Adelaide Hills
COUNCIL

BRIDGE ASSET MANAGEMENT PLAN

Span and Culvert Bridges

Document Control	Asset Management Plan

Document ID :					
Rev No	Date	Revision Details	Author	Reviewer	Approver
1	Aug 2021	Initial Draft	CM		
2	4 March 2022	Final Endorsed Plan by Council	CM	DC	Council
3					
4					
5					
6					
7					
8					

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.

DISCLAIMER: This draft report has been prepared for educational purposes only as part of undertaking a Professional Certificate in Asset Management Planning. The data and conclusions have not been reviewed for accuracy nor endorsed or adopted by the organisation. DELETE if not Applicable

Contents

1.0 EXECUTIVE SUMMARY

1.1 The Purpose of the Plan

This Asset Management Plan (AM Plan) details information about infrastructure assets with actions required to provide an agreed level of service in the most cost-effective manner while outlining associated risks. The plan defines the services to be provided, how the services are provided and what funds are required to provide over the 10 year planning period. The AM Plan will link to a Long-Term Financial Plan which typically considers a 10 year planning period.

1.2 Asset Description

This plan covers the infrastructure assets that provide Span and Culvert Bridges

Asset Category	Dimensions	Replacement Value
Span Bridges (Span longer than 6m)	Span Bridges – 27 Bridges Culvert Bridges – 20 Bridges	$ 13,821,965
Culvert/Pipe Bridges (Span less than 6m)	Culvert – 44 Bridges Pipe – 6 Bridges	$ 6,426,872
Totals		**$ 20,248,837**

1.3 Levels of Service

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

The main service consequences of the Planned Budget are:

- Bridge fatigue will increase
- Likelihood of increased failures
- Bridge may require closing due to safety issues

1.4 Future Demand

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

- Minimal impact due to future demand as unpredictable increase in service not available

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.

- Increase in maintenance based on recent condition assessment
- Monitoring program to be implemented
- Heavy Vehicle routes and load limit on older structures

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 is estimated as $1,725,900 or $172,590 on average per year.

1.6 Financial Summary

1.6.1 What we will do

Estimated available funding for the 10 year period is $1,579,400 or $157,940 on average per year as per the Planned Budget. This is 91.51% 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 Span and Culvert Bridge Asset Group leaves a shortfall of $14,650 on average per year of the forecast lifecycle costs required to provide services in the AM Plan compared with the Planned Budget currently included in the Long-Term Financial Plan. This is shown in the figure below.

The additional required funding is primarily driven by the maintenance that is required to not only clear a backlog of work but also requires allocating to ensure the bridges are safe, fit for purpose and the additional maintenance will prolong the life of the asset.

Forecast Lifecycle Costs and Planned Budgets

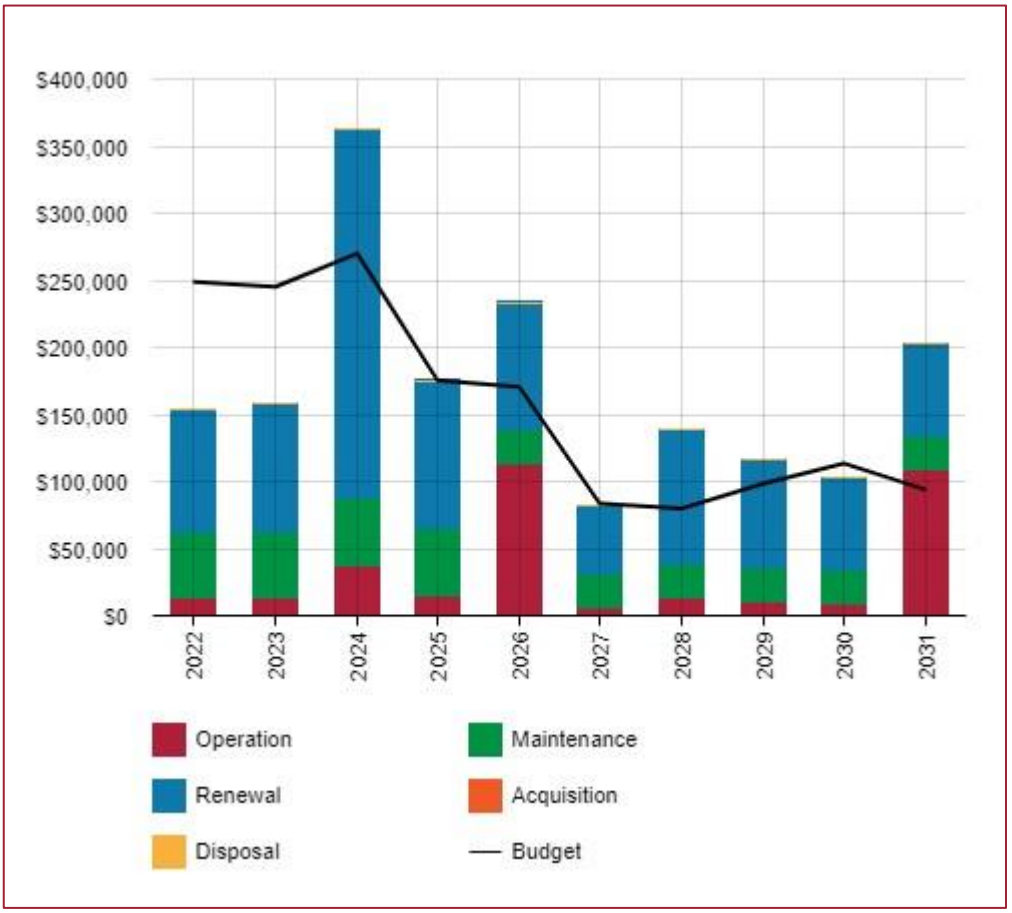


Figure Values are in current dollars.

We plan to provide Bridge and Culverts services for the following:

- Operation, maintenance, renewal and acquisition of the Span and Culvert/Pipe Bridges to meet service levels set by the annual budgets.
- Major repairs to Avenue Road Bridge, Aldgate Valley, Montacute Road and Stradbroke Road Bridges within the 10 year planning period.
- Increase maintenance dollars available to undertake identified? suggested routine maintenance
- Provide means to ensure Level 1 bridge inspections are undertaken at regular intervals

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:

- Undertake backlog of maintenance items identified in the ARRB level 2 span bridge condition assessment undertaken in 2020
- Monitor all suggested items identified in the ARRB level 2 span bridge condition assessment undertaken in 2020
- Provide internal resources to condition assess bridge assets

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

The main risk consequences are:

- Bridge failure
- Bridge component failure – eg; safety rail/barrier, pipe or culvert collapse, deck failure (potholing, severe cracking)
- Bridge closure

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

- Provide resources to review suggested monitor items
- Provide resources to undertake level 1 bridge condition assessments at regular intervals

1.7 Asset Management Planning Practices

Our systems to manage assets include:

- Open Office Finesse
- Confirm Enterprise Asset Management System

Assets requiring renewal are identified from either the asset register or an alternative method.

- The timing of capital renewals based on the asset register is applied by adding the useful life to the year of acquisition or year of last renewal,
- Alternatively, an estimate of renewal lifecycle costs is projected from external condition modelling systems and may be supplemented with, or based on, expert knowledge.

The Alternate Method was used to forecast the renewal life cycle costs for this asset management plan.

This AM Plan is based on two levels of confidence information.

Span Bridges (2020 Condition Assessment ARRB) – High level of Confidence

Culvert Bridges – Intermittent audits - Low level of Confidence

1.8 Monitoring and Improvement Program

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

- Implement process for monitoring defects from 2020 condition assessment
- Undertake Level 1 condition assessment on 50 culvert bridges within the AHC network and resource the role either internally or externally
- Rebuild existing culvert bridge asset class within the Confirm Asset System Database

2.0 Introduction

2.1 Background

The Adelaide Hills Council delivers services to our residents, visitors and businesses that support the distinctive culture, creativity and accessibility of our community and region, and the bridges provide a functionality that support the existing transportation assets on sealed and unsealed roads. The asset class is a high risk asset class and it is appropriate that they are serviceable to continue delivering associated services to the community.

This asset management plan communicates the actions required for the responsive management of these assets and services, compliance with regulatory requirements, and funding needed to provide the levels of service over a 10-year planning period, and the value of these assets is approximately $20.2 million.

The Span and Culvert/ Pipe Bridges asset management plan is a projection of the likely future funding requirements over the next 10 years, considering the state of our current assets, the community values and outcomes contained in the Strategic Plan 2020 – 2024. The document is not a detailed budget, but a key strategic document that informs the Long Term Financial Plan and hence the financial sustainability of Council over the long term.

The asset management plan is to be read with the Adelaide Hills Council planning documents. This should include the Asset Management Policy and developed along with other key planning documents:

- Adelaide Hills Council 2020-2024 Strategic Plan
- Adelaide Hills Council 2021-2022 Annual Business Plan
- Adelaide Hills Council 2021-2022 Long Term Financial Plan

The asset management plan outlines the responsibilities and management of assets to maximise their value to deliver the services to the community and to meet our obligations under the Local Government Act 1999 in preparation of asset management plans.

Throughout this journey we review the lifecycle of our assets, develop renewal strategies and analyse risks through condition audits, customer feedback, forecasting and integration into existing strategic documents to provide confidence that the community's asset base is sustainably funded and allows for minor or major challenges across the network. Minor impacts recently have included changes in operations for the Cuddle Creek Bushfire and also adaptation in providing services through the Covid-19 phase.

The asset management plan is to be reviewed on a regular basis and provides the detail for services levels, and the levels of funding that drive the renewal strategies for Adelaide Hills Councils Bridge network.

The AMP is a projection of the likely future funding requirements over the next 10 years, considering the age and state of the current assets, the community values and outcomes contained in the Strategic Plan 2020 – 2024. The document is not a detailed budget, but a key strategic document that informs the Long Term Financial Plan and hence the financial sustainability of Council over the long term.

Our Bridges: What do we own, and how healthy are they?

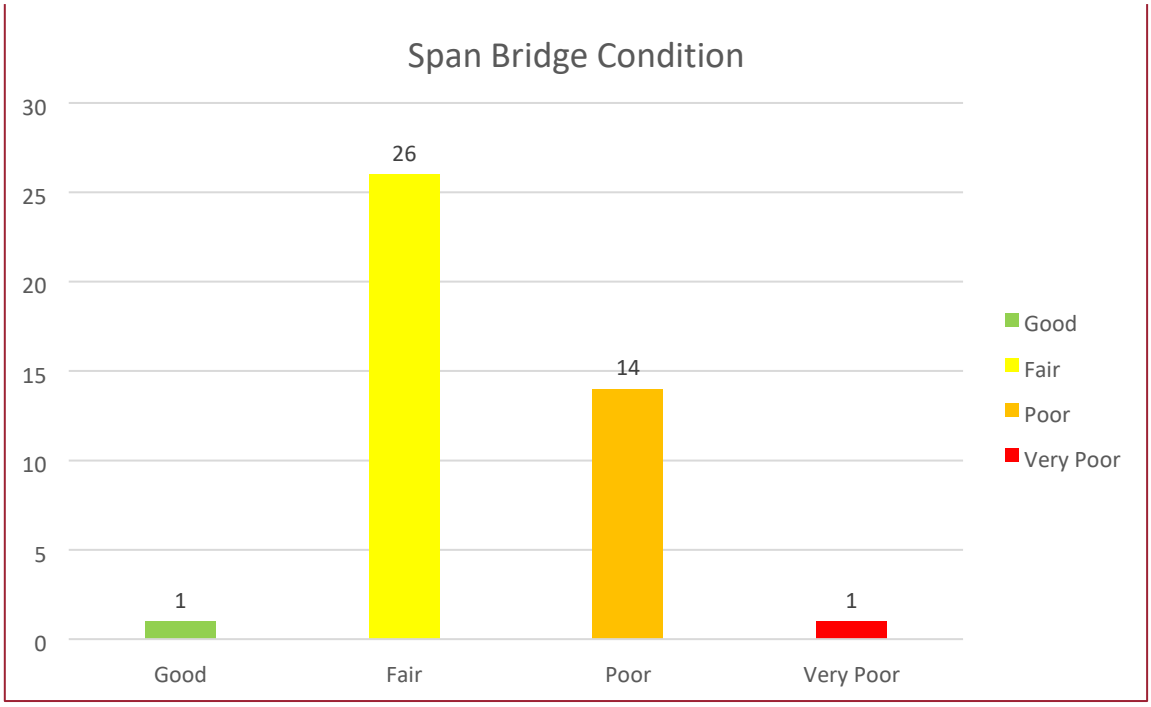
Councils bridge network is split into two categories, this comprising of span bridges which are the larger bridges which span greater than 6 metres, this covers the major structures from large overpasses, Avenue Road – spans the main rail line to Melbourne), major culvert bridges with multiple culverts covering large spans, and narrow road bridges (Onkaparinga Road, Verdun) that is one way but has multiple components. There are a total of 47 span bridges, broken into 27 major bridges, and 20 culvert bridges.

Onkaparinga Road – Bridgewater Span Bridge

The span bridges have recently been condition assessed by ARRB (Australian Road Research Board) who develop the condition assessment criteria for Australia wide, and have recently constructed a schema that captures all the major components of the bridge into a robust format for its age, condition and value.

The age profile is spread out from 60 through to over 100 years and some construction from primarily stone has been in its location for over 100 years, though key components have been replaced. The span bridges are a robust asset but are a potential high risk asset due to their nature.

The current value of the span bridges is at a replacement cost of $20.1 million in today's dollars.

