

GLEN INNES SEVERN COUNCIL



BRIDGES

ASSET MANAGEMENT PLAN PART 7



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TABLE OF CONTENTS

1.	EXECUTIVE SUMMARY	1
2.	INTRODUCTION.....	2
	2.1 Background.....	2
	2.2 Goals and Objectives of Asset Management.....	2
	2.3 Core and Advanced Asset Management.....	2
3.	LEVELS OF SERVICE	3
	3.1 Customer Research and Expectations	3
	3.2 Legislative Requirements.....	3
	3.3 Current Levels of Service.....	3
	3.4 Desired Levels of Service	3
4.	FUTURE DEMAND.....	8
	4.1 Demand Forecast	8
	4.1.2 Demand Factors – Trends and Impacts	8
	4.2 Changes in Technology	8
	4.3 Demand Management Plan	8
	4.4 New Assets from Growth	9
5.	LIFECYCLE MANAGEMENT PLAN.....	10
	5.1 Background Data	10
	5.1.1 Physical parameters.....	10
	5.1.2 Asset capacity and performance	11
	5.1.3 Asset condition.....	11
	5.1.4 Asset valuations	12
	5.2 Risk Management Plan.....	12
	5.3 Routine Maintenance Plan.....	13
	5.3.1 Maintenance plan.....	13
	5.3.2 Standards and specifications.....	14
	5.3.3 Summary of future maintenance expenditures	14
	5.4 Renewal/Replacement Plan.....	15

5.4.1	Renewal plan	15
5.4.2	Renewal standards	15
5.4.3	Summary of Optimal Renewal Expenditure	15
5.5	Creation/Acquisition/Upgrade Plan	16
5.5.3	Summary of future upgrade/new assets expenditure.....	16
5.6	Disposal Plan.....	16
6.	FINANCIAL SUMMARY	18
6.1	Financial Statements and Projections	18
6.1.1	Sustainability of service delivery.....	18
6.2	Funding Strategy	20
6.3	Valuation Forecasts	20
6.4	Key Assumptions made in Financial Forecasts	21
7.	ASSET MANAGEMENT PRACTICES	23
7.1	Accounting/Financial Systems	23
7.2	Asset Management Systems	23
7.3	Information Flow Requirements and Processes	23
7.4	Standards and Guidelines.....	23
7.5	Data Confidence Level.....	23
8.	PLAN IMPROVEMENT AND MONITORING	24
8.1	Performance Measures.....	24
8.2	Improvement Plan.....	24
8.3	Monitoring and Review Procedures	25
	REFERENCES.....	26

1. EXECUTIVE SUMMARY

In recent years Council has commenced a volume of work on the bridge network that has been unseen for decades. Bridges have previously been identified through technical inspection as having defects ranging from minor to significant. A great deal of work has already been undertaken on the network using funding from the LIRS scheme and, predominantly, in-house resources.

This approach has provided Council staff with a significant learning opportunity; the bridge team have developed into a professional unit that can renew timber bridges particularly well. Council has made the step of reverting to the use of timber in some bridge renewal works with great success. For instance, the renewal of the Gulf Road bridge over the Beardy River (locally known as Glen Creek) was completed with excellent quality at a cost of just \$900 per square metre. In comparison a new concrete structure of similar dimension has been constructed on Rangers Valley Road for \$4500 per square meter. It is noted that a concrete bridge was replaced in that location, being just 45 years old.

The use of concrete structures is justified on high freight roads, but the use of low-cost timber solutions that utilise existing concrete foundations is a very cost-effective long-term solution for low traffic local roads.

Council has moved from conventional hardwood timber to laminated timber as part of its continuous improvement philosophy. The benefit of laminated components being that a fully engineered product, consistent in dimension and treated for insect and fire protection, far outweighs their additional cost compared to natural hardwood timbers, which are becoming more and more difficult to source. A fifty-year warranty is now offered by the supplier of these components.

The approach moving forward continues to be a “horses for courses” methodology. The philosophy underpinning renewal decisions at end of life is as follows:

Timber components will not be installed in contact with the ground. Concrete will always be used for abutments and gravel boards to minimise the risk of fungal infections and termites in timber components, even when using treated timbers.

Multiple span low level bridges (<2m in height) will be replaced with laminated timber decks in those cases when an existing concrete foundation is able to be reused.

High level bridges (three bridges >2m) with concrete foundations will either be retrofitted with laminated timber using a newly developed system for working safely at heights. Bridges with timber foundations will be replaced with concrete foundation bridges when the time comes for renewal.

2. INTRODUCTION

2.1 BACKGROUND

This asset management plan covers the following infrastructure assets:

Table 2.1: Assets covered by this Plan

Asset Type	Quantity	Replacement Value	Accumulated Depreciation
Timber Bridges	11	\$ 2,410,800	-\$ 2,221,166
Concrete/Steel Bridges	77	\$ 51,607,619	-\$ 17,813,228
Culverts	33	\$ 10,821,980	-\$ 4,330,713
Causeways	134	\$ 7,165,619	-\$ 4,067,016
Total	222	72,006,019	-\$ 28,432,122

2.2 GOALS AND OBJECTIVES OF ASSET MANAGEMENT

Relevant Council goals and objectives and how these are addressed in this asset management plan are:

Table 2.2: Council Goals and how these are addressed in this Plan

GOAL	OBJECTIVE	HOW GOALS AND OBJECTIVES ARE ADDRESSED IN AMP
IM 3.1.2 Implement Capital Bridge infrastructure works according to adopted service levels.	Implement and complete Capital Bridge Infrastructure works for the current financial year.	This plan defines Capital Bridge Infrastructure works according to adopted service levels.
IM 3.2.10 Implement the Asset Management Plan for bridges.	Complete all works identified in the asset management plan for bridges in each financial year.	This plan and supporting asset registers identify assets due for renewal each year.

2.3 CORE AND ADVANCED ASSET MANAGEMENT

Refer to Core Asset Management Plan.

3. LEVELS OF SERVICE

3.1 CUSTOMER RESEARCH AND EXPECTATIONS

The recent external customer satisfaction survey indicated that community satisfaction with bridges has reduced from previous surveys. The reason for this is not known, however, one possibility is that the timber methodology needs to be communicated more thoroughly than has been the case.

3.2 LEGISLATIVE REQUIREMENTS

Refer to Core Asset Management Plan.

3.3 CURRENT LEVELS OF SERVICE

Refer to Core Asset Management Plan.

In recent years Council has commenced a volume of work on the bridge network that has been unseen for decades. Bridges have been identified through technical inspection as having a range of defects from minor to significant. A great deal of work has already been undertaken on the network using funding from the LIRS scheme, and predominantly using in-house resources.

3.4 DESIRED LEVELS OF SERVICE

Refer to Core Asset Management Plan.

