BATHURST REGIONAL COUNCIL

Stony Creek Bridge, Tarana Road

MAJOR BRIDGES & CULVERTS ASSET MANAGEMENT PLAN

Version 4.2
February 2021

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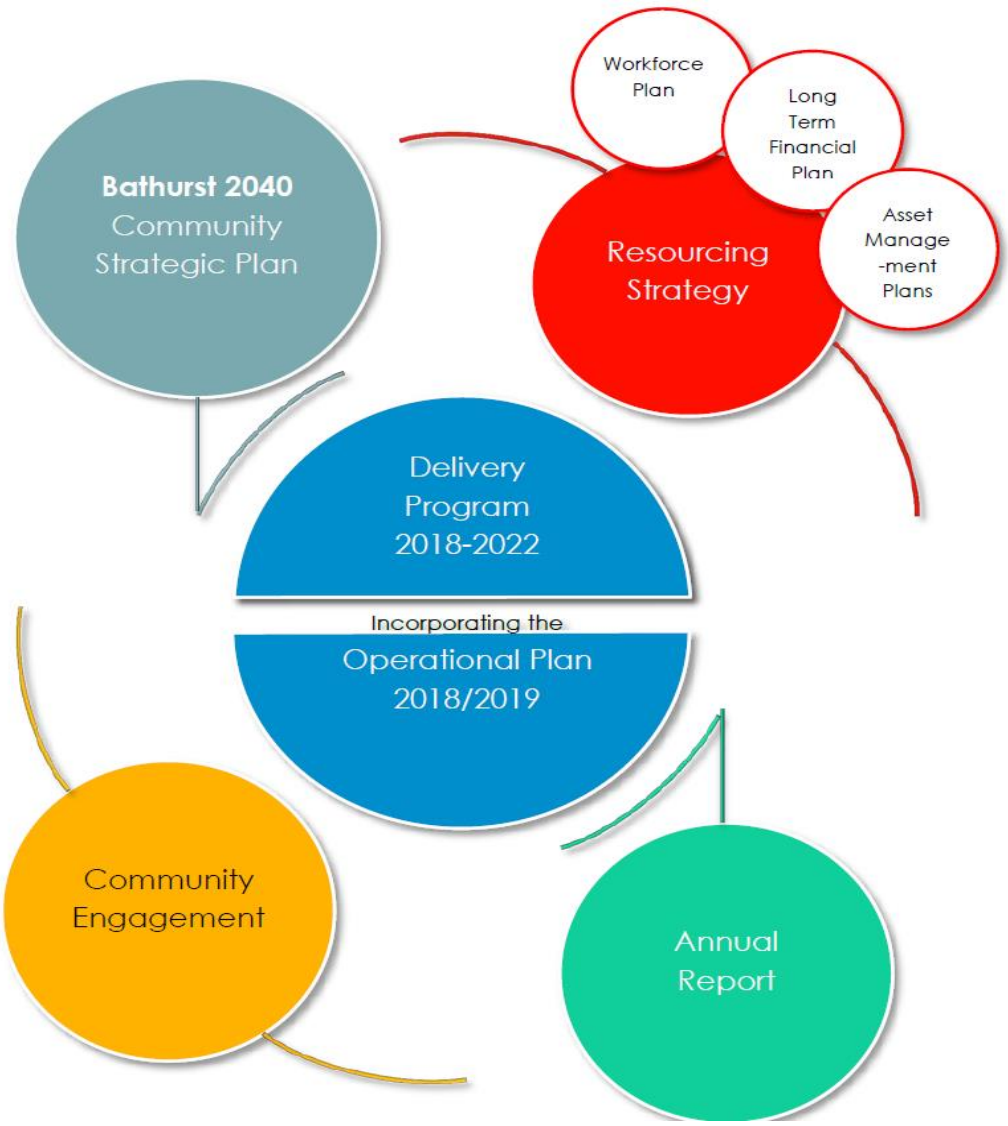
Integrated Planning and Reporting Framework



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ABBREVIATIONS

AAAC	Average annual asset consumption
AMP	Asset management plan
ARI	Average recurrence interval
BOD	Biochemical (biological) oxygen demand
CRC	Current replacement cost
CPI	Consumer Price Index
CWMS	Community wastewater management systems
DA	Depreciable amount
DoH	Department of Health
EF	Earthworks/formation
IRMP	Infrastructure risk management plan
LCC	Life Cycle cost
LCE	Life cycle expenditure
MMS	Maintenance management system
PCI	Pavement condition index
RV	Residual value
SS	Suspended solids
VPH	Vehicles per hour

GLOSSARY

Annual service cost (ASC)
An estimate of the cost that would be tendered, per annum, if tenders were called for the supply of a service to a performance specification for a fixed term. The Annual Service Cost includes operating, maintenance, depreciation, finance/ opportunity and disposal costs, less revenue.

Asset class
Grouping of assets of a similar nature and use in an entity's operations (AASB 166.37).

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

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

Assets
Future economic benefits controlled by the entity as a result of past transactions or other past events (AAS27.12). Property, plant and equipment including infrastructure and other assets (such as furniture and fittings) with benefits expected to last more than 12 months.

Average annual asset consumption (AAAC)*
The amount of a local government's asset base consumed during a year. This may be calculated by dividing the Depreciable Amount (DA) by the Useful Life and totalled for each and every asset OR by dividing the Fair Value (Depreciated Replacement Cost) by the Remaining Life and totalled for each and every asset in an asset category or class.

Brownfield asset values**
Asset (re)valuation values based on the cost to replace the asset including demolition and restoration costs.

Capital expansion expenditure
Expenditure that extends an existing asset, at the same standard as is currently enjoyed by residents, to a new group of users. It is discretional expenditure, which increases future operating, and maintenance costs, because it increases council's asset base, but may be associated with additional revenue from the new user group, e.g. extending a drainage or road network, the provision of an oval or park in a new suburb for new residents.

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

Capital funding
Funding to pay for capital expenditure.

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

Capital new expenditure
Expenditure which creates a new asset providing a new service to the community that did not exist beforehand. As it increases service potential it may impact revenue and will increase future operating and maintenance expenditure.

Capital renewal expenditure
Expenditure on an existing asset, which returns the service potential or the life of the asset up to that which it had originally. It is periodically required expenditure, relatively large (material) in value compared with the value of the components or sub-components of the asset being renewed. As it reinstates existing service potential, it has no impact on revenue, but may reduce future operating and maintenance expenditure if completed at the optimum time, e.g. resurfacing or re-sheeting a material part of a road network, replacing a material section of a drainage network with pipes of the same capacity, resurfacing an oval. Where capital projects involve a combination of renewal, expansion and/or upgrade expenditures, the total project cost needs to be allocated accordingly.

Capital upgrade expenditure
Expenditure, which enhances an existing asset to provide a higher level of service or expenditure that will increase the life of the asset beyond that which it had originally. Upgrade expenditure is discretional and often does not result in additional revenue unless direct user charges apply. It will increase operating and maintenance expenditure in the future because of the increase in the council's asset base, eg. widening the sealed area of an existing road, replacing drainage pipes with pipes of a greater capacity, enlarging a grandstand at a sporting facility. Where capital projects involve a combination of renewal, expansion and/or upgrade expenditures, the total project cost needs to be allocated accordingly.

Carrying amount

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

Class of assets
See asset class definition

Component
An individual part of an asset which contributes to the composition of the whole and can be separated from or attached to an asset or a system.

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

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

Current replacement cost "As New" (CRC)
The current cost of replacing the original service potential of an existing asset, with a similar modern equivalent asset, i.e. the total cost of replacing an existing asset with an as NEW or similar asset expressed in current dollar values.

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

Depreciable amount
The cost of an asset, or other amount substituted for its cost, less its residual value (AASB 116.6)

Depreciated replacement cost (DRC)
The current replacement cost (CRC) of an asset less, where applicable, accumulated depreciation calculated on the basis of such cost to reflect the already consumed or expired future economic benefits of the asset

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

Economic life
See useful life definition.

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

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

Greenfield asset values **
Asset (re)valuation values based on the cost to initially acquire the asset.

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

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

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

Investment property
Property held to earn rentals or for capital appreciation or both, rather than for:
(a) use in the production or supply of goods or services or for administrative purposes; or
(b) sale in the ordinary course of business (AASB 140.5)

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

Life Cycle Cost **

The life cycle cost (LCC) is average cost to provide the service over the longest asset life cycle. It comprises annual maintenance and asset consumption expense, represented by depreciation expense. The Life Cycle Cost does not indicate the funds required to provide the service in a particular year.

Life Cycle Expenditure **
The Life Cycle Expenditure (LCE) is the actual or planned annual maintenance and capital renewal expenditure incurred in providing the service in a particular year. Life Cycle Expenditure may be compared to Life Cycle Expenditure to give an initial indicator of life cycle sustainability.

Loans / borrowings
Loans result in funds being received which are then repaid over a period of time with interest (an additional cost). Their primary benefit is in 'spreading the burden' of capital expenditure over time. Although loans enable works to be completed sooner, they are only ultimately cost effective where the capital works funded (generally renewals) result in operating and maintenance cost savings, which are greater than the cost of the loan (interest and charges).

Maintenance and renewal gap
Difference between estimated budgets and projected expenditures for maintenance and renewal of assets, totalled over a defined time (eg 5, 10 and 15 years).

Maintenance and renewal sustainability index
Ratio of estimated budget to projected expenditure for maintenance and renewal of assets over a defined time (eg 5, 10 and 15 years).

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

Materiality
An item is material is its omission or misstatement could influence the economic decisions of users taken on the basis of the financial report. Materiality depends on the size and nature of the omission or misstatement judged in the surrounding circumstances.

Modern equivalent asset.
A structure similar to an existing structure and having the equivalent productive capacity, which could be built using modern materials, techniques and design. Replacement cost is the basis used to estimate the cost of constructing a modern equivalent asset.

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

Operating expenditure
Recurrent expenditure, which is continuously required excluding maintenance and depreciation, eg power, fuel, staff, plant equipment, on-costs and overheads.

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

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

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

Rate of annual asset consumption*
A measure of average annual consumption of assets (AAAC) expressed as a percentage of the depreciable amount (AAAC/DA). Depreciation may be used for AAAC.

Rate of annual asset renewal*
A measure of the rate at which assets are being renewed per annum expressed as a percentage of depreciable amount (capital renewal expenditure/DA).

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

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

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

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

Recurrent expenditure includes operating and maintenance expenditure.

Recurrent funding
Funding to pay for recurrent expenditure.

Rehabilitation
See capital renewal expenditure definition above.

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

Renewal
See capital renewal expenditure definition above.

Residual value
The net amount which an entity expects to obtain for an asset at the end of its useful life after deducting the expected costs of disposal.

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

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

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

Service potential
The capacity to provide goods and services in accordance with the entity's objectives, whether those objectives are the generation of net cash inflows or the provision of goods and services of a particular volume and quantity to the beneficiaries thereof.

Service potential remaining*
A measure of the remaining life of assets expressed as a percentage of economic life. It is also a measure of the percentage of the asset's potential to provide services that is still available for use in providing services (DRC/DA).

Strategic Management Plan (SA)**
Documents Council objectives for a specified period (3-5 yrs), the principle activities to achieve the objectives, the means by which that will be carried out, estimated income and expenditure, measures to assess performance and how rating policy relates to the Council's objectives and activities.

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

Useful life
Either:
(a) the period over which an asset is expected to be available for use by an entity, or
(b) the number of production or similar units expected to be obtained from the asset by the entity.

It is estimated or expected time between placing the asset into service and removing it from service, or the estimated period of time over which the future economic benefits embodied in a depreciable asset, are expected to be consumed by the council. It is the same as the economic life.

Value in Use
The present value of estimated future cash flows expected to arise from the continuing use of an asset and from its disposal at the end of its useful life. It is deemed to be depreciated replacement cost (DRC) for those assets whose future economic benefits are not primarily dependent on the asset's ability to generate new cash flows, where if deprived of the asset its future economic benefits would be replaced.

Source: DVC 2006, Glossary
Note: Items shown * modified to use DA instead of CRC
Additional glossary items shown **

1. EXECUTIVE SUMMARY

What Council Provides

Council provides a bridge and culvert network to enable all weather access to the Councils road network. Some bridges are maintained in partnership with the NSW Roads and Maritime Services and are not covered in this plan. Pedestrian bridges are also not covered by this plan.

Bridge type	Number of structures
Concrete bridge	**42**
Timber bridge	**13**
Stone bridge	**12**
Steel bridge	**1**
Major culvert	**70**
Minor Culverts	**29**
Causeways	**44**
Pedestrian Bridges	**18**
TOTAL	**229**

What does it Cost?

There are two key indicators of cost to provide the bridge and culvert service.