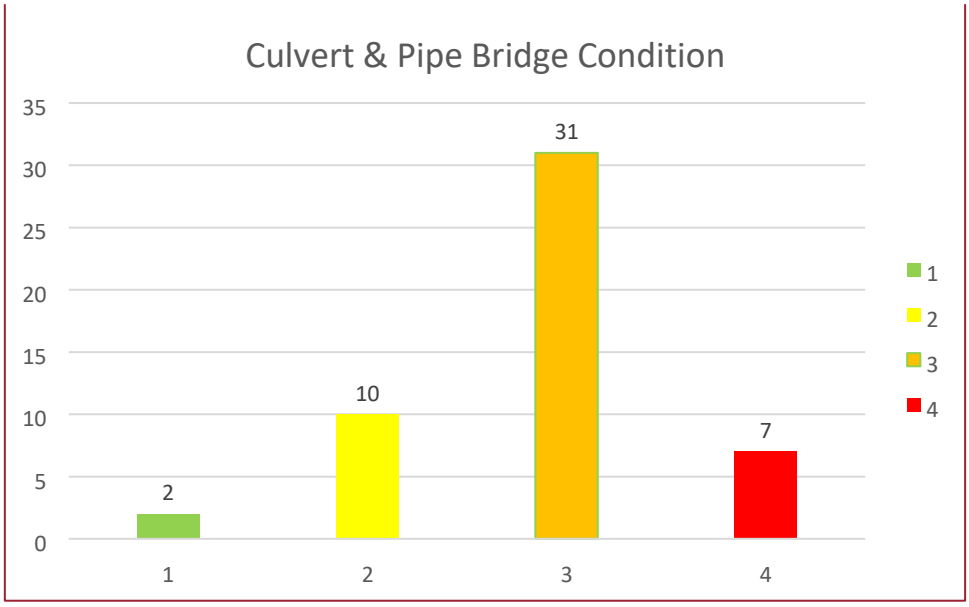


Span Bridge Condition Profile

The culvert class of bridges is made up of a combination of large culverts or medium to large pipes and are generally spread out across the rural network across creek catchments. Several assets have a combination of culvert and pipe where the capacity has been increased in-situ.

Martin Road Pipe Bridge - Oakbank

The Culvert and Pipe Bridge asset condition profile is not been updated since 2010 so the confidence in the condition is low and the likelihood of these being condition assessed as part of the improvement plan will provide greater insight into these assets. The basis of the valuation for this class is similar to the stormwater assets as they primarily use pipes or culverts and the additional decks/railing/headwalls are factored into provide an indicative replacement cost. The current value of these bridges is $6.4 million.

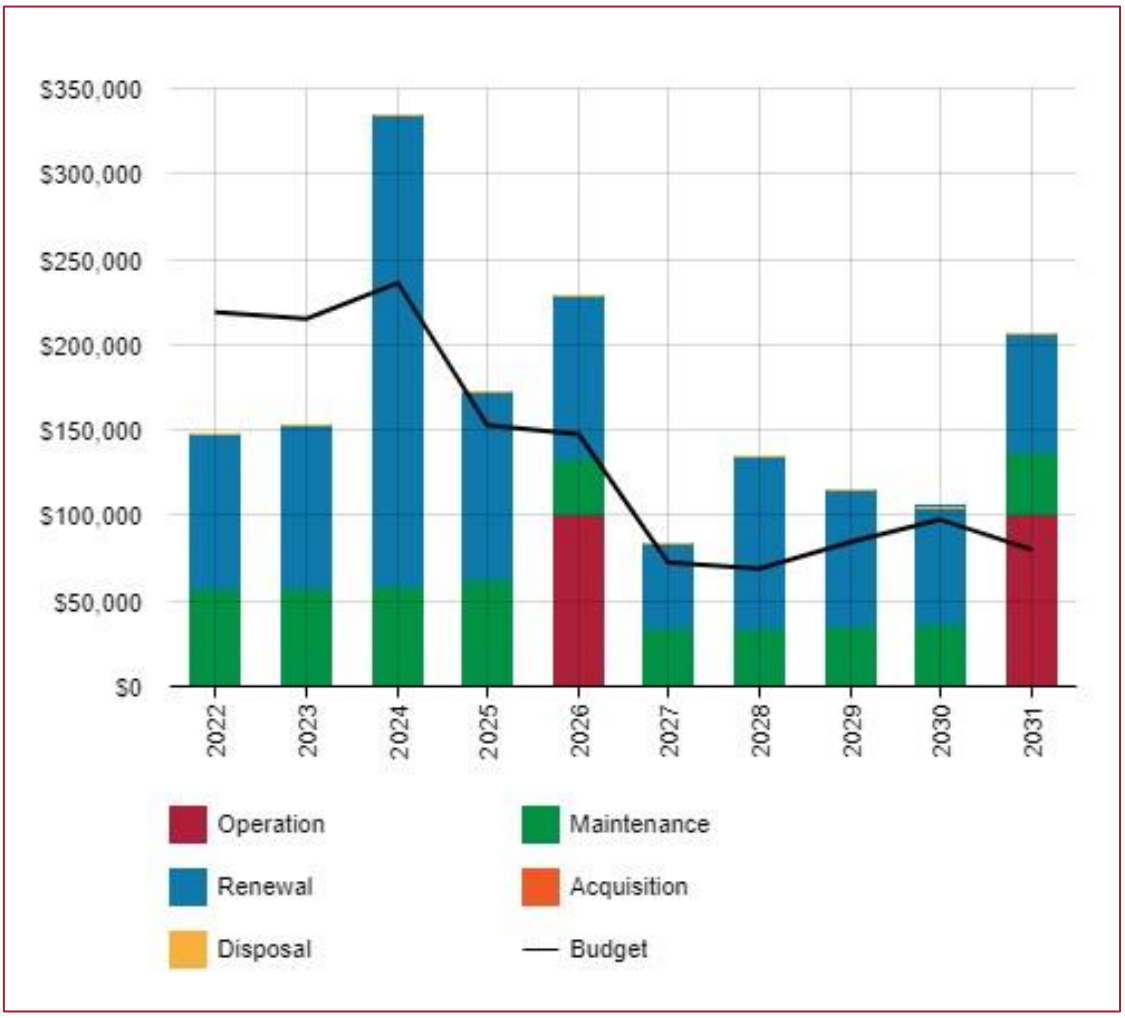


Culvert/Pipe Bridge Condition Profile

Forecast spending and wrap up.

The bridge asset class existing/current budget is insufficient to provide the services and safety that is currently planned across the life of this plan. The lifecycle graph below indicates an increase in maintenance spending which is currently unfunded to approximately $55k (2022-2025) per year to undertake the suggested maintenance across the span bridges from the recent condition assessment. This figure may increase if the same approach is applied to the culvert/pipe bridges is explored.

The long term projection based on the recent 2020 condition assessment of the span bridges has highlighted a requirement for increased spending from 2030 through to 2040 as approximately 10 bridges and or their components are nearing the end of their life. The current forecast spend for the Adelaide Hills Council 20212031 is approximately $150,000 (renewal and maintenance) per year for the life of this 10 year plan for renewal. The likely trend is upwards for the second 10 year period from 2030 onwards at a projected $330k.



Key Takeaways

- Renewals – Reduced funding compared to Long Term Financial Projections for the 10 year period, but this is expected to increase from 2030.

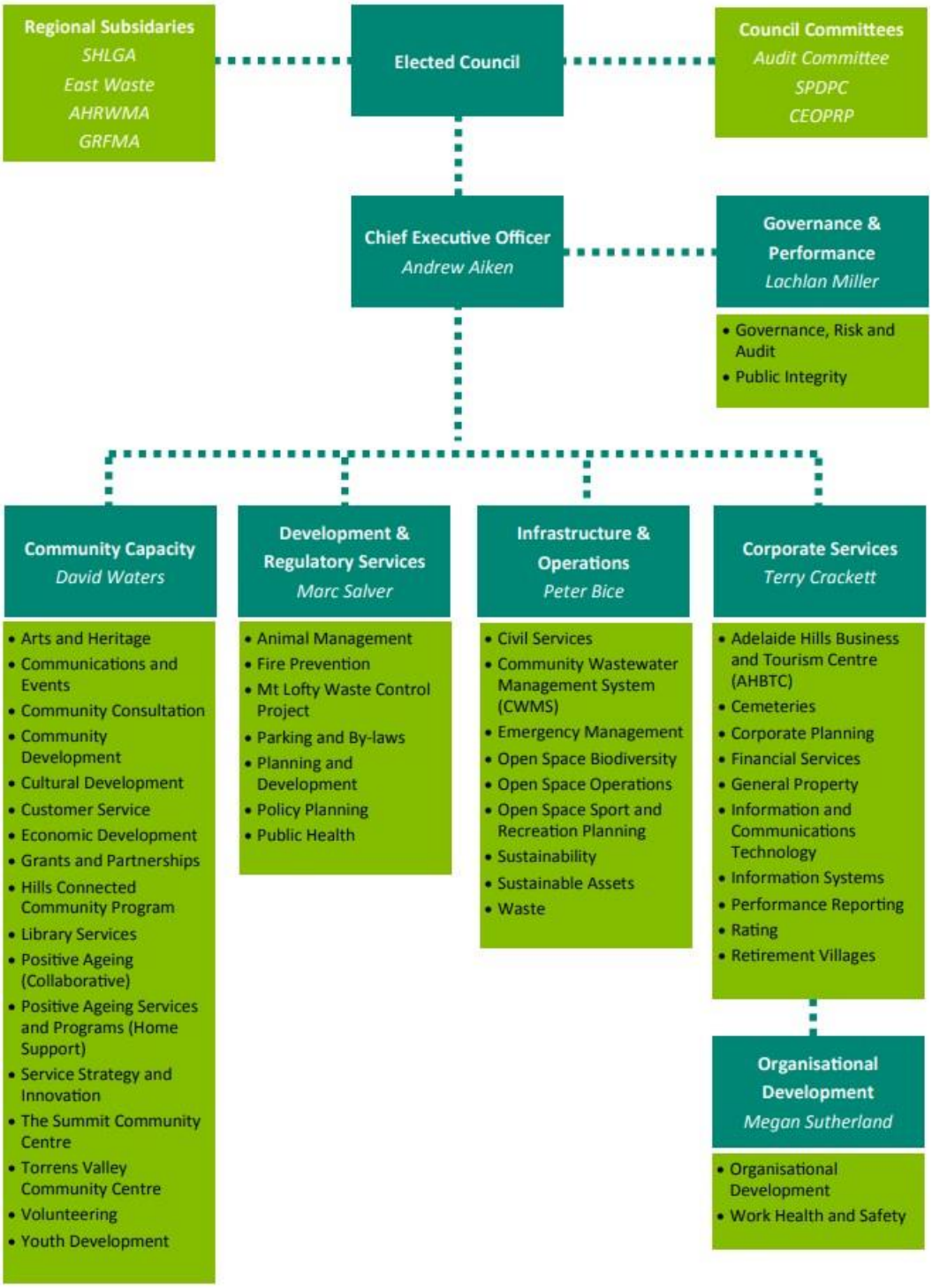
- Maintenance – Funding for bridge maintenance has been minimal and based on reactive requirements. Condition assessment has highlighted a required increase to approx. $55k per year for the first 5 years to ensure all identified high and medium priority maintenance are undertaken.
- Additional processes required to ensure Level 1 audits across bridge structures are undertaken on a yearly/bi-annual basis.
- Condition assessment required across the 50 culvert/pipe bridges still servicing the community, internal resources being trained to undertake these inspections.

Other references

Table 2.1: Key Stakeholders in the AM Plan

Key Stakeholder	Role in Asset Management Plan
Councillors	■ Represent needs of community/shareholders, ■ Establish the strategic vision and budget ■ Allocate resources to meet the organisation's objectives in providing services while managing risks, ■ Ensure organisation is financial sustainable.
CEO/Directors	■ Implement the strategic vision and budget set out by the elected Council ■ Establish the operational vision and policy ■ Oversee delivery of services
Infrastructure and Operation Directorate/ Strategic Assets	■ Development of delivery of the Span and Culvert/ Pipe Bridge Asset Management Plan through the Infrastructure & Operations Directorate
Community	■ Service levels through consultation, representation and expectation and the customer request system.

