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1 EXECUTIVE SUMMARY

1.1 Background

Council provides wastewater services to approximately 10% of its customers in a service known as the Community Wastewater Management System (CWMS). The CWMS scheme is different from the sewerage system provided by SA Water. In CWMS systems; each property typically has a septic tank installed on the property which provides some basic pre-treatment to the wastewater generated at each property. Effluent from the septic tank flows into the CWMS system, while solids remain in the tank. The CWMS system transports the wastewater to a SA Water sewer connection point. The CWMS system is connected to SA Water sewerage system through these connection points. Septic tanks are cleaned once every four years to ensure that septic tanks are not at risk of failure. Council manages the septic tank cleaning program for its customers to minimise the risk of septic tank failures, which can lead to public health risk and environmental harm. The State Government undertook the work to construct the CWMS scheme during the 1960s in response to public health concerns from failures of septic systems in particular soakage trenches. The City of Tea Tree Gully (CTTG) is now responsible for operating and maintaining the CWMS system. Under the Water Industry Act 2012, CTTG is licensed by the Essential Services of South Australia (ESCOSA) to operate as an intermediate water retailer to provide wastewater services in South Australia. Under this license, Council is required to comply with the National Water Initiative Pricing Principles when charging for wastewater services and report to the Commission on how they are complying with those principles.

1.2 Purpose

The Community Wastewater Management System (CWMS) Asset Management Plan (AM Plan) was last reviewed in June 2016 and the next review was scheduled for June 2019. This update of the CWMS AM Plan takes considers investigative work of the network undertaken over the course of the last 15 months. The investigative work included activities such as flow monitoring, condition assessment of assets, hydraulic analysis of the network, demand forecasting and updated risk analysis of the network. The key outcomes of the review are the following:

1. Updated useful life of assets and the impact on service levels and the operating and maintenance cost;
2. Updated replacement cost of the assets;
3. An updated optimum capital works program with corresponding projected capital expenditures.

This report will include a comparison of two scenarios, which will identify and discuss the impacts of the current long term financial plan on the updated AM Plan. The scenarios are:

1. Scenario 1: the “Do Nothing” approach. Council will continue with the capital expenditure based on the Long Term Financial Plan (LTFP), which is $200,000 per year.
2. Scenario 2: the optimum capital renewal plan developed from this updated CWMS AM Plan.

The comparisons will include the projected financials over 10 years, 20 years and 40 years. The projected financials will include the operating and maintenance expenditures, capital expenditures and increasing asset values over the period 2018-2019 to 2057-2058.

The AM Plan will also discuss the issues of asset backlog and useful lives of assets, demand forecasting and the results from an asset sustainability analysis of the two scenarios.

1.3 Context

Council operate and maintain a CWMS network to enable the effective disposal of wastewater from approximately 4700 properties within the City of Tea Tree Gully. The CWMS network consist of 112 km pipe network utilised to safely and efficiently dispose of wastewater from residents and businesses into SA Water’s sewerage network.

A large portion of this pipe network is located at the rear of properties that are connected to the network. This can often make renewals and upgrades difficult. Where possible, directional or trenchless technology is used for pipe renewals to limit the impact to the surrounding environment and inconvenience to households.

1.4 What Does it Cost

The projected outlay necessary to provide the services covered by this Asset Management Plan (AM Plan), includes operations, maintenance, renewal and upgrade of existing assets. Over a 10 year planning period, Scenario 1 has a projected average annual expenditure of $2,698,000 and Scenario 2 has an average annual expenditure of $1,930,000. Over a 10 year period, the accumulated difference in operation and maintenance expenditure between both scenarios
is $7.682 million. The difference in the operating and maintenance expenditure is due to the progressive increase in maintenance requirements of the CWMS network in Scenario 1, as an increased number of assets reach the end of their useful life.

**1.5 What We Will Do**

We plan to provide CWMS services with the following guiding principles.

- Where opportunities exist to dispose of sections of the CWMS network and convert properties onto SA Water sewerage system, we will explore these opportunities to reduce the demand on the CWMS network.
- Operation, maintenance, renewal and upgrade of CWMS assets to meet service levels set out by this document and Council’s CWMS and Reclaimed Water Customer Service Charter.
- To adopt planning, design and construction standards set out by the Waster Services Associations and relevant Australian Standards.
- To ensure that the AM Plan supports and promotes Council’s Strategic Plan in the operation, maintenance, renewal and upgrade of CWMS infrastructure.
- To upgrade and renew CWMS assets that will progressively provide sewerage connections to its customers.
- To endeavour to upgrade and renew CWMS assets sustainably to ensure gradual pricing rises in rates and operate and maintain a system that will meet current and future demand and customer expectations.
- To operate and maintain the CWMS system using a risk based approach that will protect public health and the environment.

**1.6 Managing the Risk**

There are risks associated with providing the service and not being able to complete all identified activities and projects. We have identified major risks as:

- Risk to public health and environmental pollution from sewer overflows, groundwater contamination due to leaking assets and privately owned septic tanks.
- Sewer overflows due to poor system hydraulics, system capacity, inadequate development controls for swimming pools, spas, illegal storm water connections and ageing infrastructure.
- Failure of critical assets such as trunk mains disrupting services over extended periods.
- Poor understanding of the condition of buried assets, leading to poor planning of asset renewals.
- Increasing urban infill placing increased demand on the CWMS network.
- Ability of the AM Plan to support the Council’s Strategic Plan.
- Financial impact to Council due to failure to meet legislative requirements, higher cost of reactive maintenance and asset renewals versus scheduled maintenance and renewals, increasing operating costs.
and maintenance cost due to ageing infrastructure and increasing infrastructure backlog which will lead to high fluctuations in rates.

- Financial hardship to customers due to poor forward planning leading to unexpected large increases in rates to fund urgent rehabilitation.
- Reduction in development potential of the city due to capacity limitations.
- Complete loss of service in parts of the network due to lack of funds and resources to undertake rehabilitation work.

We will endeavour to manage these risks within available funding by:

- Developing a proactive network capital renewal program to meet current and future demand.
- Routine inspection of underground assets by techniques such as CCTV condition assessment.
- A program of monitoring wastewater flows within the CWMS network to manage stormwater and ground water infiltration.
- Developing and maintaining up to date calibrated hydraulic models of the CWMS network.
- A program of monitoring development and growth in areas serviced by CWMS to ensure planned renewals meet demand.
- Managing asset data using Councils Asset Management Information System (AMIS).
- Utilising the acquired asset data as inputs to Council's risk based AM Plan to assist in making informed decisions in operation, maintenance, renewal and upgrade of assets.
- Increasing reliance on proactive network maintenance and renewals
- Holding a licence under the Water Industry Act to protect infrastructure located within private property.

1.7 Implications of the Updated AM Plan

The main implication of the updated AM Plan is the need for Council to increase its annual capital expenditure. Scenario 1 shows

- **Asset useful life and capital renewal**
  Adjustment to the useful lives of CWMS assets from an aged based AM Plan in the June 2016 to a condition based AM Plan which led to a general reduction in useful life of all its CWMS assets. This has an implication on the projected annual capital expenditure required to replace CWMS assets.

- **Asset Sustainability**
  The asset sustainability analysis indicate that assets are wearing out faster than they are renewed and that the current CWMS capital expenditure in the LTFP is not sustainable and requires an increase to reduce the risk of complete asset failures. Inadequate capital investment will eventually lead to failed assets and the cost of the renewal, upgrade and replacement of the assets will be too great without a sudden large rate increase that could potentially lead to financial hardship and potentially unfair charging as the next generation are having to bear the greater burden of the cost.

1.8 Confidence Levels

This AM Plan is based on “Medium” level of confidence information.

1.9 The Next Steps

The main action that needs to be undertaken in the next step is a review of the current Long Term Financial Plan and the development of funding models to fund the proposed operating, maintenance and capital expenditure projected in this AM Plan.

Other actions resulting from the AM Plan include:

- Review and development of new resources and business processes required to undertake asset management activities.
- Continuous improvement of business processes to improve efficacy and optimise existing resources.
- Develop Council’s hydraulic modelling capability and resources to assist in design of future asset renewals and upgrades and efficient maintenance and operation of assets.
- Ensuring that designs of asset renewals and upgrades are completed and finalised in advance.
- Developing a capital renewal and upgrade strategy and implement a procurement strategy that will ensure best value for money.
- Provide clear communication to customer to keep them informed of planned service disruptions and capital works program for the year ahead.
- Establish KPAs for asset performance in line with industry standards.
- Provide transparent pricing for services provided that are consistent with National Water Initiative (NWI) Pricing Principles.
Questions you may have

What is this plan about?
This asset management plan covers the operation, maintenance, renewal and upgrade of Community Wastewater Management Scheme (CWMS) infrastructure owned by the City of Tea Tree Gully. These assets include a 112 km pipe network throughout the community area that enables people to efficiently and safely dispose of wastewater from their properties.

What is an asset management plan?
Asset management planning is a comprehensive process to ensure that delivery of services from infrastructure is provided in a financially sustainable manner.

An asset management plan details information about infrastructure assets including actions required to provide an agreed level of service in the most cost effective manner. The plan defines the services to be provided, how the services are provided and what funds are required to provide the services.

What do we need to do in the future?

- Improve data collection and recording and the application of asset knowledge to make informed decisions on maintenance and asset renewals that will provide best value for money for our customers while ensuring service levels are maintained.
- Develop a proactive approach to the renewal and upgrade of CWMS assets to reduce service disruptions, safe guarding of public health and protection of the environment and ensuring pricing of services is affordable to its community.
- Develop a capital renewal and upgrade program that is funded by users.
- Proactively seek grant opportunities to reduce the financial hardship to our customers.
- Continuously review and update the capital renewal and upgrade program to reflect changes in demand, asset condition and the environment.
- Continuously identify and manage risks associated with providing services from infrastructure.
- Make trade-offs between service levels and costs to ensure that the community receives the best return from infrastructure assets.
- Identify assets surplus to needs for disposal to make savings in future operations and maintenance costs.
- Consult with the community to ensure that CWMS services and costs meet community needs and are affordable.
- Develop partnership with other bodies that will facilitate collaborative work, shared service arrangements and enhance advocacy of Council initiatives.
- Seek additional funding from governments and other bodies in keeping with a ‘whole of government’ funding approach to infrastructure services.

What happens if we don’t manage the shortfall?
Councils is responsible for the long term sustainable operation, maintenance and management of wastewater infrastructure that provides essential service to its customers. With proper planning and risk management, it is unlikely that Council will fail to meet its obligations to manage any shortfalls. In the unlikely scenario, Council will adopt a risk based approach to reduce service levels in some low impact areas. Council is bound by legislation to provide a minimum standard in the provision of essential services, responsible management of the environment and the protection of public health. Customers should be assured that there will be no breach of the minimum standards.

What can Council do?

- Council will develop options, costs and priorities for future CWMS services, consult with the community to plan future services to match community service needs with ability to pay for services and maximise community benefits against costs.
- Council will develop a capital works program that provides sustainable services to meet present and future needs.
- Council will continuously improve the maintenance program to reduce the occurrence of sewer flows caused by blockages.
- Council will proactively seek grant opportunities to fund capital renewals and upgrades.
What can residents do?
We will be pleased to consider your thoughts on the issues raised in this asset management plan and suggestions on how we may change or reduce a mix of services to ensure that the appropriate level of service can be provided to the community within available funding.
2 INTRODUCTION

2.1 Background

This Community Wastewater Management System (CWMS) Asset Management (AM) Plan demonstrates the responsive management of assets (and services provided from assets), compliance with regulatory requirements, and communicates funding needed to provide the required levels of service over the long term. This AM Plan looks at a planning period of 40 years, from 2018-2019 to 2056-2057.

The plan follows the format for AM plans recommended in Section 4.2.6 of the International Infrastructure Management Manual.1

The AM Plan is to be read in conjunction with Council’s Asset Management Policy, Asset Management Strategy and Safety Reliability Maintenance Technical Management Plan (SRMTMP).

The infrastructure assets covered by this AM Plan are shown in Table 2-1. These assets are used to provide efficient and safe wastewater disposal services to the community.

Table 2-1: Assets covered by this plan (written down value from last asset revaluation in 2015)

<table>
<thead>
<tr>
<th>Asset category</th>
<th>Dimension (m)</th>
<th>Written-Down Value ($)</th>
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</thead>
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<tr>
<td>Clay (Earthenware) Pipes</td>
<td>88,706m</td>
<td>27,702,761</td>
</tr>
<tr>
<td>Asbestos Cement Pipes</td>
<td>239m</td>
<td>119,686</td>
</tr>
<tr>
<td>Iron pipes (as outer casing for creek crossings)</td>
<td>134m</td>
<td>41,945</td>
</tr>
<tr>
<td>Polyethylene (HDPE) pipes</td>
<td>6371m</td>
<td>2,054,217.7</td>
</tr>
<tr>
<td>PVC pipes</td>
<td>16,008m</td>
<td>5,099,77</td>
</tr>
<tr>
<td>Lined Pipes (Cured In Place or Spiral Wound)</td>
<td>247m</td>
<td>97,234</td>
</tr>
<tr>
<td>TOTAL</td>
<td>112km</td>
<td>$35.305M</td>
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</tbody>
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Key stakeholders in the preparation and implementation of this asset management plan are shown in Table 2-2.

Table 2-2: Key stakeholders in this AM Plan

<table>
<thead>
<tr>
<th>Key Stakeholder</th>
<th>Role in Asset Management Plan</th>
</tr>
</thead>
</table>
| Councillors/Board Members        | • Represent needs of community/shareholders  
                                  | • Allocate resources to meet the organisation’s objectives in providing services while managing risks  
                                  | • Ensure organisation is financially sustainable.  |
| CEO                              | • Reporting to councillors on the management of the CWMS network                                |
| Director of Assets and Environment| • Reporting to CEO on the management of the CWMS network  
                                  | • Provides direction to ensure that the AM Plan is consistent with Council’s Strategic Plan.      |
| Finance Department               | • In conjunction with the Civil and Water Operations Team, develop Long Term Financial Plan (LTFP) scenarios  
                                  | • Financial reporting of CWMS activities                                                              |
| Civil and Water Operations       | • Deliver effective management of CWMS renewals and upgrades  
                                  | • Effectively maintain and operate the CWMS network  
                                  | • Ensure that CWMS network is operated, maintained and managed in accordance to relevant standards and legislation  
                                  | • Continuously review, update and improve AM Plan                                                      |
| SA Department of Health (DH)     | • Provides the guidelines for setting maintenance standards for septic tanks.              
                                  | • Provides the guidelines for acceptance of wastewater for CWMS schemes.                          |
| SA Environmental Protection Agency (EPA) | • Provides the standards for rehabilitation for environmental pollution.  
                                  | • Provides the guidelines for reporting sewer overflows.                                           |

1 IPWEA, 2011, Sec 4.2.6, Example of an asset management plan structure, pp. 4|24–27.
### Key Stakeholder | Role in Asset Management Plan
---|---
Essential Services Commission of South Australia (ESCOSA) | • Provides standards for operating a sewage scheme.
Office of Technical Regulator (OTR) | • Council is licensed by ESCOSA to operate as an intermediate water retailer.
| • The OTR assist the Technical Regulator in monitoring compliance of water infrastructure with relevant technical standards and other requirements to ensure safety and maintenance of supply.

### 2.2 Goals and Objectives of Asset Management

The organisation exists to provide a number of services to its community. This AM Plan covers only the provision of wastewater services through the community wastewater management scheme (CWMS). These services are provided by CWMS infrastructure assets. CWMS infrastructure assets have been acquired by purchase from the original asset owner, contribution of assets from developers and from rate funded capital works programs to upgrade and renew assets.

One of the key objectives in managing infrastructure assets is to meet the defined level of service (as amended from time to time) in the most cost-effective manner for current and future customers. The key elements of infrastructure asset management are:

- Providing a defined level of service and monitoring performance;
- Managing the impact of growth through demand management and infrastructure investment;
- Taking a life cycle approach to developing cost-effective management strategies for the long-term that meet the defined level of service;
- Identifying, assessing and appropriately controlling risks;
- Having a long-term financial plan which identifies required, affordable expenditure and how it will be financed.

### 2.3 Plan Framework

Key elements of the plan are

- Levels of service – specifies the services and levels of service to be provided by the organisation;
- Future demand – How Council will continue to provide wastewater services that will meet future demand;
- Life cycle management – how Council will manage its existing and future assets to provide defined levels of service;
- Financial summary – funds required to provide the defined services;
- Asset management practices;
- Monitoring – how the plan will be monitored to ensure it is meeting the organisation’s objectives;
- Asset management improvement.