Table 3.4a: Community Levels of Service

KEY PERFORMANCE INDICATOR	COMMUNITY LEVEL OF SERVICE	PERFORMANCE MEASUREMENT PROCESS	TARGET PERFORMANCE	CURRENT PERFORMANCE
Sustainability	Facilities are managed for future generations.	Long-Term Financial Plan.	Key TCORP Financial Ratios are maintained	The infrastructure backlog ratio for bridges is 7%.
Cost effectiveness	Planned scheduled maintenance	Percent of maintenance done by planned repairs	90% of planned maintenance activities	95% of work in the current financial year is planned activity or resulting from natural disasters.

Table 3.4b: Technical Levels of Service

KEY PERFORMANCE INDICATOR	TECHNICAL LEVEL OF SERVICE	PERFORMANCE MEASUREMENT PROCESS	TARGET PERFORMANCE	CURRENT PERFORMANCE
Cost effectiveness	Unit rate	Price per square metre of renewal and additions measured on a yearly basis reported by bridge type.	Unit rate from June 2020 revaluation: \$2048 (Engineered Timber) and \$4020 (All Concrete)	Not determined due to current demand in supply chain.
Accessibility	Provide advance signage of road closures affecting village residents.	Coverage of signs.	Signs in place on Emmaville Road and Strathbogie Road to provide advance warning of road closure when Severn River is in flood.	Signs in place on Emmaville Road and Strathbogie Road to provide advance warning of road closure when Severn River is in flood.

Table 3.4c: Community Levels of Service

KEY PERFORMANCE MEASURE	LEVEL OF SERVICE / OUTCOME	PERFORMANCE MEASURE PROCESS	PERFORMANCE TARGET	CURRENT PERFORMANCE
Quality	Provide reliable and safe access and connectivity	Customer Service Requests Community forums feedback	< 20 complaints per annum	Complaints FY 2022: 0
Function	Meets user requirements for: <ul style="list-style-type: none"> • Geometry • Accessibility 	Customer Service Requests Austroads technical specifications and guidelines	Compliance with current standards and Specs	Compliance with current standards and specs
Safety	Increase public safety	Accident reports	Zero reported crashes attributed to bridge condition	One vehicle washed off flooded bridge in reporting period.
Reliability	Bridges & major culverts available at all times & free of mass limits.	Periodic bridge & major culvert audit	Audit undertaken every 3 to 5 years	Load limit is current on Wentworth Street and Shannon Vale Road. Speed limits to reduce dynamic loading are in place on Mt Mitchell Road over two bridges.

Table 3.4d: Technical Levels of Service

KEY PERFORMANCE MEASURE	LEVEL OF SERVICE / OUTCOME	PERFORMANCE MEASURE PROCESS	PERFORMANCE TARGET	CURRENT PERFORMANCE
Condition	No restriction on use	Condition rating	All bridges have a condition rating of 'Satisfactory' or greater	The previous backlog of works has been significantly reduced through major capital renewal upgrades. All bridges with known deficiencies have either been renewed or are funded for renewal within the next two years.
Function	Adequate capacity and structural strength	Regular compliance inspection	All bridges inspected annually	Bridges have been inspected and scheduled for required works.

4. FUTURE DEMAND

4.1 DEMAND FORECAST

Refer to Core Asset Management Plan.

4.1.2 DEMAND FACTORS – TRENDS AND IMPACTS

Developers will contribute to bridge upgrades that are required to facilitate freight or access to significant developments. Upgrade works that were completed for the Sapphire Wind Farm were subsequently de-rated at the end of the project, much to Council's dismay. An upgrade was completed at Cam Creek on the Rangers Valley Road to convert the bridge to dual lane from single lane. Those works are funded by developer contributions from Ranger's Valley feedlot with matching grant funding.

Table 4.1.2: Demand Factors, Projections and Impact on Services

FACTOR	IMPACT
Population changes in townships/rural areas	Expectations on level of service independent of number of properties serviced, particularly on very low-traffic roads.
Rural freight task increasing	Last mile issues associated with higher mass limit vehicles place an increased expectation for bridge load capacity.

4.2 CHANGES IN TECHNOLOGY

Technological changes (as distinct from changes to installations brought about by external, e.g. environmental, forces) will impact on the asset classes in this AMP over the 20-year timeframe.

Emerging local construction ability will see more pre-cast components to minimise community disruption. Major culverts will likely be replaced 'like-for-like', with improved end walls and erosion projection.

4.3 DEMAND MANAGEMENT PLAN

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 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 asset management plan.

Table 4.3: Demand Management Plan Summary

SERVICE ACTIVITY	DEMAND MANAGEMENT PLAN
Safety Improvement Plan	Upgrades to improve user safety generally only apply when significant development is occurring, and the cost of those upgrades are borne by the developer.
Road Hierarchy Review Plan	<p>Review of the Roads Hierarchy will examine utilisation patterns and network links, within next review period.</p> <p>Consideration of freight routes and last mile implications will also occur as part of the current review. Local bridge capacities can be the limiting factor for heavy freight vehicles.</p>

4.4 NEW ASSETS FROM GROWTH

No new bridge assets from growth are anticipated within the current term of this plan.

5. LIFECYCLE MANAGEMENT PLAN

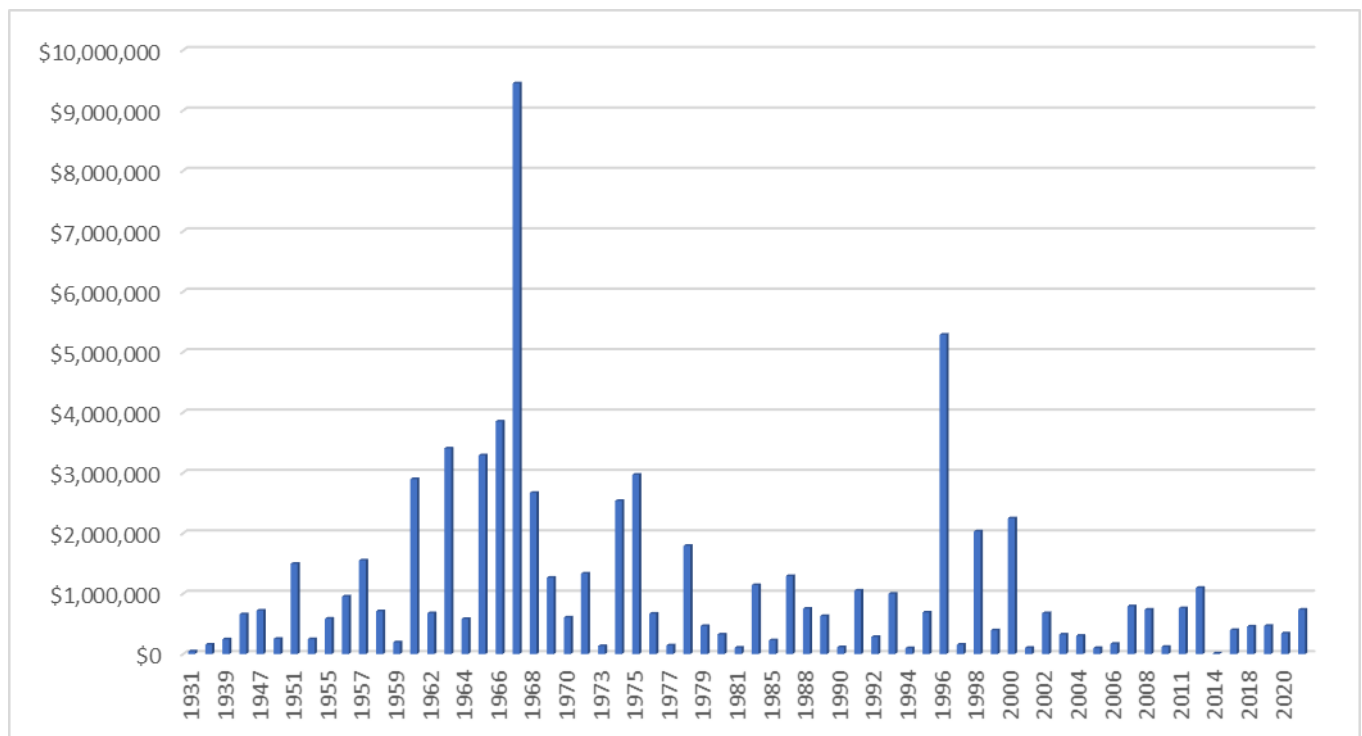
The lifecycle management plan details how Council plans to manage and operate the assets at the agreed levels of service (defined in section 3) while optimising life cycle costs.