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


Regional Subsidaries
SHLGA
East Waste
AHRWMA
GRFMA
Elected Council
Council Committees
Audit Committee
SPDPC
CEOPRP
Chief Executive Officer
Andrew Aiken
Governance & Performance
Lachlan Miller
• Governance, Risk and Audit
• Public Integrity
Community Capacity
David Waters
• Arts and Heritage
• Communications and Events
• Community Consultation
• Community Development
• Cultural Development
• Customer Service
• Economic Development
• Grants and Partnerships
• Hills Connected Community Program
• Library Services
• Positive Ageing (Collaborative)
• Positive Ageing Services and Programs (Home Support)
• Service Strategy and Innovation
• The Summit Community Centre
• Torrens Valley Community Centre
• Volunteering
• Youth Development
Development & Regulatory Services
Marc Salver
• Animal Management
• Fire Prevention
• Mt Lofty Waste Control Project
• Parking and By-laws
• Planning and Development
• Policy Planning
• Public Health
Infrastructure & Operations
Peter Bice
• Civil Services
• Community Wastewater Management System (CWMS)
• Emergency Management
• Open Space Biodiversity
• Open Space Operations
• Open Space Sport and Recreation Planning
• Sustainability
• Sustainable Assets
• Waste
Corporate Services
Terry Crackett
• Adelaide Hills Business and Tourism Centre (AHBTC)
• Cemeteries
• Corporate Planning
• Financial Services
• General Property
• Information and Communications Technology
• Information Systems
• Performance Reporting
• Rating
• Retirement Villages
Organisational Development
Megan Sutherland
• Organisational Development
• Work Health and Safety

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]

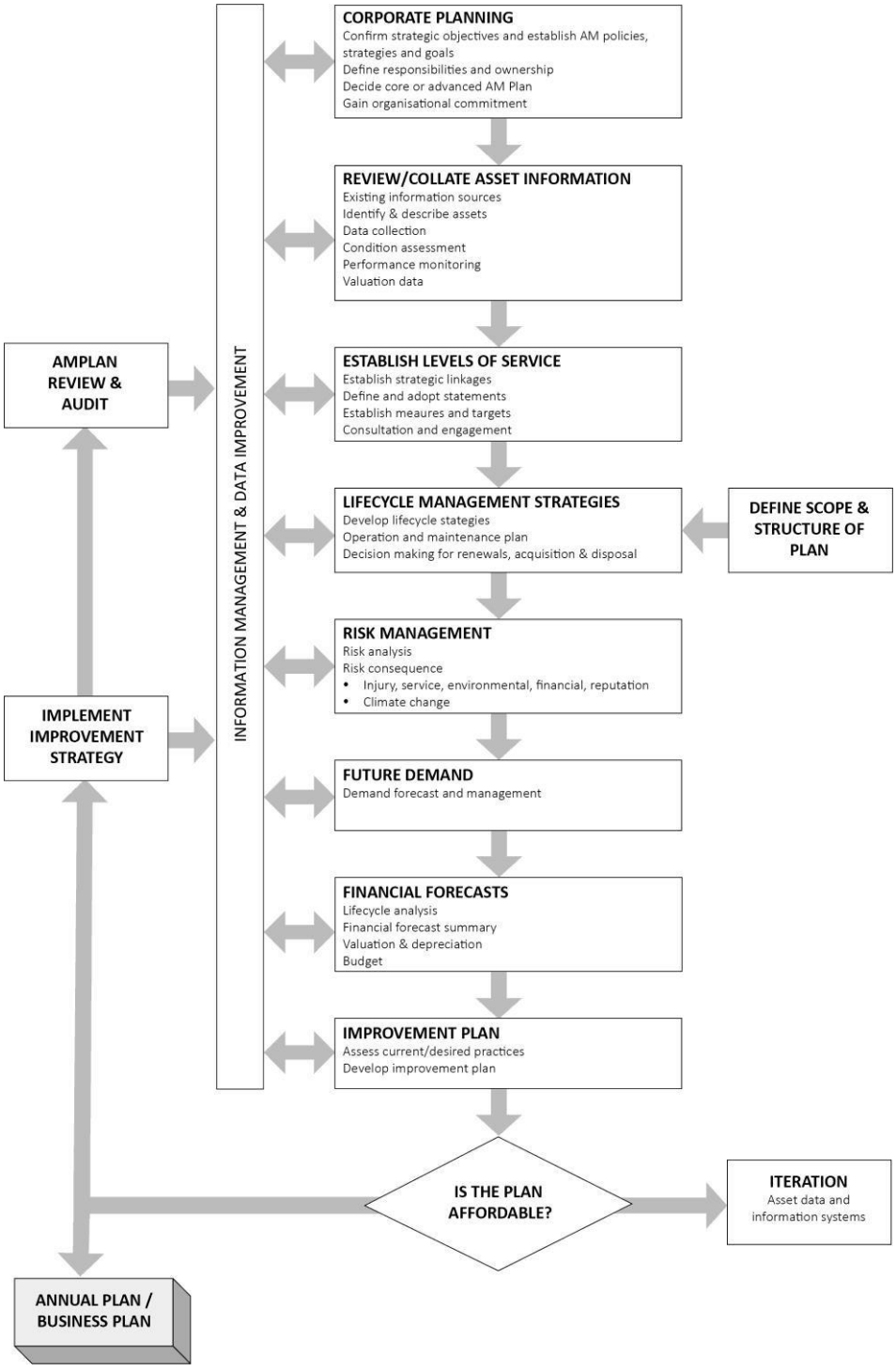
A road map for preparing an AM Plan is shown below.

[1] Based on IPWEA 2015 IIMM, Sec 2.1.3, p 2| 13

[2] ISO 55000 Overview, principles and terminology

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

This AM Plan is prepared to facilitate consultation prior to adoption of levels of service by the Adelaide Hills Council. Future revisions of the AM Plan will incorporate customer consultation on service levels and costs of providing the service. This will assist the Adelaide Hills Council 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.

We currently have no research on customer expectations. Requests from the Customer Request System are not categorised and are not available, but professional judgement indicates the volume would be extremely low. The majority of requests are either sealing/potholing issues or additional footbridge/pedestrian access across span bridges.

3.2 Strategic and Corporate Goals

This asset management plan is prepared under the direction of the Adelaide Hills Council vision, mission, goals and objectives.

Our goal is:

A functional built environment.

- Consider external influences in our long term asset management and adaptation planning

- Sustainable management of our built assets ensures a safe, functional and well serviced community

Strategic goals have been set by the Adelaide Hills Council. The relevant goals and objectives and how these are addressed in this asset management 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
A functional BUILT ENVIRONMENT	B4 - Sustainable management of our built assets ensures a safe, functional and well serviced community	Asset Management Planning is a key part of the long term planning to ensure that the bridge asset remain safe, functional and appropriately maintained.
A functional BUILT ENVIRONMENT	Provide accessibility for the full range of users by ensuring Council's road, footpath and trails network is adequately maintained and service levels for all users are developed and considered	Providing funding and fit for purpose assets that are well serviced and responsive to the changing needs of the community.

3.3 Legislative Requirements

There are many legislative requirements relating to the management of assets. Legislative requirements that impact the delivery of the Roads, Footpath and Kerb service are outlined in Table 3.3.

Table 3.3: Legislative Requirements

Legislation	Requirement
Local Government Act (1999)	Sets out the role, responsibilities and powers of local governments including the preparation of long term financial plan supported by infrastructure and asset management plans for sustainable service delivery
Road Traffic Act (1961)	The act provides legislative requirements on the use of roads by vehicles and other road users.
Australian Road Rules	Requirements for users of the roads to obey
Australian Standards	Various standards that provide guidance and specifications for the management of transport assets
Native Vegetation Act (1991)	Management of the roadside will require an understanding of this act.
Australian Accounting Standards	Sets out the requirements to sustainably protect the environment during both the construction and life of the asset.

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**
Safe and Traversable Bridges	Customer Surveys & Complaints	Minimal complaints received	Increase in minor/major safety issues unless maintenance increased
Bridge accessible	Customer Surveys & Complaints	Minimal complaints	Bridge closures may be required unless funding for minor/major repairs.
Pedestrian Access	Customer Complaints	3-5 Requests per year requesting additional capacity across bridges for pedestrians	No change to service but incorporated review into bridge renewals where service can be supplied/warranted

3.5 Customer Levels of Service

The Customer Levels of Service are considered in terms of:

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

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

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

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.

These are measures of fact related to the service delivery outcome (e.g. number of occasions when service is not available or proportion of replacement value by condition %'s) to provide a balance in comparison to the customer perception that may be more subjective.

Type of Measure	Level of Service	Performance Measure	Current Performance	Expected Trend Based on Planned Budget
Condition	Condition of Bridges	Undertake condition assessments at regular intervals	**Span Bridges** Condition – Number Good – 1 Fair – 26 Poor – 14 Very Poor - 1 **Culvert Bridges** Good – 2 Fair – 10 Poor – 31 Very Poor - 7	Span Bridges – In the short term the span bridges require increased investment to ensure the risk level is acceptable. Culvert Bridges – The condition on the span bridges is due for reassessment to provide a detailed review of the required maintenance and renewals
	Confidence levels		Span Bridges High – Condition Assessment 2020 Culvert Bridges Medium to Low Level 1 Inspections undertaken in 2018	Span Bridges Increase in the budget based on the condition assessment Culvert Bridges Increase required based on outcomes from span bridges likely to be similar impact for culvert bridges
Function	Measure of the asset is appropriate for its intended use.	Bridge Hierarchy or Type	Breakdown of current hierarchy Split in to Span Bridges/Large Culverts that by definition are functional for their intended use.	Minor impact on the planned budget as the majority of the bridges within the network are functional and are intended for the use they currently provide
	Confidence levels		Span Bridges - High Recent Condition Assessment collection size and spans Culvert Bridges High to Medium	Span Bridges High – No functional requirements highlighted from recent audit so minimal impact on how span bridges function. Culvert Bridges Medium based on the culvert bridges are appropriate and function under current conditions.

Capacity	Whether the capacity of the assets are sufficient	Appropriate size to minimise impact to the service, or measure the failure of existing structure due to capacity issue.	No measure undertaken but in general the closure of a bridge due to flooding (under capacity) is during significant rainfall events impacting customers for minimal times throughout the year.	Aging structures identified for renewal are considered for capacity at the time. Minimal impact on the budget due to capacity across the network.
	Confidence levels		Medium Medium (Professional judgement supported by data sampling)	Medium Medium (Professional judgement supported by data sampling

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, cleansing, 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

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

Lifecycle Activity	Purpose of Activity	Activity Measure	Current Performance*	Recommended Performance **
TECHNICAL LEVELS OF SERVICE				

Lifecycle Activity	Purpose of Activity	Activity Measure	Current Performance*	Recommended Performance **
Acquisition	New or Gifted assets fit for purpose	Condition assessed at time of acquisition	No planned maintenance for early life cycle	Ensure appropriate resources are supported operationally to derive asset condition at acquisition. No planned acquisitions or gifted assets identified.
		Budget	$0	$0
Operation	Project Management Support in Delivering Bridge Renewals	Bridge renewed or component at optimal time	Internal project management costs linked to renewals (Between 13-15%) $206,000 10 Year Planning Period	Funding mechanism controlled outside AMP and operational costs will be aligned with the renewal spend $143,000 10 Year Planning Period
	Bridge Audit	Condition Assessment Years 2025 & 2030	Not Funded	$200k for the 10 year planning period.
		Budget	$206,000	$143k - 10 Yr Planning period – Project Management Costs (Separately Funded) $200k – Two Bridge Condition Assessments – 10 Yr Planning Period.

Maintenance	Maintain Bridges	100 bridges across the network	Minimal based prior to bridge condition assessment	Funding required for Span & Culvert Bridges based on 2020 Condition and Maintenance Priorities $49,000k Per Year from 2022-2025 $24,000k Per Year from 2026-2031 Reduction based on clearance of maintenance priorities.
		Budget	$1,000	$49,000 Per Year (2022-2025) $24,000 Per Year (2026-2031)
Lifecycle Activity	**Purpose of Activity**	**Activity Measure**	**Current Performance***	**Recommended Performance ****
Renewal	Renew bridge/and/or components when required to ensure bridge fit for purpose and minimal risk	Condition Assessment Based	Span Bridges – Comprehensive list of renewal components identified from condition assessment Culvert Bridges – Condition Assessment required to establish renewal baseline	Span Bridges - Planned expenditure based on condition assessments conducted Culvert Bridges- Indicative spending based on 2020 Span Bridge condition assessment and planning.
		Budget	$1,490,000 Ten Year Period	$1,033,000 Ten Year Period
Disposal	Bridges	Planned disposals	Nil	No disposals planned
		Budget	$0	$0

Note: * Current activities related to Planned Budget.

** Expected performance related to forecast lifecycle costs.

*** The forecast amount has been reduced after the condition assessment of 2020 which highlighted several bridges in a state of disrepair. These have been attended to before the life of this plan, thus reducing the overall spend.

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.

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
Nil	No demands identified			

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 Bridges 21/22 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.

Risk and opportunities identified to date are shown in Table 4.5.1

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

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
Storm Intensity	More extreme weather events	Potentially more localised flooding	Ensure process in place to manage capacity, fit for purpose and increased maintenance to ensure vegetation is removed.

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 Table 4.5.2 summarises some asset climate change resilience opportunities.

Table 4.5.2 Building Asset Resilience to Climate Change

New Asset Description	Climate Change impact These assets?	Build Resilience in New Works
Asset Design	Fit for purpose	Building resilience into assets at design will increase the asset life based on climate impacts, and also lower which comes at an increased cost.

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.

5.0 LIFECYCLE MANAGEMENT PLAN

The lifecycle management plan details how the Bridges 21/22 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.

