2018-2028 STORMWATER AND FLOOD PROTECTION ASSET MANAGEMENT PLAN
He Rautaki Whakahaere Rawa mō Te Wai Āwhā me te Taupā Waipuke

RETICULATION NETWORK
TŪHONONGA KŌRERE WAI

VOLUME TWO | PUKAPUKA TUARUA

Mountain to Sea
Te Kaunihera-ā-Rohe o Ngāmotu
NEW PLYMOUTH DISTRICT COUNCIL
newplymouthnz.com

DOCUMENT CONTROL

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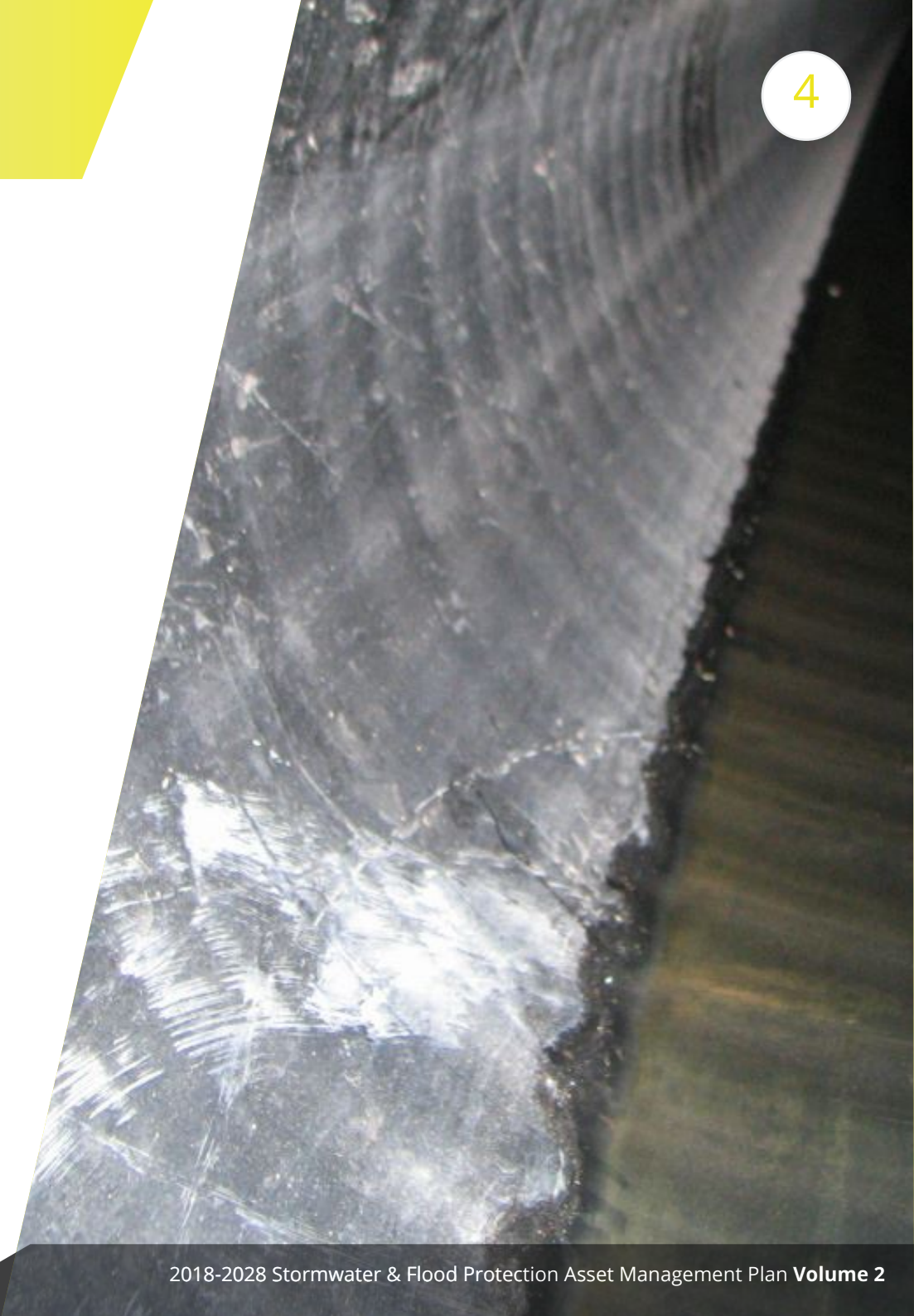


1. INTRODUCTION

This volume provides details of the asset lifecycle management for the **Reticulation Network** asset category of the Stormwater and Flood Protection AMP. The framework and key elements of the overall asset management plan are outlined in Table 1.

Table 1 Asset management document structure

No.	Document Name	Key Document Contents
1	Long Term Plan (LTP)	Infrastructure Strategy • Strategic Framework • Guiding Themes • High Level Information for Each Asset Class Council Services • High Level Information • Levels of Service • Financial Plan
2	Asset Management Strategy	General Asset Management Principles and Overview
3	Asset Class General Volumes	General Information and Glossary about each asset class • Executive Summary • Introduction • Levels of Service • Future Demand • Risk Management Plan • Financial Summary • Plan Improvement and Monitoring
4	Asset Category Lifecycle Management Volumes	Asset Life Cycle Management for each asset category within each asset class • Description • Condition • Remaining Lives • Valuation • Operations & Maintenance • Renewals • Acquisition and Augmentation • Disposals • Annual Work Plan • Risk Management • Financial Summary • Improvement Plan

Purpose and key issues

The purpose of stormwater reticulation assets is to drain stormwater from roads and public property in a manner that minimises the effect on people and property and conveys the stormwater to an acceptable discharge point.

The key issues in relation stormwater reticulation assets are:

- Population growth resulting in greater amount of paved area such as roads resulting in increased run-off and increased risk of flooding.
- Predicted increase in rainfall and high intensity storms as the result of climate change.
- Requirement for stormwater network modelling to better understand stormwater, predict the effects of flooding in the district and improve our understating of stormwater asset performance.

1. INTRODUCTION

Levels of Service

All the levels of service included in Section 3 of the Stormwater and Flood Protection General AMP apply to the reticulation assets included in this volume.

