Asset Management Plan

Bridges & Culverts

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1. EXECUTIVE SUMMARY

Shoalhaven City Council is responsible for the management of 212 bridges, footbridges, causeways and culverts with a total length of 3,875 m. These assets are of significant importance to the ongoing access of transport and residents throughout the City and hence it is essential that these assets are fit for purpose.

Council has invested significant resources, including the initial R2R grant funding, over the past 6 years to improve the overall condition of the bridge network and this has been successful with most poor condition timber bridges being replaced. The implementation of an annual maintenance program targeted to high priority defects has also assisted in improving the network condition.

Current funding levels are considered satisfactory. However, defect and condition audits are over-due and when undertaken a review of the network condition, the forward renewal program and funding requirements will be required. Staff are currently calling quotations for Level 2 Inspections in accordance with *VicRoads – Roads structures inspection manual 2011.*

1.1. The Purpose of the Plan

Bridges are key elements of the road network and represent a major investment of community resources. Because of their location over natural and other obstacles, any bridge failure may severely restrict road traffic with consequent inconvenience and economic loss to the community.

Council is committed to providing a safe bridge network for use by vehicles and pedestrians with the main objectives being –

- Bridge structure being suitable for the expected vehicle loads
- Bridge width being to standard required for traffic volume and expected pedestrian and/or cycle usage
- Bridge height and/or waterway capacity being suitable to ensure minimal delays during and after storm events and
- Bridge to be free of trip hazards for both cyclists and pedestrians.

Council is committed to ensuring that the network is maintained to a high standard and in a manner that ensures available resources are effectively applied. It is recognized that it is neither reasonable nor practical to target zero defects within the network. However it is an objective to have minimal defects and none that affect bridge integrity.

This Asset Plan will provide background data and management strategies for effectively maintaining and managing the bridge network.

1.2. Asset Description

The Bridges asset type includes all vehicle bridges, causeways, major culverts and pedestrian bridges located within the road reserve or on a designated pedestrian route.

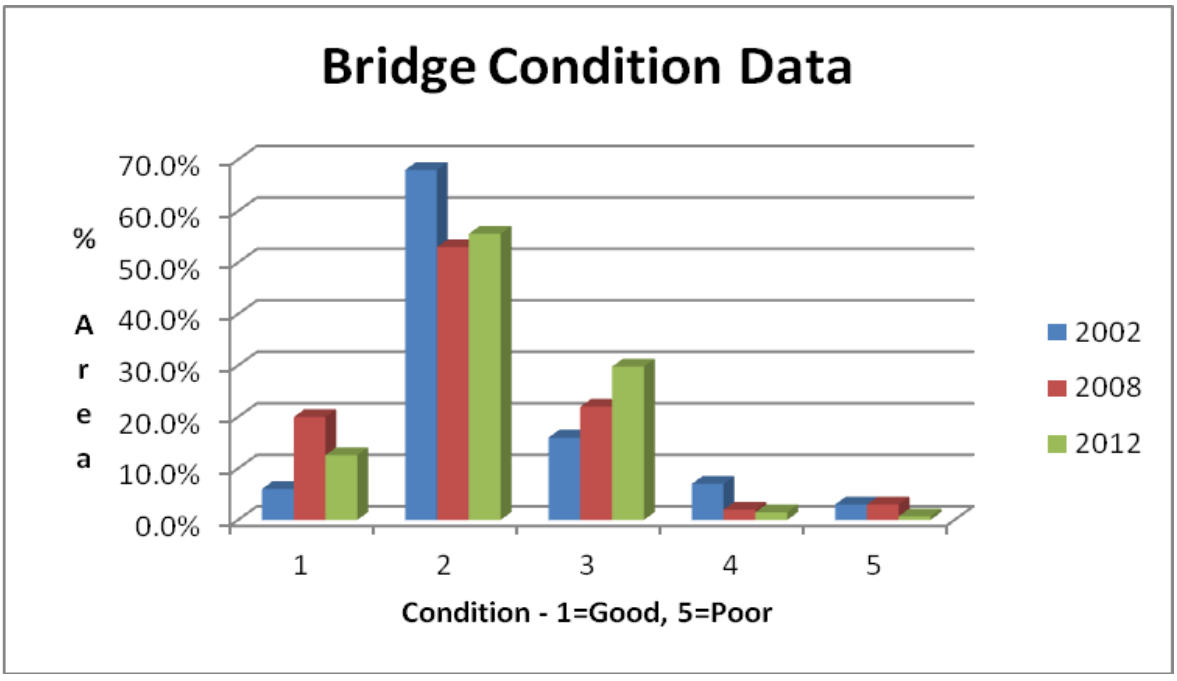
There are a number of pedestrian bridges, viewing platforms and boardwalks provided under recreation and coastal programs. These assets are not considered in this plan but will be maintained and replaced in accordance with the principles of this plan.

There are currently a total of 212 bridges/causeways/major culverts within the road network and recorded in council's asset register. Full details are shown at Appendix 1. The composition of the network is –

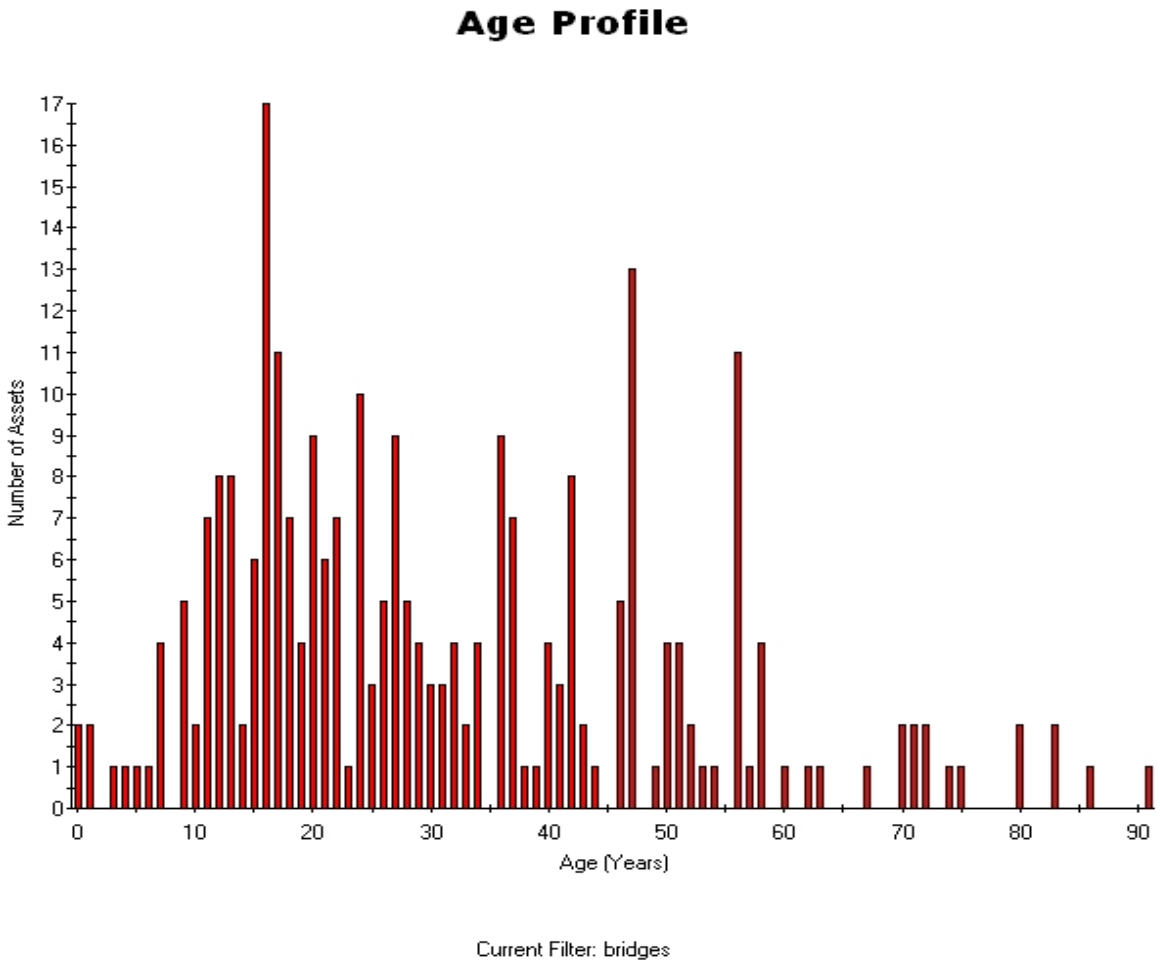
Bridge Type	Number of Structures	Total Length (m)	Total Area (sqm)
Bridges Concrete/Steel	86	2,178	16,522
Bridges Timber	25	325	1,560
Causeways	37	602	2,728
Major Culverts	49	472	4,854
Pedestrian Bridges	15	298	515
Totals	212	3,875	26,179

The condition of the bridge network for 2002, 2008 and 2012 is shown in the following chart. The assignment of condition is an overall assessment by the bridge inspector and is not based on a measurable ranking of the various bridge components. It is a required action to list bridges into components and to assess the condition of the individual components. This will then allow for a reviewed overall condition for the bridges.

Staff are currently seeking to engage an external specialist to undertake Level 2 inspections to all bridges. These inspections will provide updated data on the condition of the bridges and a forward program for repairs and renewals.



The age profile for all bridges is shown in the following chart.



1.3. Levels of Service

The 2009 Bridge AMP identified the following 'ideal' Levels of Service –

- Programmed Maintenance
  - Value of P5 defects - $0
  - Value of P4 defects - <$50,000
    - (P5=Urgent undertake as soon as resources permit; P4=undertake within 1 year)
- Urgent Works – as required
- Renewal – as required

It is considered that these Levels of Service are still applicable as the 'sustainable' and 'ideal' Levels of Service.

1.4. Future Demand

There is no identified need for the provision of new bridges unless as part of a new road link (e.g. Bishop Dr, North Nowra Link Road) and the provision of new bridges is not considered in this Plan as they would be funded separately as part of the project for the new road link.

However, there are no current needs to widen bridges for traffic capacity and safety and this aspect would generally be undertaken when structural replacement is required. There

are a number of customer requests to improve storm capacity of causeways to minimize closures and improve safety. An audit of all causeways has been undertaken and a draft "Causeway Upgrade Program" identified (refer Attachment 3).

It has been identified, on safety grounds, that there is a need to implement a strategy to improve/install guardrail at bridge approaches. This is in addition to the current annual Guardrail Program which is primarily targeted to protect motorists from steep drops.

1.5. Lifecycle Management Plan

1.5.1. Maintenance Plan

External customer requests for action regarding bridges are generally low in number with the following numbers –

- 2010/11 7
- 2011/12 7
- 2012/13 8 (to mid-May,2013)

To maximize the benefits from available funding an annual "programmed maintenance" list of works is prepared and forwarded to the internal service provider for implementation. The "programmed maintenance" list of works is derived from the register of prioritized defects identified by the regular 'Defect and Condition Inspections' (Level 2 Inspections).

Previous modeling of identified defects indicated that an annual funding level of $115,000 was required to undertake priority defects arising from inspections. It is assumed that a similar funding level is still required.

The proposed Level of Service is for all structures to be fit for use. The 'Sustainable' Level of Service and 'Ideal' Level of Service are assumed to be identical.

An allowance also needs to be made for urgent and routine works arising from hazards identified between defect inspections arising from customer reporting and risk management inspections. These works include activities such as damaged signs, blocked drainage, damaged railing, gravel on decking and tree obstruction. An annual allowance of $50,000 is required for these minor urgent and routine activities.

It has been past practice to undertake replacement of timber bridges (when required) with a non-timber structure. However, it is now proposed to undertake cost benefit assessment for each renewal project as it is likely that a timber bridge will meet required service standards for the lower traffic roads and at a lower whole of life cost.

1.5.2. Renewal Plan

A draft 5 Year Bridge Capital Works Program (2013/18) has been developed (Appendix 2) and consists of the following sub-programs –

- Vehicular bridge renewal
- Pedestrian bridge renewal
- Causeway enhancement/renewal/new
- Bridge guardrail

The draft 5 Year Bridge Capital Works Program is based on funding forecast in the current 20013/23 10 Year Financial Plan. The draft 5 Year Program will need to be varied if

funding availability forecasts are not achievable and may need to be varied following the outcome of proposed Level 2 inspections.

A draft Causeway Upgrade Strategy has been developed to prioritise works based on a risk management approach and the Strategy is included at Appendix 3. This Strategy is the basis for the projects included in the 5 Year Bridge Capital Works Program and includes over the next 5 years for the replacement or enhancement of the causeways at Evelyn and Parnell Rds, Tomerong.

The total replacement cost of the bridge network is about $76,215,000 with an annual depreciation of $1,080,000. The age distribution profile is shown in Section 5.1.3 and the information suggests that about 8 structures may need to be renewed in the next 10 years. The data also suggests that an increasing number of structures will require replacement after about 20 years.

The draft 5 Year Capital Program (Appendix 2) indicates all structures that are currently identified for renewal in the short-term. It is expected that additional renewal needs will be identified following the next Level 2 inspections.

The need for significant repairs/part renewal has been identified for Jacob's Drive, Sussex Inlet and Wheelbarrow Rd, Morton. These works have been listed in the draft 5 Year Capital Program.

The draft 10 Year Financial Plan indicates a total funding for bridge renewal and major repairs of $6,936,000 for the period 2013/23. This level of funding is considered satisfactory but will need to be significantly increased after 20 years.

1.5.3. Creation / Acquisition / Augmentation Plan

The only identified need for new bridges is as part of new major (link) road projects such as the North Nowra Link Road, East Nowra Sub-arterial and Bishop Dr, Mollymook. These new projects are considered as integral to the major road project and are not considered under this Plan.

The need to provide concrete causeway on existing roads has been identified for three locations on Upper Kangaroo River Rd.

The need to provide guardrail on approaches has been identified for four locations.

