-High	306
1	High	0

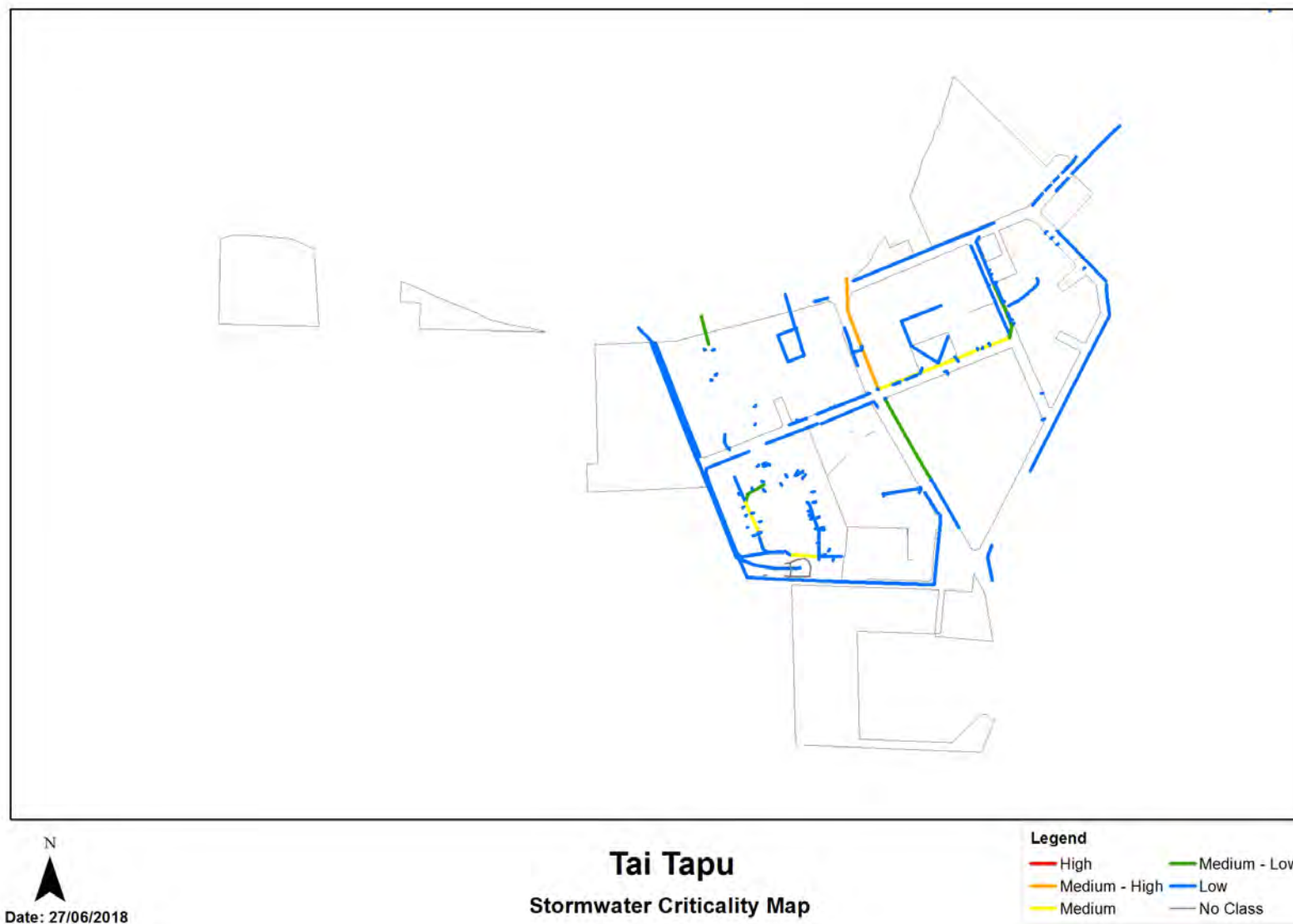


Figure 19-8 Criticality Map

19.14 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 19-9 below shows the level of asset condition for all of the assets within this scheme that have a recorded known condition.

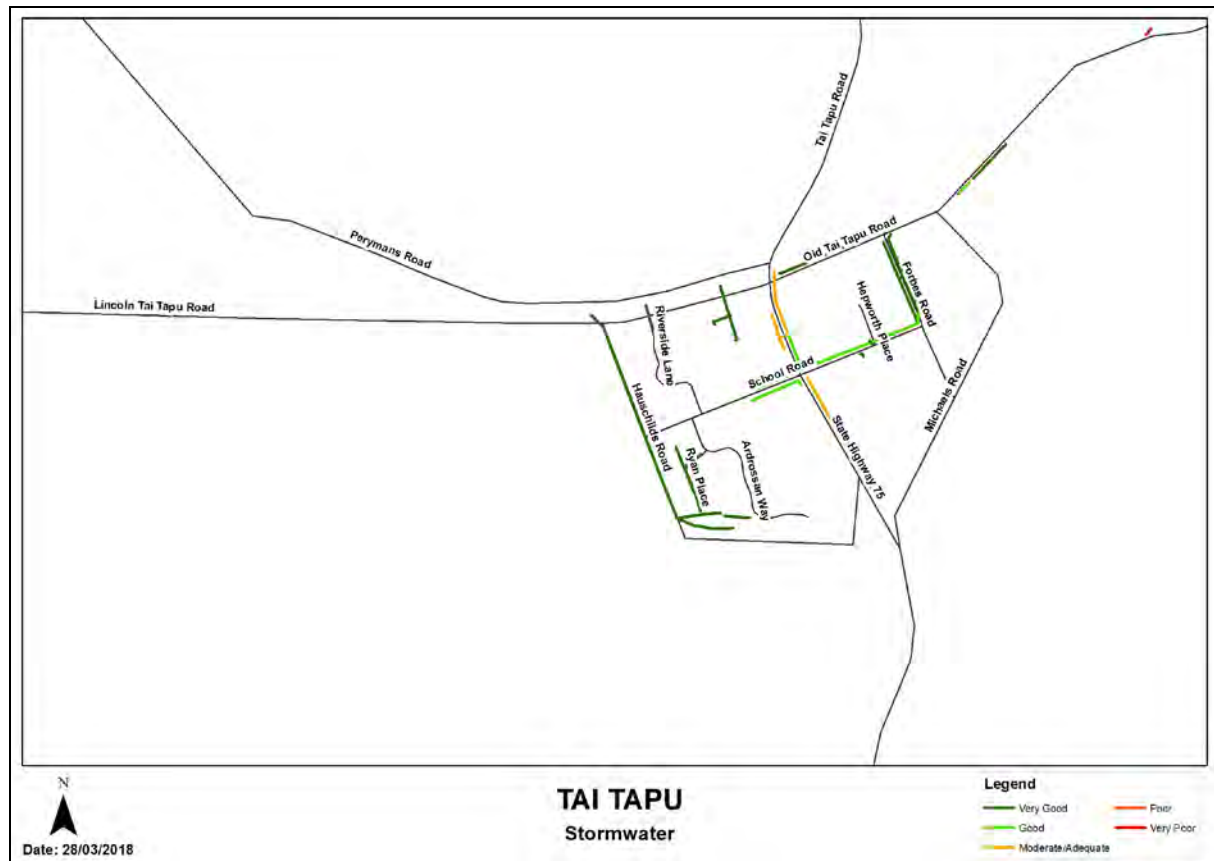


Figure 19-9 Asset Condition – Tai Tapu

Table 19-7 provides a description of the condition rating used within the condition model.

Table 19-7 Asset Condition Grading

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

19.15 Funding Program

The 10 year budgets for Tai Tapu are shown by Table 19-8 and Figure 19-10. Budgets are split into expenditure, renewals, projects and capital projects.

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

Table 19-8 Tai Tapu Budget Summary

Years	Expenditure	Renewals	Projects	Capital Projects
2018/2019	\$24,912			
2019/2020	\$20,912			
2020/2021	\$20,912			
2021/2022	\$20,912			
2022/2023	\$20,912	\$7,296		
2023/2024	\$20,912			
2024/2025	\$20,912			
2025/2026	\$20,912			
2026/2027	\$20,912			
2027/2028	\$20,912			
Total	\$213,120	\$7,296		