5.1 BACKGROUND DATA

5.1.1 PHYSICAL PARAMETERS

The age profile of Council's assets is shown below. The bulk of assets constructed from 1960 to 1970 is apparent. These assets typically comprise a low-level timber superstructure on concrete piers, often constructed above a previous concrete causeway. The nature of these assets tends to make timber superstructure renewal the most cost-effective option, as the foundations are rarely of sufficient capacity to carry a concrete superstructure.

Fig 5.1.1: Asset Age Profile



5.1.2 ASSET CAPACITY AND PERFORMANCE

Council's services are generally provided to meet design standards where these are available.

Locations where deficiencies in service performance are known are detailed in Table 5.1.2.

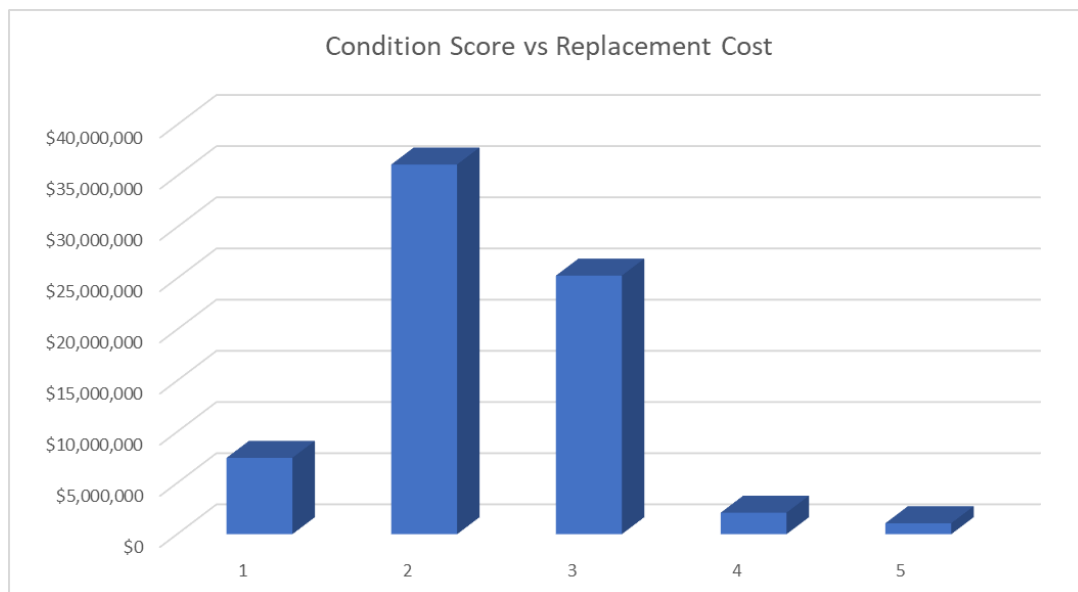
Table 5.1.2: Known Service Performance Deficiencies

LOCATION	SERVICE DEFICIENCY
Timber bridges	Lack of proper maintenance of timber bridges has compromised the integrity of some components earlier than should have been the case.
Concrete bridges	Lack of modern design and poor construction quality of some older concrete bridges has compromised the integrity of some components earlier than should have been the case.

5.1.3 ASSET CONDITION

The condition profile of Council's assets is shown below.

Fig 5.1.3: Asset Condition Profile



Condition is measured using a 1 – 5 rating system.¹

¹ IIMM 2006, Appendix B, p B:1-3 ('cyclic' modified to 'planned')

Rating	Description of Condition
1	Excellent condition: Only planned maintenance required.
2	Very good: Minor maintenance required plus planned maintenance.
3	Good: Significant maintenance required.
4	Average: Significant renewal/upgrade required.
5	Poor: Unserviceable.

5.1.4 ASSET VALUATIONS

The values of assets are shown below for bridge infrastructure assets as at 30 June 2021. Note: a full independent revaluation was completed in October 2020. Assets are valued at greenfield rates.

Table 5.1.4a: Asset Summary

Asset Type	Quantity	Replacement Value	Annual Depreciation
Timber Bridges	11	\$ 2,410,800	-\$ 35,099
Concrete/Steel Bridges	77	\$ 51,607,619	-\$ 541,338
Culverts	33	\$ 10,821,980	-\$ 137,648
Causeways	134	\$ 7,165,619	-\$ 83,972
Total	222	72,006,019	-\$ 798,057

Council's sustainability reporting reports the rate of annual asset consumption and compares this to asset renewal and asset upgrade and expansion.

Table 5.1.4b: Financial Reporting Ratios

FINANCIAL REPORTING CRITERION	BRIDGES INFRASTRUCTURE
Asset Consumption Rate (Annual)	1%
Asset Renewal Rate (Annual)	1%
Asset Upgrade Expansion Rate (Annual)	0%

5.2 RISK MANAGEMENT PLAN

The risk assessment process identified credible risks, the likelihood of the risk event and the consequences should the event occur. Future refinements will use these factors to develop risk ratings, incorporating a risk treatment plan for non-acceptable risks.

Critical risks, being those assessed as 'Very High' - requiring immediate corrective action and 'High' – requiring prioritised corrective action identified in the infrastructure risk management plan are summarised in Table 5.2.

Table 5.2: Critical Risks and Treatment Plans

ASSET AT RISK	WHAT HAPPEN	CAN	RISK RATING (VH, H)	RISK TREATMENT PLAN
Bridges	Bridges may fail structurally		VH	A comprehensive bridge inspection programme combined with an increase in capital renewal funding and maintenance mitigates this risk.
Bridges	Long term funding may be insufficient to renew and maintain bridges		VH	Detailed modelling of individual bridge performances will provide increasing knowledge of asset lives. Long term financial planning is used to prepare for periods when a bulk of assets reach maturity around the same time, as will occur for bridges in the ten-year forecast period of this plan.