Future Demand

Over the period of this AMP we plan to conduct further studies of potential future growth to ascertain system capacity limits and to produce a Stormwater Master Plan.
Provision for additional capacity in the reticulation system for specific land developments will be developed as part of the planning process.

Note: All financial forecasts are shown in inflation adjusted dollar values.

2. LIFECYCLE MANAGEMENT PLAN

2.1 General

2.1.1 Asset Data

The stormwater network has 284km of reticulation mains made up a variety of materials. The majority, 270km or (95%), are concrete pipes with the remaining 14km (5%) consisting of flexible pipes (PE and uPVC), steel pipes and GEW. The reticulation system also contains manholes and stormwater service connectors.

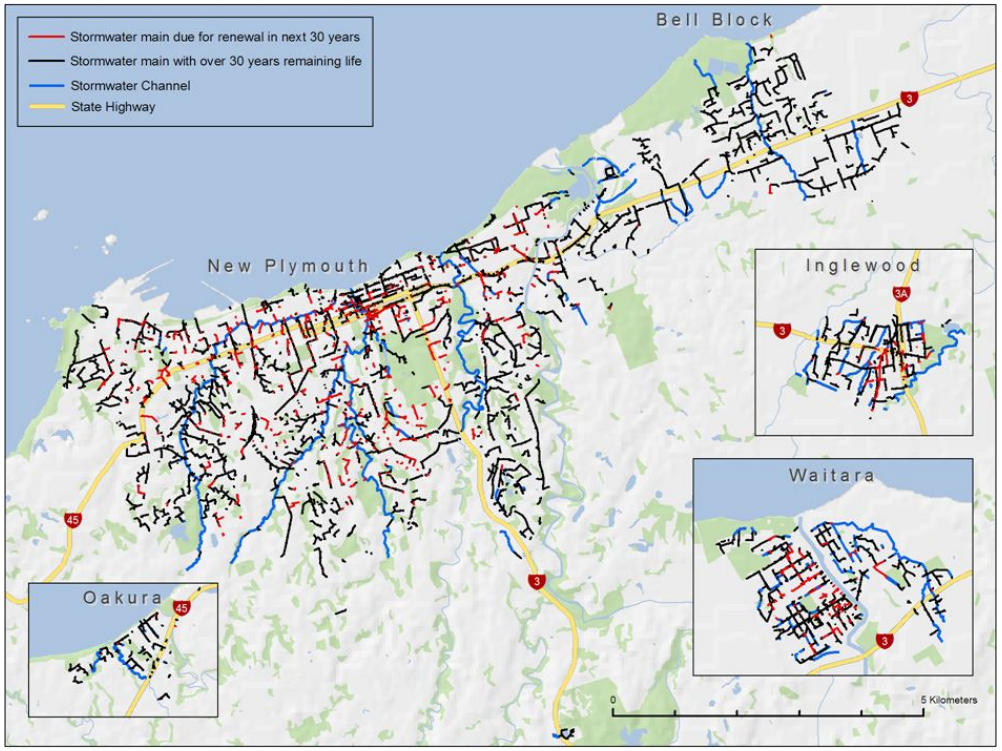
Based on the 30 June 2016 valuation data, the assets are summarised in Table 2.

Table 2 Asset summary

Description	Quantity	Expected Life	Gross Current Replacement Cost ($)	Annual Depreciation ($)	Optimised Depreciated Replacement Cost ($)
Manholes	4,911 No	100	15,499,207	154,992	11,082,122
Reticulation pipe	284 Km	100	197,390,477	2,051,550	131,207,780
Storm Water Laterals	12 Km	100	3,605,338	38,953	2,727,488
Total			216,495,022	2,245,495	145,017,390

The location of the reticulation system in the district is shown in the map in Figure 1.

Figure 1 Location of assets



The accuracy of data presented in this AMP has been assessed and graded in accordance with Section 5 of the Asset Management Strategy.

The data presented in this AMP on the length, diameter, quantity and age of the assets is classed as grade **B – Reliable** due to databases and GIS systems being well maintained and updated.

2.1.2 Asset Capacity/Performance

As new land developments occur, the capacity of the existing reticulation systems will be assessed to ensure additional stormwater generated can be catered for. Renewals are also assessed at the planning stage for potential future capacity requirements.

As already mentioned, we also plan to conduct further studies of potential future growth to ascertain system capacity limits and to produce a Stormwater Master Plan.

2.1.3 Asset Condition

Asset condition grades are given in accordance with Section 5 of the Asset Management Strategy.

We have not yet conducted formal asset condition ratings for stormwater reticulation assets because the assets are buried making condition assessment impossible. All asset conditions are recorded in the asset inventory as 6 - Unknown. **This is an asset data integrity issue and is included as an action in Section 5 –Improvement and Monitoring Plan.**

2.1.4 Asset Remaining Lives

TThe majority of stormwater reticulation assets are constructed from concrete. The expected life of concrete stormwater pipes is 100 years but because they run dry for periods, are not pressurised and have a relatively neutral pH, stormwater pipes remain in relatively good condition and will generally exceed their expected life.
The data in this AMP on the remaining life of assets is classed as grade B – Reliable due to the data being based on sound knowledge, standards and guidelines.

2.1.5 Asset Valuation

The most recent valuation of assets was the statutory valuation dated 30 June 2016. Because we have well maintained and updated databases and GIS systems, updated unit rates, and good knowledge and understanding of estimated remaining asset lives, the accuracy of the valuation data is classed as B – Reliable.

The valuation was independently peer reviewed by Beca and audited externally. A summary of values is shown in Table 2 and individual asset category values in subsequent sections.