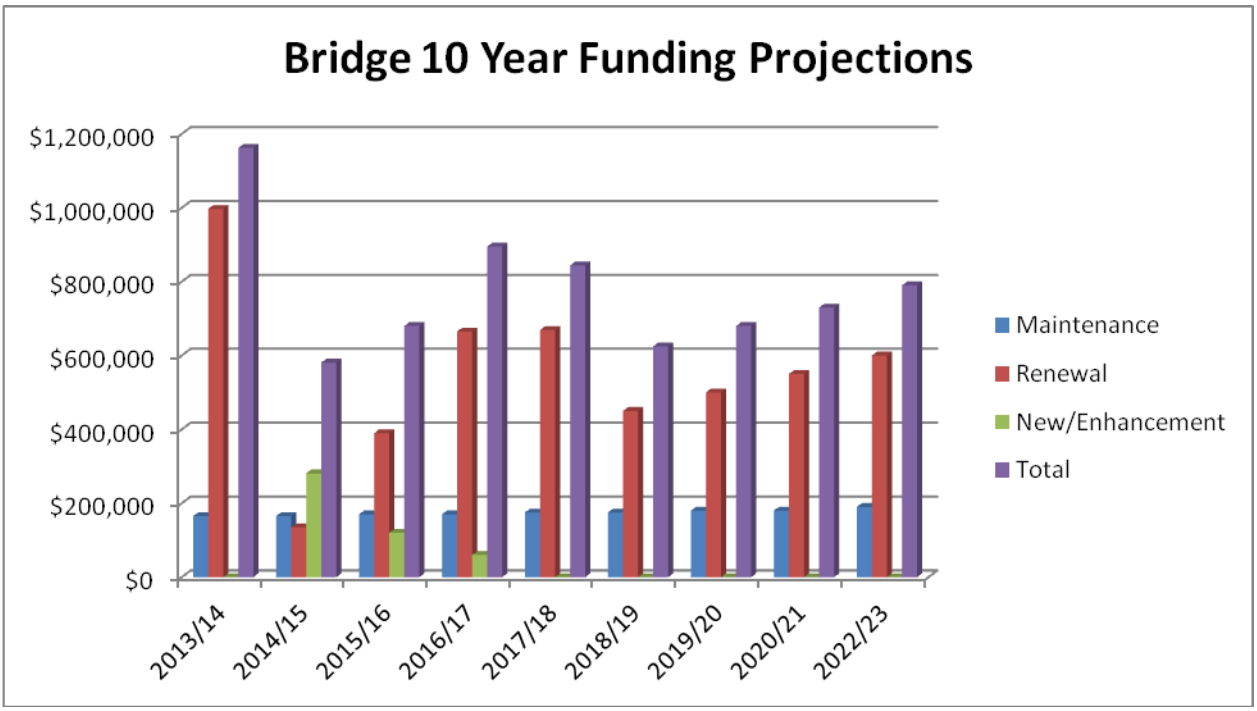
Causeway and guardrail projects are included in the draft 5 Year Capital Program (Appendix 2).

1.5.4. Standards and Specification

Waterway Design to be in accordance with Austroads *A guide to the Hydraulic Design of Bridges, Culverts and Floodways.* Bridge design to conform to *AUSTROADS Bridge Design Code 1992.*

1.6. Financial Summary

Funding projections for the next 10 years are shown on the following chart. It is to be noted that the funding levels are within predicted levels included in the 10 year Financial Plan. Funding needs will need to be reviewed following the next Level 2 Inspections.



1.7. Asset Management Practices

The existing management practices of undertaking regular defect and condition audits and preparing annual 'programmed' maintenance work lists is satisfactory. However, audits are overdue resulting in inadequate condition data. Issues have arisen at a couple of locations due to this lack of information. It is essential that regular audits continue. Ensuring that the audits conform to the VicRoads Level 2 inspections guidelines is a positive step.

Asset data is contained in Council's corporate Asset Register. Council have purchased specialist bridge management software to improve managing and monitoring the bridge network. Implementation of the new software is in progress.

1.8. Monitoring and Improvement Programme

The following table indicates actions to improve this Plan.

Task No	Task	Responsibility	Resources Required	Timeline
1	Undertake Level 2 Inspections to all bridges including prioritised and costed defect list	Roads Asset Manager	External consultant	August, 2013
2	Review residual lives for all structures	Roads Asset Manager	Existing staff	April, 2014
3	Finalise the componentisation of structures and include components and their condition in the asset register	Roads Asset Manager & Facilities and Asset Manager	Existing staff	September, 2013
4	Review specifications and levels of service for causeways including storm event capacity and review the Causeway Strategy as required.	Roads Asset Manager	Existing staff	June, 2014

The following measures can be used as a guide to monitor performance of the Bridge/Culvert Program -

- Annual number of community action requests (currently 7 - 2011/12)
- Value of P4 & P5 defects (data currently not available but desired Level of Service is for <$50,000))
- Extent of Bridges/Structures in Condition 3 or better. The measure is 97.8% as at 30/06/2012.

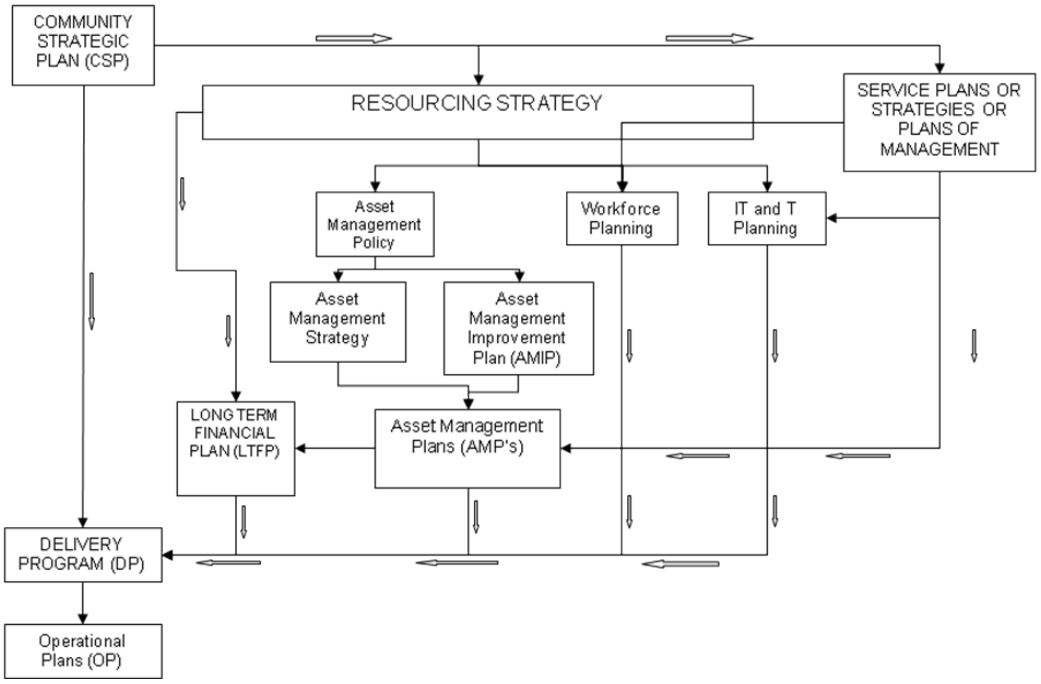
2. INTRODUCTION

2.1. Background

This Asset Management Plan (AMP) is to assist Council to meet its goals and objectives in a way that best serves the community. It provides a framework for future management of Bridges within the Council area based on current and historical information.

Council has approximately thirty (30) Asset Management Plans which are divided based on each asset type. The following flow chart indicates the role Asset Management Plans play within Council's integrated planning framework.

This Asset management Plan only applies to Bridges located within road reserves or pedestrian bridges along designated pedestrian/cycle pathways through public reserves. It is also to be noted that Council is not responsible for Bridges located within the State Highway networks of Moss Vale Rd and the Princes Highway.



2.2. Goals and Objectives of Asset Ownership

Bridges are key elements of the road network and represent a major investment of community resources. Because of their location over natural and other obstacles, any bridge failure may severely restrict road traffic with consequent inconvenience and economic loss to the community.

Council is committed to providing a safe bridge network for use by vehicles and pedestrians with the main objectives being –

- Bridge structure being suitable for the expected vehicle loads
- Bridge width being to standard required for traffic volume and expected pedestrian and/or cycle usage

- Bridge height and/or waterway capacity being suitable to ensure minimal delays during and after storm events and
- Bridge to be free of trip hazards for both cyclists and pedestrians.

Council is committed to ensuring that the network is maintained to a high standard and in a manner that ensures available resources are effectively applied. It is recognized that it is neither reasonable nor practical to target zero defects within the network. However it is an objective to have minimal defects and none that affect bridge integrity.

The desired situation is that the annual capital and maintenance programs allocate sufficient resources to ensure these objectives are obtained.

2.3. Plan Framework

The key guiding documents for this AMP are:

Council's *Asset Management Policy*

The policy is used as a base of principles and requirements to create an AMP that is in accordance with the organisation's strategic plan and following the guidelines of the 2011 International Infrastructure Management Manual.

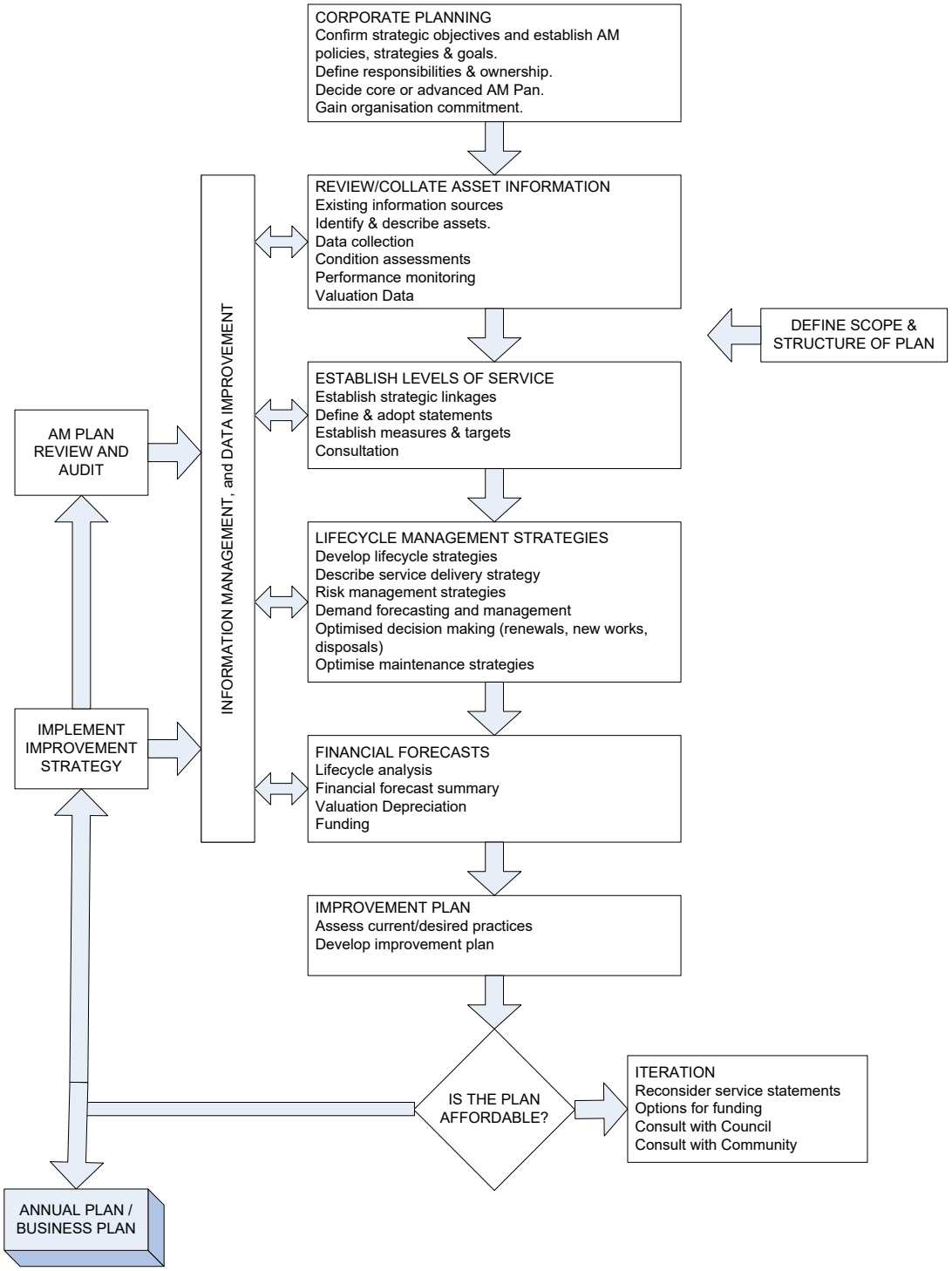
Council's *Asset Management Strategy*

A strategy for asset management covering development and implementation of plans and programs for asset creation, operation, maintenance, rehabilitation/replacement, disposal and performance monitoring to ensure desired level of service and other operational objectives are achieved at optimum cost.

The basic key elements of the AMP consist of:

- Level of service – specifying 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 services
- Plan Improvement and Monitoring – how the plan will be monitored to ensure it is meeting Council's objectives

A road map for preparing an asset management plan is shown below:



Road Map for preparing an Asset Management Plan
Source: IPWEA, 2011, IIMM, Fig 1.5.1, p 1.11.

2.4. Core and Advanced AM

This asset management plan is prepared as a 'core' plan in accordance with the *International Infrastructure Management Manual, 2011.* It is prepared to meet minimum 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 plan will move towards 'advanced' asset management using a 'bottom up' approach for gathering asset information to support the optimisation of activities and programs to meet agreed service levels.

There are limitations in the Plan due to a need to improve condition data and to componentise further the bridge structures. It is also noted that Level 2 Inspections are overdue.

3. LEVELS OF SERVICE

3.1. Customer Research and Expectations

There has been no community consultation with regard to what constitutes satisfactory condition for bridges. However, it is assumed that the community expects bridges to be safe for use with minimal or no disruption due to water levels. Accordingly, the specification for bridge design includes design to the 100 Year Flood Level.

Community consultation particularly with regard to access is undertaken in the development of major projects and the Capital Works Program is publically advertised annually as part of the annual Operational Plan process.