- The life cycle cost being the average cost over the life cycle of the asset, and
- The total maintenance and capital renewal expenditure required to deliver existing service levels in the next 10 years covered by Council's long term financial plan

The life cycle cost to provide the bridge and culvert service is estimated at **$669,856** per annum. Council's planned life cycle expenditure for year 1 of the asset management plan is **$1,581,100** which gives a life cycle sustainability index of **2.36** resulting in a funding difference of $911,244 for year 1

The total maintenance and capital renewal expenditure required to provide the bridge and culvert service in the next 10 years is estimated at **$9.938 million**. This is an average of **$993,773** per annum.

Council's maintenance and capital renewal expenditure for year 1 of the asset management plan of **$1,581,100** giving a 10 year sustainability index of **1.78,** resulting in a funding difference of $587,327 for year 1

Whilst the budgets shown above appear to be adequate, they do not reflect the backlog of assets that are overdue. For the year 2019/20, there are eight timber bridges overdue for replacement. To replace like for like would equate to a replacement value of **$3.4 million**, however the cost to replace with a modern equivalent is **$11.4 million**. This gives a backlog of $9.8 million for 2019/20.

Plans for the Future

Council plans to operate and maintain the bridge and culvert network to achieve the following strategic objectives.

1. Ensure the bridge and network is maintained at a safe and functional standard as set out in this asset management plan.
2. Systematic replacement of maintenance intensive timber bridges with concrete bridges or culverts

Measuring our Performance

Quality

Bridge and culvert assets will be maintained in a reasonably usable condition. Defects found or reported that are outside our service standard will be repaired.

Function

Our intent is that an appropriate bridge and culvert network is maintained in partnership with other levels of government and stakeholders to ensure all weather access to Council's road network.

Bridge and culvert asset attributes will be maintained at a safe level and associated signage and equipment be provided as needed to ensure public safety. We need to ensure key functional objectives are met:

- Bridges remain open for the maximum time practical during flooding events
- Bridges are not load limited to allow passage of all traffic
- Future bridges are constructed to accommodate modern truck movements in geometric design and weight capacity

Safety

We inspect all bridges and major culverts for structural integrity on a four-year cycle. Repairs to defects are prioritised in accordance with our inspection schedule to ensure they are safe.

The Next Steps

The actions resulting from this asset management plan are:

- Maintain a longitudinal database on bridge conditions
- Improve the collection of physical data pertinent to the maintenance of the bridge network
- Improve financial data collection

2. INTRODUCTION

2.1 Background

This asset management plan is to demonstrate responsive management of assets (and services provided from assets), compliance with regulatory requirements, and to communicate the funding needed to provide the required levels of service.

The asset management plan is to be read with the following associated planning documents:

- Bathurst Regional Council 2009 *Asset Management Policy PL-F002*
- Australian Standard, 2004, *Bridge Design* Standards Australia International, Sydney

This asset management plan covers the following infrastructure assets:

The New South Wales Division of Local Government has determined that a bridge is any structure with a deck length of six metres or longer. This asset management plan will cover these bridges as well as some culverts of lesser length but still considered to be of significant value. The plan also covers causeways but does not include pedestrian bridges.

It is important to note that the values shown in the "Replacement Value" column are the values to replace a bridge of similar materials and of similar dimensions (i.e. like for like). To replace many of these bridges would incur a significantly greater investment to build to modern standards and with modern materials. In the case of a single lane timber bridge, Council would build a modern two lane bridge constructed with reinforced concrete.

Table 2.1 Bridge and culvert assets covered by this plan

Asset category	Number	Length (m)	Replacement Value	Modern Equivalent Value
Concrete bridges	42*	1219	$53,224,399	$53,224,399
Steel bridges	1	5	$183,709	$271,440
Timber bridges	13*	230	$7,472,173	$13,058,026
Stone bridges	12	102	$4,623,944	$7,251,960
Major culverts > 6m	70	1321	$17,751,966	$18,651,008
Minor culverts < 6m	29	561	$4,726,934	$4,963,280
Causeways	44	937	$1,824,108	$11,750,000
Pedestrian Bridges	18	820	$8,740,913	$8,740,913
TOTAL	**229**	**4595**	**$98,548,146**	**$117,911,026**

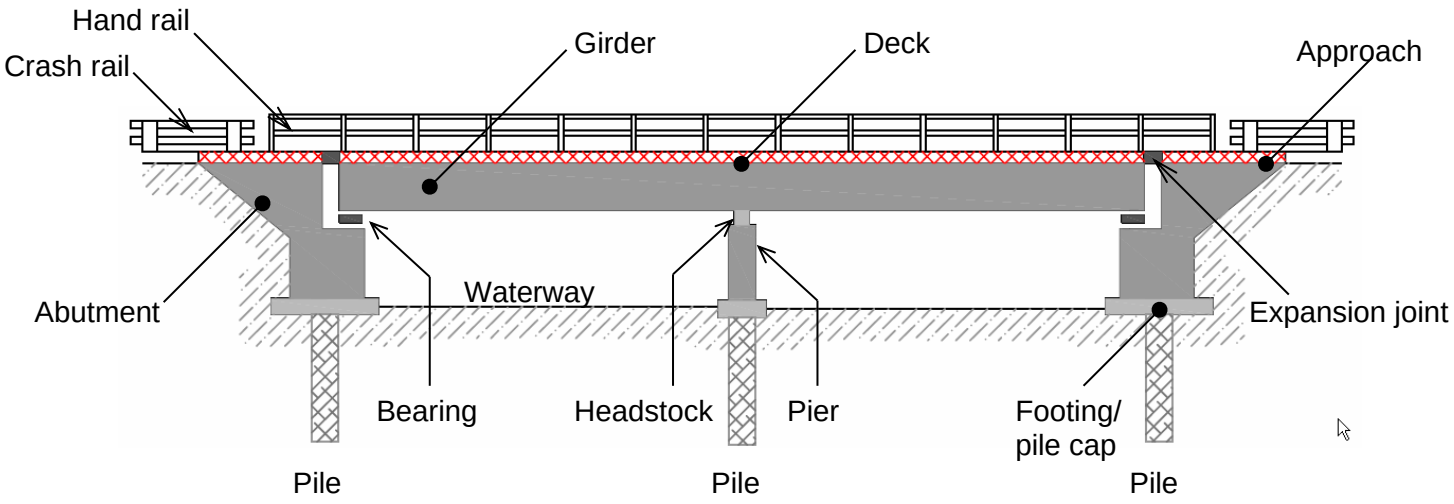
* At the time of preparing this AMP, Council was in the process of replacing the timber bridge at 1557 Bridle Track (Howards Bridge) with a concrete bridge. This will reduce the timber bridges to 12 and increase the concrete to 43.

The **Modern Equivalent** column in the above table indicates the cost to reconstruct existing narrow bridges and culverts to meet modern standards.

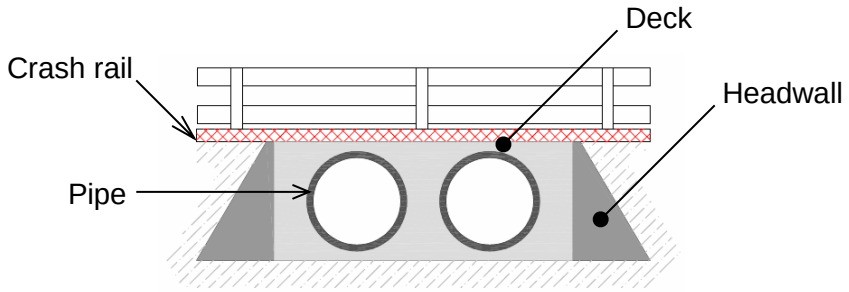
In the case of **Causeways**, an assumed average value of $250,000 per causeway would be spent to construct a modern bridge or box culver structure.

This asset management plan covers the following parts of bridges

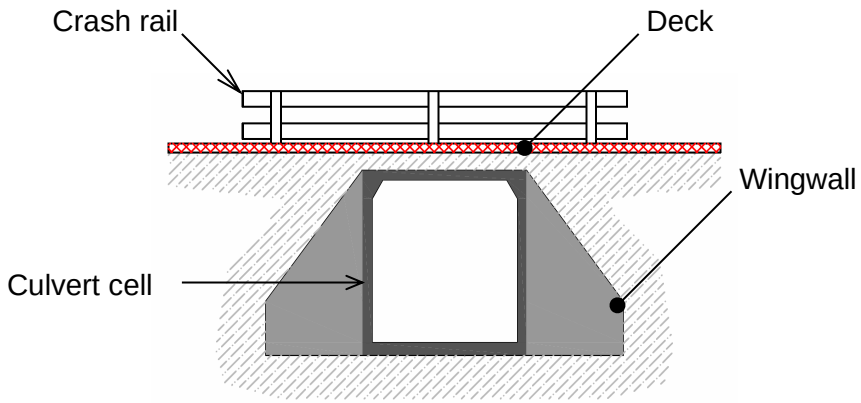
Bridge



Culvert



Box Culvert



Key stakeholders in the preparation and implementation of this asset management plan are:

The Councillors	Formulate policy for the allocation of resources to maximise benefit to the community whilst minimising the Council's exposure to risk.
The Council	To manage the implementation of policy in a timely and cost-effective manner. To ensure resources are effectively utilised
Roads & Maritime Services	Responsibility for all bridges on State owned roads and the funding of Regional roads.
General Public	End user of the bridge network
Local Businesses	Allows access to local business
Freight transport companies	Require access to designated heavy traffic routes that are constructed to standards relevant to heavy vehicles
Farmers and land holders	Rely on network of bridges and culverts to provide all weather access to properties.

2.2 Goals and Objectives of Asset Management

The Council exists to provide services to the community. Some of these services are provided by infrastructure assets. Council has acquired infrastructure assets by 'purchase', by contract, construction by council staff and by donation of assets constructed by developers and others to meet increased levels of service.

Council's goal in managing infrastructure assets is to meet the required level of service in the most cost-effective manner for present and future consumers. The key elements of infrastructure asset management are:

- Taking a life cycle approach,
- Developing cost-effective management strategies for the long term,
- Providing a defined level of service and monitoring performance,
- Understanding and meeting the demands of growth through demand management and infrastructure investment,
- Managing risks associated with asset failures,
- Sustainable use of physical resources,
- Continuous improvement in asset management practices.

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

Council's vision:

"Bathurst: A vibrant and innovative region that values our heritage, culture, diversity and strong economy."

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

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

Goal	Objective	How Goal and Objectives are addressed in IAMP
To enhance lifestyle, **optimise health and safety**	Maintain and improve existing bridge infrastructure throughout the network	The Council carries out regular inspections of all bridges and major culverts to ensure their safety and amenity. Further to this a comprehensive programme of replacing timber bridges is in place
To create a progressive economic environment that facilitates job creation and is responsive to changing demands	CSP Strategy 4.2 Provide safe and efficient road and bridge networks to improve accessibility	Existing bridges will be maintained, and any new bridges constructed to the Australian Standard 5100 ensuring load limits are adequate for the areas the bridge/culvert services
Adequate infrastructure for projected population 80,000 by 2050	CSP Strategy 4.3 Ensure services, facilities and infrastructure meet the changing needs of our region	The construction of new road assets to adequately serve the expected rise in population and changing needs of the freight industry. This includes any upgrading of existing roads and any bridges thereon required to meet the expected growth

425 Rivulet Road, Peel built 2017

2.3 Plan Framework

Key elements of the plan are:

- Levels of service – specifies the services and levels of service to be provided by council.
- Future demand – how this will impact on future service delivery and how this is to be met.
- Life cycle management – how Council will manage its existing and future assets to provide the required services
- Financial summary – what funds are required to provide the required services.
- Asset management practices
- Monitoring – how the plan will be monitored to ensure it is meeting Council's objectives.
- Asset management improvement plan