5.3 ROUTINE MAINTENANCE PLAN

Routine maintenance is the regular ongoing work that is necessary to keep assets operating, including instances where portions of the asset fail and need immediate repair to make the asset operational again.

5.3.1 MAINTENANCE PLAN

Maintenance includes reactive, planned and cyclic maintenance work activities.

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

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

Cyclic maintenance is replacement of higher value components/sub-components of assets that is undertaken on a regular cycle including repainting, building roof replacement, etc. This work generally falls below the capital/maintenance threshold.

Planned maintenance work is very high at approximately 95% of total maintenance expenditure.

Maintenance expenditure levels are adequate to meet required service levels. Future revision of this asset management plan will include linking required maintenance expenditures with required service levels.

Assessment and prioritisation of reactive maintenance is undertaken by trained (level 1 certified) Council staff using training, experience and judgement.

5.3.2 STANDARDS AND SPECIFICATIONS

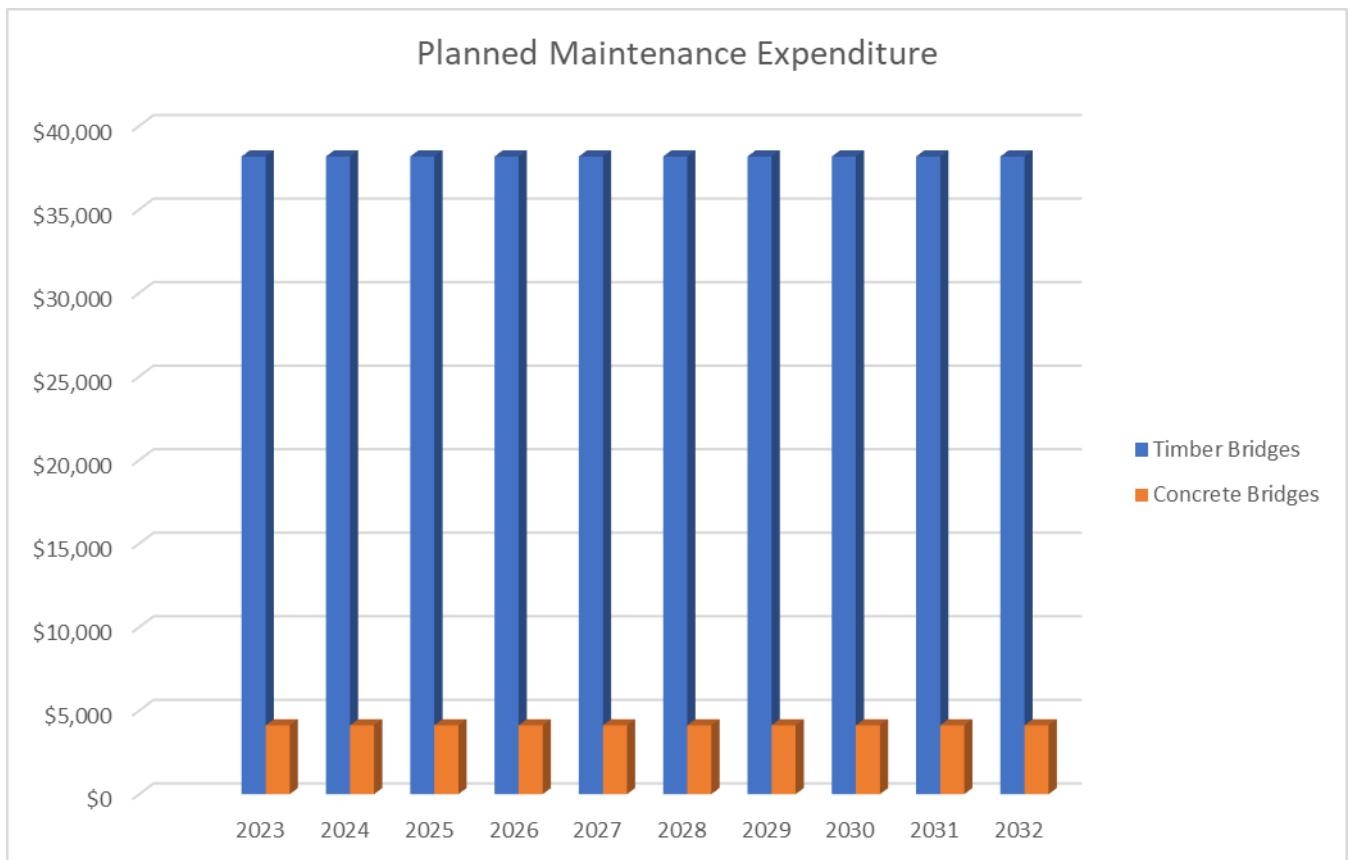
Maintenance work is carried out in accordance with the following Standards and Specifications.

- NSW RMS Timber Bridges manual
- GISC Work Method Statements
- Requirements by manufacturers for the use of proprietary products
- Traffic control at Works on Roads
- Project-specific Technical Specifications
- AS5100.1-2017 Bridge design-scope and general principles

5.3.3 SUMMARY OF FUTURE MAINTENANCE EXPENDITURES

Future maintenance expenditure is forecast to trend in line with the value of the asset stock as shown in Fig 5.3.3. Note that all costs are shown in current dollar values.

Fig 5.3.3: Planned Maintenance Expenditure



Deferred maintenance, i.e. works that are identified for maintenance and unable to be funded, are to be included in the risk assessment process in the infrastructure risk management plan.

Maintenance is funded from Council's operating budget and grants where available. Maintenance allocations have been able to be reduced as major capital work is being undertaken on bridges that would have been inefficiently patched in previous years.

5.4 RENEWAL/REPLACEMENT PLAN

Renewal expenditure is major work which does not increase the asset’s design capacity 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 upgrade/expansion or new works expenditure.

5.4.1 RENEWAL PLAN

Renewal will be undertaken using ‘low-cost’ renewal methods where practical. The aim of ‘low-cost’ renewals is to restore the service potential or future economic benefits of the asset by renewing the assets at a cost less than replacement cost.

In particular, low-level timber bridges on concrete foundations will be renewed using laminated timber carpentry methods which have shown to be more cost effective than full concrete replacement. Timber components are either reused for maintenance (if in as new condition), sold into the recycled timber market or discarded (<20% of components).

5.4.2 RENEWAL STANDARDS

Renewal work is carried out in accordance with the Standards and Specifications noted in Section 5.3.1.