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

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

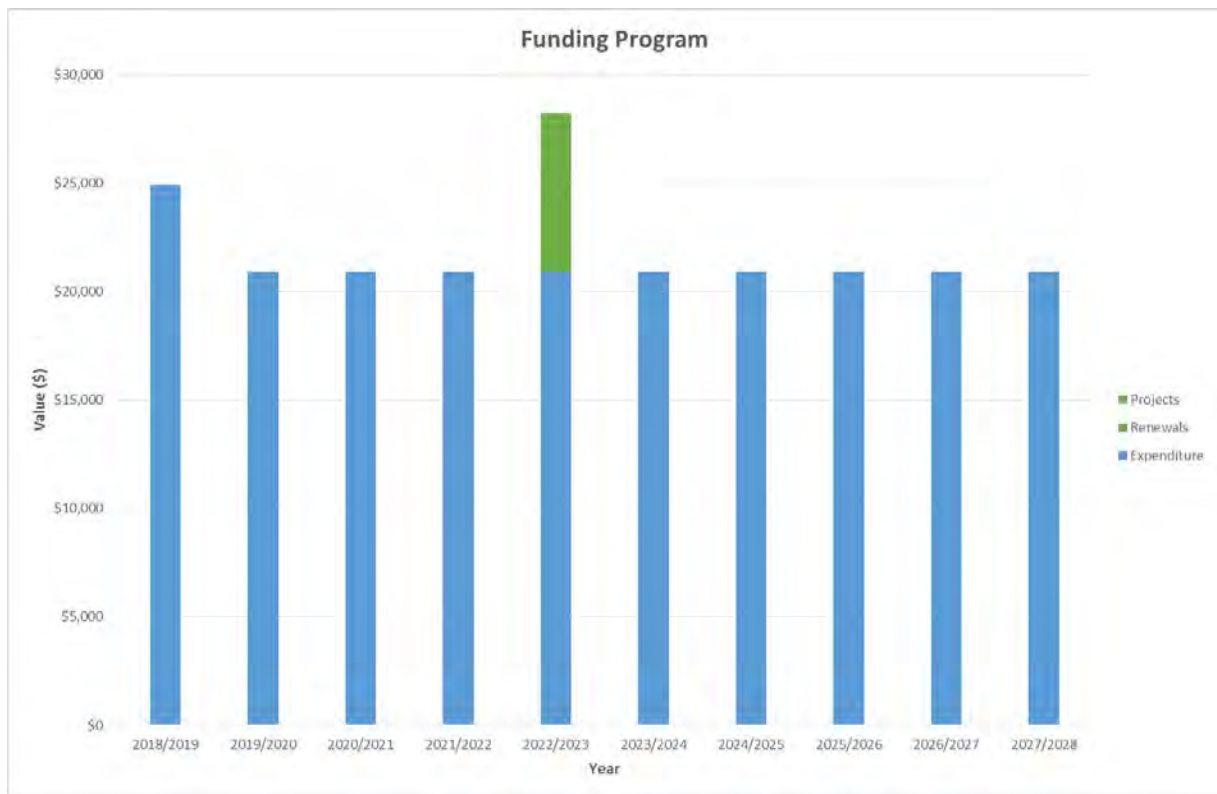


Figure 19-10 Tai Tapu Funding Summary

There are no major projects for Tai Tapu stormwater scheme in the LTP budget.

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

20.0 WEST MELTON STORMWATER SCHEME

20.1 Scheme Summary

Description		Quantity
Scheme Area		74.74ha
Scheme Coverage (as at 1 Jan 2018)	Rating numbers	647
System components	Piped (m)	4296.72
	Swales (m)	9475.7
	Drains (m)	0
	Manholes/Inspection Chambers (No.)	73
	Treatment	6 Infiltration basins
	Other	N/A
Value (\$)	Replacement Cost	\$3,752,410.44
	Depreciated Replacement Cost	\$3,597,805.43
Financial	2018/2019 Estimate	\$41,800
	Annual maintenance cost	5.98%
	% of total	
Planning	Stormwater Management Plan	Required
	No. SDC stormwater consents	1
Demand	Mean Annual Rainfall (mm)	642
	10% AEP (10 year) 1hr rainfall depth (mm)	19.6
Sustainability	Sustainable drain management practices	Adopted and Encouraged

20.2 Key Issues

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

Table 20-1 West Melton Scheme Issues

What's the Problem	What we plan to do
New stormwater system	Monitor performance of new systems

20.3 Overview & History

The majority of the West Melton stormwater assets are within the Gainsborough and Prestons Down subdivision. The system comprises a network of swales discharging to stormwater basins.

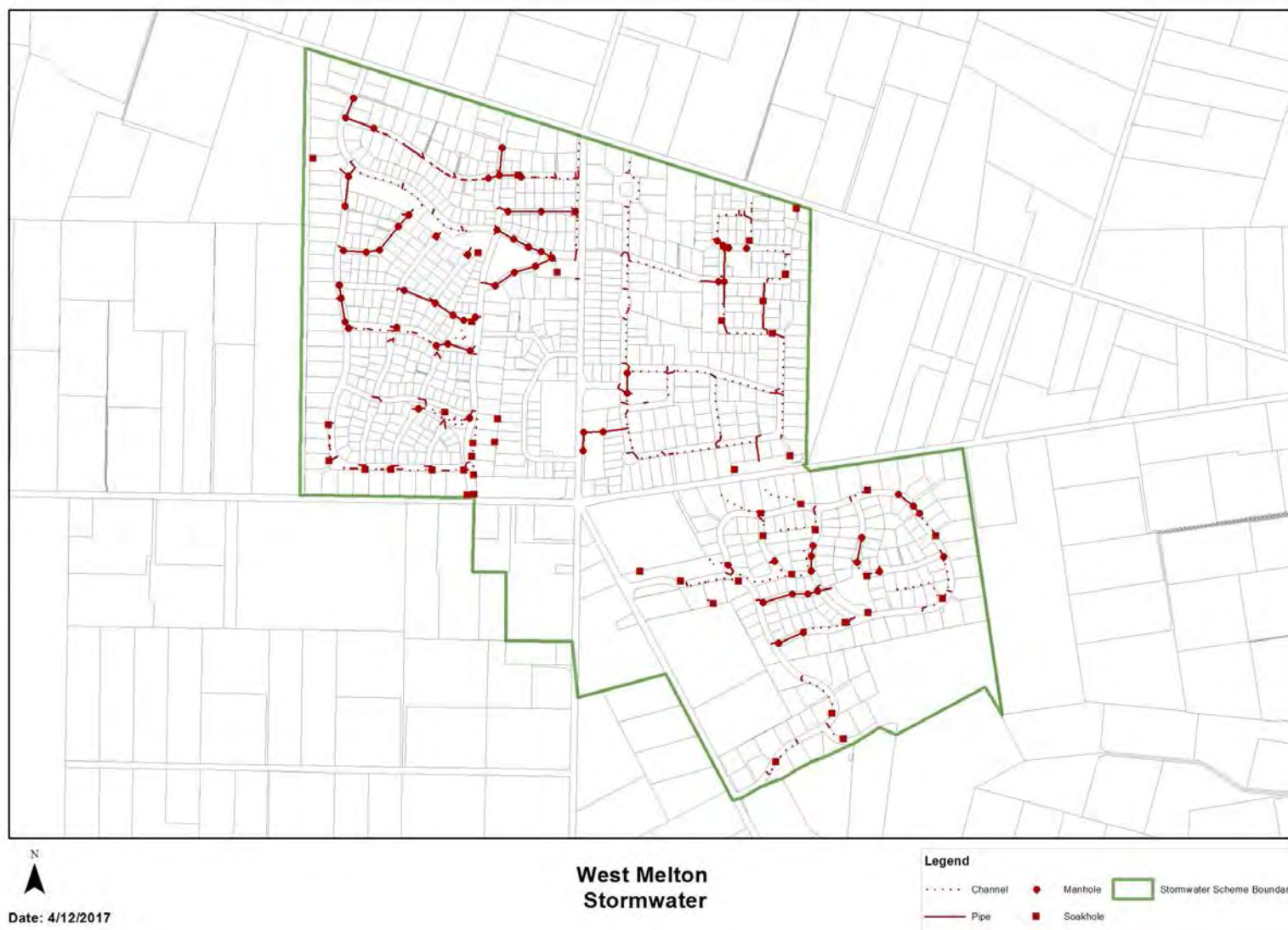


Figure 20-1 Scheme Map

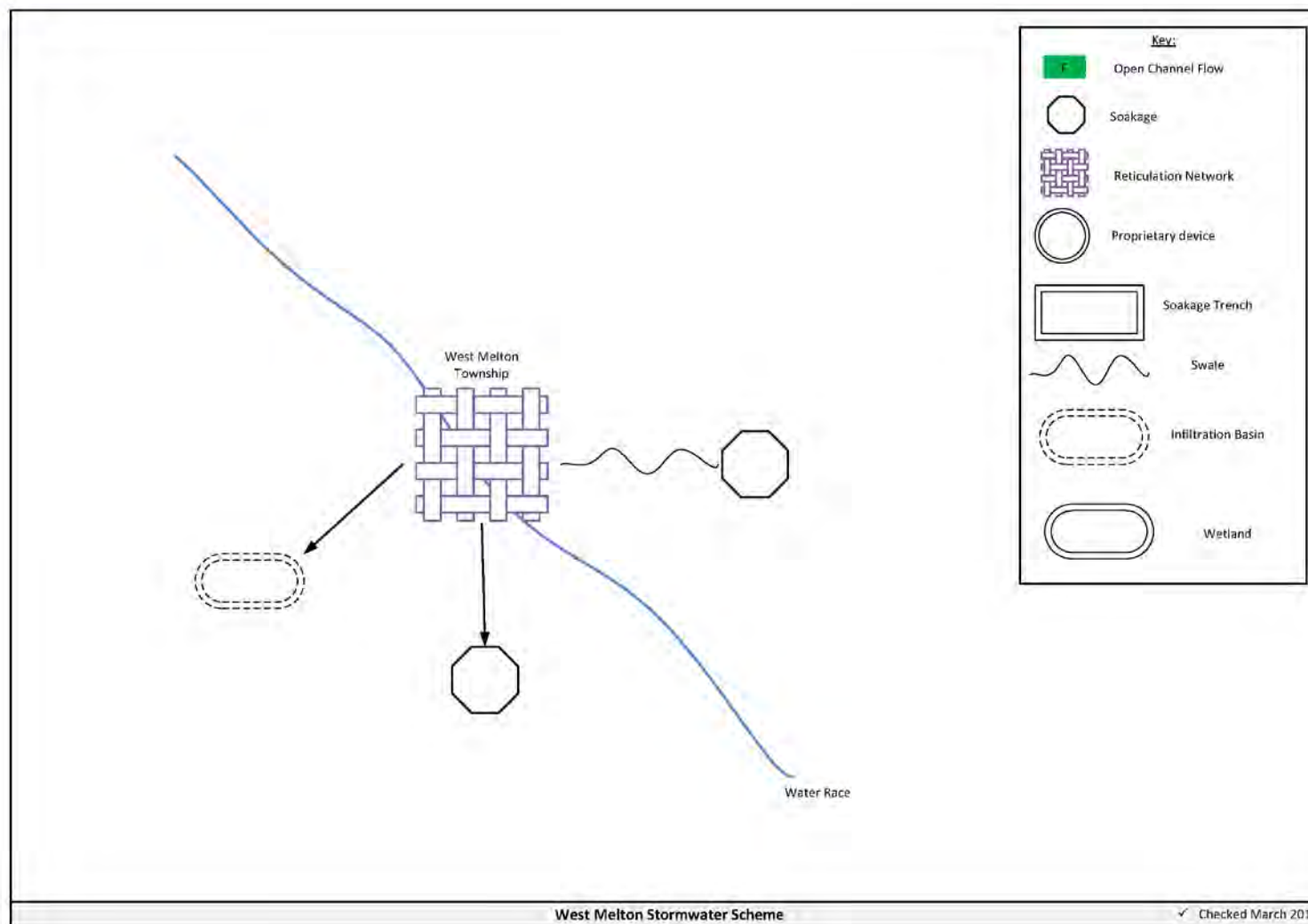


Figure 20-2 Scheme Schematic

20.4 Resource Consents

There is a global consent held by Selwyn District Council for this stormwater management area.