3.2. Strategic and Corporate Goals

The AMP provides clear guidelines for the effective management of the assets owned and by Council. Local Authorities exist principally to supply core services that meet the needs of their communities.

Council's goal in managing assets is to meet the required level of service in a sustainable manner for present and future stakeholders. The key elements to strategic goals of asset management are:

- Demonstrating responsible stewardship;
- Taking a life cycle approach to asset ownership;
- Defining the infrastructure assets physically and financially;
- Providing a defined Level of Service and monitoring the performance against service levels and service expectations;
- Understanding and meeting the demands of growth through demand management and infrastructure investment;
- Managing risks associated with asset failure; and
- Support long term financial planning.

Council objective is to ensure financial strategies underpin Council's asset management policies and strategic. Its goal is to have long term vision for sustainability. In order to do so, the action that can be done is to prepare and review the Council's short and medium term financial plans for Risk Management; Plant & Equipment, Information Technology, Section 94; Asset Management Plans.

3.3. Legislative Requirements

There are no legislative requirements for the provision and maintenance of bridges.

3.4. Current Level of Service

The 2009 Bridge AMP identified the following 'ideal' Levels of Service –

- Programmed Maintenance
  - Value of P5 defects - $0
  - Value of P4 defects - <$50,000
    - (P5=Urgent undertake as soon as resources permit; P4=undertake within 1 year)
- Urgent Works – as required
- Renewal – as required

Level 2 inspections have not been undertaken since 2008 and subsequently there are currently no listed defects. Renewal has generally been undertaken 'as required'. There have been recent delays with the renewal of the bridge on Parma Rd as failure was accelerated by the use of the bridge by overloaded vehicles. This renewal is now underway.

3.5. Desired Level of Service

The desired Level of Service is considered to be the current Level of Service as detailed above.

4. FUTURE DEMANDS

4.1. Demand Forecast

There is no identified need for the provision of new bridges unless as part of a new road link (e.g. Bishop Dr, North Nowra Link Road) and the provision of new bridges is not considered in this Plan as they would be funded separately as part of the project for the new road link.

There are currently no identified needs to widen bridges for traffic capacity and safety and this aspect would generally be undertaken when structural replacement is required. There are a number of customer requests to improve storm capacity of causeways to minimize closures and improve safety. An audit of all causeways was undertaken in 2008 and identified needs were included in the forward capital bridge program.

Also, it was identified, on safety grounds, that there is a need to implement a strategy to improve/install guardrail at bridge approaches. This is in addition to the current annual Guardrail Program which is primarily targeted to protect motorists from steep drops. Identified needs have been included in the forward capital program.

4.2. Changes in Technology

Technology changes are unlikely to impact on service provision except to improve costs. Indicative unit rates will be reviewed regularly to ensure accuracy of financial modelling.

4.3. Demand Impacts on Assets

Demands for bridge services are usually impacted by a number of components which include:

- Population or demographic changes

- Changes in community's expectation
- Changes in usage pattern
- Seasonal variation
- Cyclical variations
- Random variations which cannot be attributed to specific causes
- Changes in vehicle mass limits (e.g. "Last Mile" Programs).

With changes to the composition of rural communities, there appears to be a greater demand for all-weather access. It is recommended that a further review of the impact of water levels on access over causeways be undertaken and a Policy developed for future design specification and program development.

4.4. Demand Management Plan

There is no current Demand Management Plan. Funding is included annually in the Maintenance/Operating Budget to undertake Programmed Maintenance and Urgent Maintenance and capital funding is included for bridge renewal. Further details are given in Section 5.

5. LIFECYCLE MANAGEMENT PLAN

5.1. Background Data

5.1.1. Physical Parameters

There are currently a total of 212 bridges/causeways/major culverts within the road network and recorded in council's asset register. Full details are shown at Appendix 1. The composition of the network is –

Bridge Type	Number of Structures	Total Length (m)	Total Area (sqm)
Bridges Concrete/Steel	86	2,178	16,522
Bridges Timber	25	325	1,560
Causeways	37	602	2,728
Major Culverts	49	472	4,854
Pedestrian Bridges	15	298	515
Totals	212	3,875	26,179

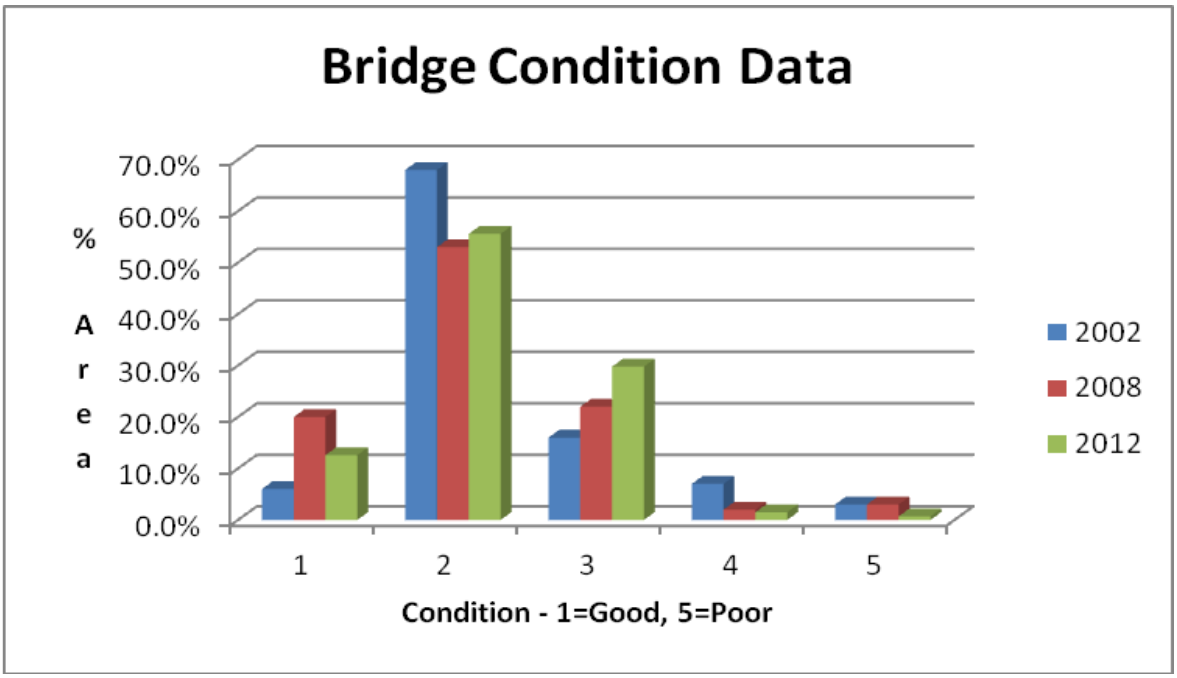
5.1.2. Asset Capacity / Performance

All bridges are fit for purpose. It is proposed to develop a policy with regard to the capacity of causeways to storm events and set design/service levels for access availability.

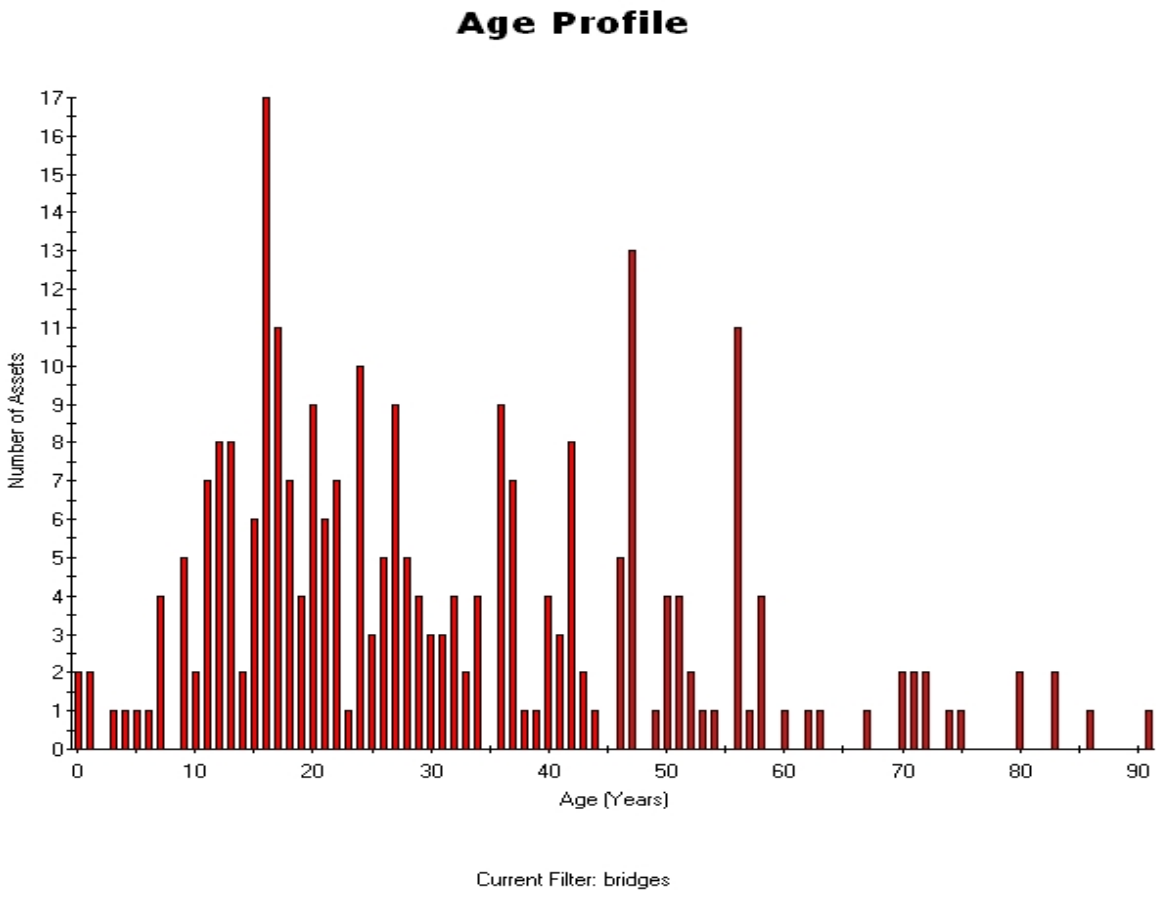
5.1.3. Asset Condition

The condition of the bridge network for 2002, 2008 and 2012 is shown in the following chart. The assignment of condition is an overall assessment by the bridge inspector and is not based on a measurable ranking of the various bridge components. It is a required action to list bridges into components and to assess the condition of the individual components. This will then allow for a reviewed overall condition for the bridges.

Staff are currently seeking to engage an external specialist to undertake Level 2 inspections to all bridges. These inspections will provide updated data on the condition of the bridges and a forward program for repairs and renewals.



The age profile for all bridges is shown in the following chart.



5.1.4. Asset Valuations

A revaluation was completed for bridges in 2012 and was based on the following componentisation. The condition of the components was based on the assessed overall bridge condition. The next revaluation is due in September, 2015 and it will be necessary to inspect all bridges and rate the condition of the individual components for those calculations.

Bridge Type	Bridge Component	Unit Rate per sqm	Useful Life (years)	Comments
Non Timber Road	Abutment	$557	80	15% of total unit rate as adopted by Camden Council and endorsed by SCC auditor.
	Deck/Superstructure	$2,413	80	65% of total unit rate as adopted by Camden Council and endorsed by SCC auditor.
	Sub-structure	$557	80	15% of total unit rate as adopted by Camden Council and endorsed by SCC auditor.
	General/Miscellaneous	$186	80	5% of total unit rate as adopted by Camden Council and endorsed by SCC auditor.
Timber Road	Abutment	$291	20	15% of total unit rate as adopted by Camden Council and endorsed by SCC auditor.
	Deck/Superstructure	$1,296	20	65% of total unit rate as adopted by Camden Council and endorsed by SCC auditor.
	Sub-structure	$291	40	15% of total unit rate as adopted by Camden Council and endorsed by SCC auditor.
	General/Miscellaneous	$116	10	5% of total unit rate as adopted by Camden Council and endorsed by SCC auditor.
Non Timber Pedestrian	Single Unit	$4,031	80	As per 2010 valuations
Timber Pedestrian	Single Unit	$1,061	35	As per Camden Council and endorsed by SCC auditor.
Culvert Box	Single Unit	$1,326	80	As per 2010 valuations
Culvert Steel Arch	Single Unit	$1,697	80	As per 2010 valuations

Culvert Pipe	Single Unit	$1,326	80	As per 2010 valuations
Causeway	Single Unit	$1,061	60	As per 2010 valuations

The outcome of the 2012 re-valuation was –

- Depreciable amount $76,214,840
- Accumulated depreciation $26,171,550
- Depreciated replacement cost $50,043,289
- Annual depreciation $1,078,002

5.1.5. Historical Data

The following table indicates past expenditures.

Activity	2008/09	2009/10	2010/11	2011/12	2012/13 (budget)
Programmed Maintenance	$215,931	$202,742	$28,099	$86,762	$123,000
Urgent Maintenance	$16,658	$5,875	$17,890	$14,978	$87,000
Total Maintenance	$232,589	$208,617	$45,989	$101,740	$210,000
Capital Renewal	$553,384	$615,393	$273,367	$694,941	$705,863
Total	$785,973	$824,010	$319,356	$796,681	$915,863

Age data is available for most bridges and this data is available in the asset register. Where not known the best estimate has been included. Age details are shown in Appendix 1. The asset register also includes identified defects and date of rectification as from about 2001.

5.2. Infrastructure Risk Management Plan

The formally adopted 'Defect and Risk Management Inspection Procedure' specifies the following inspection frequencies:

- Timber bridges – Defect & Condition Inspections – every 2 years
- Steel/Concrete bridges & causeways – Defect & Condition Inspections-every 5 years
- Risk Management Inspections – at same frequency as road pavement

Any hazards identified were prioritised and undertaken as either "Urgent Maintenance" or listed in the Defects Register and undertaken as annual "Programmed Maintenance". The inspections were undertaken in-house by the bridge work supervisor.

