# Tablelands Regional Council


# Asset Management Plan
# BRIDGES & MAJOR CULVERTS
# 2022 - 2031

TRC
TABLELANDS REGIONAL COUNCIL

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| | | | | | |

# Contents

# 1.0 EXECUTIVE SUMMARY

## 1.1 The Purpose of the Plan

Asset management planning is a comprehensive process ensuring delivery of services from infrastructure are financially sustainable.

This Bridges & Major Culverts Asset Management Plan (AMP) details information about infrastructure assets with actions required to deliver the level of service outlined in this plan in the most cost-effective manner while outlining associated risks. The plan defines the services to be provided, how the services are provided as outlined in the improvement plan table 8.2 and what funds are required to provide over the 2022/23 – 2030/31 year planning period. The Asset Management Plan will link to the 10 Year Capital and long-term financial plan.

This AMP covers the infrastructure assets that provide Road and Pedestrian Bridges as well as Major Culvert, services for Tablelands Regional Council (TRC).

## 1.2 Asset Description

The current bridge & major culvert network comprises:

- Concrete Bridges (38)
- Composite Bridges (38) – A composite bridge is defined as a bridge having components comprising of different material types i.e., Concrete Abutments with Timber Girders
- Timber Bridges (6)
- Pedestrian Bridges (16)
- Major Culverts (115)

The above infrastructure assets have a total renewal value estimated at $63.4 million.

## 1.3 Levels of Service

This AMP includes recommended levels of funding for desired service levels in accordance with Queensland Treasury Corporation (QTC).

An acceptable level of service in asset management aims to ensure the asset is fit-for-purpose and maintained within available resources in an economic and cost-effective manner.

Based on current load limits that are being applied to TRC bridges and major culverts, there are 18 structures that are not meeting the Desired Levels of Service as defined by the Transport Strategy.

Based on current information, our present funding levels are insufficient (in particularly maintenance funding). The continued insufficient funding will lead to an increase in deterioration resulting in additional load limits, closures and increased reactive maintenance costs.

## 1.4 Future Demand

Demand for change of service level i.e. request for B-Double vehicle approval, changes to rural land use (creation of farms) will be managed through one of the following methodologies: managing existing assets, upgrading of existing assets and/or providing new assets to meet demand and demand management. This will be facilitated by undertaking the following activities:

- Securing funding to undertake Level 2 Bridge Inspections on all Bridges & Major culverts in a timely manner as per Appendix D.
- Bridge & Major Culvert Renewal & Replacement Programs based on overall risk score linked to Condition and Star Rating as per Transport Strategy objectives.

## 1.5 Lifecycle Management Plan

### 1.5.1 What does it Cost?

The forecast lifecycle costs necessary to provide the services covered by this AMP includes operation, maintenance, renewal, acquisition, and disposal of assets. Although the AMP may be prepared for a range of time periods, it typically informs the 10 Year Capital Plan. Therefore, a summary output from the AMP is the forecast of 10-year total outlays, which for the bridges and major culverts is estimated as $13,816,158 or $1,381,616 on average per year.

## 1.6 It should be noted that no replacement of major culverts is included in this amount. This will be updated as the condition data is collated and incorporated in future AMPs. Financial Summary

### 1.6.1 Plan Moving Forward:

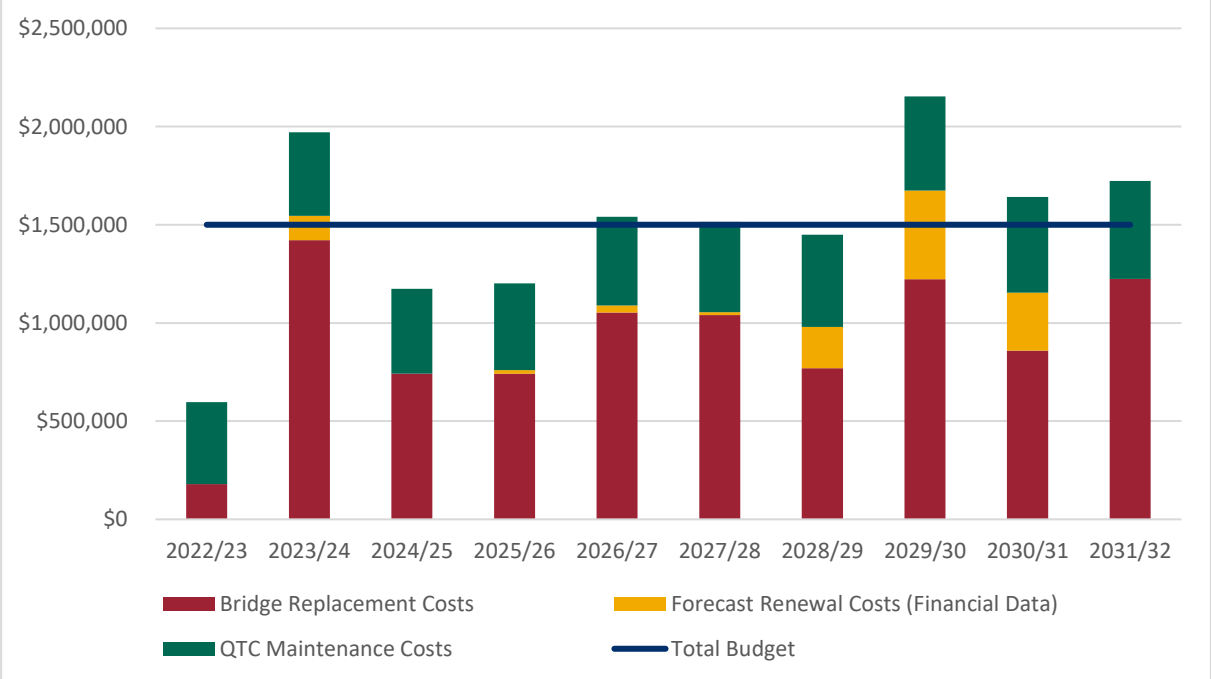
Estimated available funding for the 10 year period is $14,675,275 or $1,467,527 on average per year as per the Draft 10 Year Capital Budget. The 10 Year Capital Budget is reviewed and approved by Council annually. This equates to a ratio of 106% of the cost to sustain the current level of service at the lowest lifecycle cost.

**Note**: It is expected that the above funding ratio would reduce significantly in the next couple of years as detailed renewal plans are developed following the undertaking of Level 2 Bridge Inspections as per tasks identified in the Improvement Plan (Section 8.2) with particular focus on the lack of information on major culverts.

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 AMP emphasising the consequences of Planned Budgets on the service levels provided and risks.

The anticipated Planned Budget for bridges and major culverts leaves a surplus of $296,295 on average per year of the forecast lifecycle costs required to provide services in the AMP compared with the Planned Budget currently included in the Long-Term Financial Plan. This is shown in the figure below.

***Forecast Lifecycle Costs and Planned Budgets***




Bridge Replacement/Renewal Costs will be updated as better condition data for major culverts is collected and incorporated in future budgets.

We plan to provide bridge and major culvert services for the following:

- Operation, maintenance, renewal and upgrade of bridges to align with strategy and asset management plans.
- 15 Bridges are planned to be replaced within the 10-year planning period.

### 1.6.2 What we can improve

Current allocations within the operational budget to undertake the required inspections as identified in Appendix D. It is recommended that funding be increased in the operational budget to undertake these inspections.

### 1.6.3 Managing the Risks

The outputs from asset management programs can be compared with the outputs from other asset management programs, such as pavement management programs, to give the asset manager the necessary information to make informed choices when setting priorities for managing the whole road network asset.

As identified above, it is recommended within this AMP to increase the operational budget to allow for undertaking of inspections as identified in Appendix D. Current funding levels are likely to increase the level of risk in the medium term.

The main risk consequences are:

- Bridge Collapse
- Major Culvert collapse
- Increase in the number of bridges and major culverts requiring Load Limits
- Increased reactive works both operational and capital which will have budget impacts.

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

- Undertake Level 2 Bridge Inspections as identified through regular Level 1 inspections
- Undertake Level 3 bridge Inspections where required
- Undertake Load limit assessments based on updated Condition Data
- Apply applicable Load Limits as required and advise traveling public when changes are made

## 1.7 Asset Management Practices

Our systems to manage assets include:

- Technology One
- Pitney Bowes CONFIRM history
- Pitney Bowes MapInfo

Assets requiring renewal have been identified by the following approach.

- 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).

A combination of data from Financial Asset Register and Bridge & Major Culverts Asset Registers was used to forecast the renewal life cycle costs for this AMP.

## 1.8 Monitoring and Improvement Program

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

- Level 1 Bridge Inspections and Maintenance is undertaken on an annual basis and backlogged in Council's Asset Management System.

- Undertake Level 2 Bridge Inspections of Bridges & Major Culverts as per Appendix D
- Undertake Level 3 Bridge Inspections as required based on Level 2 assessment
- Update Renewal/Replacement program as improved condition data becomes available
- To develop Link between Finance & Asset Management systems with the TechOne Modernisation.

The costs of these activities to improve Council asset management practices have been estimated at $240,000 per year (Appendix D).

## 2.0 Introduction

### 2.1 Background

This AMP communicates the requirements for the sustainable delivery of services through management of assets, compliance with regulatory requirements, and required funding to provide the recommended levels of service for long term financial planning.

This AMP follows the format as recommended in Section 4.2.6 of the International Infrastructure Management Manual[1].

The AMP is to be read with the following associated planning documents:

- Corporate Plan 2021-2026
- Operational Plan 202223.pdf
- TRC Planning Scheme
- Asset Management Policy
- Strategic Asset Management Plan
- Community Satisfaction Report 2019
- International Infrastructure Management Manual 2011
- Transport Strategy 2019-24
- Queensland Department of Transport & Main Roads Structures Inspection Manual 2016
- 10 Year Capital Plan

The infrastructure assets covered by this AMP includes Concrete, Composite, Timber and Pedestrian Bridges as well as Major Culverts. Major Culverts are defined as structures that have an opening span, height, or diameter ≥ 1.5m or a waterway area more than 3m². For a detailed summary of the assets covered in this AMP refer to Table in Section 5.

These assets are used to provide safe and reliable vehicular and pedestrian access across rivers and creeks within the Tablelands Regional Council (TRC) Local Government area.

The infrastructure assets, bridges and major culverts, included in this plan have a total current replacement value of $63,370,388 which is based on like for like replacement and not upgrades in accordance with the Strategy.

