Drainage Asset Management Plan 2017-2026

Inverell Shire Council

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Introduction

Local government assets deliver important community services. Their effective management is crucial to the sustainable delivery of those services to meet community needs and aspirations now and in the future. The aim of this plan is to enhance the sustainable management of Inverell Shire Council's drainage assets by encouraging 'whole of life' and 'whole of organisation' approaches; and the effective identification and management of risks associated with the use of the assets. It encourages a long-term view of asset management and requires Council and the organisation to understand and meet the impacts of social, economic and environmental change in ways that ensure sustainable use of physical and financial resources.

This plan is concerned with urban drainage assets which include the shire's stormwater drainage pipes, catchment pits, kerb and gutter and related infrastructure. It does not include drainage culverts, table drains and other drainage structures on rural roads which are covered under the Roads Asset Management Plan.

Within the broad objective of achieving an optimum urban environment in Inverell Shires towns and villages, and in the context of the principles of ecologically sustainable development, the underlying objectives of the drainage design policies and standards in this document are:

- to provide safety for the public
- to minimise and control nuisance flooding and to provide for the safe passage of less frequent flood events
- to stabilise the landform and control erosion
- to protect property from flooding
- to enhance the urban landscape
- to optimise the land available for urbanisation
- to minimise the environmental impact of urban runoff on water quality
- to provide opportunities to enhance the environment through the provision of water sensitive stormwater design

The total replacement cost of assets covered by this plan is $43.4 million. This is made up of:

- Stormwater Pipes - $21.9 million
- Stormwater Pits - $7 million
- Stormwater Channels - $1.7 million
- Kerb & Gutter - $12.8 million

Asset management plans are a vital component in Inverell Shire's strategic planning process. They form the basis of short, medium and long term planning for capital, operations and maintenance budgets, and link to key corporate strategies including the following documents:

- Inverell Shire's Asset Management Policy and Asset Management Strategy
- Inverell Shire's Strategic Long Term 2030 Plan and Long Term Financial Plan
- Annual budget
- Inverell Shire's Risk Register.

Asset Management Drivers

Drainage infrastructure facilitates the movement of stormwater in order to mitigate flooding impacts on both public and private property and infrastructure in urban areas. Despite this there is a growing realisation that the management of these assets has not received the funding required for the provision of the optimal state of repair and operation.

Local Governments exercise their duties to maintain, operate and improve their drainage networks under increasing pressures that include:

- Limited budgets: with competition for funding across a range of services
- Limited resources: both human resources and materials
- Mature networks: which have a significant maintenance demand
- Increased accountability: to customers and funding providers
- Increasing public expectations: the public are increasingly informed and expect a higher level of service form their assets..

In the face of these challenges, Council is responsible for effectively accounting for and managing its assets and having regard for the long term and cumulative effects of its decisions. This is a core function of local government authorities and is reflected in the Charter in s8 of the Local Government Act. Furthermore, a strong and sustainable local government system requires a robust planning process to ensure that these assets are managed in the most appropriate way on behalf of local communities.

Asset management plans form part of Council's Resourcing Strategy that supports the community's Strategic Plan. The Strategic Plan provides a vehicle for the community to express its long term aspirations. However, these aspirations will not be achieved without sufficient resources – time, money, assets and people – to carry them out. The Resourcing Strategy is a critical link when it comes to translating strategic objectives into actions.

The asset management actions necessary to achieve the Strategic Plan Strategies relevant to Council's drainage assets are outlined in Table 1

Using this Plan

The Drainage Asset Management Plan 2017-2026 provides core resource information for users. It will be continuously reviewed and updated to improve its quality and to ensure continuing relevance. This document has been written with the intention of being informative and readily understood by persons interested in the actions of Council and particularly in drainage infrastructure matters. It does not contain detailed technical information but rather seeks to provide an overview of the Council's assets and the directions that must be taken to ensure their sustainability.