Span and Culvert Bridges

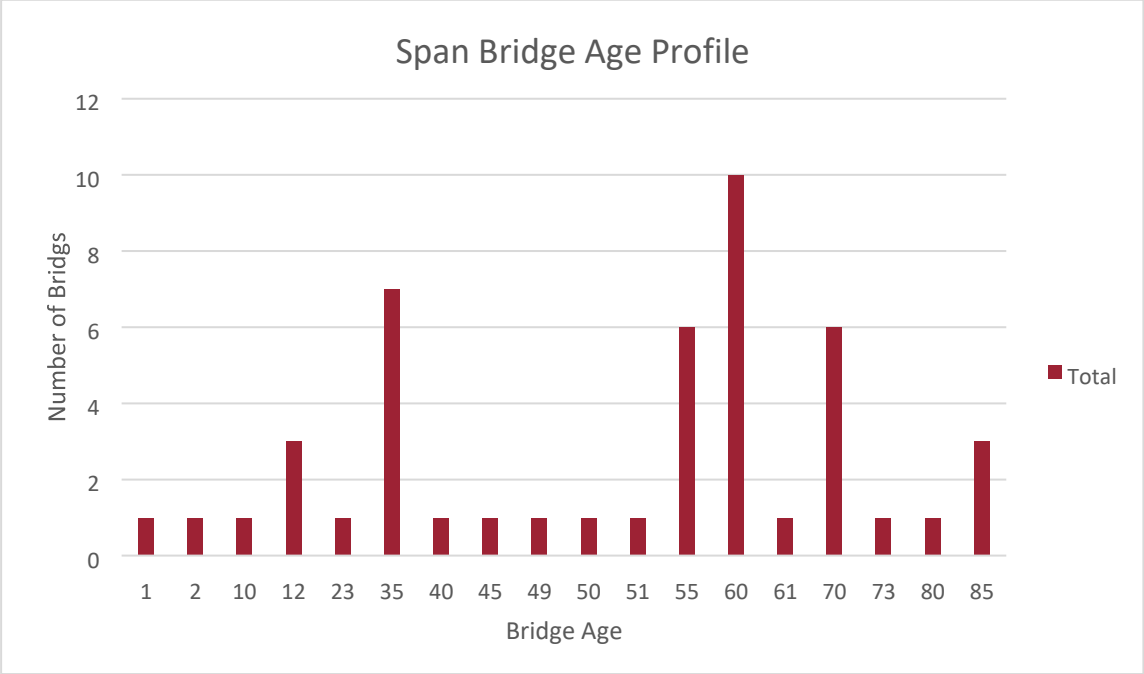
The age profile of the assets included in this AM Plan are shown in Figure 5.1.1.

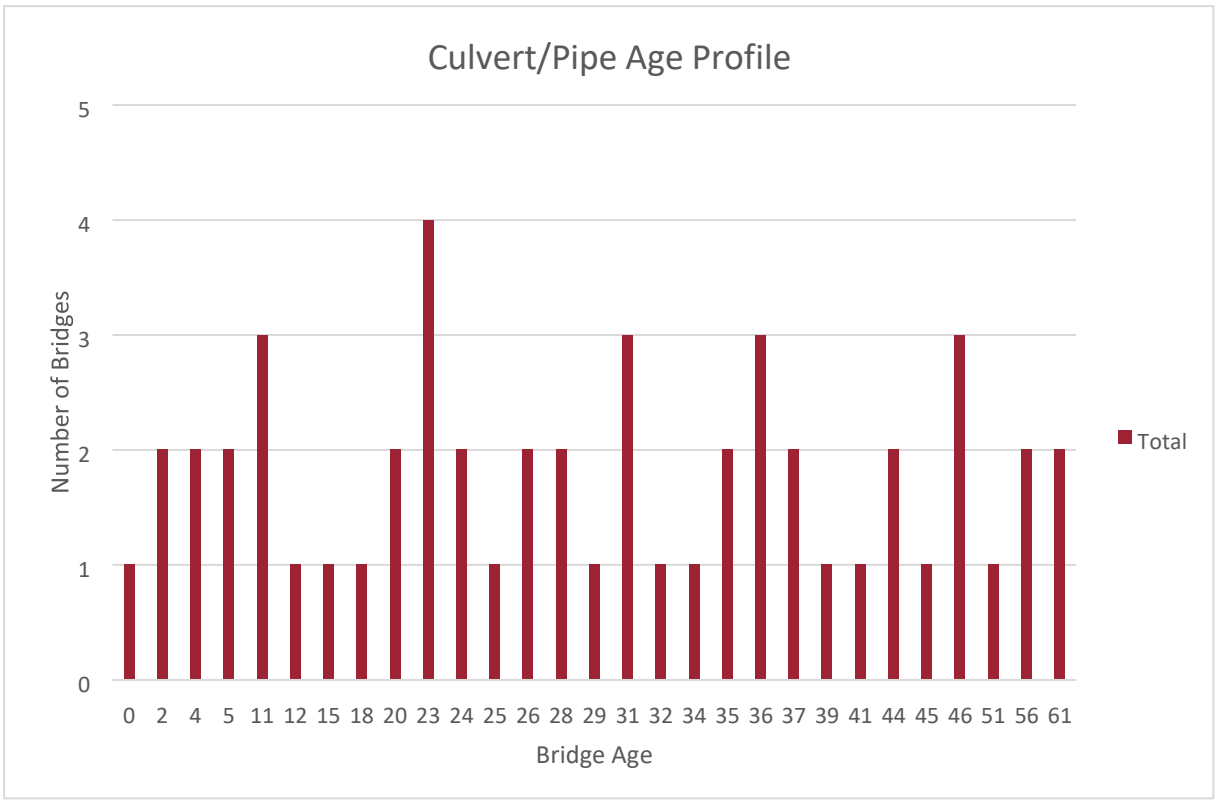
Table 5.1.1: Assets covered by this Plan

Asset Category	Dimensions	Replacement Value
Span Bridges (Span longer than 6m)	Span Bridges – 27 Bridges Culvert Bridges – 20 Bridges	$ 13,821,965
Culvert Bridges (Span less than 6m)	Culvert – 44 Bridges Pipe – 6 Bridges	$ 6,426,872
Totals		**$ 20,248,837**

All figure values are shown in current day dollars.

Add discussion about the age asset profile. Outline how past peaks of investment that may require peaks in renewals in the future. Comment on the overall age versus useful lives of the assets.





Adelaide Hills Council has a portfolio of span and culvert bridges that whilst aging have had regular audits and provisioned funds to replace components. The componentised nature can often misrepresent the condition/age profile of the bridge. Construction may indicate the bridge is 70 years old but renewals throughout its life has ensured the main structural components are replaced to ensure safe passage, this can often skew the age of the structure. Similar to a house that is 60 years old that is re-clad or re-roofed it is old but the key components each with their own lifecycle have been replaced when due.

The age or the remaining useful life of the span bridges for the 10 year life of this plan indicates that of the 5 bridges across the network that are considered end of life, 3 have been identified for partial renewal, 1 has been completely reconstructed since the time of the audit and the remaining are flagged for minor/major work across this plan. This has reduced the overall funding required for the ten year period.

The forward projections beyond the 20 year period indicates 10 bridges ending or nearing their useful life, at an indicative cost of $2.5 to $3 million over the 10 years between 2030 to 2040 so an increased spend has been identified across these years.

5.1.2 Asset capacity and performance

Assets are generally provided to meet design standards where these are available. However, there is insufficient resources to address all known deficiencies. Locations where deficiencies in service performance are known are detailed in Table 5.1.2.

Table 5.1.2: Known Service Performance Deficiencies

Location	Service Deficiency
Span Bridges	Minimal funding currently allocated for maintenance, and minimal maintenance being undertaken.
Culvert Bridges	Data collection and condition assessment required
Span and Culvert Bridges	Level 1 bridge assessments required, currently not resourced or funded

The above service deficiencies were identified from professional judgement, internal processes and asset condition assessments.

Condition is currently monitored for Span Bridges every 10 years, with a Level 1 planned annually (Not funded)

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

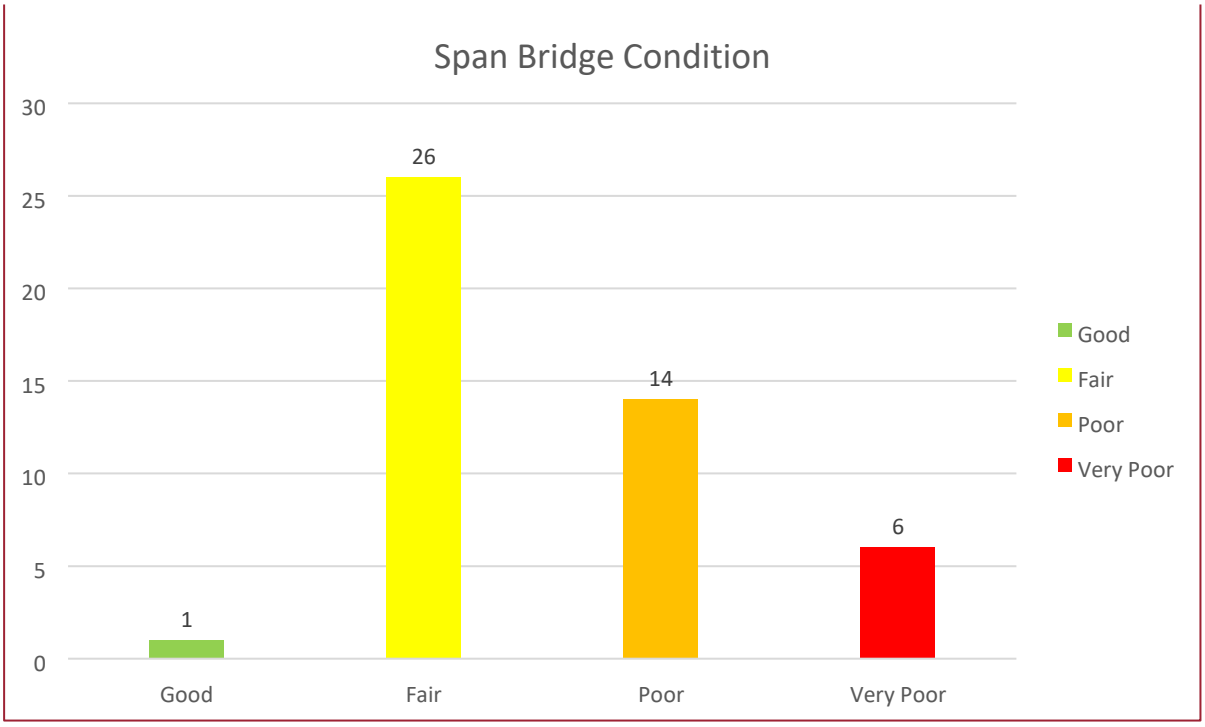
Table 5.1.3: Condition Grading System

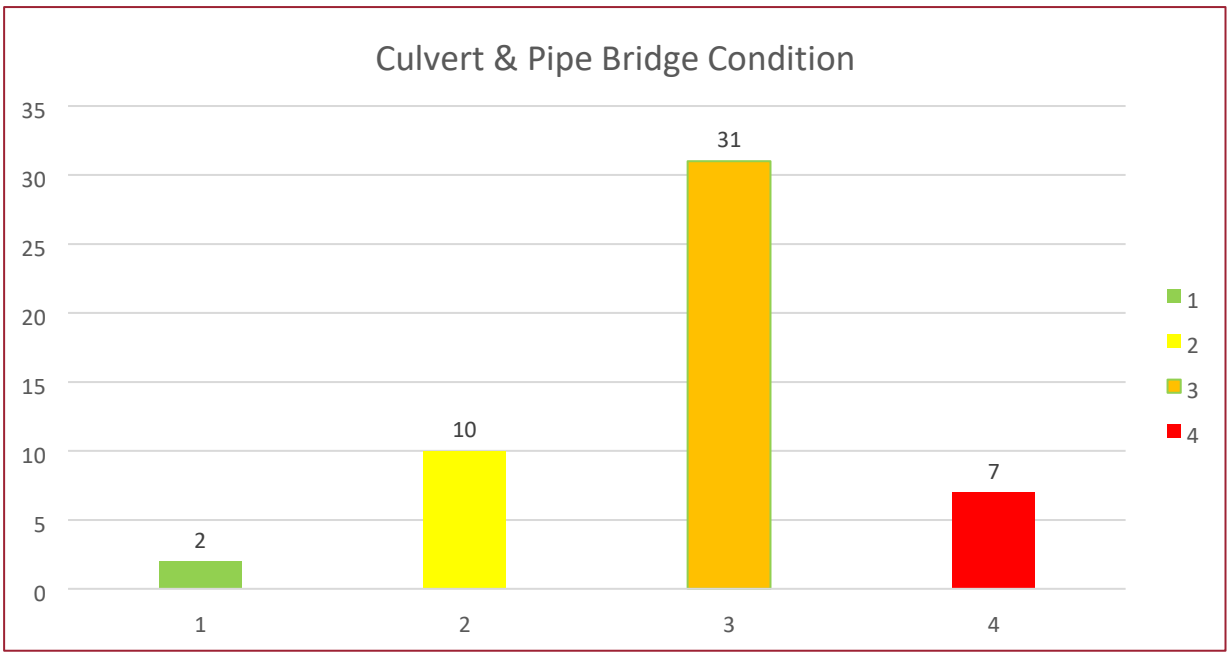
Condition Grading	Description of Condition
1	**Very Good**: free of defects, only planned and/or routine maintenance required
2	**Good**: minor defects, increasing maintenance required plus planned maintenance
3	**Fair**: defects requiring regular and/or significant maintenance to reinstate service
4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

The condition profile of our assets is shown in Figure 5.1.3.

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

Figure 5.1.3: Asset Condition Profile





Bridge Conditions that have been assessed highlight that the span bridge portfolio is reasonably healthy, and the bridges within the very poor range have either been recently refurbished or are planned as part of the newly formulated renewal plans. The span bridge is generally a long lived asset, but the components identified for renewal will be prevalent in the future 20 plus year period as the majority heads towards the end of its useful life.

The culvert portfolio is usually a low value, lower risk item with less components and complexity and the upcoming condition audit process will reset the condition to a realistic 2021-22 level of detail for planning purposes.

All figure values are shown in current day dollars.

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.

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. Examples of typical maintenance activities include pipe repairs, asphalt patching, and equipment repairs.

The trend in maintenance budgets are shown in Table 5.2.1.

Table 5.2.1: Maintenance Budget Trends

Year	Maintenance Budget $
2021/2022	$1,000
2022/2023	$49,000 (Projected)
2023/2024	$49,000 (Projected)

Maintenance budget levels are considered to be inadequate to meet projected service levels, which may be less than or equal to current service levels. Where maintenance budget allocations are such that 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 and service risks considered in the Infrastructure Risk Management Plan.