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

***Table 2.1: Key Stakeholders in the AMP***

| Key Stakeholder | Role in Asset Management Plan |
|---|---|
| Councillors | ▪ Represent needs of the whole of community/shareholders through strategies and policy not representation of individual community members in relation to individual customer requests.<br>▪ Approve resources i.e., budget to meet planning objectives in providing services while managing risks; and |

[1] IPWEA, 2011, Sec 4.2.6, Example of an Asset Management Plan Structure, pp 4|24 – 27

| Key Stakeholder | Role in Asset Management Plan |
|---|---|
| | ■ Ensure organisation is financial sustainable.<br>■ Endorse asset management policy and plan |
| Executive Leadership Team | ■ Ensure compliance and delivery |
| Council Officers | ■ Operate and maintain assets in accordance with the AMP<br>■ Compilation and verification of data.<br>■ Ensure plan represent the desired service levels; and<br>■ Review AMPs |
| Department of Transport & Main Roads | ■ Development and Maintaining Structure Inspection Manual 2016 |

## 2.2 Goals and Objectives of Asset Ownership

Our goal in managing infrastructure assets is to meet the defined level of service as defined within TRC's Transport Strategy 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 10 Year Capital 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,
- 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:

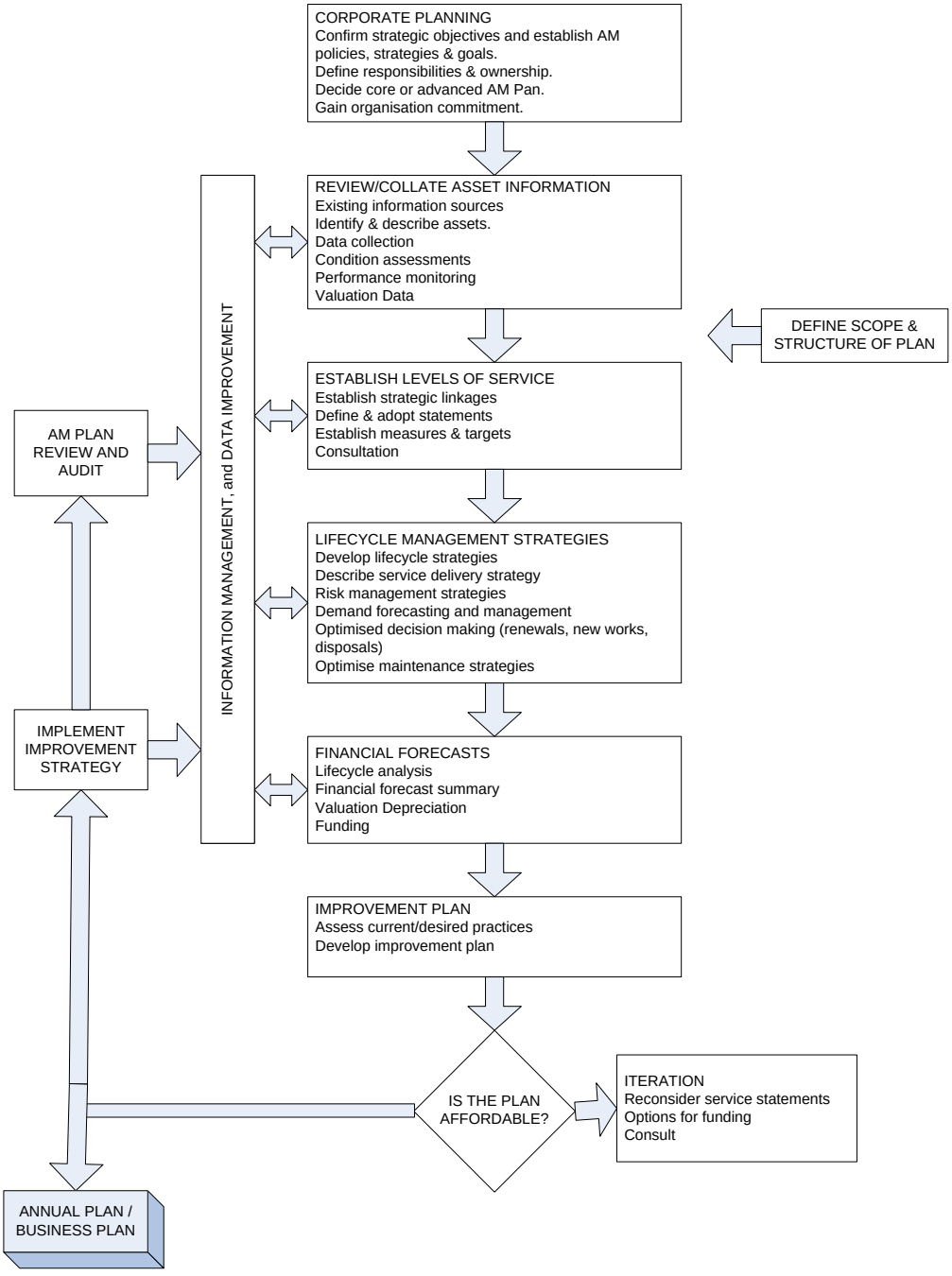
- International Infrastructure Management Manual 2015 [2]
- ISO 55000 - Asset Management[3]

A road map for preparing an Asset Management Plan is shown below.

[2] Based on IPWEA 2015 IIMM, Sec 2.1.3, p 2| 13
[3] 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

Market research was conducted between 20 September and 13 October 2019 to measure community perceptions of Council services and in particular satisfaction with those services provided by Council. The representative sample is 4% of the population (668 respondents). Outcomes from the survey are as follows: -

- The overall satisfaction with roads (including bridges and major culverts) and drainage services scored 2.5 (rating level mixed) across all of TRC. This is relatively low when compared with 6 other Councils (a mix of Regional and Metro Councils from across Australia), which have an average score of 3.0.
- Council's perceived reliability in delivering core services is 3.1, which compares to an average score of 3.4 measured across 6 other Councils (a mix of Regional and Metro Councils from across Australia).

### 3.2 Strategic and Corporate Goals

This AMP is prepared under the direction of the Strategic Asset Management Plan.

As adopted by Council. TRC Corporate Plan provides the following Strategic Theme.

"*Our infrastructure is well planned, integrated and fit-for-purpose*"

TRC Transport Strategy provides the following vision.

"*To provide residents, businesses, and visitors access to integrated fit-for-purpose infrastructure, that makes for safe, efficient, and sustainable transport within the region*."

TRC Transport Strategy also provides the following purpose:

"*TRC aims to ensure the road network sustainably provides a level of service that addresses the needs and expectations of the TRC community and its visitors*."

### 3.3 Legislative Requirements

Legislative requirements that impact the delivery of the TRC bridges are outlined in the Transport Strategy (2019-2024).

### 3.4 Customer Levels of Service

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

The Customer Levels of Service are considered in terms of:

**Quality** 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 3.4 under each of the service measures types (Quality, Function, Capacity/Use) there is a summary of the performance measure being used, the current performance, and the expected performance based on the current funding level.

These are measures of fact related to the service delivery outcome e.g. number of occasions when service is not available, condition percentage's of Very Poor, Poor/Average/Good, Very Good and provide a balance in comparison to the customer perception.

*Table 3.4: Customer Level of Service Measures*

| Type of Measure | Level of Service | Performance Measure | Current Performance | Performance Target |
|---|---|---|---|---|
| **Condition** | Bridges are structurally sound and 'Fit for Purpose" | % of Bridges in Good condition or better. | 66% | 80% |
| | ***Confidence levels*** | | Medium (Professional judgement supported by data sampling) | High (Professional Judgement supported by extensive data) |
| **Condition** | Major Culverts are structurally sound and 'Fit for Purpose" | % of Major Culverts in Good condition or better. | 49% | 80% |
| | ***Confidence levels*** | | Low (Condition Assessment undertaken by internal staff) | High (Professional Judgement supported by extensive data) |
| **Function** | Bridges are available to all appropriate transport types. | % of Bridges with Load Limit Restrictions | 25% | 20% |
| | ***Confidence levels*** | | Medium (Professional judgement supported by data sampling) | High (Professional Judgement supported by extensive data) |
| **Function** | Major Culverts are available to all vehicle types. | % of Major Culverts with Load Limit Restrictions | Unknown | 20% |
| | ***Confidence levels*** | | Low (Load Limit assessment undertaken on one major culvert only) | High (Professional Judgement supported by extensive data) |

This is subject to change as condition assessment are completed across the bridge and major culvert network.

## 3.5 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:

- **Operation** – the regular activities to provide services (e.g., opening hours of Council Customer Services, mowing grass, asset 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),

- **Upgrade/New** – 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 bridge).

Council Infrastructure Officers, plan, implement and control technical service levels to influence the service outcomes.[4]

Table 3.5 shows the activities expected to be provided under the current Planned Budget allocation, and the Forecast activity requirements being recommended in this AMP.

***Table 3.5: Technical Levels of Service***

| Lifecycle Activity | Purpose of Activity | Activity Measure | Current Performance* | Recommended Performance ** |
|---|---|---|---|---|
| **Operation** | Bridges and Major Culverts are safe, with smooth driving surface and approaches | Planned Level 1 Inspections as per Appendix D | 99% of Bridges Inspected in 2021/22.<br>100% of Major Culverts Inspected in 2021/22. | 100% of Planned Level 1 Bridge Inspections (except for Bridges & Major Culverts identified for Level 2 Inspection). |
| | Bridges and Major Culverts are safe, with smooth driving surface and approaches | Planned Level 2 Inspections as per Appendix D | 1% Level 2 Inspections completed in 2021/22 | 100% Level 2 Bridge Inspection performed every 4 years on all Bridges and Major Culverts as per Appendix D. |
| **Maintenance** | Maintain Bridges and Major Culverts to attain full useful life | Maintenance undertaken on Bridges & Major Culverts as identified in Level 1 Inspections. | 0% planned maintenance. Currently done on an ad hoc basis based on outcomes from Level 1 inspections. | 100% |
| **Renewal** | Bridges and Major Culverts to be renewed when their condition deteriorates. | Renewal Program for Bridges & Major Culvers developed from Level 2 Inspections. | 0% planned renewals program. Currently done on an ad hoc basis. | 80% of Bridges and Major Culverts renewed in year required. |
| **Upgrade/New** | Upgrade/New Bridges and Major Culverts will be constructed as per the Replacement Program and in line with Desired Standards within Transport Strategy. | All Bridges will be constructed to the Desired Standard as defined in the Transport Strategy.<br>All Major Culverts will be full concrete construction where practical. | Bridges and Major Culvert upgrades are being designed in line with Desired Standards as per Transport Strategy. | Replacement budget will be created as demand requires. |

Note: * Current activities related to Planned Budget.
** Forecast required performance related to forecast lifecycle costs.

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

It is important to monitor the service levels on an annual basis. The current performance is influenced by work efficiencies and technology, and customer priorities will change over time.

## 4.0 FUTURE DEMAND

### 4.1 Demand Factors

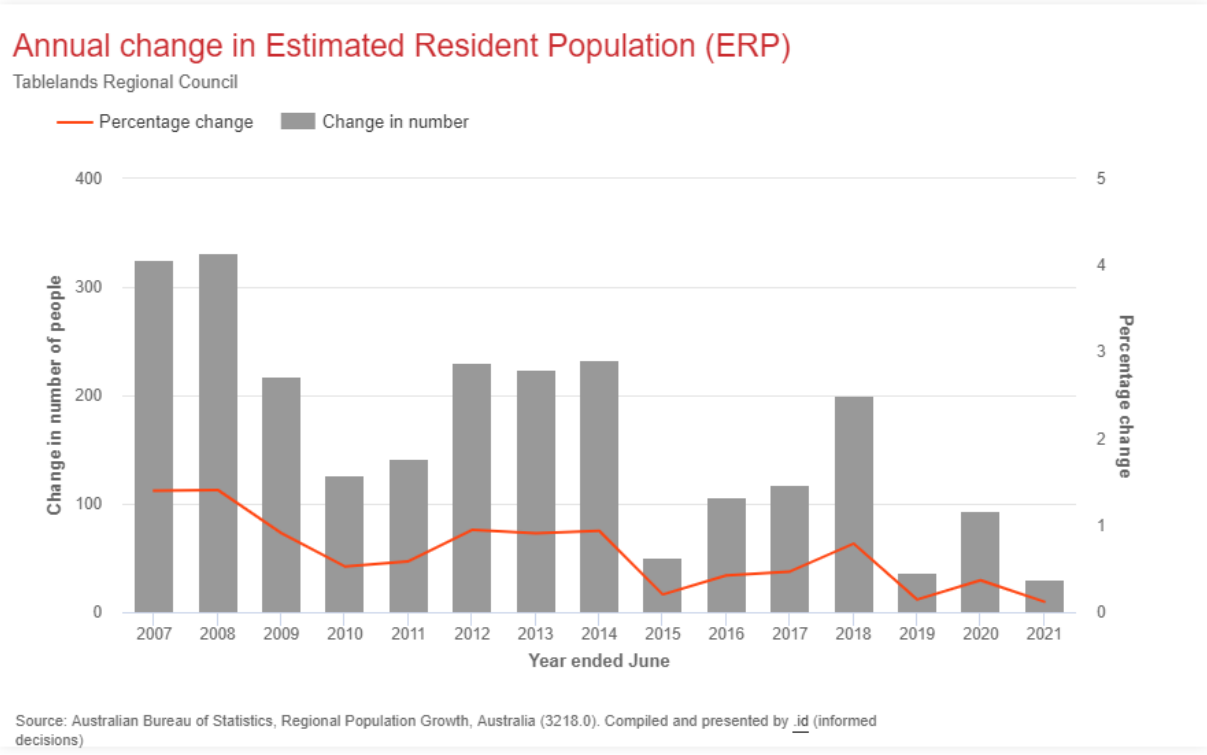
Factors affecting demand include things such as population change, regulations, changes in demographics, seasonal factors, vehicle ownership rates, consumer preferences and expectations, technological changes, economic factors, agricultural practices, and environmental awareness.