2.2 Asset Categories

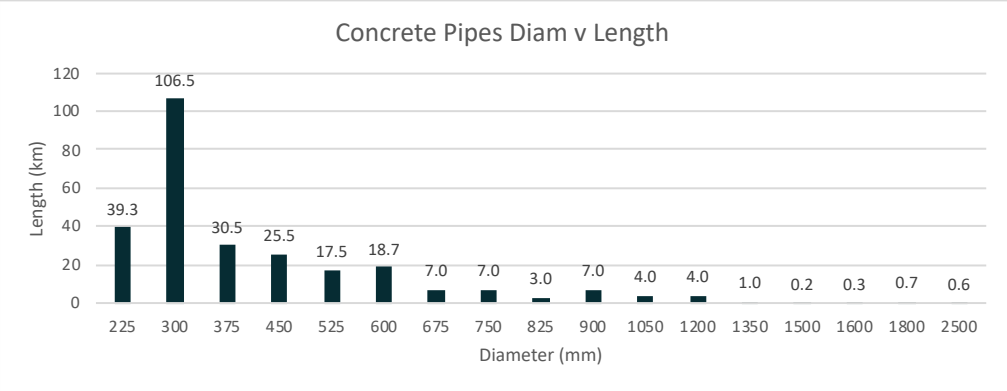
2.2.1 Concrete pipes

Asset data

Concrete piping is one of the earliest forms of conduits used in engineering applications. Installation of concrete stormwater pipes commenced around 1925 and the majority are reinforced and strengthened depending in their use. Concrete stormwater pipes are still being installed in some circumstances.

There are 270km of concrete pipes in the stormwater reticulation network, or approximately 95% of the total length of reticulation mains. The graph in Figure 2 shows the lengths of pipe by diameter.

Figure 2 Concrete pipes diameter v length

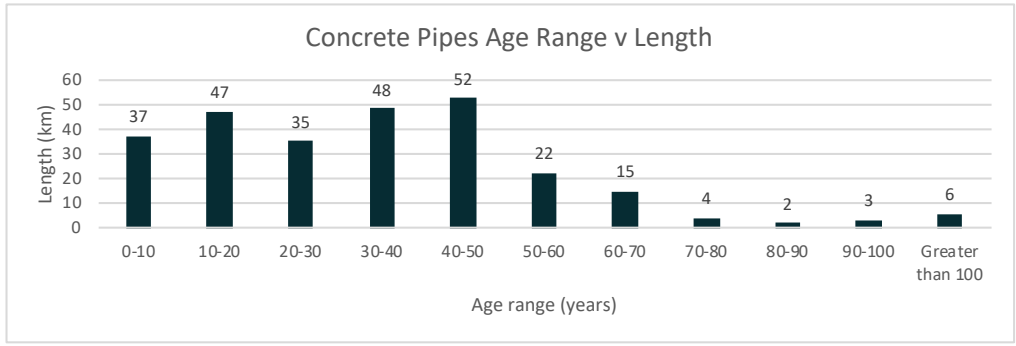


Asset Condition and Remaining Lives

We gather and record data on the condition of concrete pipes by general visual inspection during reactive maintenance. Concrete pipes are performing very well but the main issues encountered are related to capacity, normally when the ARP period exceeds 20 years.

The average age of the concrete pipe assets was 33.5 years at 30 June 2016. The average age of concrete pipe assets at 30 June 2013 was 31.2 years. Figure 3 shows the concrete pipe age range by length.

Figure 3 Concrete pipes age range v length



Asset Valuation

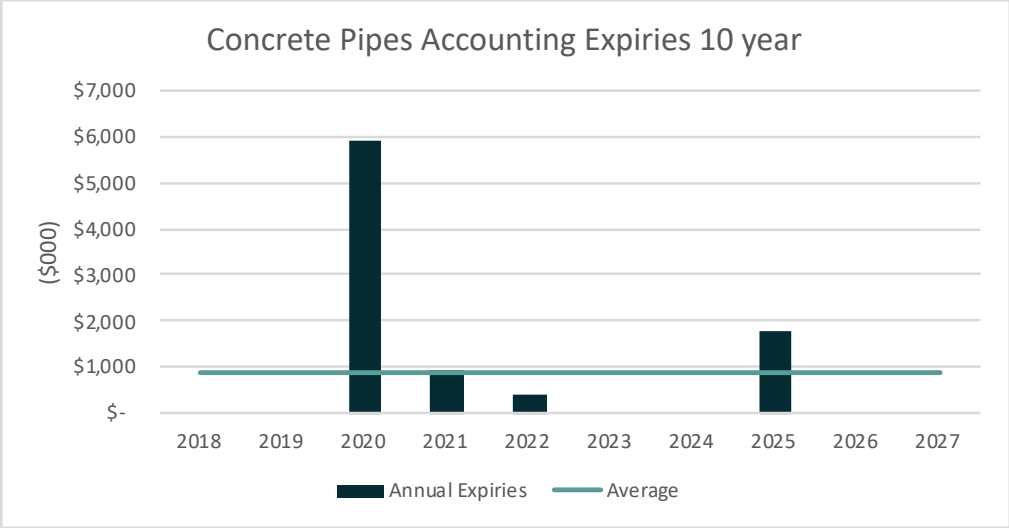
Table 3 Concrete pipes asset valuation

Gross Current Replacement Cost (GCRC) ($)	Annual Depreciation ($)	Optimised Depreciated Replacement Cost ($)
191,000,076	1,966,188	127,650,932

Asset Renewal Plans

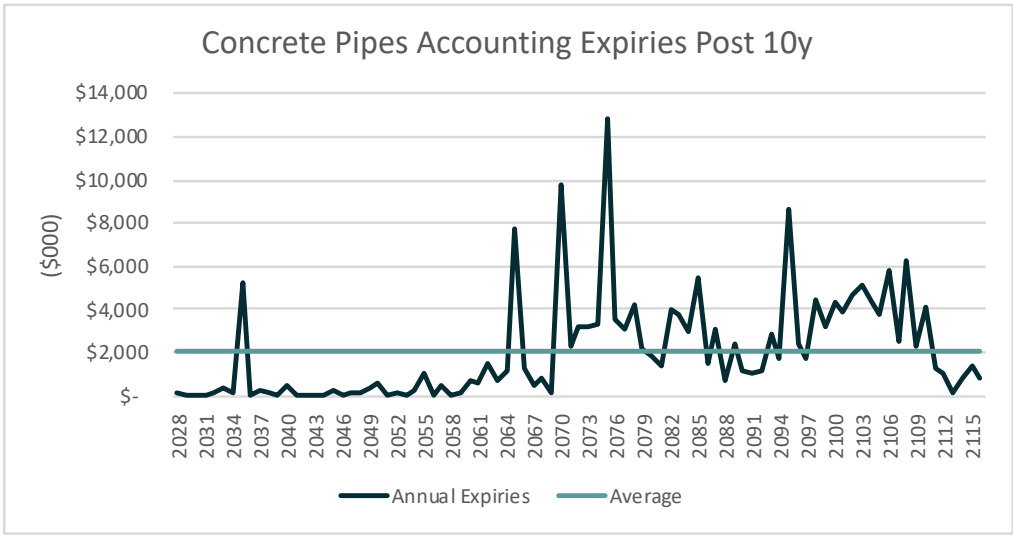
The expenditure profile based on renewing the assets when they reach the end of their expected life is shown in Figure 4. This would require a total expenditure of $9.0m over the next ten years at an average of $900k/year. However, as discussed previously, the nature and condition of concrete stormwater mains means a planned renewal programme based on criticality and condition is not yet required.

