

2018-2028 WATER SUPPLY ASSET MANAGEMENT PLAN  
*He Rautaki Whakahaere Rawa mō Te Wai Whakarato*

# STORAGE

## NGĀ PUTUNGA

VOLUME FIVE | PUKAPUKA TUARIMA



Mountain to Sea  
Te Kaunihera-ā-Rohe o Ngāmotu  
**NEW PLYMOUTH DISTRICT COUNCIL**  
[newplymouthnz.com](http://newplymouthnz.com)

# DOCUMENT CONTROL

Document Name	2018-2028 Water Supply Asset Management Plan Volume 5 - Storage
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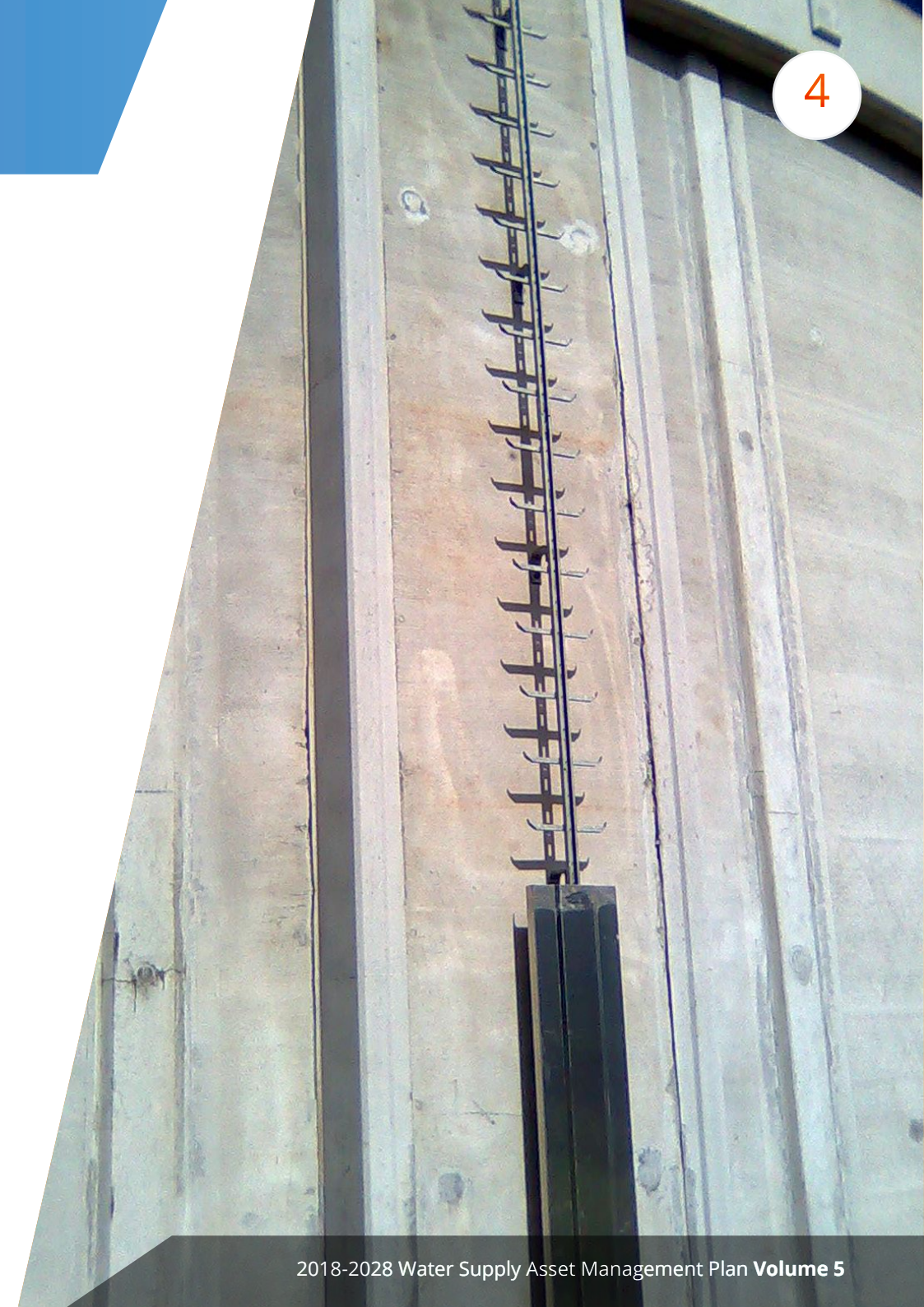
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This volume provides details of the asset lifecycle management for the **Storage** asset category of the Water Supply AMP. The framework and key elements of the overall asset management plan are outlined in the table below.