5.4.3 SUMMARY OF OPTIMAL RENEWAL EXPENDITURE

Projected future renewal expenditures are forecast to increase over time as the asset stock ages. The costs are summarised in Fig 5.4.3a. Note that all costs are shown in current dollar values

Fig 5.4.3a: Projected Capital Renewal Expenditure

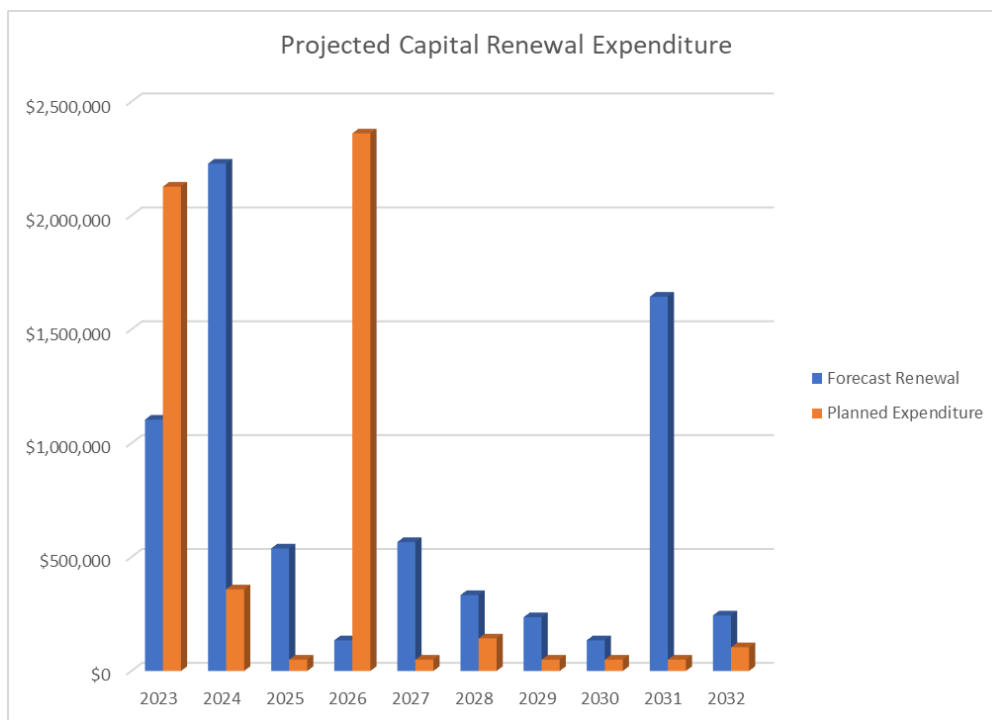
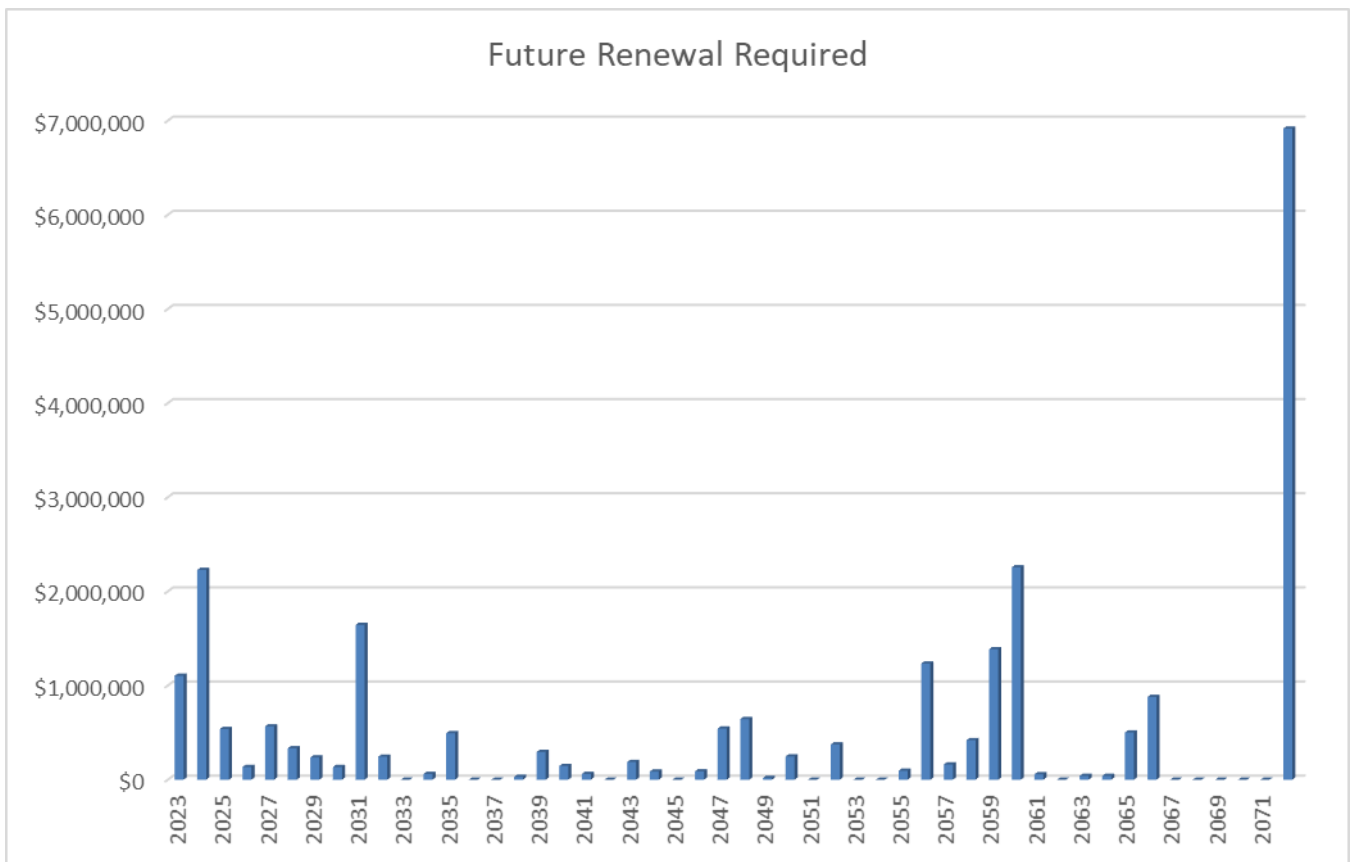


Fig 5.4.3b: 50-Year Future Renewal



Deferred renewal, i.e. those assets projected for renewal and not planned for renewal in capital works programs are to be included in the risk assessment process in the risk management plan.

Renewals are to be funded from Council's capital works program and grants where available. This is further discussed in Section 6.2.

5.5 CREATION/ACQUISITION/UPGRADE PLAN

New works are those works that create a new asset that did not previously exist or works which upgrade or improve an existing asset beyond its existing capacity. They may result from growth, social, or environmental needs. Assets may also be acquired at no cost to the Council from land development. These assets from growth are considered in Section 4.4.

5.5.3 SUMMARY OF FUTURE UPGRADE/NEW ASSETS EXPENDITURE

5.6 DISPOSAL PLAN

Bridge timbers are a valuable commodity even when no longer fit for service as a bridge component. A ready market exists for old timber that is sound and surplus timber is disposed of routinely through online auction sales. Typically, 50% of new value is received through these sales for timber that is sound. The cost of relocation can be prohibitive however, and at times it is more economical to dispose of the entire structure in situ by way of public expression of interest, with

the purchaser to remove materials from site. This is especially the case for low value timber such as where decks have been overlaid with concrete.