Figure 4 Concrete pipes accounting expiries 10Y



As shown in Figure 5, to complete the full renewal of the concrete pipe stock a further $182m of expenditure is forecast beyond 2027/28 through to 2118, at an average of $1.8m per year.

Figure 5 Concrete pipes accounting expiries post 10Y



2.2.2 Other Pipes

Asset Data

The other 11km (5%) of pipes in the stormwater reticulation consist of a range of materials in varying proportions. Figures 6 and 7 show the lengths of pipe by material and length of pipe by diameter.

Figure 6 Other pipes material v length

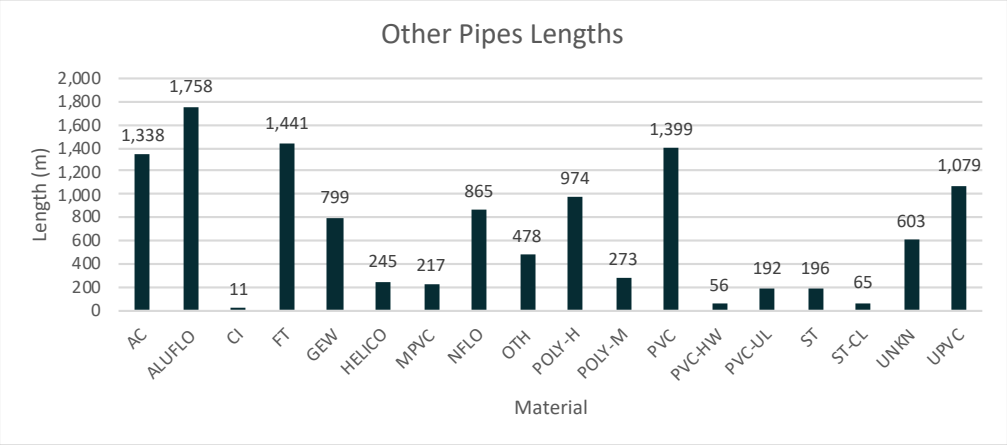
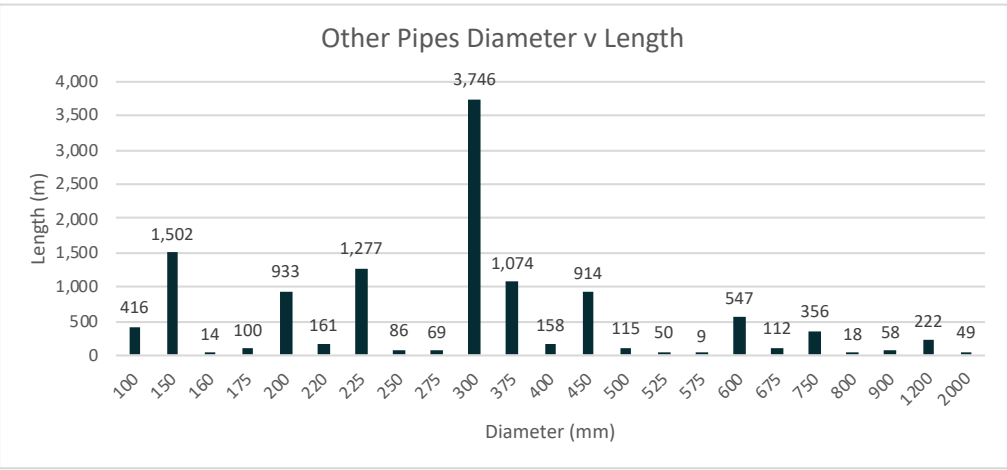


Figure 7 Other pipes diameter v length



Asset Condition and Remaining Lives

The small proportion of pipes constructed in other materials has also found to be in relatively good condition. The expected lives of these materials is similar to pipes in the water supply and wastewater reticulation networks.

Asset Valuation

Table 4 Other pipes asset valuation

Gross Current Replacement Cost (GCRC) ($)	Annual Depreciation ($)	Optimised Depreciated Replacement Cost ($)
6,390,401	85,362	3,556,848

Asset Renewal Plans

The expenditure profile based on renewing the assets when they reach the end of their expected life is shown in Figure 8. This would require a total expenditure of $1.1m over the next ten years at an average of $110k/year. However, the nature and condition of stormwater mains mean a planned renewal programme based on criticality and condition is not yet required.

To complete the full renewal of the steel pipe stock, a further $5.3m of expenditure is forecast beyond 2027 at an average of $50k per year through to 2129. This is shown in Figure 9. Depending on the rate or renewal in the years prior to 2028/29 this may need to be reviewed and modified accordingly.