**Table 1 Asset management document structure**

No.	Document Name	Key Document Contents
1	Long Term Plan (LTP)	Infrastructure Strategy <ul style="list-style-type: none"> <li>• Strategic Framework</li> <li>• Guiding Themes</li> <li>• High Level Information for Each Asset Class</li> </ul> Council Services <ul style="list-style-type: none"> <li>• High Level Information</li> <li>• Levels of Service</li> <li>• Financial Plan</li> </ul>
2	Asset Management Strategy	General Asset Management Principles and Overview
3	Asset Class General Volumes	General Information and Glossary about each asset class <ul style="list-style-type: none"> <li>• Executive Summary</li> <li>• Introduction</li> <li>• Levels of Service</li> <li>• Future Demand</li> <li>• Risk Management Plan</li> <li>• Financial Summary</li> <li>• Plan Improvement and Monitoring</li> </ul>

4	Asset Category Lifecycle Management Volumes	Asset Life Cycle Management for each asset category within each asset class <ul style="list-style-type: none"> <li>• Description</li> <li>• Condition</li> <li>• Remaining Lives</li> <li>• Valuation</li> <li>• Operations &amp; Maintenance</li> <li>• Renewals</li> <li>• Acquisition and Augmentation</li> <li>• Disposals</li> <li>• Annual Work Plan</li> <li>• Risk Management</li> <li>• Financial Summary</li> <li>• Improvement Plan</li> </ul>
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### Purpose and key issues

The purpose of water storage assets is to provide storage for treated water prior to use and consumption by residential, business and industrial customers. At the water treatment plant sites, storing treated water also allows sufficient contact time for chlorine disinfection prior to use or consumption by customers.

The key issues related to storage are:

- Provision of sufficient capacity to meet peak demands.
- Achieving sufficient water circulation and turnover so that treated water quality does not deteriorate.
- Access, security and emergency storage, particularly after earthquakes and for firefighting supply.
- Accurate measurement of flow and levels to facilitate reliable water use management.