Defect and condition inspections have not been undertaken for about 4 years and are over-due. Quotations are being called to undertake 'Level 2' inspections in accordance with the *VicRoads – Roads structures inspection manual 2011.* Based on inspection frequencies in the VicRoads manual it is proposed to undertake inspections as follows –

- Level 1 inspection
    - a brief visual assessment to note any damage or distress of structural components
    - to recommend further investigations if considered warranted
    - these inspections to be undertaken when undertaking inspections of adjacent roadway in accordance with frequencies of the Roads Risk Management procedure
- Level 2 inspections

- Every 2 years for timber structures
- Every 5 years for non-timber structures
- To be undertaken by experienced bridge personnel with practical experience in bridge maintenance or construction.

The outcome of Level 2 inspections shall include a list of defects prioritised as follows –

- P5 – undertake urgently
- P4 – undertake within 12 months
- P3 – undertake within 2 years
- P2 – undertake within 3 to 5 years
- P1 – not required within 5 years

These defects shall be entered into the Asset Register and undertaken based on available funds and priority as 'Programmed Maintenance'.

5.3. Routine Operations and Maintenance Plan

5.3.1. Maintenance Plan

External customer requests for action regarding bridges are generally low in number with the following numbers –

- 2010/11 7
- 2011/12 7
- 2012/13 8 (to mid-May,2013)

To maximise the benefits from available funding an annual "programmed maintenance" list of works will be prepared and forwarded to the internal service provider for implementation. The "programmed maintenance" list of works will be derived from the register of prioritised defects identified by the regular 'Defect and Condition Inspections' (Level 2 Inspections).

Previous modeling of identified defects indicated that an annual funding level of $115,000 was required to undertake priority defects arising from inspections. It is assumed that a similar funding level is still required.

The proposed Level of Service is for all structures to be fit for use. The 'Sustainable' Level of Service and 'Ideal' Level of Service are assumed to be identical.

An allowance also needs to be made for urgent and routine works arising from hazards identified between defect inspections arising from customer reporting and risk management inspections. These works include activities such as damaged signs, blocked drainage, damaged railing, gravel on decking and tree obstruction. An annual allowance of $50,000 is required for these minor urgent and routine activities.

Cathodic Protection has been installed to three bridges – Bawley Point Rd (Willinga Lake), River Rd, Lake Tabourie (Lemon Tree Ck) and Elizabeth Dr, Vincentia (Moona Moona Ck). Regular inspection by external specialists needs to be undertaken to these structures to ensure ongoing satisfactory operation of the protection systems.

5.3.2. Standards and Specifications

Council's design specification states –

All bridges are to be designed for a 1 in 100 year Average Recurrence Intervalunless the benefit/cost is too low. The design is to be checked for effect of probable maximum flood level. Where, however, the approach road but excluding bridge approaches has a flood level below the 1:100 year level
then a lower standard of level may be acceptable.
Small bridges and culverts within rights-of-way shall be designed with appropriate afflux to the 1:5 ARI event. Certification is to be provided stating the bridge can
withstand loadings of up to the 1:100 year storm event.
Waterway Design to be in accordance with Austroads *A guide to the Hydraulic Design of Bridges, Culverts and Floodways.* Bridge design to conform to *AUSTROADS Bridge Design Code 1992.*

It has been past practice to undertake replacement of timber bridges (when required) with a non-timber structure. However, it is now proposed to undertake cost benefit assessment for each renewal project as it is likely that a timber bridge will meet required service standards for the lower traffic roads and at a lower whole of life cost.

5.3.3. Summary of Future Costs

An ongoing annual cost of $165,000 for programmed and unplanned maintenance activities is considered to be required.

5.4. Renewal / Replacement Plan

5.4.1. Renewal Plan

A draft 5 Year Bridge Capital Works Program (2013/18) has been developed (Appendix 2) and consists of the following sub-programs –

- Vehicular bridge renewal
- Pedestrian bridge renewal (no current identified projects)
- Causeway enhancement/renewal/new
- Bridge guardrail

The draft 5 Year Bridge Capital Works Program is based on funding forecast in the current 20013/23 10 Year Financial Plan. The draft 5 Year Program will need to be varied if funding availability forecasts are not achievable and may need to be varied following the outcome of proposed Level 2 inspections.

A draft Causeway Upgrade Strategy has been developed to prioritise works based on a risk management approach and the Strategy is included at Appendix 3. This Strategy is the basis for the projects included in the 5 Year Bridge Capital Works Program and includes over the next 5 years for the replacement or enhancement of the causeways at Evelyn and Parnell Rds, Tomerong.

The total replacement cost of the bridge network is about $76,215,000 with an annual depreciation of $1,080,000. The age distribution profile is shown in Section 5.1.3 and the information suggests that about eight structures may need to be renewed in the next 10

years. The data also suggests that an increasing number of structures will require replacement after about 20 years.

5.4.2. Renewal Standards

Design specifications are show in Section 5.3.2.

5.4.3. Summary of Future Costs

The draft 5 Year Capital Program (Appendix 2) indicates all structures that are currently identified for renewal in the short-term. It is expected that additional renewal needs will be identified following the Level 2 inspections.

The need for significant repairs/part renewal has been identified for Jacob's Drive, Sussex Inlet and Wheelbarrow Rd, Morton. These works have been listed in the draft 5 Year Capital Program.

The draft 10 Year Financial Plan indicates a total funding for bridge renewal and major repairs of $6,936,000 for the period 2013/23. This level of funding is considered satisfactory but will need to be significantly increased after 20 years.

5.5. Creation / Acquisition / Augmentation Plan

The only identified need for new bridges is as part of new major (link) road projects such as the North Nowra Link Road, East Nowra Sub-arterial and Bishop Dr, Mollymook. These new projects are considered as integral to the major road project and are not considered under this Plan.

The need to provide concrete causeway on existing roads has been identified for three locations on Upper Kangaroo River Rd.

The need to provide guardrail on approaches has been identified for four locations.

Additional structures may be provided at no cost to council as part of subdivision consent conditions; there is no forecast as to this aspect.

Causeway and guardrail projects are included in the draft 5 Year Capital Program.

5.5.1. Selection Criteria

The selection criteria is as shown in the 5 Year Capital Program and the Causeway Strategy.

5.5.2. Standards and Specification

Waterway Design to be in accordance with Austroads *A guide to the Hydraulic Design of Bridges, Culverts and Floodways.* Bridge design to conform to *AUSTROADS Bridge Design Code 1992.*

5.5.3. Summary of Future Costs

Future costs are as shown in the draft 5 Year Capital Program

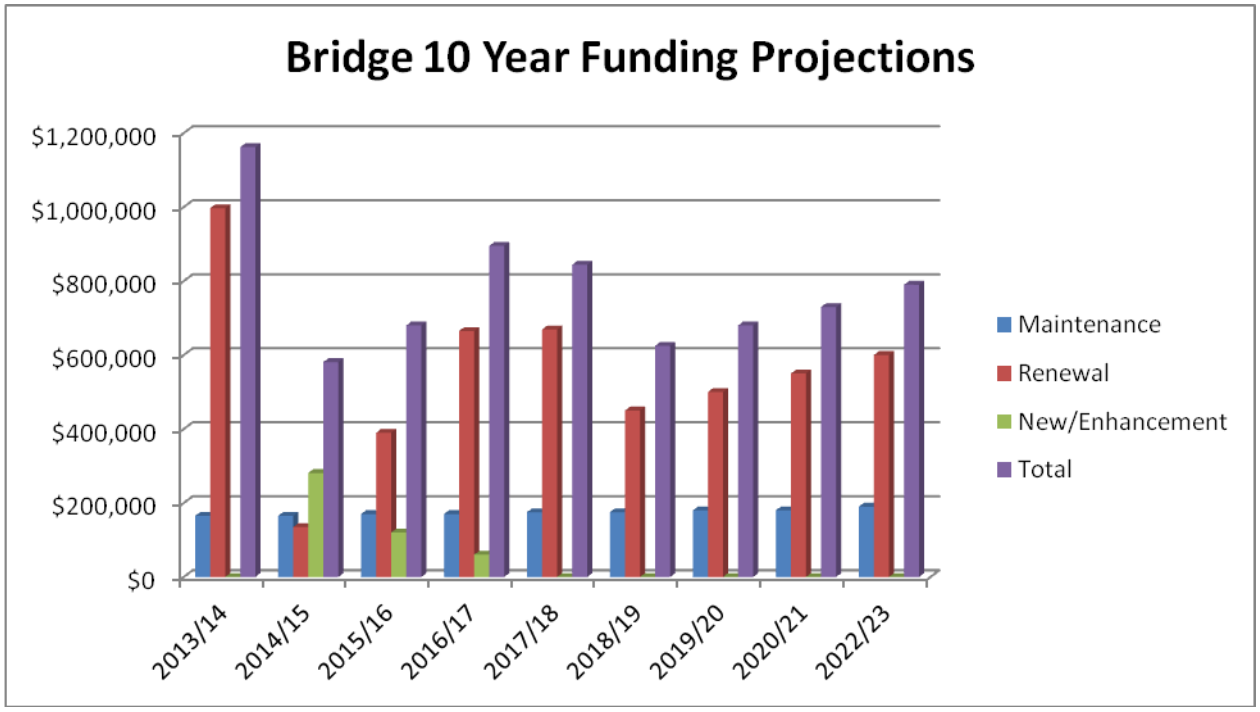
5.6. Disposal Plan

The opportunity to dispose of assets (remove and not replace) is minimal. The option of the replacement (when required) of small bridges with culverts is considered on a case by case basis.

6. FINANCIAL SUMMARY

6.1. Financial Statements and Projections

Funding projections for the next 10 years are shown on the following chart. It is to be noted that the funding levels are within predicted levels included in the 10 year Financial Plan. Funding needs will need to be reviewed following Level 2 Inspections.



6.2. Funding Strategy

The proposed Capital program is $6,936,000 over the next 10 years. Of this $1,640,000 will be funded from Strategic Reserves, $2,216,000 by loan funding and $3,080,000 from general revenue.

6.3. Valuation Forecasts

Details of the last valuation are shown at Section 5.1.4. The methodology will vary for the next re-valuation as separate condition ratings will be undertaken for each bridge component. It is uncertain how this will affect the valuation figures.

6.4. What are the Key Assumptions Made in Financial Forecasts?

The main assumptions for unit costs and useful life made for financial forecasting are –

Structure Type	Unit Cost ($/sqm)	Useful Life
Non-timber road bridge	$3,713	80
Timber road bridge	$1,994	50
Non-timber pedestrian bridge	$4,031	80
Timber pedestrian bridge	$1,061	40
Box Culvert	$1,326	80
Steel Arch Culvert	$1,697	80
Pipe Culvert	$1,326	80

Causeway	$1,061	80

Current condition data requires review and will be updated following the proposed Level 2 inspection. This should also include a review of remaining life as it would appear that Useful Lives greater than currently used are being achieved. The Level 2 inspection will also provide improved information for modelling of annual maintenance requirements.

7. PLAN IMPROVEMENT AND MONITORING

7.1. Status of Asset Management Practices

The existing management practices of undertaking regular defect and condition audits and preparing annual 'programmed' maintenance work lists is satisfactory. However, audits are overdue resulting in inadequate condition data. Issues have arisen at a couple of locations due to this lack of information. It is essential that regular audits continue. Ensuring that the audits conform to the VicRoads Level 2 inspections guidelines is a positive step.

7.2. Improvement Program

The following table indicates actions to improve this Plan.

Task No	Task	Responsibility	Resources Required	Timeline
1	Undertake Level 2 Inspections to all bridges including prioritised & costed defect list	Roads Asset Manager	External consultant	August, 2013
2	Review residual lives for all structures	Roads Asset Manager	Existing staff	April, 2014
3	Finalise the componentisation of structures and include components and their condition in the asset register	Roads Asset Manager & Facilities and Asset Manager	Existing staff	September, 2013
4	Review specifications and levels of service for causeways including storm event capacity and review the Causeway Strategy as required.	Roads Asset Manager	Existing staff	June, 2014

7.3. Monitoring and Review Procedures

There are no review procedures currently identified.

7.4. Performance Measures

The following measures can be used as a guide to monitor performance of the Bridge/Culvert Program -

- Annual number of community action requests (currently 7 - 2011/12)

- Value of P4 & P5 defects (data currently not available)
- Extent of Bridges/Structures in Condition 3 or better. The measure is 97.8% as at 30/06/2012.