Figure 8 Other pipes accounting expiries 10Y

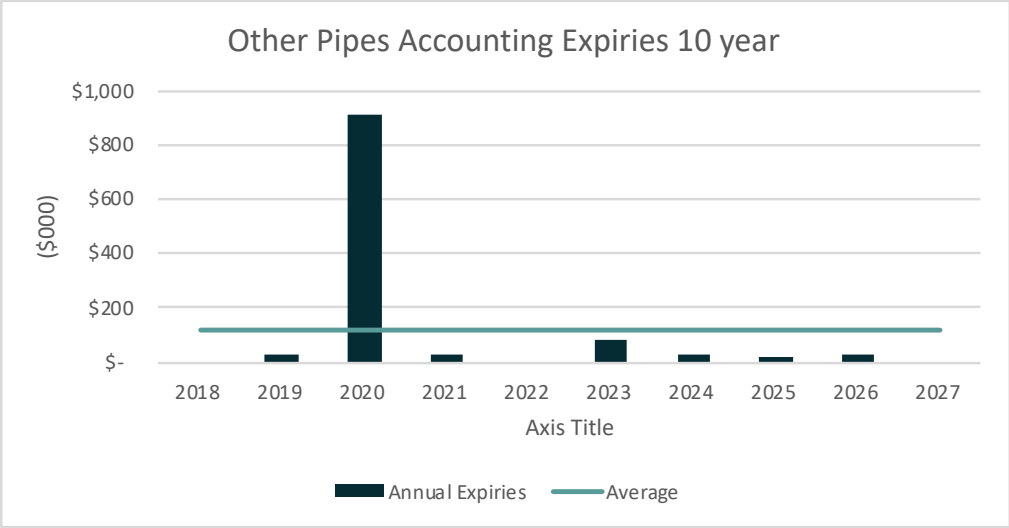
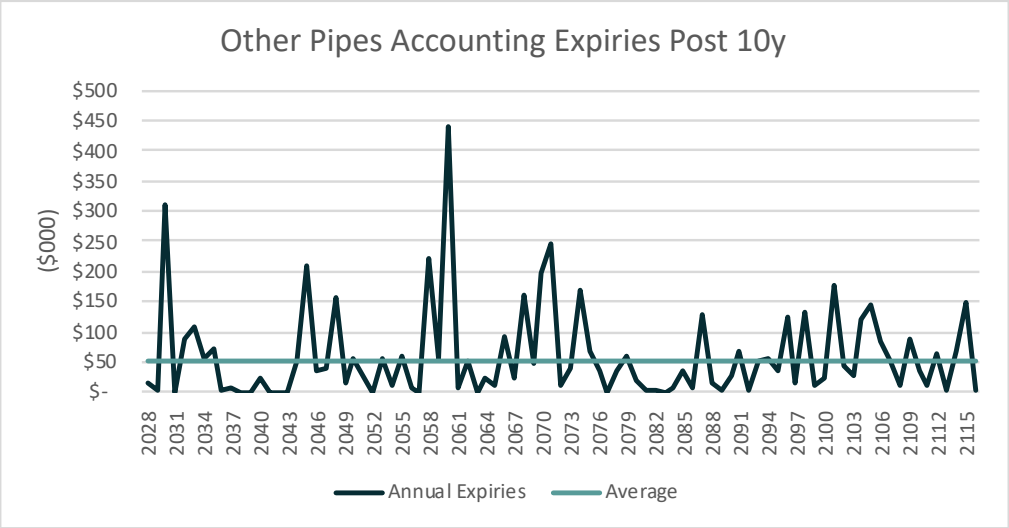


Figure 9 Other pipes accounting expiries post 10Y



2.2.3 Manholes

Asset Data

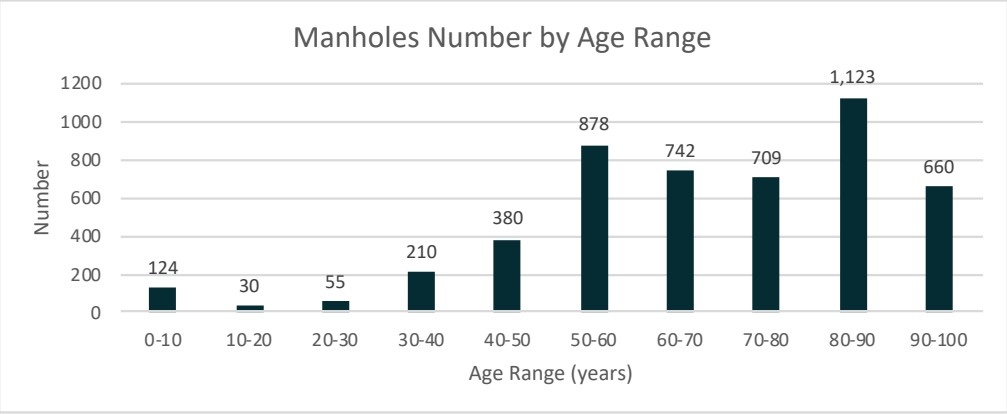
There are 4,911 manholes in the stormwater reticulation system. Manholes are installed in reticulation to change direction in the flow and breach jumps in topography. They are typically installed at 100-110m intervals. They provide access into the pipe work for cleaning and clearing blockages.

Asset Condition and Remaining Lives

Manhole condition is based on annual visual inspections. Manholes are mainly located at the side of roads making their inspection easier. These assets are in generally good condition. Manholes have an expected life of 100 years. The asset ages are shown in Figure 10.

The average age of manhole assets was 31 years as at 30 June 2016. The average age of manhole assets as at 30 June 2013 was 29 years.

Figure 10 Manholes age range v number



Asset Valuation

Table 5 Manholes asset valuation

Gross Current Replacement Cost (GCRC) ($)	Annual Depreciation ($)	Optimised Depreciated Replacement Cost ($)
15,499,207	154,992	11,082,122

Asset Renewal Plans

Figure 11 represents the expenditure profile based on renewing the asset when they reach the end of their expected life. This would require a total expenditure of $300k over the next ten years at an average of $30k/year. Again, the nature and condition of stormwater manholes means a planned renewal programme based on criticality and condition is not yet required.

For 2027 a further $15.2m of expenditure is forecast at an average of $150k per year through to 2129 to complete the full renewal of the manholes in the reticulation network as shown in Figure 12.