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

Asset Hierarchy

An asset hierarchy provides a framework for structuring data in an information system to assist in collection of data, reporting information and making decisions. The hierarchy includes the asset class and component used for asset planning and financial reporting and service level hierarchy used for service planning and delivery.

The hierarchy for the range of bridges is intrinsically linked to the road hierarchy that has been established in the Transport Asset Management Plan, and the bridges will be serviced based on location, volume and traffic and the risk is linked to the number of vehicles using the bridge.

The service hierarchy is shown is Table 5.2.2.

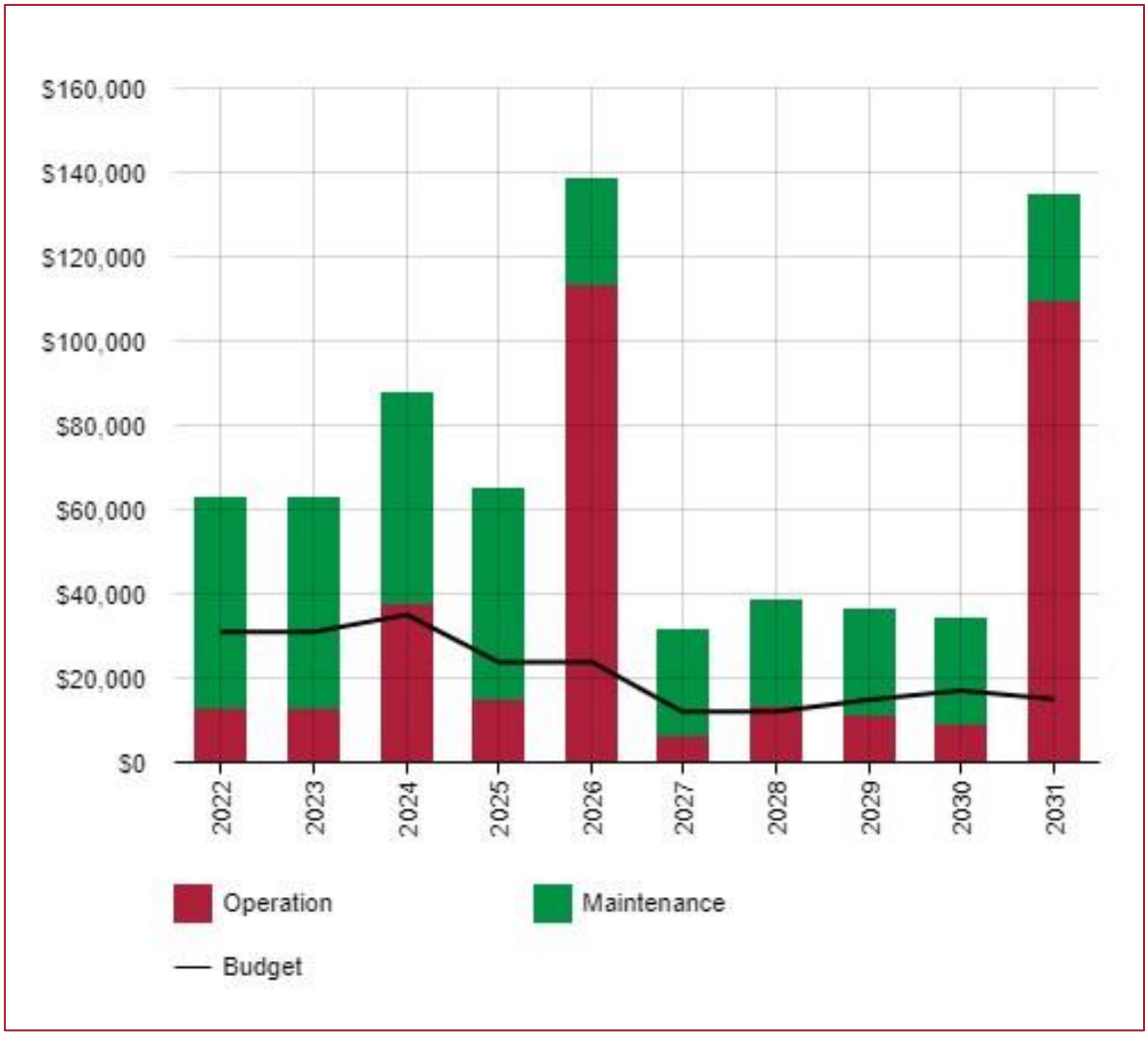
Table 5.2.2: Asset Service Hierarchy

Service Hierarchy		Service Level Objective
Bridges	Urban Distributor	Urban Distributor Roads are roads that link suburbs, towns or areas that provide a direct link through a town or area or act as a bypass route around a town or urban area.
	Urban Collector	Urban Collector roads collect traffic from suburban areas and channel traffic directly to town centres or major points of activity. They may also link suburbs or towns directly to distributor roads. Urban Collector roads are appropriate for heavy vehicle traffic but B-Double and heavy transport movements are generally restricted.
	Urban Local	Urban Local roads carry low traffic volumes and provide access with in an urban area or town and should not be thoroughfares and should be designed with traffic calming features to discourage through traffic and high speed traffic.
	Rural Distributor	Rural Distributors are roads that directly link rural areas and/or towns. They are bitumen sealed and carry large medium to volumes of traffic and are designed as freight routes.
	Rural Collector	Rural Collector roads collect traffic from rural areas and channel traffic to rural towns or to Rural Distributor roads. Rural Collector roads are suitable for heavy vehicles and farm machinery and are generally bitumen sealed but may be unsealed.
	Rural Local	Rural Local roads have low traffic volumes and link rural properties and
		areas to Rural Distributor and Rural Collector roads. Rural Local roads are generally unsealed and require a regular grading or maintenance program, unsealed roads policy derives the criteria for upgrading these to seal.

Summary of forecast operations and maintenance costs

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

Figure 5.2: Operations and Maintenance Summary



Operational Spikes are Bridge Condition Assessments – 2026 & 2031

All figure values are shown in current day dollars.

Based the 2020 Span Bridges condition assessment a large volume of maintenance and monitoring has been identified across the bridge network, including spalling, concrete & seal cracking/patching, vegetation removal and safety barrier/railing that requires maintenance.

Acknowledging this maintenance can will provide a prolonged bridge life if undertaken, the aim of delivering the maintenance backlog is to sync with the renewals also identified to create packages of work. Eg; bundling all the safety barrier or vegetation work, and the smaller maintenance items attached to the larger renewals to be undertaken with other bodies of work.

The indicative costs provided throughout the condition assessment have been utlised with an additional on cost to cover site costs and traffic management. The figure for maintenance for the span bridges is approximately $40k per year, equating to around 3% of the total value of the span bridges (IPWEA guidelines suggest 5% as best

practice). This figure has been extended to the culvert/pipe bridges at an estimated value of $15k per year, bringing the total planned budget figure to $55k for the first 5 years of the plan and reduced to $30-50k once additional condition assessments are undertaken.

Maintenance items identified from 2020 Condition Assessment for Span Bridges.

Maintenance Type	Urgent	High	Medium	Low	Grand Total
Deck drainage		1	6		7
Avenue Road Bridge		1			1
Euston Road Bridge			1		1
Old Mount Barker Road			1		1
Onkaparinga Road			1		1
Oval Road Culvert			1		1
Spoehr Road Bridge			1		1
Tiers Road Culvert			1		1
Guardrail/barrier maintenance		**2**	**14**	**3**	**19**
Avenue Road Bridge			1		1
Burns Road			1		1
Carey Gully Road Bridge			1		1
Checker Hill Road Culvert			1		1
Euston Road Bridge				1	1
Hynes Bridge			1		1
Kemp Road Bridge			1		1
Knotts Hill Road Bridge 1			1		1
Lower Hermitage Road Bridge			1		1
Merchants Road Bridge		1			1
Milan Terrace Bridge			1		1
Nicholls Road Culvert			1		1
Onkaparinga Road			1		1
Pfeiffer Road Bridge				1	1

Sires Road East Culvert			1		1
Spoehr Road Bridge				1	1
Stradbroke Road			1		1
Swamp Road Bridge			1		1
Watts Gully Road Bridge		1			1
Guardrail/barrier refurbishment			**1**	**1**	**2**
Hynes Bridge				1	1
Tiers Road Culvert			1		1
Investigation					
Foxhill Road Bridge					
Joint refurbishment		1	1		2

Carey Gully Road Bridge			1		1
Nicholls Road Culvert		1			1
Miscellaneous concrete repairs			11	3	14
Corkscrew Road Bridge			1		1
Graebers Road Bridge				1	1
Lower Hermitage Road Bridge			2		2
Onkaparinga Road			1		1
Oval Road Culvert				2	2
Somerset Road Bridge			2		2
Stevens Road Bridge			1		1
Tiers Road Bridge			1		1
Tiers Road Culvert			1		1
Watts Gully Road Bridge			2		2
Miscellaneous works		**2**	**8**	**5**	**15**
Checker Hill Road Culvert		1			1
Euston Road Bridge				1	1
Foxhill Road Bridge			1		1
Hynes Bridge			2		2
Knotts Hill Road Bridge 1			1		1
Knotts Hill Road Bridge 2				1	1
Onkaparinga Road			1	1	2
Oval Road Culvert				1	1

Pfeiffer Road Bridge			1		1
Shillabeer Road Bridge				1	1
Sires Road East Culvert			1		1
Spoehr Road Bridge			1		1
Stevens Road Bridge		1			1
Pavement Maintenance			3	3	6
Adelaide Gully Road Bridge			1		1
Carey Gully Road Bridge				1	1
McVitties Road Bridge				1	1
Montacute Road Culvert			1		1
Nicholls Road Culvert			1		1
Swamp Road Bridge				1	1
Structural concrete repairs	**1**	**16**	**19**		**36**
Adelaide Gully Road Bridge		1			1
Aldgate Valley Road Bridge		2	1		3
Avenue Road Bridge		1			1
Beaumont Road Bridge		1	2		3
Bonython Road Bridge		1			1
Euston Road Bridge		1			1
Graebers Road Bridge			1		1
Hynes Bridge			2		2
Kingsland Road Bridge		1	1		2
McVitties Road Bridge			1		1
Merchants Road Bridge		1			1
Nicholls Road Culvert		1			1
Onkaparinga Road			1		1
Oval Road Culvert			3		3
Pfeiffer Road Bridge			1		1
Rathjen Road Culvert (Complete)	1		2		3

Shillabeer Road Bridge			1		1
Spoehr Road Bridge		1			1
Stradbroke Road			1		1
Sturt Valley Road Culvert		1			1
Tiers Road Bridge			2		2
Tiers Road Culvert		2			2
Watts Gully Road Bridge		2			2
Structural steelwork painting			**7**		**7**

Aldgate Valley Road Bridge			1		1
Avenue Road Bridge			1		1
Camac Road Bridge			1		1
Graebers Road Bridge			2		2
Merchants Road Bridge			1		1
Spoehr Road Bridge			1		1
Structural steelwork repairs			2		2
McVitties Road Bridge			1		1
Onkaparinga Road			1		1
Timber deck repairs			**1**		**1**
Aldgate Valley Road Bridge			1		1
Underpinning/scour protection		1	6		7
Adelaide Gully Road Bridge		1			1
Burns Road			1		1
Foxhill Road Bridge			1		1
Knotts Hill Road Bridge 2			1		1
Montacute Road Culvert			1		1
Stevens Road Bridge			1		1
Watts Gully Road Bridge			1		1
Vegetation control		**2**	**2**	**25**	**29**
Beaumont Road Bridge		1		1	2
Burns Road				1	1
Checker Hill Road Culvert				1	1
Corkscrew Road Bridge				1	1
Forbes Road Bridge				1	1
Foxhill Road Bridge				1	1
Hartley Vale Road Culvert				1	1
Hollands Creek Rd Bridge #4				1	1
Hynes Bridge				1	1
Kemp Road Bridge				1	1
Knotts Hill Road Bridge 1				1	1
Knotts Hill Road Bridge 2				1	1
Lower Hermitage Road Bridge				1	1
McVitties Road Bridge				1	1
Milan Terrace Bridge				1	1
Montacute Road Culvert				1	1
Nicholls Road Culvert				1	1
Oval Road Culvert				1	1

Rathjen Road Culvert				1	1
Somerset Road Bridge				1	1
Stevens Road Bridge				2	2
Stradbroke Road		1			1
Sturt Valley Road Culvert			1	1	2
Tiers Road Bridge			1	1	2
Watts Gully Road Bridge				1	1
Waterway clearance			7	1	8
Aldgate Valley Road Bridge			1		1
Burns Road			1		1
Camac Road Bridge			1		1
Graebers Road Bridge			1		1
Kingsland Road Bridge			1		1
Nicholls Road Culvert			1		1
Sires Road East Culvert			1		1
Tiers Road Culvert				1	1
Onkaparinga Road			1		1
Grand Total	**1**	**25**	**89**	**41**	**156**

5.3 Renewal Plan

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

Assets requiring renewal are identified from one of two approaches in the Lifecycle Model.

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

The typical useful lives of assets used to develop projected asset renewal forecasts are shown in Table 5.3. Asset useful lives were last reviewed in 2020 for Span Bridges.

