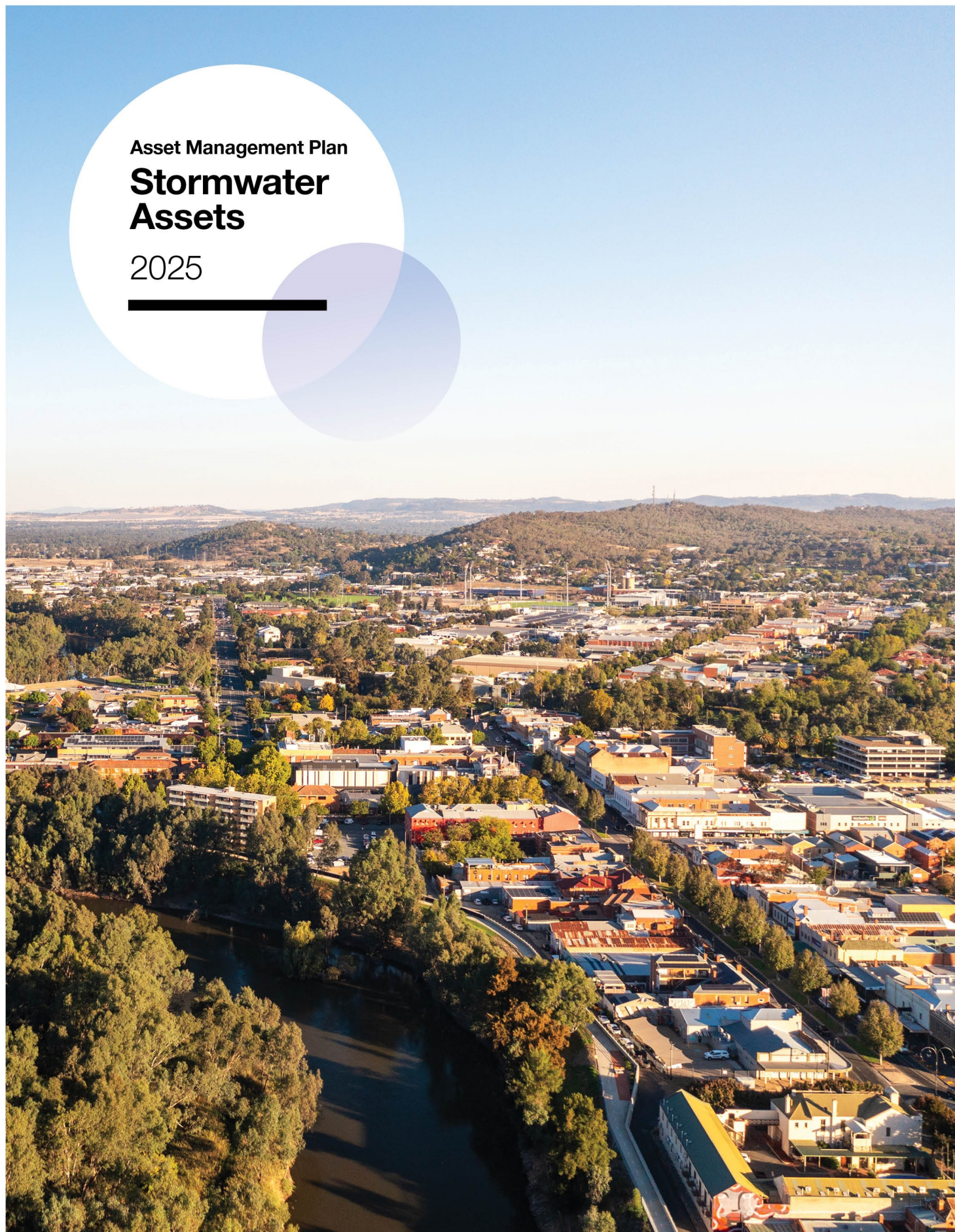


Asset Management Plan

Stormwater Assets

2025



City of
Wagga Wagga

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1.0 EXECUTIVE SUMMARY

1.1 Purpose of the Plan

Asset Management Plans (AM Plan) provide a strategic framework for managing our community's infrastructure assets, ensuring they remain safe, reliable, and capable of meeting current and future demands.

This AM Plan aims to:

- Provide a systematic approach to asset management.
- Address critical risks associated with ageing infrastructure and limited funding.
- Ensure infrastructure supports the community's social, economic, and environmental goals.

This AM Plan details information about Wagga Wagga City Council's (Council) stormwater assets with key actions required to maintain service levels, optimise lifecycle costs, and support long term financial sustainability.

The plan defines the services, how they are provided and what funds are required to provide the services over the next 10-year planning period. The AM Plan expenditure forecasts inform the Long Term Financial Plan which typically considers a 10-year planning period.

1.2 Asset Description

Council's stormwater network consists of several asset types to help provide stormwater services throughout the Local Government Area (LGA).

Table 1.2: Stormwater Assets

Asset Category	Quantity	Replacement Value
Stormwater Pipes	482kms	\$203,907,270
Stormwater Pits	14,890	\$41,918,718
Stormwater Pump Station	6	\$921,390
Levee Banks	21kms	\$39,675,813
Channels	50kms / 143 channels	\$58,641,464
Detention Basins	50	\$27,302,888
Flood Gates	57	\$1,126,969
Gross Pollutant Traps	8	\$871,512
TOTAL		\$374,366,024

1.3 Levels of Service

This plan covers Council's stormwater assets and includes those assets required to perform stormwater services and prevent flooding across the Wagga Wagga Local Government Area (LGA).

The allocation in the planned budget is insufficient to continue providing stormwater maintenance services at their current levels for the planning period. The allocation in the planned budget is insufficient to fund the renewal of existing assets and to provide upgrades and new stormwater assets over the planning period.

The main service consequences of the planned budget for renewal and acquisitions are:

- Renewal of stormwater assets cannot be undertaken as required or as they come due

- Risk of flooding will remain for the community

1.4 Future Demand

The factors influencing future demand and the impacts they have on service delivery are created by:

- Population, demographic and technological changes
- Seasonal and economic factors including climate change
- Land development and planning regulatory changes
- Shifts in community expectations

1.5 Lifecycle Management Plan

How we plan to manage and operate the assets at the agreed levels of service throughout their lifecycle is contingent on Council's 10-year Long Term Financial Plan (LTFP).

Furthermore, when Council commits to the upgrade of existing assets and the acquisition of new assets, future operations, maintenance and renewal costs including depreciation will increase.

1.5.1 What does it Cost?

The lifecycle costs necessary to provide the services covered by this AM Plan include operations, maintenance, renewal and upgrade of existing assets, and the acquisition of new assets to meet demand. Disposal of assets is also considered.

When lifecycle costs are prepared for a minimum 10-year planning period, they can be used to inform the 10-year LTFP. The first 10-year lifecycle forecast is estimated to cost \$80,477,871 or \$8,047,787 on average per year.

Depreciation is excluded from these cost estimates.

1.5.2 What we will do

The funding made available in the first 10-years of the LTFP is \$24,941,377 or \$2,494,138 on average per year, which is approximately 31% of the required cost to undertake the lifecycle activities.

The reality is, only what is funded in the LTFP can be provided. Informed decision making relies on the AM Plan emphasising the consequences of planned budgets on the service levels provided and communicating the residual risks. It is important to ensure the organisation is delivering the services in a financially sustainable manner.

We plan to provide the following services over the 10-year period of this AM Plan:

- Operate, maintain, renew and acquire stormwater assets to meet the service levels set in annual budgets
- Renew and upgrade the ageing Murray Street drainage line
- Undertake an upgrade of the North Wagga Levee system

1.5.3 What we cannot do

We currently do not allocate enough budget to sustain services at the proposed standard including the provision of new assets.

The 10-year LTFP results in a shortfall of \$5,553,649 on average per year of the forecast lifecycle costs required to provide services.

Works and services that cannot be provided under present funding levels are:

- Renew all stormwater assets in conditions 4 and 5 or as they come due.
- Not being able to eliminate the hotspots identified in the Major Overland Flow Flood Study.

1.6 Risk Management

The planned budget is insufficient to continue to manage risks of the stormwater network in the medium term.

The main risk consequences are:

- An increased risk of asset failure within the stormwater network
- Flooding at identified flood hotspots will continue
- Risk of flooding will remain for the community

1.7 Financial Summary

Providing financially sustainable and affordable services from infrastructure requires the careful management of service levels, costs and risks.

