ASSET MANAGEMENT PLAN

CITY OF GREATER GERALDTON

BRIDGES, MAJOR CULVERTS AND FLOODWAYS

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Name		**Position**	**Signature**		
Dale Hughes		Talis Consultants - Director – Asset Management Section Leader	Digitally signed by Dale Hughes Date: 2021-07-02 11:31:53		

The entity can choose either template to write/update their plan regardless of their level of asset management maturity and in some cases may even choose to use only the Executive Summary.

The illustrated content is suggested only and users should feel free to omit content as preferred (e.g. where info is not currently available).

This Asset Management Plan may be used as a supporting document to inform an overarching Strategic Asset Management Plan.

Contents

1.0 EXECUTIVE SUMMARY

1.1 The Purpose of the Plan

The Asset Management Plan (AM Plan) outlines the required asset management activities for Bridge, Major Culvert and Floodway's (BCF) to provide an agreed level of service in the most cost-effective manner while outlining associated risks. The AM plan defines the services to be provided, how the services are provided and what funds are required to deliver over the 10-year planning period. The AM Plan is intended to link to a Long-Term Financial Plan which typically considers a 10-year planning period.

A core outcome of the AM Plan is to provide visibility of the current state of assets and reduce exposure to unexpected asset failures and associated financial obligations.

Individual AM Plans may be developed as an operational guide for individual BCF assets which can assist with scheduling corrective actions if deemed necessary. In the absence of individualised Plans, this AM Plan provides overall guidance and assessment for future management of the BCF network.

1.2 Asset Description

This AM plan covers the infrastructure assets that provide safe passage and transportation for vehicles and pedestrians over water, and/or natural obstacles.

The Road and Drainage Asset Classes comprises of sub-classes:

- Bridges (8)
- Major Culverts and Floodway's (32)

The above infrastructure assets have replacement value estimated at **$ 16,356,285.**

1.3 Levels of Service

The allocation in the planned budget is insufficient to continue providing existing services at current levels for the planning period.

The main service consequences of the Planned Budget are:

- Unplanned asset closure – extended periods
- Service disruptions
- Unsafe directed travel
- Public forced to use alternate transportation routes
- Increased load on other assets - Arthur Road Floodway
- Accessibility issues – cut off from homes, business, services, supply
- Downgraded bridge loading capacity – Maley's Bridge and Walkaway Nangetty Bridge under restricted loading

1.4 Future Demand

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

- Climate change and impact on rainfall volumes and intensities
- Continued residential and commercial development increasing the geographic footprint of the City and reliance on the continual accessibility to homes and businesses via the road network
- Changes in transportation trends
- Limited Alternative Transportation Network Opportunities

These demands will be approached using a combination of managing existing assets, upgrading existing assets and providing new assets to meet demand. Demand management practices may also include a combination of non-asset solutions, insuring against risks and managing failures.

- Asset Solutions delivered through State and Federal Government Collaboration
- Increased Asset Upgrades vs Asset Renewals
- Improved Financial Forecasting (based on accurate data)

1.5 Lifecycle Management Plan

1.5.1 What does it Cost?

The forecast lifecycle costs necessary to provide the services covered by this AM Plan includes operation, maintenance, renewal, acquisition, and disposal of assets. Although the AM Plan may be prepared for a range of time periods, it typically informs a Long-Term Financial Planning period of 10 years. Therefore, a summary output from the AM Plan is the forecast of 10-year total outlays, which for the Bridges, Major Culverts and Floodway's is estimated as **$12,342,776** or **$1,234,278** on average per year.

1.6 Financial Summary

1.6.1 What we will do

Estimated available funding for the 10 year period is **$3,735,877** or **$373,588** on average per year as per the Planned Budget (historical spend). This is **27%** of the cost to sustain the current level of service at the lowest lifecycle cost.

The infrastructure reality is that only what is funded in the long-term financial plan can be provided. The Informed decision making depends on the AM Plan emphasising the consequences of Planned Budgets on the service levels provided and risks.

The anticipated Planned Budget for Bridges, Major Culverts and Floodway's leaves a shortfall of **$860,690** on average per year of the forecast lifecycle costs required to provide services in the AM Plan. This is shown in the figure below.

Figure 1.6: Forecast Lifecycle Costs and Planned Budgets

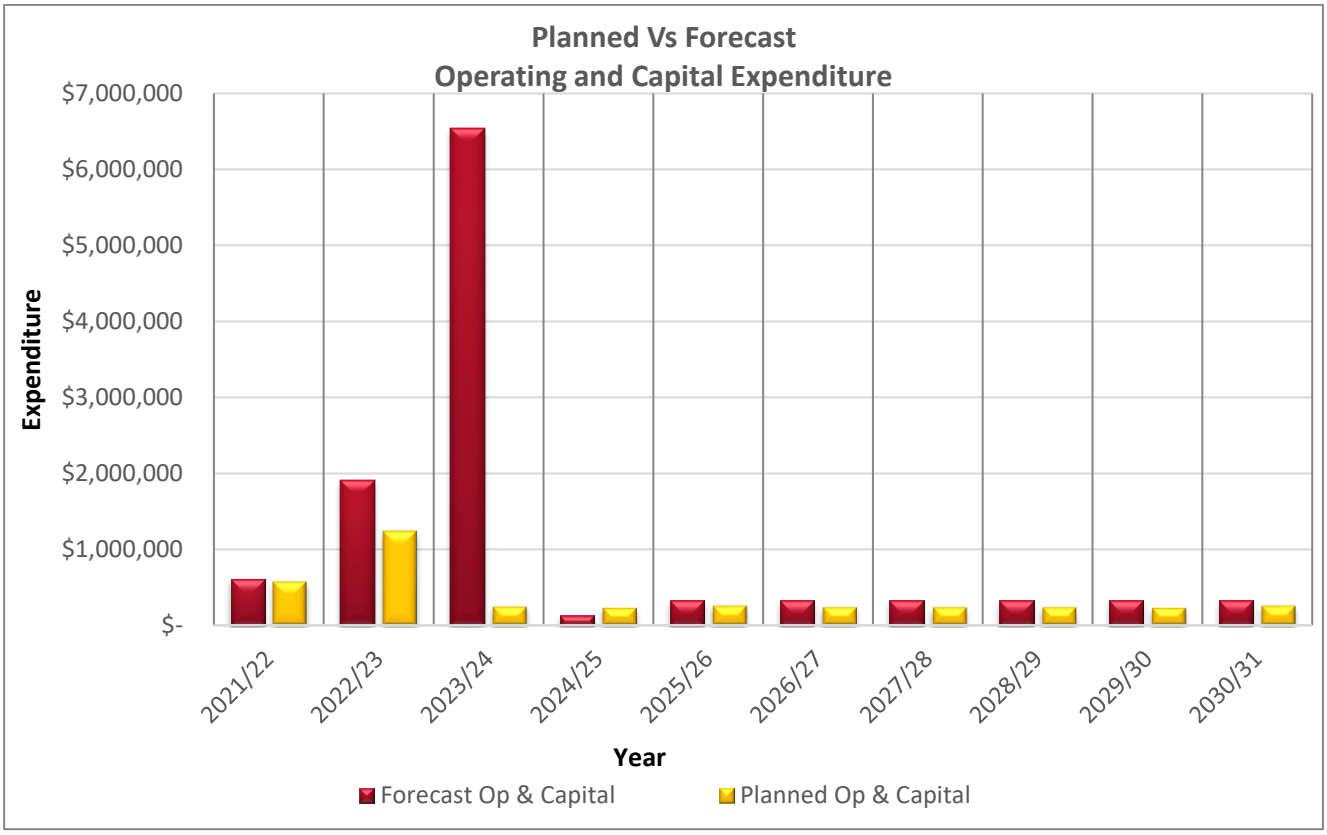


Figure Values are in current dollars.

We plan to provide transport services by:

- Taking a risk-based approach for the operation, maintenance, renewal and acquisition of Bridges, Major Culverts and Floodway's to meet service levels set by Council in annual budgets.
- Proactively monitoring the performance of the existing assets to determine maintenance and renewal requirements to mitigate unplanned loss of service.
- Planned replacement of culvert infrastructure in poor condition within the 10-year planning period.

1.6.2 What we cannot do

We currently do **not** allocate enough budget to sustain these services at the proposed standard or to provide all new services being sought. Works and services that cannot be provided under present funding levels are:

- Renewal/replacement of required assets – Menang Rd Culvert/Floodway, Giles Road Culvert/Floodway, Walkaway Nangetty Bridge, 2x Carnarvon-Mullewa Rd Culvert/Floodway's.
- Backlog maintenance items – inc. specific works/special projects.
- Acquire New Assets – Construct the Low Flow Floodway to support Maley's Bridge downgrade

1.6.3 Managing the Risks

Our present budget levels are insufficient to continue to manage risks in the medium term.

The main risk consequences are:

- Increased pressure on nearby transportation routes and assets. I.e., Arthur Rd Floodway

- Catastrophic asset failure and loss of life due to overloaded bridge and major culvert assets.
- Degrading asset functionality, physical condition, capacity and continuity of service delivery.
- Poor condition culverts are prone to fail if not renewed / replaced within the next 5 – 10 years.
- Lack of visibility on existing infrastructure – the entire major culvert inventory has not been ascertained.

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

- Developing a strategic asset hierarchy and risk-based prioritisation method for planning asset renewals.
- Attending to the backlog of maintenance within the next 1 – 3 years.
- Scheduling regular Level 1 asset inspections to monitor and dynamically prioritise maintenance and renewal activities.
- Renewing aged or poor condition assets as per the proposed timeframes.
- Ascertaining the entire Major Culvert and Foodway network through data collection exercises.

1.7 Asset Management Planning Practices

Key assumptions made in this AM Plan are:

- Increased investment in the first 5 years is necessary to address the backlog of maintenance.
- All required Maintenance activities are derived from asset Inspections conducted between 2018 – 2021. All proposed activities are relevant as of May 2021.
- Required Maintenance expenditure is derived from unit rates and estimations provided by GHD. The costings are estimates only and should be costed as per CGG labour and rates.
- Capital Expenditure is estimated from similar capital works performed by CGG and should be revised according to detailed design in the years prior to construction.
- Assets within the asset register requiring renewal have been identified from inspections, referral to previous reports and/or maintenance/renewal recommendations.
- The condition information captured in recent asset inspections was used to forecast renewals for this AM Plan. This AM Plan is based on a reliable level of confidence information.

1.8 Monitoring and Improvement Program

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

- Develop a strategic asset hierarchy and prioritisation method for planning asset renewals.
- Ascertain the entire Major Culvert and Foodway network and recognise all assets in the AM System.
- Schedule and conduct regular ‘annual’ asset inspections.
- Create specific accounting codes for monitoring BCF expenditure.
- Improve asset costing information to better represent the true cost of asset renewal.

Financial Summary and Implications

Renewal Expenditure

Avg. annual planned renewal costs:

$196,292

Avg. annual required costs :

$1,011,162

Avg. annual shortfall:

$814,869

All costs are averaged over 10 yrs.

Maintenance and Operating

Avg. annual planned costs:

$77,295

Avg. annual required costs :

$123,116

Avg. annual shortfall:

$45,821

All costs are averaged over 10 yrs.

Op + Maint + New + Renewal

Avg. annual planned Lifecycle cost:

$373,588

Avg. annual required lifecycle costs:

$1,234,278

Avg. annual shortfall

$860,690

All costs are averaged over 10 yrs.

Assets & Services at Risk

Assets

- Menang Rd Culvert/Fdwy
- Giles Rd Culvert/Fdwy
- 2 x Carnarvon-Mullewa Culvert/Fdwy's
- Walkaway-Nangetty Bridge
- Arthur Rd Floodway
- Newmarcarra Rd Culvert/Fdwy

Services

- Backlog Maintenance
- Detailed Inspections (L3)
- Usability of Transportation Network
- Public Safety - Corrective Actions

Performance Indicators

Asset Sustainability Ratio

50%

Asset Consumption Ratio

57%

Above Ratio's represent current year (2020)

Asset Renewal Funding Ratio

19%

Ratio averaged over 10 yrs.

2.0 Introduction

2.1 Background

This Asset Management Plan (the Plan) is a working document that should be updated on a regular basis once inspections/tests are undertaken and new information becomes available. This AM Plan communicates the requirements for the sustainable delivery of services through management of assets, compliance with regulatory requirements, and required funding to provide the appropriate levels of service over the planning period.

The Plan is to be read in conjunction with the City of Greater Geraldton (The City's) planning documents. This should include the Asset Management Policy, Strategic Asset Management Plan and other key planning documents:

- Strategic Community Plan 2031
- Strategic Asset Management Plan 2019
- Integrated Strategic Planning Framework Policy
- Integrated Transport Strategy 2021
- Asset Management Policy
- Risk Management Policy
- Corporate Business Plan 2017-2021

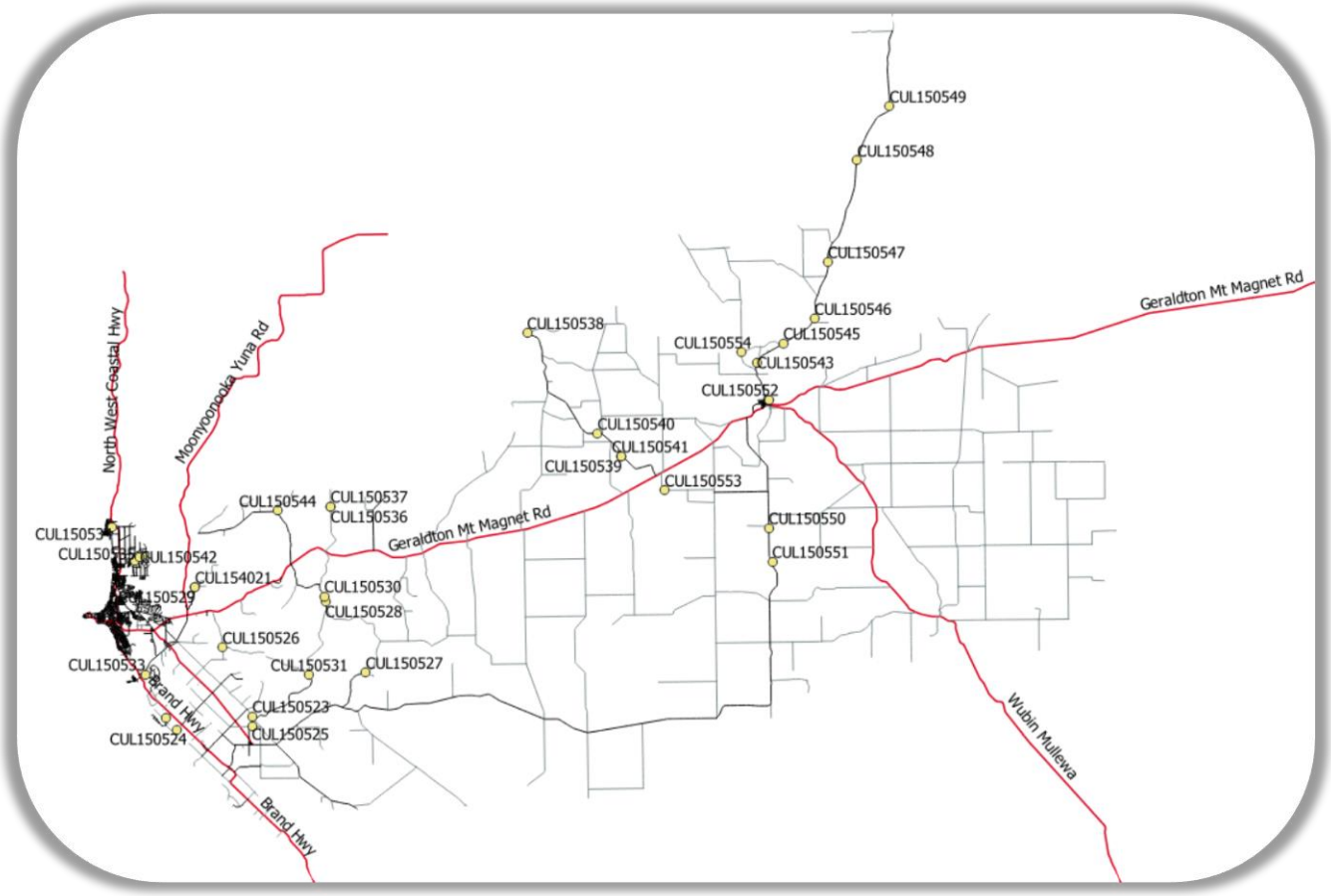
Asset management practises are implemented within the organisation and are guided by the necessary policies, plans and strategic documents. Ongoing Asset Management improvement requires AM documents be updated on a regular basis and remain relevant to current standards and practises.

The infrastructure assets covered by this AM Plan are limited to Bridges, Major Culverts and Floodway's (BCF). The assets are located throughout the Council owned area, extending through to the Mullewa, Greenough and Walkaway regions. This Plan does not cover **minor** culverts and acknowledges known deficiencies in the completeness of major culvert and major floodway inventories. For a detailed summary of the assets covered in this Plan refer to Table in Section 5.

These assets are used to safety direct water flow to a specified location or along a specified route, ensure the safe passage of vehicles and pedestrians over waterways/other infrastructure services, and maintain key transportation routes for delivery of services.

The infrastructure assets included in this plan have a total replacement value of **$ 16,356,285.** The current adopted figure of **$11,276,285.12** as stated in the most current management valuation is understood to significantly understate the value of the BCF assets and as such will not be used for future planning purposes. This will be addressed in other sections within this AM Plan.