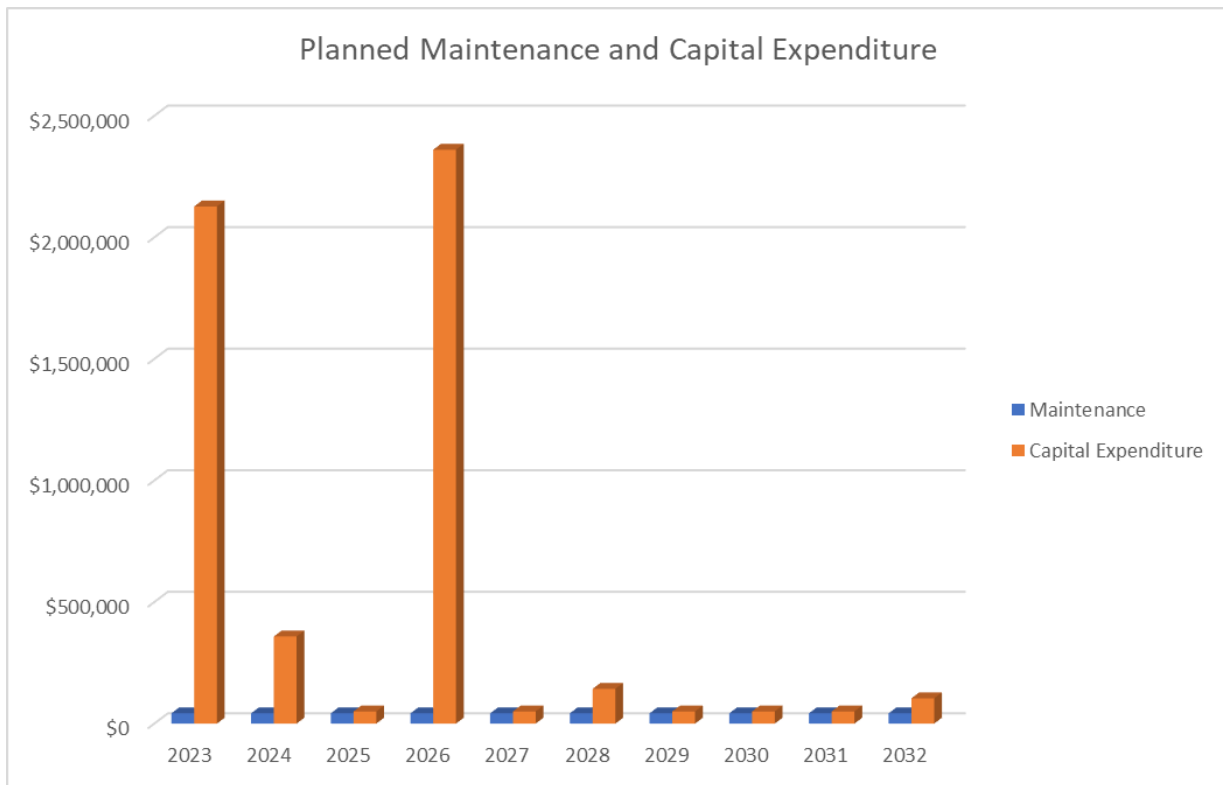
6. FINANCIAL SUMMARY

This section contains the financial requirements resulting from all the information presented in the previous sections of this asset management plan. The financial projections will be improved as further information becomes available on desired levels of service and current and projected future asset performance.

6.1 FINANCIAL STATEMENTS AND PROJECTIONS

The financial projections are shown in Fig 6.1 for planned operating (operations and maintenance) and capital expenditure (renewal and upgrade/expansion/new assets).

Fig 6.1: Planned Operating and Capital Expenditure



Note that all costs are shown in current dollar values.

6.1.1 SUSTAINABILITY OF SERVICE DELIVERY

There are two key indicators for financial sustainability that have been considered in the analysis of the services provided by this asset category, these being long term life cycle costs and medium-term costs over the 10-year financial planning period.

Long term - Life Cycle Cost

Life cycle costs (or whole of life costs) are the average costs that are required to sustain the service levels over the longest asset life. Life cycle costs include maintenance and asset consumption (depreciation expense). The annual average life cycle cost for the services covered in this asset management plan is \$840,000.

Life cycle costs can be compared to life cycle expenditure to give an indicator of sustainability in service provision. Life cycle expenditure includes maintenance plus capital renewal expenditure. Life cycle expenditure will vary depending on the timing of asset renewals. The average life cycle expenditure over the 10-year timeframe of the plan is \$577,000.

A gap between life cycle costs and life cycle expenditure gives an indication as to whether present consumers are paying their share of the assets which they are consuming each year. The purpose of this asset management plan is to identify levels of service that the community needs and can afford and develop the necessary long-term financial plans to provide the service in a sustainable manner.

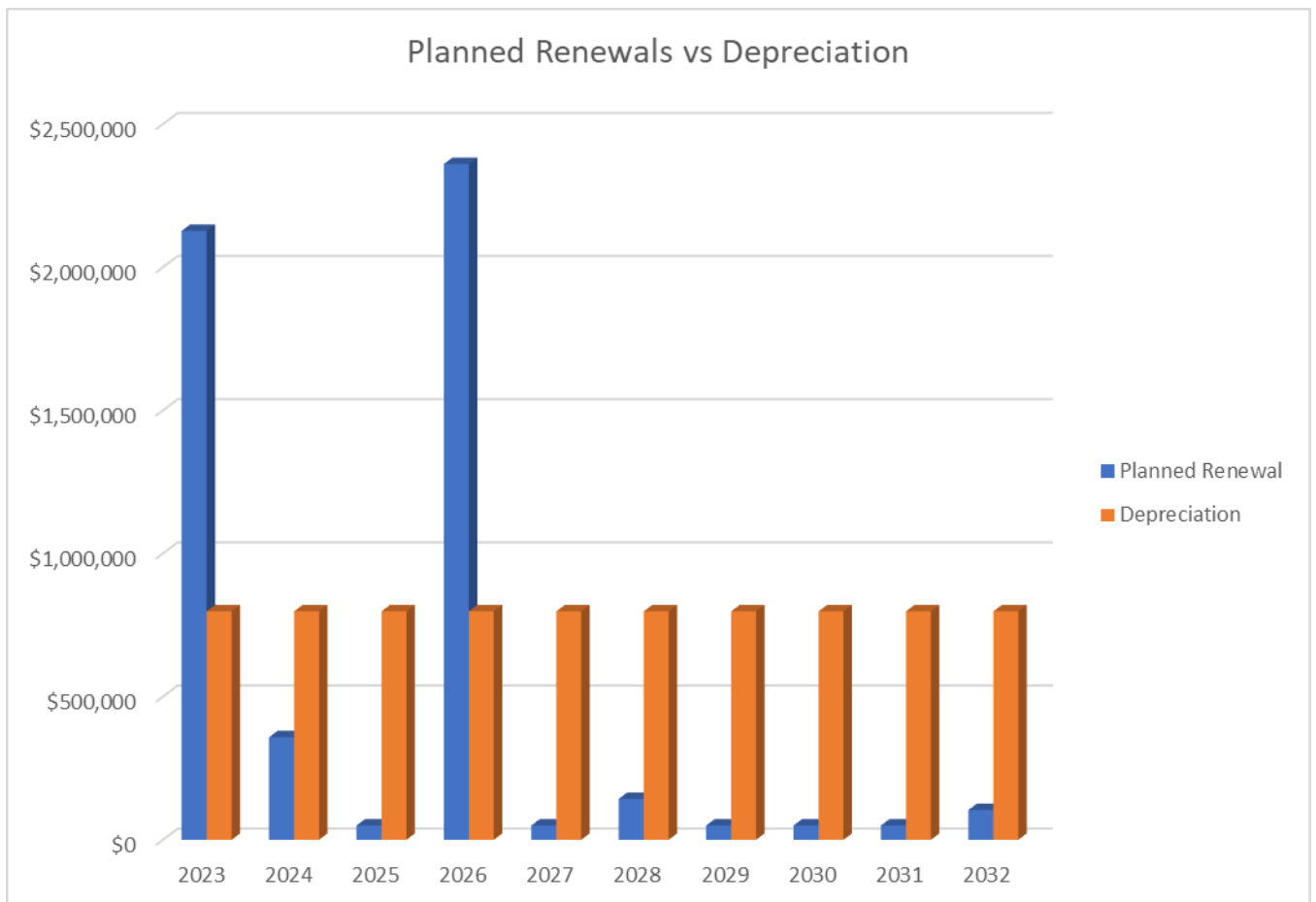
Over the 10-year horizon of this asset management plan, the average life-cycle gap for services covered by this plan is \$26,000 per annum (averaged to the nearest \$1000). The life cycle sustainability index is 69%.