Figure 11 Manholes accounting expiries 10Y

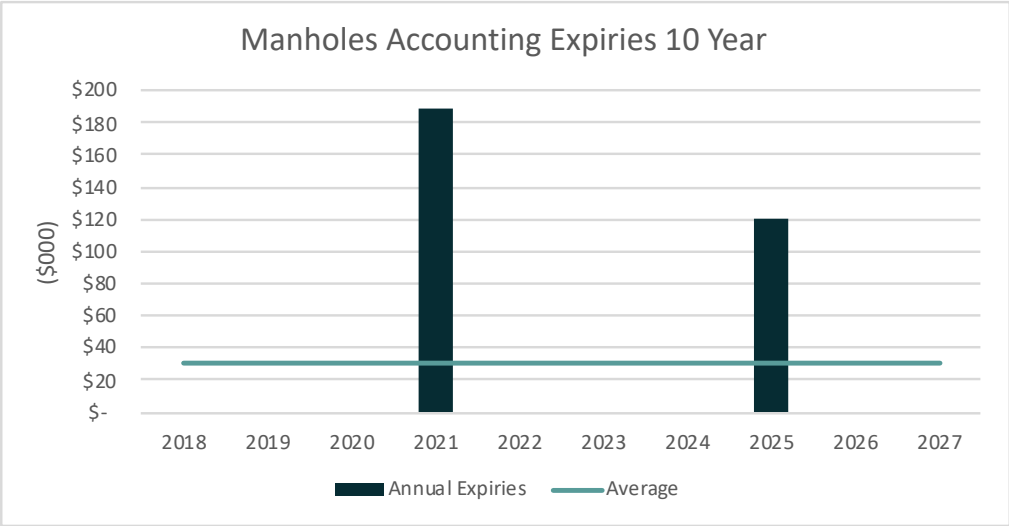
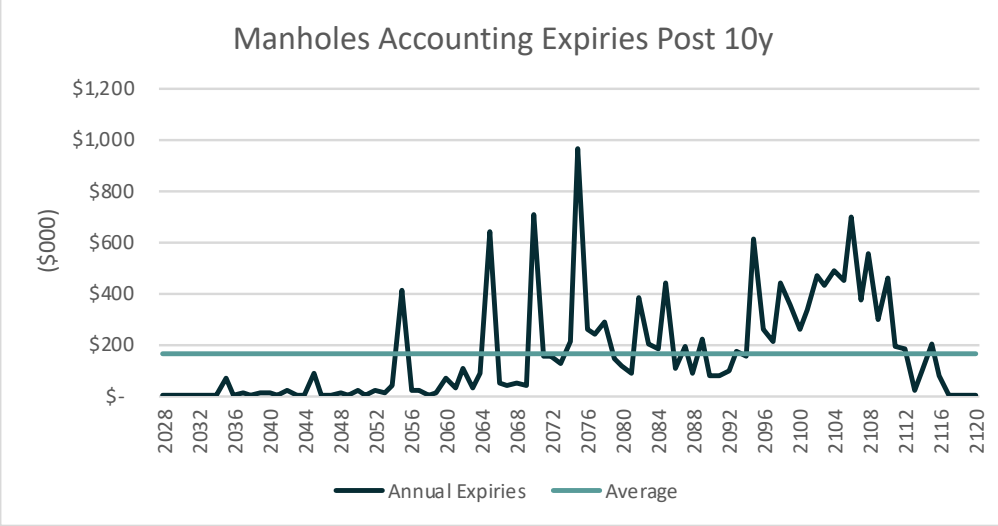


Figure 12 Manholes accounting expiries post 10Y

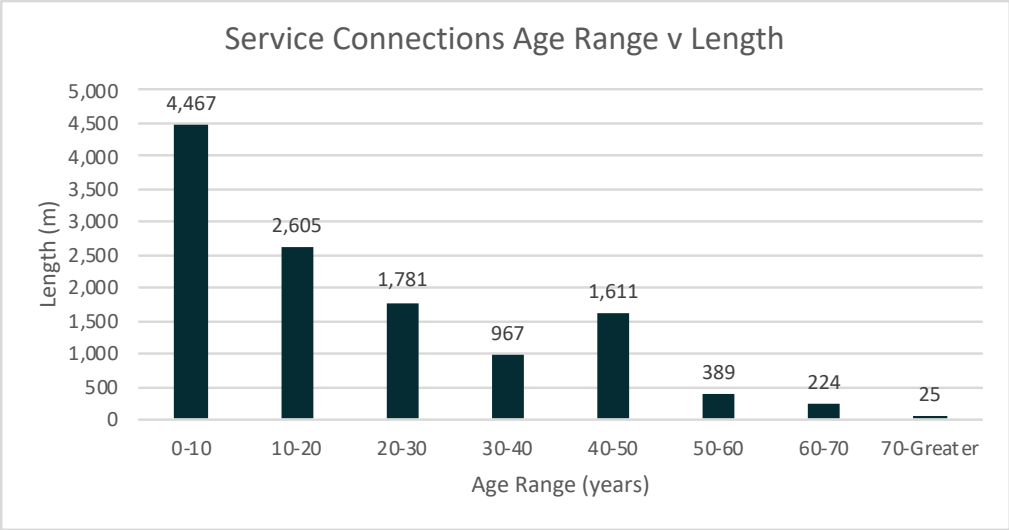


2.2.4 Service Connections Asset Data

There are 12km of stormwater service connections (laterals) in the network, serving domestic, commercial and industrial premises.

Figure 13 shows the length of stormwater service connections by age range.

Figure 13 Service connections age range v length



Asset Condition and Remaining Life

Service connections consist of various materials and are also found to be in relatively good condition. The expected lives of service connectors the same as for similar pipes in the water supply and wastewater reticulation networks.

Asset Valuation

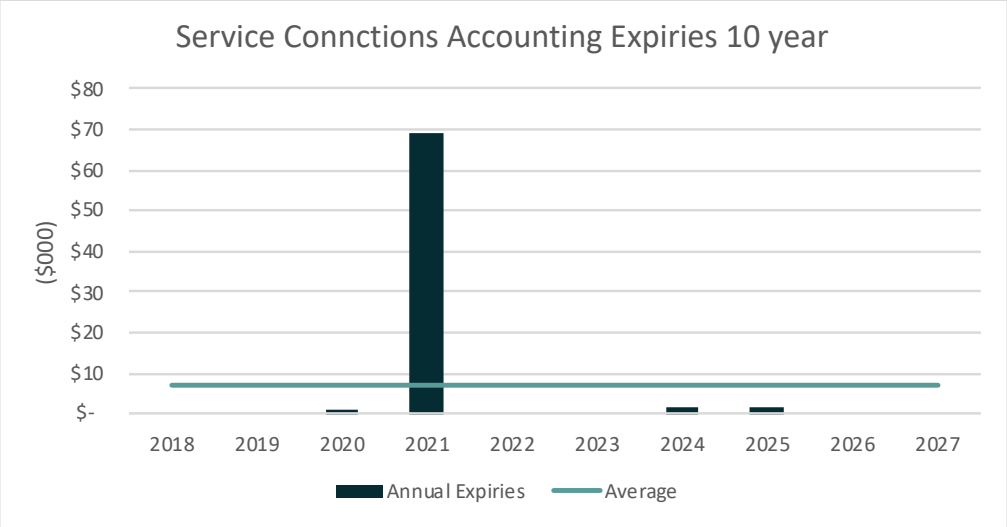
Table 6 Service connections asset valuation