Figure 2.1: Bridge, Major Culvert and Floodway Network



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
Councillors	■ Represent needs of community/shareholders, ■ Allocate resources to meet planning objectives in providing services while managing risks, ■ Ensure service sustainable.
Chief Executive Officer	■ Overall responsibility for developing the asset management strategy, plans and procedures and reporting on the status and effectiveness of asset management within the organisation.
Director Infrastructure Services	■ Managerial oversight of asset funding model and Long-Term Financial Plan. ■ Ensure capitalisation process is managed effectively.
Manager Maintenance Operations	■ Responsible for asset renewal plans and any major works to the asset to ensure continuity of service.
Coordinator Roads and Drainage	■ Responsible for providing input in the asset management plan around how maintenance activities are undertaken ensuring timely and effectively as per the agreed levels of service. ■ Identifying existing operating, maintenance, and renewal activities. Providing input into historical financial figures
City Staff	■ Implement the City's policies, decisions, and local laws. ■ Management of transport assets.
Businesses (Local)	■ Directly affected by the transport services provided. ■ Rates charges to the business. ■ Movement of goods, staff and customers.
Residents	■ Direct users of the services and assets
Main Roads WA (MRWA)	■ Provides funding support for maintaining bridges ('Special Projects works') ■ Conducts scheduled Level 2 Inspections for Bridges ■ Sets recommended levels of service in liaison with the relevant stakeholders and based on national guidelines and best practice established by bodies such as Australian Standards and Austroads
Yamatji Marlpa Aboriginal Corporation (YMAC)	■ Yamatji Marlpa Aboriginal Corporation (YMAC) is the native title representative body for the Traditional Owners of the Pilbara, Midwest and Gascoyne regions of Western Australia. ■ YMAC surveys and assessed proposed development sites to identify sites which have Aboriginal heritage. YMAC represents

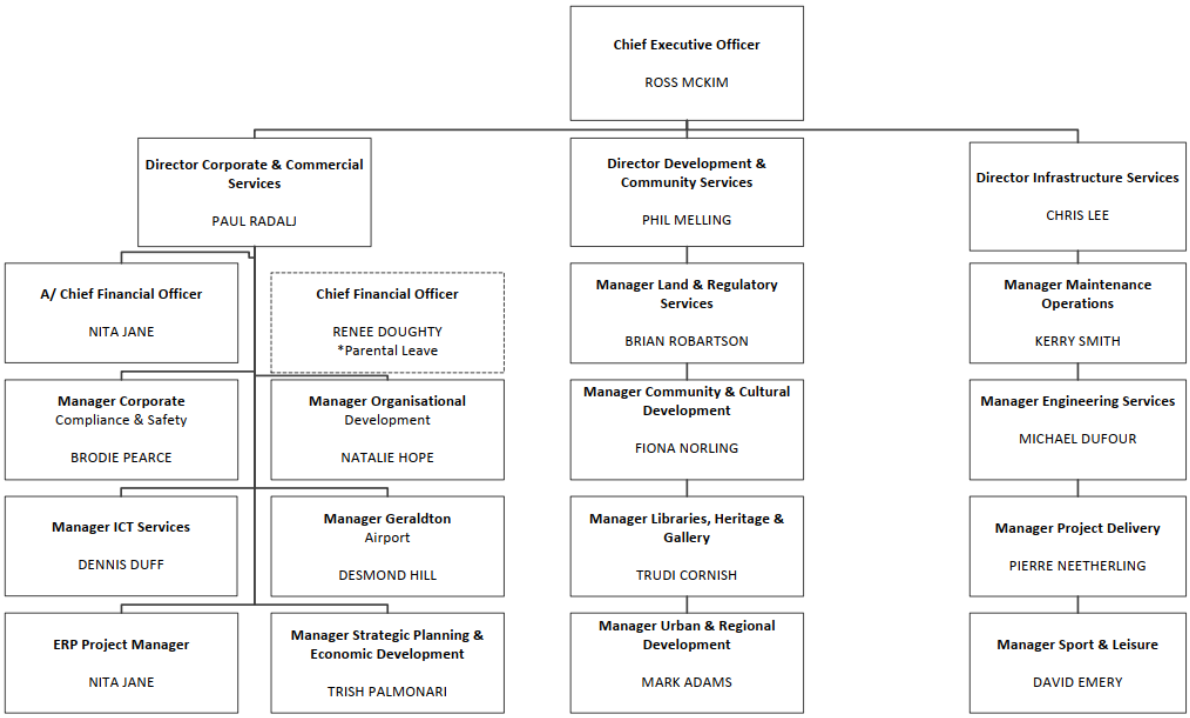
Key Stakeholder	Role in Asset Management Plan
	the interests of Aboriginal people and consults to the City throughout the design process of capital projects

Bridges on State roads are the responsibility of the State Government. MRWA is generally responsible for bridges on 'highways' and 'main roads'. However, the Commissioner of Main Roads has legal responsibility for regulatory traffic signs and devices on local government roads in accordance with the provisions of the Road Traffic Act, 1974. This responsibility includes 'load limit' signs on bridges.

The State Government (through MRWA) therefore also has a close involvement with bridges on local government roads, both technically and financially. Notwithstanding this State involvement, local governments remain accountable for all bridge structures on their roads, except those where agreement has been reached between local government and MRWA.

Our organisational structure for service delivery from infrastructure assets is detailed below:

Figure 2.2: Organisational Structure Departments and Branches



2.2 Goals and Objectives of Asset Ownership

Our goal for managing infrastructure assets is to meet the defined level of service (as amended from time to time) in the most cost effective manner for present and future consumers. 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 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 identifies required, affordable forecast costs and how it will be allocated.

Key elements of the planning framework are

- Levels of service – specifies the services and levels of service to be provided,
- Risk Management,
- Future demand – how this will impact on future service delivery and how this is to be met,
- Lifecycle management – how to manage its existing and future assets to provide defined levels of service,
- Financial summary – what funds are required to provide the defined services,
- Asset management practices – how we manage provision of the services,
- Monitoring – how the plan will be monitored to ensure objectives are met,
- Asset management improvement plan – how we increase asset management maturity.

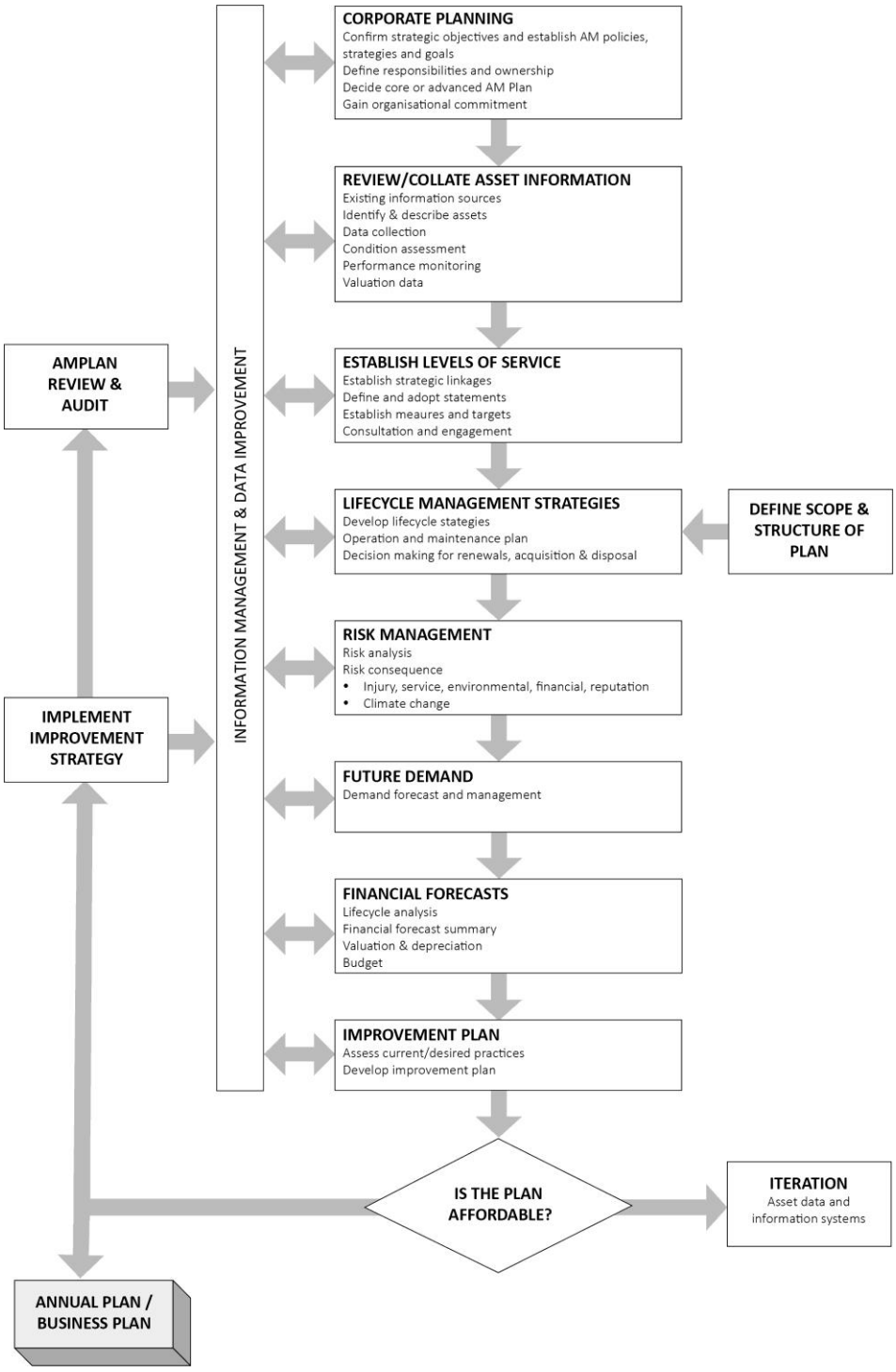
Other references to the benefits, fundamentals principles and objectives of asset management are:

- International Infrastructure Management Manual 2015 [1]
- ISO 55000[2]

[1] Based on IPWEA 2015 IIMM, Sec 2.1.3, p 2| 13
[2] ISO 55000 Overview, principles and terminology

A road map for preparing an AM Plan is shown below.

Road Map for preparing an Asset Management Plan
Source: IPWEA, 2006, IIMM, Fig 1.5.1, p 1.11



3.0 LEVELS OF SERVICE

3.1 Customer Research and Expectations

The City has long recognised that the best solutions are that made collaboratively between Council, City administration and the community using the foundation of deliberative democracy. This AM Plan is prepared to facilitate consultation prior to adoption of levels of service by the City. Future revisions of the AM Plan will incorporate customer consultation on service levels and costs of providing the service. This will assist the City and stakeholders in matching the level of service required, service risks and consequences with the customer's ability and willingness to pay for the service.

Varying levels of consultation were conducted through the development of the Asset Management Strategy and Strategic Community Plan, although there has been no specific consultation with the community regarding levels of service for Bridges, Major Culverts and Floodway's. We currently have no research on customer expectations, however customers engage with the City through the call centre. Customer research will be investigated in future updates of the AM Plan.

3.2 Strategic and Corporate Goals

This AM Plan is prepared under the direction of the Greater Geraldton 2031 Strategic Community Plan vision, mission, goals and objectives.

Our vision is to be:

"Home of WA's Regional Capital"

Our vision statement is:

"It is 2031, Greater Geraldton will be the home of the regional capital city in Western Australia. Vibrant public places and spaces support our enviable lifestyle. We will be a recognised leader in the protection of our natural environment and our people will thrive and prosper. We will celebrate our cultural heritage and history. We support business growth through diversity, education and employment opportunities. As an inclusive community, we will strive for equal rights and access for all. We will face challenges by working together in unity with integrity and creativity. We will achieve this on the foundation of open and collaborative leadership."

Strategic goals have been set by the city, with the feedback and direction from the Community. The relevant goals and objectives and how these are addressed in this AM Plan are summarised in **Table 3.2**.

Table 3.2: Goals and how these are addressed in this Plan

Goal	Objective	How Goal and Objectives are addressed in the AM Plan
Community	Our culture and heritage is recognised, we are creative, loud and proud, we can all reach our full potential	(1.4) Community safety and well-being is paramount - Assets are built in accordance with standards - BCF's are built in accordance with technical design standards and vehicle loading requirements
Economy	A healthy thriving and resilient economy that provides opportunities for all whilst protecting the environment and enhancing our social and cultural fabric	2.2 Efficient and accessible intrastate and interstate connectivity - BCF's always remain functioning and accessible, therefore promoting travel along transportation routes. Existing BCF's are maintained to the technical levels of service in the AM Plan

Goal	Objective	How Goal and Objectives are addressed in the AM Plan
Environment	Our natural environment has a voice at the table in all our decisions and design is based on people first	3.1 A City that is planned, managed and maintenance to provide for environment and community well being - BCF's are maintained and renewed according to the Council supported activities defined in this AM plan 3.4 A desirable and sustainable built and natural environment responsive to community aspirations
Leadership	A strong local democracy with an authentically engaged community, effective partnerships, visionary leadership and well informed decision making	4.4 Healthy financial sustainability that provides capacity to respond to changes in economic conditions and community priorities - BCF's are constructed in required locations which support future community development / private enterprise and future growth

3.3 Legislative Requirements

There are many legislative requirements relating to the management of assets. Legislative requirements that impact the delivery of the Bridge, Culvert and Major Floodway service are outlined in **Table 3.3**.

Table 3.3: Legislative Requirements

Type	Requirement
Legislation	▪ Legislation, Acts & Regulations ▪ Local Government Act 1995 ▪ Environmental Protection Act 1986 ▪ Environment Protection Act (unauthorised discharges) ▪ Regulations 2004 ▪ Aboriginal Heritage Act 1972 ▪ Aboriginal Heritage Regulations 1974 ▪ Land Administration Act 1997 ▪ Health Act 1911 ▪ Wildlife Conservation Act 1950 ▪ Health (Pesticides) Regulations 1956 ▪ Road Traffic Act 1974 ▪ Main Roads Act 1930 ▪ Occupational Health and Safety Act 1984 ▪ OSH Regulations 1996 ▪ Disability Discrimination Act 1992 ▪ Disability Services Act 1993 ▪ Disability Services Regulations 2004 ▪ Roads to Recovery Act 2000 ▪ Road Traffic Act 1974

Type	Requirement
Standards	▪ Disability Standards for Accessible Public Transport 2002 ▪ AustRoads Guidelines ▪ WA Department of Planning -Liveable Neighbourhoods Edition 2 ▪ Institute of Public Works Engineering Australia - Local Government Guidelines for Subdivisional Development - Edition 2 ▪ AASB 116 Property, Plant and Equipment ▪ AASB 118 Revenue ▪ AASB 119 Employee Benefits ▪ AASB 136 Impairment of Assets ▪ AASB 138 Intangible Assets ▪ AASB 140 Investment Property ▪ AASB 1051 Land Under Roads ▪ Main Roads WA – Codes of practice, standard drawings etc. ▪ AASB 5 Non-Current Assets Held for Sale and Discontinued Operations ▪ AASB 13 Fair Value Measurement ▪ AS/NZS 4360: 1995 Risk Management ▪ AS/NZS 4360: 2004 – Risk Management ▪ ISO 31000 – Risk Management ▪ ISO 55000 – Asset Management

Further to meeting legislative requirements and standards as part of the City's business context, consideration must also be given to the overall function of the transport network in setting levels of service.

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: Customer Values

Service Objective:			
Customer Values	**Customer Satisfaction Measure**	**Current Feedback**	**Expected Trend Based on Planned Budget**
Satisfaction	Customer Satisfaction Survey	Unknown / not measured	Close the gap between customer expectation and actual trending performance
Responsiveness	Customer Service requests	Requests closed out in 54 days	Proposed trend to reduce response time to under 30 days

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 of adequate capacity … do we need more or less of these assets?

Customer levels of service defined in this AM plan are based on best practise, design guidelines and the intended levels of service for the specific asset types. Further consultation is required with the community to ascertain whether the City and the Community are aligned when setting service standards.

Given the nature of the mostly functional service BCF assets provide, the community primarily measure the level of service by the role the assets have in providing a safe, connected and accessible transport network. In **Table 3.5** under each of the service measures types (Condition, Function, Capacity/Use) there is a summary of the performance measure being used, the current performance, and the expected performance based on the current budget allocation.