Council’s AM Plan is based on best practice asset management and was developed using the following roadmap shown below (refer to Figure 2-1).
Figure 2-1: Road map for preparing an asset management plan

Source: IPWEA, 2006, IIMM, Fig 1.5.1, p.11.
2.4 Core and Advanced Asset Management

This asset management plan is prepared as a “core” asset management plan over a 40 year planning. It is prepared to meet minimum legislative and organisational requirements for sustainable service delivery and long term financial planning and reporting. Core asset management is a ‘top down’ approach where analysis is applied at the ‘system’ or ‘network’ level.

Future revisions of this plan will move towards “advanced” asset management using a “bottom-up” approach for gathering asset information on individual assets to support the optimisation of activities and programs to meet agreed service levels in a financially sustainable manner.

2.5 Community Consultation

This “core” asset management plan has been prepared to facilitate community consultation, initially through inviting feedback on a public display of draft asset management plans prior to their adoption by the Council/Board. Future revisions of the AM Plan will incorporate community consultation on service levels and costs of providing the service. This will assist the Council/Board and the community in balancing the level of service needed by the community, with service risks and consequences and the community’s ability and willingness to pay for the service.

3 LEVELS OF SERVICE

3.1 Customer Research and Expectations

Annual Community Survey

Our annual Community Survey is an important way for Council to receive feedback what we are doing well and identify areas for improvement.

An independent market research company conducts this phone survey on our behalf during March. Residents are also able to participate in this survey as members of the community panel.

3.2 Strategic and Corporate Goals

This AM Plan supports and promotes Councils Strategic Plan. Table 3-1 shows the themes of Council’s Strategic Plan and a description of how the AM Plan supports and promotes Council’s Strategic Plan.

<table>
<thead>
<tr>
<th>Theme</th>
<th>Objective</th>
<th>AM Plan</th>
</tr>
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| Healthy and Safe: Our community is healthy and safe | • A community where people are safe in our public places and spaces.  
• A community where people are safe during emergencies, natural disasters and during extreme climatic events, such as storms or heatwaves.  
• A community where people have easy access to places, spaces and services that support good health | CWMS assets are renewed and upgraded to comply with current technical standards to reduce the risk of sewer overflows, leakage and seepage of effluent and groundwater contamination which increases public health and environmental pollution risk. |
| Prosperous and Connected Our local economy prospers and people feel a sense of purpose and belonging | • A community that has a say in decisions that affect them.  
• A community that participates in meaningful community and economic activities  
• A community with a resilient local economy  
• A community where people have the resources and capacity to achieve their goals | CWMS assets are renewed and upgraded to ensure that CTTG operate and maintain essential services that are reliable and have adequate system capacity to promote growth and development in the area. |
Theme | Objective | AM Plan
--- | --- | ---
**Vibrant and Livable**<br>Our city is a desirable and sustainable place to live | • A city that is made up of places and spaces that are appealing and easy to access<br>• A community with a diverse range of housing to suit a variety of needs, life stages and lifestyles<br>• A sustainable city that has a healthy natural environment and is resilient to climate change<br>• A place that expresses a unique character and identity, an area that inspires pride in its residents and one that people enjoy visiting | Ensuring that the CWMS infrastructure is designed to accommodate the diverse range of housing envisaged by Council in the Strategic Plan and ensuring that there is a source of funding to provide the CWMS infrastructure that meets the expectations of the community.

### 3.3 Legislative Requirements

Council must comply with legislative requirements, including Australian Government and State Government legislation and State regulations. The legislative requirements are summarised in Table 3-2. This AM Plan was prepared to ensure that Council meets all relevant legislative requirements.

**Table 3-2: Legislative requirements**

<table>
<thead>
<tr>
<th>Legislation</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Local Government Act 1999</strong></td>
<td>Sets out role, purpose, responsibilities and powers of local governments, including the preparation of a long-term financial plan supported by infrastructure and asset management plans to ensure sustainable service delivery.</td>
</tr>
<tr>
<td><strong>Environment Protection Act 1993</strong></td>
<td>An Act to provide for an Environmental Protection Authority, for the prevention, control and abatement of pollution and environmental harm and for the conservation, preservation, protection, enhancement and management of the environment.</td>
</tr>
<tr>
<td><strong>Public and Environmental Health Act 1987</strong></td>
<td>Provides legislative credence to the Public and Environmental Heath (Waste Control) Regulations 1995.</td>
</tr>
<tr>
<td><strong>Public and Environmental Health (Waste Control) Regulations 1995</strong></td>
<td>Set out details of approval mechanisms and inspection and compliance regulations for STEDS (septic tank effluent disposal schemes), now known as CWMS.</td>
</tr>
<tr>
<td><strong>Water Resources Act 2012</strong></td>
<td>An Act to provide for the management of the State’s water resources.</td>
</tr>
<tr>
<td><strong>Environment Protection Authority Code of Practice for Wastewater Overflow Management EPA 2003</strong></td>
<td>Details of the requirements for an emergency response plan and risk management issues.</td>
</tr>
<tr>
<td><strong>Environment Protection (Water Quality) Policy EPA 2003</strong></td>
<td>Prohibits the disposal of treated effluent to all waterways for both new and old CWMS where the policy criteria is not met.</td>
</tr>
<tr>
<td><strong>Essential services Act 2002</strong></td>
<td>Essential Services Commission South Australia (ESCOSA) regulates compliance and enforcement in the water industry to ensure that the consumers’ long term interest are protected. Compliance with ESCOSA’s price determination.</td>
</tr>
</tbody>
</table>

The organisation will exercise its duty of care to ensure public safety in accordance with the Infrastructure Risk Management Plan linked to this AM Plan. Management of risks is discussed in Section 5.5.
3.4 Levels of Service

Service levels are defined in two ways, which are customer levels of service and technical levels of service. Community Levels of Service measure how the community receives the service and whether the organisation is providing value to residents. Community levels of service measures used in the AM Plan are:

- **Quality**: How good is the service?
- **Function**: Does it meet users’ needs?
- **Capacity/Utilisation**: Is the service over or under-used?

The organisation’s current and expected service levels are detailed in Table 3-3. Table 3-3 shows the expected levels of service and the expected position in 10 years after taking into consideration two scenarios.

1. **Scenario 1**: Scenario 1 is the “Do Nothing Approach” which is to continue with the current LTFP which sets aside $200,000 per year for capital renewals and upgrades.

2. **Scenario 2**: Scenario 2 shows the optimum funding level required to undertake the capital renewal plan developed from the CWMS AM Plan. The annual capital expenditure at each year takes into account the following considerations:
   - I. The useful life of the asset;
   - II. Council’s Strategic Plan;
   - III. Engineering considerations;
   - IV. Risk management;
   - V. Demand management;
   - VI. Gradual approach to service pricing; and
   - VII. Maintenance cost of the asset.

Continuing with Scenario 1 will result in some repercussion that require careful consideration. There will be a reduction in the service levels for quality, function and capacity. Most notable are:

1. A significant increase in system blockages across the CWMS network. Figure 3-1 shows an annual increase in system blockages from 2012-2013 to 2016-2017. The number of system blockages have increased by 138% over five years. It is expected that the number of system blockages will continue to increase unless more capital expenditure is made available to renew and upgrade assets that have reached or are close to end of their useful life;

2. Potential adverse impact to public health and safety and the environment;

3. A slowdown in development and end to development in some areas due to decreasing network capacity; and

4. Increasing the rate of asset consumption, reducing asset life, increasing operating and maintenance cost and a likely reduction in service levels.

Figure 3-2 shows a heat map of the areas where blockages were recorded from 2012-2013 to 2016-2017. The heat map shows visually where blockages have been recorded. The difference in colour is an indication of the frequency of blockages. The colour shown on the heat map changes from green to red as the frequency of blockages increases. The heat map shows that system blockages have occurred system across the entire CWMS network.
Figure 3-1: Summary of system blockages from 2012-2013 to 2016-2017.

Figure 3-2: Heat map showing where system blockages were observed from 2012-2013 to 2015-2016.
### Table 3-3: Level of service

<table>
<thead>
<tr>
<th>Service attribute</th>
<th>Service objective</th>
<th>Performance Target</th>
<th>Current performance</th>
<th>Expected position in 10 years based on current LTFP (Scenario 1)</th>
<th>Expected position in 10 years based on Scenario 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMMUNITY OUTCOMES</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ensure safe and effective disposal of wastewater from households to SA Water sewer via Council’s CWMS.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>COMMUNITY LEVELS OF SERVICE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quality</td>
<td>Reduced consumer complaints related to blockages.</td>
<td>• &lt; 80 mains blockages per 100km of mains. • 2 hour response to attend to blockages.</td>
<td>• 186 mains blockages per 100km of mains. • 2-hour response to blockages.</td>
<td>• ~420 mains blockages per 100km of mains. The increase in operating and maintenance cost attributed only to clearing blockages is estimated to be $517,129 in year 2027-2028. • 5-hour response to blockages</td>
<td>• &lt; 80 mains blockages per 100km of mains. • 2 hour response to attend to blockages.</td>
</tr>
<tr>
<td>Quality</td>
<td>Improve speed of response to reported complaints</td>
<td>5 days to written correspondence.</td>
<td>5 days to written correspondence.</td>
<td>14 days to written correspondence.</td>
<td>5 days to written correspondence.</td>
</tr>
<tr>
<td>Quality</td>
<td>Ensure Council provides a septic pumping service to remove septage from property owners’ septic tanks once every 4 years in accordance with Department of Health guidelines.</td>
<td>Council manages removal of septage from customer’s septic tanks once every 4 years.</td>
<td>Septic tanks are cleaned once every 4 years.</td>
<td>• Septic tanks are cleaned once every 4 years.</td>
<td>• Septic tanks are cleaned once every 4 years.</td>
</tr>
<tr>
<td>Quality</td>
<td>Conversion of CWMS connection to sewer connection where possible.</td>
<td>Council provides advice and assistance to customers who seek to connect to SA Water sewer network. The cost of the conversion from CWMS connection to sewer connection is borne by the customer.</td>
<td>Council provides advice and assistance to customers who seek to connect to SA Water sewer network. Council on average provide information and technical advice to 2 to 5 customers annually. On average, nil to 2 CWMS to sewer conversions occur each year.</td>
<td>Council provides advice and assistance to customers who seek to connect to SA Water sewer network. The cost of the conversion from CWMS connection to sewer connection is borne by the customer.</td>
<td>179 CWMS connections are converted to sewer connections as part of the capital works program in Scenario 2.</td>
</tr>
<tr>
<td>Service attribute</td>
<td>Service objective</td>
<td>Performance Target</td>
<td>Current performance</td>
<td>Expected position in 10 years based on current LTFP (Scenario 1)</td>
<td>Expected position in 10 years based on Scenario 2</td>
</tr>
<tr>
<td>---------------------</td>
<td>------------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------</td>
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<td>-----------------------------------------------------------------------------------</td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td>COMMUNITY OUTCOMES</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Ensure safe and effective disposal of wastewater from households to SA Water sewer via Council's CWMS.</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>COMMUNITY LEVELS OF SERVICE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Function</td>
<td>Compliance with SA EPA requirements in the management of sewer overflows.</td>
<td>Nil Type 1 (&gt; 1ML) dry weather sewer overflows per annum.</td>
<td>Nil Type 1 sewer overflows.</td>
<td>Nil Type 1 (&gt; 1ML) dry weather sewer overflows per annum.</td>
<td>Nil Type 1 (&gt; 1ML) dry weather sewer overflows per annum.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&lt; 80 Type 2 (&lt;1ML) dry weather sewer overflows per 100km of mains per annum.</td>
<td>186 Type 2 dry weather sewer overflows per 100km of mains per annum.</td>
<td>420 Type 2 (&lt;1ML) dry weather sewer overflows per 100km per annum.</td>
<td>&lt; 80 Type 2 (&lt;1ML) dry weather sewer overflows per 100km of mains per annum.</td>
</tr>
<tr>
<td>Safety</td>
<td>1. Reduction in the frequency of dry and wet weather overflows.</td>
<td>Nil health issues resulting from CWMS overflows.</td>
<td>Nil health issues reported caused by CWMS overflows.</td>
<td>Council will endeavour to ensure the safety of the community and protection of the environment. With the amount of funds available through the current LTFP capital renewal, there will need to be a significant increase in the operation and maintenance fund to maintain the performance target of Nil health issues reported due to the increase in number of overflow events and the total volume of wastewater that would overflow into the environment.</td>
<td>Nil health issues resulting from CWMS overflows.</td>
</tr>
<tr>
<td></td>
<td>2. Reduction in system overflows due to unauthorised discharge of wastewater.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. Site rehabilitation to protect public health and environment due to dry weather sewer overflows</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capacity/utilisation</td>
<td>To continue to provide wastewater services that will meet future demand.</td>
<td>Nil dry weather overflow events not attributed to a system blockage.</td>
<td>Two reported dry weather overflow events.</td>
<td>Developments will cease in a number of catchment areas due to capacity constraints.</td>
<td>Capacity constraints will be eliminated in the first three years of capital works program based on the capital funding levels in Scenario 2.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wet weather overflows during wet weather events</td>
<td>4.6km of the network is currently at capacity. Note</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

City of Tea Tree Gully – Community Wastewater Management System (CWMS) - ASSET MANAGEMENT PLAN
<table>
<thead>
<tr>
<th>Service attribute</th>
<th>Service objective</th>
<th>Performance Target</th>
<th>Current performance</th>
<th>Expected position in 10 years based on current LTFP (Scenario 1)</th>
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<tbody>
<tr>
<td><strong>COMMUNITY OUTCOMES</strong></td>
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<tr>
<td>Ensure safe and effective disposal of wastewater from households to SA Water sewer via Council’s CWMS.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>COMMUNITY LEVELS OF SERVICE</strong></td>
<td></td>
<td>that this excludes any assets which have deteriorated beyond their useful life.</td>
<td>utilisation and increase the rate of wear and tear of the assets.</td>
<td>• Development and growth will continue in the City.</td>
<td></td>
</tr>
</tbody>
</table>
### 3.5 Technical Levels of Service

Supporting community service levels are operational or technical measures of performance. These technical measures relate to the allocation of resources to service activities that the organisation undertakes to best achieve the desired community outcomes and to demonstrate effective organisational performance.

Table 3-4: Technical service measures are linked to annual budgets covering:

<table>
<thead>
<tr>
<th>Budget Categories</th>
<th>Description of Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Operations:</strong></td>
<td></td>
</tr>
</tbody>
</table>
| Day to day activities that provide service to customers | • Planning and management of wastewater infrastructure.  
• Inspection of wastewater infrastructure.  
• Strategic planning of wastewater network.  
• Responding to customer request and complaints.  
• Assessing and approving new system connections.  
• System auditing.  
• Liaising with regulators and customers.  
• Collection of system data, updating system data, data analysis, reviewing and implementing risk controls.  
• Flow monitoring, condition assessment of system, asset protection activities.  
• Installation of new connections and extension of mains.  
• Community consultation.  
• Desludging of septic tanks owned by customers.  
• Monitoring and continuous improvement.  
• Trade waste approvals and monitoring.  
• Compliance monitoring and reporting.  
• Performance monitoring and reporting.  |
| **Maintenance:**  |                           |
| Activities that are required to retain an asset as near as practicable to an appropriate service condition | • Patch lining and spot repairs of damaged sections of pipe.  
• Hydro-jetting of pipes with high pressure water to clear blocked drains.  
• Rehabilitation of damaged manholes and maintenance shafts.  |
| **Renewal:**      |                           |
| Activities that return the service capability of an asset to its original level | • Design of CWMS system for renewals.  
• Procurement of services to undertake renewals.  
• Project and contract management.  |
| **Upgrade:**      |                           |
| Activities that will improve service levels | • Design of CWMS system to accommodate for increasing future demand.  
• Design CWMS system to take advantage of new technologies and improve alignments to improve development potential.  
• Procurement of services to undertake system upgrades.  
• Project and contract management.  |

Service and asset managers plan, implement and control technical service levels to influence customer service levels.\(^2\)

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\(^2\) IPWEA, 2011, IIMM, p 2.22
4 FUTURE DEMAND

4.1 Demand Drivers

The following are some of the factors that could have an impact on demand on the CWMS network:

1. Increasing urban infill from development;
2. Climate change such as higher intensity rainfall, increasing groundwater levels increasing sewer infiltration rates and volumes;
3. Changes in the types of development and population density;
4. Changes in planning legislation;
5. Lifestyle changes such as increasing number of swimming pools, smaller allotment sizes, shared opened spaces; and
6. Changes in customer expectations such as conversion from CWMS connections to sewer connections.