8. REFERENCES

- *VicRoads – Roads structures inspection manual 2011*
- The IPWEA, 2011, *International Infrastructure Management Manual.*

9. APPENDICES

Appendix 1 List of Bridges and Other Road Structures
Appendix 2 Draft 5 Year Capital Program
Appendix 3 Causeway Strategy

10. REVIEW

All Asset Management Plans are reviewed on a four yearly cycle and all reviews are undertaken within 12 months of the election of a new Council. The capital program will be reviewed annually in conjunction with the preparation of the draft Operational Plan and Budget

Appendix1 – List of all bridges, culverts and causeways

Asset ID	Asset Description	Condition	Length	Width	Area	Year Built	Load Limit	Creek/River	Structure Type	No. of Spans	Local or Regional	Urban or Rural	Approach Sealed or Unsealed
	BRIDGES - CONCRETE/STEEL												
43485	Bridge-CABBAGE TREE CK-BridgeID 19-YALWAL RD 3.3K-BAMARANG	Good	15.5	9.2	143	30/06/1991	> 75 T	CABBAGE TREE CREEK	PSC precast plank	1	L	R	S
43528	Bridge-SALTWATER-BridgeID 62-YALWAL RD 9.7K-BAMARANG	Good	34.5	9.1	314	15/06/1996	> 75 T	CALYMEA CREEK	RC beams & slab	3	L	R	U
43576	Bridge-MUNDAMIA-BridgeID 144-YALWAL RD 4.5K-BAMARANG	Good	8.2	7.9	65	15/06/1969	> 75 T	MUNDAMIA CREEK	RC slab	1	L	R	S
275456	Bridge-WILLOW GLEN-BridgeID 18-WILLOW GLEN RD 0.6K-BARRENGARRY	Excellent	9.0	4.0	36	21/10/2007		TRIMBLES CREEK	Timber girder & deck	1	L	R	U
43493	Bridge-GRAHAMS-BridgeID 27-GRAHAMS ROAD 0.5K-BARRENGARRY	Good	45.3	4.3	195	15/06/1988	< 59 T	TRIMBLES CREEK?	Steel beam & RC slab	3	L	R	S
43497	Bridge-BUNKERS HILL-BridgeID 31-BUNKERS HILL RD 0.1K-BARRENGARRY	Good	7.5	4.9	37	15/06/1986	< 59 T	UNKNOWN	RC slab	1	L	R	U
43581	Bridge-WILLINGA-BridgeID 150-BAWLEY POINT ACCESS RD 4.2K-BAWLEY POINT	Good	28.2	7.4	209	15/06/1990	> 75 T	WILLINGA LAKE	PSC precast plank	3	L	R	S
155452	Bridge-WILLINGA-BridgeID 242-WILLINGA RD 0.1K-BAWLEY POINT	Very Good	16.0	4.1	66	30/06/1995		WILLINGA CREEK	PSCPL	1	L	R	S
43483	Bridge-GREEN VALLEY-BridgeID 17-GREEN VALLEY RD 0.6K-BEAUMONT	Good	14.9	6.0	89	15/06/1988	< 59 T	SAWYERS CREEK	Steel beam & steel deck	1	L	R	U
43567	Bridge-WASHERWOMANS-BridgeID 124-NORTH BENDALONG RD 0.5K-BENDALONG	Good	15.2	7.0	105	18/09/1988	> 75 T	WASHERWOMANS CREEK	PSC precast plank	1	L	R	S
43570	Bridge-LUNCHEON-BridgeID 127-BENDALONG ROAD 0.8K-BENDALONG	Very Good	9.9	7.7	76	15/06/1984	< 59 T	LUNCHEON CREEK	Steel beam & steel deck	1	L	R	S
43522	Bridge-BENDEELA-BridgeID 56-BENDEELA ROAD 1.5K-BENDEELA	Good	21.2	8.6	182	15/06/1988	> 75 T	UNKNOWN	PSC precast plank	2	L	R	S
43634	Bridge-TURF FARM BERRY-BridgeID 160-WOODHILL MTN RD 0.5K-BERRY	Good	24.4	8.3	203	15/06/1975	> 75 T	BUNDAWALLA CREEK	PSC precast plank	3	L	R	S
43632	Bridge-TINDALLS-BridgeID 158-TINDALLS LN 1.79K-BERRY	Good	5.0	5.5	28	15/06/1993	> 75 T	TINDALS CREEK	RC slab	1	L	R	S
274474	Bridge-BEACH RD-BridgeID 29-BEACH ROAD 0.6K-BERRY	Excellent	14.0	10.1	142	30/12/2006	> 75 T	RIBUTARY OF BROUGHTON CREI	Precast Concrete	2	L	R	S
43635	Bridge-BROUGHTON CK-BridgeID 161-COOLANGATTA RD 0.6K-BERRY	Good	64.4	7.0	451	15/06/1955	15 T	BROUGHTON CREEK	PSC precast plank	7	L	R	S
43627	Bridge-DAVID BERRY-BridgeID 153-TANNERY RD 0.6K-BERRY	Good	45.5	8.1	369	15/06/1995	< 59 T	BROUGHTON CREEK	PSC precast plank	4	L	R	S
43626	Bridge-BOLONG-BridgeID 152-BOLONG ROAD 7.65K-BOLONG	Good	97.1	7.5	728	15/06/1962	> 75 T	BROUGHTON CREEK	Steel beam & RC slab	6	R	R	S
43554	Bridge-MURRAMARANG CK BRIDGE-BridgeID 100-THE RIVER ROAD 4.6K-BROOMAN	Good	14.5	5.0	73	15/06/2000	< 59 T	MURRAMARANG CREEK	Timber girder & deck	1	L	R	U
43556	Bridge-TUMBLEBAR Concrete-BridgeID 103-BROOMAN RD 9.3K-BROOMAN	Good	12.0	4.8	58	30/06/1961	< 59 T	TUMBLEBAR CREEK	Concrete	1	L	R	U
304297	Bridge-BROUGHTON VALE RD-BridgeID 182-BROUGHTON VALE RD 2.6K-Broughton Vale	Excellent	24.0	4.2	101	22/07/2009		BROUGHTON CREEK	Concrete	2	L	R	
404011	Bridge-SLAUGHTERS-BridgeID 1-BOUNDARY RD 0.08K- BROUGHTON VALE	Excellent	21.0	4.2	88	1/01/2006	< 59 T	BROUGHTON CREEK	Concrete	2	L	R	S
164399	Bridge-THOMPSONS-BridgeID 20-BURRIER 7.7K-BURRIER ROAD	Excellent	16.0	4.0	64	30/06/2005	59 to 68 T	MEADOW CREEK	Concrete	2	L	R	U
43505	Bridge-TAPITALLEE-BridgeID 39-TAPITALLEE RD 0.5K-CAMBEWARRA	Excellent	30.5	9.1	278	30/09/2008	69 to 75 T	TAPITALLEE CREEK	Concrete	2	L	R	S
43471	Bridge-GOOD DOG CREEK-BridgeID 4-MAIN RD 1.0K-CAMBEWARRA	Excellent	18.0	10.3	185	15/06/1999	> 75 T	GOOD DOG CREEK	PSC precast plank	2	L	U	S
43499	Bridge-CAMBEWARRA-BridgeID 33-MAIN RD 2.0K-CAMBEWARRA	Excellent	14.2	5.4	77	30/06/2011	< 59 T	BROWNS CREEK	Timber girder & deck	2	L	R	S
43561	Bridge-PORTERS CK DAM RD-BridgeID 108-PORTERS CK DAM RD 9.7KM-YATTE YATTAH	Excellent	7.1	4.3	31	15/06/2000	> 75 T	BUNNAIR CREEK	Timber and PSC deck	1	L	R	U
157639	Bridge-COONEMIA-BridgeID 257-COONEMIA RD 3.7K-COONEMIA	Very Good	30.3	10.7	323	30/11/2003	Legal Load	COONEMIA CREEK	PSCPL	3	L	R	S
43562	Bridge-CUDMIRRAH-BridgeID 119-THE SPRINGS ROAD 4.7K-CUDMIRRAH	Good	28.1	9.0	253	15/06/1972	> 75 T	SWAN LAKE	PSC precast plank	3	L	U	S
43543	Bridge-CURRARONG-BridgeID 77-CURRARONG RD 13.0K-CURRARONG	Good	14.6	9.2	134	15/06/1976	> 75 T	CURRARONG CREEK	PSC precast plank	1	L	R	S
43549	Bridge-EROWAL BAY-BridgeID 83-EROWAL BAY RD 1.7K-EROWAL BAY	Good	10.0	8.1	81	15/06/1992	59 to 68 T	UNKNOWN	PSC precast plank	1	L	R	S
155389	Bridge-FALLS CREEK-Bridge ID236-OLD PRINCESS HWY 0.75K-FALLS CREEK	Good	6.1	9.2	56	15/06/1978		UNKNOWN	Concrete Arch		L	U	S
291872	Bridge-FALLS CREEK-Bridge ID259-OLD PRINCESS HWY 1.7K-FALLS CREEK	Poor	83.7	6.0		Historic Relic	0	CURRAMBENE CREEK	Timber	9	L	U	S
43548	Bridge-COULON-BridgeID 82-JERVIS BAY RD 5.9K-HUSKISSON	Very Good	26.8	9.0	241	15/06/1996	> 75 T	UNKNOWN	PSC precast plank	2	R	U	S
43547	Bridge-MOONA MOONA-BridgeID 81-ELIZABETH DR 0.0K-HUSKISSON	Good	22.2	7.9	175	15/06/1965	59 to 68 T	MOONA MOONA CREEK	PSC precast plank	2	L	R	S
155309	Bridge-MOONA MOONA-BridgeID 253-NAVAL COLLEGE RD 1.3K-HUSKISSON	Excellent	7.6	10.6	81	30/06/2003		MOONA MOONA CREEK	RC Slab		L	R	S
43477	Bridge-TRIMBLES-BridgeID 11-UPPER RIVER RD 0.6K-KANGAROO VALLEY	Good	55.0	6.8	374	15/06/1984	> 75 T	TRIMBLES CREEK	Steel beam & RC slab	5	L	R	S
43478	Bridge-MACKAYS-BridgeID 12-UPPER RIVER RD 4.5K-KANGAROO VALLEY	Good	6.8	5.4	37	15/06/1981	> 75 T	MACKAY CREEK	RC slab	1	L	R	S
43479	Bridge-KELLYS-BridgeID 13-KELLYS RD 0.2K-KANGAROO VALLEY	Good	33.1	4.3	142	15/06/1986	> 75 T	KANGAROO RIVER	PSC precast plank	3	L	R	U
43480	Bridge-JARRETTS-BridgeID 14-JARRETTS RD 0.1K-KANGAROO VALLEY	Good	31.6	4.0	126	15/06/1995	> 75 T	UPPER KANGAROO RIVER	Steel beam & steel deck	2	L	R	U
43476	Bridge-HARPERS-BridgeID 10-KANGAROO VALLEY RD 15.6K-KANGAROO VALLEY	Excellent	38.3	10.1	387	15/06/1996	< 59 T	DEVILS GLEN CREEK	PSC precast plank	3	L	R	S
43583	Bridge-BENDELLA P/S-BridgeID 163-JACKS CORNER RD 0.3K-KANGAROO VALLEY	Good	36.7	8.6	316	15/06/1975	> 75 T	HOLDING POND	PSC precast plank	3	L	R	S
155438	Bridge-GERRINGONG-BridgeID 239-GERRINGONG CK RD 0.05K-KANGAROO VALLEY	Good	40.4	5.0	202	15/06/2002			PSCPL		L	R	S
155450	Bridge-GERRINGONG CK-BridgeID 241-GERRINGONG CK RD 0.9K-KANGAROO VALLEY	Very Good	39.7	5.0	199	15/06/2002		GERRINGONG CREEK	PSCPL	3	L	R	S
157640	Bridge-BUTLERS CK-BridgeID 258-MURRAMARANG RD 5.3K-KIOLOA	Very Good	16.4	11.8	193	30/04/2003		BULTERS CREEK	PSCPL	4	L	R	S
43563	Bridge-CONJOLA-BridgeID 120-LAKE CONJOLA ENTRANCE RD 6.9K-LAKE CONJOLA	Good	8.1	8.2	66	15/06/1988	> 75 T	PATTIMORES LAGOON CREEK	RC slab	1	L	U	S
43566	Bridge-LEMON TREE-BridgeID 123-RIVER ROAD 0.3K-LAKE TABOURIE	Good	21.4	9.7	208	15/06/1960	> 75 T	LEMON TREE CREEK	PSC precast plank	2	L	U	S
43553	Bridge-STONEY CREEK-BridgeID 98-WOODSTOCK ROAD 1.2K-MILTON	Good	36.6	6.5	238	15/06/1994	> 75 T	STONEY CREEK	PSC precast plank	4	L	R	S
43559	Bridge-EVANS LANE-BridgeID 106-EVANS LN 0.99K-MILTON	Good	14.8	8.6	127	15/06/2000	< 59 T	WOODSTOCK CREEK	Concrete	1	L	R	S
43470	Bridge-EVANS LANE-BridgeID 3-EVANS LN 0.61K-MILTON	Good	24.0	5.4	128	15/06/2000	> 75 T	WOODSTOCK CREEK	RC beams & slab	3	L	R	S
43565	Bridge-BLACKWATER-BridgeID 122-MITCHELL PDE 0.4K-MOLLYMOOK	Good	13.4	10.4	139	15/06/1994	> 75 T	BLACKWATER CREEK	PSC precast plank	1	L	U	S
43544	Bridge-ENDRICK-BridgeID 78-BRAIDWOOD RD MR92 54.0K-NERRIGA	Good	97.0	9.2	892	11/04/1991	59 to 68 T	ENDRICK RIVER	PSC beams & slab	4	R	U	S
43610	Bridge-RYANS-BridgeID 113-MT AGONY RD 0.9K-NORTH DURRAS	Good	10.2	10.8	11	15/06/1995	> 75 T	RYANS CREEK	PSC beams & slab	1	L	R	S
43560	Bridge-NEAR PRINCES HWY-BridgeID 107-MT AGONY RD 0.35K-NORTH DURRAS	Excellent	7.2	6.4	46	30/06/2011	< 59 T	UNKNOWN	Timber girder & deck	1	L	R	S
43529	Bridge-FLATROCK DAM-BridgeID 63-YALWAL RD-BAMARANG	Good	23.1	9.6	221	15/06/1984	> 75 T	FLAT ROCK CREEK	RC beams & slab	1	L	R	S
43517	Bridge-WHITES-BridgeID 51-ALBATROSS RD 0.8K-NOWRA	Good	12.0	12.0	144	15/06/2001	> 75 T	NOWRA CREEK	PSC precast plank	1	R	U	S
43530	Bridge-BERRY ST-BridgeID 64-BERRY ST 1.6K-NOWRA	Good	15.3	10.8	165	15/09/1988	> 75 T	NOWRA CREEK	PSC precast plank	1	L	U	S
43551	Bridge-JANE ST OVER PASS-BridgeID 85-JANE ST 0.8K-NOWRA	Good	112.2	7.8	875	1/07/1983	> 75 T	NOWRA BY PASS	PSC beams & slab	7	L	R	S
43516	Bridge-FLINDERS-BridgeID 50-ALBATROSS RD 3.5K-SOUTH NOWRA	Excellent	5.1	6.7	34	30/06/2011	< 59 T	FLAT ROCK CREEK	Timber girder & deck	1	R	R	S
43629	Bridge-SMITHS LANE-BridgeID 155-SMITHS LANE 1.75K-NUMBAA	Good	17.4	4.3	75	15/06/1965	> 75 T	FLOOD MITTIGATION DRAIN	RC slab	3	L	R	U
43630	Bridge-SMITHS LANE-BridgeID 156-SMITHS LANE 1.56K-NUMBAA	Good	14.2	4.3	61	15/06/1965	> 75 T	FLOOD MITTIGATION DRAIN	RC slab	3	L	R	U
43625	Bridge-PYREE-BridgeID 139-PYREE LANE 1.5K-PYREE	Good	30.8	11.9	367	15/06/2000	> 75 T	CROOKHAVEN CREEK	PSC precast plank	2	R	R	S