Table 3.5: Customer Level of Service Measures

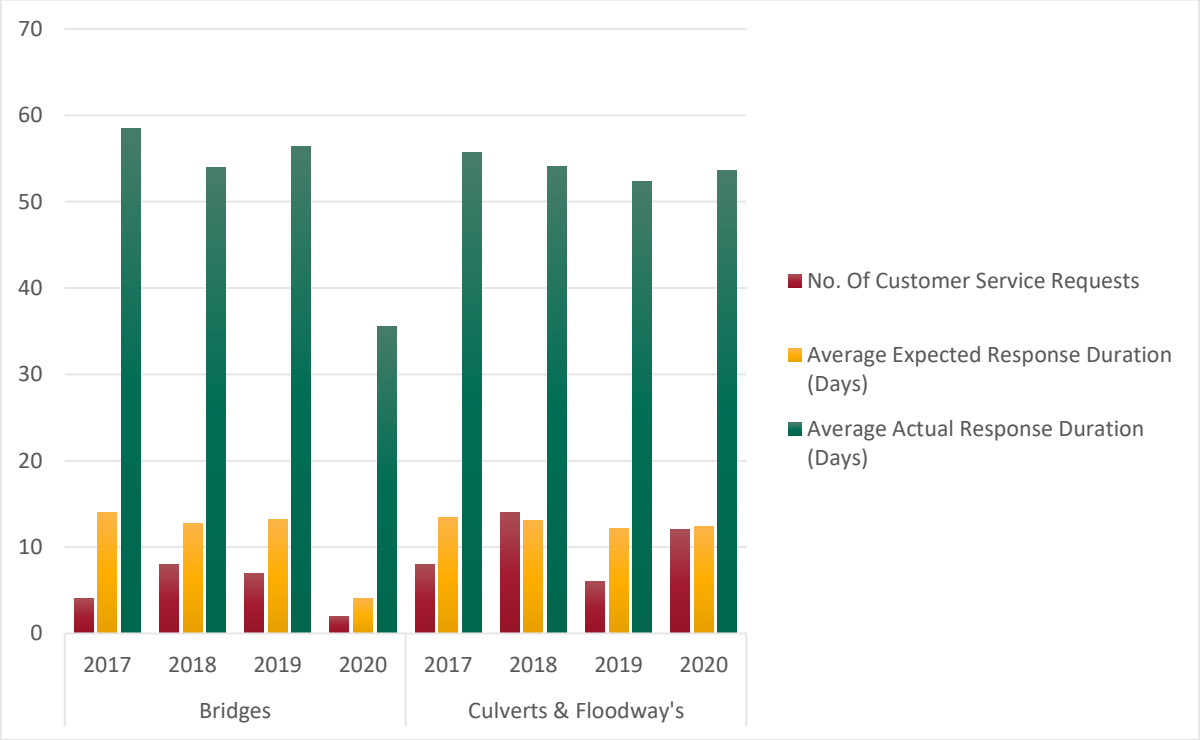
Type of Measure	Level of Service	Performance Measure	Current Performance	Expected Trend Based on Planned Budget
Condition	Assets remain are in good condition and are replaced prior to failure	Asset Condition Ratings Replaced at Condition Four (4)	Asset Conditions: Bridges = 1 - 5 Culverts = 1 - 4 Floodway's = 1 - 4	If planned renewal expenditure meets actual expenditure, the revised condition is expected to be: Bridges = 1 - 3 Culverts = 1 - 3 Floodway's = 1 - 3
	Confidence levels		HIGH	MEDIUM
Function	Assets continue to perform their intended function, providing safe passage across waterways	No of days asset is closed/out of action	Bridges – 1x pedestrian bridge closed, 1 heritage and 1 Vehicular bridge with reduced loading restrictions. Culvert/Floodway's – No closed routes	Bridges – 1 pedestrian bridge to be decommissioned, 1 new asset to provide alternate route. Culverts – All assets in use with No proposed closures
	Confidence levels		HIGH	MEDIUM
Capacity	Bridge/Culvert Lane width and strength is suitable for required vehicle use	Road traffic counts, and structural loading assessments meet design requirements (assessed through L3 Inspections)	8 x Bridges, and 32 x Culvert / Floodway's inspected 2 x Bridges working under reduced loading capacity	All BCF's working to designed capacity and strength
	Confidence levels		MEDIUM	MEDIUM

*Low = professional judgement with no data evidence, Med = Professional judgement supported by data sampling, HIGH = Professional judgement supported by extensive data.

Tracking Customer Requests and response times is an invaluable way of measuring the City's performance and evaluating how effective it is at responding to the Community. Customer request data can also identify which services need to be prioritised more in the future and which are more valued by the community.

Customer Requests are managed through the City's Customer Service Data Base (CSDB) which feeds into the AM system (ASSETIC). The AM system initiates work orders for corrective maintenance actions as well as managing the life cycle of the assets. Tracking customer requests in the AM system allows the City to assign specific maintenance tasks where required, and review close-out times and follow-up activities. The following customer request information in **Fig 3.1** shows the City's performance over the past four years.

Figure 3.1: Customer Request Data from ASSETIC



On average the City endeavours to action and close-out customer service requests within two weeks. The actual average response period for closing out requests over a four-year period is 54 days. At a more detailed level, the customer request data revealed four key observations which the community continues to raise concern over:

1. Guideposts/chevron markers are missing and require replacement
2. Identification of a safety hazard, requiring rectification
3. Identification of a defect – typically a damaged bridge or missing timber plank/material
4. Request to repair or maintain the asset – i.e., cleaning, clearing debris, repairs

Even though inspection programs are implemented to reduce risk and inform ongoing maintenance/renewal programs, irregular issues are unavoidable. The Community plays a key role in informing the City and bringing these issues to their attention. Response times need to be improved to close the gap between expected response periods and actual response deliverables.

3.6 Technical Levels of Service

Technical Levels of Service – To deliver the customer values, and impact the achieved Customer Levels of Service, are operational or technical measures of performance. These technical measures relate to the activities and allocation of resources to best achieve the desired customer outcomes and demonstrate effective performance.

Technical service measures are linked to the activities and annual budgets covering:

- **Acquisition** – the activities to provide a higher level of service (e.g., widening a road, sealing an unsealed road, replacing a pipeline with a larger size) or a new service that did not exist previously (e.g., a new library).
- **Operation** – the regular activities to provide services (e.g., opening hours, cleaning, mowing grass, energy, inspections, etc.
- **Maintenance** – the activities necessary to retain an asset as near as practicable to an appropriate service condition. Maintenance activities enable an asset to provide service for its planned life (e.g., road patching, unsealed road grading, building and structure repairs),
- **Renewal** – the activities that return the service capability of an asset up to that which it had originally provided (e.g., road resurfacing and pavement reconstruction, pipeline replacement and building component replacement),

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

Table 3.6 shows the activities expected to be provided under the current 10 year Planned Budget allocation, and the Forecast activity requirements being recommended in this AM Plan.

Table 3.6: Technical Levels of Service

Lifecycle Activity	Purpose of Activity	Activity Measure	Current Performance*	Recommended Performance **
TECHNICAL LEVELS OF SERVICE				
Acquisition	Construct assets in response to community demand and changing landscapes (built, or natural). Asset acquisition to ensure safe passage / transportation of people and vehicles, and protect natural environments and waterways	Allocation of NEW / Upgrade capital budget to meet expenditure requirements	The current planned expenditure for NEW Assets over the next ten years is: No allocated budget defined in LTFP	The Acquisitions that we would like to do as per the Lifecycle Forecast: Low Flow Causeway floodway at Maley's Bridge - $1,000,000

[3] IPWEA, 2015, IIMM, p 2|28.

Lifecycle Activity	Purpose of Activity	Activity Measure	Current Performance*	Recommended Performance **
Acquisition – Upgrade / New Assets	Upgrade existing assets to improve the level of service. This typically involves – asset widening, strengthening, improved materials	Allocation of capital budget to meet required expenditure	No upgrades budgeted for	No upgrades proposed in the forecasted plan
		Budget	***$0 (average/annum)***	***$100,000 (average/annum)***
Operation - Inspections	Event Driven Inspections - Inspect asset deterioration *post* weather events and assess damage	Level 2 Visual Inspections, Detailed Level 3 Inspections	Assets are inspected every couple of years irrespective of weather events or change in weather patterns	Asset undergoes Detailed inspection after inclement weather
	Cyclic Inspections – Regularly (annually or seasonally) inspect asset condition	Annual Level 1 Visual Inspections, Level 2 Visual Inspections,	Assets are being inspected 1 - 2 times every three years	Assets receive a planned Level 1 inspection per annum
		Budget	***$20,267 (average/annum)***	***$43,940 (average/annum)***
Maintenance - Planned Maintenance	Ensure assets meet their desired useful life and reach their full economic value.	Planned maintenance expenditure	TBD	Actual planned maintenance expenditure meets budgeted expenditure
Maintenance - Reactive maintenance	reduce asset defects and threat to public safety,	No of Work Orders raised and closed	No of raised WO's = closed out WO's and completed within required timeframes	Completed backlog maintenance defined in the 'maintenance' section of this AMP
		Budget	***$40,440 (average/annum)***	**$79,176** ***(average/annum)***
Renewal – Asset replacement	Assets are returned to existing level of service, in accordance with remaining useful life and condition rating	asset sustainability ratios	Outside of desired Desired range: 95% – 105% Actual = 76.9%	Renewal expenditure matching depreciation expense
		Budget	**$196,292** ***(average/annum)***	**$1,011,162** ***(average/annum)***
Disposal – End of Life Asset Removed	Assets are disposed at their optimum time	Assets have minimal carrying amount at the time of disposal and are not impaired	Asset disposal can be achieved within budget constraints	Assets disposed within the planned year of replacement or decommission

Lifecycle Activity	Purpose of Activity	Activity Measure	Current Performance*	Recommended Performance **
	Assets are disposed in an environmentally responsible manner	legislative requirements / standards relating to Asset Disposal	Asset removal does not impact on surrounding infrastructure assets, natural environments, or culturally/heritage sensitive sites	Disposal processes and procedures align with organisational and community expectations
		Budget	**$ NA**	**$ NA**

Note: * Current activities related to Planned Budget.

** Expected performance related to forecast lifecycle costs.

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 changing circumstances such as technology and customer priorities will change over time.

4.0 FUTURE DEMAND

4.1 Demand Drivers

Drivers affecting demand include things such as population change, regulations, changes in demographics, seasonal factors, vehicle ownership rates, consumer preferences and expectations, technological changes, economic factors, agricultural practices, environmental awareness, etc.

4.2 Demand Forecasts

The present position and projections for demand drivers that may impact future service delivery and use of assets have been identified and documented. Existing Council documents should be read when considering future demand factors. These include:

- Geraldton Jobs and Growth Plan 2020-23

4.3 Demand Impact and Demand Management Plan

The impact of demand drivers that may affect future service delivery and use of assets are shown in Table 4.3.

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. Demand management practices can include non-asset solutions, insuring against risks and managing failures.

Opportunities identified to date for demand management are shown in **Table 4.3**. Further opportunities will be developed in future revisions of this AM Plan.

Table 4.3: Demand Management Plan

Demand Driver	Current Position	Projection	Impact on Services	Demand Management Plan
Economic Growth	Parts of the road network throughout the region require upgrades based on current condition and with ongoing and increased numbers of heavy vehicles, this will be exacerbated	Increased use and loading of heavy vehicles requiring access to new/developing regions	Requires existing infrastructure to be upgraded to withstand new load limits and capacity's	Investigate economic growth regions and/or new resource operations to better predict needs analysis on existing infrastructure assets
Population Growth	There is considerable uncertainty regarding the future development of major new mining projects, the scale of development and population impacts. Several scenarios are possible, which could ultimately lead to structural change in the composition of the resident population.	A steady increase (1.8% / annum) in local population Vs Significant increases in newly determined sites	Increase in traffic volumes, but not necessarily the size of vehicles and loading capacity.	Investigate new regional settlements that are actively seeking to attract economic opportunities via mining developments. Predict needs analysis on existing infrastructure assets Work with the private sector and state government agencies to consider joint venture solutions and/or additional funding sources

Demand Driver	Current Position	Projection	Impact on Services	Demand Management Plan
Limited alternative transportation networks	Rail and major road networks are key to providing infrastructure routes for the transportation of regional users and raw mining and agricultural products	A lack of new rail networks and/or alternative transportation methods	The existing road network will be more heavily relied upon for the increase in activity until other methods are available/constructed/invested	Communicate with state and federal government agencies and advocate for alternative transportation routes / methods. Financially forecast increased expenditure to upgrade existing bridges, major culverts and floodway's when estimated for renewal Reduce straight forward renewals projects and consider upgrading infrastructure with each opportunity
Prescribed Routes	Transportation routes, and supporting infrastructure, is sufficient to transport heavy vehicles to required destinations	Prescribed routes will not meet driver requirements	Alternative routes will be sourced and place undue pressure on bridge / culvert assets	Review recent traffic modelling data to ensure heavy vehicles have a prescribed route in which to travel so that bridge augmentation is not duplicated

4.4 Asset Programs to meet Demand

The new assets required to meet demand may be acquired, donated or constructed. Additional assets are discussed in Section 5.4.

Acquiring new assets will commit the City to ongoing operations, maintenance and renewal costs for the period that the service provided from the assets is required. These future costs are identified and considered in developing forecasts of future operations, maintenance and renewal costs for inclusion in the long-term financial plan (Refer to Section 5).

4.5 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.

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. Existing Council documents should be read when considering climate change factors. These include:

- Climate Change Policy 3.1
- Geraldton Coastal Hazard Risk Management and Adaptation Planning Project

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 Description	Projected Change	Potential Impact on Assets and Services	Management
Increase in annual and seasonal rainfall averages.	Increased flooding frequency and severity	Assets, no longer fit for purpose. Design does not meet the capacity requirements	Review future climate projections and model against current asset design and capability
Increase in annual and seasonal rainfall averages.	New flooding areas	Requirement for new infrastructure to be built	Review flood network and identify possible/new hotspots. Identify locations requiring further investigation. If required estimate future funding requirements to support infrastructure builds
Increase in frequency and severity of storms, cyclones, and other inclement weather events	Flooding	Increased strain on existing asset structures. No longer fit for purpose, or. Not in suitable condition to withstand damage	Model future climate projections against current asset designs and capability

Additionally, the way in which we construct new 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

The impact of climate change on assets is a new and complex discussion and further opportunities will be developed in future revisions of this AM Plan.

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

5.0 LIFECYCLE MANAGEMENT PLAN

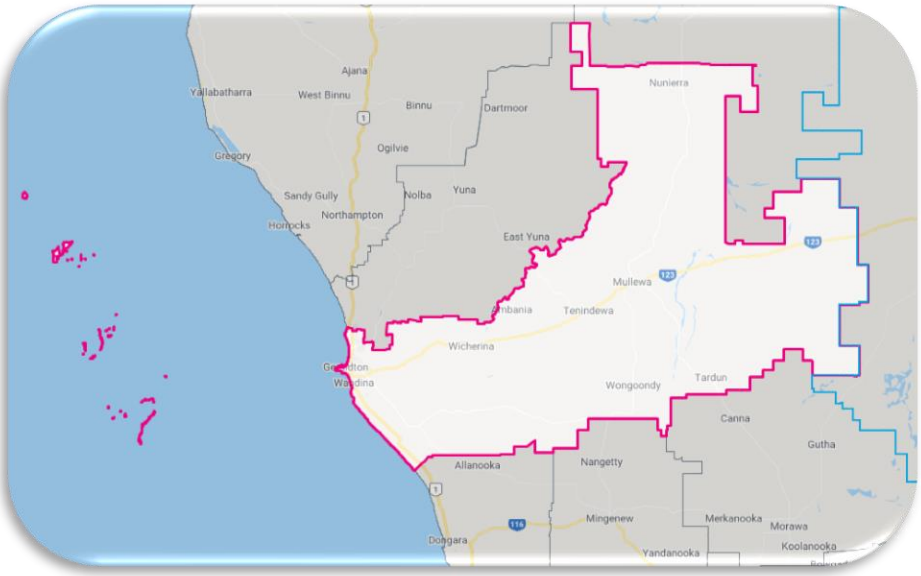
The lifecycle management plan details how the City plans to manage and operate the assets at the agreed levels of service (Refer to Section 3) while managing life cycle costs.

5.1 Background Data

5.1.1 Physical parameters

The assets covered by this AM Plan are shown in **Table 5.1.1.2**.

The City of Greater Geraldton local government boundary extent:



Assets discussed in this AM Plan are situated in both rural and urban areas, meaning that assets are accessible by either sealed or unsealed roads. Forty of the forty-two BCF assets were located at the time of inspection, which occurred between June 2020 and May 2021. Two Major Culverts/Floodway's were not located and are believed to be duplications in the asset register. A major Floodway situated along Byron Road, is *not* recognised in the asset register even though it is known to the City and proposed for renewal next financial year. A Bridge located along Devlin's Pool was *not* valued in 2018 and therefore has not been valued in this AMP.

During the recent inspections, some culvert and floodway components could not be visually assessed owing to flowing water, debris build up and/or vegetation conditions. Major floodway's were not previously reported in the Transport Asset Management Plan (TAMP) 1.0.6 but are addressed in this AM Plan.

Table 5.1.1.1: Asset Valuations (not considered in this AMP)

Asset Category	2018		2021	
	Quantity	Replacement Value	Quantity	Replacement Value
Bridges	7*	$9,536,285	7*	$ 9,536,285
Major Culverts & Floodway's	29*	$1,740,000	32*	$ 6,820,000
TOTAL	**36**	**$ 11,276,285**	**39**	**$16,356,285**

***NOTE: 2018 values are based on the City's internal asset revaluation conducted in 2018. The replacement values do NOT represent the total cost of all 40 assets specified this AM Plan. 2021 values are indicative costs developed by Talis Consultants in 2021. They are provided for more accurate financial forecasting (capital renewals), but should not be utilised for financial recognition or means outside of this AM Plan. Revision of replacement values has been identified in the improvement plan. One bridge asset requires financial recognition.**

Table 5.1.1.3 Assets Excluded in this AM Plan

Asset Category	Asset ID	Location
Bridges	BRI143416	DEVLIN POOL FOOTBRIDGE – Recognised in AMP but not valued
Major Culverts & Floodway's	CUL154021	CULVERT / FLOODWAY (CHAPMAN CROSSING) – NOT located on site. Excluded in this AMP
Major Culverts & Floodway's	CUL150539	CULVERT / FLOODWAY (C018 - MULLEWA CROSSING) – NOT Located on site – Believed to be a duplication of CUL150541. Excluded in this AMP
TOTAL		

5.1.2 Asset Components

Complex infrastructure assets are often managed at the component level. Components are individual parts of the asset as a whole that potentially have their own lifecycle and can be maintained and if necessary, renewed independently.