4.2 Demand Forecast

The pie chart (shown in Figure 4-1) shows the percentage of connections serviced by CWMS by suburb in the City of Tea Tree Gully. At the time of writing, there are 4,652 CWMS connections in the City. Council monitors the growth and development of the City closely and the projections are reviewed annually. Based on current observations and trends, it is anticipated that the number of CWMS connections would increase by 630 connections by year 2036-2037, which is approximately an increase of 13.5% for the period. The projected increase in the number of CWMS connections is shown in Figure 4-2.

Figure 4-1: Pie chart showing the percentage of properties in the City of Tea Tree Gully serviced by CWMS.
4.2.1 High Growth Areas

Council has commenced a monitoring program to assist in trending and forecasting the growth and development in areas serviced by CWMS to ensure that infrastructure is in place to cater for current and future demand. At the time of writing, high growth areas include Modbury, Modbury North, St Agnes and Ridgehaven. There are currently a total of 949 existing CWMS customers in these high growth suburbs. This means approximately 20% of the total number of CWMS customers are living in areas that are likely to experience a greater growth rate than other CWMS serviced areas in the coming years. Figure 4-3 shows the location of all the areas serviced by CWMS in the City of Tea Tree Gully. The areas highlighted in orange and pink are within the Modbury Precinct.

The long term growth is estimated to be 0.30% across the City of Tea Tree Gully. However, there has been a significant increase in recent years, averaging about 57 wastewater applications per year from 2012 to 2016. Furthermore, Council had received 94 wastewater applications in the 2016-2017 financial year. The recent measured growth and projected long term growth and development in areas serviced by CWMS is shown in Table 4-1. The growth rate recorded in the 2016-2017 financial year was greater than the projected long term growth, especially in Tea Tree Gully, Vista and Banksia Park.

Table 4-1: The long term projected annual percentage growth in CWMS serviced suburbs and the observed growth in the 2016-2017 financial year

<table>
<thead>
<tr>
<th>Suburb</th>
<th>Percentage Annual Growth (% growth/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Long Term Average</td>
</tr>
<tr>
<td>Banksia Park</td>
<td>0.30%</td>
</tr>
<tr>
<td>Fairview Park, Yatala Vale</td>
<td>0.30%</td>
</tr>
<tr>
<td>Hope Valley</td>
<td>0.30%</td>
</tr>
<tr>
<td>Modbury</td>
<td>0.30%</td>
</tr>
<tr>
<td>Modbury North</td>
<td>0.30%</td>
</tr>
<tr>
<td>Redwood Park</td>
<td>0.30%</td>
</tr>
<tr>
<td>St Agnes</td>
<td>0.30%</td>
</tr>
<tr>
<td>Surrey Downs</td>
<td>0.30%</td>
</tr>
<tr>
<td>Tea Tree gully, Vista</td>
<td>0.30%</td>
</tr>
</tbody>
</table>
The Residential Growth Policy Area 11 facilitates the development of a diverse range of houses such as apartments and flats, rows of terrace houses, group dwellings, mews style dwellings, supported accommodation and medium to high density student accommodation. These types of developments could potentially put a strain on the existing CWMS network and are given a weighted consideration in developing the capital renewal and upgrade program. Furthermore, CWMS systems are generally ill suited to service high density developments such as apartment type dwellings.

The AM Plan takes into consideration development and growth in areas to prioritise the renewal and upgrade of CWMS infrastructure. The assets will be renewed and upgraded to meet projected future demand for the lifetime of the asset.

4.3 Demand Impact On Assets

The impact of demand drivers that may affect future service delivery and utilisation of assets are shown in Table 4-2.

Table 4-2: Demand drivers, projections and impact on services

<table>
<thead>
<tr>
<th>Demand drivers</th>
<th>Present position</th>
<th>Projection</th>
<th>Impact on services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td>12,560 (2017/2018)</td>
<td>14,261 (2035/2036)</td>
<td>• Increase in peak flows and total volume of CWMS effluent generated in the catchment area requiring upgrading of network infrastructure.</td>
</tr>
<tr>
<td>Urban consolidation</td>
<td>Allotment size on average 800 m²</td>
<td>Allotment size following subdivision of individual allotments is on average 350 m²</td>
<td>• Reducing available capacity in existing CWMS assets which potentially could restrict further development until assets are upgraded.</td>
</tr>
</tbody>
</table>
### 4.4 Demand Management Planning

It is important for Council to manage demand to eliminate or minimise any adverse impacts on services. Growth and development managed well will lead to positive outcomes that will benefit all CWMS system customers by increasing the number of contributors into the scheme thereby increasing revenue, which should lead to lower rate risers over time or improved services. Demand for new services will be managed through a combination of managing existing assets, upgrading of existing assets and providing new assets to meet demand and demand management planning. The increase in demand on the existing CWMS system can be affected by changes in loading to the system. This may be in the form of the quality and quantity of wastewater which could adversely impact CWMS assets. The instantaneous flowrate (flowrate measured at any time typically in litres per second) of wastewater discharged into the CWMS network can lead to higher rates of wear and tear and potentially also lead to sewer overflows when high flow rates persist over extended periods of time. Factors that can contribute to high instantaneous flow rates include swimming pool/spa discharges, high peak flows, surface water and ground water infiltration, illegal storm water connections, partial system blockages and also greater system demand from increasing number of contributors to the CWMS system. Table 4-3 shows a list of activities that increase the demand on the CWMS system and the management strategies that are used to manage system demand.

**Table 4-3: Activities that contribute to increasing system demand and management strategies**

<table>
<thead>
<tr>
<th>Activity Increasing System Demand</th>
<th>Management Strategies</th>
</tr>
</thead>
</table>
| New business or change of business practices | • Managing liquid trade waste,  
  i. Requirement for businesses to seek approvals to discharge trade waste;  
  ii. Utilising a risk based approach to classify trade waste discharges to manage liquid trade waste appropriately;  
  iii. Requirements for business owners to install, operate and maintain pre-treatment devices;  
  iv. Inspections and auditing business depending on the risk of the activity.  
  • Restriction of certain very high risk activities.  
  • Controlled discharge of wastewater to target off peak hours. |
<p>| Addition of swimming pools and spas and modifications to existing swimming pools and spas | • Requirements for property owners to seek Council approval to connect swimming pools and spas to the CWMS network. |</p>
<table>
<thead>
<tr>
<th>Activity Increasing System Demand</th>
<th>Management Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>• The use of flow control devices or flow control methods to restrict instantaneous flowrate discharged into CWMS network.</td>
<td>Residential development through subdivision • Assessment of each proposed development to ensure that CWMS assets servicing development have adequate capacity.</td>
</tr>
<tr>
<td>• Discharge of backwash water or swimming pool water during off peak hours.</td>
<td>• Developer charges applied to each new service connection to reflect the investment in both new and existing assets required to serve the new development and also having a regard for the ongoing annual CWMS rates that will be charged to the new connections.</td>
</tr>
<tr>
<td>• Approval from Council to discharge large volumes of swimming pool, spa or pond water into CWMS system.</td>
<td>• Where possible, to require new subdivisions to connect to the SA Water sewer network.</td>
</tr>
<tr>
<td>• • Flow monitoring and network hydraulic modelling to ensure the future system upgrades are designed to meet the expected future demand for the lifetime of the asset.</td>
<td>• Flow monitoring and network hydraulic modelling to ensure the future system upgrades are designed to meet the expected future demand for the lifetime of the asset.</td>
</tr>
<tr>
<td>• • Undertake condition assessment of CWMS assets and renew severely damaged pipes to minimise the volume of surface water and ground water infiltration that would take up capacity that could be used to service new subdivisions.</td>
<td>• Monitoring development in areas serviced by CWMS.</td>
</tr>
<tr>
<td>• • Undertake condition assessment of CWMS assets and renew severely damaged pipes to minimise the volume of surface water and ground water infiltration that would take up capacity that could be used to service new subdivisions.</td>
<td>• Designing assets to meet future demand, improve alignments to maximise development potential and access for maintenance.</td>
</tr>
<tr>
<td>• • Where possible, to require new subdivisions to connect to the SA Water sewer network.</td>
<td>• Prioritisation of capital works program that takes into account high growth and development areas serviced by CWMS.</td>
</tr>
<tr>
<td>• • Flow monitoring and network hydraulic modelling to ensure the future system upgrades are designed to meet the expected future demand for the lifetime of the asset.</td>
<td>• Undertake flow monitoring of the network and utilise calibrated hydraulic models to identify properties that are discharging stormwater into the CWMS network.</td>
</tr>
<tr>
<td>• • Undertake property inspections to disconnect illegal stormwater connections.</td>
<td>• Undertake property inspections to disconnect illegal stormwater connections.</td>
</tr>
<tr>
<td>• • For repeat offenders, to impose penalties to discourage illegal stormwater connections (Clause 56 of the Water Industry Act 2012).</td>
<td>• For repeat offenders, to impose penalties to discourage illegal stormwater connections (Clause 56 of the Water Industry Act 2012).</td>
</tr>
<tr>
<td>• • Where possible, to require new subdivisions to connect to the SA Water sewer network.</td>
<td>Deterioration of existing CWMS assets • Condition assessment of CWMS assets through flow monitoring and CCTV inspections.</td>
</tr>
<tr>
<td>• • Flow monitoring and network hydraulic modelling to ensure the future system upgrades are designed to meet the expected future demand for the lifetime of the asset.</td>
<td>• Prioritisation of capital works program that takes into account condition, functionality and risk of total asset failure to actively reduce groundwater and surface water infiltration.</td>
</tr>
<tr>
<td>• • Undertake property inspections to disconnect illegal stormwater connections.</td>
<td>• Locating of all underground assets such as manholes, maintenance shafts, inspection points and pipes to enhance location accuracy to protect the assets by providing accurate information to individuals through the Dial Before You Dig (DBYD) service offered by Council.</td>
</tr>
</tbody>
</table>
### 4.5 Asset Programs to Meet Demand

Assets programs can be classified into two types:

1. Creation of new assets;
2. Upgrade of existing assets.

New assets are created to service new developments. The types of assets created may include the following.

- Manholes
- Maintenance shafts
- Pipeline extensions
- Inspection points and flushing points
- Connection points to service new subdivisions
- Pump stations (includes pumps, controllers, telemetry, civil structures, pipes and fittings and instruments)
- Rising mains

New assets are funded by the development and handed over to Council as contributed assets at practical completion of the development. Contributed assets are inspected prior to handover to Council to ensure that they comply with Council’s requirements. Contributed assets should meet all the requirements of the acceptance criteria set out by Council prior to handover of the assets.

Asset upgrades are required when the existing asset is reaching its operating capacity. This may include increasing the pumping capacity of a pump station and increasing the pipe diameter to cater for greater flowrates. Asset upgrades are funded through developer charges and annual CWMS rates. Developer charges are upfront charges to recover part of the infrastructure cost incurred in servicing new development or additions and changes to existing developments. The developer charges applied by Council reflect the investment in both new and existing assets required to serve a new development and have regard to the ongoing CWMS annual rate that will be charged by Council. The developer charge will ensure that new developments pay a contribution to the use of existing assets and future asset upgrades needed to service the area, minimising cross subsidisation from current customers.

In both cases, assets will be constructed to meet current Australian standards and industry best practice. Council will create and upgrade assets in accordance to standards established by the Waster Service Association (WSA). As construction standards improve over time, the cost of asset renewal and upgrades are typically greater than the replacement cost of the current assets. However, it should be expected that the improvement in construction standards and construction methodologies also increase the average useful life of assets.

Figure 4-4 shows the projected increase in asset value (shown in present value) derived from contributed assets over a 20 year period. The value of contributed assets is estimated to be $1.983 million by 2027 and $3.415 million by year 2036.

![Figure 4-4: Projected increase in asset value from contributed assets.](image-url)
5 LIFE CYCLE MANAGEMENT

Life cycle management plan details how the organisation plans to manage and operate the assets at the level of service (defined in Section 3) while optimising life cycle costs.

5.1 Asset Useful Life

The factors that can impact the useful life of an asset include the following:

1. Design life and asset age
2. Design of the network
3. Wastewater quality
4. Material of construction
5. Construction methodology
6. Utilisation of the asset
7. Soil reactivity
8. The type of joints between pipes

Referring back to Table 2-1, vitrified clay (VC) pipes forms the largest proportion of the CWMS network, followed by poly vinyl chloride (PVC) and polyethylene (PE). The original construction of the CWMS network occurred from 1962 to 1970. VC was the most common material of construction at the time which resulted in a network made up primarily of VC pipes. VC pipes are brittle and do not permit much movement and is therefore more susceptible to pipe failures in the presence of reactive soils, which is typical of the local area where CWMS services are located. One of the key objectives in establishing the CWMS network in the 1960s was to improve the standard of public health in the area by providing a network of gravity drains to safely collect and dispose of domestic wastewater. The conventional soakage trench servicing each residential dwelling would no longer be required eliminating all the health and environmental risk associated with managing a soakage system on a relatively small allotment. Although the CWMS system had provided enormous benefits at the time of installation, it was not designed to cope with the high density living now witnessed in our City.

Figure 5-1 shows the profile of asset age of the CWMS network. As discussed earlier, a large portion of the network was installed from 1961 to 1971 and very few assets were installed between 1972 and 2001. Council had undertaken some renewals from 1998 to replace assets that were no longer serviceable.

Figure 5-1: Age Profile of CWMS assets
The useful life as reported in the previous CWMS AM Plan (June 2016) was estimated only from the age of the asset and material of construction. There was insufficient reliable asset information at the time of writing the previous CWMS AM Plan to use a more sophisticated approach. This current AM Plan uses updated asset data of the network to improve the accuracy of predicting the useful life of CWMS assets.

Estimating the asset life based on age is not regarded as industry best practice due to other factors that could greatly shorten the asset life. However, in the absence of all other information, it is common practice for asset age to be used to estimate the useful life of assets. Assessing the condition of underground assets require novel techniques for gathering data. The data that is gathered must be reliable and be analysed by competent engineers. It is not feasible to investigate every asset in the network due to cost constraints, therefore a risk-based approach to assessing the risk of asset failure is applied. The estimated useful life of CWMS assets is based on the weightings of three criteria, which are:

1. Capacity and utilisation of the asset: Considers results obtained from flow monitoring.
2. Condition of the asset: considers the risk of asset failure, material of construction, soil type, blockage history, tree protection zone, CCTV footage, seepage and leakage analysis and asset utilisation based on flowrate (system hydraulics).
3. Age of the asset

Table 5-1 describes the methods and techniques employed by Council since the preparation of the last CWMS AM Plan to more accurately assess the useful life of CWMS assets.

**Table 5-1: Techniques employed by Council to assess useful life of assets.**

<table>
<thead>
<tr>
<th>Description of Method</th>
<th>Key Data Outputs</th>
</tr>
</thead>
</table>
| 1. Flow monitoring of the CWMS network. Installation of flow monitors and pressure transducers capable of continuously measuring flow rate, pressure and velocity in CWMS mains in strategic locations. | • Data to assess asset condition  
• System capacity analysis  
• Seepage and leakage assessment  
• Illegal Stormwater connection assessment  
• Groundwater seepage hotspot identification  
• Data for calibrating hydraulic models  
• Wet weather infiltration  
• Identification of CWMS mains approaching capacity or at capacity |
| 2. Analysing population and demographic data for each of the CWMS suburbs. Assessing the potential for residential growth in the existing allotments. Analysing historical data for growth areas. | • Estimated growth rates of each suburb from 2016 to 2026.  
• Data required to assess future demand for sewerage services. |
| 3. Developing calibrated hydraulic models of the CWMS network using modern software. | • Basis of design for CWMS renewals and upgrades and capital renewal and upgrade cost estimates.  
• Input for modelling risk  
• Assessing developments that impact CWMS infrastructure. |
| 4. Monitoring sewer blockages and sewer system failures. | • Input for modelling risk  
• Data for asset condition  
• Assessment of failure modes |
<table>
<thead>
<tr>
<th>Description of Method</th>
<th>Key Data Outputs</th>
</tr>
</thead>
</table>
| • Identification of high risk areas by location  
  • Identification of asset at risk of failure | |
| 5. CCTV inspection program to assess the condition of assets. | • Provides renewal and upgrade options  
  • Assesses the condition of the asset. |
| 6. Surveying of CWMS assets | • Precise location of underground assets  
  • Input for hydraulic modelling  
  • Input for modelling risk |
| 7. Digital Terrain Model of CTTG was undertaken to obtain 1m contours of the CTTG area. | • Input for hydraulic modelling  
  • Input for risk modelling  
  • Design input for system renewals and upgrades  
  • Updates GIS information |
| 8. Groundwater monitoring around the CWMS catchment | • Potential of CWMS leakage and seepage  
  • Input for modelling risk |
| 9. The CRM data was analysed to assess level of service, such as length of unplanned service disruptions, number of affected residents and cost of service disruptions. | • Establish level of service. |

Figure 5-2 shows the accumulated quantity of CWMS assets that will reach the end of useful life at the end of each financial year. Figure 5-3 shows the corresponding estimated replacement cost required to undertake the renewal and upgrade of CWMS assets as they reach the end of their useful life. The replacement costs in Figure 5-3 are shown in present value. The replacement costs were determined based on unit rates applied to the concept design of each replacement asset in the CWMS network. The concept design would include the following considerations:

- Installation of manholes
- Installation of maintenance shafts and inspection points
- Number of connection points and cost associated with sewer diversions
- Complexity of work due to services, trees, buildings, limited access, traffic control
- Depth of assets
- Material of construction and technical specification of the asset
- Pipe diameter
- Safety in Design (SID)
- Project management and supervision
Figure 5-2: The accumulated quantity of pipe that will reach the end of useful life from 2017-2018 to 2057-2058.
5.2 Capital Works Program

Capital works can be classified into two components, which are renewals and upgrades.