# 1. INTRODUCTION

## Levels of Service

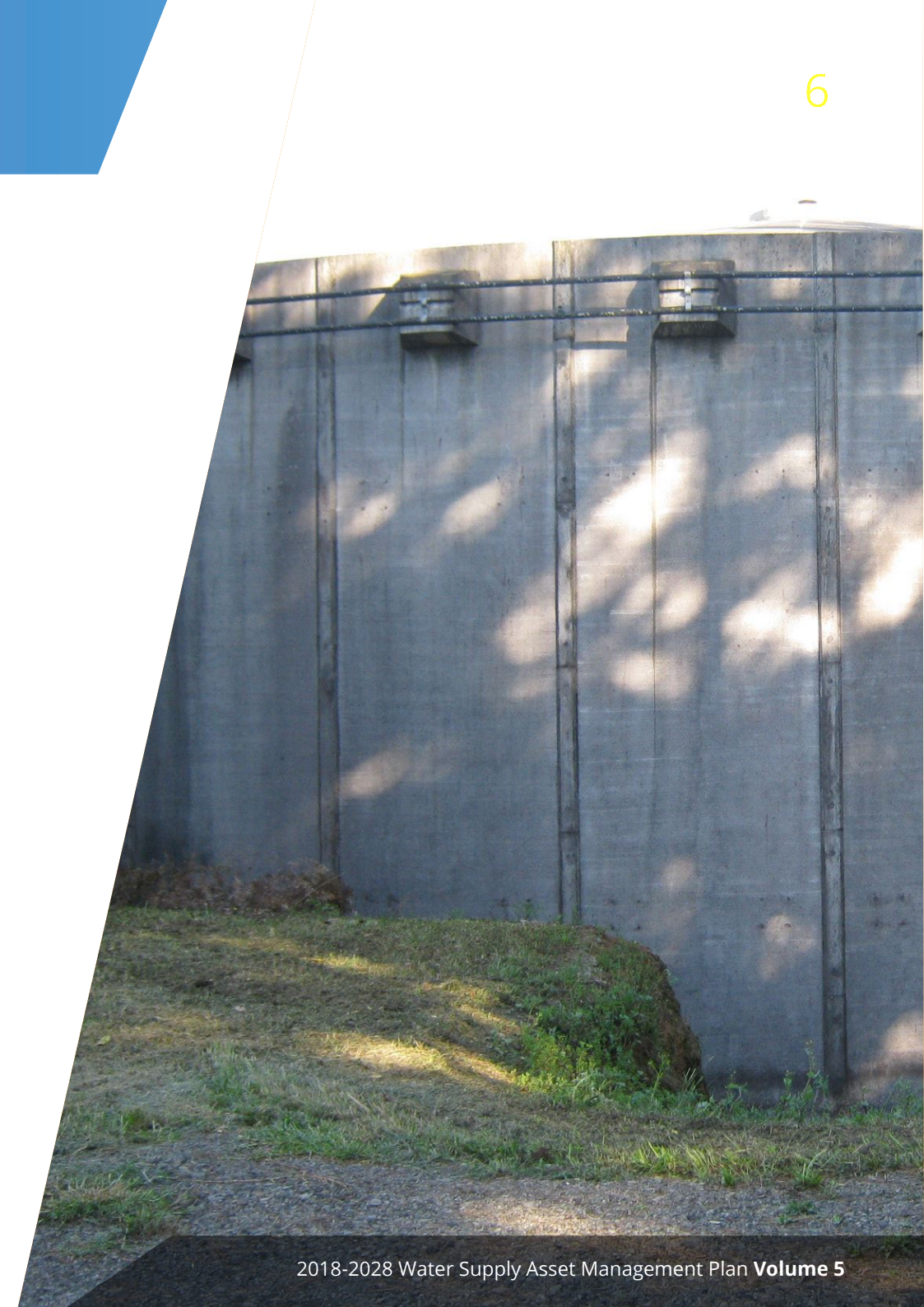
Storage facilities are required to deliver and maintain some of the customer and technical levels of service defined in section 3.1 of the General Water Supply AMP:

- Customers are satisfied with our water supply service - the total number of complaints (per 1,000 connections) received about any of the following:
  - drinking water clarity, taste, or odour;
  - drinking water pressure or flow;
  - continuity of supply; and
  - our response to any of these issues.
- The New Zealand Fire Service (NZFS) Water Supplies Code of Practice SNZ PAS 4509:2008 governs the minimum required flows and pressures for firefighting. In accordance with these standards, NPDC's targeted level of service is fire water classification FW3. However this is to be reviewed collaboratively with the Fire Service to ensure practical and suitable levels of service are provided across different areas.
- The maximum desirable working pressure for water supply is 900 kPa. This is being progressively achieved as pressure zone and demand management procedures are implemented. Some zones at higher elevations (typically on the outskirts of the city) will have pressure sustaining valves to ensure minimum pressures stay above the minimum level of service wherever possible (300 kPa for urban properties and 200 kPa for rural properties). ). Pressure reducing valves are also used to drop pressure in high pressure zones.

## Future Demand

Future demand forecasts have identified significant issues with the capacity of our water treatment plants to meet increased demand. As outlined in the Section 4 of the Water Supply General AMP, the Water Master Plan addresses the options to cater for increased future demand on the water supply system. Any items from the Water Master Plan involving augmentation of storage facilities are included in Section 2.7 of this volume.