Figure 5.1.2 Typical Box Culvert Components

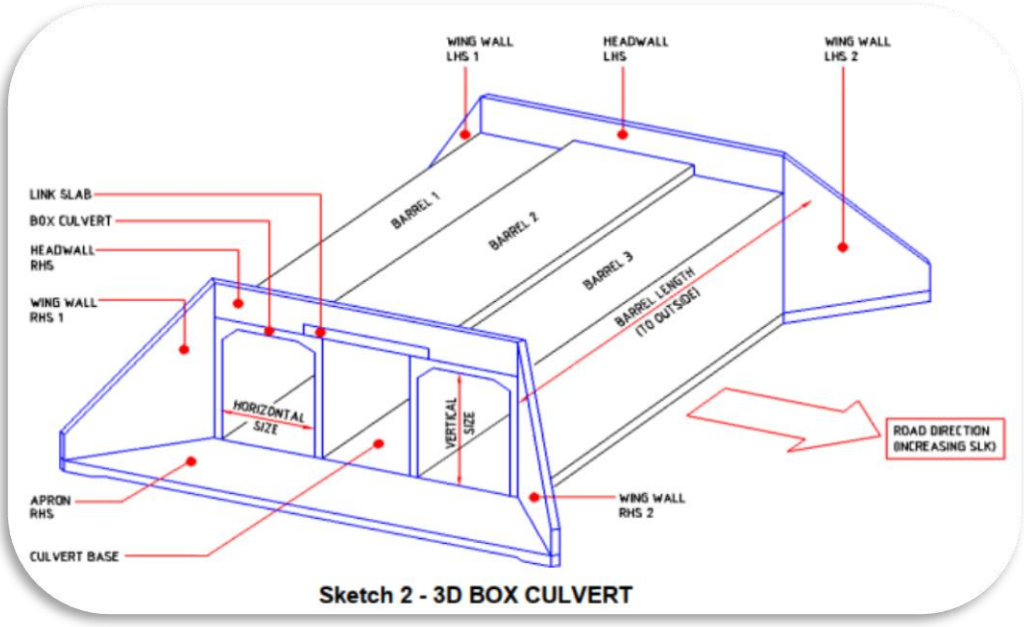
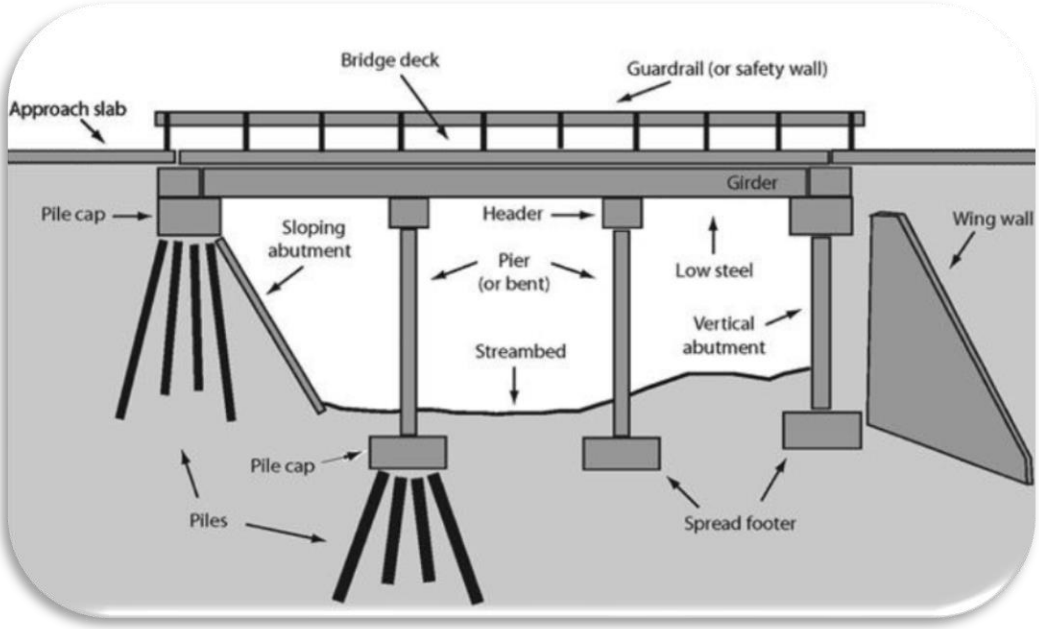


Figure 5.1.2.1 Typical Bridge Components



5.1.3 Age Profiles

There is limited age and/or constructed date information available for BCF assets. MRWA provided historical construction date information for some Bridge assets, however only recently constructed culvert/floodway construction dates are known. Age profiles are used to comment on the overall age versus useful lives of the assets. Based on the current condition of the culvert/floodway assets, it is believed that some assets are aged and nearing the end of their life. Upon replacement updated construction date data will be stored in the AM system.

5.1.4 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 detailed in **Table 5.1.4.**

Service deficiencies are identified if an asset has an inability to perform its intended function, and/or the assets is expected to fail due to significant deterioration and poor overall condition. In either case, the trigger for poor performance, or insufficient service is a severity/condition rating four (4 - very poor), or five (5 - failing/failed).

Table 5.1.4: Known Service Performance Deficiencies

Location	Service Deficiency	Service Deficiency Description
BRIDGE - BURGESS CROSSING (BRI106026: 3013)	Asset Condition / Functionality	The bridge is currently closed off to traffic with bollards installed to prevent vehicle crossing. The bridge in its current condition (very poor) presents a public safety risk due to pieces of concrete readily detaching from the bridge. Refurbishment of the bridge is not considered practical, and bridge removal should be undertaken as a matter of priority. Until that time, hazards should be addressed. – 2021 Level 1 Visual Inspection Report MRWA

Location	Service Deficiency	Service Deficiency Description
BRIDGE – MALEY'S BRIDGE (BRI106022: 4554A)	Asset Condition / Capacity	Due to the nature of the heritage listing of Maley's Bridge and the requirements to preserve the original form of construction the bridge can no longer maintain the load rating required to service the relevant vehicles. Maintenance Costs have increased in recent years and upgrade have been performed on the structure. An alternative / new vehicle crossing is being pursued by the Council. Detailed design is intended for 2021/22 with construction in following years. This would divert traffic around the bridge, thus retaining the heritage bridge in relatively good form and remaining user friendly to pedestrians/tourists/local traffic.
BRIDGE – WALKAWAY NANGETTY (BRI106021: 3014)	Asset Capacity / Loading	The Bridge is 56 years old. The bridge, at best has a lifespan of a further ten years (Level 3 Report). The load rating report conducted in 2021 recommends that the bridge be restricted to light vehicle use only. This is restricting usage by RAV-rated vehicles which is intended to cause undue pressure on neighbouring assets (Arthur Road Floodway). The impact of temporary traffic diversions is not yet known. Repairs will only support downgraded vehicular usage in the short term. There are high ongoing operating costs to implement traffic management until the bridge is replaced. Bridge requires replacement to ensure the transportation network and associated assets meets the required vehicle capacity, and lower operational cost impact.
BOX CULVERT - MENANG ROAD (CUL150553: C032)	Asset Condition / Asset Failure	Box culvert barrels (3) visually assessed as condition 4 (very poor). Barrels are near fully deteriorated showing signs of significant material loss, concrete spalling, delamination, exposed reinforcements, and sediment seeping through joints. Structural integrity appears compromised and supporting structural components (wing walls, headwalls, aprons) have failed or failing.
BOX CULVERT – GILES ROAD (CUL150529: C009)	Asset Condition / Asset Failure	Box Culvert barrels (6) visually assessed as condition 4 (very poor). Barrels showing significant signs of deterioration with concrete cracking, spalling, delamination, and exposed reinforcements. Other structural components in better condition and may be bearing some of the load (headwall of significant size). Asset requires further investigation and detailed assessment.
FLOODWAY/CULVERT - JANDANOL ROAD (CUL150533: C012)	Waterflow / Serviceability	Significant vegetation debris and sand build up impacting waterflow. Asset is not functioning whilst waterflow is impeded and needs to be cleaned. Vehicles are still able to travel over the asset with safe passage, but the onset of rainfall may cause hazards if debris is not removed
BOX CULVERT – GLENGARRY ROAD (CUL150526: C004)	Waterflow / Serviceability	Box Culvert barrels (5) unable to be visually inspected due to silt/sand build up. Waterflow almost completely blocked in some barrels and partially blocked-in others. Asset not performing as intended. Vegetation growth surrounding culvert entry /exit is encroaching and restricting access to culvert unit. Asset requires culvert barrels to be cleaned and vegetation to be removed.
FLOODWAY / CULVERT – CARNARVON / MULLEWA ROAD (CUL150549: C028)	Waterflow / Serviceability	Two independent circular barrel culverts working in conjunction with floodway. 2nd structure blocked on right hand side from debris and sand build up. Asset not performing as intended. Asset requires cleaning.
CULVERT – SANDSPRINGS ROAD (CUL50528: C008)	Waterflow / Serviceability	Circular culvert barrels clear of sand build up, but large amounts of debris built up on right-hand-side of the culvert. Grass appears to be growing from barrel exit on left-hand-side. Asset requires cleaning

Location	Service Deficiency	Service Deficiency Description
CULVERT – SUTCLIFFE ROAD (CUL150535: C014)	Waterflow / Serviceability	Circular culvert barrels (3) partially (50%) blocked due to sand/silt build up. Waterflow significantly inhibited. Asset not performing as intended. Asset requires cleaning.

5.1.5 Asset condition

Condition is currently monitored through regulatory inspections conducted by MRWA and inspections performed by the City, or consultants acting on the City's behalf. A list of the type and frequency of recommended inspections is outlined in the table below. Annual inspections are recommended by MRWA.

Bridges, Major Culverts and Floodway's should be considered critical assets because of their risk profile and ability to impact significant transportation routes/networks. Critical assets require close attention. Monitoring asset condition through regular inspections is the most consistent and informing approach.

Table 5.1.5: Asset Inspections

Inspection Type	Purpose	Asset Type	Recommended Frequency
Level 1 Visual Inspections	The routine visual inspection must check on the overall safety and performance of the structure and identify any major accident damage or incident and any obvious failure or deterioration of structural components	Bridges, Major Culverts, Floodway's	Annually
Level 2 Visual Inspections*	Involves a closer visual inspection commonly within one meter of the various asset components. Detailed quantitative data is captured for further analysis and deterioration modelling	Bridges, Major Culverts, Floodway's	Every 5 – 7 Years, or as requested
Level 3 Detailed Inspection	Requested for a specific reason. These inspections can be requested due to concerns about the asset's safety, condition, load capacity or for structures subject to complex associated repair, strengthening or widening works.	Bridges, Major Culverts, Floodway's	As requested,
Network Condition Assessments	Provides an assessment of condition of individual asset components and/or an overall condition assessment. Condition ratings are used to trigger maintenance and renewal activities. Condition is assessed in level 1, 2 and 3 inspections, although, supplementary condition assessments can be prompted by other factors (inclement weather events, entire network assessments, asset valuations etc.).	Bridges, Major Culverts, Floodway's	As requested,

***Note: Level 2 inspections on Bridges are conducted by MRWA at the intervals defined above, unless otherwise requested by the Council. Level 2 inspections on Culverts are the responsibility of the City.**

Condition at the component level is measured using a 1 – 5 grading system[5]. It is important that a consistent approach is used in reporting asset performance enabling effective decision support.

A severity rating is assigned to asset components for the condition of the waterway scour, waterway flow, headwalls, wing walls, aprons, each culvert barrel, and base slab. The severity level is a broad scale of indication of the condition and can be related to the importance and timing of identified work. More

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

specifically, the severity rating identifies when components require replacement or treatment irrespective of the overall condition and functionality of the bridge/culvert/floodway. See **Table 5.1.5**

Table 5.1.5: Severity Grading System

Severity Rating	Description of Severity
1	**Very Good**: The item is in *excellent* (as-new) condition. No deficiencies.
2	**Good**: The item is in *good* condition. No noteworthy deficiencies that affect the condition of the culvert. Insignificant damage and defects only with negligible misalignment. No work required.
3	**Fair**: The item is in *fair* condition but requires attention before the next inspection. All primary structural components are functional and fit for purpose but may have minor section loss, cracking, spalling or scour. Moderate deterioration or disintegration and minor settlement or misalignment.
4	**Poor**: The item is in *poor* condition and requires attention in the next financial year. Without repairs there is potential for failure leading to a critical situation. Advanced section loss, deterioration, significant spalling or scour have affected primary structural components. Considerable settlement or misalignment.
5	**Very Poor**: The item is in *critical, imminent failure* condition and requires immediate attention. Major deterioration or section loss present in primary structural components affecting structural stability.

The condition profile of the BCF assets is shown in Figure 5.1.3.

Floodway's and Bridges are assigned an overall condition, whereas individual culverts are assessed at the component level. **Figure 5.1.5.2** represents the average condition/severity of *key* asset components. Not all asset components are critical to an asset's overall health, but all need to be maintained to meet desired service levels. Severity ratings need to be reviewed at the component level, so that independent treatments can be targeted. The complete results of the asset inspections are included in **Appendix I**.

The below table lists key Culvert/floodway components and/or considerations assessed during asset inspections and describes their impact on overall asset health.

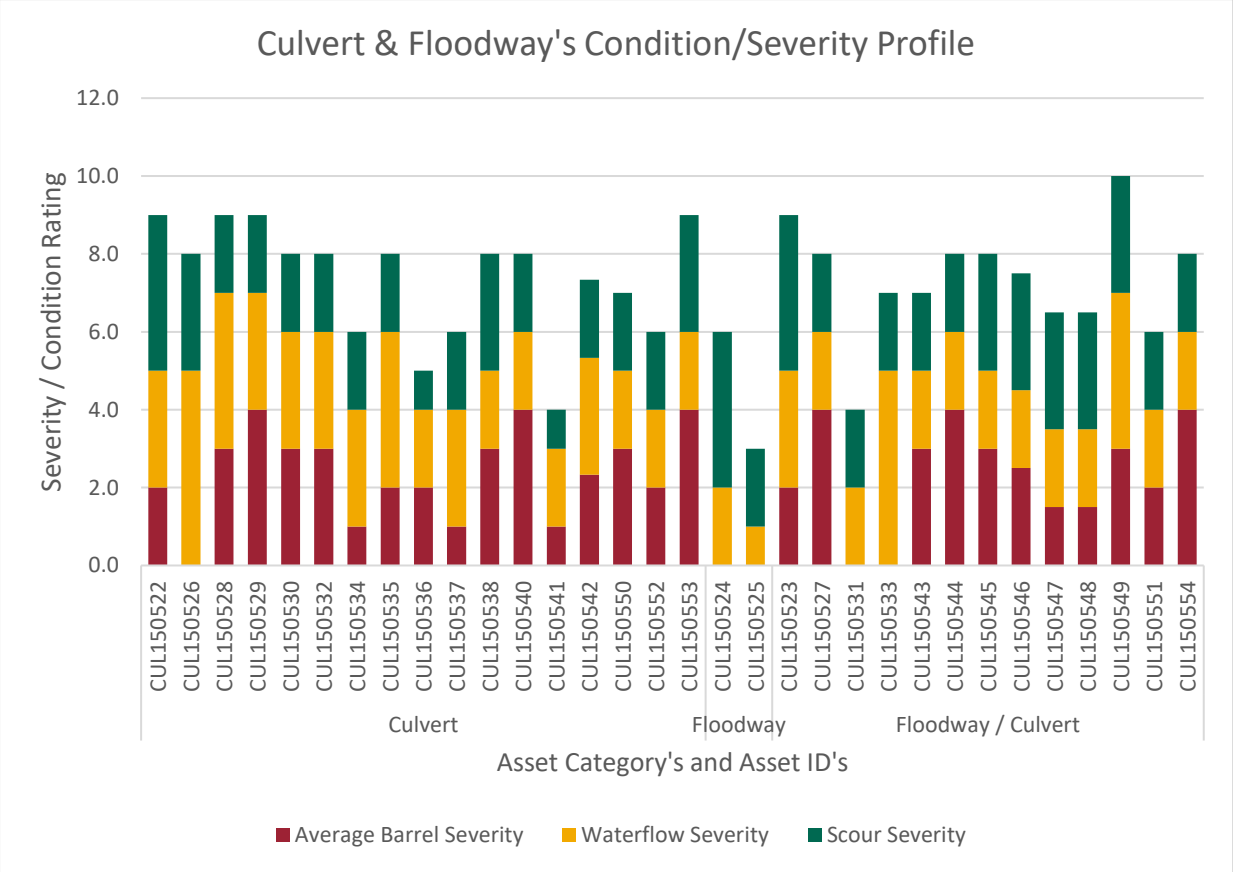
Table 5.1.5.1 : Component Impact on Asset Health (Major Culvert & Floodway)

Components	Impact on Asset Health
Waterflow	Poor waterflow (blocked/partially blocked) impacts the asset functionality and can present an immediate risk to the community if the asset is not performing during wet weather. Poor waterflow triggers reactive maintenance activities such as cleaning/clearing.
Scour	Scour of foundations caused by excessive stream flows or changes in the alignment of the stream channel can result in progressive settlement or movement of culvert units and cause ultimate failure. Scour, or undermining, can be treated with additional protective measures if caught in the early stages. If the scouring is advanced, it risks undermining the entire main culvert/floodway. Recommend detailed inspection/investigation to determine treatment and/or, trigger asset renewal

Components	Impact on Asset Health
Barrels	Poor barrel condition significantly impacts the integrity of the overall asset. The condition/severity of this component is a key trigger for asset replacement, and components in poor condition should be followed up with specific assessments (detailed inspections - L3), and/or immediate culvert replacement.
Floodway Condition	Floodway condition considers a collective of floodway components such as embankment protection, scour protection, slab base.
Delineators	Markers/signs/delineators have no impact on asset health but are critical to supporting the safe use of the asset. Missing delineators can mislead traffic and lead to critical injury.