5.2.1 Renewal

Renewal is the replacement of an asset when it is at the end of its useful life. The renewal cost of an asset would typically be funded by a reserve where funds would have been set aside by accounting for depreciation as an operating expenditure over the useful life of the asset. However, the following are factors that should be considered.

- The projected useful life of an asset may not be greater than the actual life of the asset which could lead to under depreciating assets. For example, an asset values at $100,000 is projected to have a useful life of 100 years, which means the annual depreciation of the asset is $1,000 per year. However, the actual useful life of the asset may be 50 years, which means that the same asset would require a depreciation of $2,000 per year over the actual life of the asset. Therefore the money that has been set aside to cover depreciation may not be sufficient to cover the cost of renewal. Council undertakes asset revaluations every three years to mitigate against this risk.

- The renewal cost of an asset may be greater due to the changes in construction standards, changes to minimum levels of service, changes in legislative requirements and changes in the environment, which lead to more complex methods of construction. For example, urban densification reducing access to assets, presence of significant trees, presence of new underground services, changing alignments of pipes to improve access and changes in groundwater levels.

The cost of renewals of Council's CWMS assets is significantly greater than the replacement cost of the asset indicated in the last asset revaluations (June 2016). The following points provide background to why this is the case.
The CWMS network needs to be redesigned, which will require additional assets, changes in alignments, changes in pipe gradients to meet construction standards and to accommodate design features of the new asset.

The replacement cost in this AM Plan took considered new network designs to improve system hydraulics and adopted current construction standards which will require the addition of new structures and increasing capacities of assets.

The replacement cost in this AM Plan considered future demand due to long useful life expected from the new assets and also took into account the local environmental factors such as groundwater levels which required increased system capacity.

The replacement cost in this AM Plan considered environmental impacts due to urban infill reducing access to assets, presence of many large trees including significant trees and raising of water tables, all of which would contribute to the increase in construction cost.

Under depreciation of CWMS assets because the conditioned based useful life of the assets were projected to be less than the age based useful life of the assets. The last asset revaluations used only an aged based approach to determine depreciation and written down value of assets and therefore does not consider the actual condition of the asset, which is a more accurate way of assessing actual useful life.

5.2.2 Upgrade

The upgrade of an asset to improve the level of service, such as increasing the operating capacity of a pipe to cater for increasing infill development. In order for the pipe to be sized correctly and for the network to be designed optimally, there needs to be reliable data to predict the future growth in the City of Tea Tree Gully in the medium term. Assets will be designed with a level of contingency determined by the level of risk to deal with uncertainties.

Although there are two separate components, the renewal of a CWMS asset would typically involve both components. This is because the renewed CWMS asset is expected to have a long life. The projected useful life of new CWMS pipes and structures are shown in Table 5-3. Therefore, new CWMS assets that will be replaced will have cost allocated to both upgrade and renewal. 50% of the cost of each new CWMS asset replaced is allocated to upgrade while the remaining 50% of the cost is allocated to renewal.

5.2.3 Scenario 1: Capital Funding Model Based on the Current LTFP

The useful life of each asset was used to produce the graphs shown in Figure 5-4. Figure 5-4 shows the quantity of pipe that will reach the end of its useful life from 2017-2018 to 2057-2058 based on two capital renewal scenarios. The quantities of pipe have been graphed to show the cumulative effect of not renewing assets as they reach the end of their expected useful life. Where the graph shows zero (m) of pipe quantity, this means that there is no backlog in the corresponding year. A positive value on the graph is the measure of the asset backlog in terms of quantity of pipe.

1. Scenario 1 is based on the current LTFP which consist of a capital works program valued at $200,000 per year. The infrastructure backlog continues to increase with each year because the annual capital works expenditure is insufficient to cover the cost of required annual renewals.

2. Scenario 3 shows the base scenario whereby no capital works is undertaken for each year. This graph represents the remaining useful life of all the CWMS assets.

The following are the key issues raised from the results shown in Figure 5-4.

1. The quantity of pipe reaching the end of useful life is observed to be increasing incrementally from year to year in Scenario 1 and Scenario 3 (scenario where no capital works are undertaken each year).

2. The infrastructure backlog as of 2017-2018 is $3.68 million.

3. There is an increase in the rate of asset consumption from year 2034 to year 2044, where approximately 70km of CWMS pipes will reach the end of their useful life (refer to Figure 5-4 shaded area in yellow). This is also consistent with the asset age profile shown in in Figure 5-1. It would be cost prohibitive and difficult to renew and upgrade 70km of CWMS mains over a 10 year period.

4. With a capital renewal budget of $200,000 (refer to Scenario 1), the asset backlog is observed to increase steadily with each year. The incremental increase in infrastructure backlog is observed to be less than in
Scenario 3. This means that the current annual capital expenditure funded through the current LTFP is reducing the asset backlog but is insufficient to meet the ongoing asset renewal requirements over the short to long term resulting an increasing asset backlog.

5. In the medium to long term, the asset backlog will increase from $23.87 million in 2039-2040 to $55.49 million in 2043-2044.

6. The estimated future infrastructure backlog is shown in the following table.

Table 5-2: Estimated future infrastructure backlog for Scenario 1 and Scenario 3.

<table>
<thead>
<tr>
<th>Scenario (Capital Works Funding Model)</th>
<th>LTFP Capital Works Budget ($/yr)</th>
<th>Accumulated Infrastructure Backlog (Present value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scenario 1 (Current LTFP)</td>
<td>$200,000</td>
<td>$6.5 million</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$17.7 million</td>
</tr>
<tr>
<td>Scenario 3 (No capital annual capital expenditure)</td>
<td>$0</td>
<td>$9.0 million</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$20.2 million</td>
</tr>
</tbody>
</table>

Figure 5-4: The accumulated quantity of pipe that will reach the end of useful life from 2017-2018 to 2057-2058 (shown as Scenario 3), and the increasing quantity of pipe that will reach the end of useful life despite the capital expenditure of $200,000 per year (Scenario 1).

5.2.4 Scenario 2: Capital funding model based on optimum renewal and upgrade AM Plan

The capital renewal and upgrade plan proposed by this AM Plan is based on several criteria. The following criteria were used to determine the optimum renewal and upgrade dates of each CWMS asset over a period of 40 years.

- Asset hierarchy (asset criticality), which is based on the number of connections serviced by the asset
- Renewal priority, which is based on the connectivity of the CWMS network, disruption to service, minimising site establishment and de-establishment cost and construction methodology
• Location hierarchy, which is based on proximity to areas which have a high development potential
• Asset life remaining on the asset
• When the asset will be at 60% capacity increasing the risk of sewer overflows
• Risk of asset failing
• Risk of sewer overflows
• Environmental considerations

The AM capital renewal and upgrade plan ensures that there is a balanced approach to asset renewals and upgrades taking into consideration operational risk, risk of capital while ensuring a gradual approach to rates increases over the course of the renewal and upgrade plan.

This approach will also provide a gradual and sustainable rate rises for future renewal and upgrade programs. The AM capital renewal and upgrade plan is shown in Figure 5-5. The graph shows the following information.

1. Quantity of pipe (shown in the primary vertical axis, in blue) in the positive field of the graph indicates an asset backlog exist for the corresponding year.
2. Quantity of pipe (shown in the primary vertical axis, in blue) in the negative field of the graph indicates that there is zero asset backlog for the corresponding year.
3. The quantity of pipe in each year will be in the positive field or below zero into the negative field depending on the proposed capital expenditure in the same year. If nil assets are renewed or upgraded in a year, it is expected that there will be an increase in the quantity of pipes that will reach the end of its useful life in the same year.
4. Proposed annual capital expenditure (shown as orange in the secondary vertical axis).

Figure 5-5: Projected annual capital expenditure based on the AM Plan and the quantity of pipe that will reach the end of useful life after each financial year based on the proposed capital expenditure.

The graph shown in Figure 5-5 can be interpreted as follows:
1. **Highlighted area A**: From 2018-2019 to 2021-2022, assets are in backlog. The asset backlog is projected to decrease with each year and CWMS asset backlog is eliminated in year 2021-2022 with the optimum asset renewal and upgrade plan based on Scenario 2.

2. **Highlighted area B**: The shaded area in yellow from Figure 5-4 represents a period from 2033-2034 to 2044-2045 where it is projected that there will be a rapid increase in the rate of assets deteriorating beyond its useful life. The proposed capital renewal plan takes into consideration this period and commences capital renewals of critical assets prior to the predicted end of useful life. Critical assets are typically key assets that provide services to many customers. This is shown in the period from 2022-2023 to 2033-2034. The annual capital expenditure rises gradually during this period, increasing from approximately $1.3 million per year to $2 million per year.

3. **Highlighted area C**: A significant increase in the annual capital expenditure is required from year 2034-2035 to 2042-2043. However, the magnitude of the increase is significantly less due to the initial capital investment that would take place from 2022-2023 to 2033-2034. Despite the increasing capital expenditure through this period, assets are deteriorating at a rate greater than they can be renewed and upgraded, which is why there is a transition from a state of nil asset backlog to a state of asset backlog which is projected to occur between year 2041-2042 and year 2042-2043. However, the reserves accumulated by this time through the operation of full cost recovery is anticipated to be adequate to undertake any unforeseen asset failures. Furthermore, a large portion of critical assets would have been replaced in the preceding years of 2022-2023 to 2033-2034, which will greatly reduce the risk of service disruptions that would impact a large portion of customers.

4. **Highlighted area D**: The period from 2042-2043 to 2050-2051 shows a time where CWMS assets is projected to be in backlog. However as stated in point 3 (Highlighted Area C) above, these assets are not critical assets and any unforeseen asset failures will impact a small number of customers in any single event. This backlog will eventually be eliminated by 2050-2051, after which a constant annual capital expenditure will ensure assets backlog is kept at acceptable levels. It is also important to consider the long term projected increase in the number of customers. By 2046-2047, it is estimated that there will be an increase of 953 customers. Therefore, it is anticipated that the annual rates required to operate, maintain, renew and upgrade the network will be shared across more customers, potentially reducing the annual rate increase per customer.

5.3 **Design and Construction Standards**

The cost estimates used to develop the AM capital works program is based on the guiding principles set out in this section of the AM Plan.

5.3.1 **Design**

Assets that are upgraded will be designed according to the following guiding principles:

1. Assets will be designed to have an expected useful life of 100 years. At the time of writing, the preferred material of construction for pipe renewals and upgrades will be either polyvinyl chloride (PVC) or polyethylene (PE). The preferred material of construction for manholes will be concrete.

   **Table 5-3: Design useful life of assets by asset class.**

<table>
<thead>
<tr>
<th>Asset Class</th>
<th>Design useful life</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concrete manholes</td>
<td>100 years</td>
</tr>
<tr>
<td>Polyethylene Pipes (PE)</td>
<td>100 years</td>
</tr>
<tr>
<td>Polyvinyl chloride Pipes (PVC)</td>
<td>100 Years</td>
</tr>
</tbody>
</table>

2. Assets will be designed to consider future growth, groundwater infiltration and wet weather flows.

3. Assets will be designed to the relevant codes and standards. At the time of writing, assets will be designed to comply with the Water Services Australia Code of practice, WSA 02 Gravity Sewage Code of Australia. The
design, planning and construction of CWMS assets will at a minimum comply with WSA 02. This means that renewed and upgraded assets will be designed to transport both sewage and effluent.

4. Where possible, customers will be given the option to connect directly to sewer which will remove the requirements for a septic tank. This option will only be possible if all downstream assets have been converted to sewer standards. Additional cost might be applicable for sewer connections.

5. Current and future access issues will be considered in the design and installation of new assets. Access to wastewater infrastructure is important for maintenance and repairs.

6. Where possible, taking into consideration the development potential of allotments, and relocating mains to new locations which minimise block severance.

7. The design of the replacement asset takes into account surrounding environmental factors which may contribute to premature failure of the asset and increase the complexity of the renewal to a point where it is more cost beneficial to realign the pipe.

8. The design may consider realignment of portions of the CWMS network under the following circumstances:
   - To improve hydraulics of the CWMS network
   - To improve development potential
   - For the protection of assets
   - To improve ongoing access to assets
   - To improve utilisation of assets
   - For the protection of the environment
   - To reduce the full life cycle cost of the asset

5.3.2 Construction

1. New assets will be constructed to meet the requirements of WSA 02 Gravity Sewage Code of Australia and relevant Australian Standards.

2. During the renewal and upgrade of assets, Council will endeavour to limit the disruption of wastewater services to customers.

3. Where possible, Council will renew and upgrade assets adopting trenchless methods of construction which will reduce the environmental impact.

5.4 Asset valuation

Council had last undertaken a revaluation of the CWMS assets in June 2016. The results of the revaluation are shown in Table 5-4.

Table 5-4: Summary of asset valuation

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Written-down value</td>
<td>$35,305,000</td>
</tr>
<tr>
<td>Depreciable amount</td>
<td>$35,305,000</td>
</tr>
<tr>
<td>Depreciated replacement cost(^3)</td>
<td>$21,066,000</td>
</tr>
<tr>
<td>Annual depreciation expense ($/year)</td>
<td>$363,000</td>
</tr>
</tbody>
</table>

\(^3\) Also reported as Written Down Current Replacement Cost (WDCRC).
An asset revaluation is scheduled for the 2018-2019 financial year which will take into consideration the updated useful life of the assets.

5.5 Infrastructure Risk Management Plan

A risk assessment associated with the provision of wastewater services was undertaken where risk were identified, quantified and risk controls recommended to reduce the risk rating to acceptable levels (refer to Table 5-5). With the application of the appropriate risk controls, the residual risk ratings were reduced from “high” and “very high” to “low” and “medium”. Critical risks, being those assessed as ‘Very High’ - requiring immediate corrective action and ‘High’ – requiring prioritised corrective action identified in the Infrastructure Risk Management Plan.

The risk controls are summarised below.

- Increasing the operating and maintenance budget in the short term.
- Increasing preventative maintenance activities to minimise the increase in operating and maintenance expenditure that would be spent on higher cost reactive maintenance.
- Developing and maintaining an updated capital renewal and upgrade plan.
- Updating and maintaining an asset management system to inform the capital renewal and upgrade plan.
- Promoting the conversion of CWMS connections to sewer connections as assets are renewed and upgraded as part of the capital renewal and upgrade plan.
- Adopting best practice design and construction codes and standards, which include Water Services Australia Code for Gravity Sewage schemes WSA 02.
- Developing and maintaining a funding strategy to fund the capital works program. Charging for service that ensures full cost recovery of assets and taking into consideration appropriate charging for cost of risk of the scheme.
- Applying for grants as they become available.

All the recommended risk controls should be implemented in order to provide the reduction in risk rating shown in Table 5-5. Some of the recommended risk controls will not result in an immediate reduction in the risk rating. For example, some of the risk controls involve renewing and upgrade of assets, which will require time to complete. Therefore the risk rating reduction will be incremental and only fully realised at the end of a certain stage in the capital works program.

Some of the recommended risk controls are already in place. The risk controls that have been implemented would be at different stages of maturity and their effectiveness in the reduction of risk rating would improve with maturity.