Two keys indicators of sustainable service delivery that are considered in this AM Plan are the Asset Renewal and Lifecycle Funding ratios. Based on the required costs and planned budget for providing stormwater services outlined in this plan, the forecast indicators for this planning period are:

- Asset Renewal Funding Ratio – 5%
- Lifecycle Funding Ratio – 31%

Asset values are forecast to increase as additional assets are added to the stormwater network.

1.8 Assumptions and Improvement Planning

Key assumptions made in this AM Plan are:

- Assets are consumed at a constant rate over the pre-defined standard useful lives recorded in Council's asset management system for each of the asset categories.
- Present service levels will remain constant for the life of the plan.
- Present levels of expenditure (and the relative distribution of planned and reactive maintenance, and capital renewals & new/upgrades) will remain constant for the life of the plan.

The Alternate method has been used to forecast the renewal lifecycle costs for this AM Plan.

This AM Plan is based on a reliable level of confidence in the asset data.

The next steps resulting from this AM Plan to improve asset management practices are:

- Develop and improve Council's overall asset management maturity, practices and processes
- Develop a condition inspection regime for stormwater pits and pipes
- Develop a condition based renewal model for stormwater pits and pipes

2.0 INTRODUCTION

2.1 Background

This AM Plan communicates the actions and necessary funds required to sustainably deliver services through the careful management of assets for the foreseeable future.

This AM Plan is to be read in conjunction with Council's planning documents. This should include the Asset Management Policy and Strategy along with the following planning documents:

- Community Strategic Plan (CSP) 2050
- Long Term Financial Plan 2025-2026
- Local Strategic Planning Statement (LSPS) – Planning for the future: Wagga Wagga 2040
- Wagga Wagga City Council Development Servicing Plan (DSP) Stormwater 2007
- Major Overland Flow Flood Study (MOFFS)
- Village Overland Flow Flood Study (VOFFS)
- Wagga Wagga Development Control Plan (DCP) 2010

The infrastructure assets included in this plan have a total replacement value of \$374,366,024 as at 30 June 2024.

Key stakeholders in the preparation and implementation of this AM Plan are shown in Table 2.1.

Table 2.1: Key Stakeholders in the AM Plan

Key Stakeholder	Role in Asset Management Plan
Wagga Wagga City Council (Councillors)	<ul style="list-style-type: none">■ Represent the needs of the community,■ Allocate resources to meet planning objectives in providing services while managing risks,■ Ensure service sustainability.
General Manager and Executive staff	Direct and support Council staff in balancing of agreed service levels and financial ability to provide these services.
Federal Member	Represent community interest within the Federal seat of Riverina.
State Member	Represent community interest within the State seat of Wagga Wagga.
Council staff	<ul style="list-style-type: none">■ Deliver the agreed levels of service for infrastructure assets for the members of the Wagga Wagga community■ Maintain a proactive approach to using asset management practices and processes to make informed decisions
Wagga Wagga Community Members (including residents and businesses)	Report perceived shortcomings, damage and safety concerns with current infrastructure within the LGA.
Federal & State Government Authorities and Agencies	<ul style="list-style-type: none">■ Provide input into overall infrastructure performance in conjunction with infrastructure under their jurisdiction.■ Provide financial support through grants and contributions to allow Council to achieve its asset renewal, maintenance and operational goals.
Wagga Wagga City Council Floodplain Risk Management Advisory Committee	Provide advice to Council on the development, implementation and delivery of actions contained in the WWCC Floodplain Risk Management Study and Plan (2018).
WaterNSW	Consultation during significant local runoff events, particularly when coinciding with Riverine flooding events.

2.2 Principles, Goals and Objectives of Asset Management

The principles of asset management as per the International Standards for asset management are:

- **Value:** asset management focuses on the value assets provide to the organisation over time.
- **Alignment:** asset management aligns financial, technical and operational decisions with organisational objectives.
- **Leadership:** leadership and sustained commitment at all levels are crucial for successful asset management.¹

Our goal for managing infrastructure assets is to deliver the defined level of service (as amended from time to time) in the most cost effective manner for present and future consumers.

The key objectives of infrastructure asset management as defined by the International Infrastructure Management Manual are:

- Defining levels of service and monitoring performance,
- Managing the impact of growth through demand management and infrastructure investment,
- Taking a lifecycle approach to developing cost-effective management strategies for the long-term that meet the defined level of service,
- Identifying, assessing and appropriately controlling risks, and
- Linking to a Long Term Financial Plan which accommodates the required expenditure and how it will be funded.²

¹ ISO 55000:2024 Asset Management – Vocabulary, overview, and principles

² IPWEA International Infrastructure Management Manual (IIMM), Sec 1.2.1

3.0 LEVELS OF SERVICE

Levels of service define the standards and performance targets that infrastructure assets are expected to meet to ensure they provide reliable, safe, and efficient services to the community.

3.1 Customer Research and Expectations

This AM Plan is prepared to facilitate consultation prior to adoption of levels of service by Council. Council has conducted local government satisfaction surveys since 2006. The survey samples residents on the levels of satisfaction with Council services and their importance.

The results of these surveys are interpreted into a quadrant analysis. This analysis combines the stated needs of the community and addresses Council's performance in relation to these needs.

Figure 3.1 below outlines the results of the most recent Community Satisfaction survey undertaken in 2024.

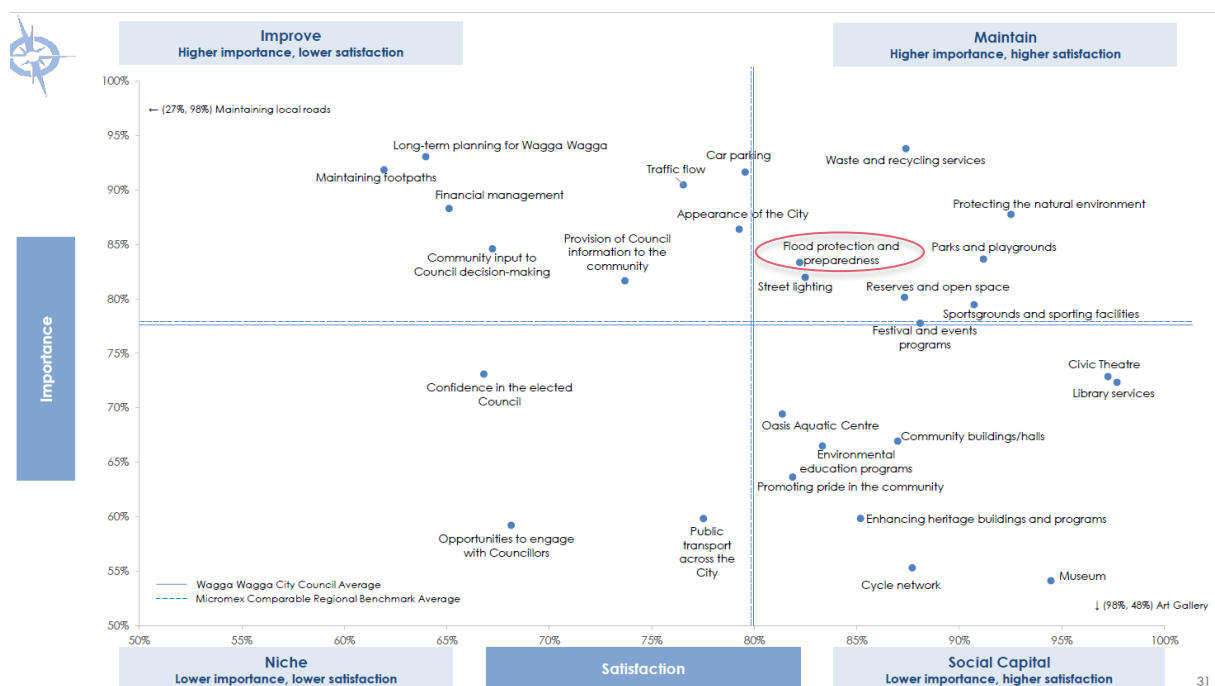


Figure 3.1: Community Satisfaction Survey 2024

The 2024 Community Satisfaction survey highlighted the following in relation to the stormwater network:

- Flood protection and preparedness had an importance rating of 83% and a satisfaction rating of 82%

When compared to the previous 2021 survey, the importance and satisfaction ratings for flood protection and preparedness have remained relatively steady, with a slight decrease in satisfaction – down from 85% in 2021.