The Major Culvert and Floodway assets are generally in fair health, with a handful of assets presenting an immediate risk to public safety. Assets in poor condition are proposed for replacement in the renewals section of the AM Plan. High Severity components requiring repair are addressed under the Maintenance section of the Plan. Refer to **Appendix I** for detailed asset descriptions and breakdown of condition ratings.

Figure 5.1.5.2: Culvert & Floodway Condition/Severity Profile



The bridge assets assessed in this AM Plan are generally in good to fair health, with only one asset presenting an immediate risk to public safety. Asset condition is presented in **Figure 5.1.5.3**.

Figure 5.1.5.3: Asset Condition/Severity Profile

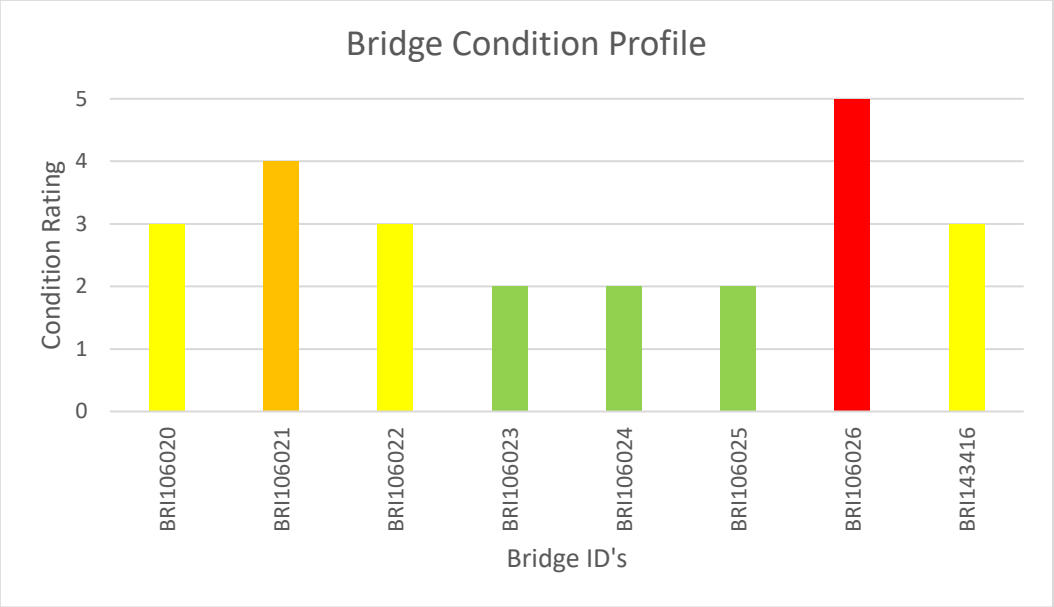


Figure 5.1.5.4: Bridge Inventory

Asset ID	Asset Sub Class	Asset Type	Bridge Description	Road Name
BRI106020	VEHICULAR	REINFORCED CONCRETE	CHAPMAN RIVER BRIDGE	CHAPMAN ROAD
BRI106021	VEHICULAR	REINFORCED CONCRETE	WALKAWAY BRIDGE	WALKAWAY-NANGETTY ROAD
BRI106022	VEHICULAR	TIMBER	MALEY'S BRIDGE	MCCARTNEY ROAD
BRI106023	VEHICULAR	REINFORCED CONCRETE	WOODBINE BRIDGE	EAST CHAPMAN ROAD
BRI106024	VEHICULAR	PRESTRESSED CONCRETE	MINGENEW-MULLEWA BRIDGE	MINGENEW-MULLEWA ROAD
BRI106025	PEDESTRIAN	PRECAST CONCRETE	CHAPMAN RIVER PEDESTRIAN BRIDGE	NORTH WEST COASTAL HIGHWAY
BRI106026	VEHICULAR	REINFORCED CONCRETE	BURGESS CROSSING	ALLEN ROAD
BRI143416	PEDESTRIAN	TIMBER	DEVLIN POOL FOOTBRIDGE	DEVLIN POOL ROAD

There are a number of Bridge, Major Culvert and Floodway assets in poor health and requiring attention. These are outlined in Section 5.1.2 (Asset Capacity and Performance).

5.2 Operations and Maintenance Plan

Operations include regular activities to provide services. Examples of typical operational activities include cleaning, street sweeping, asset inspection, and utility costs. BCF operations predominantly relate to asset inspections.

Maintenance includes 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. Maintenance activities specific to BCF are explained in further detail below.

The desired outcome for the City is to have a good proportion of preventative maintenance activities in comparison to reactive maintenance activities. It is expected that the City can move to a more proactive/preventative maintenance approach once it resolves the backlog of reactive maintenance actions and regularly conducts asset inspections.

Types of Maintenance

Routine/Reactive Maintenance - involves small, generally reactive works comprising mainly minor work items planned on a short term basis. Routine maintenance includes activities such as clearing and maintenance of drainage structures, guardrail repairs, clearing vegetation and insect extermination.

Preventative/Planned Maintenance - involves proactive works that are conducted at regular intervals longer than one year. This type of work is carried out before the development of defects (e.g. timber rot) and is aimed at preventing occurrence or progression of a defect. Preventative maintenance includes activities such as bolt tightening, end grain sealing, fungicide treatment, repairing splits in timber elements, minor concrete crack repairs and maintenance of joints seals and paint.

Refer to **Appendix G** for the maintenance work items defined by MRWA and assessed by inspectors during Level 1 and 2 Visual Inspections Guidelines. These outline the typical/routine activities required to maintain BCF's. Prescribed Bridge maintenance activities are not adopted under the current maintenance programs but should be considered for the future.

Special Projects – refers to bridge projects which can be funded by Financial Assistance Grant funding provided by the Commonwealth to the Western Australian Local Government Grants Commission. Special Project funds are typically allocated for works including proactive work items to maintain the integrity of bridge structural components or for bridge reconstruction where the existing bridge has reached the end of its economic life.

* To be eligible for Special Project funding from the State Road Funds to Local Government Agreement (SRFLGA), Local Governments must be able to show that Level 1 inspections have been performed and that adequate routine and preventative maintenance have been undertaken to prevent undue deterioration. Special Projects are identified in the detailed maintenance budget in this AMP. Therefore, there is opportunity to request funding assistance for these activities

Asset hierarchy

An asset hierarchy provides a framework for structuring data in an information (AM) system to assist in the 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 collection of information (condition/defects) at the component level facilitates targeted planned maintenance, risk identification and effective renewal planning. Component information (dimensions and condition) is captured as part of the inspection process, as per the MRWA standardised Level 1 and Level 2 inspection forms. Although, this level of detail is not registered in the City's AM System. Capturing asset

components in the Asset Register is proposed as part of the future state. See section **5.3 Renewal Plan** for definition of asset components. The service hierarchy is shown is **Table 5.2.1**.

Table 5.2.1: Asset Service Hierarchy

Service Hierarchy	Service Level Objective
Road - Bridges	A bridge is a structure having a clear opening in any span of greater than 3 metres measured between the faces of piers or abutments or structures of a lesser span with a deck supported on timber stringers. It is constructed for the purpose of providing safe passage over an obstacle, usually something that is otherwise difficult or impossible to cross. These are critical links in the road network.
Drainage - Culverts	A culvert is a structure under a road having only clear openings of less than or equal to three metres measured between the faces of piers and/or abutments and pipe shaped structures of any diameter service objective. Culverts are constructed to enable continued water flow without interrupting the passage of vehicles.
Drainage – Floodway's	A roadway across a shallow depression subject to flooding, specifically designed to overtop, and constructed to resist the damaging effects of overtopping. Floodway's and culverts are often constructed in unison. When this occurs, the culvert provides safe passage during average weather patterns (rainfall) and the floodway supports passage during inclement (increased rainfall) weather activity

The City defines **Major** Road & Culvert structures as those designated to provide passage for the regional road network. **Minor** Road and Culvert structures allow movement of cars and trucks on all other sealed and unsealed roads for access to residences or businesses within the city.

Further work on defining major and minor culverts is necessary to establish clear levels of service, performance measures and responsive actions. If defined well, there is also an opportunity to develop and assign a network level *Criticality and Risk Assessment Model*. Such a model would assist in prioritising maintenance and/or renewal works, and the subsequent impact of delayed works on the community.

Factors to be considered when defining the future state of the City's Asset Hierarchy's is listed below:

- Asset Criticality
- Road Hierarchy
- Asset Risk

Asset Criticality is explained later in this AM Plan.

Summary of forecast operations and maintenance costs

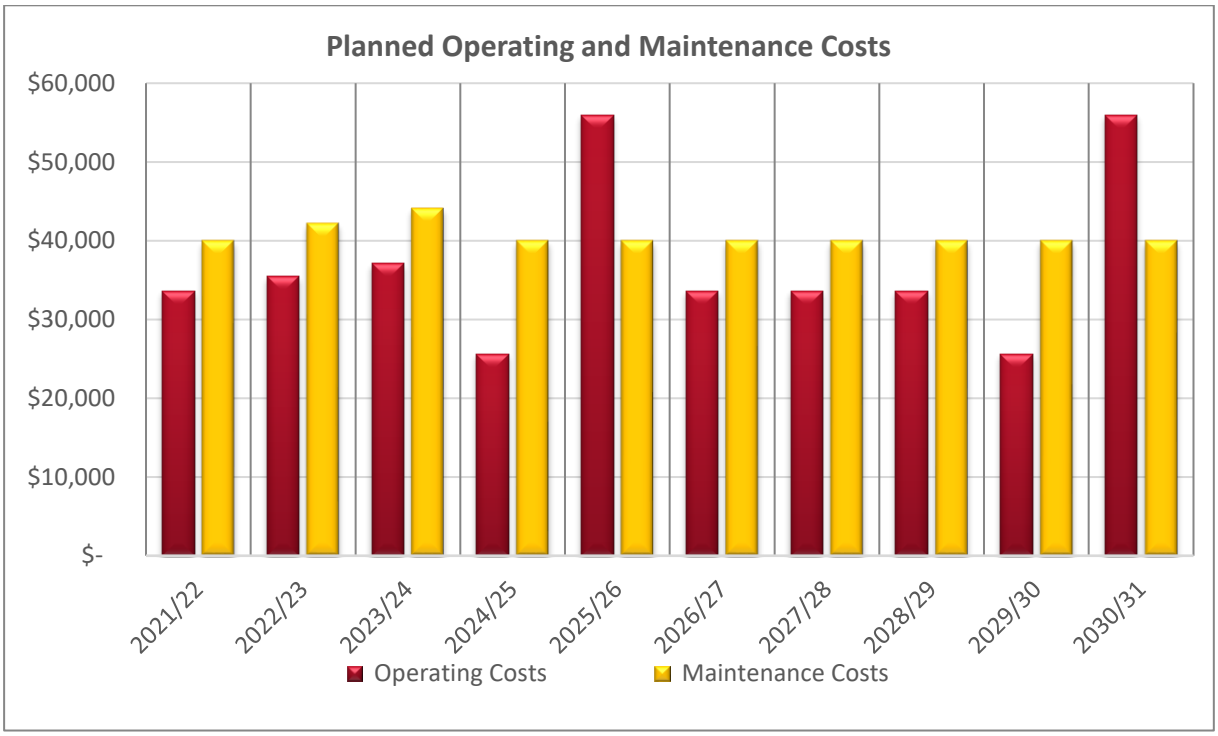
Forecast operations and maintenance costs are expected to vary in relation to the total value of the asset stock. If additional assets are acquired, the future operations and maintenance costs are forecast to increase. If assets are disposed of the forecast operation and maintenance costs are expected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

Actual maintenance expenditure is captured in the City's accounting system under the Roads and Drainage maintenance buckets. Because of this, information is not readily available to determine how much expenditure has historically been set aside for maintenance activities. Actual expenditure records are limited to money spent on asset inspections in 2020/21. Therefore, assumptions have been made surrounding the typical

amount of **planned** expenditure being spent per annum. **Planned** maintenance costs are built from the cost to perform routine asset inspections recently undertaken, and general maintenance cost estimates provided by the Maintenance and Operations team.

Figure 5.2.2 shows the planned operations and maintenance costs relative to the current operations and maintenance activities and budget.

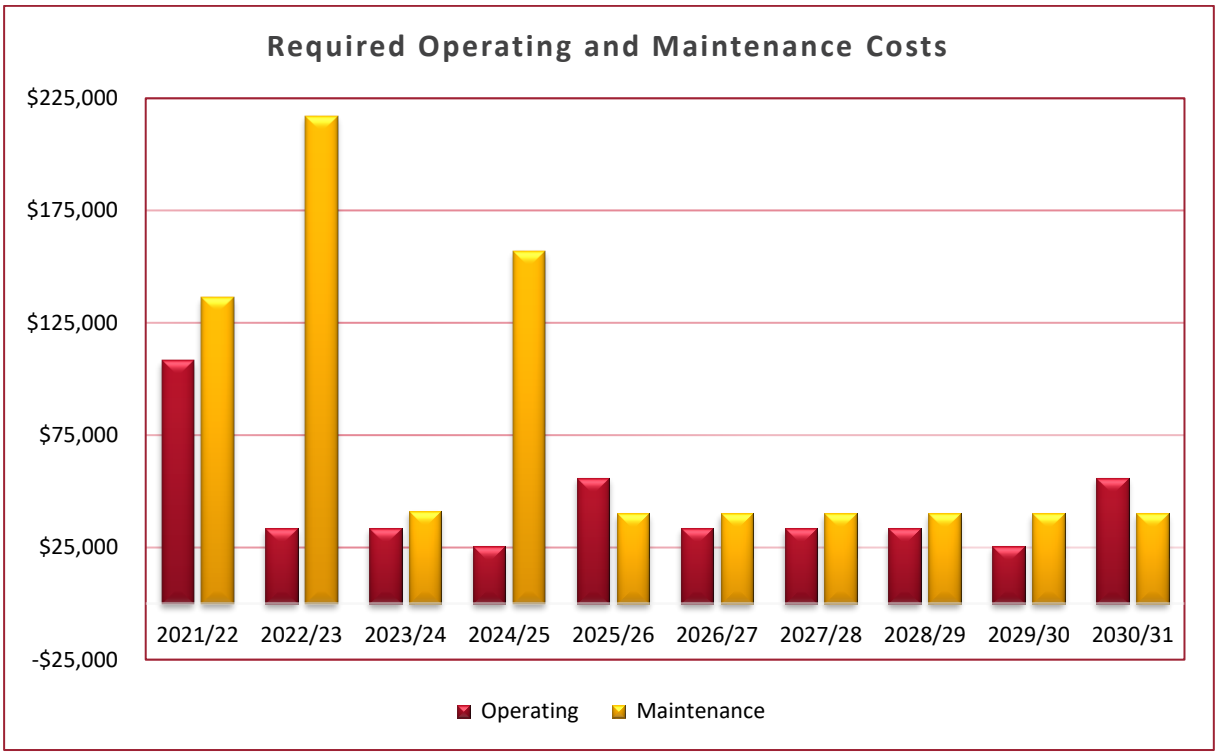
Figure 5.2.2: Planned Operations and Maintenance Summary



Required maintenance expenditure is derived from the recommended maintenance activities identified in Level 1 and Level 2 asset inspections. An outcome resulting from the asset inspections is to generate a list of identifiable defects, required maintenance activities and indicative costs for maintenance planning.

Figure 5.2.3 shows the **required** operations and maintenance costs relative to the proposed operations and maintenance activities and budget.

Figure 5.2.3: Required Operations and Maintenance Summary

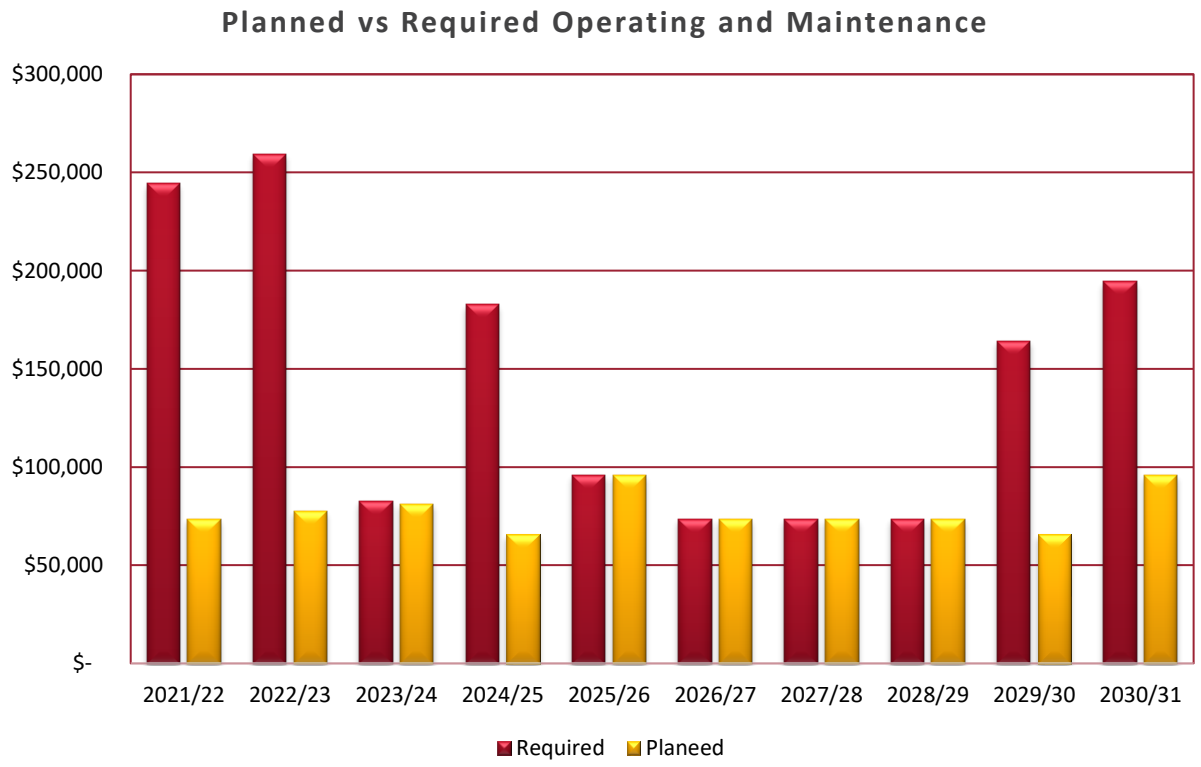


High maintenance forecasts in the first three years are due to recent flooding, which has prompted additional maintenance activities, and a backlog of unattended maintenance. Some maintenance recommendations identified in previous inspections were deferred. Recent staff turnover, limited use of the AM System (ASSETIC) and a lack of continued maintenance programs have impacted the City's ability to keep up with required maintenance activities.