There are several recommended risk controls that have not been implemented but have been addressed in this AM Plan which require urgent consideration. The risk controls that have yet to be implemented are listed below.

- The AM Plan recommends a capital renewal and upgrade program for each asset over the next 40 years. However, the financial model showing the funding requirements to undertake the capital works program has not been adopted by Council in the current LTFP.
- Council has not been charging for CWMS services to achieve full cost recovery of assets and has limited reserves to undertake emergency rehabilitation. Council will currently have to rely on borrowings to undertake rehabilitation work. Therefore, with limited reserves to cover the renewal and upgrade cost of the assets and the current state of the assets, the cost of risk at the time of writing would be quite high.
- Council has not allocated adequate resources to appropriately update asset information that informs the CWMS AM Plan and capital renewal and upgrade plan.
- Council has not allocated internal resources to undertake designing the CWMS network for renewals and upgrades. Resources are currently sourced externally in the short term but there is a longer term plan to undertake the work internally to improve the efficiency of the process.
- Council has not allocated adequate resources to undertake asset inspections and preventative maintenance. This AM Plan will recommend additional operating and maintenance expenditure for the short term to close the gap.
Although all the recommended risk controls have not been fully implemented, Council is committed to risk reduction to provide a sustainable service to its customers at service levels that comply legislatively and are acceptable to its customers.
Table 5-5: Risk assessment of delivery of CWMS services.

<table>
<thead>
<tr>
<th>Risk</th>
<th>Cause</th>
<th>Risk Rating without Controls</th>
<th>Description</th>
<th>Risk Controls</th>
<th>Residual Risk Rating with Controls</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk of not being able to fund the Increasing infrastructure backlog</td>
<td>Poor system asset condition</td>
<td>Very High</td>
<td>Limited significant capital renewals have occurred since the scheme was constructed from 1962 to 1970.</td>
<td>Develop a well-informed capital works program. Develop financial models to fund the capital works program. Increase vigilance in operating and maintaining the CWMS network. Increase budget allocation to operating and maintenance in the short term. Build a reserve through appropriate charging (account for full cost recovery of assets and cost of risk of the scheme) to fund the rehabilitation/renewals and upgrades resulting from unforeseen asset failures.</td>
<td>Medium</td>
</tr>
<tr>
<td>Increasing operating and maintenance expenditure</td>
<td>Poor system asset condition</td>
<td>High</td>
<td>High number of CWMS mains blockages observed throughout the network. There were 190 CWMS blockages in the 2016-2017 financial year, which is approximately 170 blockages per 100km. This is about 2.5 times greater than the national average. A number of assets had repeated failures in the course of two years.</td>
<td>Develop and maintain a well-informed capital works program. Continually update asset information that will inform and prioritise capital renewals and upgrades. Secure funding to undertake the capital renewal and upgrade work by implementing a user pay system.</td>
<td>Medium</td>
</tr>
<tr>
<td>Risk</td>
<td>Cause</td>
<td>Risk Rating without Controls</td>
<td>Description</td>
<td>Risk Controls</td>
<td>Residual Risk Rating with Controls</td>
</tr>
<tr>
<td>------</td>
<td>-------</td>
<td>------------------------------</td>
<td>-------------</td>
<td>--------------</td>
<td>-----------------------------------</td>
</tr>
<tr>
<td>Risk of system failure of critical assets</td>
<td>Poor system asset condition</td>
<td>High</td>
<td>Pipe collapse leading to extended and widespread service disruptions</td>
<td>Continue to undertake asset inspections of high risk critical assets. Current target is to inspect 1.2km per year. Continually update asset information that will inform and prioritise capital renewals and upgrades.</td>
<td>Medium</td>
</tr>
</tbody>
</table>
| Damage of private and public property | Poor system asset condition | Medium | • Soil subsidence damaging above ground infrastructure  
• Occurrences of sinkholes | Continue to undertake asset inspections of high risk critical assets. Current target is to inspect 1.2km per year. Continually update asset information that will inform and prioritise capital renewals and upgrades. | Low |
| Personal injury | Poor system asset condition | Medium | • Soil subsidence damaging above ground infrastructure  
• Occurrences of sinkholes | Continue to undertake asset inspections of high risk critical assets. Current target is to inspect 1.2km per year. Continually update asset information that will inform and prioritise capital renewals and upgrades. | Low |
| Increased rates of asset deterioration | Poor system asset condition | High | • Increased levels of seepage/leakage issues from CWMS conduits, rainfall infiltration, system capacity issues and provided infiltration and exfiltration rates from the CWMS system.  
• Increase infiltration and exfiltration increase operating and maintenance cost of pump stations and increase the deterioration rates of assets.  
• The condition of CWMS assets have an impact on public health and environment.  
• Poor asset design contributes to higher deterioration rates. | Develop a well-informed capital works program. Continually update asset information that will inform and prioritise capital renewals and upgrades. Secure funding to undertake the capital renewal and upgrade work by implementing a user pay system. Secure grant funding to undertake capital renewal and upgrade work. | Medium |
<p>| Increase rates of asset deterioration | Environmental | High | The soil in the CWMS areas are highly reactive and the engineering standards applied during the original | Use the appropriate material of construction and construction standards suited | Low |</p>
<table>
<thead>
<tr>
<th>Risk</th>
<th>Cause</th>
<th>Risk Rating without Controls</th>
<th>Description</th>
<th>Risk Controls</th>
<th>Residual Risk Rating with Controls</th>
</tr>
</thead>
</table>
| Groundwater contamination     | Poor system asset condition    | High                        | • High ground water levels in CWMS serviced areas increase infiltration rates, which reduces the capacity of the network to effectively transport wastewater.  
• Ageing septic tanks and CWMS conduits increase the risks of ground water contamination. | Develop a well-informed capital works program.  
Continually update asset information that will inform and prioritise capital renewals and upgrades.  
Secure funding to undertake the capital renewal and upgrade work.  
Conversion of CWMS connections to sewer connections.  
Undertake inspection of CWMS septic tanks during the 4 yearly cleaning cycle.  
Implement ground water monitoring as contamination may have an impact on Council’s managed aquifer recharge schemes. | Medium                           |

| Adverse impact on public health and the environment | Poor system asset condition | High | • The condition of CWMS assets impact public health and environment due to increased sewer overflows, wastewater seepage from the system into | Undertake groundwater monitoring.  
Renew and upgrade assets with the appropriate technology and construction standards that are specific to | Medium                           |
<table>
<thead>
<tr>
<th>Risk</th>
<th>Cause</th>
<th>Risk Rating without Controls</th>
<th>Description</th>
<th>Risk Controls</th>
<th>Residual Risk Rating with Controls</th>
</tr>
</thead>
<tbody>
<tr>
<td>environmental legislative requirements</td>
<td></td>
<td></td>
<td>the environment and receiving waters.</td>
<td>the area. Adopt WSA 02 as design, planning and construction standard. Allocate more resources to pipeline maintenance</td>
<td></td>
</tr>
<tr>
<td>System capacity leading to Increasing number of sewer Overflows</td>
<td>Poor asset design</td>
<td>High</td>
<td>• Poor CWMS system design leading to hydraulic issues, higher rates of sewer overflows, and damage to CWMS assets.</td>
<td>Redesign CWMS gravity systems in each catchment. Complete flow monitoring of catchments to develop calibrated hydraulic models for design. Adopt WSA 02 as design, planning and construction standard. Secure funding to undertake the capital renewal and upgrade work.</td>
<td>Medium</td>
</tr>
<tr>
<td>System capacity leading to Increasing number of sewer Overflows</td>
<td>Storm water infiltration</td>
<td>High</td>
<td>• Illegal stormwater connections into CWMS system.</td>
<td>Stormwater connection audits of high risk private properties. Applying penalties under the WIA 2012 to repeat offenders. Appropriate design when assets are renewed and upgraded.</td>
<td>Medium</td>
</tr>
<tr>
<td>Risk</td>
<td>Cause</td>
<td>Risk Rating without Controls</td>
<td>Description</td>
<td>Risk Controls</td>
<td>Residual Risk Rating with Controls</td>
</tr>
<tr>
<td>------</td>
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<td>-----------------------------</td>
<td>-------------</td>
<td>--------------</td>
<td>-------------------------------</td>
</tr>
<tr>
<td>System capacity leading to increasing number of sewer Overflows</td>
<td>Groundwater infiltration</td>
<td>High</td>
<td>Groundwater infiltration due to poor asset condition.</td>
<td>Secure funding to undertake the capital renewal and upgrade work.</td>
<td>Low</td>
</tr>
</tbody>
</table>
| Increase risk to public health and environment | Growth and development through urban infill | High | • Increased number of septic tanks in the area due to increasing urban density which increases the risk of seepage and leakage through ageing privately owned septic tanks.  
• The close proximity of housing also increased the risk to public health from overflowing septic tanks due to blockages of internal drainage.  
• Urban infill is sporadic across the CTTG, making it difficult to target provision of infrastructure to meet demand. | Conversion of CWMS connections to sewer connections. | Medium |
| System capacity leading to increasing number of sewer Overflows | Growth and development through urban infill | High | • Assets will reach capacity as more dwellings are added into the system. | Renew and upgrade assets to meet current and future demand.  
Monitor growth and development to update asset information that will inform and prioritise capital renewals and upgrades.  
Secure funding to undertake the capital renewal and upgrade work. | Medium |
<table>
<thead>
<tr>
<th>Risk</th>
<th>Cause</th>
<th>Risk Rating without Controls</th>
<th>Description</th>
<th>Risk Controls</th>
<th>Residual Risk Rating with Controls</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unable to fund capital works program</td>
<td>Financial hardship of CWMS customers</td>
<td>High</td>
<td>• ECOSA price determination requires Council to based pricing fees and charges on the NWI pricing principles. Cross subsidies within Council from other sources of revenue are to be eliminated, which means the full cost of the renewal and upgrade of the CWMS assets must be borne by the CWMS customers.</td>
<td>Apply for grant funding opportunities to assist with recovering from a situation of infrastructure backlog. Ensuring that developer pay a contribution to the use of current assets and installation of future upgraded assets. Develop a pricing model that will fund operating, maintenance, renewal and upgrade costs that promotes a gradual annual price increment.</td>
<td>Medium</td>
</tr>
</tbody>
</table>
5.6 Operations and Maintenance Plan

5.6.1 Operational Activities

Operations activities are day to day activities undertaken by Council to ensure the ongoing provision of CWMS services to our customers. The following are the main operational activities undertaken by Council.

- Asset protection
- Risk management
- Design and infrastructure planning
- Customer service
- Development, assessments and planning
- Asset inspection and performance monitoring activities
- System auditing
- Procurement, contract management, project management and supervision

The operating cost for Scenario 1 (current LTFP) and Scenario 2 (AM Plan) from 2018-2019 to 2056-2057 is shown in Figure 5-6. The operating cost shown in this figure includes septic cleaning services and effluent discharge fees charged by SA Water. A decrease in the operating cost is expected in the long term with the maturation of asset management practices and systems. The operating costs for Scenario 1 and Scenario 2 are anticipated to be approximately the same over the period.

![Figure 5-6: Projected operating cost from 2018-2019 to 2056-2057.](image)

5.6.2 Maintenance Activities

Maintenance is regular ongoing work that is necessary to keep assets operating, including instances where portions of the asset fail and need immediate repair to make the asset operational again. The objective of maintenance work is to retain an asset as near as practicable to a good service condition. The maintenance work at present is mainly reactive in nature. However, with the gradual input of asset condition and asset performance through asset inspections and performance monitoring activities, Council will proceed towards a planned maintenance management system (MMS).
Figure 5-7 shows historical maintenance expenditure on the CWMS network. The maintenance cost from 2013-2014 to 2016-2017 is observed to increase. The increase in the maintenance cost reflects the increase in the quantity of reactive maintenance work on the network which includes increase in the number of call outs, spot repairing damaged mains, clearing blockages and site rehabilitation (refer to Figure 3-1 to see the number of system blockages recorded during the same period).

![Annual Maintenance Expenditure Chart](image_url)

**Figure 5-7: Historical maintenance expenditure on CWMS network.**

The projected maintenance expenditure on the CWMS network under Scenario 1 (current LTFP) and Scenario 2 (AM Plan) is shown in Figure 5-8. The projected maintenance expenditure for Scenario 1 is observed to increase from 2018-2019 to 2056-2057 due to the increasing asset backlog over the period (refer to Figure 3-1 to see the number of system blockages recorded during the same period). The annual rise in maintenance cost is largely attributed to the increasing number of system blockages and steady increase in spot repairs required to maintain service levels of the CWMS network. It is assumed that 33.3% of the blockages would require spot repairs to rehabilitate the asset. The projected maintenance expenditure for Scenario 2 is observed to be relatively stable over the same period. It is projected that there will be an increase in the average annual maintenance expenditure of 1% over the first five years, after which there will be a decrease in the projected maintenance expenditure as more assets are renewed in the long term. The model becomes less accurate in the long term. The maintenance expenditure is projected to decrease in the long term despite the increase in the number of property connections and the overall size of the CWMS network. Although the network is expanded, the old assets would be replaced with newer assets that will provide a longer useful life due to new design and construction standards. The red curve in Figure 5-8 shows the difference in the projected maintenance expenditure between Scenario 1 and Scenario 2 (i.e., maintenance expenditure Scenario 1 minus maintenance expenditure for Scenario 2) for each financial year. A positively increasing trend indicates that the operating expenditure of Scenario 1 is projected to increase incrementally under Scenario 2 over the period.

The following points should be considered in relation to Scenario 1 (current LTFP):

1. In the financial year ending 2027-2028 (10 years from the time of writing), the maintenance expenditure is projected to be $1.587 million per year. In a comparison with Scenario 2 over the same 10 year period, it is projected that Council would have to spend a total of $5.451 million extra to cover the additional maintenance required, which equates to an average of $545,100 per year in additional maintenance cost.

2. By 2037-2038 (20 year period from the time of writing), the increase in maintenance cost would increase to $2.571 million per year. In a comparison with Scenario 2 over the same 20 year period, it is projected that
Council would have to spend a total of $19.96 million extra to cover the additional maintenance required, which equates to an average of $997,950 per year in additional maintenance cost.

3. The projected increase in maintenance expenditure will be approximately $1 million by 2025-2026. The asset backlog by 2040-2041 is projected to be approximately 50km (refer to Figure 5-4) with a renewal and upgrade cost of $30.92 million.

4. The average annual increase in the maintenance expense is ~8.2% per year from 2017-2018 to 2027-2028. Therefore the minimum increase in the annual rates is projected to be 8.2% based on Scenario 1 (current LTFP) to cover the increase in maintenance expenditure over this period.

The projected maintenance expenditure based on Scenario 2 increases gradually as the asset value increases from asset contribution through development. An initial decrease in the maintenance expenditure annually from 2018-2019 to 2029-2030 is projected due to the renewal and upgrade of CWMS mains. However, the decrease in maintenance expenditure is insignificant; a reduction from $40,000 (in 2018-2019) per annum to $7,500 (in 2029-2030) per annum.

Failure to invest adequately in the renewal and upgrade of CWMS assets would lead to considerable increase in the maintenance expenditure required to continue service provision and likely at a reduced level of service as the frequency of blockages will continue to increase, placing public health and the environment at risk.

Figure 5-8: Projected maintenance expenditure from 2018-2019 to 2056-2057.

5.6.3 Operations and Maintenance Strategies

The organisation will operate and maintain assets to provide a defined level of service to approved budgets in the most cost-efficient manner. Operation and maintenance activities include:

- Schedule operations activities to deliver the defined level of service in the most efficient manner.
- Undertake maintenance activities through a planned system to reduce costs and improve outcomes. Undertake cost-benefit analysis to determine the most cost-effective split between planned and unplanned maintenance activities.

- Maintain a current infrastructure risk register for assets and present service risks associated with providing services from infrastructure assets and reporting Very High and High risks and residual risks after treatment to management and Council/Board.

- Review current and required skills base and implement workforce training and development to meet required operations and maintenance needs.

- Maintain a current hierarchy of critical assets and required operations and maintenance activities.

- Develop and regularly review appropriate emergency response capability.

- Review management of operations and maintenance activities to ensure Council is obtaining best value for resources used.

5.6.4 **Asset Hierarchy**

An asset hierarchy provides a framework for structuring data in an information system to assist in collection of data, reporting information and making decisions. A risk-based asset hierarchy was adopted in preparing the AM Plan. Asset hierarchy is based on the number of customers upstream of the asset and the flows observed through the system at times of peak flow.