Table 20-2 Resource Consents

Consent	Description	Location	Date Issued	Expiry Date
CRC167467 <i>Issued - Active</i>	to discharge contaminants into and onto land	West Melton, Selwyn	12/04/2017	12/04/2052

20.5 Integrated Stormwater Management Plan

An ISMP has been granted for West Melton.

20.6 Scheme Assets

Council has a wide variety of stormwater assets within the district. A brief description of the assets within this scheme is provided below:

- Swale (Grassed) – Is a longitudinal open channel which is lined with grass. The swale both conveys and treats stormwater.
- Soakage trench – Carries out the same function as soakholes but is orientated in a horizontal direction rather than vertically. They are particularly useful in areas with reduced infiltration rates or higher ground water tables.
- Reticulated network – Includes pipes, manholes, sumps. The primary purpose of the reticulated network is to collect and convey stormwater. Historically these systems were designed for the 2 year storm event. Today's engineering standards require the piped network to be designed for a 10 year event with overland flow provision for up to the 50 year event.
- Infiltration basin – is a stormwater management device which is used to store, treat and dispose of stormwater to the ground via soakage.
- Soakholes – Are used to dispose of stormwater to ground in areas where the ground water table is low and soil permeability is high.

A summary of material and diameter for channels and pipes, where known, is shown below in Figure 20-3 and Figure 20-4.

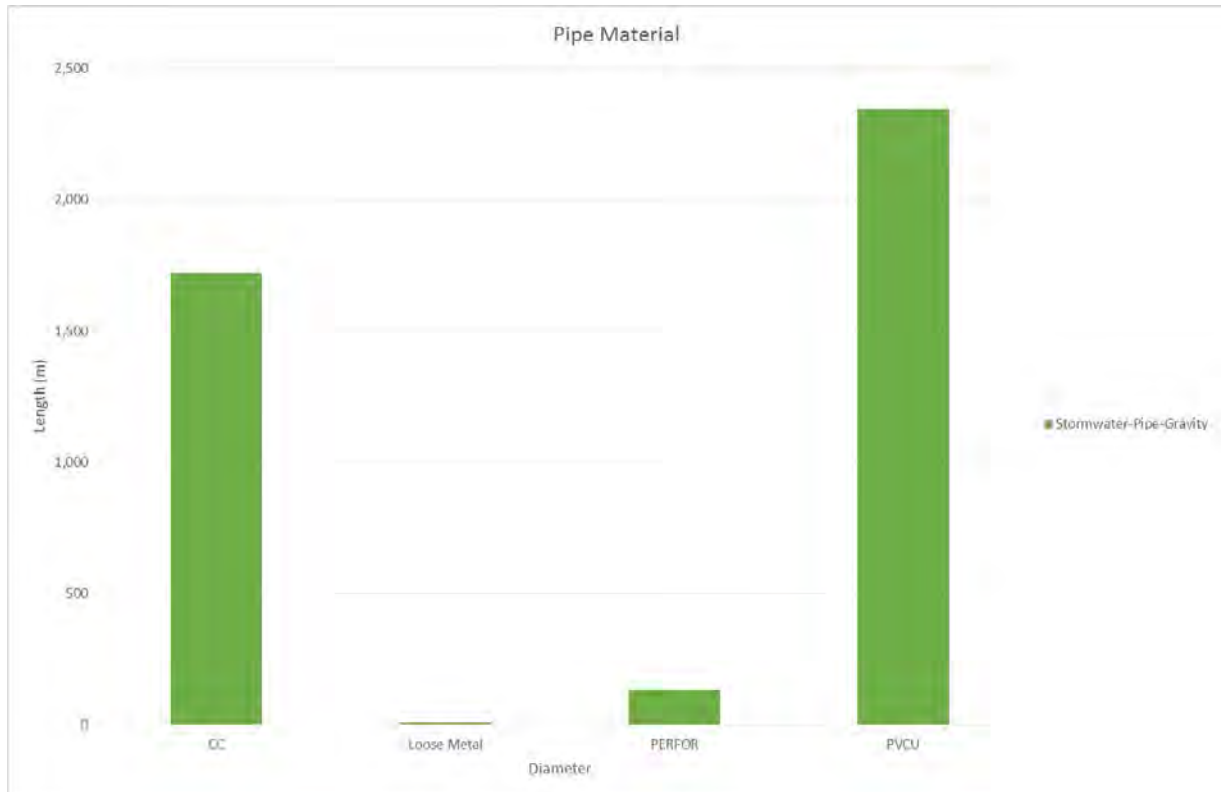


Figure 20-3 Pipe Material – West Melton

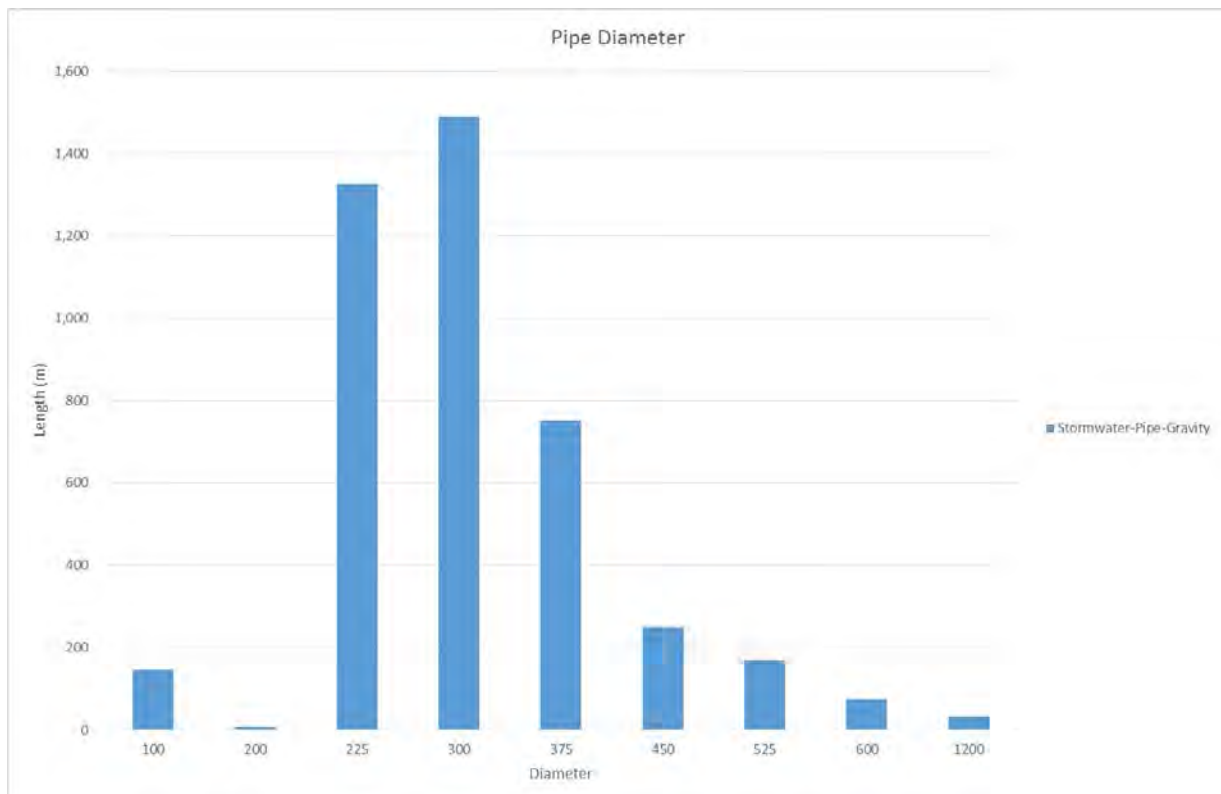


Figure 20-4 Pipe Diameter – West Melton

20.7 Operational Management

The stormwater network is operated and maintained under two maintenance contracts as follows:

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

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

20.8 Photos of Main Assets

The photos below provide a summary of the types of assets found within this stormwater management area.



Photo 1 – Basin 1 Gainsborough



Photo 2 – Basin 2 Gainsborough

20.9 Rapid Flood Modelling

The Council has undertaken 'Rapid Flood Hazard Assessment' modelling for its main townships. The modelling uses DHI MIKE 21 to simulate rainfall on grid with the outputs processed through ArcGIS producing maps illustrating a range of flood deeps during different rainfall intensities and durations.