### 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. These drivers include:

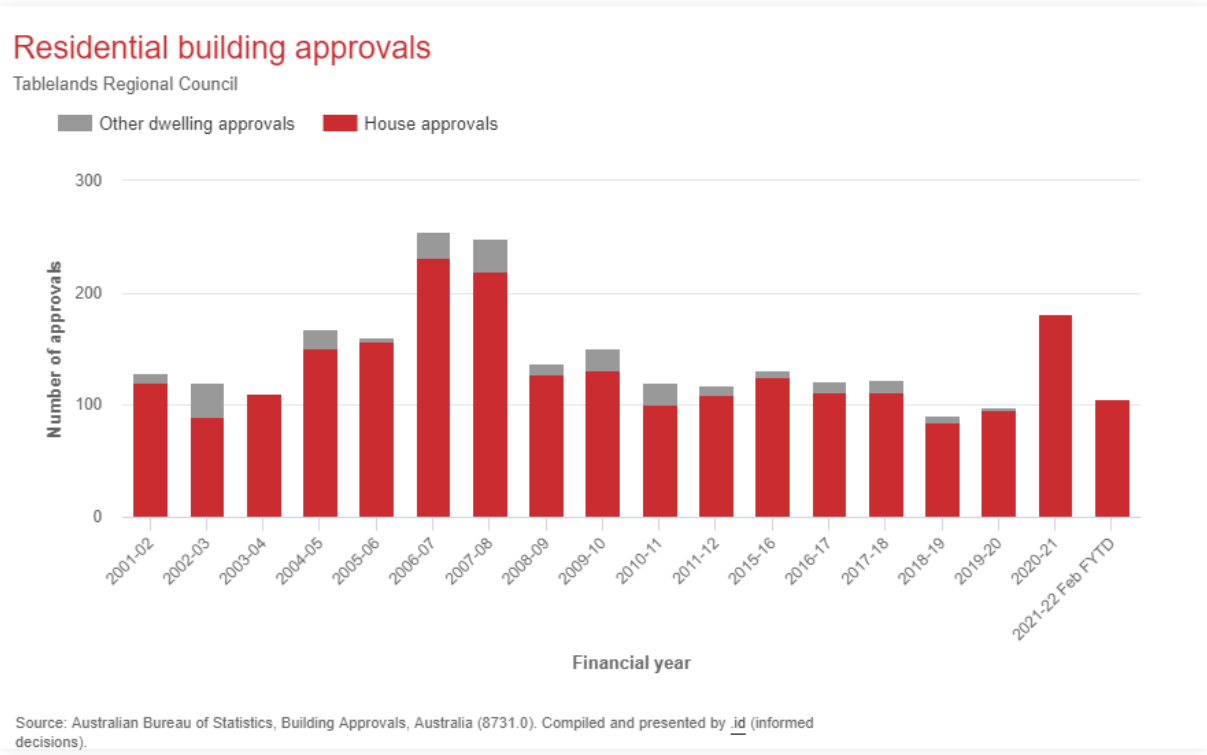
- Population growth
- Demographics
- Development – Greenfield and in-fill
- Increased demand for asset rehabilitation and maintenance
- Increased risk of failure in ageing infrastructure
- Level of employment
- Changes in recreation and leisure trends
- Change in community expectations

The official population of Tablelands Regional Council area as of the 30th June 2016, is 24,827 with an average household size of 2.32. The population estimate for Tablelands Regional Council as of the 30th June 2021 is 25,697, the population has grown by 0.12%.




It is noted that the population projection will be somewhat similar to the current trend therefore the impact of population on services will be relatively insignificant.

The figure below shows the downward trend of building approvals from 232 houses and 23 other dwelling approvals in 2006-07 down to 96 houses and 2 other dwelling approvals in 2019-20. The 2020-21 building approvals shows a larger rate of growth than predicted with 181 housing approvals, it is unknown at this stage if this trend will continue to grow or return to previous housing approval rates of approximately 100 houses per year.




## 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 change of service level i.e. request for B-Double vehicle approval, changes to rural land use (creation of new blueberry farms) will be managed through one of the following methodologies: 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 AMP.

***Table 4.3: Demand Management Plan***

| Demand driver | Current position | Projection | Impact on services | Demand Management Plan |
|---|---|---|---|---|
| Increasing Legal Limits | Bridges and Major Culverts designed to T44 Load Rating. | Potential increase to B-Double Load Rating | Bridge and Major Culvert Infrastructure will be exposed to greater loads which can be expected to cause increase deterioration rates. | Work with National Heavy Vehicle Regulator regarding freight routes. Use of Permit system to monitor movement of vehicles.<br>Future designs to consider B-Double loadings where applicable. |

| | | | | |
|---|---|---|---|---|
| Changes to Rural Land Use | Bridges designed to T44 Load Rating. | Increase usage of bridges | Bridge Infrastructure will be exposed to greater loads which can be expected to cause increase deterioration rates. | Use of Permit system to monitor movement of vehicles. Deployment of Traffic Counters to measure usage.<br>Future designs to consider B-Double loadings where applicable. |

## 4.4 Asset Programs to meet Demand

The upgrading of existing bridges and major culverts will be required to meet demand. These upgrades are discussed in Section 5.4.

## 4.5 Climate Change and Adaption

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

As a minimum we should consider both how to manage our existing assets given the potential climate change impacts, and then also how to create resilience to climate change in any new works or acquisitions.

Opportunities identified to date for management of climate change impacts on existing assets are shown in Table 4.5.1

***Table 4.5.1 Managing the Impact of Climate Change on Assets***

| Climate Change Description | Projected Change | Potential Impact on Assets and Services | Management |
|---|---|---|---|
| Climate Change | A notable risk is posed by climate change through increasing intensity of extreme rainfall events. | Bridges and Major Culverts will experience an increase in flood damage, increased structural and foundation damage through increased geotechnical effects and more generally an accelerated degradation of materials and structures through increased temperature and solar radiation. | Continue to monitor developments in this space such that the projected climate change and effects on infrastructure may be estimated. Appropriate measures may then be taken to account for these effects in asset management practices, infrastructure planning and material and design standards. |

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 will have benefits:

- Assets will withstand the impacts of climate change
- Services can be sustained
- 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 |
|---|---|---|
| Increasing intensity of extreme rainfall events | Overtopping, Damage or Collapse of Bridge/Major Culvert. | Upgrade existing Bridge & Major Culverts to flood immunity level as defined in Transport Strategy where practical.<br>Place road closure signs when Bridges & Major Culverts are flooded and damaged.<br>Regular inspections to ascertain Bridge & Major Culvert condition and required maintenance. |

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

## 5.0 LIFECYCLE MANAGEMENT PLAN

The lifecycle management plan details how the Council 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

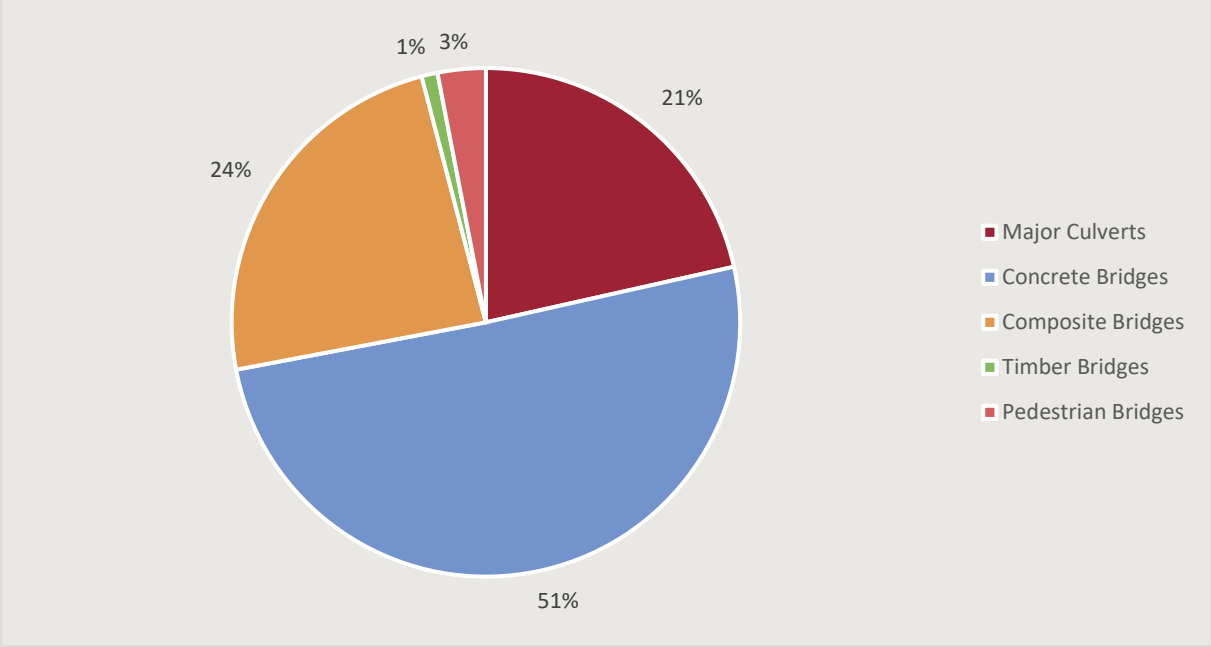
#### 5.1.1 Physical parameters

The assets covered by this AMP and their current estimated replacement of like for like costs are shown in Table 5.1.1. Note these figures do not include upgrading the bridges to new standard.

***Table 5.1.1: Assets covered by this Plan***

| Bridge Type | Quantity | Replacement Value |
|---|---|---|
| Concrete | 38 | $32,016,687 |
| Composite | 38 | $15,154,661 |
| Timber | 6 | $644,211 |
| Pedestrian | 16 | $1,935,295 |
| Major Culverts | 115 | $13,619,535 |
| **TOTAL** | 213 | **$63,370,388** |

**Figure 5.1: Replacement Value shown as Percentage**




**Note**: Timber Bridges are defined as being constructed with completely timber components i.e. girders, abutments etc. Bridges with timber girders and concrete abutments are defined as Composite bridges.

The Replacement Values presented above are from the Financial Asset register which is based on replacing bridges and major culverts on a like for like cost i.e., replacing existing timber bridge with a new timber bridge.

The Replacement Values are also based on the Greenfield model which does not take into consideration the cost to remove the existing bridge or major culvert.

The constructed year profile of the assets included in this AMP are shown in Figures 5.1.1 & 5.1.2.