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



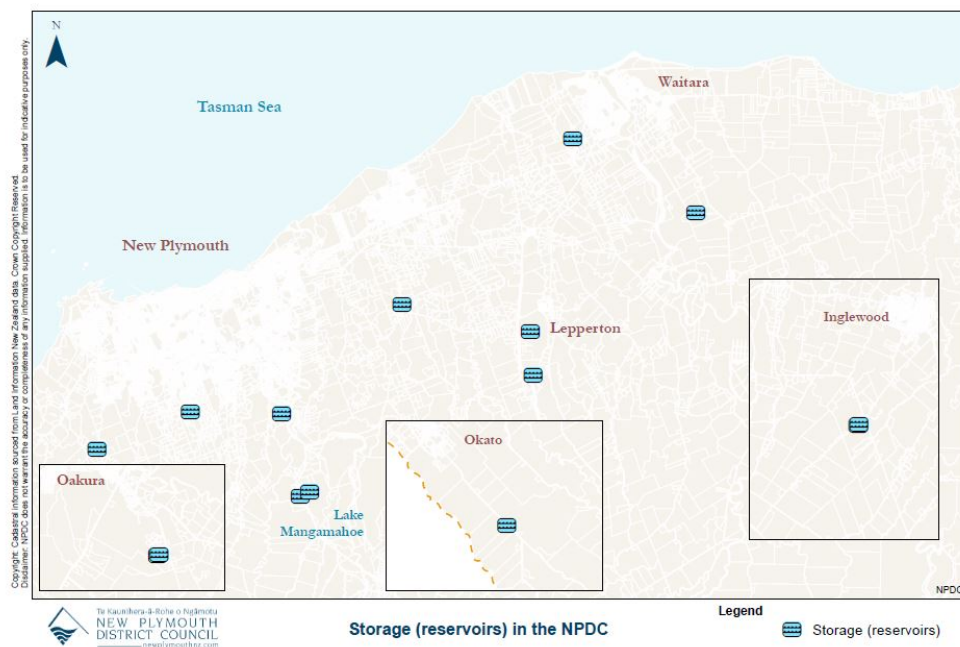
# 2. LIFECYCLE MANAGEMENT PLAN

## 2.1 Asset Description

We have 17 enclosed treated water storage reservoirs with the associated plant, equipment, valves and piping, as shown in Figure 1 and Table 2.

Twelve of our reservoirs are supplied by the New Plymouth WTP, two by the Inglewood WTP, two by the Oakura WTP and one by the Okato WTP.

**Figure 1 Location of reservoir facilities**



**Table 2 Reservoir schedule**

Treated Water Storage - Reservoir Capacity		
Reservoir	Capacity (m <sup>3</sup> )	Constructed
NPWTP #1	4,500	1972
NPWTP #2	4,500	2002
Mangorei #1	4,500	1966
Mangorei #2	4,500	1972
Mangorei #3	4,500	2003
Veale Road	9,000	1981
Henwood Road	4,500	1985
Mountain Road	4,500	1989
Barrett Road	4,500	2010
Faull Road	4,500	2001
Urenui (twin cell)	1,250	2002
Urenui Domain	320	1990
<b>NPWTP Storage Total</b>	<b>51,070</b>	
Inglewood #1	4,500	2000
Inglewood #2	3,800	2000
<b>Inglewood WTP Storage Total</b>	<b>8,300</b>	
Oakura WTP #1	1,250	1980
Oakura WTP #2	1,250	2002
<b>Oakura WTP Storage Total</b>	<b>2,500</b>	
Okato WTP (twin cell)	1,250	2002
<b>Okato WTP Supplied Total</b>	<b>1,250</b>	
<b>TOTAL STORAGE</b>	<b>63,120</b>	

# 2. LIFECYCLE MANAGEMENT PLAN

In addition, as part of the Waitara raw water supply system we have two open raw water storage reservoirs with a total capacity of 80,000m<sup>3</sup>. Situated at Mountain Road, Lepperton and Johnson Street, Waitara these reservoirs are not currently in use. We are in ongoing discussions with ANZCO regarding ownership and maintenance responsibilities.