The rapid flood assessment has been generated to provide a high level summary of potential flood and ponding areas across the district during extreme rainfall events. The results from this study are not to be used to set floor levels. The results have not been ground tested and therefore are indicative only.

For a 50 year event, Figure 20-5 shows the predicted flooding for West Melton

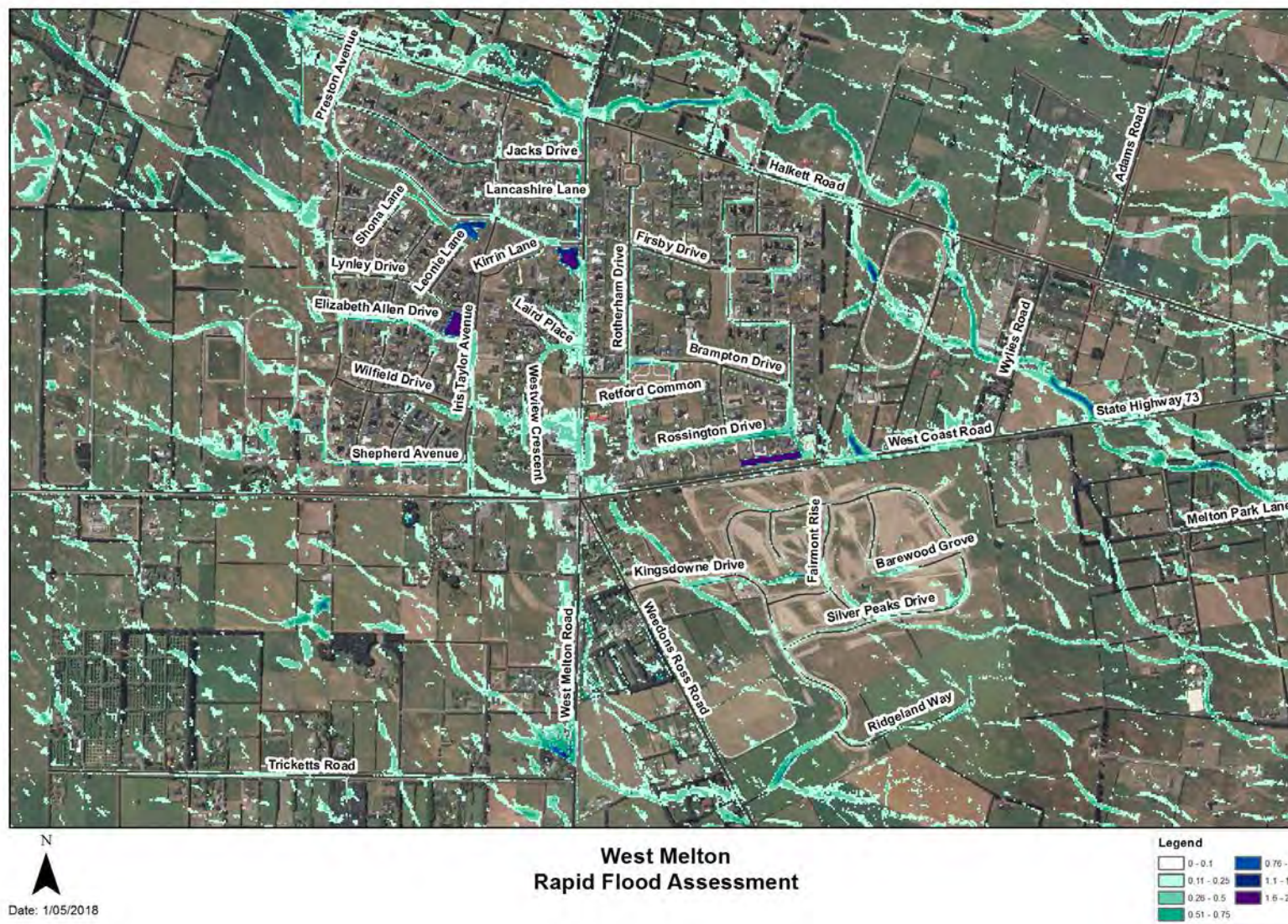


Figure 20-5 Rapid Flood Modelling, West Melton

20.10 Risk Assessment

A risk assessment has been undertaken for the West Melton scheme. The key output from the risk assessment is the identification of any extreme and high risks which need to be mitigated. In order to mitigate these risks they have been included and budgeted for in the projects within this LTP. Table 20-3 details the risk priority rating and Table 20-4 outlines the risks.

Table 20-3 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 20-4 Risks – West Melton

Risk	Action/Project	Year Identified	2014 Risk Rating	2017 Risk Rating	Residual Risk Rating
Non-consented activities	Renewal of consents	2014	27	27	6

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

20.11 Asset Valuation Details

The total replacement value of assets within the West Melton Scheme is \$3,752,410 as detailed in Table 20-5 below. The majority of value, 47%, is made up of pipes.

Table 20-5 Replacement Value, West Melton

Asset Class 1	Asset Class 2	Sum of Replacement Value
Stormwater Reticulation	Channel	\$330,656
	Inlet-Outlet-Point	\$239,819
	Management Device	\$881,649
	Manhole	\$464,664
	Pipe	\$1,763,655
	Soakhole	\$71,968

Replacement values for different types (channels, laterals, management devices and pipes) of stormwater assets are shown in Figure 20-6 below.

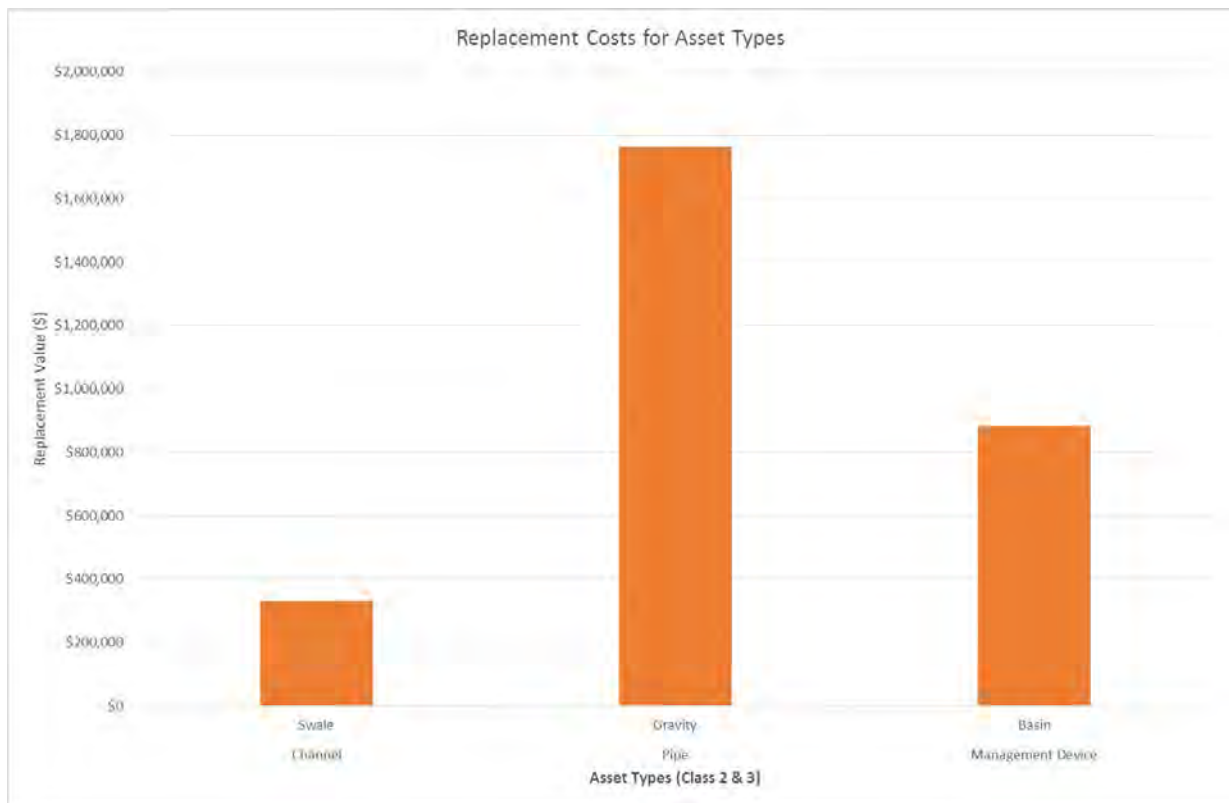


Figure 20-6 Replacement Costs for West Melton

20.12 Renewals

The renewal profile has been taken from the 2017 5 Waters Valuation. A graph showing the renewals for this scheme are shown by Figure 20-7 below. The majority of assets requiring renewal are culverts/pipes which occur in the year 2025/26, 2039 to 2042.