Gross Current Replacement Cost (GCRC) ($)	Annual Depreciation ($)	Optimised Depreciated Replacement Cost ($)
3,605,338	38,953	2,727,488

Asset Renewal Plans

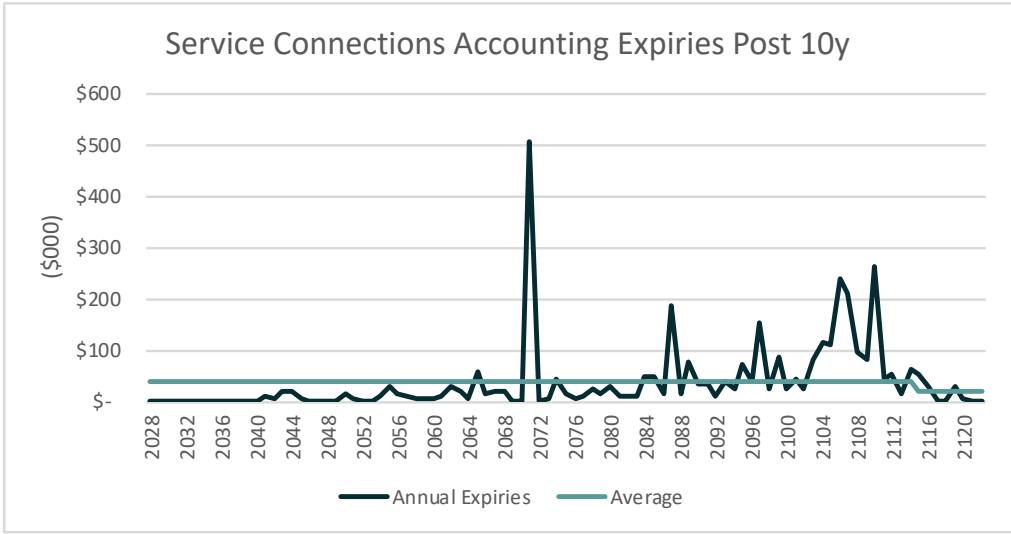
The expenditure profile based on renewing the assets when they reach the end of their expected life is shown in Figure 14. This would require a total expenditure of $70k over the next ten years at an average of $7k/year. We propose that expenditure will correspond with this profile to ensure customer supplies are maintained. This will be reviewed annually to ensure the rate of renewal matches expectations for levels of service and risk.

Figure 14 Service connections accounting expiries 10Y



To complete the full renewal of the service connection stock, a further $3.3m of expenditure is forecast beyond 2027 through to 2122, at an average of $30k per year. This is shown in Figure 15.

Figure 15 Service connections accounting expiries post 10Y



2. LIFECYCLE MANAGEMENT PLAN

2.3 Operations and Maintenance

2.3.1 Operations

Typical reticulation system operations activities include:

- Response to customer service requests.
- Flood monitoring and response.

2.3.2 Maintenance Plan

Our general approach and strategy to asset maintenance is outlined in our Asset Management Strategy.

No regular preventative and predictive (proactive) maintenance activities on pipes, connections or manholes is currently being conducted as it is not considered a requirement. Some of the more critical assets e.g. Colson Road Culvert are inspected evert 12 months.

Corrective (reactive) maintenance activities include the following.

- Investigating and repairing blockages
- Reacting to flood situations
- Repairing general damage to manhole lids etc.

2.3.3 Critical Spares

We have identified and procured critical spares for the sewer reticulation network. The majority of spares are held by contractors and used for day-to-day repairs of the reticulation system.

2.3.4 Opex Forecast

The general 10-year Opex forecast for stormwater assets is included in the Stormwater General Volume. It includes the Opex forecast for the maintenance and operation of reticulation assets.

2.4 Renewals Plan

The majority of stormwater reticulation asset renewal occurs when assets are upgraded to maintain levels of service. Renewal is generally related to capacity rather than material condition issues. Therefore, the renewal expenditure forecast for stormwater reticulation assets is based on the known and predicted locations that will require augmentation, and on renewal of existing assets as part of upgrades.

In these instances, the expenditure required is classed as renewal expenditure even though a proportion of the costs could be attributed to growth or levels of service. Each location with known asset performance issues is recorded on a register, monitored and prioritised to determine asset renewal plans each year.

Based on historical activity, we have made an annual allowance for minor stormwater renewals, as shown in Table 7.

Table 7 Renewals expenditure forecast

Stormwater Reticulation Renewals Expenditure Forecast ($000)											
Activity	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26	26/27	27/28	LTP Total
ST1032 - Minor Stormwater Renewals and Augmentations Projects	201	207	210	215	220	224	230	236	242	248	2,233
Total	201	207	210	215	220	224	230	236	242	248	2,233

2.5 Acquisition and Augmentation Plan

Acquisition

We encourage stormwater management systems on new sub-divisions to be hydraulically neutral and check designs submitted by developers for suitability. In cases where hydraulic neutrality is not possible, we will consider alternative arrangements e.g. installation of new reticulation systems.

New assets installed by developers to serve new domestic and non-domestic developments are usually vested to us. Assets are built to the NZS4404: 2010 – Land Development and Subdivision Standard. Our specific requirements are defined in the New Plymouth District Council (NPDC) and South Taranaki District Council (STDC) adopted standard for Land Development and Subdivision Infrastructure, which is based on NZS 4404:2010 with local amendments. We assume full responsibility for any assets vested in us, and include them into our operations, maintenance and future renewal plans.

Levels of Service

We plan to complete a number of stormwater system upgrades over the period of the plan. These include:

- ST2001 – Waitara Stormwater Upgrade – The general performance of the existing stormwater system is inadaquate and extensive works are required to meet current level of service and also provide provision for future growth.