Any reservoirs constructed since 2000 meet the seismic design standards of the time. In recent years, we have conducted a programme to improve levels of seismic resistance for reservoirs constructed prior to 2000. Oakura No.1 is the only reservoir still requiring seismic resistance upgrade and this is planned for 2019/20. Details of this expenditure are included in Section 2.7.

Reservoir outlet pipes (with the exceptions of Henwood Road, Mountain Road and Oakura #1 reservoirs) are now arranged so that in the event of outlet pipe rupture, the reservoir will retain 15% of its contents. Further draw below the 15% mark requires operation of a separate valve and is designed for emergency provisioning and rationed distribution only. 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 quantity, location, capacity and age of the assets is classed as grade A – Highly Reliable. This is because we have maintained accurate and up to date details of storage assets for operational purposes.

## 2.2 Asset Condition

Asset condition grades are given in accordance with yet been recorded and all asset conditions are recorded in the asset inventory as **6 - Unknown**. Therefore, the data accuracy for asset condition is classed as grade **E – Unknown. This is a data integrity issue and is recorded as an action in Section 5 – Improvement and Monitoring Plan.**

## 2.3 Asset Remaining Lives

All water reservoirs are constructed of concrete, with an assumed expected life of 80-100 years. The associated plant and equipment has a variety of shorter assumed expected lives.

Expected lives for water treatment plants were provided by Beca as part of the plant and equipment valuation and have been recorded in EAM. Therefore the data accuracy for asset remaining lives is classed as grade B – Reliable.

## 2.4 Asset Valuation

As at 30 June 2016, the value of all water storage assets is shown in Table 3.

**Table 3 Asset valuation**

Gross Current Replacement Cost (GCRC) (\$)	Annual Depreciation (\$)	Optimised Depreciated Replacement Cost (ODRC) (\$)
30,995,792	576,919	20,598,800

A detailed valuation of each asset component was provided by Beca as part of the general plant and equipment valuation during the 2016 statutory valuation. Therefore, in conjunction with a well maintained and updated asset inventory, the data is classed as B – Reliable.

## 2.5 Operations and Maintenance

### 2.5.1 Operations

Operations for water storage assets consist of general site attendance to conduct routine weekly visual checks/inspections.

### 2.5.2 Maintenance Plan

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

In terms of water storage each reservoir should be drained down (scoured), cleaned and inspected (internally and externally) at least once every five years. However, we are currently behind schedule with this work and plan to correct this over the period of the current LTP. We also refurbish the altitude valves during these 5-yearly inspections and repair any identified leaks.



# 2. LIFECYCLE MANAGEMENT PLAN

We do conduct annual inspections of the plant and equipment and the external structure (including the roof). We are required to use edge fall protection when working at heights. This protection has not yet been installed and may cause delays in scheduled roof inspections. Inspections using drones is now being deployed to avoid this issue.

Recent inspections have identified exposed rebar at the Veale Road reservoir. This will now require remedial works.

Other typical maintenance activities include fault investigation/remediation and SCADA maintenance.

### 2.5.3 Critical Spares

We have not yet conducted assessment of the critical spares required for water storage assets. **This is an asset integrity issue and is recorded as an action in Section 5 – Improvement and Monitoring Plan.**

### 2.5.4 Opex Forecast

The general 10-year Opex forecast for water supply assets is included in the Water Supply General Volume. It includes the Opex forecast for the maintenance and operation of water storage assets.

## 2.6 Renewals Plan

Our general approach to asset renewal is included in the Asset Management Strategy.