2.4 Core and Advanced Asset Management

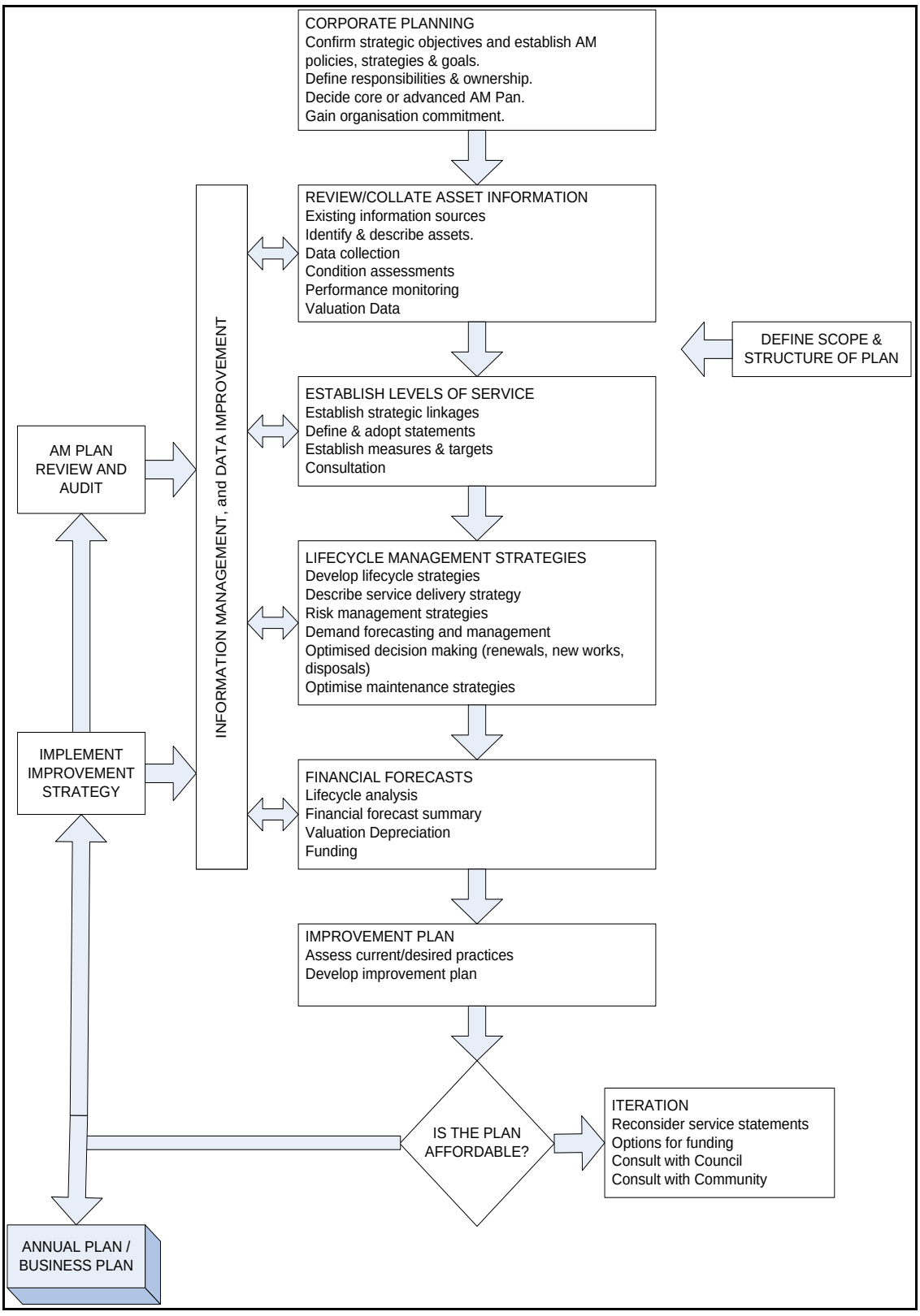
This asset management plan is prepared as a 'core' asset management plan in accordance with the International Infrastructure Management Manual. It is prepared to meet minimum legislative and organisational requirements for sustainable service delivery and long-term financial planning and reporting. Core asset management is a 'top down' approach where analysis is applied at the 'system' or 'network' level.

Future revisions of this asset management plan will move towards 'advanced' asset management using a 'bottom up' approach for gathering asset information for individual assets to support the optimisation of activities and programs to meet agreed service levels.

"Wallaby Rocks Bridge" 458 Hill End Rd

Road Map for preparing an Asset Management Plan

Source: IIMM Fig 1.5.1, p 1.11



3. LEVELS OF SERVICE

3.1 Customer Research and Expectations

In general, bridges can be regarded as an integral part of the road network and, as such, the community survey results pertinent to the road network will be relevant to the community expectations of bridges and culverts. The public often do not observe a bridge or culvert unless something is wrong with that asset or during periods of flooding.

Through the Customer Request Management system council can receive requests and complaints concerning specific bridges and culverts from network users in order to assess problem areas. Council can also gain an insight into the expectations of the bridge network users. Periodic collation of complaints and requests will allow Council to better assess customer expectations and take these into consideration when undertaking forward programming for upgrade and replacement.

Overall the levels of service experienced from the customer's point of view can be classified into three broad categories -

1. Traffic capacity (function). This considers the load limit of the bridge and its width in relation to the road (single or dual lane and any speed limits applied to the bridge. These relate to day to day operation of the bridge.

2. Quality of ride. The perceived smoothness of the bridge and the transition to the bridge.

3. Flood resistance. This is a measure of the severity of a flooding event that the bridge can reasonably be expected to remain usable, and the flood event that the bridge can reasonably be expected to maintain its structural integrity.

The specific level of service offered by each bridge and culvert in the area is a function of the road the bridge is located on and the land usage and population on either side of the bridge.

3.2 Legislative Requirements

Council has to meet many legislative requirements including Federal and State legislation and State regulations. These include:

Table 3.2. Legislative, Strategic and Policy Requirements

Legislation, strategies and policies	Requirement
Local Government Act 1993	Sets out role, purpose, responsibilities and powers of local governments including the preparation of a long-term financial plan supported by asset management plans for sustainable service delivery. Details Council's role as custodian and trustee of public assets, and its associated responsibility to effectively account for and manage these assets.
NSW Roads Act 1993	To confer certain functions (in particular, the function of carrying out road work) on Council and other roads authorities and to regulate the carrying out of various activities on Council.
Environmental Planning and Assessment Act 1979	The proper management, development and conservation of natural resources, including agricultural land, natural areas, forests, minerals, water, the city, towns and villages for the purpose of promoting the social and economic welfare of the community and a better environment.
Fisheries Management Act 1994	To ensure fish habitats are not destroyed when working within a stream for the construction and maintenance of bridges and culverts.
Protection of the Environment Operations Act 1997	To protect, restore and enhance the quality of the environment having regard to the need to maintain ecologically sustainable development.

RMS Standards	Provides industry standards for road design – includes bridge approaches
Australian Standards AS5100 - 2017	Provides a minimum design standard
Work Health & Safety Act 2011	To secure and promote the health, safety and welfare of people at work.
Bathurst Regional Council Policies	• Bathurst City Traffic Model • Bathurst Regional Council Urban Strategy 2007 • Bathurst 2036 Housing Strategy • Bathurst Regional Council Bridge Conservation Plan 2010
Civil Liabilities Act 2002	Sets out the provisions that give protection from civil liability and the responsibilities of Council and public alike.

3.3 Current Levels of Service

Council has defined service levels in two terms.

Community Levels of Service - relate to how the community receives the service in terms of safety, quality, quantity, function, condition, reliability, responsiveness, cost/efficiency and legislative compliance.

Technical Levels of Service - Supporting the community service levels are operational or technical measures of performance developed to ensure that the minimum community levels of service are met. These technical measures relate to service criteria such as:

Service Criteria	Technical measures may relate to
Quality	The smoothness, speed rating, load rating etc.
Quantity	The total number of bridges in the network
Availability	The time bridge is unavailable for use from flood or maintenance
Safety	Number of injury accidents

Table 3.3. Current Service Levels

Key Performance Measure	Level of Service	Performance Measure Process	Performance Target	Current Performance
COMMUNITY LEVELS OF SERVICE				
Quality	Perceived smoothness of bridge transition and bridge	Number of complaints relating bridge ride quality	< 10 p.a.	0
Function	Bridge or culvert is available to traffic during flood events	Number of hours or days per year bridge is unusable due to flooding	Distributor road < 1 day Collector Road < 3 days Local Road < 5 days	0
Safety	Bridge is safe	The bridge presents no defects that may compromise the safety the users	Nil structural defects	0
TECHNICAL LEVELS OF SERVICE				
Condition	Quality of ride	Bridge condition rating for approaches and deck	Average <= 3.0	2.75
Condition Function	Overall condition	Bridge condition rating	Average <= 3.0	2.5
	Exceedance	Number of hours or days per year bridge is unusable due to flooding	Distributor road < 1 day Collector Road < 3 days Local Road < 5 days	0
Function Cost Effectiveness	Load limit	Load limit	No load limited bridges	0
Cost Effectiveness	Maintenance of bridges is within budget	Bridge maintenance is carried out within allocated budget	Expenditure within ±10% of budget	$0

4. FUTURE DEMAND

4.1 Demand Forecast

Factors affecting demand include population change, changes in demographics, seasonal factors, vehicle ownership, consumer preferences and expectations, economic factors, agricultural practices, environmental awareness, technological changes in transport (e.g. semi-trailers being replaced by heavier and longer trucks, B Doubles, etc).

Table 4.1. Demand Factors, Projections and Impact on Services

Demand factor	Present position	Projection	Impact on services
Population	44,182 (2019 forecast)	53,361 (2036)	Increased population means increased infrastructure and increased stress on existing infrastructure.
Households with 2 or more cars	8,257 (2016 census)	11,789 (2036)	The extra vehicle movements will accelerate the deterioration of bridge and culvert structures

4.2 Changes in Technology

Table 4.2. Changes in Technology and Forecast effect on Service Delivery

Technology Change	Effect on Service Delivery
Advances in bridge construction techniques including pre-cast concrete spans.	Time for construction is reduced Cost of construction is reduced
Advances in bridge assessment techniques	Bridges can be accurately and quickly assessed for structural defects – especially timber bridges

4.3 Demand Management Plan

Demand for new services can be managed through a combination of managing existing assets, upgrading of existing assets and providing new assets to meet demand and demand management. Demand management practices include non-asset solutions, insuring against risks and managing failures.

Table 4.3. Demand Management Plan Summary

Service Activity	Demand Management Plan
Heavy vehicle movements.	Where a bridge is deemed to be structurally inadequate for unlimited load capacity a load limit will be placed on it preventing possible structural failure. Alternative routes can be identified in the event of a load limit being placed on a bridge or culvert
General traffic movement	Reducing speed limits on bridges and/or bridge approaches to minimise the stress placed on a bridge. This may increase the life span of the bridge by a significant amount.
Providing an alternative route	Signs posted warning of a bridge or culvert load limit with direction to take an alternative route. Ensure the alternative route is clearly explained or marked.
Crossing flooded causeways	Providing depth markers to indicate the depth of flood waters across the deck. This provides the user with the knowledge required to assess the risk of crossing

4.4 New Assets from Growth

New bridges and major culverts are not constructed in proportion to the growth in population of the Bathurst area. Future growth patterns and the areas earmarked for development are not expected to require any major bridges or culverts in the foreseeable future.

5. LIFECYCLE MANAGEMENT PLAN

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

5.1 Background Data

5.1.1 Physical parameters

The assets covered by this asset management plan are shown below.

Bridge type	Number of structures
Concrete bridge	43
Timber bridge	13
Steel	1
Stone bridge	12
Major culverts	67
Minor culverts	25
Causeways	44

The bridge and culvert assets can be characterised as:

Concrete bridge –

- Generally dual lane
- Reinforced concrete super and sub structure
- Kerbing
- Guard rails
- Abutments and wing walls
- Separation line markings
- Designed to AS5100 *Bridge design* – designed for modern traffic loads
- Maintenance costs are low
- 100 year design life

Timber bridge –

- May be single or dual lane
- Timber super and sub structure
- timber kerbing
- Width markers may be required
- timber decking – may be overlayed with concrete
- guardrail may or may not be present
- Generally designed for road task of the early 20th Century – sometimes historical structures
- Not designed for modern heavy traffic
- Constructed of hardwood timbers – now difficult to obtain.
- Require constant maintenance
- Maintenance costs are medium to high
- 70 year design life

Stone bridge –

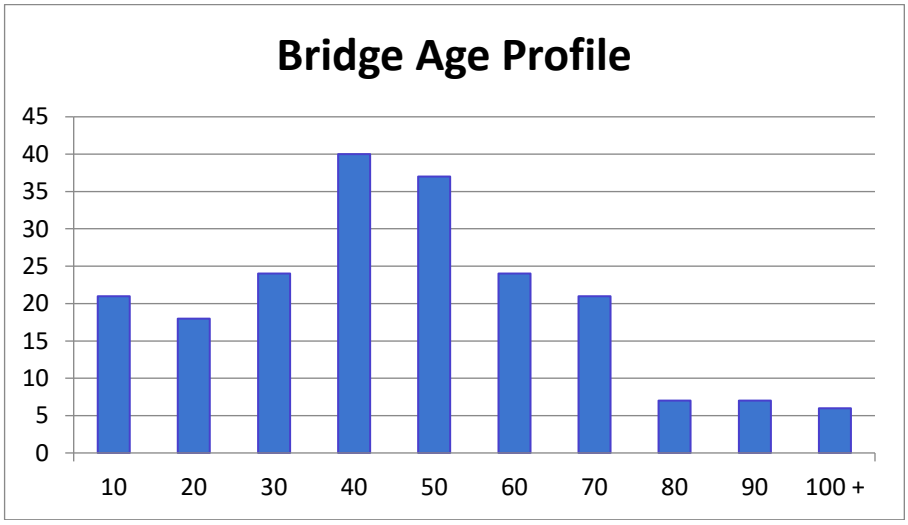
- May be single or dual lane
- Stone super and sub structure
- Width markers may be required
- Deck may be buckle plate or earthen
- Solid stone guard rails
- Generally designed for road task of the early 20th century – maybe historical structure
- Not designed for modern heavy traffic
- Constructed of quarried stone – difficult to source and maintain