Asset hierarchy has an impact on the service level, such as response time, frequency of asset maintenance, inspection,

5.6.5 **Critical Assets**

Critical assets are those assets which have a high consequence of failure but not necessarily a high likelihood of failure. By identifying critical assets and critical failure modes, organisations can target and refine investigative activities, maintenance plans and capital expenditure plans at the appropriate time.

Operations and maintenance activities may be targeted to mitigate critical assets failure and maintain service levels. These activities may include increased inspection frequency and higher maintenance intervention levels.

5.6.6 **Summary of projected operations and maintenance expenditures**

The projected operating and maintenance expenditure for Scenario 1 and Scenario 2 is shown in Figure 5-9. The operating and maintenance expenditure is projected to increase over the period in the case of Scenario 1, while the level of service is expected to decrease despite the increase in operating and maintenance expenditure (reduced level of service is illustrated in Figure 5-10).

**Table 5-6: Summary of average operating and maintenance cost corresponding to Scenario 1 and Scenario 2.**

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Average Operating and Maintenance Cost (Present value $ million/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Year 5</td>
</tr>
<tr>
<td>Scenario 1 (Current LTFP)</td>
<td>$2.539</td>
</tr>
<tr>
<td>Scenario 2 (AM Plan)</td>
<td>$1.957</td>
</tr>
</tbody>
</table>
An increase in the number of system blockages would lead to a reduction in service standards because system blockages lead to service disruptions, sewer overflows, potential sewer overflows damage to private property, increase environmentally harmful incidents and also poses a public health risk. The reduction in the level of service based on Scenario 1 is shown in Figure 5-10. The graph indicates that a reduction in the level of service should be expected (based on the projected number of blockages, refer to Figure 3-1 which shows the historical system blockages) despite increasing operating and maintenance expenditure. In general, system blockages are largely due to root intrusion from poor condition pipes. The projected number of blockages was estimated by linear extrapolation and therefore might not be an accurate projection in the long term. The curve for projected blockage is a close match to the historical blockage data shown in red from years 2013 to 2017.
5.6.7 Summary of Projected Capital Expenditure

The AM Plan proposes a capital renewal and upgrade program that will result in the renewal and upgrade of approximately 95 km of CWMS assets. Figure 5-11 shows the current asset backlog and projected quantity of pipes that will reach the end of its useful life at the end of each financial year (more details can be found in Section 5.2.3). The current asset backlog is $3.7 million (approximately 5km of CWMS mains) and is expected to continue increasing with each year.

The period between 2034-2035 and 2043-2044 is of concern because of the quantity of pipe that will require renewal and upgrade during this 10 year period. Approximately 70km of pipe will need to be renewed during this period, which equates to the renewal and upgrade of an average of 7km of pipe per year.

The rate of asset deterioration reduces significantly as the new assets that are installed will have longer useful lives due to the improved design and construction standards that will apply to new installations.

Figure 5-12 shows the projected annual capital expenditure to renew and upgrade assets based on Scenario 1 (based on current LTFP capital expenditure) and Scenario 2 (based on AM Plan). The key benefits from the AM Plan capital renewal and upgrade plan are:

1. Eliminates infrastructure backlog in the first three years of the capital works program. This would minimise the risk of capacity issues and impeding development and growth in the City of Tea Tree Gully.
2. Eliminates development limitations by ensuring infrastructure servicing areas designated as Urban Zone 1 and areas affected by Council’s Residential Growth Policy Area 11 are adequately sized and have the appropriate technology to service the developments.
3. The AM Plan capital works plan takes into consideration high growth areas as part of demand management planning.
4. Entails the renewal and upgrade of all critical assets by year 2036-2037, reducing the risk of widespread system failures and loss of service which could potentially impact many customers with each event.
5. The proposed capital works program based on this AM Plan incrementally reduces the asset backlog over the 40 year period resulting in asset backlog that acceptable from a risk management perspective.
6. The proposed capital works program based on this AM Plan promotes a gradual annual rate rise in the long term, reducing the impact of financial hardship to customers and reducing the risk of non-payments for services rendered.

Refer to Section 5.2.4 for more details on the Capital renewal and upgrade program based on this AM Plan.

Figure 5-11: Current and projected asset backlog from 2017-2018 to 2057-2058.

Figure 5-12: Projected capital expenditure for Scenario 1 (current LTFP capital expenditure) and Scenario 2 (AM Plan capital expenditure) from 2018-2019 to 2056-2057.
5.7 Creation of new assets

New assets refer to additional assets not currently in existence in the CWMS network. New assets are created by methods shown in Table 5-7.

Table 5-7: Methods of creating new assets

<table>
<thead>
<tr>
<th>Methods</th>
<th>Description of Assets</th>
<th>Source of Funding</th>
</tr>
</thead>
</table>
| New development (refer to Section 4.5) | • New cwms mains may have to be extended to service new customers through land division where a single allotment may be divided to provide additional allotments.  
  • Provision of new connection points to service new allotments.  
  • Installation of new maintenance shafts, manholes.  
  • Installation of pump station to provide service to new subdivisions.  
  • In addition to the assets that are contributed to Council, the developer is also required to pay developer charges (Refer to current Fees and Charges Register) for each new additional dwelling added to the CWMS scheme. | Developer             |
| Asset renewals/upgrades        | • Installation of new maintenance shafts, manholes, inspection points to provide access, improve system hydraulics in compliance to construction standards.  
  • Installation of new pump stations and rising main.  
  • New pipeline alignments to resolve issues with access for maintenance work and system hydraulics and improve development potential. | CWMS customers  
  Grant funding          |

5.8 Disposal

Council may dispose of assets that have been decommissioned because they are no longer required. CWMS assets that may be disposed include gravity sewer pipes, rising mains, pump stations, inspection points, connection points and manholes.
6 FINANCIAL SUMMARY

The financial projections shown in this section are based on present value. This section summarises the financial implications of two scenarios based on the information provided in this CWMS AM Plan.

1. Scenario 1: Scenario 1 is the “Do Nothing Approach” which is to continue with the current LTFP which sets aside $200,000 per year for capital renewals and upgrades.

2. Scenario 2: Scenario 2 shows the optimum funding level required to undertake the capital renewal program developed from this CWMS AM Plan.

6.1 Financial projections for Scenario 1 (current LTFP capital expenditure)

The projected total expenditure (including operating expense, maintenance expense and capital expense) for Scenario 1 is shown in Figure 6-1. The greatest portion of the projected total annual expenditure is attributed to maintenance. The projected annual maintenance expenditure is expected to increase with each year. Figure 5-10 provides detail on the projected annual increase in maintenance expenditure. The capital expenditure is based on an allocation in the current LTFP, which is $200,000 per year. Details of the annual capital expenditure can be found in Section 5.2.3. In the first 10 years, the projected average annual increase in operating expenditure is approximately 0.84%, while the projected average annual increase in maintenance expenditure is 8.45%. The projected average annual increase in the total annual expenditure is 3.46% over the first 10 years.

The average annual total expenditure over 10 years from 2018-2019 to 2027-2028 is projected to be $2.978 million per year. The average annual total expenditure over 40 years from 2018-2019 to 2056-2057 is projected to be $5.153 million per year. The annual expenditure is projected to be $8.577 million at year 2056-2057.

![Figure 6-1: Projected operating, maintenance and capital expenditure for Scenario 1 (current LTFP capital expenditure).](image-url)
6.2 Financial projection for Scenario 2 (AM Plan)

The projected total expenditure (including operating expense, maintenance expense and capital expense) for Scenario 2 is shown in Figure 6-2. Details on the annual capital expenditure for Scenario 2 is shown in Figure 5-12 and more information can be found in Section 5.2.4. Over the first 10 years, it is projected that the operating cost will increase on average by 0.97% per year while the maintenance expenditure is projected to have an average annual increase of 0.1% per year. The depreciation of new assets contributes to the increase in the annual operating expenditure. Refer to Section 5.6.6 for more details on projected maintenance expenditure. The projected increase in the total annual expenditure over 10 years is 1.3% per year.

The average annual total expenditure over 10 years from 2018-2019 to 2027-2028 is projected to be $3.766 million per year due mainly to annual capital expenditure of approximately $1.2 million per year. The average annual total expenditure over 40 years from 2018-2019 to 2056-2057 is projected to be $5.13 million per year. The annual expenditure is projected to be $5.374 million at year 2056-2057, which is significantly less than the projected annual expenditure for Scenario 1 (which is $8.577 million per year).

6.3 Comparison of financial summary of Scenario 1 and Scenario 2

Figure 6-3 shows the projected annual total expenditures for Scenario 1 and Scenario 2. The projected annual total expenditure of Scenario 2 is greater than Scenario 1 until the year 2043-2044. The total annual expenditure decreases significantly for Scenario 2 after 2043-2044 due to the reduction in the annual capital expenditure as the asset backlog is reduced to acceptable levels. However, the projected maintenance expenditure for Scenario 1 continues to increase due to the projected increase in maintenance requirements from the increasing number of assets that have reached the end of their useful lives.

Figure 6-4 shows the projected accumulated total expenditure (including capital, operating and maintenance expenditure) for Scenario 1 and Scenario 2. Each curve in Figure 6-4 shows the incremental increase in total expenditure from each financial year for Scenario 1 and Scenario 2 from 2018-2019 to 2056-2057. The graph shows that the Scenario 2 curve lies above the Scenario 1 curve from 2018-2019 to 2054-2055. This means that the total expenditure spent to date at any financial year from 2018-2019 to 2054-2055 is greater for Scenario 2. Both curves intersect at 2054-2055, which means the projected total expenditure for each scenario is the same at the end of this financial year. An important point to consider is that the curve for Scenario 2 will remain under the Scenario 1 curve after 2054-2055 due to these main factors:
1. Maintenance expenditure is projected to continue to increase in Scenario 1 as the asset backlog increases.
2. Capital renewals undertaken in Scenario 2 will reduce maintenance cost in the long term to optimal levels.

Figure 6-3: A comparison of the projected total expenditures (operating, maintenance and capital) for Scenario 1 and Scenario 2.

Figure 6-4: Total accumulated expenditure (operating, maintenance and capital expenditure) for Scenario 1 (Current LTFP) and Scenario 2 (AM Plan).

Table 6-1 shows a summary of the average annual expenditures for Scenario 1 and Scenario 2. The projected average total annual expenditures for Scenario 1 and Scenario 2 are expected to be the same in the long term (40 years). This means that at the end of 40 years (2056-2057), the total accumulated expenditure over the 40 year period will be the same. This suggest that Scenario 2 will be a more asset sustainable option as the maintenance cost projected in Scenario 1 becomes so significant that capital renewals and upgrades would become a lower cost option as shown in Scenario 2.
Table 6-1: Summary of average annual expenditures for Scenario 1 and Scenario 2

<table>
<thead>
<tr>
<th></th>
<th>Average Annual Expenditure Scenario 1 (LTFP)</th>
<th>Average Annual Expenditure Scenario 2 (AM Plan)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>10 Year</td>
<td>20 Year</td>
</tr>
<tr>
<td>Average Total Annual</td>
<td>$2.98 million</td>
<td>$3.53 million</td>
</tr>
<tr>
<td>Annual Expenditure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average Total Annual</td>
<td>$1.66 million</td>
<td>$1.76 million</td>
</tr>
<tr>
<td>Annual Operating</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Expenditure</td>
<td>$1.12 million</td>
<td>$1.57 million</td>
</tr>
<tr>
<td>Average Total Annual</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maintenance Expenditure</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Infrastructure sustainability ratios are shown in the following table (refer to Table 6-2). The Asset Sustainably Ratio (ASR) is an indicator of the extent to which the infrastructure managed by Council is being replaced as they reach the end of their useful lives. It is the ratio of capital expenditure relative to the asset consumption. If the capital expenditure spent on renewals is equal to the depreciation of assets over time, assets are being renewed as they wear out and the organisation is maintaining its assets.

The Asset Consumption Ratio (ACR) is the ratio of the current value of the infrastructure relative to the current replacement value of the assets (current value).

6.3.1 Asset Sustainability Ratio (ASR)

Table 6-2 shows the projected ASR for Scenario 1 (current LTFP) and Scenario 2 (AM Plan) for 2018-2019 to 2027-2028 (10 year period). Figure 6-5 shows the long term projection for the ASR for the period 2018-2019 to 2056-2057.

Scenario 1 (current LTFP)

The projected ASR for Scenario 1 decrease from 58.11% to 54.32% over the first ten years, and continues to decrease to ~41% by 2056-2057. It is important to consider the age of the current CWMS assets and the projected remaining useful life of the assets (refer to Figure 5-1 and Figure 5-4) when considering the ASR in relation to asset financial sustainability. As reported in Figure 5-1 and Figure 5-4, the CWMS assets are relatively old. An asset backlog already exist at the time of writing and increase significantly from 2033-2034 to 2043-44 when approximately 70km of pipe will reach the end of its useful life. This suggests that Council is underspending on renewal and replacement of its assets. Over time, this will progressively undermine financial sustainability due to increasing maintenance costs (refer to Figure 5-8 for the projected increase in maintenance expenditure) as more assets reach the end of their useful life. This will eventually lead to failed assets and the cost of the renewal, upgrade and replacement of the assets will be too great without a substantial annual rate increase. This could potentially result in financial hardship and claims of unfair charging with the next generation having to bear the greater burden of the cost. As a guide, the ASR should be maintained at approximately 90%, but this value should be carefully considered as it depends on the age of the asset.

The projected ASR indicates that Scenario 1 is not asset sustainable and that greater capital investment would be necessary.

Scenario 2 (AM Plan)

The projected ASR for Scenario 2 decrease from 185.7% to 153.3% from 2018-2019 to 2027-2028. Over the long term, the ASR plateaus to 90% and remains at that level into the future as capital renewals and replacements match the wear and tear of the assets. Greater capital expenditure over the depreciation of the assets is necessary at the start of the period due to the age of a large proportion of the assets and the shrinking of their useful lives. The proposed capital expenditure is based on a gradual capital renewal program over the next 40 years that will progressively renew assets.
6.3.2 **Asset Consumption Ratio (ACR)**

Table 6-2 shows the projected ACR for Scenario 1 (current LTFP) and Scenario 2 (AM Plan) for 2018-2019 to 2027-2028. Figure 6-6 shows the long term projection for the ACR for the period 2018-2019 to 2056-2057.

**Scenario 1 (current LTFP)**

The ACR is an indicator of the asset age/condition over the total replacement cost of the asset. Best practice asset management recommend a target range from 40% to 80%. The projected ACR for Scenario 1 is observed to decrease progressively from 2018-2019 to 2027-2028 from 51.92% to 35.30%. This is a 32% decrease over the 10 year period indicating that the assets are ageing across the CWMS network. In year 2027-2028, the CWMS infrastructure is in effect 35.30% of its “as new” condition. By the year 2024-2025, the ACR falls below the target range of 40% to 80%. As shown in Figure 6-6, the long term projected ASR progressively decreases to 11.8% in 2056-2057. This indicates that Council’s assets are ageing increasing the likelihood of significant asset replacement in the short term.

**Scenario 2 (AM Plan)**

The projected ACR for Scenario 2 remains within the target range of 40% to 80% from 2018-2019 to 2027-2028. In the long term, the ACR increases to 100% in year 2043-2044 due to the increase in capital expenditure starting from 2035-2036 to 2043-2044 (refer to Figure 5-12 for the projected annual capital expenditure). Assets return to the targeted range at 2056-2057 and remains within the target range as capital expenditure and asset wear and tear become more aligned. Operating at this level of ACR means that there is less likelihood of the need for significant asset replacement in the medium to long term.
Table 6-2: Summary of infrastructure capital sustainability ratios for Scenario 2 (AM Plan)

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Scenario 2 (AM Plan)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ASR (%)</td>
<td>185.70%</td>
<td>175.85%</td>
<td>161.95%</td>
<td>167.45%</td>
<td>164.26%</td>
<td>160.86%</td>
<td>160.46%</td>
<td>150.51%</td>
<td>155.92%</td>
<td>153.34%</td>
</tr>
<tr>
<td>ACR (%)</td>
<td>53.82%</td>
<td>53.62%</td>
<td>56.14%</td>
<td>53.45%</td>
<td>53.45%</td>
<td>53.49%</td>
<td>53.92%</td>
<td>56.99%</td>
<td>54.78%</td>
<td>55.28%</td>
</tr>
<tr>
<td><strong>Scenario 1 (Current LTFP)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ASR (%)</td>
<td>58.11%</td>
<td>57.66%</td>
<td>54.50%</td>
<td>56.79%</td>
<td>56.36%</td>
<td>55.94%</td>
<td>55.53%</td>
<td>52.49%</td>
<td>54.72%</td>
<td>54.32%</td>
</tr>
<tr>
<td>ACR (%)</td>
<td>51.92%</td>
<td>49.43%</td>
<td>49.70%</td>
<td>45.05%</td>
<td>42.87%</td>
<td>40.78%</td>
<td>38.79%</td>
<td>40.97%</td>
<td>37.12%</td>
<td>35.30%</td>
</tr>
</tbody>
</table>

Figure 6-5: ASR of Scenario 1 (current LTFP) and Scenario 2 (AM Plan)
### 6.3.3 Comparison of Scenario 1 and Scenario 2

Table 6-3 shows the comparison summary of Scenario 1 and Scenario 2.