Table 5.3: Useful Lives of Assets – Span Bridges

Span Bridges				
Structure Type	**Deck Material**	**Superstructure Material**	**Substructure Material**	**Base Life (Years)**
Bridge	Concrete	Concrete	Concrete	100
Bridge	Concrete	Concrete	Steel	90
Bridge	Concrete	Masonry	Concrete	100
Bridge	Concrete	Steel	Concrete	95

Bridge	Concrete	Steel	Steel	90
Bridge	Timber	Steel	Concrete	80
Bridge	Timber	Steel	Steel	80
Bridge	Timber	Steel	Timber	75
Bridge	Timber	Timber	Concrete	75
Bridge	Timber	Timber	Steel	75
Bridge	Timber	Timber	Timber	70
Box/Arch Culvert	Concrete	Concrete	N/A	90
Pipe Culvert	Concrete	N/A	N/A	60
Masonry Arch	Masonry	Masonry	N/A	100

Culvert & Pipe Bridges	
Structure Type	**Base Life (Years)**
Pipe	60
Culvert – Precast or Insitu	60

The Culvert and Pipe Bridge useful lives will be reviewed once a condition assessment is undertaken as part of this process.

Revaluation Unit Rates

ARRB as part of the 2020 the valuation process ensured that the bridge and its key components have been established into a proforma method to calculate the bridges current replacement cost based on the type and the dimensions of each bridge. An example for a **Cast In Situ Concrete Deck Slab** below calculates out the value for each bridge, hence the rates are grouped but calculated out on a bridge by bridge basis.

Modern Equivalent Structure - Cast In Situ Concrete Deck Slab			
Spans	**Length (m)**	**Width (m)**	**Height (m)**
1	6	6	2
Bridge Component	**Replacement Cost**	**Notes**	
Abutment - Concrete	$ 65,523.78	assume abutment wall concrete is 500mm thick, abutment foundation is 1m wide x 0.8m long	
Deck - Concrete	$ 50,302.32	assume deck concrete is 300mm thick	
Deck Surface - Asphalt	$ 11,844.30	assume deck surface extends 5m each side	
Wingwalls - Concrete	$ 7,548.96	assume wingwall concrete is 300mm thick	
Barriers - Steel	$ 22,080.67	assume barrier extends 10m each side	
Total	**$ 157,300.03**		

The estimates for renewals in this AM Plan were based on the alternative method.

The following span bridges have been identified for renewal with major components comprising the majority of the renewals – headwalls, deck (timber), improved drainage and structural concrete repairs over the life of the 10 year plan.

- Aldgate Valley Road Bridge
- Avenue Road Bridge
- Beaumont Road Bridge
- Checker Hill Road Culvert

- Euston Road Bridge
- Foxhill Road Bridge
- Kingsland Road Bridge
- Montacute Road Bridge
- Nicholls Road Culvert
- Onkaparinga Road
- Sires Road East Culvert
- Somerset Road Bridge
- Spoehr Road Bridge
- Stradbroke Road
- Tiers Road Culvert Woodside)

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. replacing a bridge that has a 5 t load limit), or
- To ensure the infrastructure is of sufficient quality to meet the service requirements (e.g. condition of a playground).[6]

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

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

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

The renewal ranking criteria is linked to the asset hierarchy in table 5.2.2 that is linked to the road hierarchy.

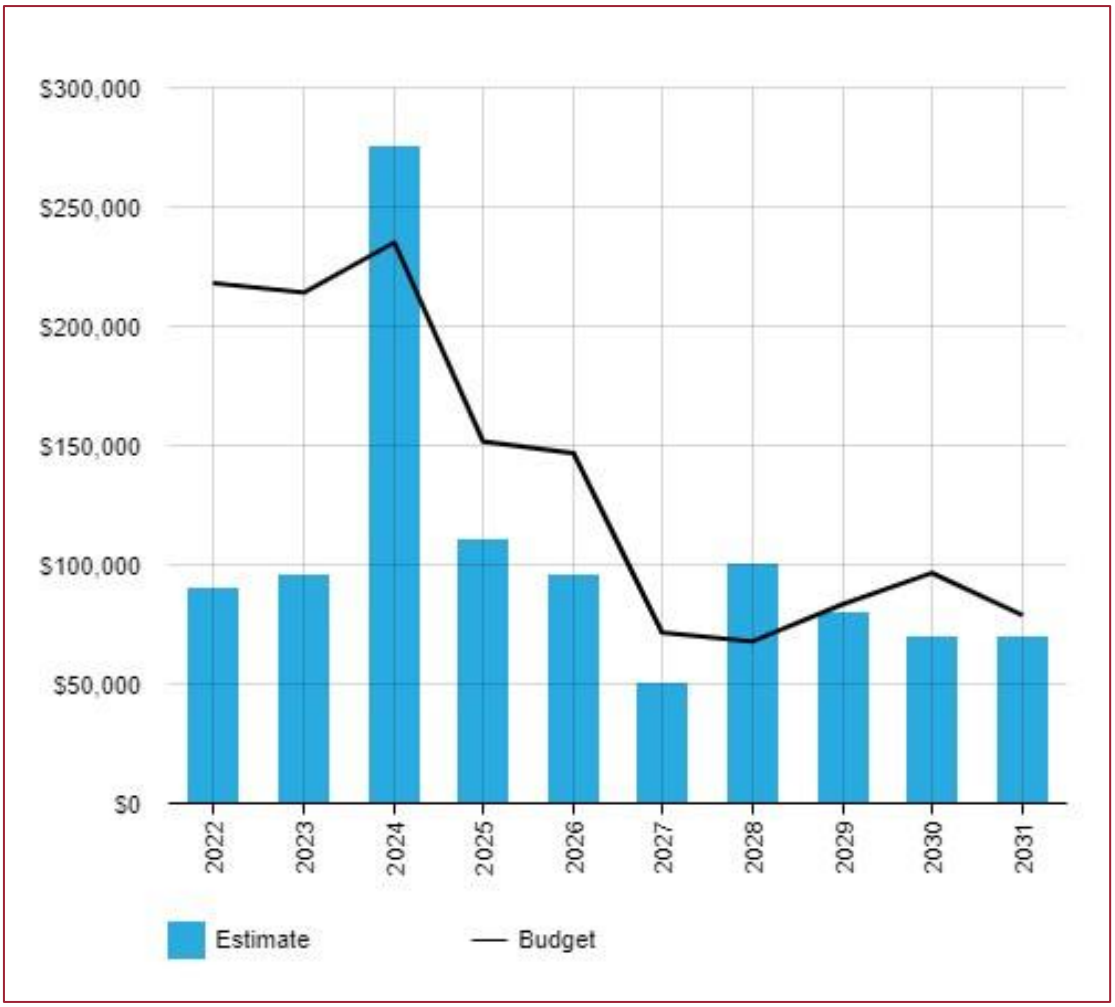
5.4 Summary of future renewal costs

Forecast renewal costs are projected to increase over time if the asset stock increases. The forecast costs associated with renewals are shown relative to the proposed renewal budget in Figure 5.4.1. A detailed summary of the forecast renewal costs is shown in Appendix D.

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

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

Figure 5.4.1: Forecast Renewal Costs



All figure values are shown in current day dollars.

The forecast renewal costs have been reduced based on projected component replacements identified within the 2020 condition assessment process. Several bridge components (Rathjen Road, Beaumont Road & Montacute Road) have been brought forward as part of the renewal program for 2021/22, not included within this asset management plan.

Council plans to undertake a Level 1 (simple) audit of the remaining 50 culvert/pipe bridges and items identified may impact the renewal program if major components are identified for renewal.

The expected budget beyond 2030 is predicted to increase due to span bridge components identified for renewal will reach end of life.

5.5 Acquisition Plan

Acquisition reflects 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. Assets may also be donated to the Bridges 21/22.

No bridges are identified as being gifted or constructed during the life of this plan

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

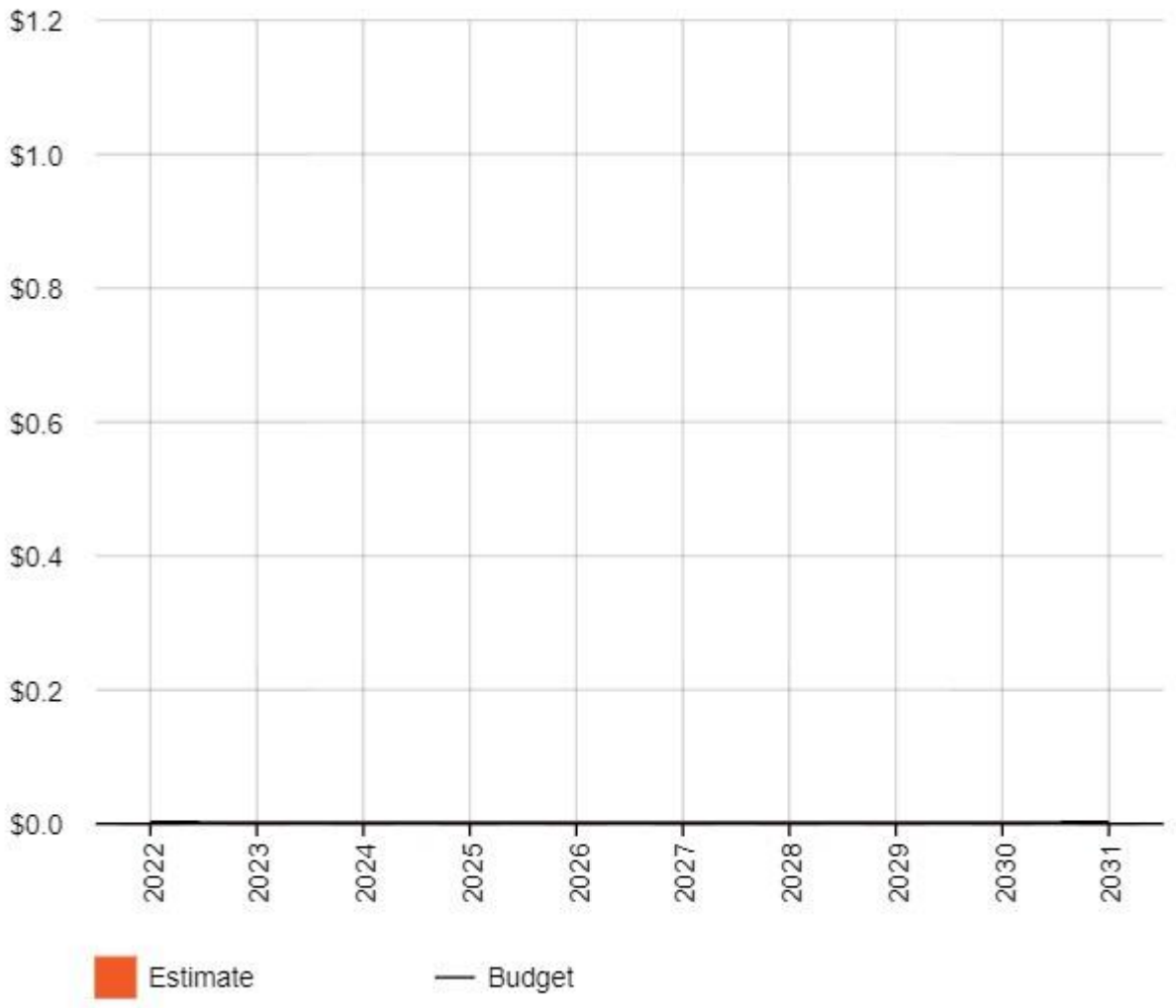
new work analysis should also include the development of a preliminary renewal estimate to ensure that the services are sustainable over the longer term. Verified proposals can then be ranked by priority and available funds and scheduled in future works programmes.

Summary of future asset acquisition costs

Council does not plan to acquire or construct any assets through the life of this plan.

Forecast acquisition asset costs are summarised / summarized in Figure 5.5.1 and shown relative to the proposed acquisition budget. The forecast acquisition capital works program is shown in Appendix A.

Figure 5.5.1: Acquisition (Constructed) Summary



All figure values are shown in current day dollars.

When an Entity 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 Entity. The cumulative value of all acquisition work, including assets that are constructed and contributed shown in Figure 5.5.2.

Figure 5.5.2: Acquisition Summary

All figure values are shown in current dollars.

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.

Council does not plan to acquire or construct any assets through the life of this plan.

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. Any costs or revenue gained from asset disposals is included in the long-term financial plan.