- Maintenance costs are medium
- 200 year design life

Major Culvert

- Wingwall or headwall at either end of the structure
- Generally constructed of reinforced concrete pipes or culvert cells
- Surface is generally compacted earth either gravel sheeted or sealed
- Guard rails are usually present
- Designed for the traffic and hydraulic task
- Maintenance costs are low
- 100 year design life

Fig 2. Asset Age Profile



The average age of bridge structures is **43** years

5.1.2 Asset capacity and performance

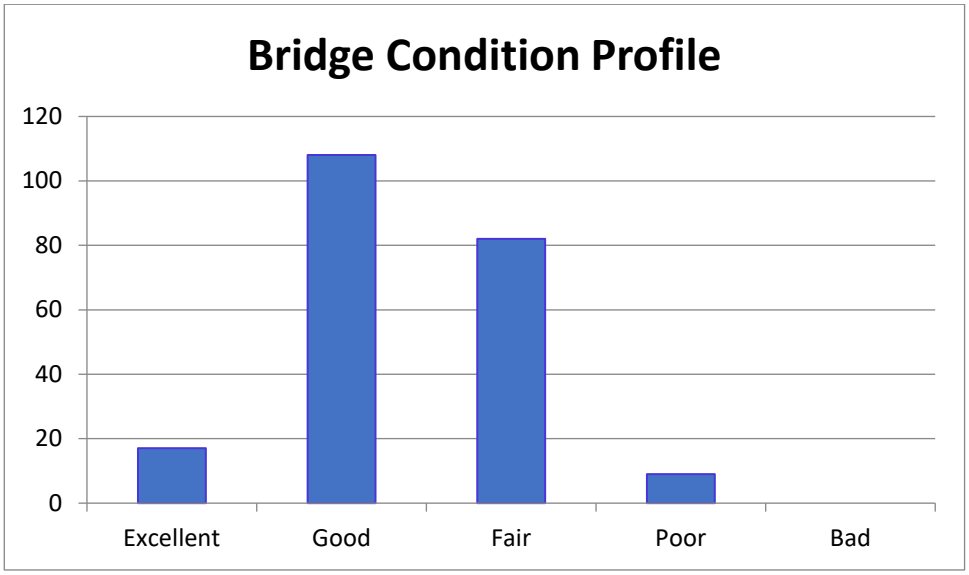
Council's services are generally provided to meet design standards where these are available. However, in some circumstances it is not possible to provide the service to the highest standard and a service deficiency results. Once identified service deficiencies can be assessed an appropriate action programme developed. This can range from no action to asset replacement.

Table 5.1.2. Known Service Performance Deficiencies

Location	Service Deficiency
3142 Turondale Rd (Coles Bridge)	Single lane timber bridge subject to flooding
1553 The Bridle Track	Single lane timber bridge subject to flooding

5.1.3 Asset condition

Fig 3. Asset Condition Profile



Of the nine bridges listed as being in poor condition, four are concrete causeways on minor rural roads which are structurally sound but are cracked and in general poor condition. There are two timber bridges that is listed as poor after a level 3 inspection revealed that some of the key members have internal rot. There is one steel bridge on Rivulet Road which has been designed for replacement but is waiting for funding. There are no bridges listed as being in "Bad" condition.

Table 5.1.3. Bridge Condition Descriptions

Rating	Description of Condition
1 – Excellent	No maintenance required
2 – Good	Only planned maintenance required
3 – Average	Significant maintenance/renewal required
4 – Poor	Significant maintenance/renewal required
5 – Bad	Over 50% of bridge requires replacement

5.1.4 Asset valuations

The value of assets as at 30th June, 2019 covered by this asset management plan is summarised below.

Table 5.1.4. Asset Valuation Breakdown

Value Description	Amount
Current Replacement Cost	**$65.240 million**
Depreciated to date	**$25.758 million**
Depreciated Replacement Cost	**$39.482 million**
Annual Depreciation Expense	**$669,856**

5.2 Risk Management Plan

An assessment of risks associated with service delivery from infrastructure assets has identified critical risks to Council. The risk assessment process identifies credible risks, the likelihood of the risk event occurring, the consequences should the event occur, develops a risk rating, evaluates the risk and develops a risk treatment plan for non-acceptable risks.

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

Table 5.2. Critical Risks and Treatment Plans

Asset at Risk	What can Happen	Risk Rating (VH, H)	Risk Treatment Plan
Bridge superstructure of substructure	Structural failure caused by flood damage resulting in collapse or partial collapse	VH	Inspection after flood event and appropriate reactive maintenance
Bridge superstructure of substructure	Structural failure caused by fatigue stress of individual components	VH	Regular inspection and programmed maintenance to ensure the functional integrity of the bridge. Placing load limits if required
Bridge deck	Collection of debris after flood event	H	Bridges are cleared of debris as soon as possible after flooding
Crash barrier, approach rails or bridge barrier	Damage from accident or flood event resulting in loss of function	H	Inspection after any accident or flood event and appropriate reactive maintenance
Timber bridge deck	Deterioration of deck planks to point where load capacity of bridge is compromised	H	Regular inspections and replacement of deck planks

5.3 Routine Maintenance Plan

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

5.3.1 Maintenance plan

Maintenance includes reactive, planned and cyclic maintenance work activities.

Reactive maintenance is unplanned repair work carried out in response to customer service requests and management/supervisory directions. Reactive bridge and culvert maintenance consists primarily of:

- Replacement of decayed deck planks on timber bridges
- Tightening of loose decking bolts
- Replacement of damaged or missing warning and regulatory signs.
- Removal of any obstructions and debris after flood events

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

- Regular inspections of bridge network for overall condition and defects
- Replacing bridge joint sealant to prevent water ingress through bridge deck.
- Casting concrete over timber decked bridges

- Painting handrails and posts where necessary
- Resurfacing of sealed bridges
- Repair of kerb and guttering, clearing of scuppers
- Repair or replacement of signs other than warning and regulatory signs
- Regular tightening of deck bolts on timber bridges
- Replacing bearing pads
- Levelling approaches

Cyclic maintenance is repetitive maintenance performed without specific programming. There is no cyclic maintenance performed on the bridge network.

Table 5.3.1. Actual Maintenance Expenditure for the past 3 years

Year	Rural Bridge Maint	Urban Bridge Maint	Unsealed Bridge Maint	Yearly Total
2016/17	$49,749.96	$1,469.36	$1,580.96	$52,800.28
2017/18	$91,102.39	$2,923.30	$8,241.36	$102,267.05
2018/19	$36,551.10	$0.00	$9,944.75	$46,495.85
Total	$177,403.45	$4,392.66	$19,767.07	

The high maintenance recorded in the Rural Bridge Maintenance for the year 2017/18 was due to $30,500 of purchased timbers for the re-decking of timber bridges. Maintenance expenditure levels are adequate to meet required service levels.

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

5.3.2 Standards and specifications

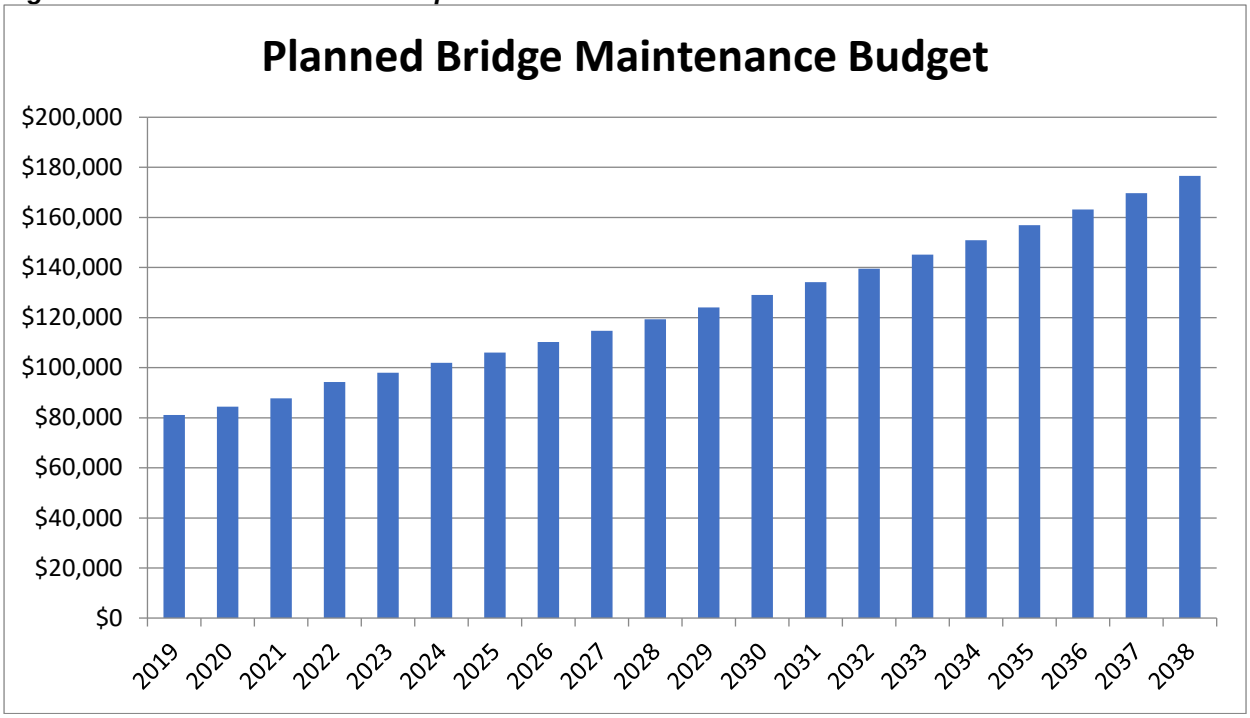
Maintenance work is carried out in accordance with the following Standards and Specifications.

- Australian Standard AS5100, 2004, *Bridge Design*
- Bathurst Regional Council 2004, *Guidelines for engineering works*

5.3.3 Summary of future maintenance expenditures

Future maintenance expenditure is forecast to trend in line with the value of the asset stock as shown in Fig 4.

Figure 4: Planned maintenance expenditure



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

Maintenance is funded from Council's operating budget and grants where available. This is further discussed in Section 6.2.

5.4 Renewal/Replacement Plan

Renewal expenditure is major work which does not increase the bridge's design capacity but restores, rehabilitates, replaces or renews an existing bridge to its original service potential. Work over and above restoring an asset to original service potential is upgrade/expansion or new works expenditure. The nature of bridge replacement is such that renewal often results in an upgrade of function, rather than a straight replacement. This is the result of complete bridge replacement process that may include:

- Redesign and reconstruction of bridge approaches.
- Reassessment of bridge exceedance levels.
- Improved load bearing capacity.
- New construction techniques that provide a longer serviceable life than previously available construction techniques.

***Table 5.4.1. B*ridge Design Evolution**

Year	Vehicle	Total Mass
Pre 1945	Steam Rollers, Crusher Trains and Standard Trucks	Around 10 - 30 tonnes
1946 - 1976	MS18 (H20-S16-44)	32 tonnes
1976 - 2004	T44	44 tonnes
2004 - Current	SM1600	160 tonnes

Table 5.4.1 shows the evolution of bridge design over the years to meet the changing need of the transport industry. For example, an older bridge that was not designed to take the number, speed and weight of modern traffic may have a load limit and speed limit placed on it to ensure its structural integrity. When replaced, the new bridge will be constructed to the Australian Standard AS5100.

The design standard addresses the road geometry, traffic volumes and composition, terrain, climactic conditions and the bridge locality. This will generally result in the new bridge being superior in its load carry capacity and speed limit, thus technically being an upgrade.

The aim of renewal is not usually to upgrade the service but to maintain the service, even if an upgraded service is the end result.

Renewal will be undertaken using 'low-cost' renewal methods where practical. The aim of 'low-cost' renewals is to restore the service potential or future economic benefits of the asset by renewing the assets at a cost less than replacement cost. Examples of low-cost renewal include pre-cast concrete girder bridges and pre-cast box culvert designs.

Bathurst Council has implemented a strategy to systematically replace timber bridges, budget permitting, with culverts where appropriate and concrete bridges where culverts are not suitable. The resulting effect on the asset management plan is the appearance of over funding the replacement of bridges (see Table.5.4.2. With the superior expected life of concrete bridges and box culverts and the number of timber bridges that are in the final 20% of their expected life the programme will reduce onerous maintenance expenses. Further to the issue of cost is the availability of suitable material to repair timber bridges. It is becoming increasingly difficult to obtain the large hardwood beams and planks necessary to repair timber bridges.