**Table 6-3: Summary of Comparison of Scenario 1 and Scenario 2**

<table>
<thead>
<tr>
<th></th>
<th>Scenario 1</th>
<th>Scenario 2</th>
</tr>
</thead>
</table>
| Operating and maintenance expenditure (Refer to Section 5.6) | Increase in average operating and maintenance expenditure  
- Increase by 16.4% in the first 10 years (average of $2.78 million/year);  
- Increase by 31.8% in first 20 years (average of $3.33 million/year). | Average operating and maintenance expenditure remains relatively constant through the first 20 years.  
- Average of $2.36 million/year for first 10 years  
- Average of $2.47 million/year for first 20 years |
| Level of Service (Refer to Figure 5-10) | Reduction in the level of service as the number of system blockages increase from historical levels. | Reduction in the number of system blockages. |
| No. of blockages /100km/year | Financial Year | No. of blockages /100km/year | Financial Year |
|                           | 186 | 420 | 650 | 1078 | 186 | 160 | 130 | 80 |
| Risk of asset failure | The capital expenditure for CWMS based on the current LTFP is inadequate to cover the required replacement cost of assets that will reach their end of useful life increasing the risk of asset failure. The projected asset backlog will be $55.49 million in 2043-2044 (refer to Section 5.2.3). | Scenario 2 projects a capital expenditure that will ensure that all the critical assets are renewed before the end of their useful life. Although asset backlog is projected to occur over the next 40 years, the assets in backlog should not be critical assets. Therefore the associated risk to service levels, public health and the environment would be “low”. |
| Asset sustainability Assessment | - The ASR indicates poor asset sustainability due to inadequate capital | - High ASR is projected in the short to medium term to be greater than 90% indicating future asset backlog is |

![Figure 6-6: ACR for Scenario 1 (current LTFP) and Scenario 2 (AM Plan)](image-url)
6.4 Funding strategy

Funding strategy will be developed based on this AM Plan. In addition to the information in this AM Plan, the funding strategy will take into consideration the affordability of the typical residential bill and risk of financial hardship on our customers.

6.5 Valuation forecasts

Asset values are forecast to increase as additional assets are added to the asset stock from construction, from acquisition by Council, from assets constructed by land developers which are donated to Council as capital contributions and from capital renewals and upgrades. Figure 6-7 shows the projected increase in CWMS asset value based on Scenario 2 capital renewal and upgrade program and projected contributed asset. Figure 6-7 Projected increase in CWMS Assets from 2018-2019 to 2056-2057. Figure 6-7 and Figure 6-8 show the projected increase in CWMS assets (including contributed assets) and projected depreciation for Scenario 2.

<table>
<thead>
<tr>
<th>Financial Year</th>
<th>CWMS Asset Value Scenario 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018</td>
<td>$0</td>
</tr>
<tr>
<td>2020</td>
<td>$10,000</td>
</tr>
<tr>
<td>2022</td>
<td>$20,000</td>
</tr>
<tr>
<td>2024</td>
<td>$30,000</td>
</tr>
<tr>
<td>2026</td>
<td>$40,000</td>
</tr>
<tr>
<td>2028</td>
<td>$50,000</td>
</tr>
<tr>
<td>2030</td>
<td>$60,000</td>
</tr>
<tr>
<td>2032</td>
<td>$70,000</td>
</tr>
<tr>
<td>2034</td>
<td>$80,000</td>
</tr>
<tr>
<td>2036</td>
<td>$90,000</td>
</tr>
</tbody>
</table>

Figure 6-7: Projected increase in CWMS Assets from 2018-2019 to 2056-2057.
6.6 Forecast reliability and confidence

The expenditure and valuations projections in this AM Plan are based on best available data. Currency and accuracy of data is critical to effective asset and financial management. Data confidence is classified on a 5-level scale\(^4\) as shown in Table 6-4.

Table 6-4: Data confidence grading system

<table>
<thead>
<tr>
<th>Confidence Grade</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Highly reliable</td>
<td>Data based on sound records, procedures, investigations and analysis, documented properly and recognised as the best method of assessment. Dataset is complete and estimated to be accurate ± 2%</td>
</tr>
<tr>
<td>B Reliable</td>
<td>Data based on sound records, procedures, investigations and analysis, documented properly but has minor shortcomings; for example, some of the data is old, some documentation is missing and/or reliance is placed on unconfirmed reports or some extrapolation. Dataset is complete and estimated to be accurate ± 10%</td>
</tr>
<tr>
<td>C Uncertain</td>
<td>Data based on sound records, procedures, investigations and analysis which is incomplete or unsupported, or extrapolated from a limited sample for which grade A or B data are available. Dataset is substantially complete but up to 50% is extrapolated data and accuracy estimated ± 25%</td>
</tr>
<tr>
<td>D Very Uncertain</td>
<td>Data is based on unconfirmed verbal reports and/or cursory inspections and analysis. Dataset may not be fully complete and most data is estimated or extrapolated. Accuracy ± 40%</td>
</tr>
<tr>
<td>E Unknown</td>
<td>None or very little data held</td>
</tr>
</tbody>
</table>

The estimated confidence level for and reliability of data used in this AM Plan is shown in Table 6-5.

---

\(^4\) IPWEA, 2011, IIMM, Table 2.4.6, p 2159.
Table 6-5: Data confidence assessment for data used in AM Plan

<table>
<thead>
<tr>
<th>Data</th>
<th>Confidence Assessment</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demand drivers</td>
<td>B</td>
<td>Unknown Infill Redevelopments (housing, commercial etc.), difficult to determine additional CWMS mains required in future</td>
</tr>
<tr>
<td>Growth projections</td>
<td>B</td>
<td>Population growth was based on data obtained through data acquired by Council’s City Planning and City Strategy. Published state growth projections were used when no other data was available.</td>
</tr>
<tr>
<td>Operations and maintenance expenditures</td>
<td>B</td>
<td>Operating expenditure was calculated using the following information: 1. Historical operating and maintenance expense 2. Growth projections 3. Scheduled works based on asset management plans 4. Analysis of historical data such as system blockage data, flow monitoring data and growth data to develop costings.</td>
</tr>
<tr>
<td>Projected capital expenditures</td>
<td>B</td>
<td>Projected renewal and upgrade cost was based on the following information: 1. Recent construction cost, NSW Water Reference Rates 2. Concept designs based on Water Services Association (WSA 02) Gravity Sewer Code of Australia 3. Alignments of existing catchment concept design with required structures (manholes, maintenance shafts, inspection points) that comply with WSA 02 4. Existing number of connections</td>
</tr>
<tr>
<td>Asset useful lives</td>
<td>B</td>
<td>Useful life was assessed based on 1. Capacity and utilisation of the asset: considers results obtained from flow monitoring. 2. Condition of the asset: considers the risk of asset failure, material of construction, soil type, blockage history, tree protection zone, CCTV footage, seepage and leakage analysis and asset utilisation based on flowrate. 3. Age of the asset</td>
</tr>
</tbody>
</table>
7  PLAN IMPROVEMENT AND MONITORING

7.1  Status of asset management practices

7.1.1  Accounting and financial systems

Council uses Civica Authority as its accounting / financial system.

Accountabilities for financial systems

The Civica system is integrated with Council’s asset management system “AIM”.

Accounting Standards and Regulations

The Australian Accounting Standards provide the benchmark against which Council reports on assets.

Capital/maintenance threshold

Council’s Draft Capitalisation Policy considers issues other than just monitory materiality thresholds when defining expenditure being considered as either maintenance or capital. For CWMS assets capital expenditure relates to pipe replacement whereas maintenance expenditure relates to maintenance works detailed in the CWMS works agreement.

Required changes to accounting financial systems arising from this AM Plan

A new Council asset management system is currently in the development, implementation and rollout phase. The program is “Assetic” and is expected to be rolled out by the end of 2017.

7.1.2  Asset management system

Council currently uses Civica Authority “AIM” for asset management but will migrate to the Assetic system by 2017. Also linked to Civica Authority are Council’s GIS software Mapinfo and Exponaire, which will link to Assetic in future.

Asset Register

- The assets register classes data on size, age, value, and remaining life of the network
- The unit rates for categories of work / material
- The adopted service levels
- Projections of various factors affecting future demand for services
- Correlation between maintenance and renewal
- Data on new assets acquired by Council.

Linkage from asset management to financial system

- The assumed Works Program and trends
- The resulting budget, valuation and depreciation projections
- The useful life analysis.

These will impact the LTTP, the Strategic Business Plan, Annual Budget and departmental business plans and budgets.

Required changes to asset management system arising from this AM Plan

Council is currently developing information flow processes and new asset recognition processes alongside the rollout of its new asset management system.

7.2  Improvement plan

The asset management improvement plan from the last AM Plan (June 2016) is shown in Table 7-1. All actions have been implemented and completed.
Table 7-1: June 2016 AM Improvement plan

<table>
<thead>
<tr>
<th>Task No</th>
<th>Task</th>
<th>Responsibility</th>
<th>Resources Required</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A database of properties connected to CWMS that also have a SA Water sewer connection available is to be developed. This way we can continue to proactively work with property owners to connect onto SA Water and off the CWMS.</td>
<td>Civil Assets, Civil and Water Operations</td>
<td>Implemented</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Update register of blockages against pipe runs electronically using new Asset Management Information System (AMIS)</td>
<td>Civil and Water Operations (CWMS maintenance)</td>
<td>CWMS maintenance team and management</td>
<td>Implemented</td>
</tr>
<tr>
<td>3</td>
<td>Undertake pro-active CCTV inspection of pipes near the end of their useful life and update useful life if necessary. (Target 1% of network per year)</td>
<td>Civil and Water Operations (CWMS Maintenance)</td>
<td>CCTV inspection team and equipment (internal)</td>
<td>Implemented</td>
</tr>
<tr>
<td>4</td>
<td>Undertake revised flow modelling of the CWMS network to monitor impacts of urban infill</td>
<td>Civil and Water Operations (CWMS maintenance)</td>
<td>Project manager, consultant, budget</td>
<td>Implemented</td>
</tr>
<tr>
<td>5</td>
<td>Undertake condition rating investigations of portions of the network shown as required for renewal</td>
<td>Civil and Water Operations (CWMS maintenance)</td>
<td>CCTV inspection team and equipment (internal)</td>
<td>Implemented</td>
</tr>
</tbody>
</table>

Table 7-2 shows the updated improvement plan for this AM Plan.

Table 7-2: Updated improvement plan

<table>
<thead>
<tr>
<th>Task No</th>
<th>Task</th>
<th>Responsibility</th>
<th>Resources Required</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Undertake an updated revaluation of CWMS assets taking into account the updated useful lives of the assets.</td>
<td>Finance, Civil and Water Operations</td>
<td>External and existing internal resource</td>
<td>6 months</td>
</tr>
<tr>
<td>2</td>
<td>Use the new revaluations to update the CWMS AM Plan</td>
<td>Finance, Civil and Water Operations</td>
<td>Not and existing internal resource</td>
<td>12 Months</td>
</tr>
<tr>
<td>3</td>
<td>Develop a funding strategy that would support the CWMS AM Plan.</td>
<td>Finance, Civil and Water Operations</td>
<td>Internal resources</td>
<td>12 months</td>
</tr>
<tr>
<td>4</td>
<td>Identify resources needed to undertake the following activities.</td>
<td>Civil Assets, Civil and Water Operations</td>
<td>Not an existing internal resource</td>
<td>24 months</td>
</tr>
<tr>
<td></td>
<td>1. Continuously update asset management information</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. Undertake hydraulic and flow modelling</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. Concept designs of CWMS assets</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4. Manage asset inspections and investigations</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Task No</td>
<td>Task</td>
<td>Responsibility</td>
<td>Resources Required</td>
<td>Timeline</td>
</tr>
<tr>
<td>---------</td>
<td>----------------------------------------------------------------------</td>
<td>----------------</td>
<td>-------------------</td>
<td>----------</td>
</tr>
<tr>
<td>5.</td>
<td>Review of mains extensions.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Strategic planning and management of the proposed capital works program</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

7.3 Monitoring and review procedures

This AM Plan will be reviewed during annual budget planning processes and amended to recognise any material changes in service levels and/or resources available to provide those services as a result of budget decisions.

The AM Plan will be updated annually to ensure it represents the current service level, asset values, projected operations, maintenance, capital renewal and replacement, capital upgrade/new and asset disposal expenditures and projected expenditure values incorporated into the organisation’s LTFP.

The AM Plan has a life of four years (Council/Board election cycle) and is due for complete revision and updating within two years of each Council/Board election.

7.4 Performance measures

The effectiveness of the AM Plan can be measured in the following ways:

- The degree to which the required projected expenditures identified in this Am Plan are incorporated into Council’s LTFP
- The degree to which the existing and projected service levels and service consequences (what we cannot do), risks and residual risks are incorporated into the Council’s Strategic Plan and associated plans
- Infrastructure sustainability ratios are within optimum or target levels.

8 REFERENCES


9 APPENDICES

9.1 Proposed 10-Year Capital Renewal Upgrade Program

Figure 9-1 Proposed 10-year capital works program. 16.71km of pipes renewed and upgraded.
9.2 Proposed 20-Year Capital Renewal and Upgrade Program

Figure 9-2 Proposed 20-Year capital works program. 48.2km of pipes renewed and upgraded.
9.3 Proposed 30-Year Capital Renewal and Upgrade Program

Figure 9-3 Proposed 30-Year Capital Works Program. 85.8 km of pipes renewed and upgraded.
9.4 Proposed 40-Year Capital Renewal and Upgrade Program

Figure 9-4 Proposed 40-Year Capital Works Program. 97.7km of pipes renewed and upgraded.
9.5 Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AAAC</td>
<td>Average annual asset consumption</td>
</tr>
<tr>
<td>AM</td>
<td>Asset management</td>
</tr>
<tr>
<td>AM Plan</td>
<td>Asset management plan</td>
</tr>
<tr>
<td>ARI</td>
<td>Average recurrence interval</td>
</tr>
<tr>
<td>ASC</td>
<td>Annual service cost</td>
</tr>
<tr>
<td>BOD</td>
<td>Biochemical (biological) oxygen demand</td>
</tr>
<tr>
<td>CRC</td>
<td>Current replacement cost</td>
</tr>
<tr>
<td>CWMS</td>
<td>Community wastewater management systems</td>
</tr>
<tr>
<td>DA</td>
<td>Depreciable amount</td>
</tr>
<tr>
<td>DRC</td>
<td>Depreciated replacement cost</td>
</tr>
<tr>
<td>EF</td>
<td>Earthworks/formation</td>
</tr>
<tr>
<td>IRMP</td>
<td>Infrastructure risk management plan</td>
</tr>
<tr>
<td>LCC</td>
<td>Life cycle cost</td>
</tr>
<tr>
<td>LCE</td>
<td>Life cycle expenditure</td>
</tr>
<tr>
<td>LTFP</td>
<td>Long term financial plan</td>
</tr>
<tr>
<td>MMS</td>
<td>Maintenance management system</td>
</tr>
<tr>
<td>PCI</td>
<td>Pavement condition index</td>
</tr>
<tr>
<td>RV</td>
<td>Residual value</td>
</tr>
<tr>
<td>SoA</td>
<td>State of the Assets</td>
</tr>
<tr>
<td>SS</td>
<td>Suspended solids</td>
</tr>
<tr>
<td>vph</td>
<td>Vehicles per hour</td>
</tr>
<tr>
<td>WDCRC</td>
<td>Written down current replacement cost</td>
</tr>
</tbody>
</table>
9.6 Glossary

**Annual service cost (ASC)**

1) Reporting actual cost
   
The annual (accrual) cost of providing a service including operations, maintenance, depreciation, finance/opportunity and disposal costs less revenue.