5.7 Summary of asset forecast costs

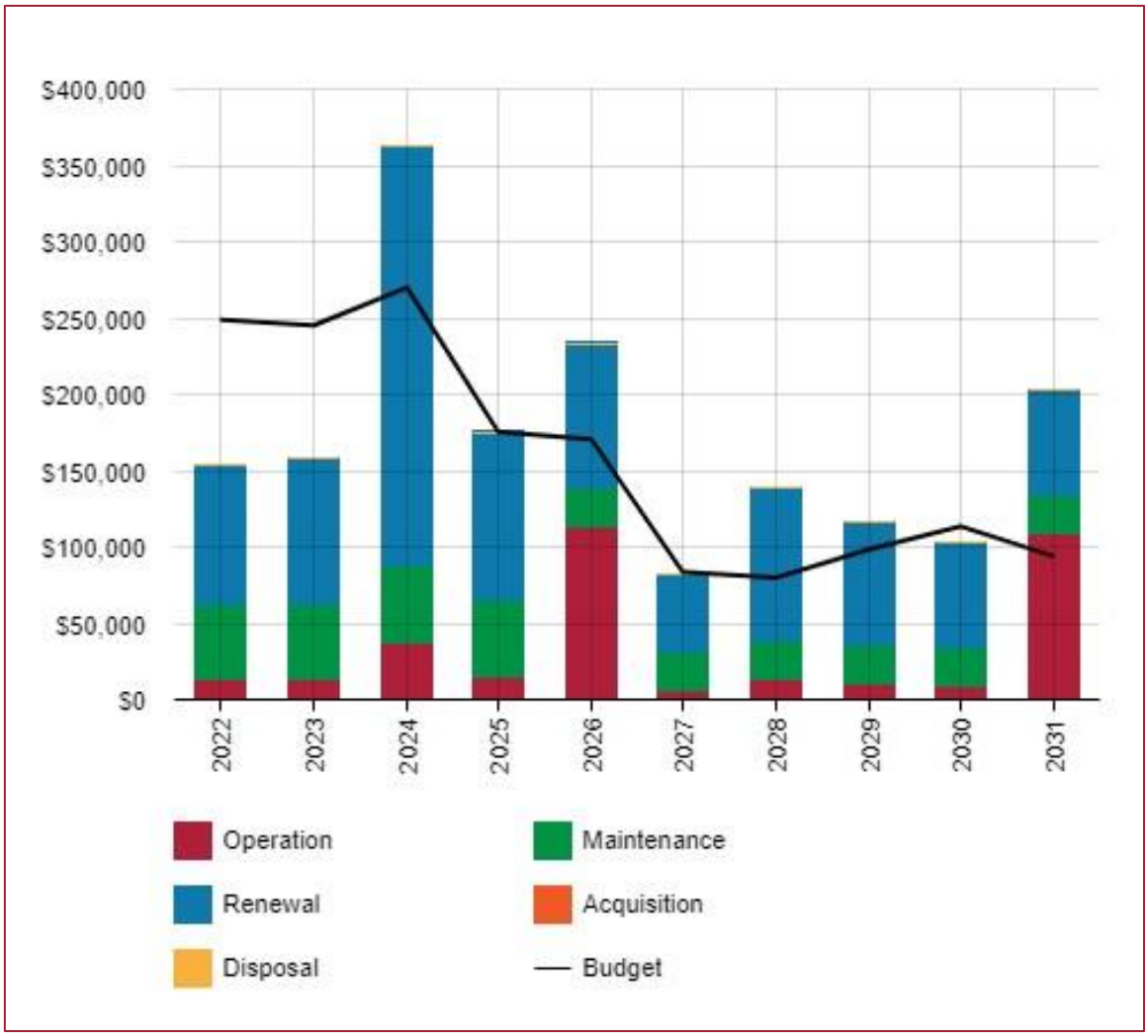
The financial projections from this asset plan are shown in Figure 5.7.1. These projections include forecast costs for acquisition, operation, maintenance, renewal, and disposal. These forecast costs are shown relative to the proposed budget.

The bars in the graphs represent the forecast costs needed to minimise the life cycle costs associated with the service provision. The proposed budget line indicates the estimate of available funding. The gap between the

forecast work and the proposed budget is the basis of the discussion on achieving balance between costs, levels of service and risk to achieve the best value outcome.

No assets identified for disposal throughout the life of this plan.

Figure 5.7.1: Lifecycle Summary



All figure values are shown in current day dollars.

Identified savings within the renewal program due to components being completed early through the renewal/audit process have reduced the overall renewal budget, but the condition assessment process has identified a large number of maintenance items to be maintained into order to prolong the lifecycle of the bridges identified. The pro-active maintenance process is linked to the core condition assessment process, and has been identified within the operation budget for re-collection in 2026 and 2031 to ensure the high risk bridge assets is fit for purpose.

6.0 RISK MANAGEMENT PLANNING

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

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

An assessment of risks[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. The risk assessment process identifies credible risks, the likelihood of the risk event occurring, and the consequences should the event occur. The risk assessment should also include the development of a risk rating, evaluation of the risks and development of a risk treatment plan for those risks that are deemed to be non-acceptable.

6.1 Critical Assets

Critical assets are defined as those which have a high consequence of failure causing significant loss or reduction of service. Critical assets have been identified and along with their typical failure mode, and the impact on service delivery, are summarised in Table 6.1. Failure modes may include physical failure, collapse or essential service interruption.

Table 6.1 Critical Assets

Critical Asset(s)	Failure Mode	Impact
Avenue Road Bridge, Stirling	Collapse/Component Fail	Main rail line impacted between Adelaide to Melbourne.
Onkaparinga Road, Bridgewater	Collapse/Component Fail	Main rail line impacted between Adelaide to Melbourne.
Montacute Road, Montacute	Collapse/Component Fail	Significant alternate route for current access into the city.

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

6.2 Risk Assessment

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

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

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

[8] ISO 31000:2009, p 2

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

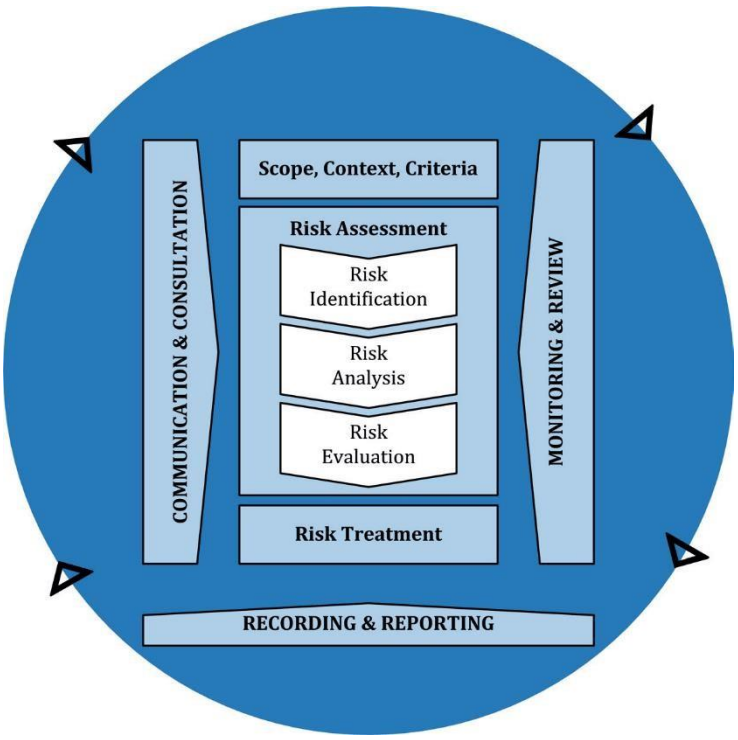


Fig 6.2 Risk Management Process – Abridged *Source: ISO 31000:2018, Figure 1, p9*

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

An assessment of risks[10] 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 the Senior Leadership Team

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	Failure/Collapse	Med	Undertake Yearly Level 1 inspections	Low	$5-10k per year
Bridges on Monitor List	Failure/Collapse	Medium	Undertake monitoring program per assessment	Low	$10k once off

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

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

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.

Our current measure of resilience is shown in Table 6.3 which includes the type of threats and hazards and the current measures that the organisation takes to ensure service delivery resilience.

Table 6.3: Resilience Assessment

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. These include:

- Undertake backlog of maintenance items identified in the ARRB level 2 span bridge condition assessment undertaken in 2020
- Monitor all suggested items identified in the ARRB level 2 span bridge condition assessment undertaken in 2020
- Provide internal resources to condition assess bridge assets

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:

- Bridge closure and rerouting
- Loss of reputation for council
- No access to 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. These risk consequences include:

- Bridge failure
- Bridge component failure – eg; safety rail/barrier, pipe or culvert collapse, deck failure (potholing, severe cracking)
- Bridge closure

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.

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[11] 144.24%

The 20 year prediction sees twice the number of bridges recognised for renewal or reconstruction which indicatively projects an increase by 100% of the spend to fulfil the sustainability ratio

The Asset Renewal Funding Ratio is an important indicator and illustrates that over the next 10 years we expect to have 0.0% 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 $150,000 average per year.

The proposed (budget) operations, maintenance and renewal funding is $150,000 on average per year giving a 10 year funding shortfall of 9,300 per year. This indicates that 94.16% 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 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.

Note – The forecast budget v the planned (LTFP) shows a reduction in funding as opposed to what was originally forecast, thus leading to a high asset funding renewal ratio. This is partly offset by the increase in maintenance and is reflected with 2 audits required ($200k), and the reduction in planned renewals reduces the overhead for delivery of the planned project management fees across the life of the plan.

[11] 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 7.1.3 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.

The primary short term gap is the lack of maintenance expenditure currently available to maintain the asset class.

Forecast costs are shown in current dollar values.

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

Year	Acquisition	Operation	Maintenance	Renewal	Disposal	Total
2022	0	30000	1000	218000	0	249000
2023	0	30000	1000	214100	0	245100
2024	0	34000	1000	235000	0	270000
2025	0	22800	1000	151700	0	175500
2026	0	22800	1000	146700	0	170500
2027	0	11000	1000	71500	0	83500
2028	0	11000	1000	67900	0	79900
2029	0	13900	1000	83600	0	98500
2030	0	16000	1000	96500	0	113500
2031	0	14000	1000	78900	0	93900

Year	Acquisition	Operation	Maintenance	Renewal	Disposal
2022	0	$ 13,000	$ 50,000	$ 90,000	0
2023	0	$ 13,000	$ 50,000	$ 95,000	0
2024	0	$ 38,000	$ 50,000	$ 275,000	0
2025	0	$ 15,300	$ 50,000	$ 110,000	0
2026	0	$113,300	$ 25,000	$ 95,000	0
2027	0	$ 6,500	$ 25,000	$ 50,000	0
2028	0	$ 13,700	$ 25,000	$ 100,000	0
2029	0	$ 11,200	$ 25,000	$ 80,000	0
2030	0	$ 9,200	$ 25,000	$ 69,000	0
2031	0	$109,700	$ 25,000	$ 69,000	0

7.2 Funding Strategy

The proposed funding for assets is outlined in the Entity's budget and Long-Term financial plan.

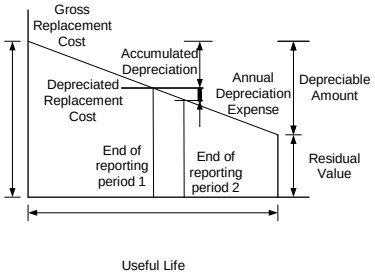
The financial strategy of the entity determines how funding will be provided, whereas the AM Plan communicates how and when this will be spent, along with the service and risk consequences of various service alternatives.

7.3 Valuation Forecasts

7.3.1 Asset valuations

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

Replacement Cost (Current/Gross)	$20,248,837
Depreciable Amount	$20,248,837
Depreciated Replacement Cost12	$8,672,636
Depreciation	$315,560



7.3.2 Valuation forecast

Asset values are forecast to increasee, and may change depending on the valuation of the culvert bridges once condition assessed and valued.

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.

No assets identified for construction.

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:

- Renewal forecasts have been made by professional judgement, condition assessments & existing datasets
- A 3% uplift has been included for maintenance, operations or renewal over the long term forecast.
- Current day dollars

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[13] in accordance with Table 7.5.1.

[12] Also reported as Written Down Value, Carrying or Net Book Value.
[13] IPWEA, 2015, IIMM, Table 2.4.6, p 2|71.

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%
Confidence Grade	**Description**
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	C	Professional Judgement
Growth projections	B	Strategic Plan
Acquisition forecast	B	No assets recognised for acquisition
Operation forecast	B	Included in the long term financial plan
Maintenance forecast	C	Included in the long term financial plan, targeted approach to capturing maintenance information
Renewal forecast - Asset values	B-C	ARRB Condition Assessment and Professional Judgement
- Asset useful lives	B	ARRB Condition Assessment and Professional Judgement
- Condition modelling	C	ARRB Condition Assessment and Professional Judgement
Disposal forecast	B	No assets identified for disposal

The estimated confidence level for and reliability of data used in this AM Plan is considered to be medium to high based on recent condition assessment.

8.0 PLAN IMPROVEMENT AND MONITORING

8.1 Status of Asset Management Practices[13]

8.1.1 Accounting and financial data sources

This asset management plan utilises accounting and financial data. The source of the data is Finesse Financial Suite

8.1.2 Asset management data sources

This asset management plan also utilises asset management data. The source of the data is Confirm Asset Management System

8.2 Improvement Plan

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

Table 8.2: Improvement Plan

Task	Task	Responsibility	Resources Required	Timeline
1	Undertake condition assessment and valuation across the remaining culvert and pipe bridges assets – Planned for 2022	Strategic Assets	$10,000	2022
2	Develop process to manage monitor program	Strategic Assets	Internal	2022
3	Review yearly maintenance requirements	Strategic Assets/Civil Services	Internal	2023
4	Reclassify potential culvert bridges that identify as storm water assets.	Strategic Assets	Internal	2024
5				

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 4 years and is due for complete revision and updating within 2 years of each local government election.

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

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 longterm 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

- IPWEA, 2006, 'International Infrastructure Management Manual', Institute of Public Works Engineering Australasia, Sydney, www.ipwea.org/IIMM
- IPWEA, 2015, 3rd edn., 'International Infrastructure Management Manual', Institute of Public Works Engineering Australasia, Sydney, www.ipwea.org/IIMM
- IPWEA, 2008, 'NAMS.PLUS Asset Management', Institute of Public Works Engineering Australasia, Sydney, www.ipwea.org/namsplus.
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- IPWEA, 2018, Practice Note 12.1, 'Climate Change Impacts on the Useful Life of Assets', Institute of Public Works Engineering Australasia, Sydney
- IPWEA, 2012, Practice Note 6 Long-Term Financial Planning, Institute of Public Works Engineering Australasia, Sydney, https://www.ipwea.org/publications/ipweabookshop/practicenotes/pn6
- IPWEA, 2014, Practice Note 8 – Levels of Service & Community Engagement, Institute of Public Works Engineering Australasia, Sydney, https://www.ipwea.org/publications/ipweabookshop/practicenotes/pn8
- ISO, 2014, ISO 55000:2014, Overview, principles and terminology
- ISO, 2018, ISO 31000:2018, Risk management – Guidelines
- 'Strategic Plan 2020 – 2024'
- 'Annual Business Plan 21/22'

10.0 APPENDICES

Appendix A Acquisition Forecast

No assets identified for construction or gifted to Council.