**Figure 5.1.1: Bridges Constructed Year Profile (As of June 2020)**

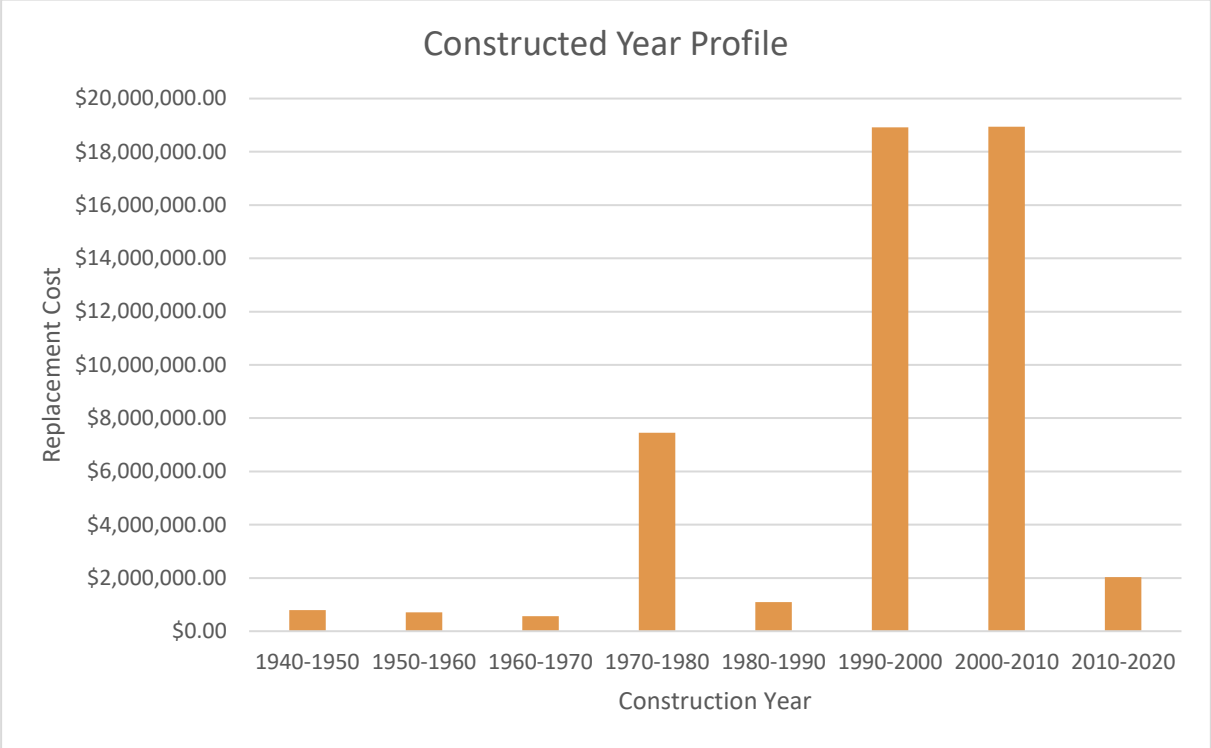
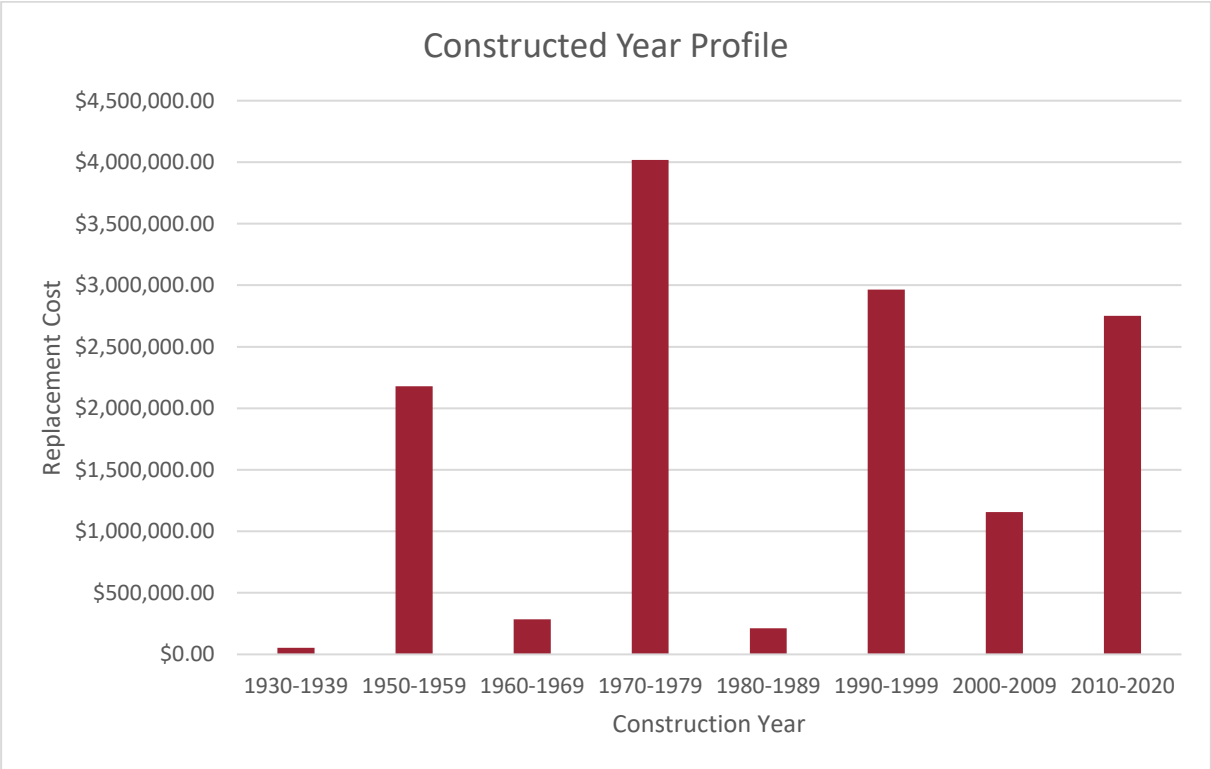



**Figure 5.1.1: Major Culvert Constructed Year Profile (As of June 2020)**




All figure values are shown in current day dollars.

The constructed year profile shown in Figure 5.1.1 indicates that a significant proportion of the bridges were constructed between 1990– 2010.

The constructed year profile shown in Figure 5.1.2. indicates that a significant proportion of the major culverts were constructed prior to 1980.

The useful life for both bridges and major culverts is covered in 5.3.

### 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***

| Bridge Location | Service Performance Required | Current Service Deficiency (Bridges and Major Culverts with Load Limits) |
|---|---|---|
| Mary St - Malanda | 44T Load Limit | 8T Load Limit based on Level 3 Structural Assessment. |
| Webster Rd - Wondecla | 44T Load Limit | 8T Load Limit based on Level 3 Structural Assessment. |
| Wrights Ck Rd – Lake Eacham | 44T Load Limit | 6T Load Limit based on Level 3 Structural Assessment. |
| Turner Rd – Ravenshoe | 44T Load Limit | 6T Load Limit based on Level 3 Structural Assessment. |
| Clarkes Trk - Jaggan | 44T Load Limit | 10T Load Limit based on Level 3 Structural Assessment. |
| Bew Rd – Ravenshoe | 44T Load Limit | 25T Load Limit based on Level 3 Structural Assessment. |
| Cashmere-Kirrama Rd - Kirrama | 44T Load Limit | 10T Load Limit based on Level 3 Structural Assessment. |
| Wooroora Rd - Millstream | 44T Load Limit | 6T Load Limit based on Level 3 Structural Assessment. |
| Silver Valley Rd – Silver Valley | 44T Load Limit | 15T Load Limit based on Level 3 Structural Assessment. |
| Lindsay Rd – Glen Allyn | 44T Load Limit | 10T Load Limit based on Level 3 Structural Assessment. |
| Morganbury Rd - Walkamin | 44T Load Limit | 20T Load Limit based on Level 3 Structural Assessment. |
| Ross Rd - Evelyn | 44T Load Limit | 5T Load Limit based on Level 3 Structural Assessment. |
| Glue Pot Rd - Wondecla | 44T Load Limit | 10T Load Limit based on Level 3 Structural Assessment. |
| Uramo Rd – Innot Hot Springs | 44T Load Limit | 10T Load Limit based on Level 3 Structural Assessment. |
| Whiting Rd – Beatrice | 44T Load Limit | 15T Load Limit based on Level 3 Structural Assessment. |
| Kaban Rd - Kaban | 44T Load Limit | 30T Load Limit based on Level 3 Structural Assessment. |
| Nymbool Rd – Mount Garnet | 44T Load Limit | 40T Load Limit based on Level 3 Structural Assessment. |
| Go Tack Rd – Evelyn | 44T Load Limit | 20T Load Limit based on Level 3 Structural Assessment. |

| | | |
|---|---|---|
| Middlebrook Rd – Middlebrook | 44T Load Limit | 25T Load Limit based on Level 3 Structural Assessment. |
| No Name Rd – Wondecla | 44T Load Limit | 20T Load Limit based on Level 3 Structural Assessment. |
| Cockram Rd – Ravenshoe | 44T Load Limit | 35T Load Limit based on Level 3 Structural Assessment. |
| Princess Hills Rd - Wairuna | 44T Load Limit | 40T Load Limit based on Level 3 Structural Assessment. |
| Allwood Ln - Walkamin | 44T Load Limit | 10T Load Limit based on Level 3 Structural Assessment. |
| Wairuna Rd - Wairuna | 44T Load Limit | 8T Load Limit based on Level 3 Structural Assessment (Major Culvert). |
| Moregatta Rd - Moregatta | 44T Load Limit | 12T Load Limit based on Level 3 Structural Assessment (Major Culvert). |

### 5.1.3 Asset condition

Condition is currently monitored by the undertaking of limited Level 2 Bridge Inspections in line with the Structures Inspection Manual (2016 developed by the Queensland Department of Transport & Main Roads).

Condition is measured using a 1 – 5 grading system[5] as detailed in Table 5.1.3. It is important that consistent condition grades be used in reporting various assets across an organisation. This supports effective communication. At the detailed level assets may be measured utilising different condition scales, however, for reporting in the AMP they are all translated to the 1 – 5 grading scale.

***Table 5.1.3: Simple Condition Grading Model***

| Condition Grading | Description of Condition |
|---|---|
| **1** | **Good "as new"**: Free of defects with little or no deterioration evident. |
| **2** | **Fair**: Free of defects affecting structural performance, integrity and durability.<br>Deterioration of a minor nature in the protective coating and/or parent material is evident. |
| **3** | **Poor**: Defects affecting the durability/serviceability which may require monitoring and/or remedial action or inspection by a structural engineer.<br>Component or element shows marked and advancing deterioration including loss of protective coating and minor loss of section from the parent material is evident.<br>Intervention is normally required. |
| **4** | **Very Poor**: Defects affecting the performance and structural integrity which require immediate intervention including an inspection by a structural engineer if principal components are affected.<br>Component or element shows advanced deterioration, loss of section from the parent material, signs of overstressing or evidence that it is acting differently to its intended design mode or function. |
| **5** | **Unsafe**: This state is only intended to apply to the overall structural integrity. Structural integrity is severely compromised, and the structure must be taken out of service until a structural engineer has inspected the structure and recommended the required remedial action. |

The condition profile of TRC Bridges & Major Culverts is shown in Figure 5.1.3.& 5.1.4.