  ST2006 – Govett Avenue Stormwater Upgrades - The residential property situated at 10 Govett Avenue regularly gets flooded with stormwater coming off Frankley Road. In a big rain event the channel on the eastern side of Frankley Road does not have sufficient capacity and the water jumps the kerb and flows down the bank into the property and floods a habitable floor. Our maintenance contractor clean the channel on a monthly basis, but this does not prevent this flooding from occurring. There is no stormwater system in this section of Frankly Rd.

- ST2008 – South Road Stormwater Upgrades - The section of road opposite 92 South Road regularly gets flooded in big rain events because the stormwater system in the road does not have sufficient capacity. This poses a problem for vehicles that need to use the road during these rain events. Flooding of properties is also taking place in these events when water from the road runs down the driveways. Two super sumps have been installed to alleviate the problem, but the pipes draining the sumps are too small.
- ST 2009 – Doralto Road Stormwater Upgrades - The residential property situated at 48 Doralto Road regularly gets flooded with stormwater coming off the road. In a big rain event the stormwater system in the road does not have sufficient capacity and the water flows down the driveway into the property and floods a garage floor. A super sump has been installed to alleviate the problem, but the pipe draining the sump is too small.

- ST2010 – Devon Street West Stormwater Upgrades - The residential property situated at 330 Devon Street West regularly gets flooded with stormwater coming off the road. In a big rain event the stormwater sumps in the road does not have sufficient capacity and the water flows down the driveway into the property and floods a habitable floor.

The expenditure summary for these projects is summarised in Table 8.

Table 8 Levels of service expenditure forecast

Stormwater Reticualtion Level of Service Expenditure Forecast ($000)											
Activity	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26	26/27	27/28	LTP Total
ST2001 - Waitara Stormwater Upgrades	-	515	1,052	2,150	2,197	2,248	920	-	-	-	9,082
ST2006 - Govett Ave Stormwater Upgrade	-	-	-	166	-	-	-	-	-	-	166
ST2008 - South Road Stormwater Upgrade	-	-	-	92	-	-	-	-	-	-	92
ST2009 - Doralto Road Stormwater Upgrade	-	-	-	82	-	-	-	-	-	-	82
ST2010 - Devon Street West Stormwater Upgrade	-	-	-	85	-	-	-	-	-	-	85
Total	-	515	1,052	2,575	2,197	2,248	920	-	-	-	9,507

General level of service projects that contain reticulation network components are included in Section 3 of the Stormwater and Flood Protection General Volume.

Growth

ST2002 - Mangatoku Stormwater Upgrades - To meet our established levels service, a number of flooding issues in the Mangaotuku Catchment require resolution. Growth/ densification in the area has become a significant factor and these assets also need to be upgraded to provide provision for the anticipated growth.

Table 9 Growth expenditure forecast

Stormwater Reticulation Growth Expenditure Forecast ($000)											
Activity	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26	26/27	27/28	LTP Total
ST2002 - Mangatoku Stormwater Upgrades	-	-	3,576	-	-	-	-	-	-	-	3,576
Total	-	-	3,576	-	-	-	-	-	-	-	3,576

General growth projects that will contain reticulation network components are included in Section 4 of the Stormwater and Flood Protection General Volume.

2. LIFECYCLE MANAGEMENT PLAN

2.6 Disposal Plan

Disposal is the retirement or sale of assets when they become surplus or superseded by new or improved systems. Assets may become surplus to requirements for any of the following reasons:

- Under-utilisation
- Obsolescence
- Provision exceeds required level of service
- Replacement before end of predicted economic life
- Uneconomic to upgrade or operate
- Policy changes
- Service provided by other means (e.g. private sector involvement)
- Potential risk of ownership (financial, environmental, legal, social)

No asset disposals are planned over the 10 year AMP period.

2.7 Annual Work Plans

Detailed work plans included in Annual Plans will be based on the asset renewal forecasts included in section 2.4 and the augmentation projects identified in section 2.5.

3. RISK MANAGEMENT PLAN

3.1 Critical Assets

We assess the criticality of stormwater reticulation mains using the process and scoring system contained in ECM#988741 - Water, Wastewater and Stormwater Mains Criticality and Renewals Prioritisation Process. Primarily used to select mains for renewal purposes, critically ratings are based a number of factors including:

- Diameter i.e. number of customers supplied
- Location e.g. proximity to hospital
- Depth
- Material
- Age
- Condition
- Repair and maintenance history

We record asset criticality ratings in the Enterprise Asset Management system (Technology 1).

3.2 Risk Assessment

Details of our Risk Management Framework are included in section 6.2 of the Stormwater and Flood Protection General AMP volume and section 7 of the Asset Management Strategy.

3.3 Infrastructure Resilience Approach

During the development of the Stormwater Master Plan, we will investigate and assess opportunities to enhance asset resilience and will include investment where appropriate.

4. FINANCIAL SUMMARY

A summary of the Capex forecast included in this volume is shown in Table 10.

Table 10 Capex forecast summary

Stormwater Reticulation Expenditure Forecast ($000)											
Activity	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26	26/27	27/28	LTP Total
Renewals	201	207	210	215	220	224	230	236	242	248	2,233
Service Level	-	515	1,052	2,575	2,197	2,248	920	-	-	-	9,507
Growth	-	-	3,576	-	-	-	-	-	-	-	3,576
Total	201	722	4,838	2,790	2,417	2,472	1,150	236	242	248	15,316

The Opex forecast for operations and maintenance is included in the overall Opex forecast for Stormwater and Flood Protection and Control detailed in the LTP. It is also included in the Stormwater and Flood Protection General Volume.

5. IMPROVEMNT AND MONITORING PLAN

Our general Asset Management Maturity Improvement Plan is included in the Asset Management Strategy.

General improvements to stormwater assets are included in the Stormwater and Flood Protection General Volume.

The specific areas of improvement identified for treatment plant assets are listed in Table 11.

Table 11 Improvements summary

No	Improvement Area	Owner	Start Date	End Date
1	Conduct asset condition assessment and record results in EAM	Asset Operations Planning Lead	Jul 2019	Jun 2020

2018-2028 STORMWATER AND FLOOD PROTECTION ASSET MANAGEMENT PLAN

He Rautaki Whakahaere Rawa mō Te Wai Āwhā me te Taupā Waipuke

RETICULATION NETWORK

TŪHONONGA KŌRERE WAI

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