3.2 Strategic and Corporate Goals

This AM Plan is prepared in conjunction with the future vision outlined in Council's Community Strategic Plan (CSP) 2050, "Wagga Wagga - a vibrant, growing and sustainable regional city". The Community Strategic Plan 2050 identifies four (4) strategic focus areas developed in consultation with the community:

- Vibrant – Wagga Wagga is a vibrant place to live, work and visit. We foster a thriving cultural, social, and recreational life, where health, creativity, diversity and our rich cultural heritage is valued, and people feel safe and secure within our community.

- Growing – Wagga Wagga is a progressive regional city with a strong economic future for our Local Government Area and wider region. Wagga Wagga is the Southern Regional Capital of NSW.
- Sustainable – We plan for future generations with a focus on sustainability. We protect the environment and embrace best practice as we move towards net zero emissions for the community and Council.
- Regional Leader – Wagga Wagga is a regional leader. We lead by example and set the standard for innovation, collaboration and resilience driving progress. Our approach is underpinned by good governance and planning.

Within each of these focus areas, the CSP outlines objectives and indicators which will allow Council to further define what the community's long-term vision will look like once it is realised and how we are going to measure the success of each of the focus areas and their objectives.

Asset Management Planning at Council aligns with both the Growing and Regional Leader strategic focus areas within the Community Strategic Plan 2050 and particularly the following objectives and strategies:

- Enabling Infrastructure – Wagga Wagga has a real focus on enabling infrastructure to catalyse and underpin growth.
 - Provide essential infrastructure, including sewer, roads, key housing enabling infrastructure to support growth.
 - Deliver critical community infrastructure to facilitate growth and attract business.
- Planning for the future – Wagga Wagga has sound planning for the future of Wagga Wagga.
 - Adopt a sound approach to strategic planning to ensure that we are preparing for future growth requirements of the city.

For Council's stormwater network services, the Sustainable strategic focus area also needs to be considered, in particular the following objective and strategy:

- Climate action – Wagga Wagga is resilient to natural hazards and acting on climate change.
 - Support the community to prepare for and recover from the impacts of natural hazards and climate change.

3.3 Legislative Requirements

There are many legislative requirements relating to the management of assets. Legislative requirements that impact the delivery of Council's stormwater network services are outlined in Table 3.3.

Table 3.3: Legislative Requirements

Legislation	Requirement
Local Government Act 1993	Sets out role, purpose, responsibilities and powers of local governments including the preparation of a long term financial plan supported by asset management plans for sustainable service delivery.
Local Government (General) Regulation 2021	Sets out roles, purposes, responsibilities and powers of local government, in addition to those set out in the Local Government Act 1993, including integrated planning and reporting guidelines.
Environmental Planning & Assessment Act 1979	Requirement for Local Environmental Plans and Development Control Plans. Provides for Council control of development of towns and approval of infrastructure expansion.
State Emergency and Rescue Management Act 1989	Council is a key participant planning and supporting emergency management through its role as an infrastructure owner, but also as the Local Emergency Management Officer (LEMO) for the Local Emergency Management Committee and administrator of the Local Emergency Management Plan.

Australian Accounting Standards	Provide the conceptual framework and standards for accounting and financial reporting.
Work Health and Safety Act 2011	Impacts all operations in relation to safety of workers and the public. Council's responsibility to ensure health, safety and welfare of employees and others at places of work.
Work Health and Safety Regulation 2017	Sets out the specific duties for managing hazards and risks to ensure health, safety and welfare.
Wagga Wagga Local Environmental Plan 2010	Defines land use restrictions within the Wagga Wagga Local Government Area.

3.4 Customer Values

Service levels are defined in three ways, customer values, customer levels of service and technical levels of service.

Customer Values indicate:

- What aspects of the service is important to the customer,
- Whether they see value in what is currently provided and
- The likely trend over time based on the current budget provision

Table 3.4 outlines the current customer feedback received on Council's stormwater network from the Community Satisfaction Survey held in 2024.

Table 3.4: Customer Values

Customer Values	Customer Satisfaction Measure	Current Feedback	Expected Trend Based on Planned Budget
Flood protection and preparedness	Community Satisfaction Survey 2024	Importance – 83% Satisfaction – 82%	Expected to remain steady

3.5 Customer Levels of Service

The Customer Levels of Service are considered in terms of:

Condition How good is the service ... what is the condition or quality of the service?

Function Is it suitable for its intended purpose Is it the right service?

Capacity/Use Is the service over or under used ... do we need more or less of these assets?

Table 3.5 outlines the current condition performance (as at 30 June 2024) of Council's stormwater network.

Table 3.5: Customer Level of Service Measures

Type of Measure	Level of Service	Performance Measure	Current Performance
Condition	Stormwater assets in conditions 4 and 5 are renewed	Condition ratings	Condition 1 – 28.65% Condition 2 – 44.14% Condition 3 – 16.28% Condition 4 – 6.02% Condition 5 – 4.91%

3.6 Technical Levels of Service

To deliver on the customer values, and impact Customer Levels of Service, Council has a number of operational and technical measures of performance. These measures relate to the lifecycle activities and allocation of resources to best achieve the desired customer outcomes and demonstrate effective performance.

Service and asset managers plan, implement and control technical service levels to influence service outcomes.³

³ IPWEA, 2015, IIMM, p 2|28.

Table 3.6 shows the lifecycle activities related to the current 10-year planned budget, and the forecast costs recommended in this AM Plan.

Table 3.6: Technical Levels of Service

Lifecycle Activity	Purpose of Activity	Activity Description	Required Costs	Planned Budget	Funding Ratio
Acquisition	Jubilee Oval to Red Hill Rd - Wagga West DSP Area - Implement Stormwater Drainage Improvements	Stormwater infrastructure upgrades at Jubilee Park.	\$295,946	\$295,946	
	Stormwater - Day, Higgins, Tarcutta St - Wagga West DSP Area Drainage Upgrade	Stormwater drainage works identified in Stormwater Development Servicing Plan (DSP).	\$328,458	\$328,458	
	Stormwater - Kincaid St end to Flowerdale pumping station drainage - Wagga West DSP Area	Drainage improvements for the end of Kincaid Street to the Flowerdale Pump Station - 800 metres.	\$810,935	\$810,935	
	Stormwater - Lloyd Contour Ridge approx 5 km - Wagga West DSP Area Drainage Upgrade	Drainage from the Contour ridge line (Lloyd) approximately 5 kms to the urban west DSP boundary	\$157,660	\$157,660	
	Stormwater - Murray St Project	Replacement and upgrade of ageing Murray Street drainage line.	\$2,952,750	\$2,952,750	
	Stormwater - Tarcoola Drainage Extension	Stormwater drainage works identified in Stormwater DSP.	\$495,657	\$495,657	
	Levee System Upgrade - North Wagga (1 in 20)	Upgrade and strengthening of the North Wagga Levee system.	\$7,919,811	\$2,604,334	
	Stormwater - Tarcutta Drainage Upgrade & Supplementary Levee	Provision of a supplementary levee within the Tarcutta township.	\$359,804	\$359,804	
	Red Hill Road and Glenfield Road basin upgrade to increase capacity (GD01)	Drainage upgrade works identified in the MOFFS.	\$1,000,000	\$0	
	Adjin Street and Maher Street intersection – upgrade	Drainage upgrade works identified in the MOFFS.	\$800,000	\$0	

Lifecycle Activity	Purpose of Activity	Activity Description	Required Costs	Planned Budget	Funding Ratio
	stormwater infrastructure to increase capacity (GD02)				
	Increase storage of Anderson Oval basin and swale drain (GD03)	Drainage upgrade works identified in the MOFFS.	\$510,000	\$0	
	Raise Lake Albert Road to increase the capacity of Lake Albert (LA01)	Drainage upgrade works identified in the MOFFS.	\$1,900,000	\$0	
	Divert Crooked Creek to Lake Albert to increase capacity (LA02)	Drainage upgrade works identified in the MOFFS.	\$500,000	\$0	
	Divert Stringybark Creek to Lake Albert to increase capacity (LA03)	Drainage upgrade works identified in the MOFFS.	\$1,300,000	\$0	
	Automate the main Bolton Park drainage gate (SW02)	Drainage upgrade works identified in the MOFFS.	\$100,000	\$0	
	Upgrade stormwater assets at McNickle Road and Roach Road intersection (FM02)	Drainage upgrade works identified in the MOFFS.	\$300,000	\$0	
	Install new trunk drainage at Rabaul Plan to divert water from Glenfield Drain to Ashmont Drain (GD04)	Drainage upgrade works identified in the MOFFS.	\$2,900,000	\$0	
		Total Acquisition	\$22,631,021	\$8,005,545	35%
Maintenance	Maintain stormwater assets across the LGA	Conduct maintenance on assets as required across the stormwater network.	\$1,346,285 average per year	\$1,346,285 average per year	
	Maintain levee banks across the LGA	Conduct minor maintenance as required across the network.	\$139,914 average per year	\$139,914 average per year	
		Total Maintenance	\$14,861,989	\$14,861,989	100%