Maintenance budgets need to meet the projected levels of service. Where maintenance budget allocations are inadequate, they will result in a lesser level of service. The service consequences and service risks have been identified and are highlighted in this AM Plan. The projected level of service requires more frequent inspections, followed by prompt completion of recommended maintenance activities within the specified time period. **Figure 5.2.4** provides a comparison between planned and required maintenance activities over the next 10-years.

An improvement deriving from this plan is to create account codes specifically for monitoring costs associated with BCF activities prescribed in this AM Plan.

Figure 5.2.4: Planned vs Required Operations and Maintenance Summary



All figure values are shown in current day dollars.

The **required** maintenance activities proposed in this AM Plan are scheduled according to individual asset requirements. Due to this, there are likely inefficiencies in actioning all required maintenance items against each asset in the programmed year. Productivities can be found by developing maintenance programs which address one/similar activity types against all required assets in one program. Improvements in maintenance scheduling would reduce overall maintenance costs.

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

If the City commits to meeting the required maintenance program and budget, then deferred maintenance works (i.e., previously unable to be completed due to available resources) would be resolved by 2024/25.

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 upgrade resulting in potential additional future operations and maintenance costs.

Assets requiring renewal are identified from visual observations (condition assessments) collected from recent inspections.

The typical useful lives of assets are shown in Table 5.3. Asset useful lives were last reviewed in 2020.

Table 5.3: Useful Lives of Assets

Asset (Sub)Category	Useful life
Roads - Bridges	40 – 60 years
Drainage - Culverts	60 – 90 years
Drainage – Floodway's	Unknown

*Source data for defined useful lives taken from CGG Annual Report

Asset components which support the parent structure generally have design lives less than that of the overall Asset life. Although design lives are not yet defined, the components are identified in **Table 5.3.1**

Table 5.3.1: Bridge, Culvert & Floodway Components

Bridge Components	Culvert Components	Floodway Components
Superstructure	Culvert Barrels	Embankment Protection
Parapet and Barrier	Headwall	Scour Protection / Stone Pitching
Pedestrian Walkway Handrail	Wingwalls	Base slab
Road Surfacing	Aprons	Stone Pitching
Approach Slabs	Link Slab	
Piers	Stone Pitching	
Abutments		
Wing Walls		
Anti-graffiti Coating		
Expansion Joint		
Bearings		
Traffic Barrier		
Drainage		

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., renewing a bridge component to ensure intended load capacity), or
- To ensure the infrastructure is of sufficient quality to meet the service requirements (e.g., condition of a playground).[6]

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

BCF assets are more specifically renewed to ensure they adequately meet intended design capacity (e.g., load rating) and are adequately accessible (e.g., not available through unplanned failure).

Renewals presented in the AM Plan are based on the assets (current) condition, and the condition of asset components deemed 'critical' to the service delivery of the asset. Some asset components are structural in nature (load bearing) and therefore built to last the useful life of the asset. Other components are repaired and replaced as required, without triggering full asset replacement. When structural components reach the end of their life, they can be difficult to replace in isolation, and uneconomical. Therefore, the condition of structural components acts as key identifier for complete asset replacement. Other supporting components are renewed as and when required.

The ongoing renewal of asset components is required to sustain the overall asset condition and ensure the asset reaches its design life. Failure to replace components at the optimum time can introduce premature asset failure. "**Replacement** of asset components is considered capital expenditure providing it is above $5,000 (CGG capital threshold). All other "**repairs**" to the asset is covered under maintenance, irrespective of the cost of those repairs.

Asset condition is typically the lead criteria that triggers asset renewal/replacement, but because BCF's are complex/critical assets their renewal must be considered in consultation of other deciding factures such as ongoing operating costs, design, risk etc. These are outlined in Table 5.3.1.1.

The ranking criteria used to determine priority of identified renewal proposals is detailed in Table 5.3.1.

Table 5.3.1.1: Renewal Priority Ranking Criteria

Criteria	Bridge Weighting	Culvert Weighting	Floodway Weighting
Overall Asset Condition	40%	30%	60%
Condition of 'Critical' Asset Components:	20%	40%	10%
Structural Design / Capacity	20%	20%	20%
Maintenance Costs	10%	10%	10%
Asset Age*	%TBA	%TBA	%TBA
Asset Criticality / Risk*	%TBA	%TBA	%TBA
Environmental*	%TBA	%TBA	%TBA
Total	**100%**	**100%**	**100%**

*Criteria may not yet be defined. Weightings presented in the above table are proposed only and have not yet been adopted by the City.

5.4 Summary of future renewal costs

Forecast renewal costs are projected to increase over time if the asset stock increases. Stock increases are expected following future network inspections and proposed exercises to recognise unidentified assets. The City currently budgets for asset renewals on a reactive (ad hoc) basis. A review of the past three years expenditure reveals significant peaks and troughs in actual expenditure. Historical costs trends are outlined below:

Table 5.4: Historical Renewal Expenditure (Planned)

Asset (Sub)Category	2017/18	2018/19	2019/20	Average
Bridges, Major Culverts and Floodway's	$471,568	$11,394	$4,679.00	**$162,547**

Planned renewal forecasts are usually taken from the Long-Term Financial Plan. Projected BCF figures are not available at this level of detail, although review of historical expenditure explains how renewal budgets have been allocated in the past. It is evident that budgets have typically been allocated for complete asset replacements, whereas consistent renewal funding has not been made available for regular renewal activities.

In this AM Plan, **Planned** expenditure is taken from the actual (historical) renewal expenditure averaged over the past three years (Table 5.4). Where data is limited, it is industry practice for Councils to use annual depreciation as the benchmark for setting the **Required** renewal expenditure. Annual depreciation figures were updated in this AM Plan to reflect the value of its asset base more accurately. This has resulted in a significant increase in annual depreciation.

A comparison between **planned** and **required** expenditure identifies if the City is allocating and spending sufficient funds on renewing assets. The City's revised annual depreciation in 2021 is approximately **$304,000.** Comparing this against the City's **planned** expenditure (Table 5.4), an annual **shortfall of $142,000** is recognised**.** Based on these comparisons it is thought that limited renewal projects have been delivered in the past 10 years.

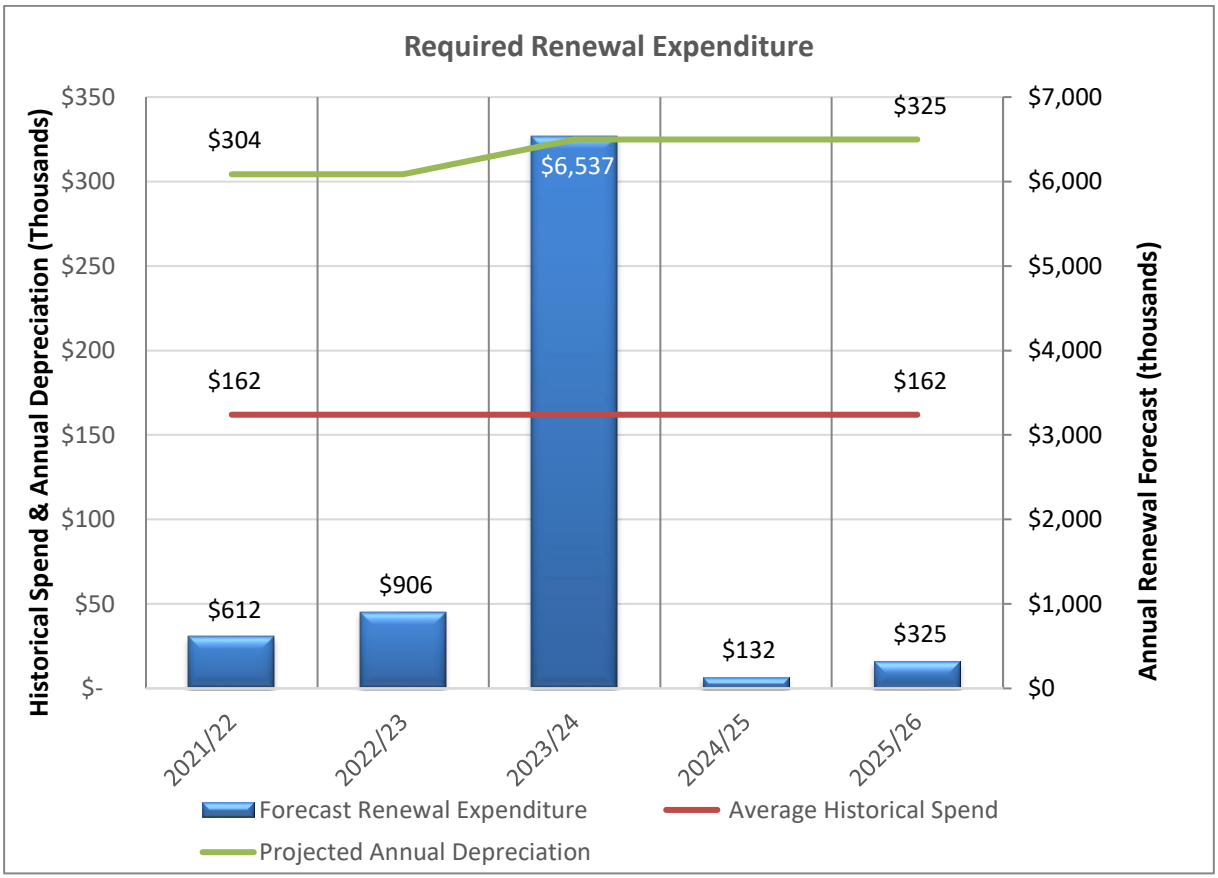
The observations obtained from recent asset inspections support the identified shortfall mentioned above. The observations highlight a history of insufficient renewal funding, resulting in an accumulation of assets now nearing the end of life and requiring replacement in the immediate future. The backlog (insufficient) maintenance has also played a part in hasting deterioration and prompting the need for assets to be renewed, and soon.

The revised annual depreciation figure ($304K) would in normal circumstances be adequate to define required expenditure. Nevertheless, deferred renewals have created an accumulation of required capital expenditure, which needs to be addressed in the immediate future. Therefore, **forecast** renewal costs are prepared to correctly capture the **required** renewals (including deferred renewals), irrespective of the benchmark provided by annual depreciation. **Forecast** costs presented in this AM Plan are based on actual data collated from the recent asset inspections and account for the deferred asset renewals.

The renewal forecasts are *not* relative to any approved renewal budgets. The forecast renewals require serious consideration by Council for adoption into the LTFP. It is understood that one Floodway asset renewal is already proposed in the City's 2021/22 budget process. Although this asset is not recognised in the asset register and not form part of these recent inspections, it is included in the forecast budget.

See **Figure 5.4.1 for** the planned (historical), required (annual depreciation) and forecast renewal costs**.** Forecasts are only provided for the first five years. Ultimately further inspections and revision of the AMP in 2025/26 would identify updated asset renewals. A detailed summary is shown in Appendix D.

Figure 5.4.1: Forecast Renewal Costs



All figure values are shown in current day dollars.

Forecast renewals also account for the cost of detailed design in the year prior to assets being replaced. This ensures that any changes to environmental conditions and or design criteria is revised before committing to construction. Renewing asset components would generally fall within renewal budgets. However, because of the relatively low cost to renew culvert and floodway components, some renewal costs do not meet the City's capital threshold and are therefore accounted for under maintenance.

Deferred renewal of assets forecasted in **Figure 5.4.1** will place increased pressure on the network and future budgeting responsibilities. If unattended it is likely to cause a significant financial liability. This is highlighted in the risk management plan.

Renewal Funding Opportunities

The Bridges Renewal Program (BRP) is an Australian Government initiative to fund the upgrade and replacement of bridges to enhance access for local communities and facilitate higher productivity vehicle access.

The Australian Government is providing more than $760 million over the 10 years from 2015-16 to 2024-25, with an ongoing commitment of at least $85 million per year from 2025-26. State, territory, and local governments are encouraged to submit funding proposals for projects that will upgrade road infrastructure by enhancing access for both local communities and higher productivity vehicles.

The next round of funding applications will be made under round six, which is not yet open for submissions. Proposals must be submitted as per the *Bridges Renewal Program Guidelines*. Australian Government Funding to local governments is limited to a maximum of 50 percent of the total project costs or $700,000 per bridge project and $1.4 million per proponent whichever is greater.

Asset renewal/replacements proposed in the first four years of this AM Plan are likely to qualify for funding and could therefore provide funding relief to the City.

5.5 Acquisition Plan

Acquisitions are new assets that did not previously exist or works which will upgrade or improve an existing asset beyond its existing capacity. They may result from growth, demand, social or environmental needs.

5.5.1 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 the Entities needs. Proposed upgrade and new work analysis should also include the development of a preliminary renewal estimate to ensure that the services are sustainable over the longer term. Verified proposals can then be ranked by priority and available funds and scheduled in future works programmes. The priority ranking criteria is detailed in **Table 5.5.1**.

Table 5.5.1: Acquired Assets Priority Ranking Criteria

Criteria	Proposed Weighting
Design / Capacity – Is the asset under increased activity and bearing more load than designed for*	50%
Demand – Community / Commercial / Private demand for new supported routes*	30%
Service Impact – Provide relief to regional road network, or local road network users*	20%
Total	**100%**

*Criteria may not yet be defined. Weighting presented in the above table is proposed and needs to be reviewed and endorsed by the City.

Summary of future asset acquisition costs

Newly acquired assets are not common for Bridges and Major Culverts and Floodways. The introduction of new assets usually requires significant planning and analysis. Forecast acquisitions are limited to the establishment of one new Floodway asset nearest to the existing Malley's Bridge. The Bridge has recently had its weight loading reduced and alternative means of transporting vehicles is deemed necessary to sustain the heritage listed bridge in some working form.

The expected cost of design and construction of this Floodway, known as the 'Low Flow Causeway' is estimated to be around **1 million dollars**. Construction costs have gone up in recent times and is expected to impact the delivery of this project

When the City commits to new assets, they must be prepared to fund future operations, maintenance, and renewal costs. They must also account for future depreciation when reviewing long term sustainability. 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 the City.

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. A review of the City's strategic documents and customer service interfaces revealed no immediate demand for the acquisition of new bridge, culvert and floodway assets, other than those already committed in Council budgets.

5.6 Disposal Plan

Disposal includes any activity associated with the disposal of a decommissioned asset including sale, demolition or relocation. Assets identified for possible decommissioning and disposal are shown in Table 5.6. A summary of the disposal costs and estimated reductions in annual operations and maintenance of disposing of the assets are also outlined in Table 5.6. Disposals presented in Table 5.6 are proposed for disposal and require Council approval before any action is taken. Proposed disposals align with the forecasted renewals in section 5.4.