Asset ID	Asset Description	Condition	Length	Width	Area	Year Built	Load Limit	Creek/River	Structure Type	No. of Spans	Local or Regional	Urban or Rural	Approach Sealed or Unsealed
43631	Bridge-TERARA DRAIN-BridgeID 157-GREENWELL PT RD 5.9K-PYREE	Good	14.2	4.3	61	15/06/1965	> 75 T	FLOOD MITTIGATION DRAIN	RC slab	3	L	R	S
43623	Bridge-COCKROW CK-BridgeID 137-LARMER AVE 0.45K-SANCTUARY POINT	Good	36.5	9.6	350	3/08/1982	> 75 T	COCKROW CREEK	PSC precast plank	3	L	U	S
155454	Bridge-TYRRELL-BridgeID 244-THE WOOL RD 5.1K-SANCTUARY POINT	Excellent	100.6	12.0	1207	30/07/2003		TOMERONG CREEK	RCBMSL	4	L	R	S
43542	Bridge-TIANJARA-BridgeID 76-BRAIDWOOD RD MR92 29.0K-SASSAFRAS	Good	24.6	8.5	209	15/06/1994	59 to 68 T	YARRAMUNMUN CREEK	PSC precast plank	3	R	R	U
43541	Bridge-BOOLIJAH-BridgeID 75-BRAIDWOOD RD MR92 34.0K-SASSAFRAS	Good	15.5	9.1	141	9/05/1990	< 59 T	BOOLIJAH CREEK	PSC precast plank	1	R	R	U
43575	Bridge-CENTRAL AVE-BridgeID 143-CENTRAL AVE 0.3K-SOUTH NOWRA	Excellent	11.8	9.8	115	12/12/2001	> 75 T	NOWRA CREEK	PSC precast plank	1	L	U	S
43578	Bridge-FLINDERS-BridgeID 147-FLINDERS RD 0.15K-SOUTH NOWRA	Good	18.6	10.2	190	15/07/1974	> 75 T	NOWRA CREEK	PSC precast plank	2	L	U	S
43512	Bridge-HILLCREST AVE-BridgeID 46-HILLCREST AVE 0.3K-SOUTH NOWRA	Good	8.6	9.9	85	15/06/1999	> 75 T	BROWNS CREEK	Steel beam & RC slab	1	L	U	S
43546	Bridge-WOOL RD-BridgeID 80-WOOL RD 0.7K FM GRANGE RD-ST GEORGES BASIN	Good	11.8	9.5	112	15/06/1992	> 75 T	UNKNOWN	PSC beams & slab	1	R	U	S
43615	Bridge-BADGEE-BridgeID 118-RIVER ROAD 1.3K-SUSSEX INLET	Excellent	36.0	8.5	305	12/12/2001	> 75 T	UNKNOWN	PSC precast plank	3	L	U	S
43617	Bridge-CHRIS CK-BridgeID 130-RIVER ROAD 0.7K-SUSSEX INLET	Good	24.0	7.4	178	15/06/1962	> 75 T	CHRIS CREEK	PSC precast plank	3	L	U	S
43616	Bridge-BOWMANS-BridgeID 129-SUSSEX INLET RD 9.9K-SUSSEX INLET	Good	15.0	13.0	195	15/06/1987	> 75 T	UNKNOWN	PSC precast plank	1	R	R	S
43571	Bridge-TULLARWALLA-BridgeID 128-SUSSEX INLET RD 0.9K- SUSSEX INLET	Good	22.8	7.9	180	15/06/1982	> 75 T	TULLARWALLA CREEK	PSC beams & slab	1	R	R	S
43568	Bridge-COW CREEK-BridgeID 125-SUSSEX INLET RD 3.2K-SUSSEX INLET	Good	17.0	9.8	167	15/06/1981	> 75 T	COW CREEK	RC beams & slab	1	R	R	S
43569	Bridge-JACOBS DRIVE-BridgeID 126-JACOBS DR 0.2K-SUSSEX INLET	Good	15.0	8.5	128	15/06/1973	> 75 T	UNKNOWN	PSC precast plank	2	R	U	S
43535	Bridge-LAMONDS-BridgeID 69-TERARA RD 0.6K-TERARA	Good	22.4	7.8	175	15/06/1992	> 75 T	FLOOD MITTIGATION	PSC precast plank	2	L	U	S
43628	Bridge-LAMONDS FARM BRIDGE-BridgeID 154-LAMOND FARM ENTRANCE-TERARA	Good	18.5	4.3	80	15/06/1965	> 75 T	FLOOD MITTIGATION DRAIN	RC slab	3	L	U	U
48343	Bridge-MONKEY MTN ROAD-BridgeID 97 MONKEY MTN ROAD 1.5K-TERMEIL	Excellent	7.9	4.1	32	15/06/1954	< 59 T	TERMEIL CREEK	Concrete	1	L	R	U
43550	Bridge-STEWARTS-BridgeID 84-HAWKEN RD 5.0K-TOMERONG	Good	22.5	10.3	232	31/01/1950	> 75 T	STEWARTS CREEK	PSC beams & slab	3	L	U	S
43545	Bridge-TOMERONG-BridgeID 79-HAWKEN RD 4.2K-TOMERONG	Good	18.5	12.5	231	11/08/1966	> 75 T	TOMERONG CREEK	RC beams & slab	3	L	U	S
155368	Bridge-FLATROCK-BridgeID 233-TURPENTINE RD 9.0K-TOMERONG	Excellent	16.2	8.5	138	12/12/2001		FLATROCK CREEK	PSC precast plank	2	L	R	U
43564	Bridge-MILLARDS-BridgeID 121-ST VINCENT ST 0.7K-ULLADULLA	Good	10.7	12.5	134	15/06/1992	Road 3 T	MILLARDS CREEK	PSC precast plank	1	L	U	S
43475	Bridge-RIDERS CK-BridgeID 9-WATTAMOLLA RD 4.05K-WATTAMOLLA	Good	20.6	8.5	175	15/06/1992	> 75 T	RIDERS CREEK	Steel beam & RC slab	1	L	R	S
43482	Bridge-WALKERS-BridgeID 16-CLINTON PARK RD 0.3K-WATTAMOLLA	Good	45.5	4.3	196	15/06/1988	> 75 T	BROGERS CREEK	Steel beam & RC slab	3	L	R	U
	BRIDGES - TIMBER												
43507	Bridge-KOLOONA DRIVE-BridgeID 41-KOLOONA DR 2.1K-BANGALEE	Good	11.2	5.5	62	15/06/1988	< 59 T	BANGALEE CREEK	Timber girder & deck	1	L	R	S
43489	Bridge-EDWARD-BridgeID 23-EDWARD ST (STH) 0.14K-BERRY	Good	7.3	5.3	39	15/06/1976	< 59 T	TRIBUTARY BROUGHTON MILL CI	Timber girder & deck	1	L	U	S
43609	Bridge-BOONDOBAH-BridgeID 112-THE RIVER ROAD 0.7K-BROOMAN	Good	8.0	4.2	34	15/12/2005	< 59 T	BOONDOBAH CREEK	Timber girder & deck	1	L	R	U
48354	Bridge-BRIDGE CK BRIDGE-BridgeID 101-THE RIVER ROAD 9.9K-BROOMAN	Good	10.2	5.0	51	15/06/1995	< 59 T	BRIDGE CREEK	Timber girder & deck	1	L	R	U
43555	Bridge-TUMBLEBAR Timber-BridgeID 102-BROOMAN RD 9.0K-BROOMAN	Good	26.0	4.4	114	15/06/1961	> 75 T	UNKNOWN	Timber	4	L	R	U
43606	Bridge-TOOMBOOLOMOBAH-BridgeID 109-BROOMAN RD 10.3K-BROOMAN	Good	18.0	4.2	76	15/06/1994	< 59 T	TOOMBOOLOMOBAH CREEK	Timber girder & deck	2	L	R	U
43510	Bridge-MAYFIELD-BridgeID 44-MAYFIELD ROAD 0.7K-BRUNDEE	Good	16.0	4.0	64	15/06/1992	10 T	CROOKHAVEN CREEK	Timber girder & deck	2	L	R	U
43474	Bridge-SCHOOL CK-BridgeID 8-BUGONG RD 10.5K-BUDGONG	Good	13.8	4.9	68	15/06/1988	< 59 T	SCHOOL CREEK	Timber girder & deck	2	L	R	U
43481	Bridge-BUNDEWALLA-BridgeID 15-BUNDEWALLA RD 1.2K-BUNDEWALLA	Good	9.1	4.0	36	15/06/1972	< 59 T	BUNDEWALLA CREEK	Timber girder & deck	1	L	R	S
43500	Bridge-CAMBEWARRA-BridgeID 34-TANNERY RD 2.4K-CAMBEWARRA	Very Good	7.7	4.1	32	15/06/1959	< 59 T	GOOD DOG CREEK	Timber girder & deck	1	L	R	S
43498	Bridge-CAMBEWARRA-BridgeID 32-MAIN RD 3.4K-CAMBEWARRA	Good	9.2	3.8	35	15/06/1956	< 59 T	BROWNS CREEK	Timber girder & deck	1	L	R	S
43501	Bridge-BELLS-BridgeID 35-BELLS LANE 0.9K-CAMBEWARRA	Very Good	9.6	5.4	52	15/06/1994	< 59 T	ABERNETHY'S CREEK	Timber girder & deck	1	L	R	U
43611	Bridge-MURRAYS-BridgeID 114-MURRAYS RD 1.4K-CONJOLA	Very Good	36.1	4.5	163	30/06/1958	20 T	CONJOLA CREEK	Timber girder & deck	5	L	R	S
43521	Bridge-PARMA-BridgeID 55-PARMA RD 0.2K-FALLS CREEK	Poor	26.3	6.5	171	15/06/1982	20 T	YERRIYONG GULLY CREEK	Timber girder & deck	3	L	R	S
49201	Bridge-SINCLAIR-BridgeID 190-SINCLAIR RD 1.2K-FALLS CREEK	Excellent	12.0	4.6	55	12/12/2001	> 75 T	UNKNOWN	Timber and PSC deck	1	L	R	U
43538	Bridge-DUCK CREEK-BridgeID 72-NAVAL COLLEGE RD 2.2K-HUSKISSON	Excellent	9.5	7.8	74	21/10/1970	< 59 T	DUCK CREEK	Imber girder & steel bridge deckin	1	R	R	S
43473	Bridge-CROZIERS RD-BridgeID 7-CROZIERS RD 2.4K-JASPERS BRUSH	Average	9.5	3.6	34	15/06/1954	< 59 T	FLYING FOX CREEK	Timber girder & deck	1	L	R	U
43519	Bridge-KIETLEY'S-BridgeID 53-BOXSELL'S LANE 0.5K-MEROO MEADOW	Good	5.4	5.5	30	15/06/1998	< 59 T	UNKNOWN	Timber girder & deck	1	L	R	S
43518	Bridge-Cain's Bridge ID 52-FLETCHERS LANE 1.2K-MEROO MEADO	Average	7.4	3.7	27	15/06/1952	< 59 T	UNKNOWN	Timber girder & deck	1	L	R	U
43557	Bridge-PETTY'S BRIDGE-BridgeID 104-CROOBYAR RD 6.8K-MILTON	Good	17.3	4.0	69	15/06/1963	< 59 T	CROOBYAR CREEK	Timber girder & deck	3	L	R	U
43607	Bridge-SMARTS-BridgeID 110-CROOBYAR RD 7.9K-MILTON	Good	10.0	4.3	43	15/06/1983	< 59 T	UNKNOWN	Timber girder & deck	1	L	R	U
43572	Bridge-ARCH GATE-BridgeID 140-CULBURRA RD 2.1K-PYREE	Very Good	10.0	8.1	81	15/06/1976	< 59 T	FLOOD MITIGATION	Timber girder & deck	2	R	R	S
43608	Bridge-WHEELBARROW-BridgeID 111-WHEELBARROW RD 1.3K-WOODBURN	Good	7.3	4.9	36	15/06/1976	Road 5 T	UNKNOWN	Timber girder & deck	1	L	R	S
43514	Bridge-YALWAL-BridgeID 48-YALWAL RD 25.5K-BAMERANG	Good	20.6	4.2	87	15/06/1932	< 59 T	YARRAMUNMUN CREEK	Timber girder & deck	2	L	R	U
43613	Bridge-PORTERS CK DAM-BridgeID 116-PORTERS CK DAM RD 2.4KM-YATTE YATTAH	Good	7.0	4.1	29	15/06/1950	< 59 T	BUNNAIR CREEK TRIBUTORY	Timber girder & deck	1	L	R	S
	CAUSEWAYS												
141130	Causeway-BUNKERS HILL-BridgeID 228-BUNKERS HILL RD 0.5K-BARRENGARRY	Good	19.2	4.4	88	15/06/1986			RC Slab		L	R	U
141083	Causeway-GREEN VALLEY-BridgeID 215-GREEN VALLEY RD 1.4K-BEAUMONT	Very Good	11.5	5.3	61	15/06/1984		Sawyers Creek	RC Slab	1	L	R	U
141127	Causeway-CARRINGTON-BridgeID 225-CARRINGTON RD 1.1k-BEAUMONT	Good	4.0	4.2	17	15/06/1975			RC Slab		L	R	U
141128	Causeway-CARRINGTON-BridgeID 226-CARRINGTON RD 0.9K-BEAUMONT	Good	4.0	4.1	16	15/06/1975			RC Slab		L	R	U
141085	Causeway-NORTH ST-Bridge ID 217-NORTH STREET 1.3K-BERRY	Good	16.8	6.9	116	15/06/1980			RC Slab		L	U	S
43595	Causeway-BROGERS-BridgeID 175-BROGERS CK RD 2.5K-BROGERS CREEK	Good	30.7	4.1	126	15/06/1976	< 59 T	BROGERS CREEK	RC slab	1	L	R	U
43636	Causeway-BROGERS-BridgeID 176-BROGERS CK RD 2.9K-BROGERS CREEK	Good	5.2	4.5	23	15/06/1976	< 59 T	UNKNOWN	RC slab	1	L	R	U
48461	Causeway-BROGERS-BridgeID 184-BROGERS CK RD 4.0K-BROGERS CREEK	Average	19.0	4.0	76	15/06/1976	< 59 T	UKNOWN	RC Slab		L	R	U
141131	Causeway-BROGERS-BridgeID 229-BROGERS CK RD 3.3K-BROGERS CREEK	Good	28.3	3.0	85	15/06/1970			RC Slab		L	R	U
43638	Causeway-CURRANAN-BridgeID 178-THE RIVER RD 19.5K-BROOMAN	Good	25.8	4.5	116	15/06/1961	< 59 T	UNKNOWN	RC slab	1	L	R	U
43637	Causeway-SHALLOW CROSSING-BridgeID 177-THE RIVER RD 12.3K-BROOMAN	Good	102.0	4.5	459	15/06/1956	< 59 T	CLYDE RIVER	RC slab	1	L	R	U
155453	Causeway-RIVER RD-BridgeID243-THE RIVER RD 18.4K-BROOMAN	Good	15.0	4.6	69	30/06/1975		Unknown	RC Slab		L	R	U