Lifecycle Activity	Purpose of Activity	Activity Description	Required Costs	Planned Budget	Funding Ratio
Renewal	Stormwater assets in conditions 4 and 5 are renewed	Develop a renewal plan based on the current replacement cost of each stormwater asset	\$40,911,017	\$0	
	Copland St Industrial Area - Stormwater Drainage	Renewal of stormwater assets within industrial area.	\$658,989	\$658,989	
	Glenfield Road Drain Remediation	Priority renewal works for corridor north of Fernleigh Rd.	\$1,414,854	\$1,414,854	
		Total Renewal	\$42,984,860	\$2,073,843	5%

It is important to monitor the service levels regularly as circumstances can and do change. Current performance is based on existing resource provision and work efficiencies. It is acknowledged that circumstances such as technology and customer priorities will change over time.

4.0 FUTURE DEMAND

Future demand refers to the anticipated need for infrastructure services driven by factors such as population movement, economic development, technological advancements, and changing environmental or community expectations.

4.1 Demand Drivers

A demand driver refers to the factors or trends that influence the need for infrastructure services and capacity. The factors influencing future demand are created by:

- Population, demographic and technological changes
- Seasonal and economic factors including climate change
- Land development and planning regulatory changes
- Shifts in community expectations

Demand drivers help predict future infrastructure needs and guide planning and investment decisions.

Demand for infrastructure is generated predominantly through either an increased utilisation of existing infrastructure brought about by the factors above or the requirement for new infrastructure to meet the needs of growth in new development.

The demand created by these two circumstances requires analysis to consider the ramifications to existing infrastructure networks and the ability of these networks to cope with the increased infrastructure. This analysis applies in all cases ranging from new subdivisions creating an increased load on existing networks, to changes in existing areas leading to increasing or decreasing utilisation and demand on infrastructure assets.

4.2 Impacts and Demand Management Plan

The impact on service delivery is managed through a combination of managing and upgrading existing assets and the provision of new assets to meet demand. Demand management practices can include non-asset solutions, insuring against risks and managing failures.

A demand management plan will be considered as part of future revisions of this AM Plan.

4.3 Asset Programs to meet Demand

The new assets required to meet demand may be acquired, donated or constructed.

Acquiring new assets will commit Council to ongoing operations, maintenance and renewal costs. These future costs and expenses are identified and considered in developing future forecasts for the long term financial plan.

4.4 Climate Change Adaptation

The impacts of climate change may have a significant impact on the assets we manage and the services they provide. In the context of the Asset Management Planning process climate change can be considered as both a future demand and a risk that needs to be managed.

How climate change impacts on assets will vary depending on the location and the type of services provided, as will the way in which we respond and manage those impacts.⁴

As a minimum we consider how to manage our existing assets given potential climate change impacts for our region such as dual purpose usage of existing assets.

⁴ IPWEA Practice Note 12.1 Climate Change Impacts on the Useful Life of Infrastructure

Risk and opportunities identified to date are shown in Table 4.5.1

Table 4.5.1 Managing the Impact of Climate Change on Assets and Services

Climate change risk	Impact on services	Climate Change Management Plan
Increased intensity of storm events	Increased flooding and storm events result in the capacity of the assets within the stormwater network being exceeded – leading to localised flooding, decreased access, community complaints and increased maintenance and renewal costs.	Implement actions from the Floodplain Risk Management Plan and Major Overland Flow Flood Study
Increased flooding		Review modelling and design requirements to allow for greater flow volumes and upgraded pump capacities.

Additionally, the way in which we construct new and upgrade existing assets should recognise that there is opportunity to build in resilience to climate change impacts. Building resilience can have the following benefits:

- Assets will withstand the impacts of climate change;
- Services can be sustained; and
- Assets that can endure may potentially lower the lifecycle cost and reduce their carbon footprint.

Table 4.5.2 summarises opportunities to build climate change resilience into new and existing assets.

Table 4.5.2 Building Climate Change Resilience into New and Existing Assets

Asset Description	Climate Change Impact	Resilience Plan
Stormwater Network	Intensity, Frequency and Duration (IFD) of rainfall is predicted to increase over the city.	Ensure overland flow paths are considered when building new development areas.
	Increased risk of stronger and more frequent storm events.	Address MOFFS and VOFFS identified hotspots.

The impact of climate change on new and existing assets is evolving and new opportunities will be considered in future revisions of this AM Plan.

5.0 LIFECYCLE MANAGEMENT PLAN

The lifecycle management plan details how Council plans to manage and operate the assets at the agreed levels of service throughout their entire lifecycle, from acquisition to disposal. The goal is to maximise the value of the assets while minimising costs and risks, ensuring they continue to meet performance requirements over time.

From a financial perspective, infrastructure activities tend to be classified as being either Operating or Capital. The lifecycle activities used in the asset management and financial planning and reporting process cover:

■ Capital

- **Acquisition** – the activities to provide a higher level of service (e.g. upgraded levee banks) or a new service that did not exist previously (e.g. new stormwater pipes).
- **Renewal** – the activities that replace or restore assets to the standard it had originally provided (e.g. relining of stormwater pipes and pits).

■ Operating

- **Operations** - the routine activities that keep services accessible and effective, balancing efficiency with user expectations (e.g. cleaning, mowing grass, electricity)
- **Maintenance** – the preventative and corrective actions to sustain asset functionality and minimise unexpected failures. Maintenance activities enable an asset to provide service for its planned life (e.g. flood gate repairs).
- **Disposal** – the decommissioning, removing, or repurposing of assets that are no longer cost-effective, safe, or necessary (e.g. decommissioning stormwater pump).

A pictorial representation of the asset lifecycle activities is shown below in Figure 5.0.



Figure 5.0: Asset Lifecycle Activities

5.1 Background Data

5.1.1 Physical parameters

The assets covered by this AM Plan are shown in Table 5.1.1.

Table 5.1.1: Assets covered by this Plan

Asset Category	Quantity	Replacement Value
Stormwater Pipes	482kms	\$203,907,270
Stormwater Pits	14,890	\$41,918,718
Stormwater Pump Station	6	\$921,390
Levee Banks	21kms	\$39,675,813
Channels	50kms / 143 channels	\$58,641,464
Detention Basins	50	\$27,302,888
Flood Gates	57	\$1,126,969
Gross Pollutant Traps	8	\$871,512
TOTAL		\$374,366,024

All quantities and values shown above are as at 30 June 2024.

5.1.2 Asset capacity and performance

Assets are generally provided to meet design standards where these are available. However, there is insufficient resources to address all known deficiencies. Locations where deficiencies in service performance are known are summarised below:

- Crooked Creek – upstream of Craft Street and downstream of Brunskill Road
- Stringybark Creek area
- Wollundry Lagoon drainage area
- Flowerdale Lagoon area
- Turvey Park overland flow path
- Glenfield Road industrial areas
- East Wagga industrial area

The above service deficiencies have been identified from the Major Overland Flow Flood Study (MOFFS) undertaken in 2021.

5.1.3 Asset condition

The condition of Council's stormwater network assets is currently monitored through a combination of internal and external resources. Condition assessments of stormwater assets are undertaken every 3-5 years in line with the asset revaluation process. The most recent condition assessments were undertaken in 2020, with sample inspections of the stormwater pipes and pits being completed. Internal inspections of stormwater pipes and pits are currently completed on an ad-hoc basis, with a proactive inspection program to commence in the near future.

Condition is measured using a 1 – 5 grading system⁵ as detailed in Table 5.1.3. It is important that a consistent approach is used in reporting asset performance enabling effective decision support. A finer grading system may be used at a more specific level, however, for reporting in the AM plan results are translated to a 1 – 5 grading scale for ease of communication.

Table 5.1.3: Condition Grading System

Condition Grading	Description of Condition
1	Excellent: free of defects, only planned and/or routine maintenance required
2	Good: minor defects, increasing maintenance required plus planned maintenance
3	Average: defects requiring regular and/or significant maintenance to reinstate service
4	Poor: significant defects, higher order cost intervention likely
5	Very Poor: physically unsound and/or beyond rehabilitation, immediate action required

The condition profile of Council’s stormwater network assets is shown in Figure 5.1.3.