2) For investment analysis and budgeting
   
   An estimate of the cost that would be tendered, per annum, if tenders were called for the supply of a service to a performance specification for a fixed term. The annual service cost includes operations, maintenance, depreciation, finance/ opportunity and disposal costs, less revenue.

**Asset**

A resource controlled by an entity as a result of past events and from which future economic benefits are expected to flow to the entity. Infrastructure assets are a sub-class of property, plant and equipment which are non-current assets with a life greater than 12 months and enable services to be provided.

**Asset category**

Sub-group of assets within a class hierarchy for financial reporting and management purposes.

**Asset class**

A group of assets having a similar nature or function in the operations of an entity, and which, for purposes of disclosure, is shown as a single item without supplementary disclosure.

**Asset condition assessment**

The process of continuous or periodic inspection, assessment, measurement and interpretation of the resultant data to indicate the condition of a specific asset so as to determine the need for some preventative or remedial action.

**Asset hierarchy**

A framework for segmenting an asset base into appropriate classifications. The asset hierarchy can be based on asset function or asset type or a combination of the two.

**Asset management (AM)**

The combination of management, financial, economic, engineering and other practices applied to physical assets with the objective of providing the required level of service in the most cost effective manner.

**Asset renewal funding ratio**

The ratio of the net present value of asset renewal funding accommodated over a 10 year period in a long term financial plan relative to the net present value of projected capital renewal expenditures identified in an asset management plan for the same period [AIFMG Financial Sustainability Indicator No 8].

**Average annual asset consumption (AAAC)**

The amount of an organisation’s asset base consumed during a reporting period (generally a year). This may be calculated by dividing the depreciable amount by the useful life (or total future economic benefits/service potential) and totalled for each and every asset OR by dividing the carrying amount (depreciated replacement cost) by the remaining useful life (or remaining future economic benefits/service potential) and totalled for each and every asset in an asset category or class.

**Borrowings**

A borrowing or loan is a contractual obligation of the borrowing entity to deliver cash or another financial asset to the lending entity over a specified period of time or at a specified point in time, to cover both the initial capital provided and the cost of the interest incurred for providing this capital. A borrowing or loan provides the means for the borrowing entity to finance outlays (typically physical assets) when it has insufficient funds of its own to do so, and for the lending entity to make a financial return, normally in the form of interest revenue, on the funding provided.

**Capital expenditure**

Relatively large (material) expenditure, which has benefits, expected to last for more than 12 months. Capital expenditure includes renewal, expansion and upgrade. Where capital projects involve a combination of renewal, expansion and/or upgrade expenditures, the total project cost needs to be allocated accordingly.

**Capital expenditure – expansion**

Expenditure that extends the capacity of an existing asset to provide benefits, at the same standard as is currently enjoyed by existing beneficiaries, to a new group of users. It is discretionary expenditure, which increases future operations and maintenance costs, because it increases the organisation’s asset base, but may be associated with additional revenue from the new user group, e.g. extending a drainage or road network, the provision of an oval or park in a new suburb for new residents.
Capital expenditure – new
Expenditure which creates a new asset providing a new service/output that did not exist beforehand. As it increases service potential it may impact revenue and will increase future operations and maintenance expenditure.

Capital expenditure – renewal
Expenditure on an existing asset or on replacing an existing asset, which returns the service capability of the asset up to its original level. It is periodically required expenditure, relatively large (material) in value compared with the value of the components or sub-components of the asset being renewed. As it reinstates existing service potential, it generally has no impact on revenue, but may reduce future operations and maintenance expenditure if completed at the optimum time; for example, resurfacing or re-sheeting a material part of a road network, replacing a material section of a drainage network with pipes of the same capacity, resurfacing an oval.

Capital expenditure – upgrade
Expenditure that enhances an existing asset to provide a higher level of service or expenditure that will increase the life of the asset beyond its originally projected span. Upgrade expenditure is discretionary and often does not result in additional revenue unless direct user charges apply. It will increase operations and maintenance expenditure in the future because of the increase in the organisation’s asset base, eg. widening the sealed area of an existing road, replacing drainage pipes with pipes of a greater capacity, enlarging a grandstand at a sporting facility.

Capital funding
Funding to pay for capital expenditure.

Capital grants
Monies received generally tied to the specific projects for which they are granted, which are often upgrade and/or expansion or new investment proposals.

Capital investment expenditure
See capital expenditure definition

Capitalisation threshold
The value of expenditure on non-current assets above which the expenditure is recognised as capital expenditure and below which the expenditure is charged as an expense in the year of acquisition.

Carrying amount
The amount at which an asset is recognised after deducting any accumulated depreciation / amortisation and accumulated impairment losses.

Class of assets
See asset class definition

Component
Specific parts of an asset having independent physical or functional identity and having specific attributes such as different life expectancy, maintenance regimes, risk or criticality.

Core asset management
Asset management which relies primarily on the use of an asset register, maintenance management systems, job resource management, inventory control, condition assessment, simple risk assessment and defined levels of service, in order to establish alternative treatment options and long-term cashflow predictions. Priorities are usually established on the basis of financial return gained by carrying out the work (rather than detailed risk analysis and optimised decision- making).

Cost of an asset
The amount of cash or cash equivalents paid or the fair value of the consideration given to acquire an asset at the time of its acquisition or construction, including any costs necessary to place the asset into service. This includes one-off design and project management costs.

Critical assets
Assets for which the financial, business or service level consequences of failure are sufficiently severe to justify proactive inspection and rehabilitation. Critical assets have a lower threshold for action than noncritical assets.

Current replacement cost (CRC)
The cost the entity would incur to acquire the asset on the reporting date. The cost is measured by reference to the lowest cost at which the gross future economic benefits could be obtained in the normal course of business or the minimum it would cost to replace the existing asset with a technologically modern equivalent new asset (not a second-hand one) with the same economic benefits (gross service potential) allowing for any differences in the quantity and quality of output and in operating costs.

Deferred maintenance
The shortfall in rehabilitation work undertaken relative to that required to maintain the service potential of an asset.

Depreciable amount
The cost of an asset, or other amount substituted for its cost, less its residual value.
**Depreciated replacement cost (DRC)**
The current replacement cost (CRC) of an asset less, where applicable, accumulated depreciation calculated on the basis of such cost to reflect the already consumed or expired future economic benefits of the asset.

**Depreciation / amortisation**
The systematic allocation of the depreciable amount (service potential) of an asset over its useful life.

**Economic life**
See useful life definition.

**Expenditure**
The spending of money on goods and services. Expenditure includes recurrent and capital outlays.

**Expenses**
Decreases in economic benefits during the accounting period in the form of outflows or depletions of assets or increases in liabilities that result in decreases in equity, other than those relating to distributions to equity participants.

**Fair value**
The amount for which an asset could be exchanged, or a liability settled, between knowledgeable, willing parties, in an arms length transaction.

**Financing gap**
A financing gap exists whenever an entity has insufficient capacity to finance asset renewal and other expenditure necessary to be able to appropriately maintain the range and level of services its existing asset stock was originally designed and intended to deliver. The service capability of the existing asset stock should be determined assuming no additional operating revenue, productivity improvements, or net financial liabilities above levels currently planned or projected. A current financing gap means service levels have already or are currently falling. A projected financing gap if not addressed will result in a future diminution of existing service levels.

**Heritage asset**
An asset with historic, artistic, scientific, technological, geographical or environmental qualities that is held and maintained principally for its contribution to knowledge and culture and this purpose is central to the objectives of the entity holding it.

**Impairment loss**
The amount by which the carrying amount of an asset exceeds its recoverable amount.

**Infrastructure assets**
Physical assets that contribute to meeting the needs of organisations or the need for access to major economic and social facilities and services, e.g. roads, drainage, footpaths and bikeways. These are typically large, interconnected networks or portfolios of composite assets. The components of these assets may be separately maintained, renewed or replaced individually so that the required level and standard of service from the network of assets is continuously sustained. Generally, the components and hence the assets have long lives. They are fixed in place and often have no separate market value.

**Investment property**
Property held to earn rentals or for capital appreciation or both, rather than for:
(a) use in the production or supply of goods or services or for administrative purposes; or
(b) sale in the ordinary course of business.

**Key performance indicator (KPI)**
A qualitative or quantitative measure of a service or activity used to compare actual performance against a standard or other target. Performance indicators commonly relate to statutory limits, safety, responsiveness, cost, comfort, asset performance, reliability, efficiency, environmental protection and customer satisfaction.

**Level of service**
The defined service quality for a particular service/activity against which service performance may be measured. Service levels usually relate to quality, quantity, reliability, responsiveness, environmental impact, acceptability and cost.

**Life cycle cost **
1. **Total LCC** The total cost of an asset throughout its life including planning, design, construction, acquisition, operation, maintenance, rehabilitation and disposal costs.
2. **Average LCC** The life cycle cost (LCC) is the average cost to provide the service over the longest asset life cycle. It comprises average operations, maintenance expenditure plus asset consumption expense, represented by depreciation expense projected over 10 years. The LCC does not indicate the funds required to provide the service in a particular year.
Life cycle expenditure
The life cycle expenditure (LCE) is the average operations, maintenance and capital renewal expenditure accommodated in the LTFP over 10 years. LCE may be compared to average life cycle cost to give an initial indicator of affordability of projected service levels when considered with asset age profiles.

Loans / borrowings
See borrowings.

Maintenance
All actions necessary for retaining an asset as near as practicable to an appropriate service condition, including regular ongoing day-to-day work necessary to keep assets operating; e.g. road patching but not including rehabilitation or renewal. It is operating expenditure required to ensure that the asset reaches its expected useful life.

- Planned maintenance
  Repair work that is identified and managed through a maintenance management system (MMS). MMS activities include inspection, assessing the condition against failure/breakdown criteria/experience, prioritising scheduling, actioning the work and reporting what was done to develop a maintenance history and improve maintenance and service delivery performance.

- Reactive maintenance
  Unplanned repair work that is carried out in response to service requests and management/supervisory directions.

- Specific maintenance
  Maintenance work to repair components or replace sub-components that need to be identified as a specific maintenance item in the maintenance budget.

- Unplanned maintenance
  Corrective work required in the short term to restore an asset to working condition so it can continue to deliver the required service or to maintain its level of security and integrity.

Maintenance expenditure *
Recurrent expenditure, which is periodically or regularly required as part of the anticipated schedule of works required to ensure that the asset achieves its useful life and provides the required level of service. It is expenditure, which was anticipated in determining the asset’s useful life.

Materiality
The notion of materiality guides the margin of error acceptable, the degree of precision required and the extent of the disclosure required when preparing general purpose financial reports. Information is material if its omission, mis-statement or non-disclosure has the potential, individually or collectively, to influence the economic decisions of users, taken on the basis of the financial report, or to affect the discharge of accountability by the management or governing body of the entity.

Modern equivalent asset
Assets that replicate what is in existence with the most cost-effective asset performing the same level of service. It is the most cost-efficient, currently available asset which will provide the same stream of services as the existing asset is capable of producing. It allows for technology changes and, improvements and efficiencies in production and installation techniques.

Net present value (NPV)
The value to the organisation of the cash flows associated with an asset, liability, activity or event calculated using a discount rate to reflect the time value of money. It is the net amount of discounted total cash inflows after deducting the value of the discounted total cash outflows arising from eg the continued use and subsequent disposal of the asset after deducting the value of the discounted total cash outflows.

Non-revenue-generating investments
Investments for the provision of goods and services to sustain or improve services to the community that are not expected to generate any savings or revenue to the Council; e.g. parks and playgrounds, footpaths, roads and bridges, libraries, etc.

Operations
Regular activities to provide services such as public health, safety and amenity; e.g. street sweeping, grass mowing and street lighting.

Operating expenditure
Recurrent expenditure, which is continuously required to provide a service. In common use the term typically includes, power, fuel, staff, plant equipment, on-costs and overheads, but excludes maintenance and depreciation. Maintenance and depreciation is instead included in operating expenses.
Operating expense
The gross outflow of economic benefits, being cash and non-cash items, during the period arising in the course of ordinary activities of an entity when those outflows result in decreases in equity, other than decreases relating to distributions to equity participants.

Operating expenses
Recurrent expenses continuously required to provide a service, including power, fuel, staff, plant equipment, maintenance, depreciation, on-costs and overheads.

Operations, maintenance and renewal financing ratio
Ratio of estimated budget to projected expenditure for operations, maintenance and renewal of assets over a defined time (e.g. 5, 10 and 15 years).

Operations, maintenance and renewal gap
Difference between budgeted expenditures in a long-term financial plan (or estimated future budgets in absence of a LTFP) and projected expenditures for operations, maintenance and renewal of assets to achieve/maintain specified service levels, totalled over a defined time (e.g. 5, 10 or 15 years).

Pavement management system (PMS)
A systematic process for measuring and predicting the condition of road pavements and wearing surfaces over time and recommending corrective actions.

PMS Score
A measure of condition of a road segment determined from a Pavement Management System.

Rate of annual asset consumption *
The ratio of annual asset consumption relative to the depreciable amount of the assets. It measures the amount of the consumable parts of assets that are consumed in a period (depreciation) expressed as a percentage of the depreciable amount.

Rate of annual asset renewal *
The ratio of asset renewal and replacement expenditure relative to depreciable amount for a period. It measures whether assets are being replaced at the rate they are wearing out with capital renewal expenditure expressed as a percentage of depreciable amount (capital renewal expenditure/DA).

Rate of annual asset upgrade/new *
A measure of the rate at which assets are being upgraded and expanded per annum with capital upgrade/new expenditure expressed as a percentage of depreciable amount (capital upgrade/expansion expenditure/DA).

Recoverable amount
The higher of an asset's fair value, less costs to sell and its value in use.

Recurrent expenditure
Relatively small (immaterial) expenditure or that which has benefits expected to last less than 12 months. Recurrent expenditure includes operations and maintenance expenditure.

Recurrent funding
Funding to pay for recurrent expenditure.

Rehabilitation
See capital renewal expenditure definition above.

Remaining useful life
The time remaining until an asset ceases to provide the required service level or economic usefulness.

Renewal
See capital renewal expenditure definition above.

Residual value
The estimated amount that an entity would currently obtain from disposal of the asset, after deducting the estimated costs of disposal, if the asset were already of the age and in the condition expected at the end of its useful life.

Revenue-generating investments
Investments for the provision of goods and services to sustain or improve services to the community that are expected to generate some savings or revenue to offset operating costs, eg public halls and theatres, childcare centres, sporting and recreation facilities, tourist information centres, etc.

Risk management
The application of a formal process to the range of possible values relating to key factors associated with a risk in order to determine the resultant ranges of outcomes and their probability of occurrence.

Section or segment
A self-contained part or piece of an infrastructure asset.

Service potential
The total future service capacity of an asset. It is normally determined by reference to the operating capacity and economic life of an asset. A measure of service potential is used in the not-for-profit sector/public sector to value assets, particularly those not producing a cash flow.
**Service potential remaining**
A measure of the future economic benefits remaining in assets. It may be expressed in dollar values (Fair Value) or as a percentage of total anticipated future economic benefits. It is also a measure of the percentage of the asset’s potential to provide services that is still available for use in providing services (depreciated replacement cost (DRC) / depreciable amount (DA)).

**Specific maintenance**
Replacement of higher value components/subcomponents of assets that is undertaken on a regular cycle, including repainting, replacement of air conditioning equipment, etc. This work generally falls below the capital/maintenance threshold and needs to be identified in a specific maintenance budget allocation.

**Strategic Longer-Term Plan**
A plan covering the term of office of councillors (4 years minimum) reflecting the needs of the community for the foreseeable future. It brings together the detailed requirements in the Council’s longer-term plans such as the AM Plan and the LTFP. The plan is prepared in consultation with the community and details where the Council is at that point in time, where it wants to go, how it is going to get there, mechanisms for monitoring the achievement of the outcomes and how the plan will be resourced.

**Sub-component**
Smaller individual parts that make up a component part.

**Useful life**
Either:
(a) the period over which an asset is expected to be available for use by an entity, or
(b) the number of production or similar units expected to be obtained from the asset by the entity.
It is estimated or expected time between placing the asset into service and removing it from service, or the estimated period of time over which the future economic benefits embodied in a depreciable asset, are expected to be consumed by the Council.

**Value in use**
The present value of future cash flows expected to be derived from an asset or cash generating unit. It is deemed to be depreciated replacement cost (DRC) for those assets whose future economic benefits are not primarily dependent on the asset’s ability to generate net cash inflows, where the entity would, if deprived of the asset, replace its remaining future economic benefits.

Source: IPWEA, 2009, Glossary
Additional and modified glossary items shown *
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