Table A3 - Acquisition Forecast Summary

Year	Constructed	Donated	Growth
2022	0	0	0
2023	0	0	0
2024	0	0	0
2025	0	0	0
2026	0	0	0
2027	0	0	0
2028	0	0	0
2029	0	0	0
2030	0	0	0
2031	0	0	0

Appendix B Operation Forecast

B.1 – Project management costs incurred in delivering bridge/component renewals (budgeted through existing operations budget)

Table B2 - Operation Forecast Summary

Year	Operation Planned	Additional Operation Forecast	Total Operation Forecast
2022	$ 30,000	$ -	$ 13,000
2023	$ 30,000	$ -	$ 13,000
2024	$ 34,000	$ -	$ 38,000
2025	$ 22,800	$ -	$ 15,300
2026	$ 22,800	$ -	$ 113,300
2027	$ 11,000	$ -	$ 6,500
2028	$ 11,000	$ -	$ 13,700
2029	$ 13,900	$ -	$ 11,200
2030	$ 16,000	$ -	$ 9,200
2031	$ 14,000	$ -	$ 109,700

Appendix C Maintenance Forecast

C.1 – Increase in maintenance identified through condition assessment process 2020

.

Table C2 - Maintenance Forecast Summary

Year	Maintenance Planned	Additional Maintenance Forecast	Total Maintenance Forecast
2022	$ 1,000	$ -	$ 50,000
2023	$ 1,000	$ -	$ 50,000
2024	$ 1,000	$ -	$ 50,000
2025	$ 1,000	$ -	$ 50,000
2026	$ 1,000	$ -	$ 25,000
2027	$ 1,000	$ -	$ 25,000
2028	$ 1,000	$ -	$ 25,000
2029	$ 1,000	$ -	$ 25,000
2030	$ 1,000	$ -	$ 25,000
2031	$ 1,000	$ -	$ 25,000

Appendix D Renewal Forecast Summary

D.1 – The forecast budget for renewals based on the recent condition assessment is below the projected long term financial plan projections.

The predicted spend for the following 10 years from 2031 to 2041 has identified approx. 10 bridges reaching end of life, this is projected to be around $330k per year.

Table D3 - Renewal Forecast Summary

Year	Renewal Forecast	Renewal Budget
2022	$ 90,000	$ 218,000
2023	$ 95,000	$ 214,100
2024	$ 275,000	$ 235,000
2025	$ 110,000	$ 151,700
2026	$ 95,000	$ 146,700
2027	$ 50,000	$ 71,500
2028	$ 100,000	$ 67,900
2029	$ 80,000	$ 83,600
2030	$ 69,000	$ 96,500
2031	$ 69,000	$ 78,900

Appendix E Disposal Summary

E.1 - No disposals identified

Table E3 – Disposal Activity Summary

Year	Disposal Forecast	Disposal Budget
2022	0	0
2023	0	0
2024	0	0
2025	0	0
2026	0	0
2027	0	0
2028	0	0
2029	0	0
2030	0	0
2031	0	0

Appendix F Budget Summary by Lifecycle Activity

Total lifecycle costs.

Table F1 – Budget Summary by Lifecycle Activity

Year	Acquisition	Operation	Maintenance	Renewal	Disposal	Total
2022	$ -	$ 30,000	$ 1,000	$ 218,000	$ -	$ 249,000
2023	$ -	$ 30,000	$ 1,000	$ 214,100	$ -	$ 245,100
2024	$ -	$ 34,000	$ 1,000	$ 235,000	$ -	$ 270,000
2025	$ -	$ 22,800	$ 1,000	$ 151,700	$ -	$ 175,500
2026	$ -	$ 22,800	$ 1,000	$ 146,700	$ -	$ 170,500
2027	$ -	$ 11,000	$ 1,000	$ 71,500	$ -	$ 83,500
2028	$ -	$ 11,000	$ 1,000	$ 67,900	$ -	$ 79,900
2029	$ -	$ 13,900	$ 1,000	$ 83,600	$ -	$ 98,500
2030	$ -	$ 16,000	$ 1,000	$ 96,500	$ -	$ 113,500
2031	$ -	$ 14,000	$ 1,000	$ 78,900	$ -	$ 93,900

Appendix G – Monitoring Program for Span Bridges

Road Name	Chainage	Latitude	Longitude	Action	Priority	Date Noted
120 Aldgate Valley Road - Mylor		-35.03706563	138.7538003	Monitor holes between stones noted throughout abutment 1 masonry wall.	Monitor	2/10/2020
Adelaide Gully Road		-34.80949554	138.8358106	Monitor spalling at Abutment 2 right hand side wingwall.	Monitor	1/10/2020
Avenue Road - Stirling		-35.00771485	138.7097066	Prepare vegetation control plan for vegetation encroaching on bridge barriers, wearing surface, kerbing, abutment 2 and wingwalls.	Monitor	29/9/2020
Avenue Road - Stirling		-35.00771485	138.7097066	Monitor mortar joints on approach 2 barrier.	Monitor	29/9/2020
Brooks Bridge Swamp Road - Uraidla		-34.9733588	138.7354993	Monitor movement between culvert units.	Monitor	8/10/2020
Brooks Bridge Swamp Road - Uraidla		-34.9733588	138.7354993	Monitor cracking noted on culverts.	Monitor	8/10/2020
Camac Road - Balhannah		-34.98993369	138.8079558	Monitor cracking noted on abutment 2 and abutment 2 wingwalls.	Monitor	6/10/2020

Corkscrew Road - Montacute		-34.8776435	138.7558069	Monitor concrete defects (cracking, delamination and spalling) throughout abutment 1 and abutment 2.	Monitor	1/10/2020
Corkscrew Road - Montacute		-34.8776435	138.7558069	Seal horizontal cracking through mid point of abutment 1 left hand side wingwall.	Monitor	1/10/2020
Forbes Road - Aldgate		-35.026101	138.7400836	Monitor separation between batter protection and headstock at abutment 1.	Monitor	2/10/2020
Forbes Road - Aldgate		-35.026101	138.7400836	Monitor cracking in batter protection at abutment 2.	Monitor	2/10/2020
Foxhill Road - Mount George		-35.00172892	138.7563556	Monitor rotten timber decking.	Monitor	6/10/2020
Hollands Creek Rd - Cudlee Creek		-34.85534481	138.8285511	Monitor cracking on both abutments.	Monitor	1/10/2020
Kain Avenue - Bridgewater		-35.0098741	138.7497889	Monitor scouring in waterway at left hand side of abutment 2.	Monitor	7/10/2020
Kingsland Road - Aldgate		-35.01565246	138.7362072	Monitor the deterioration of the deck wearing surface	Monitor	2/10/2020
McVitties Road - Birdwood		-34.83058997	138.9814416	Monitor cracks on masonry abutments and wingwalls.	Monitor	30/9/2020

Milan Terrace - Aldgate		-35.01625828	138.7247395	Verify the original condition of the channel to see if the channel material is eroded, or it is silt accumulation (e.g. photo 25)	Monitor	8/10/2020
Old Carey Gully Road - Piccadilly		-34.9890259	138.7407639	Monitor cracking on abutment 2 right hand side wingwall.	Monitor	8/10/2020
Old Carey Gully Road - Piccadilly		-34.9890259	138.7407639	Monitor loose masonry stones at top of abutment 2 left	Monitor	8/10/2020
				hand side wingwall.		
Old Mount Barker Road - Bridgewater		-35.00486218	138.7527311	Monitor cracking between masonry stones noted on abutment 1.	Monitor	7/10/2020
Old Mount Barker Road - Bridgewater		-35.00486218	138.7527311	Monitor mortar missing at base of abutment 1 left hand side wingwall.	Monitor	7/10/2020
Sires Road East - Kersbrook		-34.75105196	138.8728587	Monitor separation between pipe culvert units.	Monitor	28/9/2020
Spoehr Road - Balhannah		-34.99555302	138.8121114	Monitor abutment 1 and abutment 2 for movement.	Monitor	6/10/2020
Stevens Road - Mylor		-35.03396509	138.7460595	Monitor abutments for further movement.	Monitor	2/10/2020

Stradbroke Road		-34.895313	138.690743	Monitor vertical separation noted on abutment 1 wall of original structure and left hand side of deck.	Monitor	1/10/2020
Tiers Road - Woodside		-34.94671629	138.856516	Monitor rotation of wingwall.	Monitor	7/10/2020

Appendix H

Sample of Bridge Audit Condition Assessment Sheet

Adelaide Hills COUNCIL

Structure Condition Inspection Report

L2/1

Sheet Page 1 of 34

Structure ID	BR044	Owner	Local Government Agency
Structure Name	Beaumont Road Bridge		
Region	Adelaide Hills Council		

Local Authority	Adelaide Hills Council	Coordinates	-34.99944141, 138.790874
Road Number	-	Road Name	Beaumont Road - Verdun
Chainage			
Road Type	Local Access	Waterway	Unknown
Year Built			
Structure Type	Culvert	Function	Road over waterway
Superstructure Type	Pipe culvert	Superstructure Material	Precast reinforced concrete
Span Arrangement	1/1.5, 1/1.5, 3/1.5	Overall Length (m)	1.5
Overall Width (m)	10.8		

General Comment

Pipe culvert with 1.5 m diameter.

Date Inspected	06/10/2020	Inspected By	Alex Aldana	Inspection Type	Programmed	Entered By	Malcolm Mak
Date Reviewed	16/11/2020	Reviewed By	Hanson Ngo	Date of Last Inspection		Next Inspection Due	10/2022

Original Rating	CS4	Original Comment	Structure was found in very poor condition at the time of inspection.
WL1 Rating		WL1 Comment	
WR1 Rating		WR1 Comment	

Overall Inspection Comment

Structure rated very poor with cracking throughout pipe culvert and separation/movement between pipe culvert units.

Component Condition Inspection Report

L2/2

Component Location				Exposure Class	Quantity	Unit	Quantity per Condition State				Defect - Location of defect - Description of defect - Reference of sketches and photos	Action Required?
Modification	Group	Component	Standard Number				1	2	3	4		
O	AP1	GR1	55S	1	1	Ea.	1	0	0	0	No major defects noted. Refer to photo 8.	☐
O	AP1	AP1	52O	1	1	Ea.	0	1	0	0	Pothole development noted to left hand side. Refer to photos 9-10.	☑
O	AP1	GR2	55S	1	1	Ea.	1	0	0	0	No major defects noted. Refer to photo 11.	☐
O	S1	BR1	51S	1	2	Lin. m	2	0	0	0	No major defects noted. Refer to photo 12.	☐
O	S1	WS1	14O	1	16	m²	8	8	0	0	Break up and pothole develop noted to left hand edge. Crocodile cracking noted to right hand side. Refer to photos 13-14.	☑
O	S1	BR2	51S	1	2	Lin. m	2	0	0	0	No major defects noted. Refer to photo 15.	☐
O	AP2	GR1	55S	1	1	Ea.	1	0	0	0	No major defects noted. Refer to photo 16.	☐
O	AP2	AP1	52O	1	1	Ea.	1	0	0	0	No major defects noted. Refer to photo 17.	☐
O	AP2	GR2	55S	1	1	Ea.	1	0	0	0	No major defects noted. Refer to photo 18.	☐
O	A1	WW1	63C	2	2	Ea.	0	1	1	0	Overgrown vegetation encroaching on left hand side wingwall. Typical cracking in masonry on left hand side. Loss of fines throughout right hand side wingwall. Moderate spalling up to 40 mm deep on rhs wingwall. Severe cracking up to 35 mm and delamination noted on rhs wingwall. Vegetation encroaching on rhs wingwall. Refer to photos 19-26.	☑
O	S1	CBS1	8C	2	5	m²	2	0	0	3	Severe crack up to 9mm wide near abutment 2. 30 mm separation between pipe and culvert base slab. Refer to photos 27-29.	☑
O	S1	HW1	63C	2	1	Ea.	1	0	0	0	No major defects noted. Refer to photo 30.	☐
O	S1	PC1	60P	2	12	Lin. m	0	0	0	12	PC: 5 units. Unit 1, 3, 4 and 5 are 2.4m long. Unit 2 is 1.2m wide. Pipe diameter is 1.5m. Misalignment noted between all units. Unit 4 and 5 are held together with a steel bracket. 40 mm separation between unit 1 and 2. Horizontal cracking to PC2, up to 0.3 mm, noted at midheight. 40 mm Separation between unit 2 and unit 3. Longitudinal cracking to unit 3, 4 and 5, up to 0.3 mm wide, noted at top. Horizontal cracking to unit 3, up to 0.3 mm wide, noted at midheight. Horizontal cracking to PC3, up to 0.3 mm, noted at midheight. 40 mm separation between unit 3 and 4. 120mm separation between unit 4 and 5. Moderate to severe spalling at reinforcement. 60 mm separation between right hand side wingwalls and pipe unit 5. Loss of backfill behind joints. Refer to photos 7, and 31-44.	☑
O	S1	HW2	63C	2	1	Ea.	0	0	0	1	Severe crack noted up to 50 mm wide. Refer to photos 45-46.	☑
O	S1	CBS2	8C	2	0	m²	0	0	0	0	Unable to inspect as under 25% of component is accessible due to being underwater. Transversed component on foot, no defects noted. No major	☐