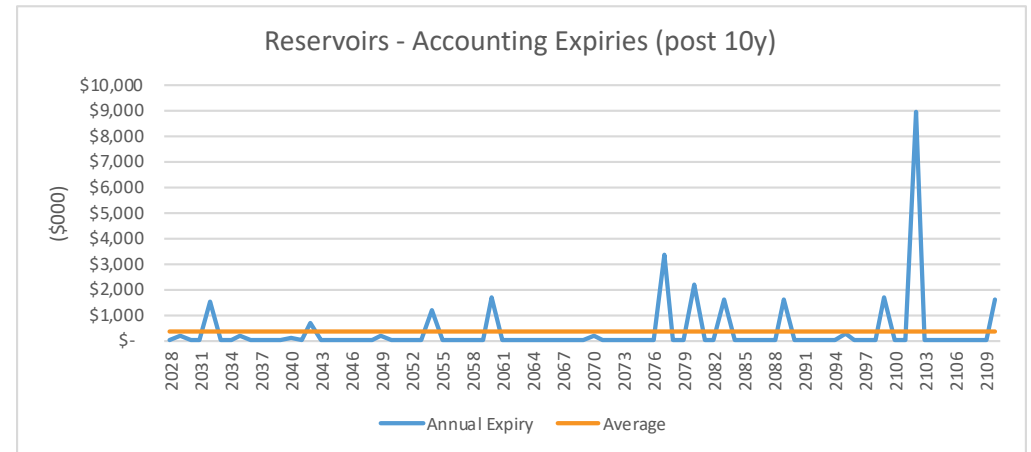
Our concrete water storage containment tanks have a life expectancy of 80-100 years. Given all assets are under 52 years old, there are no renewals required during the 10-year forecast period or for the years beyond 27/28.

As storage plant and equipment assets continue to age, we will require investment in renewals to maintain current levels of reliability. However, no specific renewal projects for water storage assets are planned over the period of the AMP. The general provision for plant and equipment renewals included in Volume 2 – Treatment Plants is sufficient to cover any planned or unplanned renewals that may occur.

Prior to confirming expenditure on renewal projects, we will undertake condition and criticality assessments and review the remaining life of the assets to ensure we achieve optimum value from the assets.

The accounting expiries for the years beyond 27/28 are shown in Figure 2. This shows that the major expenditure for renewing the concrete structures does not occur until 2078 with other structures being required in individual prior years.

Figure 2 Accounting expiries post 10Y



## 2.7 Acquisition and Augmentation

### Acquisition

There are no acquisitions of water storage assets planned over the next 10 years.

### Growth

The Water Master Plan identifies the new water storage assets that will be required to meet future predicted demand. The assets required are summarised in Section 4 of the Water Supply General AMP.

Even with successful demand management to reduce individual usage per person per day, as future population growth is realised, the district's total water demand will continue to grow.

Demand at the Mountain Road Reservoir is increasing, partly because of increased oil and gas exploration to the north. Under current demand, the existing storage provides less than one day of storage capacity, which means it and would struggle to meet firefighting requirements. A second reservoir is required to meet capacity and \$3,935k has been allocated for this project in 2018/19.

The Henwood Road Reservoir (feeding Bell Block and associated identified growth areas) currently operates at 90% of Average Day Demand (ADD). We require increased storage capacity to accommodate current demand, as well as future growth. A project to construct an additional reservoir at the existing site is planned for 2019/20 at an estimated cost of \$3,499k (including land acquisition). A summary of the forecast expenditure for growth projects is shown in Table 4.

**Table 4 Growth expenditure forecast**

Water Storage 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
WA1040 - Mountain Rd & Henwood Rd Reservoirs	3,935	3,499	-	-	-	-	-	-	-	-	7,434
<b>Total</b>	<b>3,935</b>	<b>3,499</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>7,434</b>

The Water Master Plan includes options and cost estimates for growth projects beyond the period of the AMP.

# 2. LIFECYCLE MANAGEMENT PLAN

## Levels of Service

As described in section 2.1, the Oakura No.1 reservoir requires a seismic resistance upgrade, which is planned for 2020/21 at an estimated cost of \$189k.