Medium-term – 4 to10 year financial planning period

Funding for the remainder of the delivery program will be adequate to keep pace with asset consumption using the previous financial modelling that is contained in the asset register. These will be reviewed, and it is hoped that actual costs will prove to be much lower than have been adopted in the past. The current iteration of this plan provides accurate modelling as project history accumulates and costs with associated variables become more accurately known.

Council will manage the ‘gap’ by developing this asset management plan to provide guidance on future service levels and resources required to provide these services.

Fig 6.1.1: Planned Renewals vs Depreciation



6.2 FUNDING STRATEGY

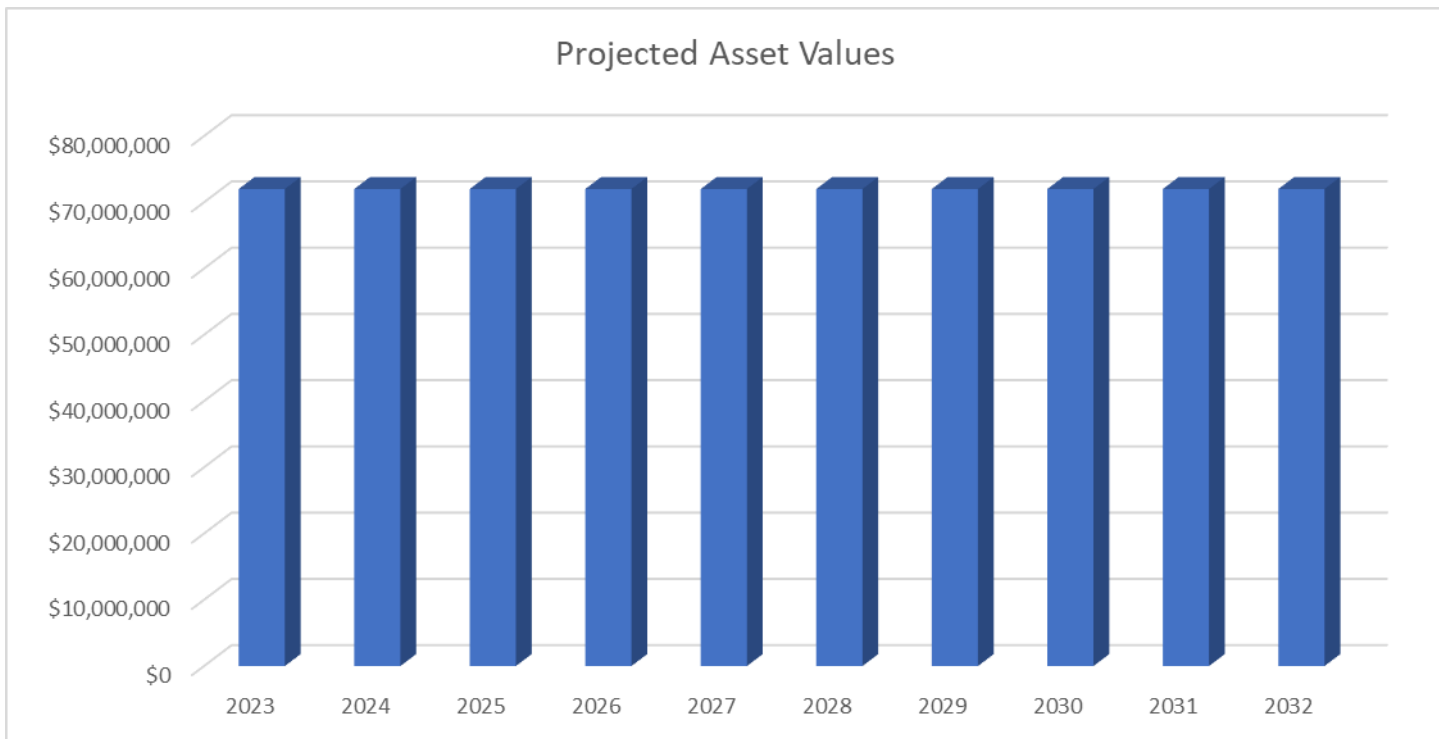
Projected costs are to be funded from Council’s operating and capital budgets. The funding strategy will be detailed in the Council’s LTFFP.

Achieving the financial strategy will require an ongoing commitment to fund the increasing demand for asset renewals. Renewal costs may outpace increased revenue from development growth.