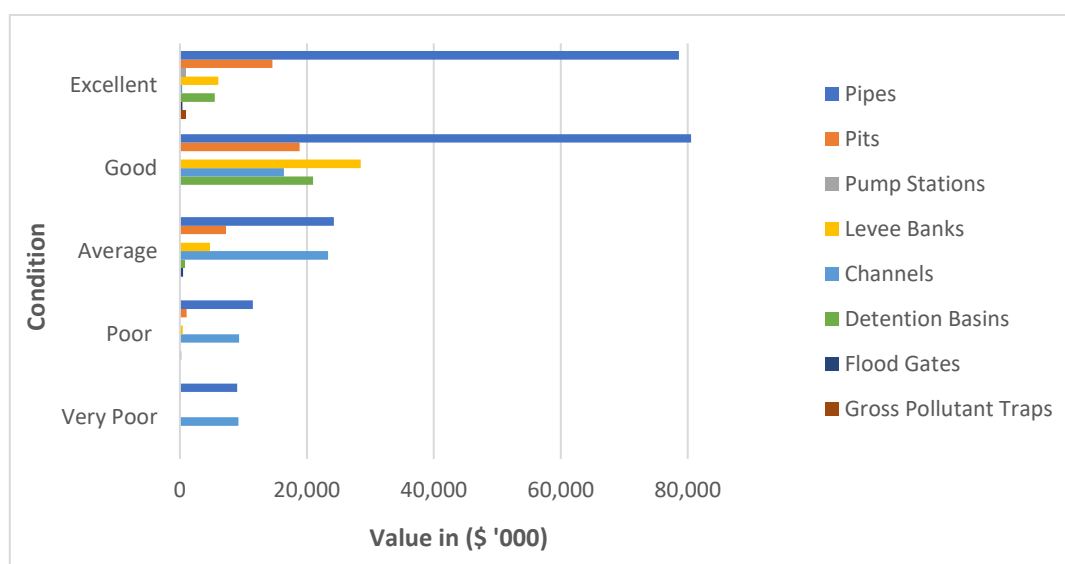


Figure 5.1.3: Asset Condition Profile

5.2 Operations and Maintenance Plan

Operations include regular activities to provide services. Examples of typical operational activities include cleaning, asset inspection, and utility costs such as electricity, gas and water.

Maintenance includes all activities necessary for ensuring an asset remains in an appropriate service condition including regular ongoing day-to-day work necessary to keep assets operating. Examples of typical maintenance activities for stormwater assets include removing blockages caused by debris, leaves, branches and foreign matter washed into inlet pits during rain events.

The trend in maintenance expenditure and forecast budgets is shown in Table 5.2.1.

⁵ IPWEA, 2015, IIMM, Sec 2.5.4, p 2|80.

Table 5.2.1: Maintenance Expenditure and Budget Trends

Year	Expenditure/Budget
2022/23 Actual Maintenance	\$738,756
2023/24 Actual Maintenance	\$832,234
2024/25 Budgeted Maintenance	\$1,436,063
2025/26 Budgeted Maintenance	\$1,381,333

Maintenance budget levels are considered to be adequate to meet the current service level provided for by Council.

Assessment and priority of reactive maintenance is undertaken by staff using experience and judgement.

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. The hierarchy includes the asset class and component used for asset planning and financial reporting and service level hierarchy used for service planning and delivery.

The asset service hierarchy is shown in Table 5.2.2.

Table 5.2.2: Asset Service Hierarchy

Asset Category	Asset Components
Stormwater Pipes	Assets are recognised as a single component.
Stormwater Pits	Assets are recognised as a single component.
Stormwater Pump Station	Assets are recognised as two separate components: <ul style="list-style-type: none"> ▪ Wet well ▪ Pump house
Levee Banks	Assets are recognised as a single component.
Channels	Assets are recognised as a single component.
Detention Basins	Assets are recognised as a single component.
Flood Gates	Assets are recognised as a single component.
Gross Pollutant Traps	Assets are recognised as a single component.

Summary of forecast operations and maintenance costs

Forecast operations and maintenance costs are expected to vary in relation to the total value of the asset stock. If additional assets are acquired, the future operations and maintenance costs are forecast to increase. If assets are disposed of, the forecast operation and maintenance costs are expected to decrease. Figure 5.2 shows the forecast operations and maintenance costs relative to the proposed operations and maintenance planned budget.

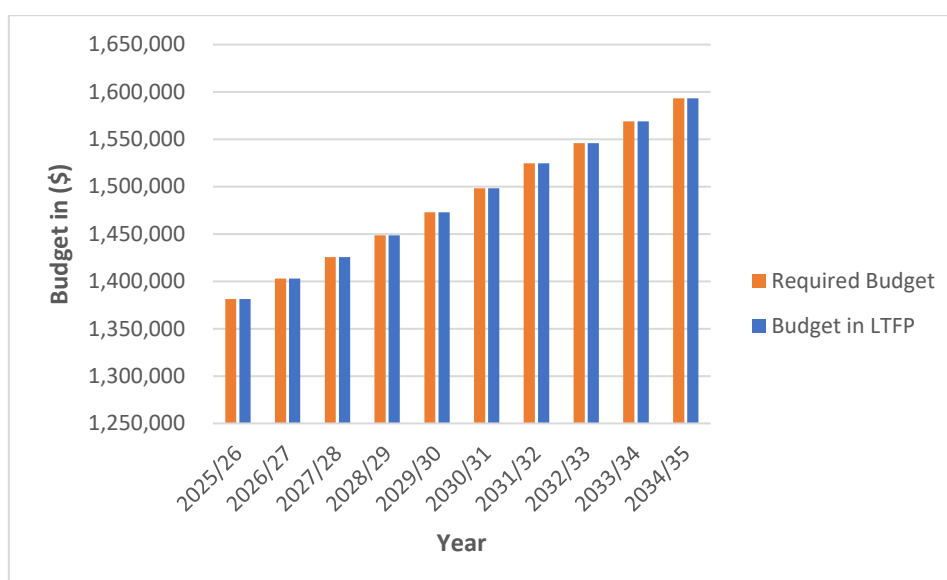


Figure 5.2: Operations and Maintenance Summary

The current budget in the long term financial plan is sufficient for Council to continue to provide the current level of service for maintaining its stormwater network assets. Council does not currently separate its operational costs from its maintenance costings, including condition assessments and inspections, and have listed this as a medium-term improvement.

5.3 Renewal Plan

Renewal is major capital work which does not significantly alter the original service provided by the asset, but restores, rehabilitates, replaces or renews an existing asset to its original service potential. Work over and above restoring an asset to original service potential is considered to be an acquisition resulting in additional future operations and maintenance costs.

Assets requiring renewal are identified from one of two approaches.

- The first method uses Asset Register data to project the renewal costs (replacement cost) and renewal timing (acquisition year plus updated useful life to determine the renewal year), or
- The second method uses an alternative approach to estimate the timing and cost of forecast renewal work (i.e. condition modelling system, staff judgement, average network renewals, or other).

The useful lives of stormwater asset range from 25 to 100 years. These asset useful lives were last reviewed during the revaluation of stormwater assets in 2020. Table 5.3 outlines the current useful lives of stormwater network assets.

Table 5.3: Useful Lives of Stormwater Assets

Asset Category	Useful Life
Stormwater Pipes	60 to 100 years
Stormwater Pits	100 years
Stormwater Pump Station	25 to 50 years
Levee Banks	60 to 100 years
Channels	100 years
Detention Basins	100 years

Asset Category	Useful Life
Flood Gates	50 years
Gross Pollutant Traps	50 years

The estimates for renewals in this AM Plan were based on the Alternate Method, using the cost to renew any stormwater assets in conditions 4 and 5.