Table 5.4.2 Bridge Replacement Due Dates

Bridge	Due for replacement
667 Ophir Road Dunkeld*	19/10/2019
2305 Tarana Road Tarana	1/01/2020
139 Tarana Road Brewongle	2/01/2020
2000 Tarana Road Gemalla #	14/03/2020
1553 Bridle Track Duramana+	14/03/2020
5 East Street Rockley	2/01/2021
24 Porters Lane Yetholme	2/01/2021
3142 Turondale Road Duramana	2/01/2021
2721 Bridle Track Bruinbun	18/06/2022
2673 Limekilns Road Limekilns	1/01/2025
180 Elmswood Road Caloola	1/01/2026
8 Brewongle School Road, Brewongle	1/01/2030
261 Upper Turon Road Sofala	2/01/2035

* Council has received funding of $650,000 under the Fixing Country Roads Programme for 667 Ophir Road Bridge. Council will match this funding with an equivalent amount bringing the total project cost to $1,300,000.

+ Council has received $1,294,365 from the Commonwealth Government for Natural Disaster Relief Funding in response to Howards Bridge being washed away in a flood event on the 11 January 2019. Council will also contribute $29,000 to this project bring the total to $1,323,365. The new bridge is estimated for completion by the end of 2020.

There are 7 bridges due for replacement by June 2022. A further funding application is pending in round 5 of the Timber Bridge Replacement Programme, however, each application is on a 50/50 basis and requires Council to contribute 50% of the project costs. This therefore limits Council to only one application per year. Council cannot achieve the required replacement in the time frames above. This will result in more money being required for maintenance to keep the bridges in a safe and satisfactory condition until funds can be allocated for replacement.

5.4.1 Selection criteria

Replacement, upgrade or expansion of existing bridges and culverts are identified from various sources such as the knowledge base of council employees, bridge inspections, community requests, proposals identified by strategic plans or partnerships with other organisations. Candidate proposals are inspected by council engineers to verify need and to develop a preliminary renewal estimate. Verified proposals are

ranked by priority and available funds and scheduled in future works programmes. The priority ranking criteria is detailed below.

Table 5.4.3 New Assets Priority Ranking Criteria

Criteria	Weighting
Condition	40%
Bridge material (timber, steel, concrete)	30%
AADT	20%
Geometry of approaches	5%
Bridge width	5%

5.4.2 Renewal standards

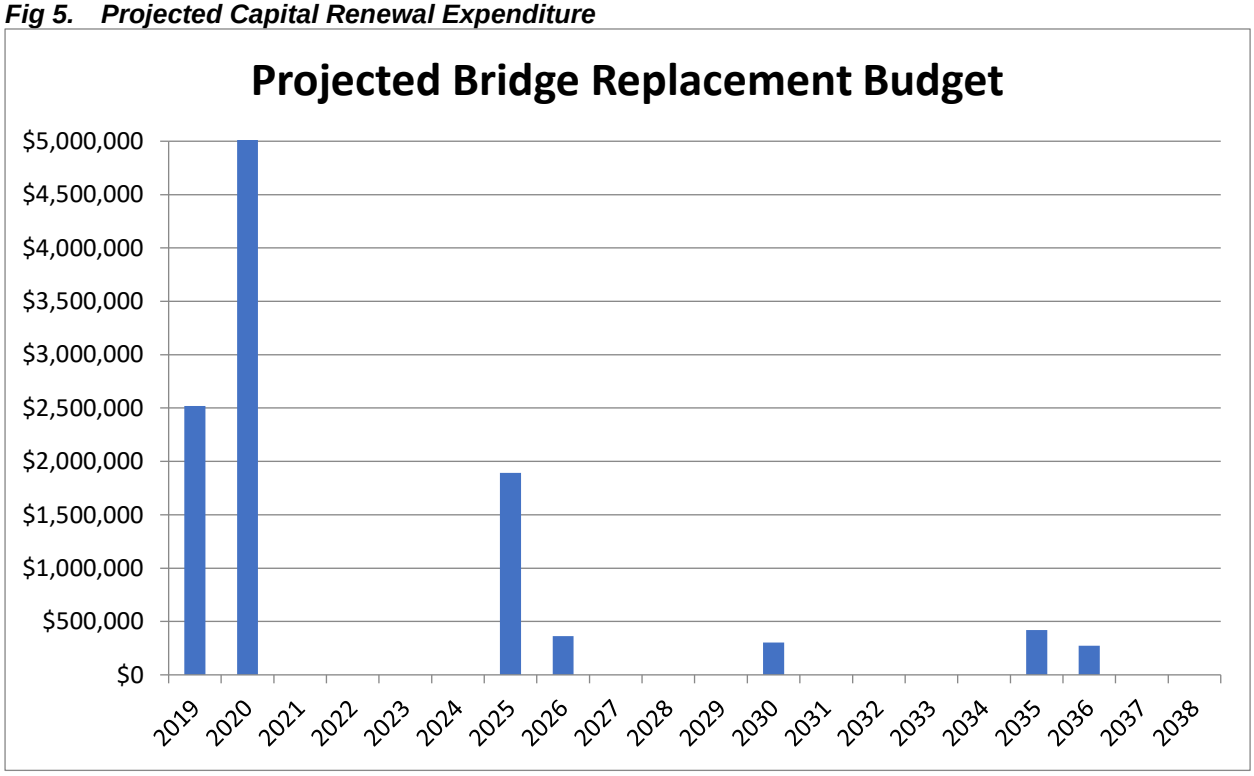
Renewal work is carried out in accordance with the following Standards and Specifications.

- Standards Australia 2004, *AS5100 Bridge Design* Standards Australia, Sydney.
- Bathurst Regional Council 2004, *Guidelines for engineering works* Bathurst Regional Council Engineering Department, Bathurst.

5.4.3 Summary of future renewal expenditure

Projected future renewal expenditures are forecast to increase over time as the asset stock ages. The costs are summarised in Fig 5. Note that all costs are shown in current 2019/20 dollar values.

Fig 5. Projected Capital Renewal Expenditure



5.5 Disposal Plan

Disposal includes any activity associated with disposal of a decommissioned asset including sale, demolition or relocation. From time to time a bridge will be replaced necessitating the disposal of the existing bridge. Assets identified for possible decommissioning and disposal, and recent disposals are shown in table 5.5.1.

Table 5.5.1 Assets identified for Disposal

Asset	Reason for Disposal	Due for Replacement
139 Tarana Road Brewongle	Timber bridge is being replaced with a concrete structure	2019
667 Ophir Rd, Dunkeld	Timer bridge is to be replaced with a concrete structure	2019
5 East St, Rockley	Timber bridge is being replaced with a concrete structure	2020
24 Porters Ln, Yetholme	Timber bridge is being replaced with a concrete structure	2020
3142 Turondale Rd, Turondale	Timber bridge is being replaced with a concrete structure	2020
2000 Tarana Rd, Gemalla	Timber bridge is being replaced with a concrete structure	2020
1553 Bridle Track, Duramana	Timber bridge is being replaced with a concrete structure	2020
2721 Bridle Track, Bruinbun	Timber bridge is being replaced with a concrete structure	2020
2673 Limekilns Rd, Limekilns	Timber bridge is being replaced with a concrete structure	2025
2305 Tarana Rd, Tarana	Timber bridge is being replaced with a concrete structure	2025
180 Elmswood Rd, Caloola	Timber bridge is being replaced with a concrete structure	2026
8 Brewongle School Rd, Brewongle	Timber bridge is being replaced with a concrete structure	2030

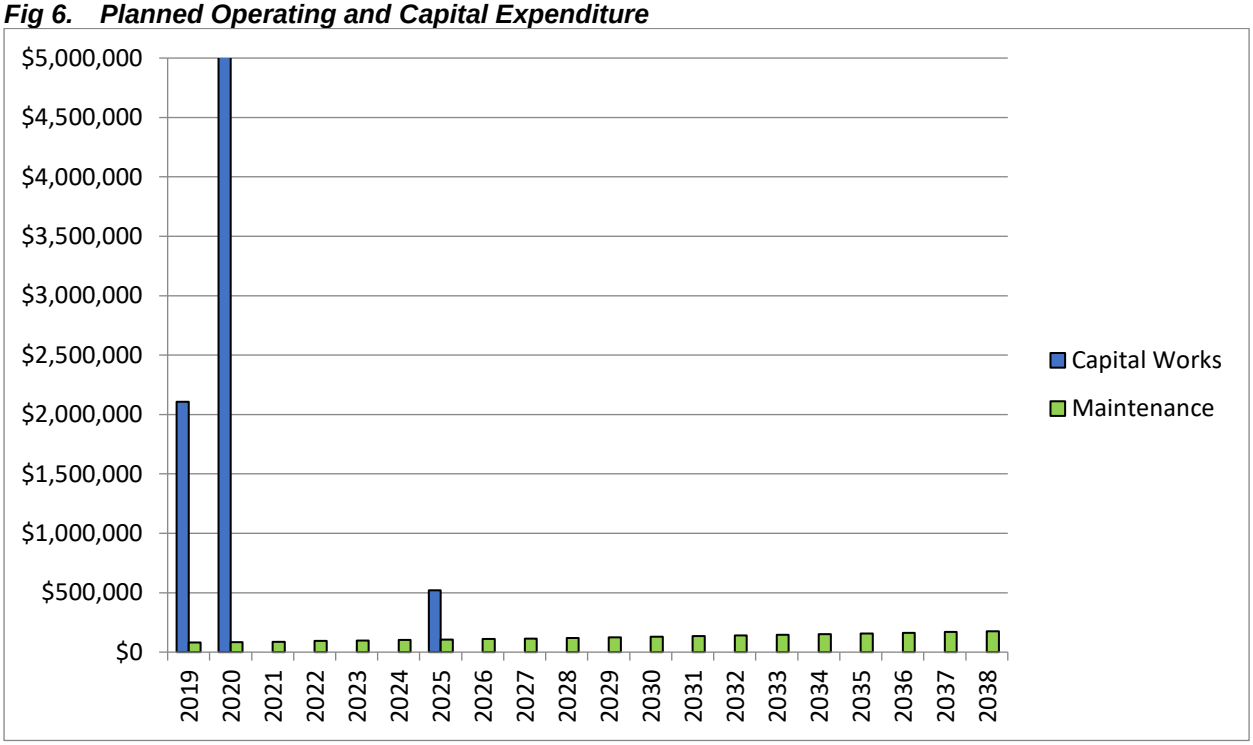
6. FINANCIAL SUMMARY

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

6.1 Financial Statements and Projections

The financial projections are shown in Fig 6 for planned operating (operations and maintenance) and capital expenditure (renewal and upgrade/expansion/new assets).

Fig 6. Planned Operating and Capital Expenditure



6.1.1 Sustainability of service delivery

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

Due to the discrete nature of bridge and culvert assets the long term and medium-term indices are substantially altered by the addition of a single asset into the planning period.

Long term - Life Cycle Cost
Life cycle costs (or whole of life costs) are the average costs that are required to sustain the service levels over the longest asset life. Life cycle costs include maintenance and asset consumption (depreciation expense). The annual average life cycle cost for the services covered in this asset management plan is **$669,856**.

Life cycle costs can be compared to life cycle expenditure to give an indicator of sustainability in service provision. Life cycle expenditure includes maintenance plus capital renewal expenditure. Life cycle expenditure will vary depending on the timing of asset renewals. The life cycle expenditure at the start of the plan is **$1,581,100.** This number is boosted by a one-off grant from the government of $1.5 million to replace Howards Bridge which was washed away in a flood on 11 January 2019.

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

The life cycle gap for services covered by this asset management plan is **-$911,244** per annum. The life cycle sustainability index is **2.36.** Without the funding grant from the government, the life cycle gap is **$588,756** per annum and the sustainability index is **2.68.**

Medium term – 10-year financial planning period
This asset management plan identifies the estimated maintenance and capital expenditures required to provide an appropriate level of service to the community over a 20-year period for input into a 10 year financial plan and funding plan to provide the service in a sustainable manner.

This may be compared to existing or planned expenditures in the 20-year period to identify any gap. In a core asset management plan, a gap is generally due to increasing asset renewals. Providing services in a sustainable manner will require matching of projected asset renewals to meet agreed service levels with planned capital works programs and available revenue.

Council's long-term financial plan covers the first 10 years of the 20-year planning period. The total maintenance and capital renewal expenditure required over the 10 years is **$9.938 million.**

This is an average expenditure of **$993,800 p.a.** Estimated maintenance and capital renewal expenditure in year 1 is **$1,581,100.** The 10-year sustainability index is **0.63.**

6.2 Funding Strategy

Projected expenditure identified in Section 6.1 is to be funded from Council's operating and capital budgets. The funding strategy is detailed in the Council's 10-year, long term financial plan.

The current funding strategies for maintenance and renewal of the bridge and culvert network are adequate in the mid-term. The mid-term funding includes the replacement of timber bridges. Due to the reduced costs involved maintaining a modern concrete bridge, the end result of the timber bridge replacement programme should be an overall reduction in the maintenance budget required to keep the bridges in a condition corresponding to the level of service. Further to this the increased lifespan of a concrete bridge will have the effect of slowing the rate of depreciation of the network as a whole.

Life cycle funding is also adequate. This indicates that bridge depreciation is being funded adequately. This is dependent on the realisation of funding specified in the 10-year management plan.

The current funding strategy is comprised primarily of funding sourced from grants from the State and Federal Governments.