Table 5.6: Assets Identified for Disposal

Asset	Reason for Disposal	Timing	Disposal Costs	Operations & Maintenance Annual Savings
BRIDGE - BURGESS CROSSING BRI106026: 3013	Decommission - Very Poor Condition	2022 - 2025	Unknown	$1,500 +
CULVERT / FLOODWAY - Byron Road	Asset Replacement	2021/22	NA Incorporated in Replacement Cost	NA
CULVERT / FLOODWAY CUL150553 - Menang Road	Asset Replacement	2022/23	NA Incorporated in Replacement Cost	NA
CULVERT / FLOODWAY CUL150544 - Newmarcarra Road	Asset Replacement	2023/24	NA Incorporated in Replacement Cost	NA
CULVERT / FLOODWAY CUL150529 - Giles Road	Asset Replacement	2023/24	NA Incorporated in Replacement Cost	NA
CULVERT / FLOODWAY CUL150554 - Nubberoo Road	Asset Replacement	2024/25	NA Incorporated in Replacement Cost	NA
BRIDGE - Walkaway Nangetty BRI106021: BR005	Asset Replacement	2023/24	NA Incorporated in Replacement Cost	NA

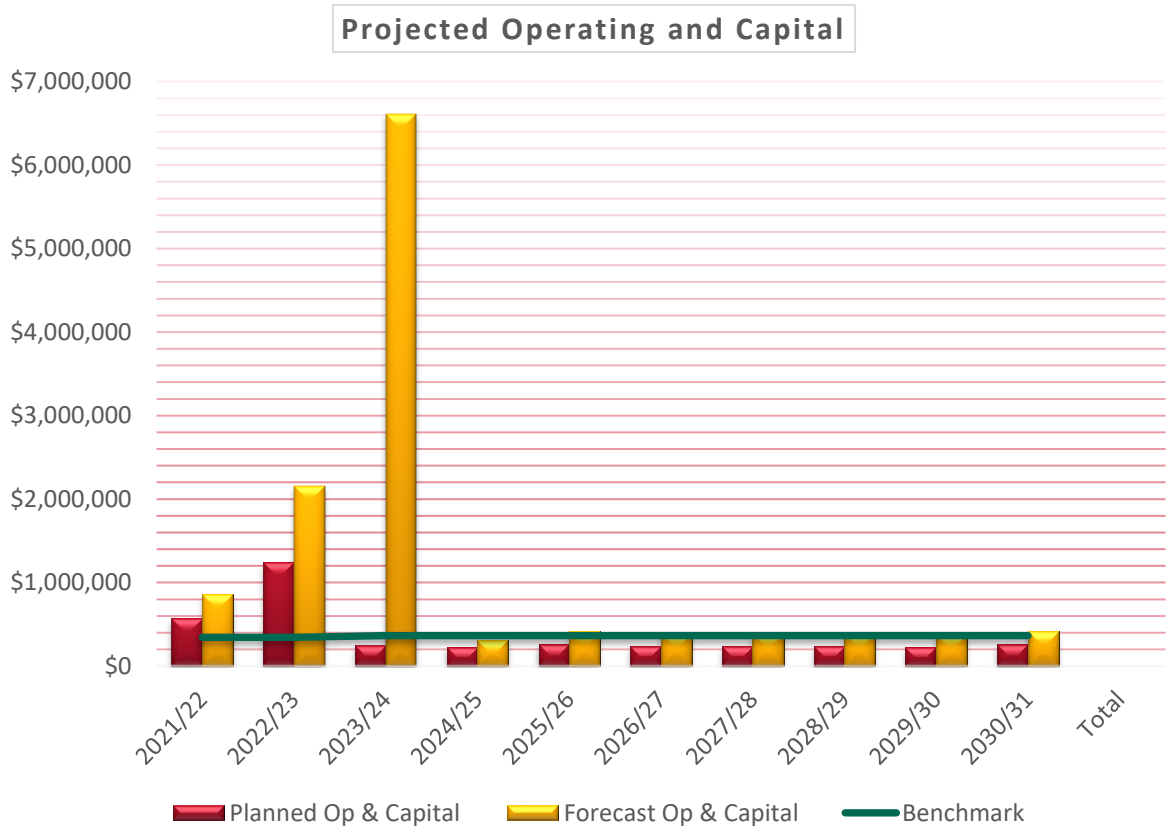
5.7 Summary of asset forecast costs

The financial projections from this asset plan are shown in **Figure 5.7.1**. These projections include forecast costs for acquisition, operation, maintenance, renewal, and disposal. These forecast costs are shown relative to the proposed budget. Budget constraints are largely unknown, however forecast costs are shown in relation to the planned budget based on historical expenditure trends.

The bars in the graphs represent the forecast costs needed to minimise the life cycle costs associated with the service provision. The planned budget is represented by the Planned Op & Capital bars. The line indicates the

benchmark for future funding. The gap between the forecast work and the planned budget is the basis of the discussion on achieving balance between costs, levels of service and risk to achieve the best value outcome.

Figure 5.7.1: Lifecycle Summary



All figure values are shown in current day dollars.

The high forecast costs in the initial few years are related to deferred renewals and backlog maintenance. This has created the need for significant upfront financial investment, and unless it is addressed soon it will continue to accumulate. The City's exposure to risk is linked to its ability to allocate the required expenditure for operating and capital activities.

This AM Plan is intended to provide the oversight required to address *known* service deficiencies, exposure to risk and budget constraints. The lifecycle summary identifies the clear need to act upon known issues and activities. The City must also consider the impact of *unknown* risks associated with assets not yet identified and the inclement weather on existing structures. The more information that becomes readily available the more insight the City will have.

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'[7].

An assessment of risks[8] 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 are considered to be all Bridges, Major Culvert and Floodway assets, however actual criticality assignments have not yet been made. Development of a network level criticality and risk assessment model is proposed in the improvement plan. Typical failure modes, and the impact on service delivery, are summarised in Table 6.1. Failure modes may include physical failure, collapse or essential service interruption.

Table 6.1 Critical Asset Failure Modes

Critical Asset(s)	Failure Mode	Impact
Bridges, Major Culverts and Floodway's	Deterioration of structural asset components - corrosion	Increase in deterioration profile (poor condition) and early asset failure.
Bridges, Major Culverts and Floodway's	Structural and Design deficiencies	Asset Closure and/or reduced working capacity (not suitable for intended traffic conditions) – Service disruption
Bridges, Major Culverts and Floodway's	Changes in soil conditions	Increased deterioration - Asset materials not suitable for change in conditions
Bridges, Major Culverts and Floodway's	Increased loading over time	Asset failure, Service disruption
Bridges, Major Culverts and Floodway's	Aggressive/changed weather conditions – wind, moisture	Damage to structural integrity, increased deterioration
Bridges, Major Culverts and Floodway's	Construction Supervision – poor oversight of workmanship	Premature or sudden asset failure
Major Culverts and Floodway's	Culvert barrel deterioration	Reduced performance, early asset failure
Major Culverts and Floodway's	Loss of embankment and scour protection	Increased deterioration of supporting infrastructure, asset closure and service disruption

[7] ISO 31000:2009, p 2

[8] REPLACE with Reference to the Corporate or Infrastructure Risk Management Plan as the footnote

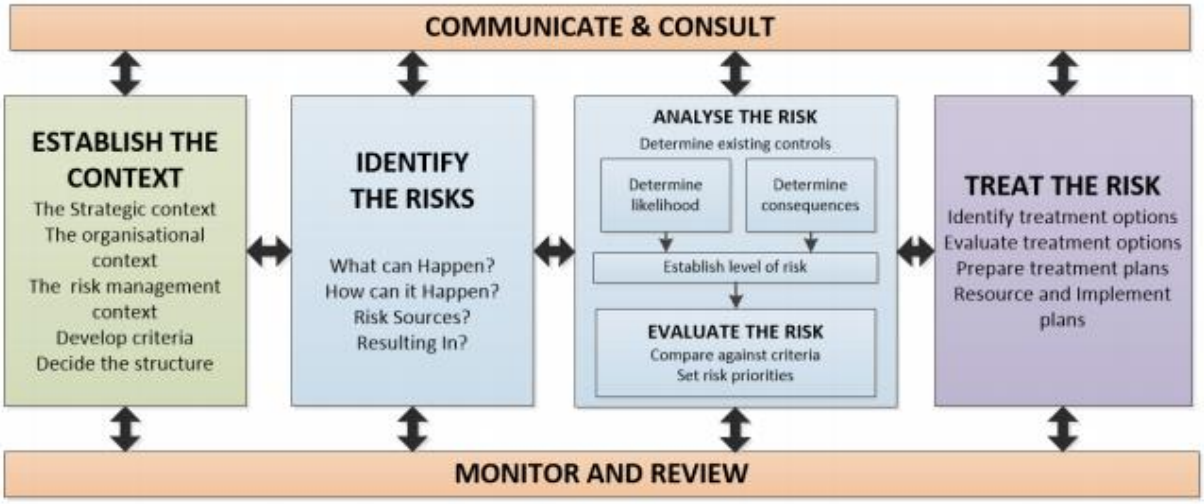
By identifying critical assets and failure modes an organisation can ensure that investigative activities, condition inspection programs, maintenance and capital expenditure plans are targeted at critical assets.

6.2 Risk Assessment

Effective risk identification and management leads to better understanding of an asset's risk exposure and the subsequent actions and investment required to maintain or mitigate the risk. The City's risk assessment processes are set out in the Risk Management Framework 2018 document and are based on ISO 31000:2018 Risk management – Principles and guidelines.

The City uses the Promapp Risk Module to store, document and report on the City's Risks and treatments. The risk management process is standardised across all areas of the City. The following diagram outlines the process with the following commentary providing broad descriptions of each step. Specific expanded guidance are provided in the Risk Management Procedures document.

Fig 6.2 Indicative Risk Management Process



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[9] 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.

Critical risks are those assessed with 'Very High' (requiring immediate corrective action) and 'High' (requiring corrective action) risk ratings identified in the Infrastructure Risk Management Plan. The residual risk and treatment costs of implementing the selected treatment plan is shown in Table 6.2. It is essential that these critical risks and costs are reported to management and where necessary, treatment plans adopted by Council.

[9] REPLACE with Reference to the Corporate or Infrastructure Risk Management Plan as the footnote

Table 6.2: Risks and Treatment Plans

Service or Asset at Risk	What can Happen	Risk Rating (VH, H)	Risk Treatment Plan	Residual Risk *	Treatment Costs
Bridges	Structural supports suffering significant deterioration - concrete decay / delamination / spalling	VERY HIGH	Reactive – Engage Contractor to carry out Detailed L3 Inspections on known failures/defects. Reactive - Action maintenance items identified in L1 and L2 visual Inspections Proactive – Schedule L3 Detailed inspections every 5 years	MEDIUM	LOW
Bridges	Vehicle Collision	VERY HIGH	Ensure barriers/rail guards are in place, constructed according to standards and inspected on regular basis.	MEDIUM	LOW
Culverts	Failure to detect deterioration of concrete decay/delamination	MEDIUM	Reactive – Engage Contractor to carry out Detailed L3 Inspections on known failures/defects. Reactive - Action maintenance items identified in L1 and L2 visual Inspections	LOW	$3,000 per Level 3 Inspection $800 – $1,500 Per L1 and L2 inspections
Floodway's	Embankment protection deteriorated – no longer protecting sealed/unsealed road and/or Culvert/bridge asset	HIGH	Reactive - Action maintenance items identified in L1 and L2 visual Inspections		$800 – $1,500 Per L1 and L2 inspections
Asset Inspections	Failure to conduct annual inspections and identify emerging risks and asset failure	VERY HIGH	Trigger annual inspections via Asset Management System. Budget annual operating expenditure for level 1 inspections	LOW	LOW
Maintenance Expenditure	Failure to prevent defects from contributing to overall (premature) asset failure	HIGH	Budget annual maintenance expenditure based on estimated cost breakdown from L1/L2 Inspections	LOW	MEDIUM
Capital Renewals	Forecast Renewal Budget not adopted	VERY HIGH	Council to approved forecast renewals as identified in the AMP	MED	HIGH
Backlog Maintenance	Failure to action backlog maintenance items requiring immediate action	HIGH	Council to approved required budgets identified via AMP and inspection recommendations	MED	MED

Note * The residual risk is the risk remaining after the selected risk treatment plan is implemented.

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 included in 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 if the forecasted budgets are not adopted by Council. These would include:

- Renewal of end-of-life assets
- Replacement and/or installation of safety measures (delineators, sign markers)
- Repairs to deteriorating asset components
- Replacement of failed asset components
- Removal of debris causing performance issues

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:

- Unplanned asset closure – extended periods
- Service disruptions
- Unsafe directed travel
- Forced to use alternate transportation routes

- Accessibility issues – cut off from homes, business, services

6.4.3 Risk trade-off

The operations and maintenance activities and capital projects that cannot be undertaken may sustain or create risk consequences. If forecast operations and renewals continue to be delayed, then the risk consequences include:

- Asset Failure - Significant risk to public safety (inc. death)
- Poor financial sustainability – Unable to fund the cumulative backlog of required expenditure.
- Poor Asset Function – Assets become unavailable for public use
- Interrupted transportation network
- Increased pressure on alternative assets
- Reduced occupational health and safety

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 requirements resulting from the information presented in the previous sections of this AM Plan. The financial projections will be improved as the discussion on desired levels of service and asset performance matures.

Figures relating to planned renewal costs are calculated from the City's historical expenditure over the past 3-years. Maintenance and operating costs are taken from the planned expenditure section

7.1 Financial Sustainability and Projections

7.1.1 Sustainability of service delivery

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 (proposed renewal budget for the next 10 years / forecast renewal costs for next 10 years), and
- medium term forecast costs/proposed budget (over 10 years of the planning period).

Asset Renewal Funding Ratio

Asset Renewal Funding Ratio[10] **19%**

The Asset Renewal Funding Ratio is an important indicator and illustrates that over the next 10 years we expect to have **19%** of the funds required for the optimal renewal of assets.

The forecast renewal work along with the proposed renewal budget, and the cumulative shortfall, is illustrated in Appendix D.

Medium term – 10-year financial planning period

This AM Plan identifies the forecast operations, maintenance and renewal costs required to provide an agreed level of service to the community over a 10 year period. This provides input into 10 year financial and funding plans aimed at providing the required services in a sustainable manner.

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

The forecast operations, maintenance and renewal costs over the 10 year planning period is **$1,349,248** on average per year.

The proposed (budget) operations, maintenance and renewal funding is **$373,588** on average per year giving a 10 year funding shortfall of **$975,660** per year. This indicates that **27%** of the forecast costs needed to provide the services documented in this AM Plan are accommodated in the proposed budget. Note, these calculations exclude acquired (new/upgrade) assets.

Providing sustainable services from infrastructure requires the management of service levels, risks, forecast outlays and financing to achieve a financial indicator of approximately 1.0 for the first years of the AM Plan and ideally over the 10 year life of the Long-Term Financial Plan.

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

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 (including possibly revising the long-term financial plan).

We will manage the 'gap' by developing this AM Plan to provide guidance on future service levels and resources required to provide these services in consultation with the community.

Forecast costs are shown in 2021 dollar values.

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

Year	Acquisition	Operation	Maintenance	Renewal	Disposal
2021/22		$108,200	$136,200	$611,500	
2022/23	$1,000,000	$33,600	$217,161	$906,000	
2023/24		$33,600	$157,100	$6,537,375	
2024/25		$25,600	$40,000	$132,000	
2025/26		$56,000	$40,000	$320,790	
2026/27		$33,600	$40,000	$320,790	
2027/28		$33,600	$40,000	$320,790	
2028/29		$33,600	$40,000	$320,790	
2029/30		$25,600	$40,000	$320,790	
2030/31		$56,000	$40,000	$320,790	
TOTALS	**1,000,000**	**$439,400**	**$791,761**	**$10,111,615**	

7.2 Funding Strategy

The proposed funding for assets is **not** outlined in the Entity's budget and Long-Term financial plan.

The financial strategy of the entity determines how funding will be provided, whereas the AM Plan communicates how and when this will be spent, along with the service and risk consequences of various service alternatives.

Additional funding opportunities are outlined under the Maintenance and Renewal sections in this AM Plan. State Government funding can be sought for renewal/replacement of BCF's. Fifty percent (50%) of the cost to renew/replace assets is available under the Bridge Renewal Funding Program. Other funding is provided through State Road Funds to Local Government Agreement (SRFLGA), for routine and preventative maintenance. Only one third of the proposed amount is available under this program. The City can reduce the financial impacts in future years by accessing these programs and available funding.

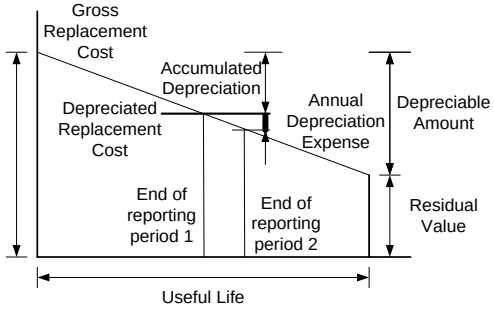
7.3 Valuation Forecasts

7.3.1 Asset valuations

Actual carrying amounts of individual Bridges, Major Culverts and Floodway's are not identifiable in the Financial Management System. The best available estimate of the value of assets included in this AM Plan are shown below. The assets are valued upon cost approach method and were last valued in 2018 as part of the infrastructure revaluation project assessed by the City.

However, valuations were deemed to be significantly underestimated and not encompassing of all assets. Therefore, the figures were revised for the purpose of accurate asset planning and forecasting. The revised figures are provided below:

Replacement Cost (Current/Gross)	**$16,356,285**
Depreciable Amount	**$16,356,285**
Depreciated Replacement Cost[11]	**$9,254,907**
Depreciation	**$304,315**



7.3.2 Valuation forecast

Asset values are forecast to increase as additional assets are constructed and discovered through data capture/inspection exercises

Additional assets will generally add to the operations and maintenance needs in the longer term. Additional assets will also require additional costs due to future renewals. Any additional assets will also add to future depreciation forecasts.

Based on the maturity of the asset register and known deficiencies in asset data, it is expected that new (discovered) assets will be recognised in the near future and need to be factored into future planning practice.

7.4 Key Assumptions Made in Financial Forecasts

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 financial forecasts.

Key assumptions made in this AM Plan are:

- Planned maintenance expenditure is derived from the cost of routine asset Inspections and cost estimates provided by Council staff.
- Asset Valuations and depreciation figures are based on indicative figures. Assets were revised to more accurately account for the current asset inventory and current replacement cost of assets.
- Required Maintenance expenditure is derived from *standard* unit rates and estimations. Costings are estimates only and should be costed as per CGG labour and rates.
- Capital Expenditure is estimated from similar capital works performed by CGG and should be revised according to detailed design in the years prior to construction.
- Proposed budgets have not been adopted by Council.

[11] Also reported as Written Down Value, Carrying or Net Book Value.

7.5 Forecast Reliability and Confidence

The forecast costs, proposed budgets, and valuation projections in this AM Plan are based on the best available data. For effective asset and financial management, it is critical that the information is current and accurate. Data confidence is classified on a A - E level scale[12] in accordance with Table 7.5.1.