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

*Figure 5.1.3: Bridge Asset Condition Profile*

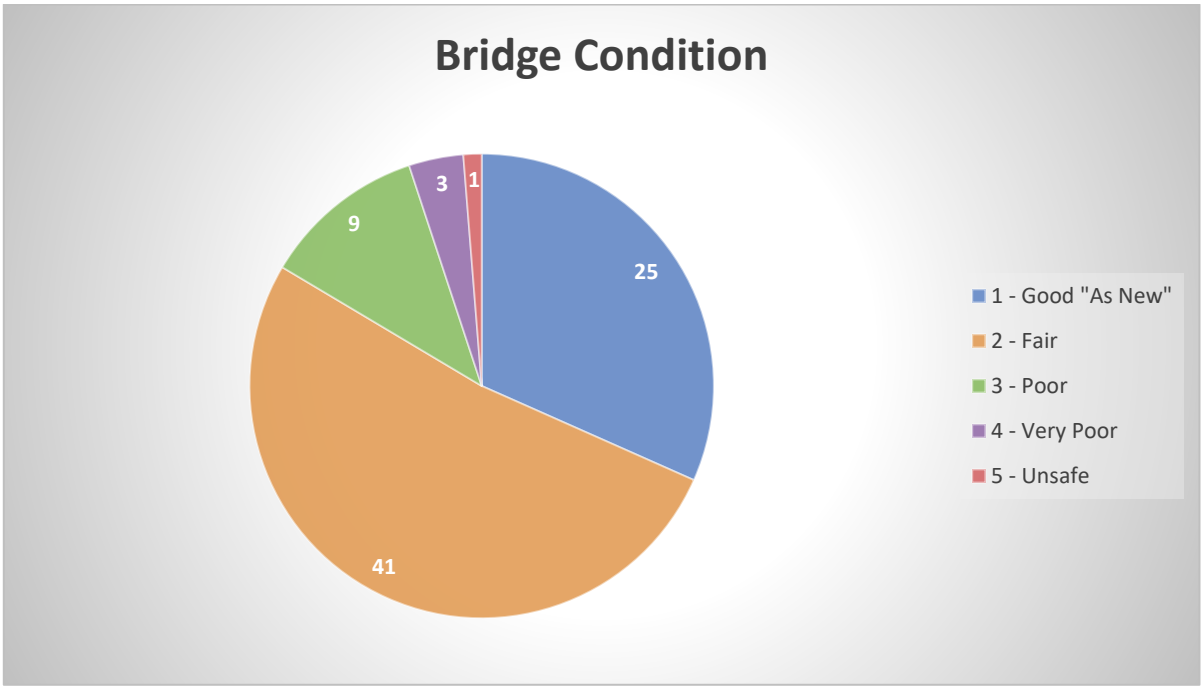
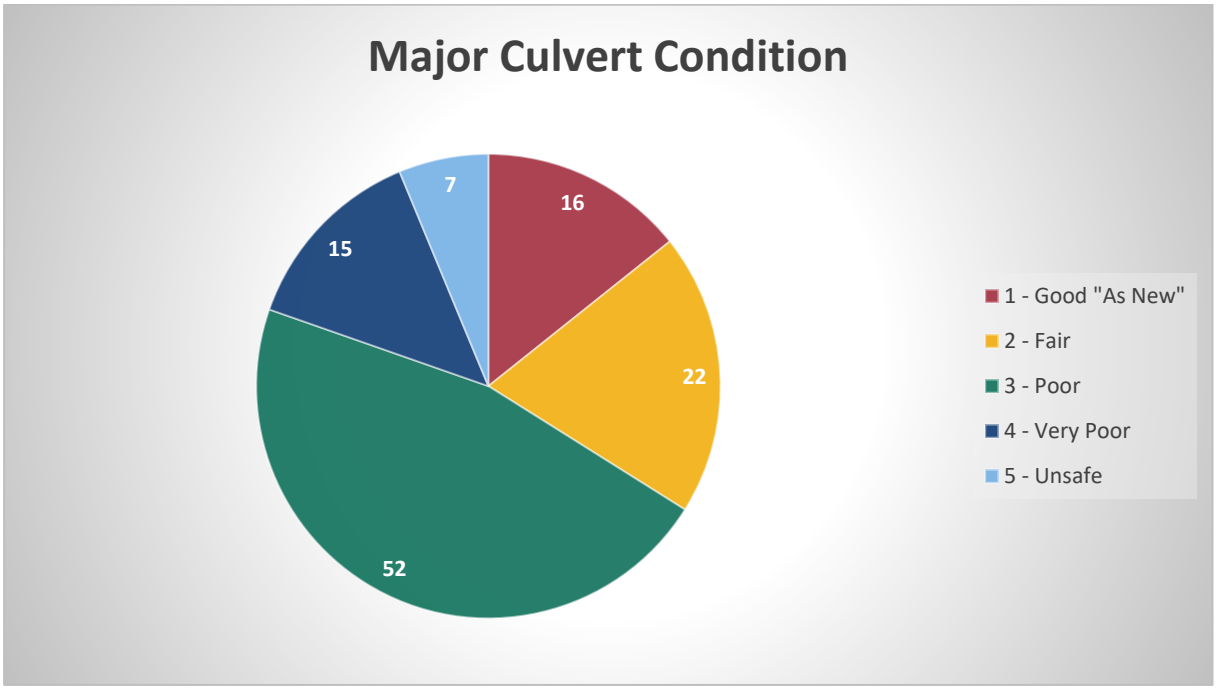


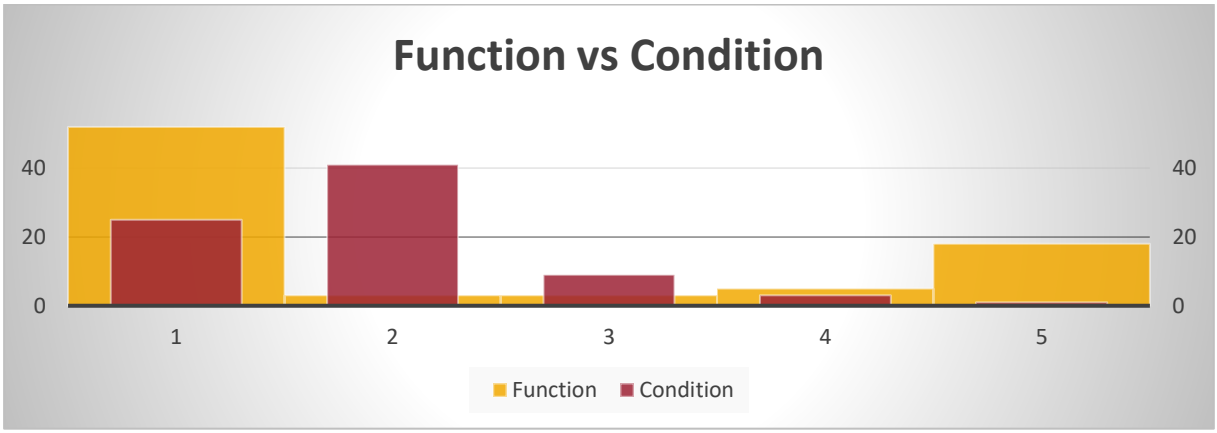

*Figure 5.1.4: Major Culvert Asset Condition Profile*




The condition profile shown in Figure 5.1.3 & 5.1.4 shows that 66 bridges and 74 major culverts are in either Very Good or Good Condition. An analysis of the condition data identified a concerning issue where bridges has been assessed as being in good condition however at the same time had been identified as requiring a Load Limit to be applied. This is contradictory.

This would indicate that the condition score is not a true reflection of the current ability of the bridge to deliver the required service which was the result of poor-quality Level 2 Inspections being undertaken in previous years. This is presented in Figure 5.1.5 below.

*Figure 5.1.5: Bridge Condition v Bridge Function*




The Function Score was developed using the table below based on current Load limit applied. Note this has only been applied to bridges.

*Table 5.1.3: Bridge Function Score based on Load Limit*

| Load Limit (T) | Function Score |
|---|---|
| No Limit | 1 |
| 33 - 44 | 2 |
| 22 -32 | 3 |
| 11-21 | 4 |
| >=10 | 5 |

Assuming the bridges were originally designed and constructed to service 44T load limits, ideally there would be a correlation between the condition score of the bridge and Load Limit i.e., as condition deteriorates a load limit would be applied to extend the useful life of the bridge. Due to concerns regarding the quality of the condition data as previously mentioned, it was decided to use the Bridge Load Limit Function Score combined with Road Star Rating to develop future bridge replacements.

The condition data for the major culverts is based on a visual inspection undertaken by former Council staff and not based on a formal Level 2 Inspection undertaken by independent contractor.

All the Pedestrian bridges and a significant number of the major culverts are yet to have an independent Level 2 Bridge Inspection undertaken on them which is not represented in Figure 5.1.3. The undertaking of independent Level 2 Bridge Inspections has been identified as an issue in the improvement plan table 8.2.

## 5.2 Operations and Maintenance Plan

Operations include regular activities to provide services. Examples of typical operational activities include bridge inspection, cleaning of road furniture and vegetation maintenance of approaches.

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 cleaning scuppers and debris removal.

The trend in maintenance budgets are shown in Table 5.2.1.

*Table 5.2.1: Maintenance Budget Trends*

| Year | Estimated Maintenance Budget in line with Plan | Maintenance Budget $ (TRC) | Maintenance Budget $ (QTC Model) |
|---|---|---|---|
| 2019/20 | $440,000 | $156,161 | $435,681 |
| 2020/21 | $440,000 | $90,000 | $444,395 |
| 2021/22 | $440,000 | $91,800 | $453,283 |

The QTC Model Maintenance Budget in the above table has been calculated using a standard percentage (2.0% for Timber, 0.5% for all Other Bridge & 1.0% for Major Culverts) of the replacement cost of each bridge & major culvert and is provided as a guide to check actual budgets against. The estimated maintenance budget is made up of a two-person crew, job truck and inclusive of Level 2 Bridge Inspections.

The above table shows a significant difference between the Actual, Required Maintenance Expenditure and Budget Allocation. The table also show a significant difference between budget allocation and the estimated budget based on QTC Modelling.

Work has been undertaken by Council officers to develop a cost estimate to undertake Level 1,2 & 3 inspections on all bridges and major culverts on a regular basis. This analysis has identified that a budget of $240,000/yr is required just to undertake these inspections. A breakdown of this analysis in attached in Appendix D.

**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. Council's Transport Strategy includes Service Level linked to Star Rating of the Road Network.

The service hierarchy is shown is Table 5.2.2.

*Table 5.2.2: Asset Service Hierarchy*

Urban Roads

| Road Star Rating | Bridge Load Limit (T) | Lane Configuration |
|---|---|---|
| 4.6 – 5.0 | 44 | Dual |
| 4.1 - 4.5 | 44 | Dual |
| 3.6 – 4.0 | 44 | Dual |
| 3.1 - 3.5 | 44 | Dual |
| 2.6 – 3.0 | 44 | Dual |
| 2.1 - 2.5 | 44 | Single |
| 1.6 – 2.0 | 44 | Single |
| 1.1 – 1.5 | 44 | Single |
| 0.0 – 1.0 | 44 | Single |