There are several programmes that provide ongoing funding specifically for roads and road infrastructure. The 'Roads to Recovery' initiative administered through the Department of Infrastructure, Transport, Cities and Regional Development provides funding for local roads maintenance and upgrading. Under current arrangements, the council is guaranteed a share of the total available funding. Applications are made by Council for specific projects and the money is paid directly from the Australian Government to each council. The budgeted amount reported on the Department's website for 2019/20 is **$1,872,838**[1]. This amount is available for spending on the whole road network and is prioritised by the Engineering Department of Council and is thus not specifically for bridge infrastructure.

In the 2019/2020 financial year the Department of Infrastructure, Transport, Cities and Regional Development allocated a total of **$6.466 million**[2] to Bathurst Regional Council under the Financial Assistance Grants programme. Of the total amount **$2.029 million** was allocated from the total length of local roads within Bathurst Regional Council LGA. The local roads component is assessed based on councils' proportion of the state's lengths of local roads and bridges. The formula was developed by the Transport NSW.

Other funding sources available are;

- Fixing Country Roads. This is a $543 million NSW Government program providing targeted infrastructure funding from Restart NSW for regional freight projects. Local councils can apply to repair and upgrade local and regional roads to facilitate the movement of freight, to key freight hubs and state roads.
- Bridge Renewal Program. The Australian Government committed $25 million per year to the Bridges Renewal Program from 2019-20. The Government will provide $640 million from the 2015-2016 financial year to the 2022-2023 financial year, with an on-going commitment of $85 million each following year to upgrade and replace bridges to enhance access for local communities and facilitate higher productivity vehicle access. Bathurst Regional Council was successful for funding under this program on a 50:50 basis to replace Howards Bridge on the Bridle Track.

Table 6.2 Financial Assistance Grant Funding for past 5 years

Financial Assistance Grant Funding					
Year	General Purpose	Roads	Total	Change	Percentage
2019/20	$4,436,951	$2,029,263	$6,466,214	$102,227	1.58%
2018/19	$4,384,987	$1,979,000	$6,363,987	$146,001	2.29%
2017/18	$4,313,984	$1,904,002	$6,217,986	$286,398	4.61%
2016/17	$4,114,049	$1,817,539	$5,931,588	-$260,931	-4.40%
2015/16	$4,329,786	$1,862,733	$6,192,519	-$85,579	-1.38%

Financial assistance is also provided to improve the physical condition or management of sites noted for a high incidence of accidents involving death and injury, often termed 'black spot'. Funding assistance is reliant on Council's ability to prove a significant reduction in accidents will be the result of the funding. The requirements of receiving this funding are quite onerous and achieving approval cannot be relied on as a stable source of funds.

6.3 Valuation Forecasts

Asset values are forecast to increase as additional assets are added to the asset stock from construction and acquisition by Council and from assets constructed by land developers and others and donated to Council.

The projected asset values are expected to remain steady as the overall bridge and culvert network rarely increases in size. Realistically this value can be expected to rise and fall by a small percentage as the

[1] https://investment.infrastructure.gov.au/files/roads_to_recovery_program/New_list_for_website_all_Councils.pdf

[2] https://www.regional.gov.au/local/assistance/fags-state-summaries-nsw-2019-20.aspx

make up of the network changes. For example, there are situations where a bridge or culvert may be bypassed if a road is realigned, such as 1792 Limekilns Road, over Dempsey's Creek. In this case a 3m wide x 1.8m high box culvert was used to cross Dempsey's Creek, while the superseded bridge was left for access purposes for adjoining properties.

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

6.4 Key Assumptions made in Financial Forecasts

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

Key assumptions made in this asset management plan are:

- Useful lives of bridges are:
    - Concrete box culverts 100 years
    - Concrete bridges 100 years
    - Steel bridges 100 years
    - Stone bridges 200 years
    - Timber bridges 70 years
    - Causeways 100 years

- Projected Maintenance and Capital Works budgets are from the 2019/23 Management Plan. The increase between each year within this budget is 1.04%. A continued annualised figure of 1.04% was used over the 20 year long term planning period to project future maintenance and capital works costs. CPI for the year 2019 is 1.9%.
- Depreciation is calculated using a straight line method

7. ASSET MANAGEMENT PRACTICES

7.1 Accounting/Financial Systems

Council currently uses Civica Authority

Administrator: IT manager

Relevant accounting standards are set out in the "Local Government Code of Accounting Practice and Financial Reporting Guidelines"

7.2 Asset Management Systems

Council uses CONFIRM asset management software. The current version is 19.00e.AM.12665

CONFIRM team:

Team leader:	Administration Engineer
Administrator:	Assets System Administrator
Data entry:	3 x Asset Technicians
Field inspections:	Asset Inspector

Confirm bridge and culvert asset register consists of:

- A comprehensive bridge and culvert inventory;
- Condition rating for the bridge and culvert network;
- Inspections carried out in the field using handheld devices;
- Data Management, with functional reporting procedure to present inventory and assessment information;
- Asset Accounting reporting capability and life cycle costing;
- Council uses MapInfo GIS system linked to CONFIRM.

A number of handheld devices using GlobalPos GPS units are used to collect data.

As a result of this plan it is intended to improve the Asset management system by:

- Linking of Confirm to Financial Software to gain more accurate costs of works
- Using the Strategic Asset Management module of Confirm
- Tailored reports for each bridge condition assessment
- Identifying any limitations of each bridge

7.3 Information Flow Requirements and Processes

The key information flows *into* this asset management plan are:

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

The key information flows *from* this asset management plan are:

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

These will impact the Long Term Financial Plan, Strategic Business Plan, annual budget and departmental business plans and budgets. The current communication between financial and asset systems is limited to manually entering the relevant data. CONFIRM has provided asset valuations and capitalisations from 2008 onwards. These figures have been supplied to the finance system for reporting purposes.

8. CONCLUSION

The Bathurst Regional Council bridge network represents a large investment over many generations that supports the current level of service supplied by road network. Provision of the bridge network is an important part of the service Council's provides to members of the public.

There are **205** bridge and major culvert assets throughout the Bathurst Regional Council road network. One new major culvert has been donated to Council on Muldoon Ave, Kelso in 2017. Since 2014, ten existing structures have been replaced.

Fig 8.1 New/Reconstructed bridges in the last 5 years

Bridge Location	Date of Construction
483 Brewongle Lane, Glanmire	01-Oct-14
Concrete culvert 900 m from Mitchell Hwy	01-Feb-16
Carrs Creek 1290 Lachlan Road, Caloola	17-Dec-14
3824 Limekilns Road, Wattle Flat	01-Dec-16
Muldoon Avenue/Great Western Highway Intersection, Kelso	15-Dec-17
Winburndale Rivulet 425 Rivulet Road, Peel	01-May-17
230 Sydney Road, Kelso	11-May-17
170 Sydney Road, Kelso	31-Mar-17
Oaky Creek Crossing 1855 Turondale Road, Duramana	09-Jun-14
Whyalla Circuit, Kelso	07-Nov-17

The current replacement cost of the bridge network is **$65.240 million.** The annual depreciation expense is **$669,856 p.a.** Assets were last revalued at June 2019. Assets are valued at greenfield rates.

The current maintenance budget is approximately **$81,100 p.a.**

Future budgets for bridge maintenance have been estimated by adding a factor for CPI at the time of budget preparation. As maintenance intensive timber bridges are replaced with concrete structures it could be reasonably expected that the required maintenance budget will decrease in the future, without decreasing the level of service the bridge network provides.

Bridges and major culverts have various useful lives based on the type and material of construction and the make up and volume of the traffic using the bridge. A modern concrete structure can be assumed to have a minimum useful life of 100 years. A timber bridge, depending on maintenance levels may have a 70-year lifespan. Although the final assessment on bridge replacement will be based on the criteria listed is table 5.4.1, asset age is the best indicator available to predict the future expenditure required to replace bridge assets that have deteriorated to a point where they are becoming no longer serviceable. To cover the cost of bridge assets at the end of their theoretical serviceable life an annual budget of **$918,000** required over the next 10 years. There are currently no bridges in the asset register beyond their useful life.

It should be noted that the replacement costs are calculated as theoretical replacement of 'like for like' assets as dictated by accounting standard AASB116. The practice of 'like for like' asset replacement rarely happens. The usual outcome of asset replacement is a modern engineering equivalent.

The information contained within the asset management plan sets a benchmark for the bridge network at the close of the 2019/2020 financial year. By continuing to collect information on the condition of the network and closely monitoring the expenditure on maintenance and renewal of the network the performance of the Council's bridge strategies can be measured, reported on and improved in the future.

9. PLAN IMPROVEMENT AND MONITORING

9.1 Performance Measures

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

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

9.2 Improvement Plan

The asset management improvement plan generated from this asset management plan is shown in Table 9.2.

Table 9.2 Improvement Plan

Task No	Task	Responsibility	Timeline
1.	Move the capital works focus for bridges and culverts to the replacement of timber bridges with concrete bridges.	Administration Engineer	Ongoing
2.	Componentise the bridges asset register to allow for more detailed and more accurate condition survey. This will allow more efficient planning and better bridge strategy for the future.	Asset Systems Administrator and Administration Engineer	June 2020

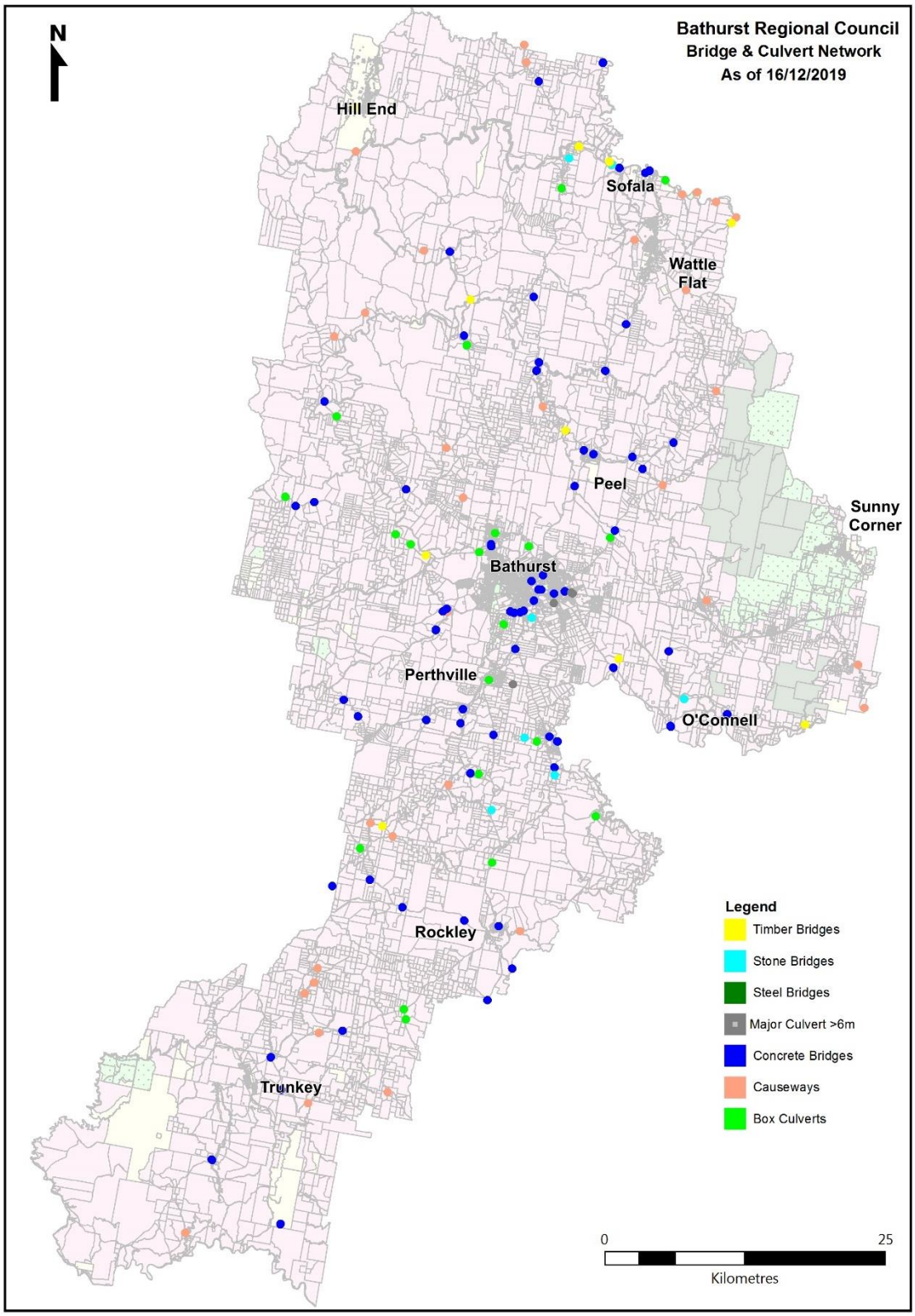
9.3 Monitoring and Review Procedures

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

This Plan has a life of 4 years and is due for revision and updating within 2 years of each Council election.