Asset ID	Asset Description	Condition	Length	Width	Area	Year Built	Load Limit	Creek/River	Structure Type	No. of Spans	Local or Regional	Urban or Rural	Approach Sealed or Unsealed
43642	Causeway-BROUGHTON VALE RD-BridgeID 182-BROUGHTON VALE RD 2.6K-BROUGHTON	Good	18.6	3.9	73	15/06/1978	< 59 T	BROUGHTON CREEK	RC slab	1	L	R	U
141081	Causeway-BUGONG RD-BridgeID 213-BUGONG RD 3.3K-BUDGONG	Good	8.2	7.0	57	15/06/1995			RC Slab		L	R	U
43590	Causeway-BUGONG-BridgeID 170-BUGONG RD 8.7K-BUDGONG	Good	21.0	3.9	82	15/06/1965	< 59 T	BUGONG CREEK	RC slab	1	L	R	U
141074	Causeway-TANNERY RD-BridgeID 211-TANNERY RD 1.0K-CAMBEWARRA	Average	15.0	8.0	120	15/06/1970		Good Dog Creek	RC Slab	1	L	U	U
43586	Causeway-HOCKEYS-BridgeID 166-HOCKEYS LANE 1.9K-CAMBEWARRA	Excellent	18.0	3.4	61	30/06/2011	< 59 T	TAPITALLEE CREEK	RC slab	1	L	R	U
155387	Causeway-DOWLING-Bridge ID235-Dowling St 0.2K-FALLS CREEK	Good	9.0	5.2	47	30/06/1985		Unknown	RC Slab		L	U	S
141129	Causeway-CROZIERS RD-BridgeID 227-CROZIERS RD 2.3K-JASPERS BRUSH	Average	9.0	4.0	36	15/06/1985			RC Slab		L	R	U
141084	Causeway-MARTINVALE-Bridge ID 216-MARTINVALE LANE 0.2K-JASPERS BRUSH	Good	18.2	3.0	55	15/06/1996		Jasper Creek	RC Slab		L	R	U
43584	Causeway-WALKERS-BridgeID 164-WALKERS LN 0.5K-KANGAROO VALLEY	Good	17.0	3.8	65	15/06/1981	> 75 T	SAWYERS CREEK	RC slab	1	L	R	U
43585	Causeway-WALKERS-BridgeID 165-WALKERS LN 0.2K-KANGAROO VALLEY	Average	12.3	4.7	58	15/06/1971	> 75 T	TRIBUTORY OF SAWYERS CK	RC slab	1	L	R	U
141121	Causeway-UPPER KANGAROO-BridgeID 219-UPPER RIVER RD 10.6K-KANGAROO VALLEY	Good	7.5	4.8	36	15/06/1965		Upper Kangaroo River	RC Slab		L	R	S
141122	Causeway-UPPER KANGAROO-BridgeID 220-UPPER RIVER RD 11.1K-KANGAROO VALLEY	Good	12.0	4.1	49	15/06/1965		Unknown	RC Slab	1	L	R	S
141123	Causeway-UPPER KANGAROO-BridgeID 221-UPPER RIVER RD 11.4K-KANGAROO VALLEY	Good	9.0	5.0	45	15/06/1965		Unknown Creek	Rock	1	L	R	S
141124	Causeway-UPPER KANGAROO-BridgeID 222-UPPER RIVER RD 12.1K-KANGAROO VALLEY	Good	9.0	5.0	45	15/06/1965			RC Slab		L	R	S
141125	Causeway-UPPER KANGAROO-BridgeID 223-UPPER RIVER RD 14.5K-KANGAROO VALLEY	Good	16.5	4.0	66	15/06/1970		Kangaroo River	RC Slab		L	R	S
155535	Causeway-UPPER KANGAROO-BridgeID 251-UPPER RIVER RD 14.1K-KANGAROO VALLEY	Average	6.0	4.2	25	15/06/1970			Rock		L	R	U
43592	Causeway-GERRINGONG-BridgeID 172-GERRINGONG CK RD 1.6K-KANGAROO VALLEY	Good	24.0	3.6	86	15/06/1985	> 75 T	GERRINGONG CREEK	RC slab	1	L	R	U
43593	Causeway-GERRINGONG-BridgeID 173-GERRINGONG CK RD 2.0K-KANGAROO VALLEY	Good	11.5	3.9	45	15/06/1985	< 59 T	GERRINGONG CREEK	RC slab	1	L	R	U
141126	Causeway-GERRINGONG-BridgeID 224-GERRINGONG CK RD 1.3K-KANGAROO VALLEY	Very Good	8.6	4.8	41	15/06/1985			RC Slab		L	R	U
43594	Causeway-GLENMURRAY-BridgeID 174-GLENMURRAY RD 0.5K-KANGAROO VALLEY	Good	9.8	5.0	49	15/06/1989	< 59 T	BROGERS CREEK	RC slab	1	L	R	U
141080	Causeway-BOXSELL'S-BridgeID 212-BOXSELL'S LANE 0.9K-MEROO MEADOW	Good	10.8	5.2	56	15/06/1970			RC Slab		L	R	S
43640	Causeway-EVELYN RD-BridgeID 180-EVELYN RD 1.53K-TOMERONG	Good	6.0	8.0	48	15/06/1985	< 59 T	RIBUTORY OF MOONA MOONA C	RC slab	1	L	R	U
43639	Causeway-PARNELL RD-BridgeID 179-PARNELL RD1.97K-TOMERONG	Good	7.5	9.5	71	15/06/1996	< 59 T	RIBUTORY OF MOONA MOONA C	RC slab	1	L	R	U
43587	Causeway-WATTAMOLLA-BridgeID 167-WATTAMOLLA RD 4.9K-WATTAMOLLA	Excellent	22.8	5.0	114	15/06/2008	> 75 T	UNKNOWN	RC slab	1	L	R	U
140596	Causeway-BROGERS CK-BridgeID 204-PRIDDLES LN 0.55K-WATTAMOLLA	Good	13.5	3.4	46	15/06/1992	< 59 T	BROGERS CREEK	RC slab	1	L	R	U
	MAJOR CULVERTS												
155437	Culvert-BAMARANG-BridgeID238 -BAMARANG RD 0.5K-BAMARANG	Excellent	7.1	7.8	55	15/06/1999		Unknown	RC Pipe Culvert	3	L	R	U
43513	Culvert-BARRINGELLA-BridgeID 47-BURRIER RD 4.7K-BARRINGELLA MOUNTAIN	Good	11.6	9.7	113	15/06/1997	> 75 T	BARRINGELLA CREEK	Precast box culvert	5	L	R	U
156558	Culvert-BENDEELA-bridgeID 254-BENDEELA ROAD 3.4K-BENDEELA	Good	7.0	8.4	59	30/06/1986		Unknown			L	R	S
43582	Culvert-PRINCESS ST-BridgeID 162-PRINCESS ST 0.68K-BERRY	Good	6.0	8.5	51	15/06/1980	> 75 T	MILL CREEK TRIBUTORY	RC Pipe culvert	3	L	U	S
141053	Culvert-BROOMAN-BridgeID210-THE RIVER RD 16.0K-BROOMAN	Good	6.6	10.1	67	15/06/1980		Black Bird Creek	RC SLAB		L	R	U
43496	Culvert-BROUGHTON-BridgeID 30-BROUGHTON VALE RD 2.4K-BROUGHTON VALE	Good	17.3	4.7	81	15/06/1972	> 75 T	BROUGHTON CREEK	Precast concrete	5	L	R	S
43506	Culvert-BROWNS MTN RD-BridgeID 40-BROWNS MTN RD 0.8K-BROWNS MOUNTAIN	Good	7.9	6.1	48	15/06/1996	> 75 T	UNKNOWN	Precast box culvert	2	L	R	S
43573	Culvert-MAYFIELD-BridgeID 141-MAYFIELD LN-BRUNDEE	Good	11.0	13.0	143	15/06/1976	< 59 T	FLOOD MITIGATION DRAIN	box culvert	4	L	R	S
43487	Culvert-KELLETS-BridgeID 21-BUDGONG RD 1.4K-BUDGONG	Excellent	6.8	5.0	34	15/06/2000	> 75 T	KELLETS CREEK	Precast box culvert	2	L	R	U
43502	Culvert-KELLETS-BridgeID 36-BUGONG RD 3.1K-BUDGONG	Good	6.0	16.0	96	15/06/1996	> 75 T	KELLETS CREEK	Steel arch culvert		L	R	U
43589	Culvert-BUNDEWALLA-BridgeID 169-BUNDEWALLA RD 2.5K-BUNDEWALLA	Good	10.2	3.9	40	15/06/1985	< 59 T	BUNDEWALLA CREEK	RC slab	1	L	R	S
43527	Culvert-MOFFITS-BridgeID 61-BURRIER RD 0.2K-BURRIER ROAD	Good	7.3	21.1	153	10/05/1991	> 75 T	UNKNOWN	Steel arch	1	L	R	U
43508	Culvert-TANNERY RD-BridgeID 42-TANNERY RD 1.8K-CAMBEWARRA	Good	7.3	6.7	49	20/05/1997	< 59 T	GOOD DOG CREEK	RC Pipe culvert	3	L	R	U
43602	Culvert-EROWAL BAY-BridgeID 93-GRANDVIEW ST 0.5K-EROWAL BAY	Good	6.5	7.4	47	15/06/1987	59 to 68 T	UNKNOWN	Precast box culvert	5	L	U	S
43603	Culvert-EROWAL BAY-BridgeID 94-KILLARNEY RD-EROWAL BAY	Good	6.6	7.3	48	23/07/1987	> 75 T	UNKNOWN	Precast box culvert	5	L	R	S
43492	Culvert-BRYCES RD-BridgeID 26-BRYCE'S ROAD 1.0K-FAR MEADOW	Good	9.3	7.3	68	15/06/1997	< 59 T	TRIBUTARY #1 BROUGHTON CK	Precast box culvert	3	L	R	S
43490	Culvert-BRYCES RD-BridgeID 24-BRYCES ROAD 2.0K-FAR MEADOW	Good	7.0	7.5	53	15/06/1997	< 59 T	TRIBUTARY #2 BROUGHTON CK	Precast box culvert	2	L	R	S
155385	Culvert-VALLON RD INTERSECTION-BridgeID 234-JERVIS BAY RD 5.6K-HUSKISSON	Good	6.6	23.5	155	30/06/1990		Unknown	RC Slab		R	U	S
43472	Culvert-STRONGS RD-BridgeID 6-STRONGS RD 2.0K-JASPERS BRUSH	Good	8.3	8.6	71	15/06/1998	> 75 T	JASPERS CREEK	Precast box culvert	3	L	R	U
141086	Culvert-CEDARVALE-Bridge ID 218-CEDARVALE LANE 0.4K-JASPERS BRUSH	Good	14.7	3.7	54	15/06/1996		Jaspers Creek	RCPBC	3	L	R	U
43488	Culvert-WALKERS-BridgeID 22-WALKERS LANE 1.7K-KANGAROO VALLEY	Good	19.6	4.9	96	15/06/1994	> 75 T	UPPER KANGAROO RIVER	Precast box culvert	6	L	R	U
43526	Culvert-GRAHAMS-BridgeID 60-GRAHAMS ROAD 0.3K-MEROO MEADOW	Very Good	11.0	4.8	53	15/06/1996	> 75 T	UNKNOWN	Precast box culvert	4	L	R	U
43621	Culvert-LEANEY'S-BridgeID 134-CROOBYAR RD 2.75K-MILTON	Good	9.7	9.9	96	15/06/1993	> 75 T	UNKNOWN	Precast box culvert	3	L	R	S
49056	Culvert-EVANS LANE-BridgeID 186-EVANS LANE 1.4K-MILTON	Good	12.8	9.3	119	15/06/2000	> 75 T	WOODSTOCK CREEK	Steel Arch	1	L	R	U
43504	Culvert-NORTH NOWRA-BridgeID 38-ILLAROO RD 2.0K-NORTH NOWRA	Good	8.7	17.5	152	15/06/1992	> 75 T	TRIBUTARY # BOMADERRY CK?	Precast box culvert	3	L	U	S
43532	Culvert-JELLICOE-BridgeID 66-JELLICOE ST0.15K-NOWRA	Good	6.7	9.8	66	15/06/1996	< 59 T	NOWRA CREEK	Precast box culvert	2	L	U	S
43531	Culvert-BERRY ST-BridgeID 65-BERRY ST 1.8K-NOWRA	Good	17.1	14.6	248	13/06/1978	> 75 T	NOWRA CREEK	Precast box culvert	5	L	U	S
156577	Culvert-WALLACE-BridgeID 256-WALLACE STREET (NTH) 0.29K-NOWRA	Good	8.9	9.0	80	30/06/1990		Unknown	PC Slab		L	U	S
155367	Culvert-ALBATROSS-BridgeID 232-BRAIDWOOD RD MR92 1.8K-NOWRA HILL	Very Good	15.4	11.0	169	30/06/1997			RC Slab		R	R	S
43574	Culvert-HENRYS'-BridgeID 142-COMERONG ISLAND RD 3.5K-NUMBAA	Good	10.4	12.6	131	15/06/1965	> 75 T	FLOOD MITIGATION DRAIN	box culvert	4	L	R	S
49106	Culvert-COMERONG-BridgeID 188-COMERONG ISLAND RD 5.78K-NUMBAA	Good	6.4	7.6	49	15/06/1965	> 75 T	UNKNOWN	RC Pipe culvert 3x1350	3	L	R	S
43579	Culvert-WORROWING-BridgeID 148-THE WOOL ROAD 1.0K-OLD EROWAL BAY	Good	7.0	16.0	112	15/06/1945	> 75 T	WORROWING CREEK	Steel arch	2	R	R	S
43605	Culvert-COCKROW OVERFLOW-BridgeID 96-LARMER AVE 0.85K-SANCTUARY POINT	Good	10.5	12.2	128	6/11/1991	> 75 T	UNKNOWN	Precast box culvert	4	R	R	S
155455	Culvert-Wool Rd-BridgeID 245-THE WOOL RD 4.5K-SANCTUARY POINT	Excellent	8.0	28.0	224	30/07/2003			RC Slab		L	R	S
43533	Culvert-COOLANGATTA-BridgeID 67-COOLANGATTA RD 7.7K-SHOALHAVEN HEADS	Good	6.4	9.0	58	15/06/1996	< 59 T	UNKNOWN	box culvert	1	L	R	S
48424	Culvert-JERRY BAILEY COMONDERRY-BridgeID 159-SHOALHAVEN HDS ROAD 0.3K-SHOA	Good	14.6	9.0	131	15/06/1969	> 75 T	FLOOD MITTIGATION	Steel arch	2	L	U	S
43515	Culvert-CALYMEA-BridgeID 49-ALBATROSS RD 4.2K-SOUTH NOWRA	Good	6.8	11.1	76	15/06/1999	> 75 T	FLAT ROCK CREEK	Precast box culvert	2	R	R	S