5.3.1 Renewal ranking criteria

Asset renewal is typically undertaken to either:

- Ensure the reliability of the existing infrastructure to deliver the service it was constructed to facilitate (e.g. relining of a stormwater pipe), or
- To ensure the infrastructure is of sufficient quality to meet the service requirements (e.g. condition of stormwater pits).⁶

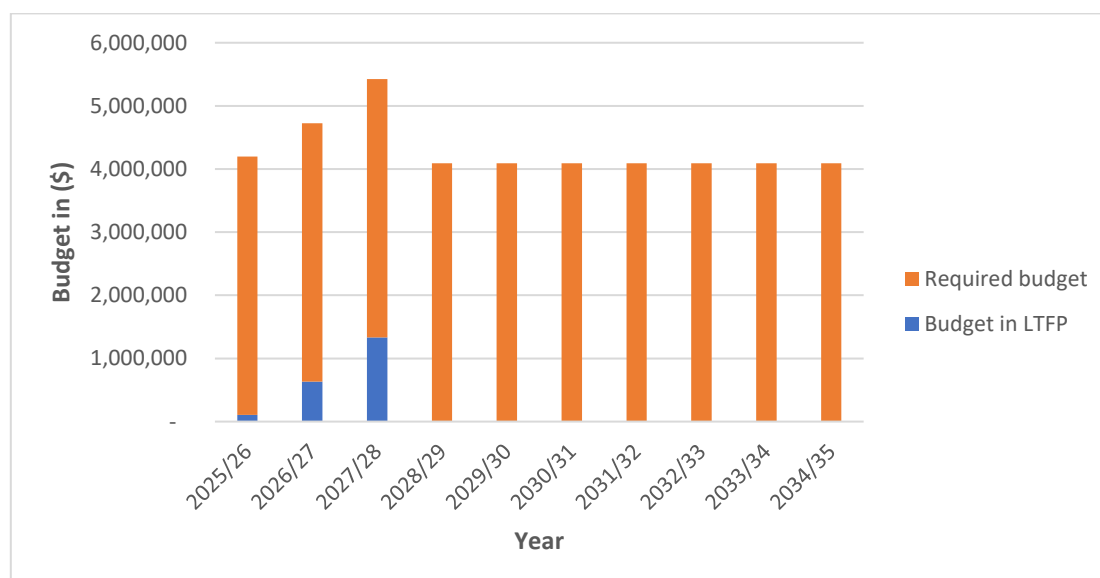
It is possible to prioritise renewals by identifying assets or asset groups that:

- Have a high consequence of failure,
- Have high use and subsequent impact on users would be significant,
- Have higher than expected operational or maintenance costs, and
- Have potential to reduce life cycle costs by replacement with a modern equivalent asset that would provide the equivalent service.⁷

Council does not currently have a formalised renewal ranking criteria for its stormwater network assets. It is proposed to develop this as an improvement for future AM Plans.

5.3.2 Summary of future renewal costs

Forecast renewal costs are projected to increase over time if the asset stock increases. The forecast costs associated with renewals are shown relative to the proposed renewal budget in Figure 5.3.2.



⁶ IPWEA, 2015, IIMM, Sec 3.4.4, p 3|91.

⁷ Based on IPWEA, 2015, IIMM, Sec 3.4.5, p 3|97.

Figure 5.3.2: Forecast Renewal Costs

Council's Long Term Financial Plan identifies a number of specific asset renewal projects across the 10-year planning period. Even though these individual projects have been budgeted for, there continues to be no identified ongoing renewal budget for stormwater assets, which is resulting in a significant shortfall in required renewal funding over the planning period.

5.4 Acquisition Plan

Acquisition reflects new assets that did not previously exist or works which will upgrade or improve an existing asset beyond its original service level. They may result from growth, demand, social or environmental needs. Assets may also be donated to Council.

Forecast acquisition costs for the 10-year planning period are summarised in Figure 5.4.1.

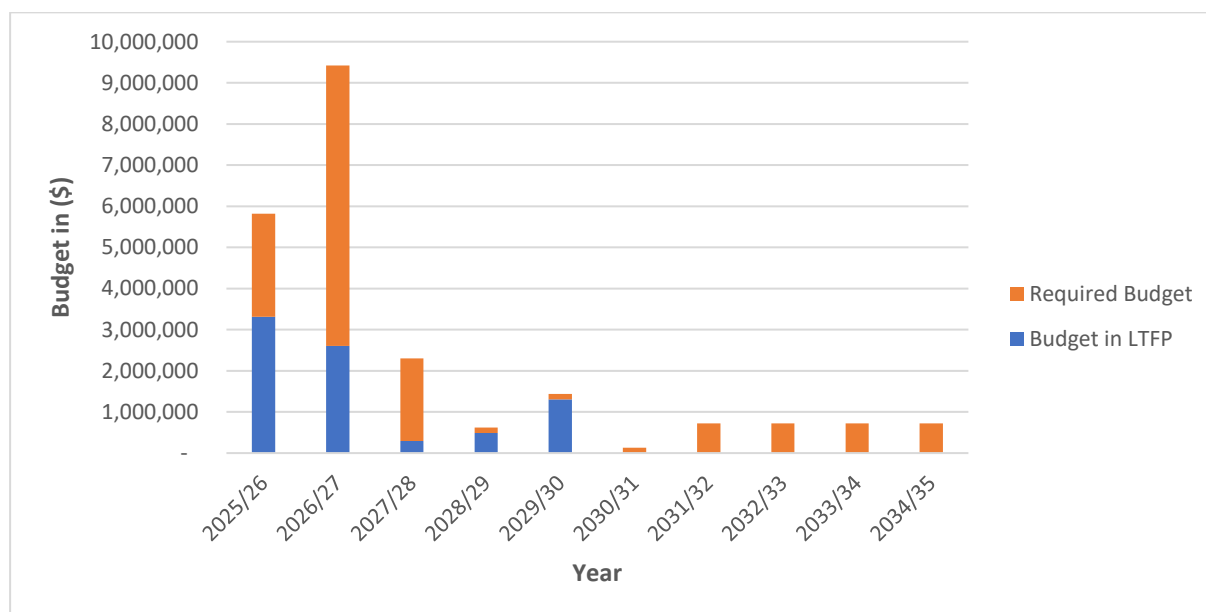


Figure 5.4.1: Acquisition Summary

Council has a number of new stormwater network assets identified in its Major Overland Flow Flood Study that require consideration as future network asset upgrade and construction projects. These proposed projects have been considered in the development of this AM Plan and are currently unfunded within Council's long term financial plan.

5.4.1 Selection criteria

Proposed acquisition of new assets, and upgrade of existing assets, are identified from various sources such as community requests, proposals identified by strategic plans or partnerships with others. Potential upgrade and new works should be reviewed to verify that they are essential to Council's needs.

When Council commits to new assets, they must be prepared to fund future operations, maintenance and renewal costs. When reviewing the long-term impacts of asset acquisition, it is useful to consider the cumulative value of the acquired assets being taken on by Council.

Expenditure on new assets and services in the capital works program will be accommodated in the long term financial plan, but only to the extent that there is available funding.

5.5 Disposal Plan

Disposal includes any activity associated with the disposal of a decommissioned asset including sale, demolition or relocation. At this time, Council has not identified any specific stormwater assets within its network for disposal. From time to time, Council may elect to upsize or remove stormwater assets as part of its capital works program identified within the Long Term Financial Plan.

5.6 Summary of Lifecycle Costs and Planned Budget

The financial projections from this asset management plan are shown in Figure 5.6.1. These projections include forecast costs for acquisition, maintenance and renewal. These forecast costs are shown relative to the proposed budget for the planning period.

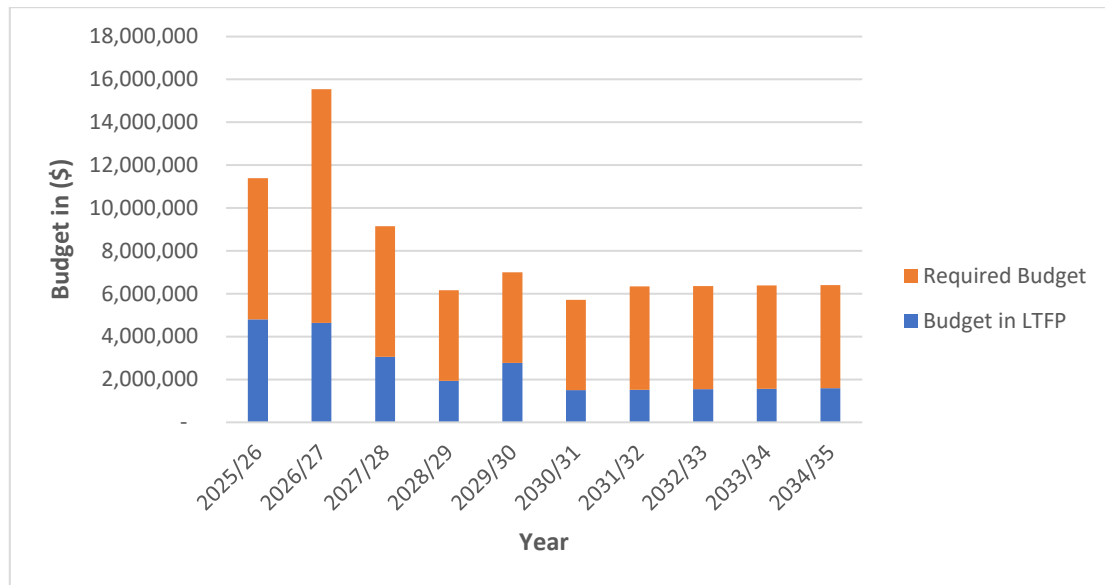


Figure 5.6.1: Lifecycle Costs and Planned Budget Summary

6.0 RISK MANAGEMENT PLANNING

The purpose of infrastructure risk management is to document the findings and recommendations resulting from the periodic identification, assessment and treatment of risks associated with providing services from infrastructure, using the fundamentals of International Standard ISO 31000:2018 Risk management – Principles and guidelines.