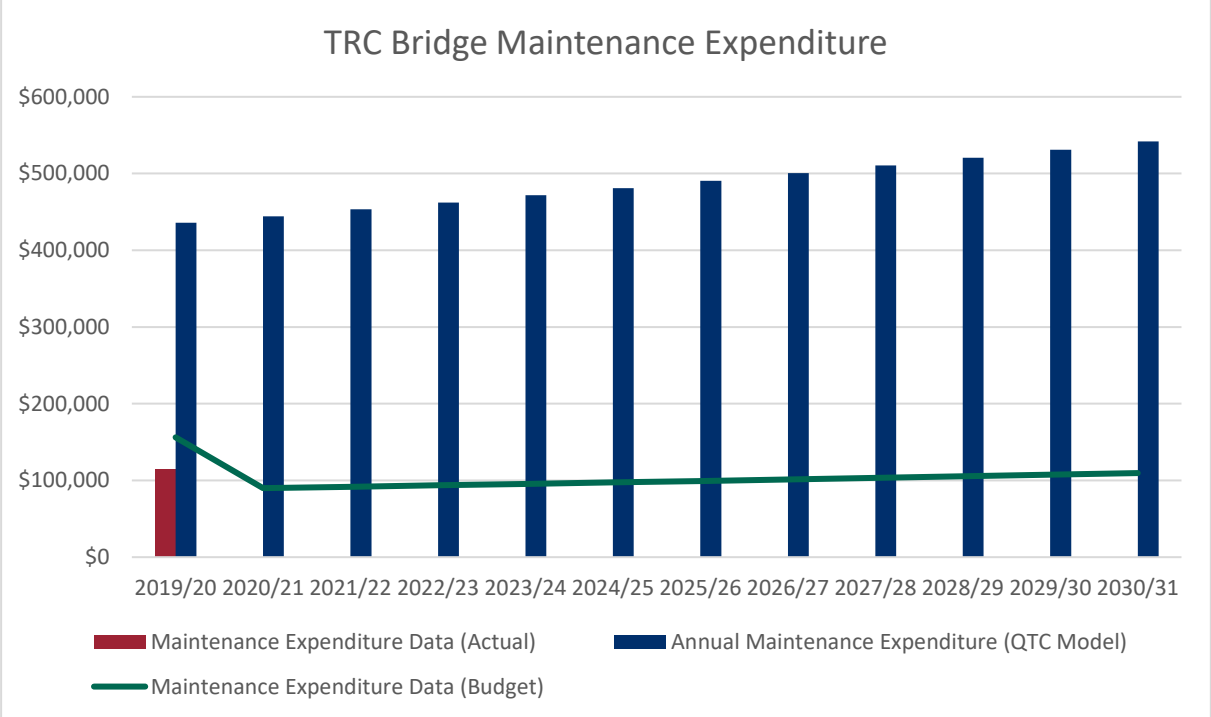
Rural Roads

| Road Star Rating | Load Limit (T) | Lane Configuration |
|---|---|---|
| 4.6 – 5.0 | S1600 | Dual |
| 4.1 - 4.5 | S1600 | Dual |
| 3.6 – 4.0 | 44 | Dual |
| 3.1 - 3.5 | 44 | Dual |
| 2.6 – 3.0 | 44 | Single |
| 2.1 - 2.5 | 44 | Single |
| 1.6 – 2.0 | 44 | Single |
| 1.1 – 1.5 | N/A | N/A |
| 0.0 – 1.0 | N/A | N/A |

**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***



All figure values are shown in current day dollars.

Based on the above forecast budgets, there is significant difference between the proposed Maintenance Expenditure contained within the budget and Maintenance Expenditure required based on the QTC Model. The actual amount of Maintenance Expenditure required will be determined by the undertaking of Level 1 Bridge Inspections on an annual basis, whereas the QTC model is being used as a guide/comparison and is calculated using a percentage of the replacement cost.

Deferred maintenance, if required (i.e. works that are identified for maintenance activities but unable to be completed due to available funding) should be included in Corporate Risk Register.

## 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 have been identified by the following approach.

- 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)

The typical useful lives of assets based on a financial model rather than asset management principles used to develop projected asset renewal forecasts are shown in Table 5.3. Asset useful lives were last reviewed on the 30th June 2020.[6] These useful live timeframes for the purpose of asset management will significantly differ in certain asset categories.

***Table 5.3: Useful Lives of Assets***

| Asset (Sub)Category | Asset Component | Useful life |
|---|---|---|
| Railings | Steel | 25 |
| Substructure | Concrete | 100 |
| | Timber | 50 |
| Superstructure | Concrete | 100 |
| | Steel | 60 |
| | Timber | 50 |
| Wearing Surface | Asphalt | 25 |
| | Bitumen | 12 |
| | Concrete | 100 |
| | Timber | 20 |
| Major Culvert | | 100 |

[6] Enter Reference to Report documenting Review of Useful Life of Assets

The estimates for renewals in this Asset Management Plan were based on the asset register.

### 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 bridge and major culverts).[7]

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,
- Aligning of renewals to depreciation to achieve 90%,
- 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.[8]

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

***Table 5.3.1: Renewal Priority Ranking Criteria***

| Criteria | Weighting |
|---|---|
| Road Star Rating | 60% |
| Function Score | 40% |
| **Total** | **100%** |

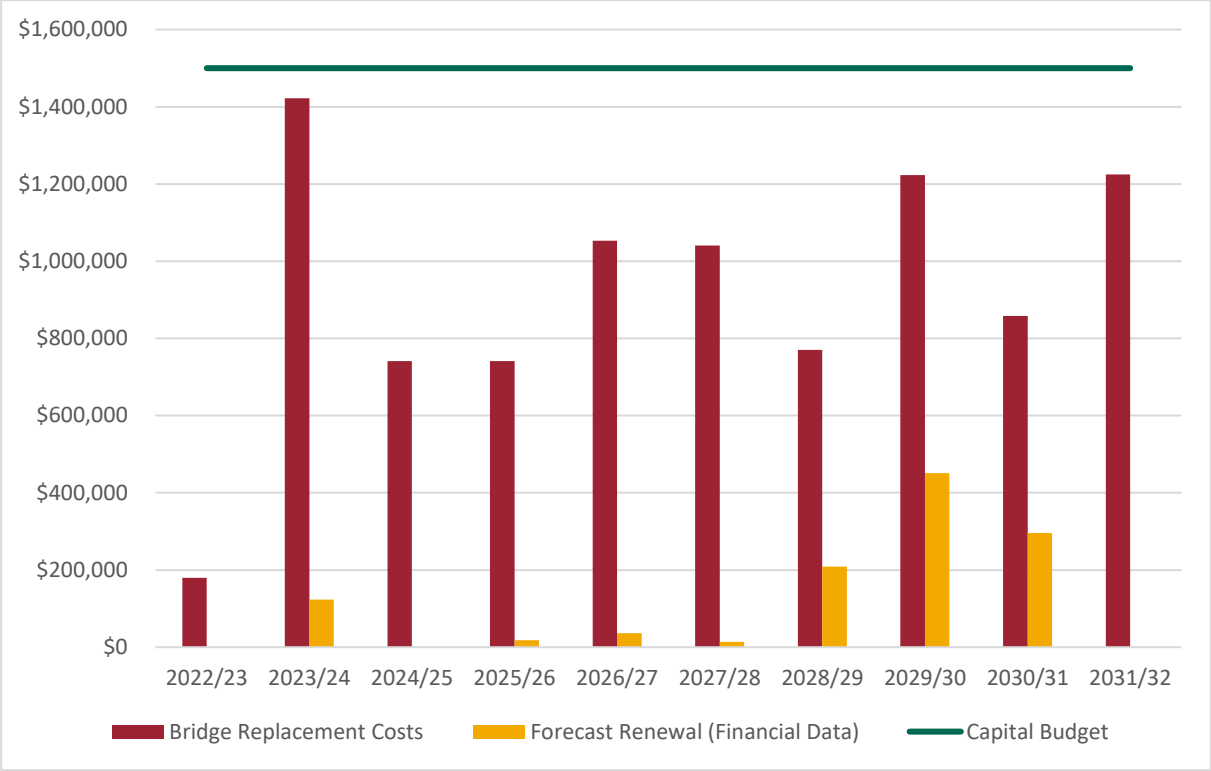
**Note: - The above ranking has been applied to bridges only.**

## 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.

[7] IPWEA, 2015, IIMM, Sec 3.4.4, p 3|91.
[8] 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 bridge replacement costs in the above graph includes costs that will renew bridges to the required standards as defined within the Transport Strategy. The above graph is based on a strategy of replacing 17 bridges beyond 2023/24 based on the minimum load limit design element as per the Transport Strategy. Bridge replacement program has been based on overall priority (combination of Star Rating and Function Score) as defined in Section 5.3.1.

It should be noted that the replacement costs in the above Figure are based on replacing existing bridges in line with Desired Standards within the Transport Strategy i.e. Replacing Timber bridge with concrete and widening to duals lane where required and include costs to demolish existing bridge.

Due to lack of condition data for major culverts, there are currently no planned renewals in the above graph. If funding is made available to undertake condition inspections on major culverts, any renewal costs will be calculated using the same methodology as bridges. These costs will be added as condition data is acquired and if replacement is required.

The Forecast Renewal expenditure is based on Replacement Cost/Year within the Financial Register and is based on a like for like replacement i.e. replacing timber with timber and no upgrade in width of bridge and does not include demolishing costs as they are considered an operational cost.

The actual amount of Bridge Renewal works required will be determined by the undertaking of Level 2 Bridge Inspections. The required timeframes and required budget for these inspections have yet to be determined and should be included in the risk analysis in the risk management plan and improvement plan.

## 5.5 Acquisition Plan

Acquisition reflects are new assets that did not previously exist or works which have been identified in the Local Government Infrastructure Plan. They may result from growth, demand, social or environmental needs (See Section 4). Assets may also be donated to the Council.

Council does not have plans to build any new bridges over the life of this AMP. This has been reflected in Council's Local Government Infrastructure Plan (LGIP) which is available on Council's website.

## 5.6 Disposal Plan

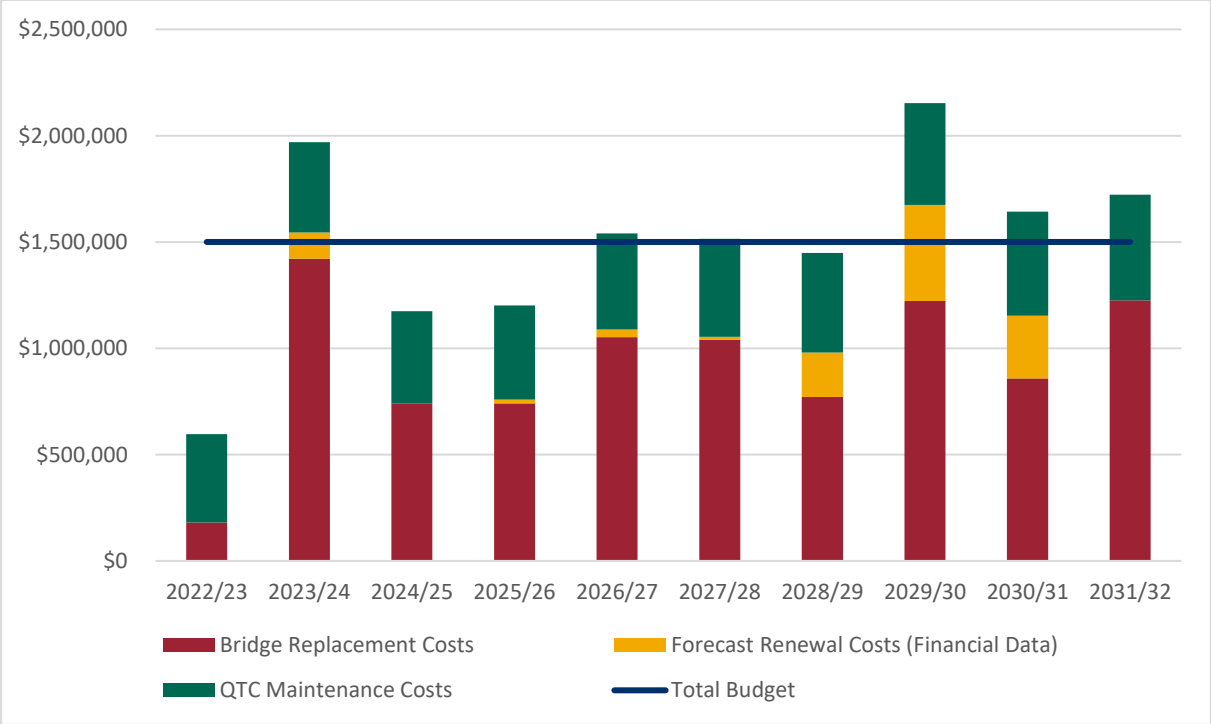
Disposal includes any activity associated with the disposal of a decommissioned asset including sale, demolition or relocation. There are no plans to dispose of any bridges within this AMP.