6.3 VALUATION FORECASTS

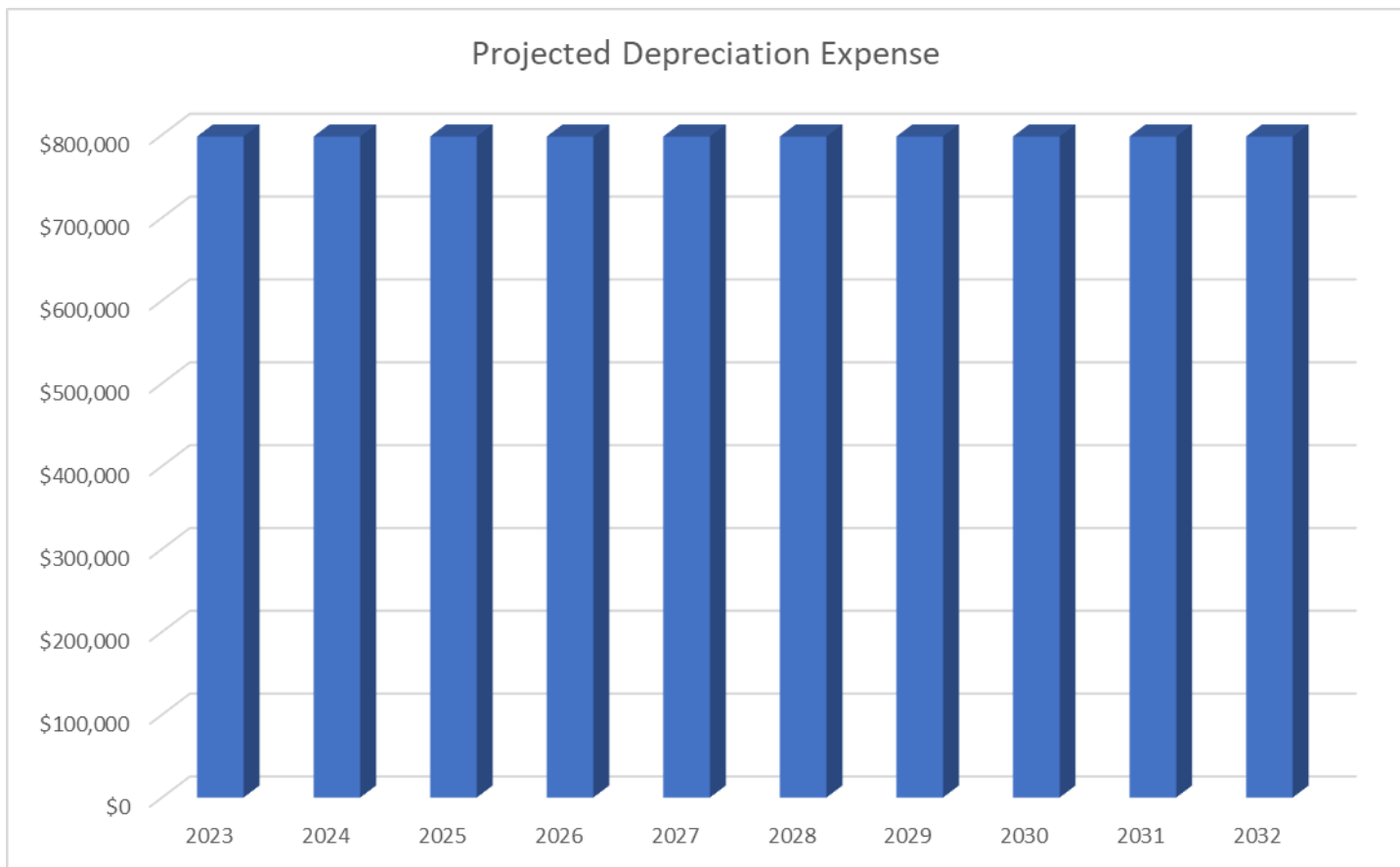
Asset values are forecast to increase as additional assets are added to the asset stock from construction and acquisition by Council and from assets constructed by land developers and others and donated to Council. Fig 6.3a shows the projected replacement cost asset values over the planning period in current dollar values.

Fig 6.3a: Projected Asset Values



Depreciation expense values are forecast in line with asset values as shown in Fig 6.3b.

Fig 6.3b: Projected Depreciation Expense



The depreciated replacement cost (current replacement cost less accumulated depreciation) will vary over the forecast period depending on the rates of addition of new assets, disposal of old assets and consumption and renewal of existing assets.

6.4 KEY ASSUMPTIONS MADE IN FINANCIAL FORECASTS

This section details the key assumptions made in presenting the information contained in this asset management plan and in preparing forecasts of required operating and capital expenditure and asset values, depreciation expense and carrying amount estimates. It is presented to enable readers to gain an understanding of the levels of confidence in the data behind the financial forecasts.

Key assumptions:

- Assumptions on the relationship between growth and increases in the asset stock.
- Assumptions on changes to useful life estimated to reflect improved maintenance and renewal practices.
- Present service levels will remain constant until revised service levels are produced in accordance with Section 3.3.
- Assumption of a normal weather conditions.

Accuracy of future financial forecasts may be improved in future revisions of this Asset Management Plan by the following actions:

- Undertaking regular defect surveys on bridges.
- Improved information on maintenance and operating expenditures.
- Assumptions have been made as to the average useful lives and remaining lives of the asset groups based on current local knowledge and experience and historical trends. These need to be reviewed and the accuracy improved based on real time assessment of asset deterioration.
- Changes in the desired level of service and service standards from those identified in this plan.

7. ASSET MANAGEMENT PRACTICES

7.1 ACCOUNTING/FINANCIAL SYSTEMS

Refer to Core Asset Management Plan.

7.2 ASSET MANAGEMENT SYSTEMS

Refer to Core Asset Management Plan.

7.3 INFORMATION FLOW REQUIREMENTS AND PROCESSES

Refer to Core Asset Management Plan.

7.4 STANDARDS AND GUIDELINES

Refer to Core Asset Management Plan.

7.5 DATA CONFIDENCE LEVEL

Data confidence levels for this AMP are rated as B or C.

8. PLAN IMPROVEMENT AND MONITORING

8.1 PERFORMANCE MEASURES

The effectiveness of the asset management plan can be measured in the following ways:

- The degree to which the required cash flows identified in this asset management plan are incorporated into council's Long-Term Financial Plan and Community Strategic Plan;
- The degree to which 1 to 5-year detailed works programs, budgets, business plans and organisational structures take into account the 'global' works program trends provided by the asset management plan.

8.2 IMPROVEMENT PLAN

Refer to Core Asset Management Plan.

The asset management improvement plan generated from this asset management plan is shown in Table 8.2.

Table 8.2: Improvement Plan

TASK NO	TASK	RESPONSIBILITY	RESOURCES REQUIRED	TARGET COMPLETION DATE
1	Maintenance Activities - document levels of service and Maintenance Management Plan	Manager of Infrastructure Delivery	Staff	Ongoing
2	Undertake an annual review of this Asset Management Plan.	Manager Asset Services	Staff	After revaluation or during review of the Resourcing Strategy.

3	Review costs in asset register and revalue assets	Manager Asset Services	Staff	Full revaluation of this class is to be undertaken for 2026 financial statement.
4	Review of risk management plan detailed in Section 5.2.	Manager Asset Services	Staff	Ongoing

8.3 MONITORING AND REVIEW PROCEDURES

This asset management plan will be reviewed during annual budget preparation and amended to recognise any changes in service levels and/or resources available to provide those services as a result of the budget decision process.

The Plan has a life of 10 years and is due for major revision and updating within 2 years of each Council election.

REFERENCES

Refer to Core Asset Management Plan.