Risk Management is defined in ISO 31000:2018 as: ‘coordinated activities to direct and control with regard to risk’⁸.

An assessment of risks associated with service delivery will identify risks that will result in loss or reduction in service, personal injury, environmental impacts, a ‘financial shock’, reputational impacts, or other consequences. The risk assessment process identifies credible risks, the likelihood of the risk event occurring, and the consequences should the event occur. The risk assessment should also include the development of a risk rating, evaluation of the risks and development of a risk treatment plan for those risks that are deemed to be non-acceptable.

6.1 Critical Assets

Critical assets are defined as those which have a high consequence of failure causing significant loss or reduction of service. Critical assets have been identified and along with their typical failure mode, and the impact on service delivery. Failure modes may include physical failure, collapse or essential service interruption.

The entire stormwater network is considered critical within this AM Plan.

By identifying critical assets and failure modes an organisation can ensure that investigative activities, condition inspection programs, maintenance and capital expenditure plans are targeted at critical assets.

6.2 Risk Assessment

The risk management process used is shown in Figure 6.2 below.

It is an analysis and problem-solving technique designed to provide a logical process for the selection of treatment plans and management actions to protect the community against unacceptable risks.

The process is based on the fundamentals of International Standard ISO 31000:2018.

⁸ ISO 31000:2018, p 2

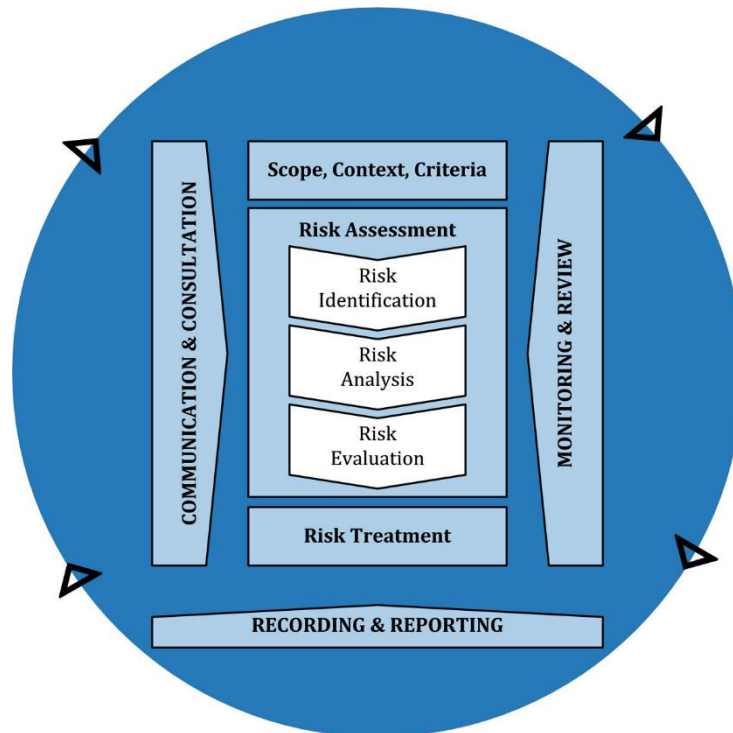


Figure 6.2 Risk Management Process – Abridged
Source: ISO 31000:2018, Figure 1, p9

The risk assessment process identifies credible risks, the likelihood of the risk event occurring, the consequences should the event occur, development of a risk rating, evaluation of the risk and development of a risk treatment plan for non-acceptable risks.

An assessment of risks associated with service delivery will identify risks that will result in loss or reduction in service, personal injury, environmental impacts, a 'financial shock', reputational impacts, or other consequences.

6.3 Infrastructure Resilience Approach

The resilience of our critical infrastructure is vital to the ongoing provision of services to customers. To adapt to changing conditions we need to understand our capacity to 'withstand a given level of stress or demand', and to respond to possible disruptions to ensure continuity of service.

Resilience recovery planning, financial capacity, climate change risk assessment and crisis leadership.

We do not currently measure our resilience in service delivery. This will be considered for future iterations of the AM Plan.

6.4 Service and Risk Trade-Offs

The decisions made in adopting this AM Plan are based on the objective to achieve the optimum benefits from the available resources.

6.4.1 What we cannot do

There are some operations and maintenance activities and capital projects that are unable to be undertaken within the next 10 years. These include:

- Renewing stormwater assets in conditions 4 and 5 or as they come due.
- Not being able to eliminate the hotspots identified in the Major Overland Flow Flood Study.
- Deliver some proposed capital works projects without the receipt of grant funding from other levels of government.

6.4.2 Service trade-off

If there is forecast work (operations, maintenance, renewal, acquisition or disposal) that cannot be undertaken due to available resources, then this will result in service consequences for users. These service consequences include:

- Stormwater assets will not be renewed and may increase instances of failure or non-performance.
- New and upgraded stormwater assets may not be delivered.

6.4.3 Risk trade-off

The operations and maintenance activities and capital projects that cannot be undertaken may sustain or create risk consequences. These risk consequences include:

- Increased risk of asset failure due to a lack of asset renewals over the planning period.
- Flooding at identified hotspots will continue.

These actions and expenditures are considered and included in the forecast costs, and where developed, the Risk Management Plan.

7.0 FINANCIAL SUMMARY

This section contains the financial and valuation forecasts resulting from the information presented in the previous sections of this plan. Forecasts will be improved as the discussion on sustainable levels of service, risk and cost matures.

7.1 Sustainable Service Delivery

7.1.1 Financial Indicators

There are two key indicators of sustainable service delivery that are considered in the AM Plan for this service area. The two indicators are the:

- Asset Renewal Funding Ratio (planned renewal budget / forecast renewal outlays for the next 10 years), and
- Lifecycle Funding Ratio (planned lifecycle budget for the next 10 years / forecast lifecycle outlays for the next 10 years identified in the AM Plan).

Asset Renewal Funding Ratio

Asset Renewal Funding Ratio⁹ 5%

The Asset Renewal Funding Ratio illustrates that over the next 10 years we expect to have 5% of the funds required for the optimal renewal of assets.

Lifecycle Funding Ratio – 10-year financial planning period

This AM Plan identifies the forecast operations, maintenance and renewal costs required to provide the levels of service to the community over a 10-year period. This provides input into the 10-year Long Term Financial Plan (LTFP) aimed at providing the required services in a sustainable manner.

This forecast work can be compared to the planned budget over the first 10 years of the planning period to identify any funding shortfall.

The forecast maintenance, acquisition and renewal costs over the 10-year planning period is \$80,477,871 or \$8,047,787 on average per year.

The funding made available in the first 10 years of the LTFP is \$24,941,377 or \$2,494,138 on average per year, giving a 10-year funding shortfall of \$5,553,649 per year. This indicates that **31%** of the forecast costs needed to provide the services documented in this AM Plan are accommodated in the proposed budget.

Providing sustainable and affordable services from infrastructure requires the management of service levels, risks, forecast outlays and financing to achieve a financial indicator of approximately 100% for the first years of the AM Plan and ideally over the 10-year life of the Long Term Financial Plan.

7.1.2 Forecast Costs (outlays) for the Long Term Financial Plan

Table 7.1.2 shows the forecast costs (outlays) required for consideration in the 10-year long term financial plan.

Providing services in a financially sustainable manner requires a balance between the forecast outlays required to deliver the agreed service levels with the planned budget allocations in the long term financial plan.

A gap between the forecast outlays and the amounts allocated in the financial plan indicates further work is required on reviewing service levels in the AM Plan and/or financial projections in the LTFP.