**Summary of asset forecast costs**

The financial projections from this asset plan are shown in Figure 5.5.3. 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 below on what the gap represents and what actions can be undertaken to reduce this gap.

***Figure 5.5.3: Lifecycle Summary***




All figure values are shown in current day dollars.

In summary, based on current data in the above graphs, there is a gap between the costs required and the available budget in future years. There are currently no major culvert replacements budgeted for in the above graph. It is recommended that funding be increased in the operational budget to undertake these inspections.

Based on current condition/load limit assessments of the TRC bridges, it is projected that several major culverts will require replacement in the future years as Level 2 inspections are undertaken. As these projects are

identified, they will be included in future capital works programs which will lead to a reduction in the gap between budget and replacement cost.

## 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'[9].

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. 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 | Failure Mode | Impact |
|---|---|---|
| Bridge & Major Culverts | Bridge or Major Culvert Collapse | The road would be closed until the bridge or major culvert is replaced, causing significant inconvenience/isolation to residents, tourists and commercial operators. |
| Bridge & Major Culvert | Load Limit Placed on Bridge or Major Culvert | Heavy Vehicles required to use alternative routes adding costs to operators. Operators required to apply/pay for permit to cross bridge or major culvert where no alternative access is available. |

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.

[9] ISO 31000:2009, p 2

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

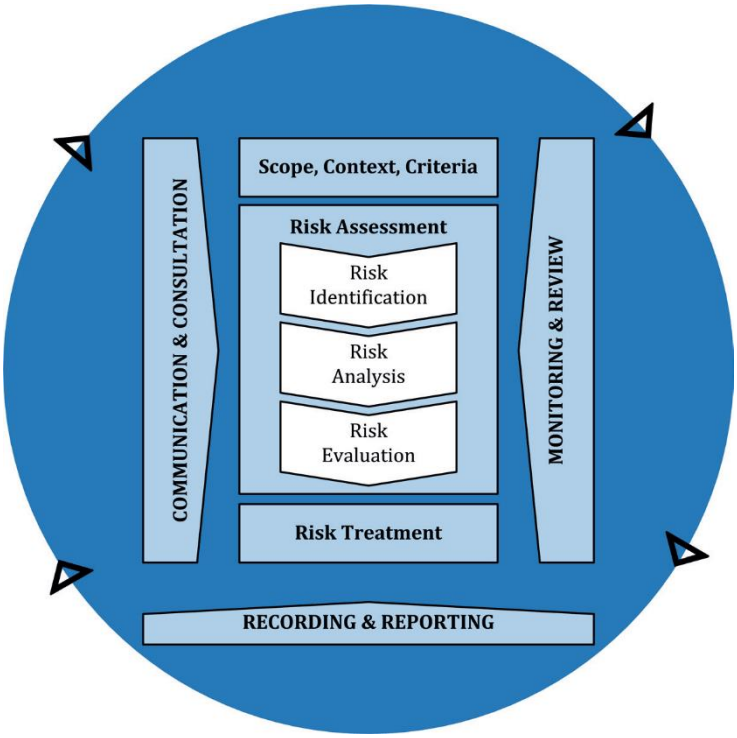



***Fig 6.2 Risk Management Process – Abridged***
*Source: ISO 31000:2018, Figure 1, p9*

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[11] 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 Corporate Risk register. 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 Council.

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

*Table 6.2: Risks and Treatment Plans*

| Service or Asset at Risk | What can Happen | Risk Rating (VH, H) | Risk Treatment Plan | Residual Risk * | Treatment Costs |
|---|---|---|---|---|---|
| Load Limited Bridges & Major Culvert | Bridge Collapse | High | Replace all Load Limited bridge over 10 yrs based on Overall Risk | Low | $16,753,410 |
| Bridges & Major Culvert | Maintenance Budget does not meet asset maintenance requirements as determined by Level 1 Inspections | High | Maintenance budget development to be directly linked to requirements determined by Level 1 Inspections. | Low | $200,000/yr |
| Bridges & Major Culvert | Level 2 Inspection not undertaken in a timely matter. | High | Level 2 Bridge Inspection program to be developed in line with Overall Risk Rating for bridges and Major Culverts. (To be included in improvement plan) | Low | $240,000/yr |
| Bridges & Major Culvert | Renewal budget does not meet asset renewal requirements as determined by Level 2 Bridge Inspections and Service Level Standard defined with Transport Strategy. (yet to be determined) | High | Renewal budget development to be directly linked to requirements determined by Level 2 Inspections and Service Level Standard defined with Transport Strategy. | Low | TBD |

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

## 6.3 Infrastructure Resilience Approach

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

Resilience is built on aspects such as response and recovery planning, financial capacity, climate change 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***

| Threat / Hazard | Current Resilience Approach |
|---|---|
| Flood/Bridge & Major Culvert Overtopping | Build future bridges & major culverts above flood level where possible. Place road closure signs when bridges & major culverts are flooded. |
| Flood/Bridge & Major Culvert Damage | Build future bridges & major culverts above flood level where possible. Place road closure signs when bridges & major culverts are flooded. |
| Bridge & Major Culvert Collapse | Inspections to ascertain bridge condition rating and any maintenance/repairs required. |

## 6.4 Service and Risk Trade-Offs

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

### 6.4.1 What we cannot do

Based on current funding levels, there is insufficient funds to undertake Level 2 Condition Assessments on bridges and major culverts on routine basis i.e. every 4 yrs. This exposes Council to the risk of structures failing i.e. collapsing without Council knowing the condition of its 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:

- Reduction in service (i.e. Load Limit) will occur to the travelling public
- Closure of Asset will occur causing the public to find alternative access

### 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:

- Reduction in service (i.e. Load Limit) will occur to the travelling public
- Collapse of structure with potential risk of life to travelling public

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

## 7.0 FINANCIAL SUMMARY

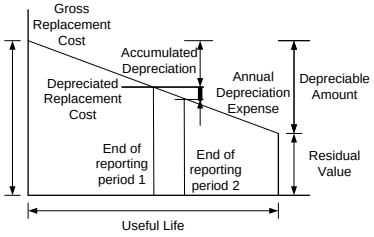
This section contains the financial requirements resulting from the information presented in the previous sections of this AMP. The financial projections will be improved as the discussion on desired levels of service and asset performance matures.

### 7.1 Financial Statements and Projections

#### 7.1.1 Asset valuations

The best available estimate of the value of assets included in this AMP are shown below. The assets are valued at Fair Value.

| | |
|---|---|
| Current (Gross) Replacement Cost | $63.4m |
| Depreciable Amount | $63.4m |
| Depreciated Replacement Cost[12] | $36.4m |
| Annual Depreciation | $825k |




#### 7.1.2 Sustainability of service delivery

There are two key indicators of sustainable service delivery that are considered in the AMP 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[13] 139%

The Asset Renewal Funding Ratio is an important indicator and illustrates that over the next 10 years we expect to have 139% of the funds required for the optimal renewal of assets.

**Note**: It is expected that the above funding ratio would reduce significantly in the next couple of years if the tasks contained within the Improvement Plan (Level 2 & 3 Bridge Inspections) are implemented within Council.

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

**Medium term – 10-year financial planning period**

This AMP 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 10 year period to identify any funding shortfall.

The forecast operations, maintenance and renewal costs over the 10 year planning period is $1,598,727 on average per year.

The proposed (budget) operations, maintenance and renewal funding is $1,381,158 on average per year giving a 10 year funding shortfall of $217,112 per year. This indicates that 86% of the forecast costs needed to

[12] Also reported as Written Down Value, Carrying or Net Book Value.
[13] AIFMM, 2015, Version 1.0, Financial Sustainability Indicator 3, Sec 2.6, p 9.

provide the services documented in this AMP are accommodated in the proposed budget. This excludes acquired assets.

**Note**: It is expected that the above funding ratio would reduce significantly in the next couple of years if the tasks contained within the Improvement Plan (Level 2 & 3 Bridge Inspections) are implemented within Council.

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 AMP and ideally over the 10 year life of the Long-Term Financial Plan.

### 7.1.3 Forecast Costs (outlays) for the 10 Year Capital Plan

Table 7.1.3 shows the forecast costs (outlays) for the 10 Year Capital Plan.

Forecast costs are shown in 2021-dollar values.

***Table 7.1.3: Forecast Costs (Outlays) for the Long-Term Financial Plan***

| Year | Forecast Acquisition | Forecast Operation | Forecast Maintenance | Forecast Renewal | Forecast Disposal |
|---|---|---|---|---|---|
| 22/23 | $0 | $0 | $416,668 | $180,000 | $0 |
| 23/24 | $0 | $0 | $425,001 | $1,422,000 | $0 |
| 24/25 | $0 | $0 | $433,501 | $741,000 | $0 |
| 25/26 | $0 | $0 | $442,171 | $741,000 | $0 |
| 26/27 | $0 | $0 | $451,015 | $1,053,000 | $0 |
| 27/28 | $0 | $0 | $460,035 | $1,040,250 | $0 |
| 28/29 | $0 | $0 | $469,236 | $770,250 | $0 |
| 29/30 | $0 | $0 | $478,620 | $1,222,860 | $0 |
| 30/31 | $0 | $0 | $488,193 | $858,500 | $0 |
| 30/31 | 0 | $0 | $497,957 | $1,224,900 | $0 |

Forecast Renewal Costs in above table are the sum of Bridge Replacement Costs from Budget and Renewals from Financial Asset Register.

## 7.2 Funding Strategy

The proposed funding for assets is outlined in the Council's 10 Year Capital Plan.

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

## 7.3 Valuation Forecasts

Asset values are forecast to increase as assets are upgraded i.e. Timber bridges are replaced with Concrete bridges. There is also likely to be an increase to the Asset values as existing bridges are replaced with bridges constructed to meet the Desired Standards contained within the Transport Strategy i.e. Single Lane bridge replaced with a Dual Lane bridge.

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.

## 7.4 Key Assumptions Made in Financial Forecasts

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

Key assumptions made in this AMP are:

- All Values are in 2020/21 Dollars
- Maintenance forecasts have been adjusted annually for inflation at 2%
- Financial Asset data extracted from Asset Re-Valuation data
- Replacement program developed using a combination of Star Rating (Asset Criticality) and Function Score (Load Limit)

Accuracy of future financial forecasts may be improved in future revisions of this plan by:

- Undertaking Level 2 Bridge Inspections in a timely manner to better understand the renewal requirements of the bridges
- Consulting with community and other stakeholders to finalise the levels of service to be delivered
- Running modelling scenarios for different service levels outcomes

## 7.5 Forecast Reliability and Confidence

The forecast costs, proposed budgets, and valuation projections in this AMP 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[14] in accordance with Table 7.5.1.

***Table 7.5.1: Data Confidence Grading System***

| Confidence Grade | Description |
|---|---|
| A. Highly reliable | 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. Reliable | Data based on sound records, procedures, investigations and analysis, documented properly but has minor shortcomings, for example some of the data is old, some documentation is missing and/or reliance is placed on unconfirmed reports or some extrapolation. Dataset is complete and estimated to be accurate ± 10% |
| C. Uncertain | 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. Very Uncertain | 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. Unknown | None or very little data held. |

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

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

***Table 7.5.2: Data Confidence Assessment for Data used in AMP***

| Data | Confidence Assessment | Comment |
|---|---|---|
| Demand drivers | B. Reliable | Standard Resource used for TRC (Economy.ID). |
| Growth projections | B. Reliable | Standard Resource used for TRC (Economy.ID). |
| Acquisition forecast | A. Highly reliable | High confidence of Council not acquiring any new bridges over the planning period. |
| Operation forecast | N/A | Bridges have no operational expense. |
| Maintenance forecast | C. Uncertain | Maintenance budgets based on overall budget and QTC Model. Actual maintenance budget requirements to be based on Level 1 Bridge Inspections and linked to Star Rating of Asset. |
| Renewal forecast<br>- Asset values | C. Uncertain | Renewal values uncertain as information is driven by financial asset data and is based on like for like renewal. |
| - Asset useful lives | B. Reliable | Benchmarked |
| - Condition modelling | D. Very Uncertain | Uncertain condition data collected in previous Level 2 Bridge Inspections. Further investment required to improve the confidence of the data. |
| Disposal forecast | A. Highly reliable | High confidence of Council not disposing any new bridges over the planning period |

The estimated confidence level for and reliability of data used in this AMP is considered to be medium.