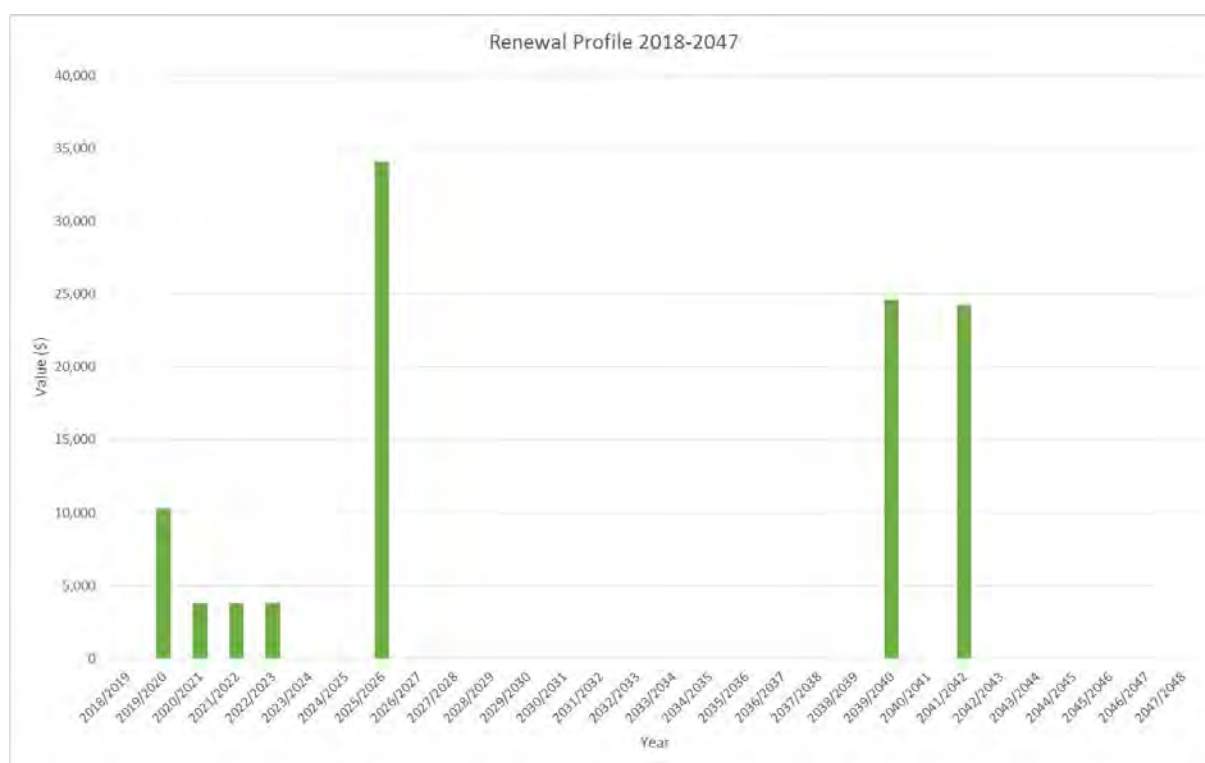


Figure 20-7 West Melton Stormwater Renewal Profile

20.13 Critical Assets

The criticality model for West Melton has been updated for the 2018 AcMP. The methodology of the criticality model can be found in 5Waters Activity Management Plan: Volume 1 and it provides details of how the criticality has been calculated for the reticulation assets. Table 20-6 and Figure 20-8 below shows the calculated criticality for all of the assets within this scheme that have a recorded known length.

Table 20-6 Length of Assets per Criticality Level

Criticality Bands		Length (m)
5	Low	9,466
4	Medium-Low	877
3	Medium	495
2	Medium-High	0
1	High	34



Figure 20-8 Criticality Map

20.14 Asset Condition

The asset condition model was run for West Melton in 2017. The methodology of the model can be found in 5Waters Activity Management Plan: Volume 1 and it provides details of how the model has been calculated for the reticulation assets (particularly pipes). Figure 20-9 below shows the level of asset condition for all of the assets within this scheme that have a recorded known condition.

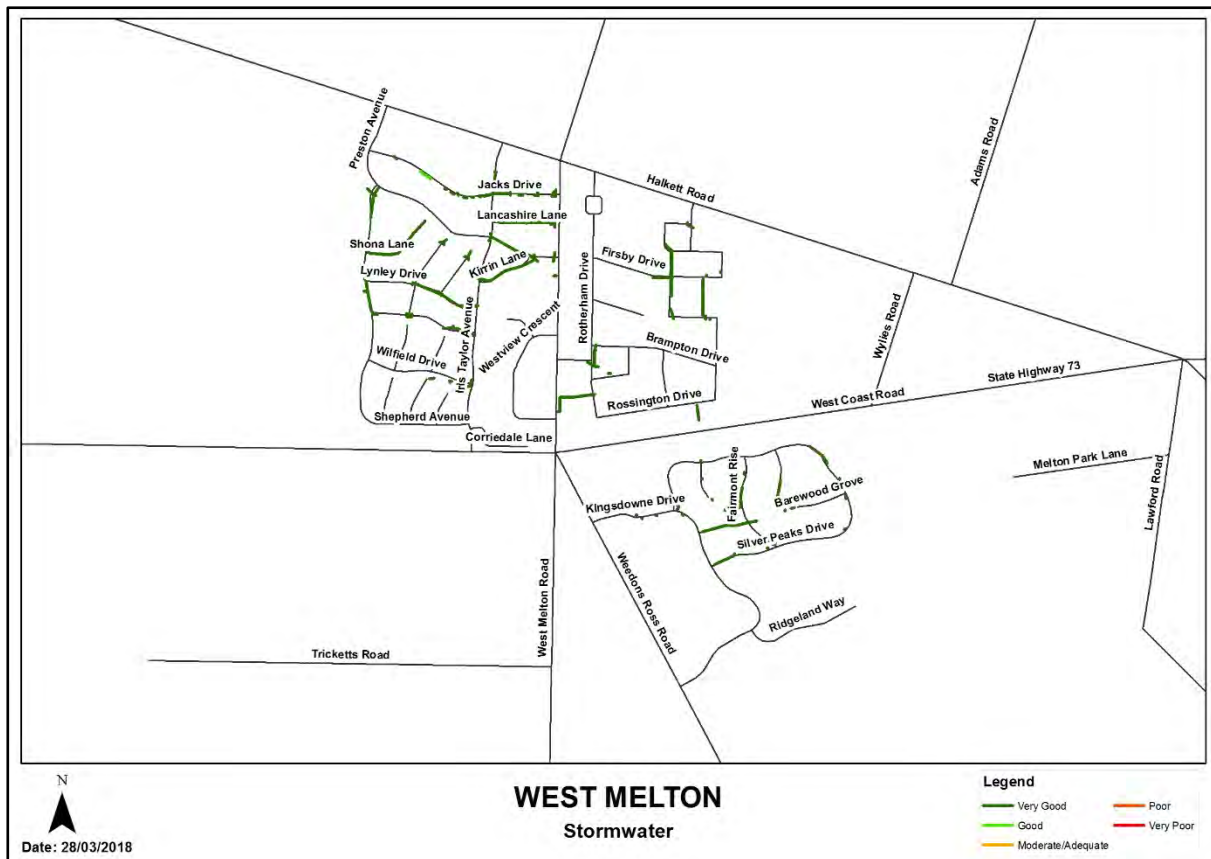


Figure 20-9 Asset Condition – West Melton

Table 20-7 provides a description of the condition rating used within the condition model.

Table 20-7 Asset Condition Grading

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

20.15 Funding Program

The 10 year budgets for West Melton are shown by Table 20-8 and Figure 20-10. Budgets are split into expenditure, renewals, projects and capital projects.

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

Table 20-8 West Melton Budget Summary

Years	Expenditure	Renewals	Projects	Capital Projects
2018/2019	\$41,800			
2019/2020	\$46,000	\$10,294		
2020/2021	\$50,000	\$3,788		
2021/2022	\$50,000	\$3,788		
2022/2023	\$50,000	\$3,788		
2023/2024	\$50,000			
2024/2025	\$50,000			
2025/2026	\$50,000	\$34,090		
2026/2027	\$50,000			
2027/2028	\$50,000			
Total	\$487,800	\$55,748		

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

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

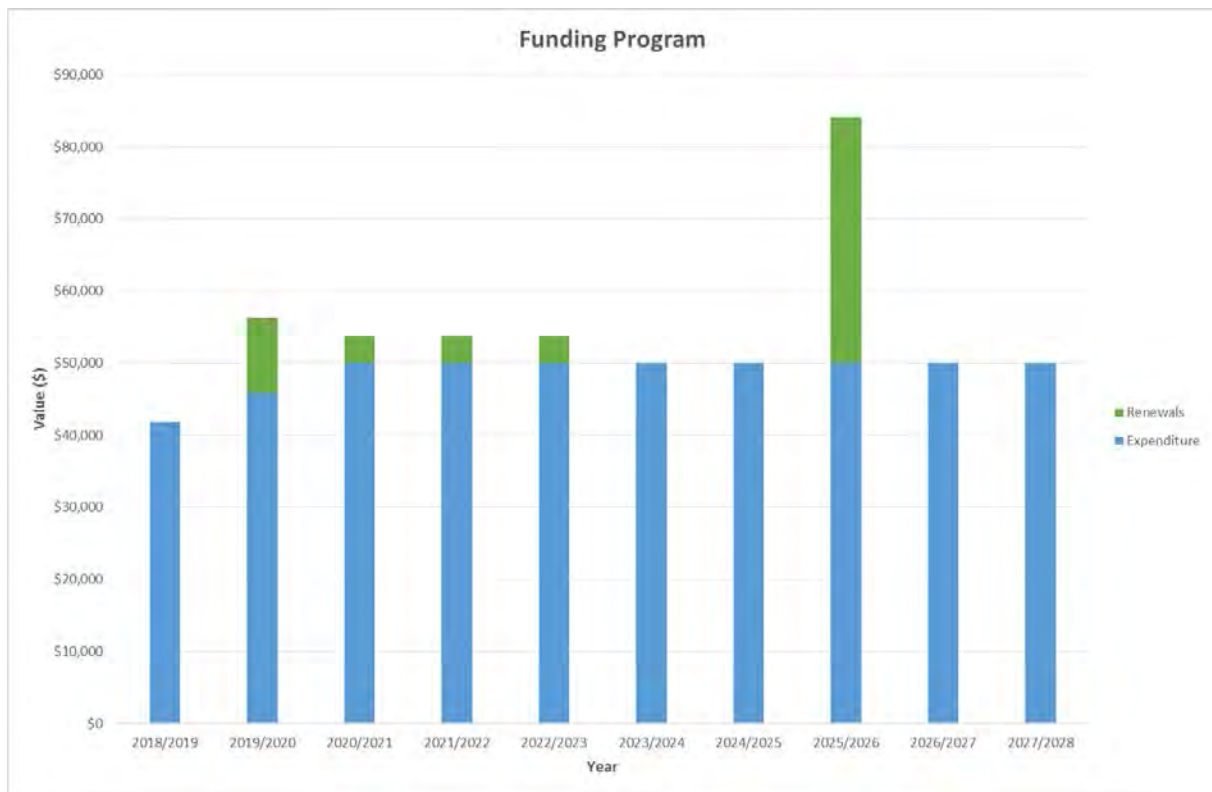


Figure 20-10 West Melton Funding Summary

There are no major projects for West Melton stormwater scheme in the LTP budget. The list of district wide projects can be found in 5Waters Activity Management Plan: Volume 1.