APPENDICES

Appendix A - ***Bathurst Regional Council Bridge and Culvert Network***



Appendix B – *Bathurst Regional Council major bridge and culvert register*

Address	Type	Material	Watercourse Name	Construction Date	Useful Life	Replacement Date
1017 Ophir Road, Rock Forest	Box Culvert	Concrete	Unnamed creek	1/01/1975	100	1/01/2075
1057 Curragh Road, Trunkey	Box Culvert	Concrete	Pot O Tea Creek	1/01/1989	100	1/01/2089
1074 Bridle Track, Duramana	Box Culvert	Concrete	Unnamed creek	1/01/1965	100	1/01/2065
1173 Turondale Road, Duramana	Box Culvert	Concrete	Middle Station Creek	1/01/1980	100	1/01/2080
1180 Triangle Flat Road, Triangle Flat	Box Culvert	Concrete	Unnamed creek	1/01/1980	100	1/01/2080
119 Lachlan Road, Rockley	Box Culvert	Concrete	Jumpers Flat	1/01/1990	100	1/01/2090
1190 Rockley Road, Fosters Valley	Box Culvert	Concrete	Unnamed creek	1/01/1975	100	1/01/2075
124 Hereford Street, Kelso	Box Culvert	Concrete	Raglan Creek	1/01/2002	100	1/01/2102
132 Wambool Road, O'Connell	Box Culvert	Concrete	Unnamed creek	1/01/1980	100	1/01/2080
145 Ophir Road, Stewarts Mount	Box Culvert	Concrete	Saw Pit Creek	1/01/1982	100	1/01/2082
147 Ryans Road, Lagoon	Box Culvert	Concrete	Unnamed creek	1/01/1980	100	1/01/2080
150 Upper Turon Road Road, Sofala	Box Culvert	Concrete	Little Oaky Creek	1/01/1988	100	1/01/2088
1511 Ophir Road, Rock Forest	Box Culvert	Concrete	Mooney Swamp Creek	1/01/1989	100	1/01/2089
16 White Rock Road, Kelso	Box Culvert	Concrete	Unnamed creek	1/01/1985	100	1/01/2085
1618 Freemantle Road, Watton	Box Culvert	Concrete	Spring Creek	1/01/1970	100	1/01/2070
1635 Freemantle Road, Watton	Box Culvert	Concrete	Dick Creek	1/01/1970	100	1/01/2070
1776 Triangle Flat Road, Triangle Flat	Box Culvert	Concrete	Unnamed creek	1/01/1980	100	1/01/2080
1813 Rockley Road, Fosters Valley	Box Culvert	Concrete	Fosters Valley Creek	1/01/1975	100	1/01/2075
189 Eleven Mile Drive, Eglinton	Box Culvert	Concrete	Unnamed creek	1/01/1985	100	1/01/2085
1906 Freemantle Road, Milkers Flat	Box Culvert	Concrete	Milkers Creek	1/01/1995	100	1/01/2095
1997 Turondale Road, Turondale	Box Culvert	Concrete	Dam Creek	1/01/1980	100	1/01/2080
22 Back Swamp Road, The Rocks	Box Culvert	Concrete	Back Swamp	1/01/1980	100	1/01/2080
2248 Ophir Road, Rock Forest	Box Culvert	Concrete	Sandy Swamp	1/01/1980	100	1/01/2080
2480 Freemantle Road, Killongbutta	Box Culvert	Concrete	Corbys Creek	1/01/1980	100	1/01/2080
2632 Turondale Road, Turondale	Box Culvert	Concrete	Cole Gully	1/01/1990	100	1/01/2090
280 Cow Flat Road, Cow Flat	Box Culvert	Concrete	Unnamed creek	1/01/1980	100	1/01/2080
2850 Limekilns Road, Kelso	Box Culvert	Concrete	Black Fellows Creek	1/01/1975	100	1/01/2075
320 Evans Plains Road Road, Evans Plains	Box Culvert	Concrete	Unnamed creek	1/01/1985	100	1/01/2085
343 Pymonts Lane, Peel	Box Culvert	Concrete	Bread and Butter Creek	1/01/1980	100	1/01/2080
416 Garthowen Road, Garthowen	Box Culvert	Concrete	Reedy Creek	1/01/2002	100	1/01/2102
425 Cow Flat Road, Cow Flat	Box Culvert	Concrete	Unnamed creek	1/01/1985	100	1/01/2085
450 Evans Plains Road Road, Evans Plains	Box Culvert	Concrete	Unnamed creek	1/01/1990	100	1/01/2090
475 Evans Plains Rd, Evans Plains	Box Culvert	Concrete	Spring Creek	7/09/2005	100	7/09/2105
508 Bathampton Road, Bathampton	Box Culvert	Concrete	Evans Plains Creek	1/01/1972	100	1/01/2072
55 Rockley Road, Perthville	Box Culvert	Concrete	Unnamed creek	1/01/1970	100	1/01/2070
565 Eleven Mile Drive, Eglinton	Box Culvert	Concrete	Saltram Creek	1/01/2001	100	1/01/2101
576 Brewongle Lane, Glanmire	Box Culvert	Concrete	Unnamed creek	1/01/1990	100	1/01/2090
6 Gestingthorpe Road, Perthville	Box Culvert	Concrete	Unnamed creek	1/01/1980	100	1/01/2080
670 Eusdale Road, Yetholme	Box Culvert	Concrete	Eusdale Creek	1/01/1976	100	1/01/2076
710 Limekilns Road, Forest Grove	Box Culvert	Concrete	Unnamed creek	22/03/2005	100	22/03/2105
724 Bridle Track, Duramana	Box Culvert	Concrete	Stony Creek	1/01/1972	100	1/01/2072
736 Duramana Road, Duramana	Box Culvert	Concrete	Saltram Creek	1/01/1978	100	1/01/2078
737 Cow Flat Road, Cow Flat	Box Culvert	Concrete	Unnamed creek	1/01/1987	100	1/01/2087
75 Caloola Road, Caloola	Box Culvert	Concrete	Ferndale Creek	1/01/1982	100	1/01/2082
75 Mount Rankin Rd, Mount Rankin	Box Culvert	Concrete	Unnamed creek	1/01/1996	100	1/01/2096
77 Schumachers Road, Triangle Flat	Box Culvert	Concrete	Triangle Creek	29/08/2012	100	29/08/2112
80 Lloyds Road, Gormans Hill	Box Culvert	Concrete	Unnamed creek	1/01/2003	100	1/01/2103
841 Ophir Road, Abercrombie	Box Culvert	Concrete	Jerrys Swamp Creek	1/09/1965	100	1/09/2065
875 Lachlan Road, Caloola	Box Culvert	Concrete	Browns Creek	1/01/1983	100	1/01/2083
898 Bridle Track, Duramana	Box Culvert	Concrete	Burnt Creek	1/01/1969	100	1/01/2069
94 O'Regans Road, Perthville	Box Culvert	Concrete	Unnamed creek	1/01/1968	100	1/01/2068
99 Red Hill Road Road, Paling Yards	Box Culvert	Concrete	Black Fellows Creek	1/01/1970	100	1/01/2070
10 Lagoon Road, Orton Park	Bridge	Concrete	Vale Creek	1/06/2003	100	1/06/2103
104 Bant Street, South Bathurst	Bridge	Concrete	Hawthornden Creek	1/11/1997	100	1/11/2097
1066 O'Connell Plains Road, The Lagoon	Bridge	Concrete	Campbells River	1/09/1966	100	1/09/2066
1167 Bridle Track, Duramana	Bridge	Concrete	Stony Creek	1/01/1954	100	1/01/2054
1208 Lagoon Road, The Lagoon	Bridge	Concrete	Davys Creek	1/01/2001	100	1/01/2101
1290 Lachlan Road, Caloola	Bridge	Concrete	Carrs Creek	17/12/2014	100	17/12/2114
1367 Tarana Road, Locksley	Bridge	Concrete	Frying Pan Creek	1/01/1960	100	1/01/2060
1411 Limekilns Road, Clear Creek	Bridge	Concrete	Clear Creek	1/01/1970	100	1/01/2070
142 Cow Flat Road, Cow Flat	Bridge	Concrete	Queen Charlottes Creek	1/01/1958	100	1/01/2058
1491 Lachlan Road, Caloola	Bridge	Concrete	Caloola Creek	1/01/1971	100	1/01/2071
152 Rivulet Road, Peel	Bridge	Concrete	Clear Creek	4/03/1991	100	4/03/2091
1538 Turondale Road, Millah Murrah	Bridge	Concrete	Millah Murrah Creek	1/01/1966	100	1/01/2066
175 Dog Rocks Road, Rockley	Bridge	Concrete	Campbells River	1/01/1957	100	1/01/2057
1792 Limekilns Road, Dempseys Creek	Bridge	Concrete	Dempseys Creek	1/01/1943	100	1/01/2043