Table 7.5.1: 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 ± 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 ± 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 ± 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 ± 40%
E. Very Low	None or very little data held.

The estimated confidence level for and reliability of data used in this AM Plan is shown in Table 7.5.2.

Table 7.5.2: Data Confidence Assessment for Data used in AM Plan

Data	Confidence Assessment	Comment
Demand drivers	MEDIUM	Demand Drivers are largely dependent on Council strategy to develop areas, economic growth factors and the larger transportation network servicing WA. Demand drivers could be reviewed in depth to identify likely locations for upgrade/new assets.
Growth projections	LOW	Significant growth statistics was not identified in the Geraldton region. Growth patterns are low and steady and unlikely to place undue strain on the region.
Acquisition forecast	LOW	Limited acquisitions identified in current state. Although, expected recognitions likely to come from renewals.
Operation forecast	MEDIUM	Developed from visual inspections.
Maintenance forecast	HIGH	Developed from visual inspections.
Renewal forecast - Asset values	LOW	Forecast values require review
- Asset useful lives	MEDIUM	Based on existing asset lives.

[12] IPWEA, 2015, IIMM, Table 2.4.6, p 2|71.

Data	Confidence Assessment	Comment
- Condition modelling	MEDIUM	Only applicable to condition ratings and assessments provided through asset inspections.
Disposal forecast	MEDIUM	Developed from visual inspections

Most of the information (current state and forecasts) stipulated in the AM Plan is based on recent data sources, with associated assumptions. For that reason, the estimated confidence level for and reliability of data used in this AM Plan is at medium.

8.0 PLAN IMPROVEMENT AND MONITORING

8.1 Status of Asset Management Practices[13]

8.1.1 Accounting and financial data sources

This AM Plan utilises accounting and financial data. The source of actual expenditure is extracted from the City's Financial Asset Management System; Synergy.

8.1.2 Asset management data sources

This AM Plan also utilises asset management data. The source of the data is My Data.

8.2 Improvement Plan

It is important that an entity recognise areas of their AM Plan and planning process that require future improvements to ensure effective asset management and informed decision making. The improvement plan generated from this AM Plan is shown in Table 8.2.

Table 8.2: Improvement Plan

Task	Task	Responsibility	Resources Required	Timeline
1	Allocate ongoing funding for annual Level 1 Bridge, Culvert and Major Floodway Inspections	Finance	Operating Expenditure	12 months
2	Complete all recommended maintenance actions according to recommended timelines as outlined within the inspection reports	Coordinator Roads & Drainage	Operating Expenditure Internal Maintenance Crew	12 – 36 months
3	Develop Network Level Criticality and Risk Assessment Model. Assign ratings to individual assets. Prioritise future maintenance and capital works based on asset criticality and risk	Manager Maintenance & Operations	Internal Staff & External Resources	6 months
4	Data Capture Exercise – Inspect entire BCF network, capture all culvert and Floodway (minor and major) assets and record in the asset management system	Manager Maintenance & Operations	Internal Staff & External Resources	12 months
5	Capture component level condition information in the AM System	Coordinator Roads & Drainage	Internal Staff	12 months
6	Define unique accounting codes in the finance system for capturing specific maintenance and renewals costs against Bridges, Major Culverts and Floodway's.	Finance	Internal Resources	6 months
7	Reconcile the asset management expenditure forecasts with the data used to generate the Long-Term Financial Plan	Finance	Internal Resources	12 months

[13] ISO 55000 Refers to this as the Asset Management System

8.3 Monitoring and Review Procedures

This AM Plan will be reviewed during the annual budget planning process and revised to show any material changes in service levels, risks, forecast costs and proposed budgets as a result of budget decisions.

The 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. These forecast costs and proposed budget are incorporated into the Long-Term Financial Plan or will be incorporated into the Long-Term Financial Plan once completed.

The AM Plan has a maximum life of 5 years and is due for complete revision and updating by 2025/26.

8.4 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 1–5-year detailed works programs, budgets, business plans and corporate structures consider the 'global' works program trends provided by the AM 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 achieving the Organisational target (this target is often 90 – 100%).

9.0 REFERENCES

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- 'Strategic Plan 20XX – 20XX',
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- State Road Funds to Local Government Procedures D21#545923 https://www.mainroads.wa.gov.au/globalassets/technical-commercial/local-government-funding/state-road-funds-to-local-government-procedures.pdf
- State Road Funds to Local Government Agreement 2018/19 to 2022/23, https://www.mainroads.wa.gov.au/globalassets/technical-commercial/local-government-funding/state-road-funds-to-local-government-procedures.pdf

10.0 APPENDICES

Appendix A Acquisition Forecast

A.1 – Acquisition Forecast Assumptions and Source

Acquisition forecasts are based on the construction of NEW assets for which the City has already begun designing and planning for development. It is expected that existing assets will be discovered in the following years after field inspection exercises conducted by the City. Estimations regarding the increase in the City's asset base are not considered in the acquisition projections. It is expected that the Acquisition forecasts be updated, and financial projections revised after the field inspections are carried out. Newly recognised assets will need to be financially recognised.

A.2 – Acquisition Project Summary

One acquisition project is forecast in the next ten years. This project relates to a low flow causeway (floodway) designed to relieve Maley's Bridge (heritage) from vehicular traffic. This bridge is heritage listed and of significance to the City. Hence, actions are being taken to reduce traffic and loading, but still provide access to destinations.

A.3 – Acquisition Forecast Summary

Table A3 - Acquisition Forecast Summary

Year	Constructed	Donated	Growth
2021/22			
2022/23	$1,000,000		
2023/24			
2024/25			
2025/26			
2026/27			
2027/28			
2028/29			
2029/30			
2030/31			
TOTALS	**$1,000,000**		

Appendix B Operation Forecast

B.1 – Operation Forecast Assumptions and Source

Forecast operational activities relate to ongoing inspections and timelines defined under the MRWA Guidelines for L1 and L2 visual inspections. Other operational activities relate to L3 inspections identified from recent inspections.

B.2 – Operation Forecast Summary

Table B2 - Operation Forecast Summary

Year	Operation Forecast	Additional Operation Forecast	Total Operation Forecast
2021/22	$108,200		$108,200
2022/23	$33,600		$33,600
2023/24	$33,600		$33,600
2024/25	$25,600		$25,600
2025/26	$56,000		$56,000
2026/27	$33,600		$33,600
2027/28	$33,600		$33,600
2028/29	$33,600		$33,600
2029/30	$25,600		$25,600
2030/31	$56,000		$56,000
TOTALS	**$439,400**		**$439,400**

Appendix C Maintenance Forecast

C.1 – Maintenance Forecast Assumptions and Source

GHD provided costed work item estimates in 2018 as part of the level 1 inspections across all Bridges, Major Culverts and Floodway's. The cost estimates provided a basis for costed maintenance activities. Maintenance activities proposed in 2018 were reviewed against recent (2020-2021) visual inspections performed by Talis and MRWA and revised to forecast recommended maintenance estimates over the next 5 years. Estimates should be reviewed by Council Staff when budgeting for maintenance in the following financial year.

C.2 – Maintenance Forecast Summary

Forecast maintenance activities in the first four years is primarily related to backlog maintenance and specific work activities. From year five (2025/26) onwards routine maintenance activities are assumed. What is not factored into the forecast maintenance, is any maintenance backlog accumulated over the first four years whilst existing activities are being resolved. This can increase maintenance costs in addition to the proposed figures.

Table C2 - Maintenance Forecast Summary

Year	Maintenance Forecast	Additional Maintenance Forecast	Total Maintenance Forecast
2021/22	$136,200		$136,200
2022/23	$217,161		$217,161
2023/24	$41,300		$41,300
2024/25	$157,100		$157,100
2025/26	$40,000		$40,000
2026/27	$40,000		$40,000
2027/28	$40,000		$40,000
2028/29	$40,000		$40,000
2029/30	$40,000		$40,000
2030/31	$40,000		$40,000
TOTALS	**$791,761**		**$791,761**

Appendix D Renewal Forecast Summary

D.1 – Renewal Forecast Assumptions and Source

Renewal forecasts are derived from CGG concept design estimates, or estimations calculated from similar capital works and design criteria. Renewal forecasts are estimates only and should be revised in the prior planning year and based off detailed designs and agreed asset solutions.

D.2 – Renewal Forecast Summary

Renewal forecasts in the first four years are primarily related to deferred renewal works. From year five (2025/26) onwards the renewal forecasts are based on depreciation expense. What is not factored into the renewal forecasts, is the identification of any renewals related to newly recognised assets and/or assets which have deteriorated faster than expected. This can increase renewal costs in those years in addition to the proposed figures.

Table D3 - Renewal Forecast Summary

Year	Renewal Forecast	Renewal Budget	Shortfall
2021/22	$611,500	$500,000	-$111,500
2022/23	$906,000	$162,547	-$743,453
2023/24	$6,537,375	$162,547	-$6,374,828
2024/25	$132,000	$162,547	$30,547
2025/26	$320,790	$162,547	-$158,243
2026/27	$320,790	$162,547	-$158,243
2027/28	$320,790	$162,547	-$158,243
2028/29	$320,790	$162,547	-$158,243
2029/30	$320,790	$162,547	-$158,243
2030/31	$320,790	$162,547	-$158,243
TOTALS	**$10,111,615**	**$1,962,925**	**-$8,148,690**

D.3 –Renewal Plan

Asset ID	Type	2021/22	2022/23	2023/24	2024/25	Total
CUL150543 - Carnarvon Mullewa Road	Renewal	$26,000				**$26,000**
CUL150545 - Carnarvon Mullewa Road	Renewal	$27,000				**$27,000**
CUL150531 – Minnenooka Road	Renewal	$18,500				**$18,500**
CUL150553 - Menang Road	Replacement	$40,000	$361,000			**$401,000**
FLOODWAY - Byron Road	Replacement	$500,000				**$500,000**
CUL150529 - Giles Road	Replacement		$30,000	$373,000		**$403,000**
CUL150544 - Newmarcarra Road	Replacement		$15,000	$144,375		**$159,375**
CUL150554 - Nubberoo Road	Replacement			$20,000	$132,000	**$152,000**
BRI106021 – Walkaway Nangetty Rd	Replacement		$500,000	$6,000,000		
TOTAL		**$611,500**	**$906,000**	**$6,537,375**	**$132,000**	**$8,186,875**

Appendix E Disposal Summary

E.1 – Disposal Forecast Assumptions and Source

Disposals forecasts are based on renewing/replacing assets in that financial year. Renewal/replacement dates are subject to change, in which case forecast disposals would also change. The cost to dispose an asset that is being replaced is consumed within the replacement cost of the new asset. No revenue is generated from disposing the asset, therefore there are no forecast disposal costs to account for.

Appendix F Budget Summary by Lifecycle Activity

Table F1 – Budget Summary by Lifecycle Activity

Year	Acquisition	Operation	Maintenance	Renewal	Disposal	Total
2021/22		$108,200	$136,200	$611,500		$855,900
2022/23	1,000,000	$33,600	$217,161	$906,000		$2,156,761
2023/24		$33,600	$41,300	$6,537,375		$6,612,275
2024/25		$25,600	$157,100	$132,000		$314,700
2025/26		$56,000	$40,000	$320,790		$416,790
2026/27		$33,600	$40,000	$320,790		$394,390
2027/28		$33,600	$40,000	$320,790		$394,390
2028/29		$33,600	$40,000	$320,790		$394,390
2029/30		$25,600	$40,000	$320,790		$386,390
2030/31		$56,000	$40,000	$320,790		$416,790
TOTALS	**1,000,000**	**$439,400**	**$791,761**	**$10,111,615**		**$12,342,776**

Appendix G Maintenance Work Items

General Supporting Activities

Work Item Code	Item Description
G003	Detailed Inspection (L2)
G006	Environmental Requirements
G008	Geotechnical Investigation
G010	Monitor Defect
G015	Waterways Design
G016	Review Structure after Next Detailed Inspection

Preventative Maintenance

Work Item Code	Item Description
P101	Seal Timber
P103	Fungicide Treatment

MAIN ROADS Western Australia Culvert Inspection Guidelines
Doc: No. 6706-02-2237 - Issue Date 06/01/2012

Routine Maintenance

Work Item Code	Item Description
R202	Remove Graffiti
R203	Repair Scour (Minor)
R204	Eradicate Termites
R205	Clear Vegetation
R207	Deck Surface - Maintain
R208	Drainage - Maintain
R210	Fence - Remove
R211	Fence - Repair (Control of Access)
R212	Guardrail - Maintain / Repair
R213	Kerb - Repair (Minor) - Non-Structural
R215	Sign - Maintain

Specific Works

Work Item Code	Item Description
S301	Embankment - Repair
S308	Widen Embankment
S322	Control Fauna (Pest)
S324	Control Corrosion
S336	Replace with Culvert
S350	Repair Scour (Major)
S352	Strengthen
S357	Widen
S364	Footpath - Install
S378	Services - Relocate
S385	Services - Repair
S392	Walkway - Repair
S437	Decking - Repair (Timber)
S443	Drainage - Install
S449	Drainage - Repair
S461	Footpath - Repair
S467	Guardrail - Install
S471	Kerb - Extend
S473	Kerb - Repair

S507	Bedlog - Repair
S510	Bedlog - Shim
S537	Footpath Railing - Repair
S578	Wing Wall - Construct
S585	Wing Wall - Extend
S588	Wing Wall - Repair
S701	Apron - Repair
S716	Barrel - Repair
S731	Headwall - Repair

Appendix H MRWA Recommended Routine Bridge Maintenance Activities

Asset Grouping	Maintenance Activities	Frequency
Bridge Deck	Traffic Lanes – sweep or wash down to remove debris or dirt	TBA
	Traffic Lanes – repair road seal and approaches	TBA
	Traffic Lanes – clean and remove debris from expansion joint	TBA
	Traffic Lanes – repair/replace signage	TBA
	Guardrails – repair, tighten and adjust	TBA
Superstructure	Expansion joint cleaning	TBA
	Scupper cleaning	TBA
	Abutments – remove graffiti , repair anti-graffiti coating and repair holes in stone pitching	TBA
	Piers – remove graffiti and repair anti-graffiti coating	TBA
	Services – repair switchboards, wiring, lighting, globes and other electrical items	TBA
	Services – check tension in connecting bolts of light pole bases and re-tighten if required	TBA
		TBA

Appendix I Asset Condition and Severity profiles

Asset ID's	Average Barrel Severity	Waterflow Severity	Scour Severity	Average Condition
Culvert				
CUL150522 - WEST BANK ROAD	2	3	4	N/A
CUL150526 - GLENGARRY ROAD	Not Inspected	5	3	N/A
CUL150528 - SANDSPRINGS ROAD	3	4	2	N/A
CUL150529 - GILES ROAD	4	3	2	N/A
CUL150530 - SANDSPRINGS ROAD	3	3	2	N/A
CUL150532 - CHAPMAN VALLEY ROAD	3	3	2	N/A
CUL150534 - CHAPMAN ROAD	1	3	2	N/A
CUL150535 - SUTCLIFFE ROAD	2	4	2	N/A
CUL150536 - NORTHERN GULLY ROAD	2	2	1	N/A
CUL150537 - NORTHERN GULLY ROAD	1	3	2	N/A
CUL150538 - YUNA-TENINDEWA ROAD	3	2	3	N/A
CUL150540 - YUNA-TENINDEWA ROAD	4	2	2	N/A
CUL150541 - YUNA-TENINDEWA ROAD	1	2	1	N/A
CUL150542 - WEBBER ROAD	2.3	3	2	N/A
CUL150550 - MINGENEW-MULLEWA ROAD	3	2	2	N/A
CUL150552 - WARREN ROAD	2	2	2	N/A
CUL150553 - MENANG ROAD	4	2	3	N/A
Floodway				
CUL150524 - PHILLIPS ROAD	N/A	2	4	4
CUL150525 - SHORT ROAD	N/A	1	2	2
Floodway / Culvert				
CUL150523 - ARTHUR ROAD	2	3	4	2
CUL150527 - ELLENDALE ROAD	4	2	2	3
CUL150531 - MINNENOOKA ROAD	Not Inspected	2	2	4
CUL150533 - JANDANOL ROAD	Not Inspected	5	2	2

CUL150543 - CARNARVON-MULLEWA ROAD	3	2	2	2
CUL150544 - NEWMARCARRA ROAD	4	2	2	3
CUL150545 - CARNARVON-MULLEWA ROAD	3	2	3	3
CUL150546 - CARNARVON-MULLEWA ROAD	2.5	2	3	2
CUL150547 - CARNARVON-MULLEWA ROAD	1.5	2	3	2
CUL150548 - CARNARVON-MULLEWA ROAD	1.5	2	3	2
CUL150549 - CARNARVON-MULLEWA ROAD	3	4	3	3
CUL150551 - MINGENEW-MULLEWA ROAD	2	2	2	2
CUL150554 - NUBBEROO ROAD	4	2	2	3
Bridges				
BRI106020 - CHAPMAN ROAD	N/A	N/A	N/A	3
BRI106021 - WALKAWAY-NANGETTY ROAD	N/A	N/A	N/A	4
BRI106022 - MCCARTNEY ROAD	N/A	N/A	N/A	3
BRI106023 - EAST CHAPMAN ROAD	N/A	N/A	N/A	2
BRI106024 - MINGENEW-MULLEWA ROAD	N/A	N/A	N/A	2
BRI106025 - NORTHWEST COASTAL HIGHWAY	N/A	N/A	N/A	2
BRI106026 - ALLEN ROAD	N/A	N/A	N/A	5
BRI143416 - DEVLIN POOL ROAD	N/A	N/A	N/A	3