21.0 WHITECLIFFS STORMWATER SCHEME

21.1 Scheme Summary

Description		Quantity
Scheme Area		29.18ha
Scheme Coverage (as at 1 Jan 2018)	Rating numbers	90
System components	Piped (m)	0
	Swales (m)	120
	Drains (m)	1666.85
	Manholes/Inspection Chambers (No.)	0
	Treatment	N/A
	Other	N/A
Value (\$)	Replacement Cost	\$80,238.36
	Depreciated Replacement Cost	\$80,238.36
Financial	2018/2019 Estimate	\$10,488
	Annual maintenance cost	1.50%
	% of total	
Planning	Stormwater Management Plan	Draft
	No. SDC stormwater consents	0
Demand	Mean Annual Rainfall (mm)	
	10% AEP (10 year) 1hr rainfall depth (mm)	
Sustainability	Sustainable drain management practices	Adopted and Encouraged

21.2 Key Issues

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

Table 21-1 Whitecliffs Scheme Issues

What's the Problem	What we plan to do
Flooding from upper catchment	Work with the community to agree whether capacity increase of existing system or the development of a flood diversion channel can be funded.

21.3 Overview & History

The Whitecliffs stormwater management area is serviced by a network of open drains. The system works efficiently requiring minimal maintenance. The Council network discharged onto private property at the end of the network. This drain is steep and subject to erosion.

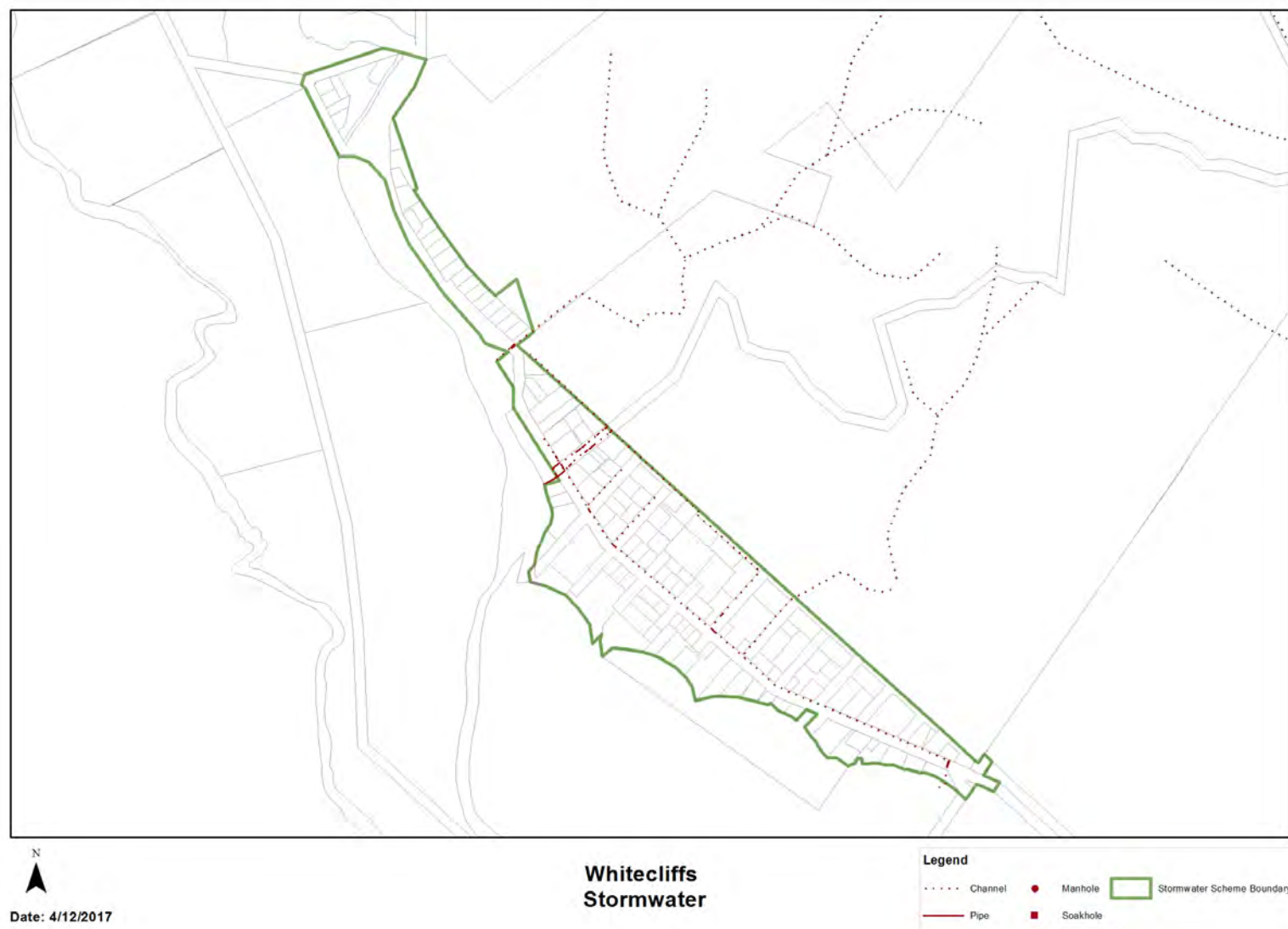


Figure 21-1 Scheme Map

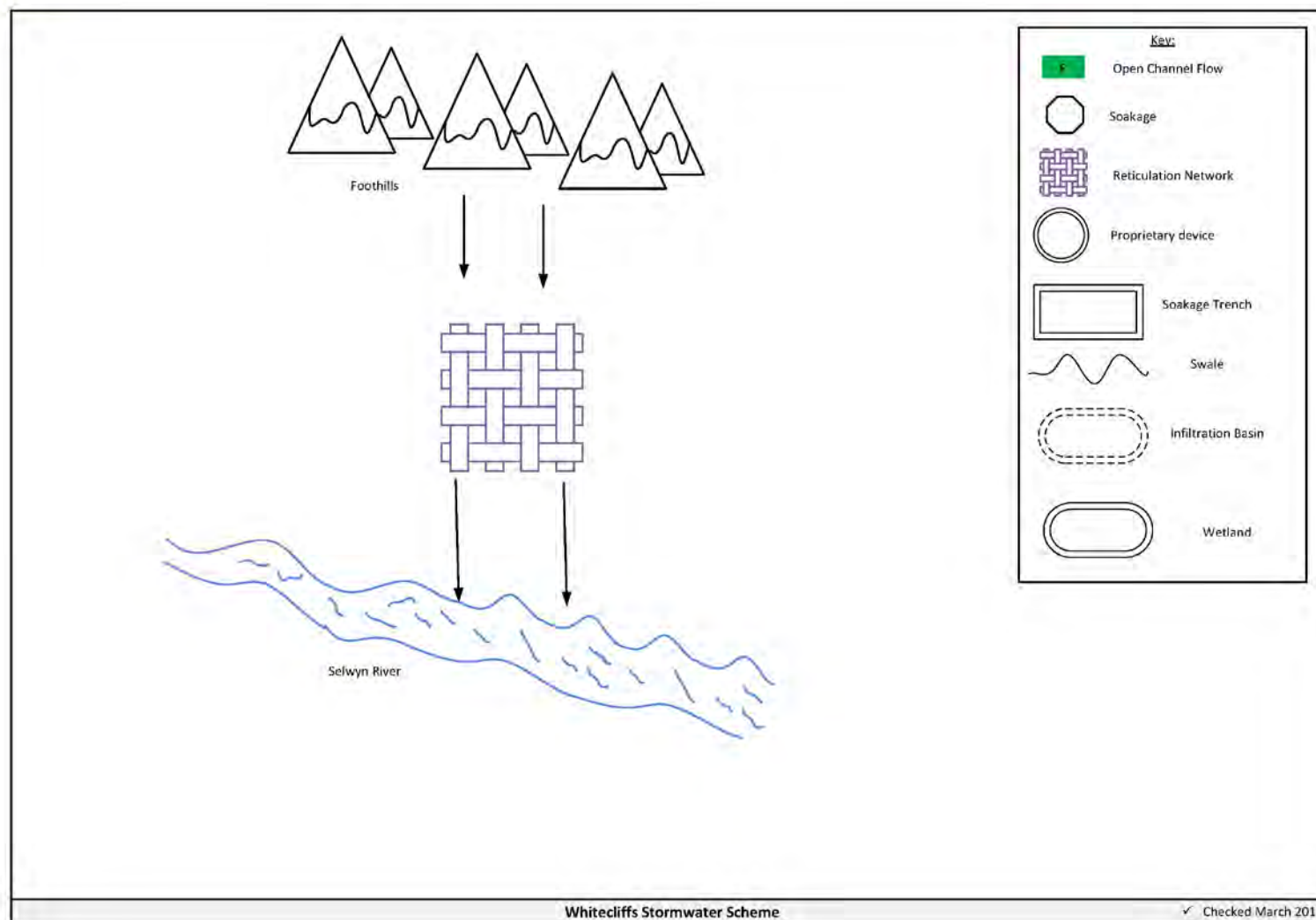


Figure 21-2 Scheme Schematic

21.4 Resource Consents

No resource consents are held by the Selwyn District Council for this stormwater management area. Council will actively seek a global consent for this area.