1930 Ophir Road, Rock Forest	Bridge	Concrete	Oaky Creek	1/01/1960	100	1/01/2060
2080 Freemantle Road, Milkers Flat	Bridge	Concrete	Macquarie River	5/11/2008	100	5/11/2108
2110 Ophir Road, Rock Forest	Bridge	Concrete	Swallow Creek	1/01/1964	100	1/01/2064
2216 Bald Ridge Road, Abercrombie River	Bridge	Concrete	Grove Creek	1/01/1971	100	1/01/2071
2435 Crudine Road, Crudine	Bridge	Concrete	Crudine River	1/01/1991	100	1/01/2091
2436 Rockley Road, Rockley	Bridge	Concrete	Pepper Creek	1/01/1956	100	1/01/2056
2460 Limekilns Road, Limekilns	Bridge	Concrete	Diamond Creek	1/01/1943	100	1/01/2043
250 Rankens Bridge Road, Abercrombie.	Bridge	Concrete	Macquarie River	4/04/1998	100	4/04/2098
255 Lachlan Road, Rockley	Bridge	Concrete	Pepper Creek	1/01/1971	100	1/01/2071
31 College Road, South Bathurst	Bridge	Concrete	Macquarie River	1/01/1979	100	1/01/2079
323 Hill End Road, Sofala	Bridge	Concrete	Hawthornden Creek	1/01/1954	100	1/01/2054
325 Walang Drive, Napoleon Reef	Bridge	Concrete	Bells Creek	1/01/1955	100	1/01/2055
34 Russell Street, Gormans Hill	Bridge	Concrete	St Anthonys Creek	23/09/1983	100	23/09/2083
35 Lee Street, Kelso	Bridge	Concrete	Queen Charlottes Creek	1/01/1964	100	1/01/2064
38 Stewart Street, Evans Plains	Bridge	Concrete	Raglan Creek	1/01/1980	100	1/01/2080
425 Rivulet Road, Peel	Bridge	Concrete	Evans Plains Creek	1/05/2017	100	1/05/2117
483 Brewongle Lane, Glanmire	Bridge	Concrete	Spring Creek	1/10/2014	100	1/10/2114
51 Hill End Road, Sofala	Bridge	Concrete	Unnamed creek	1/03/2010	100	1/03/2110
767 Burraga Road, Rockley	Bridge	Concrete	Triangle Creek	1/01/1947	100	1/01/2047
794 Limekilns Road, Yarras	Bridge	Concrete	Winburndale Rivulet	12/04/1990	100	12/04/2090
8 Hereford Street, Kelso	Bridge	Concrete	Macquarie River	1/01/1995	100	1/01/2095
820 Turondale Road, Duramana	Bridge	Concrete	Winburndale Rivulet	1/01/1992	100	1/01/2092
848 Freemantle Road, Mt Rankin	Bridge	Concrete	Kings Creek	1/01/1974	100	1/01/2074
896 Curragh Road, Abercrombie River	Bridge	Concrete	Copperhannia Creek	1/01/1966	100	1/01/2066
9 Wimbledon Road, Georges Plains	Bridge	Concrete	Georges Plains Creek	1/01/1991	100	1/01/2091
903 Curragh Road, Copperhannia	Bridge	Concrete	Jonhsons Creek	1/01/1966	100	1/01/2066
908 Turondale Road, Duramana	Bridge	Concrete	Cheshire Creek	1/01/2001	100	1/01/2101
910 Lagoon Road, The Lagoon	Bridge	Concrete	Deep Creek	1/10/1970	100	1/10/2070
919 Curragh Road, Copperhannia	Bridge	Concrete	Johnsons Creek	1/01/1966	100	1/01/2066
589 Rivulet Road, Duramana	Bridge	Steel	Unnamed creek	1/01/1936	200	1/01/2136
100 Hill End Road, Sofala	Bridge	Stone	Unnamed creek	1/01/1887	200	1/01/2087
1130 Freemantle Road, Billywillinga	Bridge	Stone	Unnamed creek	1/01/1888	200	1/01/2088
1280 Lagoon Road, The Lagoon	Bridge	Stone	Unnamed creek	1/01/1920	200	1/01/2120
1288 Rockley Road, Fosters Valley	Bridge	Stone	Unnamed creek	1/01/1930	200	1/01/2130
173 Hill End Road, Sofala	Bridge	Stone	Unnamed creek	1/01/1890	200	1/01/2090
1970 Turondale Road, Turondale	Bridge	Stone	Oaky Creek	1/01/1945	200	1/01/2145
200 Hill End Road	Bridge	Stone	Unnamed creek	1/01/1895	200	1/01/2095
265 Ryans Road, The Lagoon	Bridge	Stone	Deep Creek	1/01/1935	200	1/01/2135
2934 Turondale Road, Duramana	Bridge	Stone	Bridge Creek	1/01/1970	200	1/01/2170
413 Ryans Road, The Lagoon	Bridge	Stone	Sandy Creek	1/01/1945	200	1/01/2145
420 Hill End Road	Bridge	Stone	Unnamed creek	1/01/1890	200	1/01/2090
908 Tarana Road, O'Connell	Bridge	Stone	Unnamed creek	1/01/1940	200	1/01/2140
139 Tarana Road, Brewongle	Bridge	Timber	Saltwater Creek	1/01/1965	70	1/01/2035
1553 Bridle Track, Duramana	Bridge	Timber	Winburndale Rivulet	13/03/1937	70	13/03/2007
180 Elmswood Road, Caloola	Bridge	Timber	McGeorges Creek	1/01/1956	70	1/01/2026
2000 Tarana Road, Gemalla	Bridge	Timber	Stony Creek	13/03/1937	70	13/03/2020
2305 Tarana Road, Tarana	Bridge	Timber	Eusdale Creek	1/01/1955	70	1/01/2025
24 Porters Lane, Yetholme	Bridge	Timber	Frying Pan Creek	1/01/1950	70	1/01/2020
261 Upper Turon Road, Sofala	Bridge	Timber	Big Oaky Creek	1/01/1965	70	1/01/2035
2673 Limekilns Road, Limekilns	Bridge	Timber	Penders Creek	1/01/1955	70	1/01/2025
2721 Bridle Track, Bruinbun	Bridge	Timber	Winburndale Rivulet	17/06/1936	70	17/06/2020
3142 Turondale Road, Duramana	Bridge	Timber	Turon River	1/01/1950	70	1/01/2020
5 East Street, Rockley	Bridge	Timber	Pepper Creek	1/01/1950	70	1/01/2020
667 Ophir Road, Dunkeld	Bridge	Timber	Evans Plains Creek	18/10/1949	70	18/10/2019
8 Brewongle School Road, Brewongle	Bridge	Timber	Unnamed creek	1/01/1960	70	1/01/2030
1015 Diamond Swamp Rd	Causeway	Concrete	Diamond Swamp Creek	1/01/1978	100	1/01/2078
12 Burges Road, Caloola	Causeway	Concrete	Caloola Creek	1/01/1950	100	1/01/2050
120 Winburndale Dam Road Road, Napoleon Reef	Causeway	Concrete	St Anthonys Creek	1/01/1955	100	1/01/2055
122 Forge Rd	Causeway	Concrete	Unnamed creek	1/07/2012	100	1/07/2112
1284 Pyramul Road, Sallys Flat	Causeway	Concrete	Unnamed creek	1/01/1973	100	1/01/2073
1310 Box Ridge Rd	Causeway	Concrete	Unnamed creek	1/07/2012	100	1/07/2112
1392 Pyramul Road, Sallys Flat	Causeway	Concrete	Unnamed creek	1/01/1980	100	1/01/2080
146 Old Trunk Road Road, Arkell	Causeway	Concrete	Bucks Creek	1/01/1980	100	1/01/2080
1787 Bridle Track	Causeway	Concrete	Unnamed creek	1/06/2012	100	1/06/2112
180 Crudine Road, Crudine	Causeway	Concrete	Bourke Creek	1/01/1960	100	1/01/2060
182 Killongbutta, Killongbutta	Causeway	Concrete	Unnamed creek	1/01/2006	100	1/01/2106
188 Wells Access Road, Wattle Flat	Causeway	Concrete	Tanwarra Creek	1/01/1976	100	1/01/2076
2006 Triangle Flat Road, Triangle Flat	Causeway	Concrete	Grove Creek	1/01/1964	100	1/01/2064
205 Doughertys Junction Road, Sallys Flat	Causeway	Concrete	Green Valley Creek	1/01/1972	100	1/01/2072
2106 Bridle Track, Bruinbun	Causeway	Concrete	Cummings Oaky Creek	1/01/2004	100	1/01/2104

219 Mount Rankin Rd, Mount Rankin	Causeway	Concrete	Unnamed creek	1/01/2003	100	1/01/2103
238 Paling Yards Road, Wattle Flat	Causeway	Concrete	Unnamed creek	1/01/1980	100	1/01/2080
2410 Bridle Track, Duramana	Causeway	Concrete	Black Fellows Creek	1/01/2012	100	1/01/2112
248 Quarry Road, Cow Flat	Causeway	Concrete	Mountain Run Creek	1/01/1975	100	1/01/2075
261 Old Trunk Road Road, Arkell	Causeway	Concrete	Gove Creek	1/01/1975	100	1/01/2075
274 Clear Creek Rd, Clear Creek	Causeway	Concrete	Unnamed creek	1/01/1983	100	1/01/2083
280 Burges Road, Caloola	Causeway	Concrete	Summer Hill Creek	1/01/1950	100	1/01/2050
3200 Lagoon Road, Rockley	Causeway	Concrete	Pepper Creek	1/01/1985	100	1/01/2085
35 Howarths Road, Freemantle	Causeway	Concrete	Unnamed creek	1/01/2004	100	1/01/2104
363 Upper Turon Road, Sofala	Causeway	Concrete	Pennyweight Flat Creek	1/01/1970	100	1/01/2070
398 Clear Creek Rd, Clear Creek	Causeway	Concrete	Clear Creek	11/03/2011	100	11/03/2111
420 Old Trunk Road Road, Arkell	Causeway	Concrete	Grove Creek	1/01/1965	100	1/01/2065
4460 Bridle Track, Duramana	Causeway	Concrete	Turon River	1/01/1960	100	1/01/2060
4572 Bridle Track, Duramana	Causeway	Concrete	Hill End Creek	1/01/1960	100	1/01/2060
47 Pymonts Lane, Peel	Causeway	Concrete	Foleys Creek	1/01/1960	100	1/01/2060
50 Howarths Road, Freemantle	Causeway	Concrete	Sprousters Creek	1/01/1950	100	1/01/2050
542 Diamond Swamp Rd	Causeway	Concrete	Diamond Swamp Creek	1/01/1978	100	1/01/2078
564 Upper Turon Road Road, Sofala	Causeway	Concrete	Turon River	1/01/1972	100	1/01/2072
566 Crudine Road, Crudine	Causeway	Concrete	Unnamed creek	1/01/1968	100	1/01/2068
64 Armitage Road	Causeway	Concrete	Unnamed creek	1/01/1980	100	1/01/2080
667 Redbank Road, Triangle Flat	Causeway	Concrete	Saw Pit Creek	1/01/1960	100	1/01/2060
7 Slatterys Road, Sallys Flat	Causeway	Concrete	Slatterys Creek	1/01/1950	100	1/01/2050
710 Killongbutta Rd, Killongbutta	Causeway	Concrete	Gum Creek	1/06/2012	100	1/06/2112
770 Upper Turon Road Road, Sofala	Causeway	Concrete	Turon River	1/01/1975	100	1/01/2075
792 Grove Creek Road, Trunkey	Causeway	Concrete	Grove Creek	1/01/1972	100	1/01/2072
8 Carlyle Street, Trunkey	Causeway	Concrete	Trunkey Creek	1/01/1986	100	1/01/2086
818 Rivulet Road, Peel	Causeway	Concrete	Spring Creek	1/01/1972	100	1/01/2072
85 Crudine Road, Crudine	Causeway	Concrete	Buckleys Creek	1/01/2010	100	1/01/2110
89 Mount Horrible Road, Limekilns	Causeway	Concrete	Diamond Creek	6/03/2013	100	6/03/2113
106 Panorama Avenue, Mitchell	Culvert	Concrete	Hawthornden Creek	1/01/1980	100	1/01/2080
11 Littles Access Road, Napoleon Reef	Culvert	Concrete	St Anthonys Creek	1/01/2000	100	1/01/2100
128 Burges Road, Caloola	Culvert	Concrete	Unnamed creek	1/01/2005	100	1/01/2105
1297 Lachlan Road, Caloola	Culvert	Concrete	Carrs Creek	1/01/1995	100	1/01/2095
145 Freemantle Rd, Mt Rankin	Culvert	Concrete	Kelloshiel Creek	13/12/2010	100	13/12/2110
1611 Bald Ridge Rd	Culvert	Concrete	Phoebes Creek	1/01/1985	100	1/01/2085
1693 Hill End Road, Sallys Flat	Culvert	Concrete	Unnamed creek	1/01/1955	100	1/01/2055
1855 Turondale Road Duramana	Culvert	Concrete	Oaky Creek	9/06/2014	100	9/06/2114
209 Perthville Road,	Culvert	Concrete	Sandy Creek	1/02/2010	100	1/02/2110
2093 Turondale Road, Turondale	Culvert	Concrete	Reedy Creek	1/01/1989	100	1/01/2089
213 Curragh Road, Trunkey	Culvert	Concrete	Unnamed creek	1/01/1940	100	1/01/2040
2211 Turondale Road, Turondale	Culvert	Concrete	Oaky Creek	1/01/1980	100	1/01/2080
2232 Lagoon Road, Charlton	Culvert	Concrete	Reedy Creek	1/01/1999	100	1/01/2099
231 Rivulet Road, Peel	Culvert	Concrete	Unnamed creek	1/01/1990	100	1/01/2090
2411 Ophir Rd	Culvert	Concrete	Unnamed creek	1/01/1980	100	1/01/2080
255 Rivulet Road, Peel	Culvert	Concrete	Unnamed creek	1/01/1990	100	1/01/2090
258 Schumachers Road, Triangle Flat	Culvert	Concrete	Unnamed creek	1/01/2005	100	1/01/2105
2795 Lagoon Road, Charlton	Culvert	Concrete	Unnamed creek	1/01/1970	100	1/01/2070
281 Bathampton Road, Bathampton	Culvert	Concrete	Unnamed creek	1/01/1990	100	1/01/2090
300 Hill End Road, Sofala	Culvert	Concrete	Unnamed creek	1/07/1955	100	1/07/2055
310 Havannah Street, South Bathurst	Culvert	Concrete	Hawthornden Creek	1/01/1980	100	1/01/2080
3183 Bridle Track, Bruinbun	Culvert	Concrete	Wicketts Creek	1/01/1985	100	1/01/2085
33 Adrienne Street, Raglan	Culvert	Concrete	Raglan Creek	17/05/1977	100	17/05/2077
35 Broken Bridge Rd, Yetholme	Culvert	Concrete	Unnamed creek	3/07/2009	100	3/07/2109
35 Lloyds Road, Gormans Hill	Culvert	Concrete	Queen Charlottes Creek	1/01/1990	100	1/01/2090
367 Hen and Chicken Lane, Evans Plains	Culvert	Concrete	Spring Creek	1/01/1987	100	1/01/2087
376 Grove Creek Road Road, Trunkey	Culvert	Concrete	Mulgunnia Creek	1/01/1980	100	1/01/2080
3824 Limekilns Road, Wattle Flat	Culvert	Concrete	Solitary Creek	1/12/2016	100	1/12/2116
388 Yarras Lane, Glanmire	Culvert	Concrete	Swamp Creek	1/10/2012	100	1/10/2112
394 Napoleon Reef Road, Napoleon Reef	Culvert	Concrete	Unnamed creek	1/01/1994	100	1/01/2094
4 Ardsley Lane, Laffing Waters	Culvert	Timber	Unnamed creek	1/01/1936	70	1/01/2006
435 Hen and Chicken Lane, Evans Plains	Culvert	Concrete	Unnamed creek	1/01/1986	100	1/01/2086
509 Conrod Straight, Mt Panorama	Culvert	Concrete	Underpass	1/04/1993	100	1/04/2093
580 Rockley Road Rockley Mount	Culvert	Concrete	Unnamed creek	1/01/1970	100	1/01/2070
640 Cow Flat Road, Cow Flat	Culvert	Concrete	Unnamed creek	1/01/1985	100	1/01/2085
764 Sunny Corner Road, Sunny Corner	Culvert	Concrete	Bobs Creek	1/01/1980	100	1/01/2080
771 Cow Flat Road, Cow Flat	Culvert	Concrete	Unnamed creek	1/01/1975	100	1/01/2075
90 Dunkeld Road, Dunkeld	Culvert	Concrete	Mount Creek	1/02/2016	100	1/02/2116
990 Hollis Lane	Culvert	Concrete	Sandy Creek	1/04/1978	100	1/04/2078