With the exception of Oakura No.1, Henwood Road and Mountain Road reservoirs all of our drinking water storage reservoirs have either been built or internally modified to retain 15 % of the stored water in the event of a major mains rupture and/or sudden loss of water storage. The Oakura No.1 reservoir requires upgrading to meet this standard / strategy. This project has been allocated \$21k and is planned for 2020/21, to coincide with the seismic strengthening project. A review of the works required at Henwood Road and Mountain Road reservoirs will be conducted and completed as part of the growth project WA1040 described above. A summary of the forecast expenditure for level of service projects is shown in Table 5.

**Table 5 Level of service expenditure forecast**

Water Storage 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
WA1013 - Oakura Reservoir Seismic Strengthening	-	-	189	-	-	-	-	-	-	-	189
WA1079 - Oakura WTP - Reservoir 1 - internal pipework upgrade	-	-	21	-	-	-	-	-	-	-	21
<b>Total</b>	<b>-</b>	<b>-</b>	<b>210</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>210</b>

## 2.8 Disposal Plan

A number of existing land assets associated with former water storage assets have no further anticipated use and are intended for disposal. This includes minor land holdings associated with the Waitara Raw Water storage reservoirs, contingent on the presumed divestment of this scheme.

## 2.9 Annual Work Plan

Detailed work plans included in Annual Plans will be based on the asset renewal forecasts included in section 2.6 and the augmentation projects identified in section 2.7.



# 3. RISK MANAGEMENT PLAN

## 3.1 Critical assets

We have not yet conducted criticality ratings for storage assets; therefore, there is currently no data recorded in EAM. **This is an asset data integrity issue and is recorded as an action in Section 5 – Improvement and Monitoring Plan**

Water storage assets are considered critical to the continuity of water supply, particularly during emergency situations when water treatment plants may be inoperative.

Following asset criticality assessments, we will develop a focused management plan to ensure the integrity and resilience of critical assets. **This is recorded as an action in Section 5 – Improvement and Monitoring Plan.**

## 3.2 Risk Assessment

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

## 3.3 Infrastructure Resilience Approach

During the development of the Water Master Plan we assessed and investigated opportunities to enhance asset resilience and allocated investment where appropriate. For example, we have programmed the construction of new reservoirs that will add additional capacity and provide provisional storage so other reservoirs can be put out of service on a temporary basis for cleaning, strengthening and the like.

Following on from ex-cyclone Gita which damaged one of our trunk mains crossing a pipe-bridge in February 2018 and the Havelock North Water Inquiry; the importance of our water network has been highlighted. This has caused us to consider the resilience of our water assets based on cost versus risk assessments. Section 6.3 of the General Water Supply volume gives details the items selected for investment in improving asset resilience.



# 4. FINANCIAL SUMMARY

The Capex forecast for water storage assets is shown in Table 6.

**Table 6 Summary expenditure forecast**

Storage 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	-	-	-	-	-	-	-	-	-	-	-
Service Level	-	-	210	-	-	-	-	-	-	-	210
Growth	3,935	3,499	-	-	-	-	-	-	-	-	7,434
Total	3,935	3,499	210	-	-	-	-	-	-	-	7,644

The Opex forecast for operations and maintenance is included in the overall Opex forecast for Water Supply detailed in the LTP. It is also included in the Water Supply General Volume.

# 5. IMPROVEMENT AND MONITORING PLAN

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

General improvements to Water Supply assets are included in the Water Supply General Volume.

The specific areas of improvement identified for water storage assets are listed in Table 7.

**Table 7 Improvements Summary**

No	Improvement Area	Owner	Start Date	End Date
1	Assess asset condition and record results in EAM	Asset Operations Planning Lead	Jul 2018	Jun 2020
2	Assess critical spares and procure any required components	Manager Three Waters	Jul 2018	Jun 2019
3	Assess criticality of assets and record results in EAM	Asset Operations Planning Lead	Jul 2018	Jun 2020
4	Produce focused management plan for those assets identified as critical	Manager Three Waters	Jul 2018	Jun 2020





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