# 8.0 PLAN IMPROVEMENT AND MONITORING

## 8.1 Status of Asset Management Practices[15]

### 8.1.1 Accounting and financial data sources

This AMP utilises accounting and financial data. The source of the data is the financial asset register with technology one software package.

### 8.1.2 Asset management data sources

This AMP also utilises asset management data. The source of the data is the operational asset register with Council's asset management software package.

## 8.2 Improvement Plan

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

***Table 8.2: Improvement Plan***

| Task | Task | Responsibility | Resources Required | Timeline |
|---|---|---|---|---|
| 1 | Level 1 Bridge Inspections & Maintenance is undertaken in line with Draft Bridge & Major Culvert Maintenance Management Plan. | Coordinator Maintenance | Internal Staff | TBA |
| 2 | Develop detailed maintenance program based on maintenance inspections, criticality of bridges and Service Levels | Coordinator Maintenance | Internal Staff | TBA |
| 3 | Generate and co-ordinate yearly Level 2 Bridge Inspection program for bridges and major culverts. | Roads & Transport Asset Management Officer | External Contractor | Annual |
| 4 | Develop detailed renewals program based on condition assessments, criticality of bridges and Service Levels for future budget consideration. | Roads & Transport Asset Management Officer | Internal Staff | Annual |
| 5 | Generate and coordinate Level 3 Bridge Inspections for bridge and major culverts | Roads & Transport Asset Management Officer | External Contractor | Annual |
| 6 | Develop budget estimates for bridge and major culvert replacements based on structural assessments, criticality of bridges and Service Levels for future budget consideration | Roads & Transport Asset Management Officer | Internal Staff | Annual |
| 7 | Develop link between Finance, MMS & Asset Management. | Roads & Transport Asset Management Officer & Asset Accountant | Internal Staff | Annual |

[15] ISO 55000 Refers to this the Asset Management System

## 8.3 Monitoring and Review Procedures

This AMP 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 AMP will be reviewed and updated annually to ensure it represents the current service level, asset values, forecast operations, maintenance, renewals, upgrade/new and asset disposal costs and proposed budgets. These forecast costs and proposed budget will be incorporated into the 10 Year Capital Plan once completed.

The AMP has a maximum life of 4 years and is due for complete revision and updating in 2026.

## 8.4 Performance Measures

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

- The degree to which the required forecast costs identified in this AMP are incorporated into the 10 Year capital plan,
- The degree to which the 1-5 year detailed works programs, budgets, business plans and corporate structures take into account the 'global' works program trends provided by the AMP,
- The degree to which the existing and projected service levels and service consequences, risks and residual risks are incorporated into the Strategic Plan and associated plans,
- The Asset Renewal Funding Ratio achieving the Organisational target (this target is often 1.0).

## 9.0 REFERENCES


- IPWEA, 2006, '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.
- IPWEA, 2015, 2nd edn., 'Australian Infrastructure Financial Management Manual', Institute of Public Works Engineering Australasia, Sydney, www.ipwea.org/AIFMM.
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- IPWEA, 2012 LTFP Practice Note 6 PN Long-Term Financial Plan, Institute of Public Works Engineering Australasia, Sydney
- ISO, 2018, ISO 31000:2018, Risk management – Guidelines
- TRC Corporate Plan 2021 - 2026
- TRC Transport Strategy 2019 – 2024
- TRC Strategic Asset Management Plan 2016
- TRC Annual Operation Plan 2021-22
- TRC Annual Budget 2021-22
- Draft 10 yr Capital Plan 2022/23
- idcommunity, population and demand forecast, https://profile.id.com.au/tablelands

## 10.0APPENDICES

## Appendix A Maintenance Forecast

### A.1 – Maintenance Forecast Assumptions and Source

The maintenance budget figures have been based on the current financial year's allocation, whilst the required figures are based on the QTC whilst of life cost model.

### A.2 – Maintenance Forecast Summary

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*Table A2 - Maintenance Forecast Summary*

| Year | Maintenance Forecast (QTC Model) | Maintenance Budget | TRC Maintenance Estimate |
|---|---|---|---|
| 2022/23 | $416,668 | $93,636 | $440,000 |
| 2023/24 | $425,001 | $95,509 | $448,800 |
| 2024/25 | $433,501 | $97,419 | $457,776 |
| 2025/26 | $442,171 | $99,367 | $466,932 |
| 2026/27 | $451,015 | $101,355 | $476,270 |
| 2027/28 | $460,035 | $103,382 | $485,796 |
| 2028/29 | $469,236 | $105,449 | $495,511 |
| 2029/30 | $478,620 | $107,558 | $505,422 |
| 2030/31 | $488,193 | $109,709 | $515,530 |
| 2031/32 | $497,957 | $111,904 | $525,841 |

## Appendix B Renewal Forecast Summary

### B.1 – Renewal Forecast Assumptions and Source

Renewals are based on a combination of replacements using data from TRC Asset Management System and data from TRC Financial Asset Register.

### B.2 – Renewal Forecast Summary

***Table D2 - Renewal Forecast Summary***

| Year | Renewal Forecast | Renewal Budget |
|---|---|---|
| 2022/23 | $180,000 | $188,000 |
| 2023/24 | $1,422,000 | $1,500,000 |
| 2024/25 | $741,000 | $1,500,000 |
| 2025/26 | $741,000 | $1,500,000 |
| 2026/27 | $1,053,000 | $1,500,000 |
| 2027/28 | $1,040,250 | $1,500,000 |
| 2028/29 | $770,250 | $1,500,000 |
| 2029/30 | $1,222,860 | $1,500,000 |
| 2030/31 | $858,500 | $1,500,000 |
| 2031/32 | $1,224,900 | $1,500,000 |

### B.3 –Renewal Plan

Appendix 10 Year Report

| Road Name & Locality | Creek Crossing | Renewal Budget |
|---|---|---|
| Webster Rd, Wondecla | Wondecla Ck | $312,000 |
| Wrights Creek Rd, Lake Eacham | Wrights Ck | TBA |
| Turner Rd, Ravenshoe | Vine Ck | $1,100,000 |
| Clarkes Trk, Jaggan | Ithaca Rv | $741,000 |
| Bew Rd, Ravenshoe | Watercourse Minor | $429,000 |
| Cashmere-Kirrama Rd, Kirrama | Big Swamp Ck | $312,000 |
| Wooroora Rd, Millstream | Gully | $390,000 |
| Silver Valley Rd, Silver Valley | Woolamin Ck | $663,000 |
| Lindsay Rd, Glen Allyn | Johnstone Rv | $663,000 |
| Morganbury Rd, Walkamin | Irrigation Channel | $377,250 |
| Ross Rd, Evelyn | Weir Ck | $358,000 |
| Glue Pot Rd, Wondecla | North Wondecla Ck | $412,250 |
| Uramo Rd, Innot Hot Springs | Herbert Rv | $364,360 |
| Whiting Rd, Beatrice | Beatrice Rv | $858,500 |
| Kaban Rd, Kaban | Station Ck | $410,000 |
| Nymbool Rd, Mt Garnet | Eastine Ck | $448,500 |
| Go Tack Rd, Evelyn | Coolabbi Ck | $428,000 |

| | | |
|---|---|---|
| Middlebrook Rd, Middlebrook | Middlebrook Ck | $796,900 |

## Appendix C Budget Summary by Lifecycle Activity

Renewals are based on the Financial Asset Register while Bridge Replacement is based on data from TRC Asset Management data.

***Table F1 – Budget Summary by Lifecycle Activity***

| Year | Maintenance | Renewal | Replacement | Total |
|---|---|---|---|---|
| 2022/23 | $93,636 | $0 | $180,000 | $273,636 |
| 2023/24 | $95,509 | $123,043 | $1,422,000 | $1,640,552 |
| 2024/25 | $97,419 | $0 | $741,000 | $838,419 |
| 2025/26 | $99,367 | $18,233 | $741,000 | $858,600 |
| 2026/27 | $101,355 | $35,902 | $1,053,000 | $1,190,257 |
| 2027/28 | $103,382 | $14,181 | $1,040,250 | $1,157,812 |
| 2028/29 | $105,449 | $209,196 | $770,250 | $1,084,895 |
| 2029/30 | $107,558 | $451,269 | $1,222,860 | $1,781,687 |
| 2030/31 | $109,709 | $295,481 | $858,500 | $1,263,691 |
| 2031/32 | $111,904 | 0 | $1,224,900 | $1,336,804 |

*Note the below budget summary will change as the condition of assets are further investigated.

**Appendix D Inspection Program for TRC Bridges & Major Culverts**

Project Information

# Asset Renewal Estimate

| PROJECT DETAILS | | | |
|---|---|---|---|
| PREPARED BY | | | |
| PROJECT | Level 1, 2 & 3 bridge inspections | | |
| PROJECT NO. | N/A | CLIENT PROJECT NO. | |
| JOB NO. | | | |
| LOCALITY | TRC Shire | | |

| PROJECT SCOPE |
|---|
| Develop an annual budget for the establishment of regular level 1 internal Council inspections, level 2 inspections (external consultants) following recommendations from level 1 inspections and level 3/structural assessments (external consultants) following level 2 inspections. Allowance for Overload Bridge Permit applications on an ad hoc basis and renewal of existing Bridge Overload Permits annually |

| BUDGET | | |
|---|---|---|
| TRC Funding | $ | - |
| Other Funding | $ | - |
| CAPITAL BUDGET | **$** | **-** |

| FUNDING STATUS | NOT FUNDED | | *0* |
|---|---|---|---|

| COST COMPONENT | Unit | Qty | Rate | Total |
|---|---|---|---|---|
| | | | | |
| **Level 1 Bridge Inspections** | | | | |
| Allowance for 100 bridges and 100 major culverts per year<br>1 crew member, 2 structures per day | each | 100 | $380.00 | $38,000.00 |
| Does not allow for any maintenance requirements from<br>level 1 inspections | | | | |
| | | | | |
| | | | | |
| **Level 2 Bridge Inspections** | | | | |
| Allowance for initial 4 year rotational level 2 inspections for 100 bridges<br>and 100 major culverts | each | 50 | $1,500.00 | $75,000.00 |
| | | | | |
| **Level 3 Bridge Inspections** | | | | |
| Allowance for approx. 20% of Level 2 inspections requiring Level 3 | | | | |

| | | | | |
|---|---|---|---|---|
| inspections | each | 10 | $2,500.00 | $25,000.00 |
| | | | | |
| **Level 3 Bridge Maintenance Reports** | | | | |
| Allowance for engineering report for programmed future maintenance/upgrade to infrastructure to maximise asset life | each | 5 | $10,000.00 | $50,000.00 |
| | | | | |
| **Overload Bridge Permit assessments** | | | | |
| Allowance for engineering load limit assessments for vehicles<br>Council funded only (road maintenance/upgrade, single access bridges with lowered load limits) | each | 15 | $800.00 | $12,000.00 |
| | | | | |
| **Overload Bridge Permit renewals** | | | | |
| Engineering assessments for renewal of existing Bridge Overload | | | | |
| Permits | each | 10 | $500.00 | $5,000.00 |
| | | | | |
| | | | | |
| **Total** | | | | $200,000.00 |
| Contingency 20% | | | | $40,000.00 |
| **Estimated Overall Cost** | | | | **$240,000.00** |