We will manage any 'gap' by communicating the service performance, cost, and risk implications in consultation with the community and key stakeholders.

⁹ AIFMM, 2015, Version 1.0, Financial Sustainability Indicator 3, Sec 2.6, p 9.

Table 7.1.2: Forecast Costs (Outlays) for the Long Term Financial Plan

Year	Acquisition	Maintenance	Renewal
2025/26	\$5,815,888	\$1,381,333	\$4,198,142
2026/27	\$9,423,144	\$1,402,910	\$4,722,857
2027/28	\$2,299,279	\$1,425,464	\$5,426,149
2028/29	\$619,451	\$1,448,517	\$4,091,102
2029/30	\$1,439,925	\$1,472,807	\$4,091,102
2030/31	\$133,333	\$1,498,125	\$4,091,102
2031/32	\$725,000	\$1,524,525	\$4,091,102
2032/33	\$725,000	\$1,546,015	\$4,091,102
2033/34	\$725,000	\$1,568,939	\$4,091,102
2034/35	\$725,000	\$1,593,354	\$4,091,102
Total	\$22,631,021	\$14,861,989	\$42,984,860

7.2 Valuation Forecasts

The best available estimate of the value of assets included in this AM Plan are shown below.

The assets included within this plan are valued at fair value:

Current Replacement Cost \$374,366,024

Depreciable Amount \$374,366,024

Net Carrying Amount¹⁰ \$255,599,521

Annual Depreciation Expense \$3,734,395

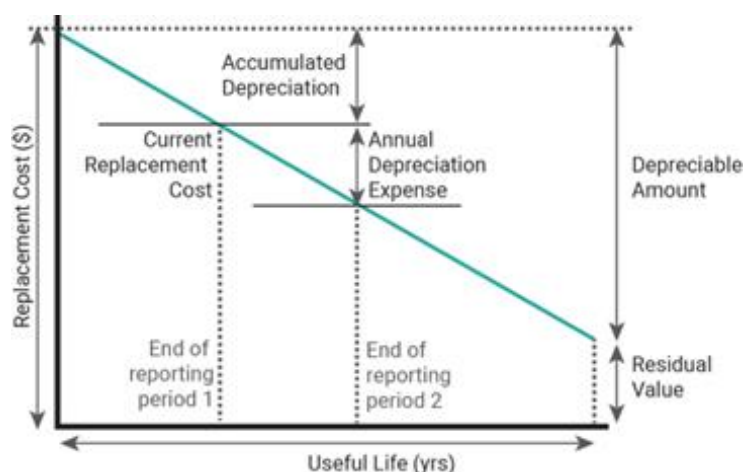


Figure 7.2.1: Valuation Terminology

Asset values are forecast to increase as additional assets are added to Council's asset base. Acquiring new assets will add to existing operations, maintenance, future renewal, and depreciation expenses.

¹⁰ Also reported as Written Down Value.

8.0 ASSUMPTIONS AND IMPROVEMENT PLANNING

8.1 Data and Information Sources

8.1.1 Accounting and financial data sources

This AM Plan utilises accounting and financial data sourced from its Technology One finance system and myData asset management software.

8.1.2 Asset management data sources

This AM Plan utilises asset management data sourced from Council's myData asset management software.

8.2 Key Assumptions

In compiling this AM Plan, it was necessary to make some assumptions. This section details the key assumptions made in the development of this AM plan and should provide readers with an understanding of the level of confidence in the data behind the forecasts.

Key assumptions made in this AM Plan are:

- Assets are consumed at a constant rate over the pre-defined standard useful lives recorded in Council's asset management system for each of the asset categories.
- Present service levels will remain constant for the life of the plan.
- Present levels of expenditure (and the relative distribution of planned and reactive maintenance, and capital renewals & new/upgrades) will remain constant for the life of the plan.

8.3 Forecast Reliability and Confidence

The forecast demands, costs, planned budgets, and valuation projections in this AM Plan are based on the best available data. For effective asset management and financial planning and reporting, it is critical that the information is reliable and up to date. Data confidence is classified on an A to E level scale in accordance with the guidance provided in the International Infrastructure Management Manual.¹¹

Table 8.3: Data Confidence Grading System

Confidence Grade	Description
A. Very High	Data based on sound records, procedures, investigations and analysis, documented properly and agreed as the best method of assessment. Dataset is complete and estimated to be accurate $\pm 2\%$
B. High	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 $\pm 10\%$
C. Medium	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 $\pm 25\%$
D. Low	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 $\pm 40\%$

¹¹ IPWEA, 2015, IIMM, Table 2.4.6, p 2|71.

Confidence Grade	Description
E. Very Low	None or very little data held.

The estimated confidence level for and reliability of data used in this AM Plan is considered to be of Medium confidence.

8.4 Improvement Plan

It is important that we recognise gaps in the planning process that require improvement to ensure effective asset management and informed decision making. The improvement plan generated from this AM Plan is shown in Table 8.4.

Table 8.4: Improvement Plan

Task	Task	Responsibility	Resources Required	Timeline
1	Develop a condition inspection regime for stormwater pipes and pits	Manager Wastewater & Stormwater	Staff time	Short term
2	Develop a condition based renewal model for stormwater pipes and pits	Senior Financial Accountant	Staff time	Medium term
3	Develop required operations and maintenance costs for stormwater asset types	Manager Wastewater & Stormwater	Staff time	Medium term
4	Develop a renewal ranking criteria for Council's different stormwater asset types	Manager Wastewater & Stormwater	Staff time	Medium term

8.5 Monitoring and Review Procedures

This AM Plan will be reviewed and updated annually to ensure it represents the current service level, asset values, forecast operations, maintenance, renewals, acquisition and asset disposal costs and planned budgets. The forecast costs and proposed budget are incorporated into the Long Term Financial Plan or will be incorporated into the Long Term Financial Plan.

The AM Plan has a maximum life of 4 years and is due for complete revision and updating within 12 months of each Local Government election.

8.6 Performance Measures

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

- The degree to which the required forecast costs identified in this AM Plan are incorporated into the Long Term Financial Plan,
- The degree to which the existing and projected service levels and service consequences, risks and residual risks are incorporated into the Strategic Planning documents and associated plans,
- The Asset Renewal Funding Ratio achieves the Office of Local Government benchmark target (greater than 100%).

9.0 REFERENCES

- IPWEA, 'International Infrastructure Management Manual', Institute of Public Works Engineering Australasia, Sydney, <https://www.ipwea.org/resourcesnew/bookshop/iimm>
- IPWEA, 'NAMS+ - A Toolkit for Asset Management Planning', Institute of Public Works Engineering Australasia, Sydney, <https://www.ipwea.org/resourcesnew/namsplus>
- IPWEA, 2024 'International Infrastructure Financial Management Manual', Institute of Public Works Engineering Australasia, Sydney, <https://www.ipwea.org/resourcesnew/bookshop/iifmm>
- IPWEA, 2018, Practice Note 12.1, 'Climate Change Impacts on the Useful Life of Assets', Institute of Public Works Engineering Australasia, Sydney, <https://www.ipwea.org/resourcesnew/bookshop/pn12-1>
- IPWEA, 2012, Practice Note 6 Long-Term Financial Planning, Institute of Public Works Engineering Australasia, Sydney, <https://www.ipwea.org/publications/ipweabookshop/practicenotes/pn6>
- IPWEA, 2014, Practice Note 8 – Levels of Service & Community Engagement, Institute of Public Works Engineering Australasia, Sydney, <https://www.ipwea.org/publications/ipweabookshop/practicenotes/pn8>
- ISO, 2024, ISO 55000:2024 Asset Management – Vocabulary, overview, and principles
- ISO, 2018, ISO 31000:2018 Risk management – Guidelines
- Wagga Wagga City Council, Community Strategic Plan 2050
- Wagga Wagga City Council, Long Term Financial Plan 2025-2026
- Wagga Wagga City Council, Local Strategic Planning Statement – Planning for the future: Wagga Wagga 2040
- Wagga Wagga City Council, Development Servicing Plan Stormwater 2007
- Wagga Wagga City Council, Major Overland Flow Flood Study (MOFFS)
- Wagga Wagga City Council, Village Overland Flow Flood Study (VOFFS)
- Wagga Wagga City Council, Wagga Wagga Development Control Plan (DCP) 2010
- Building Resilience to Climate Change – Climate Change Risk Assessment & Adaptation Options for Council Assets – Report for City of Wagga Wagga 2018