21.5 Integrated Stormwater Management Plan

Environment Canterbury's Natural Resources Regional Plan (NRRP) became operative on the 11th June 2011. The plan requires that all non-permitted stormwater discharges have consent application lodged by 11th December 2011 under rules WQL6 and 7 or June 2016 under rule WQL8. Due to the tight timeframes (6 months) under rules WQL 6 and 7 it is proposed to obtain consents under rule WQL8. Under the Provisional Land and Water Regional Plan (PLWRG), the deadline for obtaining network discharge consents to allow discharges to be permitted under rule 5.93 has been extended to June 2018.

An ISMP is required for Whitecliffs, these application documents are still being developed and will be lodged before June 2018.

21.6 Scheme Assets

Council has a wide variety of stormwater assets within the district. A brief description of the assets within this scheme is provided below:

- a. Infiltration basin – is a stormwater management device which is used to store, treat and dispose of stormwater to the ground via soakage.

A summary of material and diameter for channels and pipes is unavailable for this scheme.

21.7 Operational Management

The stormwater network is operated and maintained under two maintenance contracts as follows:

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

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

21.8 Photos of Main Assets

The photos below provide a summary of the types of assets found within this stormwater management area.



Photo 1: Typical Open Drain

21.9 Rapid Flood Modelling

The Council has undertaken 'Rapid Flood Hazard Assessment' modelling for its main townships. The modelling uses DHI MIKE 21 to simulate rainfall on grid with the outputs processed through ArcGIS producing maps illustrating a range of flood deeps during different rainfall intensities and durations.

The rapid flood assessment has been generated to provide a high level summary of potential flood and ponding areas across the district during extreme rainfall events. The results from this study are not to be used to set floor levels. The results have not been ground tested and therefore are indicative only.

For a 50 year event, Figure 21-3 shows the predicted flooding for Whitecliffs.

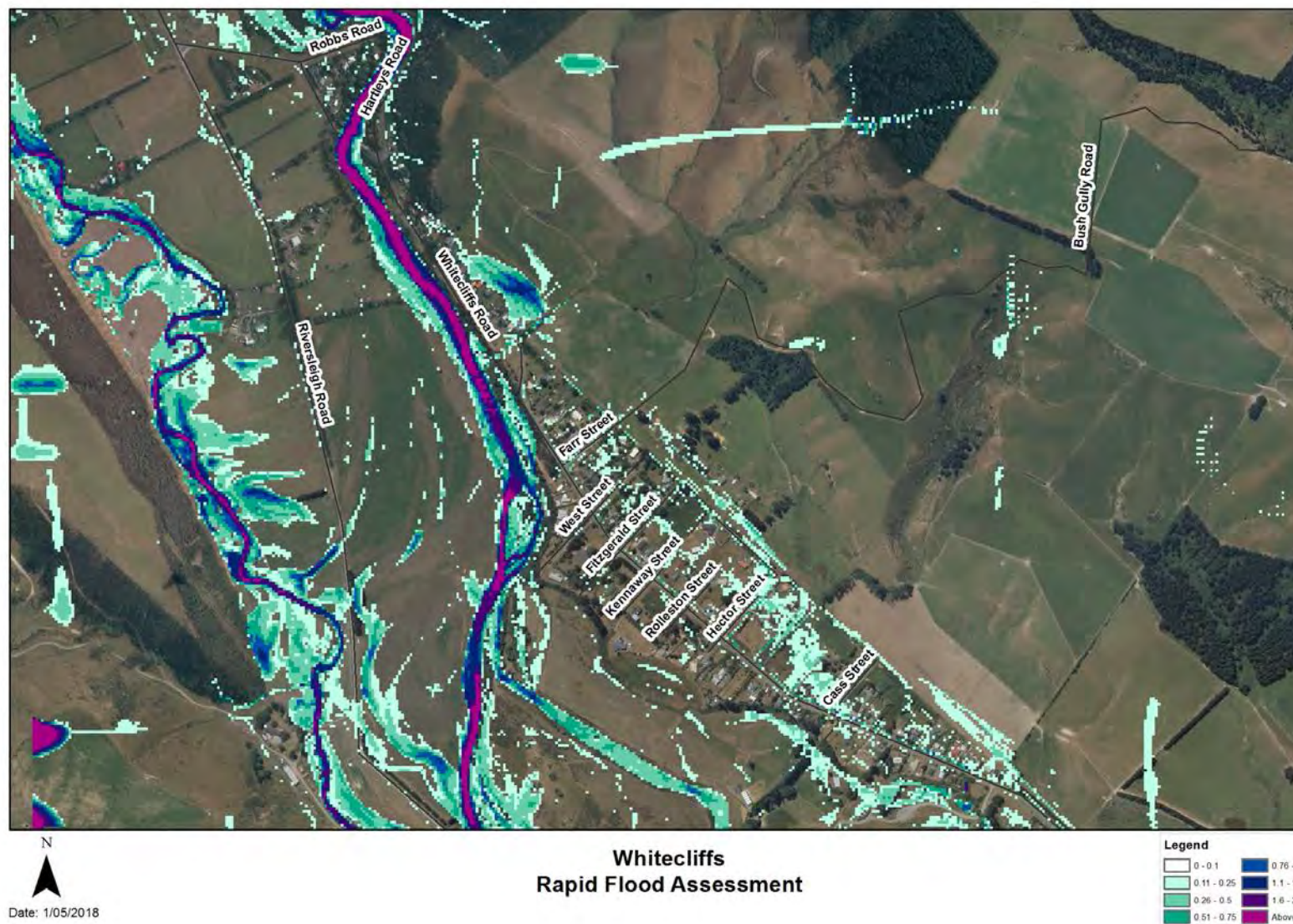


Figure 21-3 Rapid Flood Modelling, Whitecliffs

21.10 Risk Assessment

A risk assessment has been undertaken for the Whitecliffs scheme. The key output from the risk assessment is the identification of any extreme and high risks which need to be mitigated. In order to mitigate these risks they have been included and budgeted for in the projects within this LTP. Table 21-2 details the risk priority rating and Table 21-3 outlines the risks for this scheme.

Renewal of this consent is budgeted under district projects.

Table 21-2 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 21-3 Risks – Whitecliffs

Risk	Action/Project	Year Identified	2014 Risk Rating	2017 Risk Rating	Residual Risk Rating
Non-consented activities	Renewal of consents	2014	27	27	6
Drain scouring	Drain scouring	2017		9	2

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

21.11 Asset Valuation Details

The total replacement value of assets within the Whitecliffs Scheme is \$80,238 as detailed in Table 21-4 below. All of the value is made up of channels.

Table 21-4 Replacement Value, Whitecliffs

Asset Class 1	Asset Class 2	Sum of Replacement Value
Stormwater Reticulation	Channel	\$80,238

Replacement values for different types (channels, laterals, management devices and pipes) of stormwater assets are shown in Figure 21-4 below.

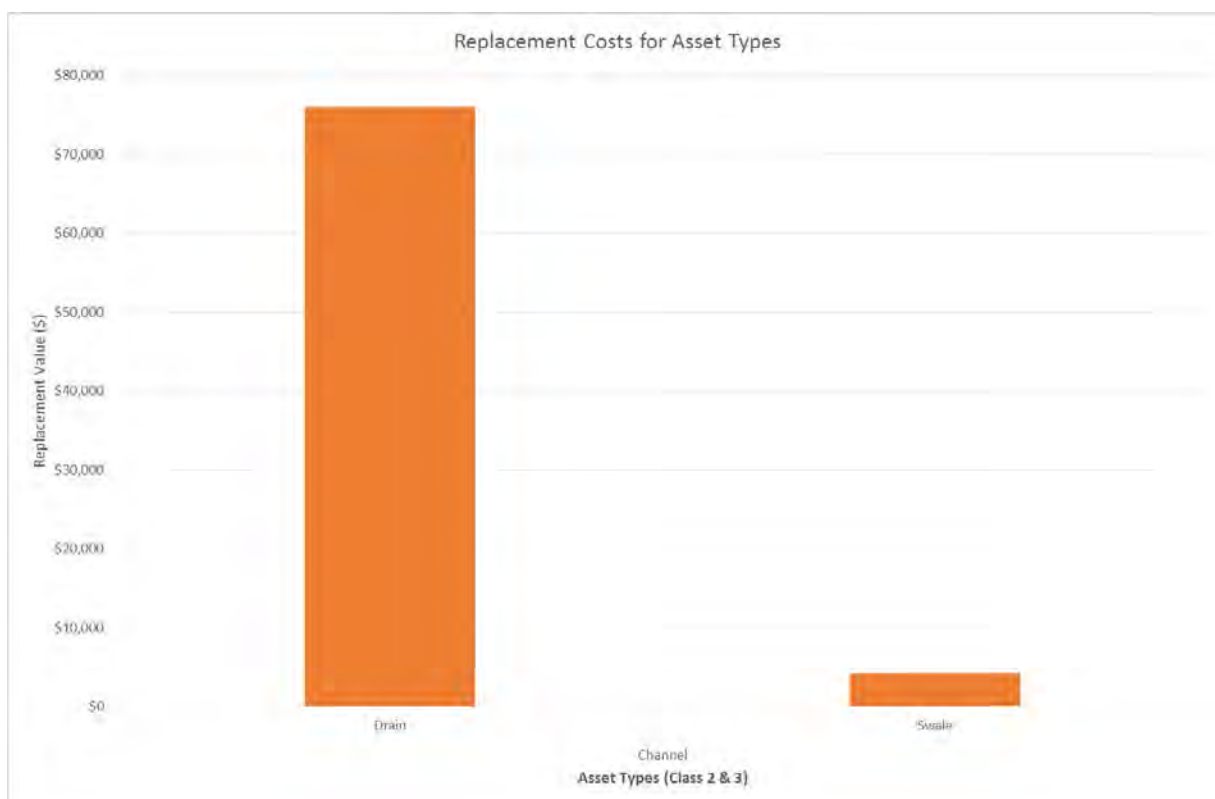


Figure 21-4 Replacement Costs for Whitecliffs

21.12 Renewals

The renewal profile has been taken from the 2017 5 Waters Valuation. There are no renewals scheduled for this scheme.