Asset ID	Asset Description	Condition	Length	Width	Area	Year Built	Load Limit	Creek/River	Structure Type	No. of Spans	Local or Regional	Urban or Rural	Sealed o Unsealed
43552	Culvert-PARNELL RD-BridgeID 86-PARNELL RD 2.0K-TOMERONG	Good	6.2	11.0	68	15/06/1996	> 75 T	MOONA MOONA CREEK	Precast box culvert	4	L	R	U
43577	Culvert-BATTUNGA-BridgeID 145-BATUNGA DRIVE 0.16K-TOMERONG	Good	20.0	6.4	128	15/06/1991	59 to 68 T	SUFFOLK CREEK	Precast box culvert	5	L	R	S
141046	Underpass-NAVAL COLLEGE-Bridge ID 207-NAVAL COLLEGE RD 6.1K-HUSKISSON	Good	10.0	3.9	39	30/06/1990		UNKNOWN	RC Slab	3	L	R	S
401948	Culvert-VINCENTIA-BridgeID 259 - HALLORAN ST 0.43K- VINCENTIA	Good	18.0	15.0	270	1/01/2012			Precast box culvert	7	L	R	S
43588	Culvert-WATTAMOLLA-BridgeID 168-WATTAMOLLA RD 7.06K-WATTAMOLLA	Excellent	9.3	6.2	58	30/06/2010	> 75 T	UNKNOWN	RC slab	?	L	R	U
43523	Culvert-WATTAMOLLA-BridgeID 57-WATTAMOLLA RD 3.18K-WATTAMOLLA	Very Good	10.0	6.8	68	15/06/1970	> 75 T	UNKNOWN	Precast box culvert	1	L	R	S
43503	Culvert-WEST CAMBEWARRA-BridgeID 37-ILLAROO RD 8.8K-WEST CAMBEWARRA	Good	7.9	46.5	367	15/06/1990	> 75 T	BANGALEE CREEK	Steel arch	1	L	R	S
43614	Culvert-MIMOSA PK RD#1-BridgeID 117-MIMOSA PARK RD 1.0K-WOODSTOCK	Good	9.7	7.4	72	15/06/2000	> 75 T	UNKNOWN	Precast box culvert	3	L	R	U
43612	Culvert-MIMOSA PK RD#2-BridgeID 115-MIMOSA PARK RD 2.0K-WOODSTOCK	Excellent	10.0	7.7	77	12/12/2001	> 75 T	UNKNOWN	RC Pipe culvert 3x2400	3	L	R	U
43600	Culvert-WOOLLAMIA-BridgeID 91-JERVIS BAY RD 4.2K-WOOLLAMIA	Good	6.6	9.6	63	15/06/1996	> 75 T	UNKNOWN	box culvert	2	R	U	S
43598	Culvert-WOOLLAMIA-BridgeID 89-JERVIS BAY RD 3.0K-WOOLLAMIA	Good	6.6	8.7	57	15/06/1996	> 75 T	UNKNOWN	Precast box culvert	2	R	R	S
155390	Culvert-WOOLLAMIA-BridgeID 237-WOOLLAMIA RD 2.2K-WOOLLAMIA	Good	6.9	16.5	114	30/06/1985		Unknown	RC Slab		L	R	S
	PEDESTRIAN BRIDGES												
140258	Footbridge-PRINCE ALFRED-BridgeID 192-PRINCE ALFRED STREET (STH) 0.35K-BERRY	Excellent	5.5	2.0	11	15/06/2012		STORMWATER	Concrete	1	L	U	S
140257	Footbridge-EDWARD-BridgeID 193-EDWARD STREET (STH) 1.4K-BERRY	Very Good	7.9	1.3	10	15/06/1975		STORMWATER	Timber	1	L	U	S
49170	Footbridge-ALBANY-BridgeID 189-ALBANY STREET 0.09K-BERRY	Good	9.3	1.6	15	15/06/1979		DRAIN	Timber	1	L	U	S
140255	Footbridge-QUEEN-BridgeID 195-QUEEN STREET (SH1) 0.85K-BERRY	Good	9.4	1.3	12	15/06/1980		STORMWATER	Timber	1	L	U	S
388733	Footbridge-Abernethys Creek - Bolong Road Ch 1.492 to ch 1.52 - Bomaderry	Excellent	10.0	2.5	25	30/12/2011		Abernethys	Concrete		R	U	
140250	Footbridge-BOMADERRY TRIBUTORY-BridgeID 201-NUMROCK STREET (STH)-BOMADERR	Good	7.3	1.2	9	15/06/1992		BOMADERRY CREEK TRIBUTORY	Timber	1	L	U	S
140251	Footbridge-CALLALA CREEK-BridgeID 200-LACKERSTEEN ST 1.5K-CALLALA BAY	Excellent	60.0	2.9	174	15/06/2005		CALLALA CREEK	Timber Piles Concrete Deck	6	L	U	S
140248	Footbridge-CURLEYS BAY-BridgeID 202-ADDISON ROAD 0.5K-CULBURRA BEACH	Good	4.6	1.2	6	15/06/1985		CURLEYS BAY	Timber	1	L	U	S
140252	Footbridge-CURRARONG CREEK-BridgeID 199-CURRARONG ROAD-CURRARONG	Excellent	11.8	2.9	34	15/06/2001		CURRARONG CREEK	Timber	1	L	U	S
141132	Footbridge-UPPER RIVER-BridgeID 230-UPPER RIVER RD 10.0K-KANGAROO VALLEY	Good	57.0	1.3	74	15/06/1965		UPPER KANGAROO RIVER	Timber Suspension	1	L	R	S
141133	Footbridge-GERRINGONG-BridgeID 231-GERRINGONG CREEK RD 1.6K-KANGAROO VALLE	Good	75.5	1.2	91	15/06/1986			Timber Suspension		L	R	U
156240	Footbridge-WHITES CYCLEWAY-BridgeID 252-ALABATROSS RD 0.08K-NOWRA	Good	6.1	1.5	9	30/06/1995			Timber Piles Concrete Deck	3	R	U	S
140247	Footbridge Kalandra Street East Nowra	Very Good	7.4	1.3	10	30/06/2004		STORMWATER DRAIN	Steel & Concrete	1	L	U	S
156559	Footbridge-WORROWING FOOTBRIDGE-BridgeID 255-THE WOOL RD 1.0K-OLD EROWAL E	Good	10.0	2.0	20	30/06/1990		WORRING CREEK	Concrete		L	U	S
43633	Footbridge-JERRY BAILEY-BridgeID 183-SHOALHAVEN HDS ROAD 0.3K-SHOALHAVEN HDS	Good	16.0	1.0	16	15/06/1979		FLOOD MITTIGATION	Timber	2	L	U	S

Appendix 2 - Draft Capital Bridge Works Programme 2013/18

DRAFT CAPITAL WORKS BRIDGE PROGRAM 2013/18

PROPOSED PROJECTS	DRAFT ANNUAL PROGRAMS					COMMENTS
	2013/14	2014/15	2015/16	2016/17	2017/18	
BRIDGES						
FORWARD INVESTIGATION & DESIGN	$25,000	$25,000	$30,000	$30,000	$30,000	
PARMA ROAD, FALLS CREEK	$822,000					Replace
JACOBS CREEK SUSSEX INLET	$150,000	$50,000				Major repairs as per Level 3 Consultant Report
WHEELBARROW RD		$60,000				Major timber repairs
CAINS BRIDGE - FLETCHERS LANE MEROO MEADOW (CHN1.2)				$90,000		Access to one property only; replace with timber bridge
CROZIERS RD JASPERS BRUSH (CHN2.4)					$90,000	Replace with Culvert&Causeway - access to one property only
HENRYS BRIDGE - MAIN ROAD CAMBEWARRA (CHN3.4)				$330,000		Replacement
PROJECTS TO BE DETERMINED					$460,000	
CAUSEWAYS (existing structures)						
EVELYN ROAD				$215,000	$85,000	Replacement
PARNELL ROAD			$360,000			Replacement
UPPER RIVER RD 10.9KM WIDEN & INSTALL BLOCKS		$75,000				
UPPER RIVER RD 14.1KM CONSTRUCT CONCRETE CAUSEWAY			$60,000			
UPPER RIVER RD 11.2KM INSTALL BLOCKS		$20,000				
UPPER RIVER RD 11.9KM CONSTRUCT CONCRETE CAUSEWAY			$60,000			
UPPER RIVER RD 14.5KM CONSTRUCT CONCRETE CAUSEWAY				$60,000		
ERECT BLOCKS ON D/S EDGE OF DIRTY DOG CREEK ON TANNERY ROAD		$23,000				
ERECT BLOCKS ON D/S EDGE OF GERRINGONG CK RD (CHN1.61)		$23,000				
GUARDRAIL ON APPROACHES						
TUMBLEBAR BRIDGE AT 9KM ON BROOMAN RD		$35,000				
TUMBLEBAR BRIDGE AT 9.3KM ON BROOMAN RD		$35,000				
3.18 AND 4.15 ON WATTAMOLLA RD		$70,000				
	$997,000	**$416,000**	**$510,000**	**$725,000**	**$665,000**	
Expected available funds:	**$997,000**	**$416,000**	**$525,000**	**$725,000**	**$665,000**	

Incl $150K from 2012/13 for Edward St

Appendix 3 – Draft Causeway Strategy

DRAFT CAUSEWAY STRATEGY 2013

Traffc Count Score - 1=<5 houses (<30vpd), 2=<20 houses (30-100vpd), 3=>20 houses (100vpd)
Possible Flow Velocity Score - 1=Low/standing water, 2=Medium, 3=Fast
Frequency Exceedence of 0.3m Flow Depth Score - 0=Never, 1=Rare (<1/yr), 2=Occasional (3/yr), 3=Frequent (6/yr) Alternate Route Yes = + 0 No = + 5
Condition - 1 good, 2 fair, 3 poor

Locality	Road	CH (km)	Causeway/ Ford	Traffic Count Score (1-3) (1-3)	Possible Flow V Score (1-3) (1-3)	Frequency Score (1-3) (1-3)	Condition (1 - 3) (1-3)	Alternate Route 0/5 0/5	RISK SCORE	Kerbing or Wheel Blocks y/n	Comments
Tomerong	EVELYN RD	1.53	Causeway	3	3	1	3	0	27	N	Will need upgrading with Port Jervis roadworks
Kangaroo Valley	UPPER KANGAROO RIVER RD	10.87/11.1	Causeway	2	3	1	3	5	23	N	Widen D/s and attach kerb blocks
Kangaroo Valley	GERRINGONG CK RD (Gerringong Ck)	1.61	Causeway	1	3	3	2	5	23	N	Attach Kerb Blocks
Broughton Vale	BROUGHTON VALE RD (Broughton Mill Ck)	2.23	Causeway over PBCs	3	3	2	1	5	23	N	Upgrade causeway height and approach road
Tomerong	PARNELL RD	1.97	Causeway	3	3	2	1	0	18	N	Will need upgrading with Port Jervis roadworks
Kangaroo Valley	UPPER KANGAROO RIVER RD	10.60	Causeway over Culvert	2	3	1	2	5	17	N	Attach Kerb Blocks
Kangaroo Valley	UPPER KANGAROO RIVER RD	11.22/11.4	Causeway	1	3	1	3	5	14	N	Attach Kerb Blocks
Kangaroo Valley	UPPER KANGAROO RIVER RD	11.90	Ford	1	2	2	2	5	13	N	Construct Concrete Causeway
Kangaroo Valley	WALKERS LN	0.17	Causeway	1	3	2	2	0	12	N	Narrow
Kangaroo Valley	WALKERS LN	0.43	Causeway	1	3	2	2	0	12	N	Always wet. Bad alignment
Cambewarra	TANNERY RD	1.00	Causeway over PCs	2	3	2	1	0	12	u/s only	Kerb Blocks needed D/s
Kangaroo Valley	UPPER KANGAROO RIVER RD	13.85/14.1	Ford	1	2	1	3	5	11	N	Construct Concrete Causeway
Kangaroo Valley	GLENMURRAY RD	0.53	Causeway over PCs	1	3	2	1	5	11	N	Needs Blocks
Bugong	BUGONG RD	8.48/8.7	Causeway	1	3	3	1	0	9	N	No Kerb Blocks
Kangaroo Valley	UPPER KANGAROO RIVER RD	14.24/14.5	Causeway over PCs	1	3	1	1	5	8	N	Needs Kerb Blocks