21.13 Critical Assets

The criticality model for Whitecliffs has been updated for the 2018 AcMP. The methodology of the criticality model can be found in 5Waters Activity Management Plan: Volume 1 and it provides details of how the criticality has been calculated for the reticulation assets. Table 21-5 and Figure 21-5 below shows the calculated criticality for all of the assets within this scheme that have a recorded known length.

Table 21-5 Length of Assets per Criticality Level

Criticality Bands		Length (m)
5	Low	1,769
4	Medium-Low	0
3	Medium	0
2	Medium-High	0
1	High	0



Figure 21-5 Criticality Map

21.14 Asset Condition

The asset condition model was run for Whitecliffs 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 21-6 below shows the level of asset condition for all of the assets within this scheme that have a recorded known condition.

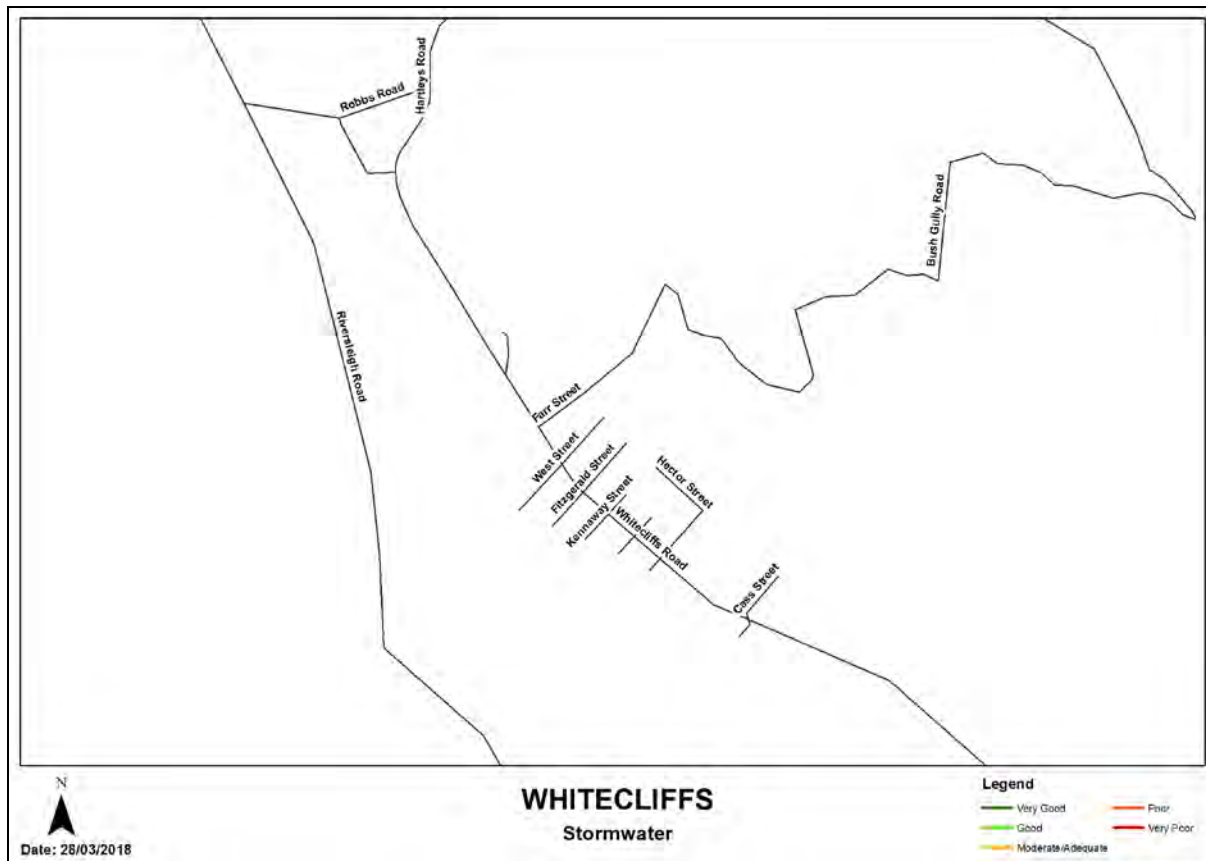


Figure 21-6 Asset Condition - Whitecliffs

Table 21-6 provides a description of the condition rating used within the condition model.

Table 21-6 Asset Condition Grading

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

21.15 Funding Program

The 10 year budgets for Whitecliffs are shown by Table 21-7 and Figure 21-7 Budgets are split into expenditure, renewals, projects and capital projects.

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

Table 21-7 Whitecliffs Budget Summary

Years	Expenditure	Renewals	Projects	Capital Projects
2018/2019	\$10,488			\$20,000
2019/2020	\$4,488			
2020/2021	\$3,988			
2021/2022	\$3,988			
2022/2023	\$3,988			
2023/2024	\$3,988			
2024/2025	\$3,988			
2025/2026	\$3,988			
2026/2027	\$3,988			
2027/2028	\$3,988			
Total	\$46,880			\$20,000

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.

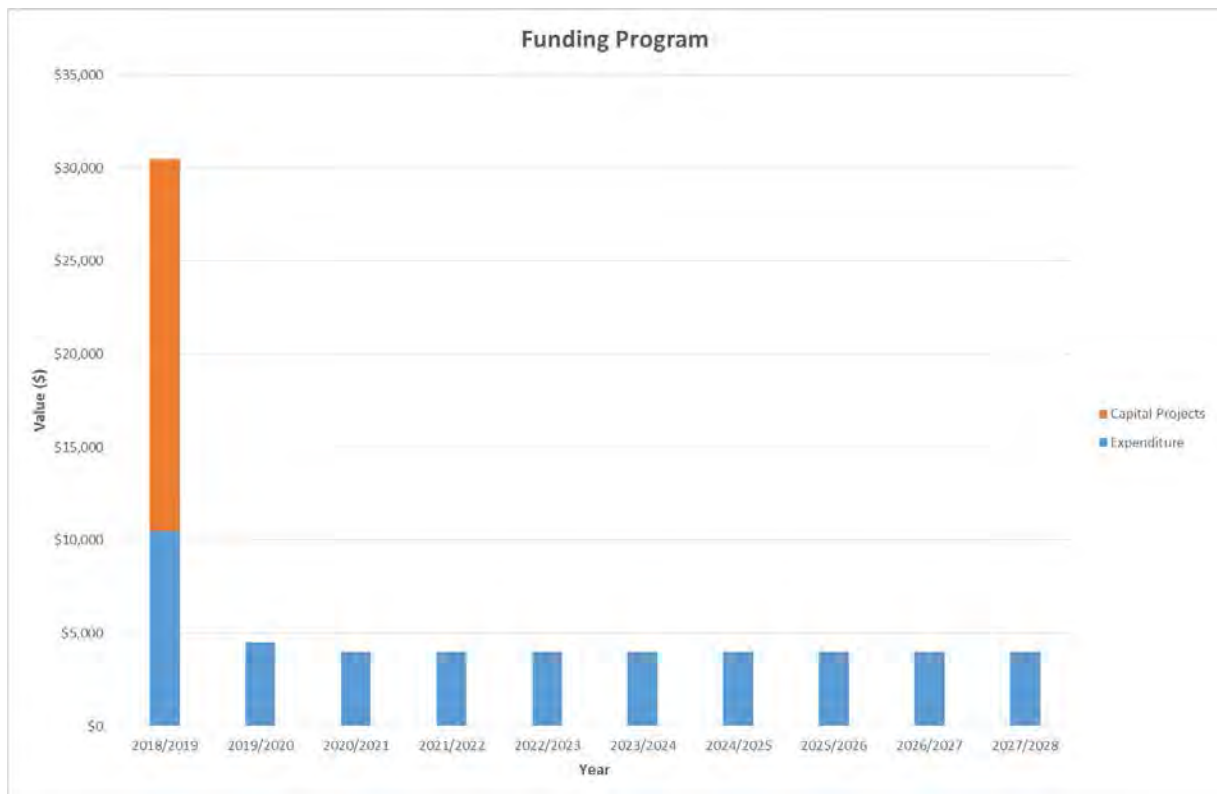


Figure 21-7 Whitecliffs Funding Summary

There is one project for Whitecliffs stormwater scheme in the LTP budget.

Table 21-8 Key Projects

Account Label	GL	Description	Year 1 (\$)	Year 2 (\$)	Year 3 (\$)	Years 4 to 10	Funding Split ¹⁰
Capital Projects	449690001	Whitecliffs capex	\$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.

¹⁰ Where LoS refers to Level of Service and G refers to Growth