This asset management plan is prepared as a 'core' asset management plan in accordance with the International Infrastructure Management Manual 2015. It has been prepared to initially meet minimum legislative and organisational requirements for the sustainable management of drainage infrastructure and long-term financial planning and reporting.

This plan is considered a 'core' plan due to its top-down approach where key analysis has been applied at the 'system' or 'network' level of asset management planning.

Strategic Plan Strategies	Term Achievements	Asset Management Actions
R.06 Council ensures it is able to provide resources to effectively deliver its Strategy and Programs.	R.06.01 Council provides adequate resources to deliver its programs and has introduced measures to increase its capacity to deliver cost effective and efficient services. R.06.02 Council's financial sustainability is being managed through best practices, diverse investment strategies and asset management control.	Implement AMP to ensure the Council's assets are managed and maintained to target service levels Outputs of this plan are to include a report on the sustainability of the drainage network
C.03 Promote an ordered and safe Community.	C.03.01 Compliance and regulation programs have been developed and implemented to provide a safe environment for citizens and visitors.	Carry out regular inspection and reporting as per routine maintenance plan requirements.
C.08 Reduce the risk to the community arising from emergency events.	C.08.01 Shire-wide waterway management strategies are being implemented.	A waterway management strategy will be developed as this plan moves to an advanced stage (See Improvement Plan Action 1.1)
S.01 Sound Local Government Administration, Governance and Financial Management are provided.	S.01.02 A sound long term financial position is maintained. S.01.07 A contemporary system of risk management and internal control is operating. S.01.09 Best Value principles specified in the Local Government Act along with contemporary asset management processes have been implemented for asset sustainability.	Outputs of this plan are to include a report on the required financial expenditure to ensure the sustainability of the drainage network. This plan includes an inspection regime and risk management procedure consistent with Council's Risk management policies and industry best practice.
S.02 Council displays leadership, community engagement and collaboration with others.	S.02.01 Council is managing its statutory requirements and the needs of a participatory community in a transparent and balanced way.	Report on progress against performance measures in the annual report. Engage the community to develop desired levels of service and agree on a funding strategy to achieve them.
S.03 Council provides equitable services, consistent with available resources and priorities to meet the Shire's identified needs and preferences.	S.03.01 Services and programs that Council provides are determined based on equity, customer requirements and community benefits, best value and excellence.	This plan includes an evaluation procedure for maintenance and capital works that takes into account these areas.
S.08 Civil infrastructure is secured, maintained and used to optimum benefit.	S.08.01 An asset management strategy is in operation for civil infrastructure that optimises its use and maintained to agreed standards fit for contemporary purpose.	Implement AMP to ensure the Council's assets are managed and maintained to target service levels

Table 1 : Strategic Plan Strategies

Understanding our Assets

Understanding what assets Council owns and controls, along with key supporting information such as their condition, age, location and value is a key step to ensuring best practice asset management. Without this knowledge there is no way Council can be sure that the decisions it makes regarding the assets are in the best interests of the community.

A good asset register is the foundation for enabling most asset management functions. To be able to operate and maintain the assets, staff need to be able to locate and identify them. To accurately value assets, sufficient data is needed to calculate replacement cost (e.g. size, type) and remaining life (age, expected life, condition). Council is also beginning to gather data on maintenance history and costs to support lifecycle optimisation and increase knowledge of the probability and consequence of asset failure for risk management purposes.

Asset Inventory

An asset data model provides a framework to structure and store asset data in an information system, segmenting an asset base into appropriate classifications. Inverell Shire Council has developed an inventory structure for its drainage assets that groups them based on their location.

The stormwater drainage system has been segmented into catchments and sub catchments based on the flow paths of the network, in Inverell there are ten catchment areas each containing up to nine sub catchments. Catchments contain all surface channels (including kerb and channel), pits and underground drainage and each catchment flows to one general direction as shown in Figure 1.

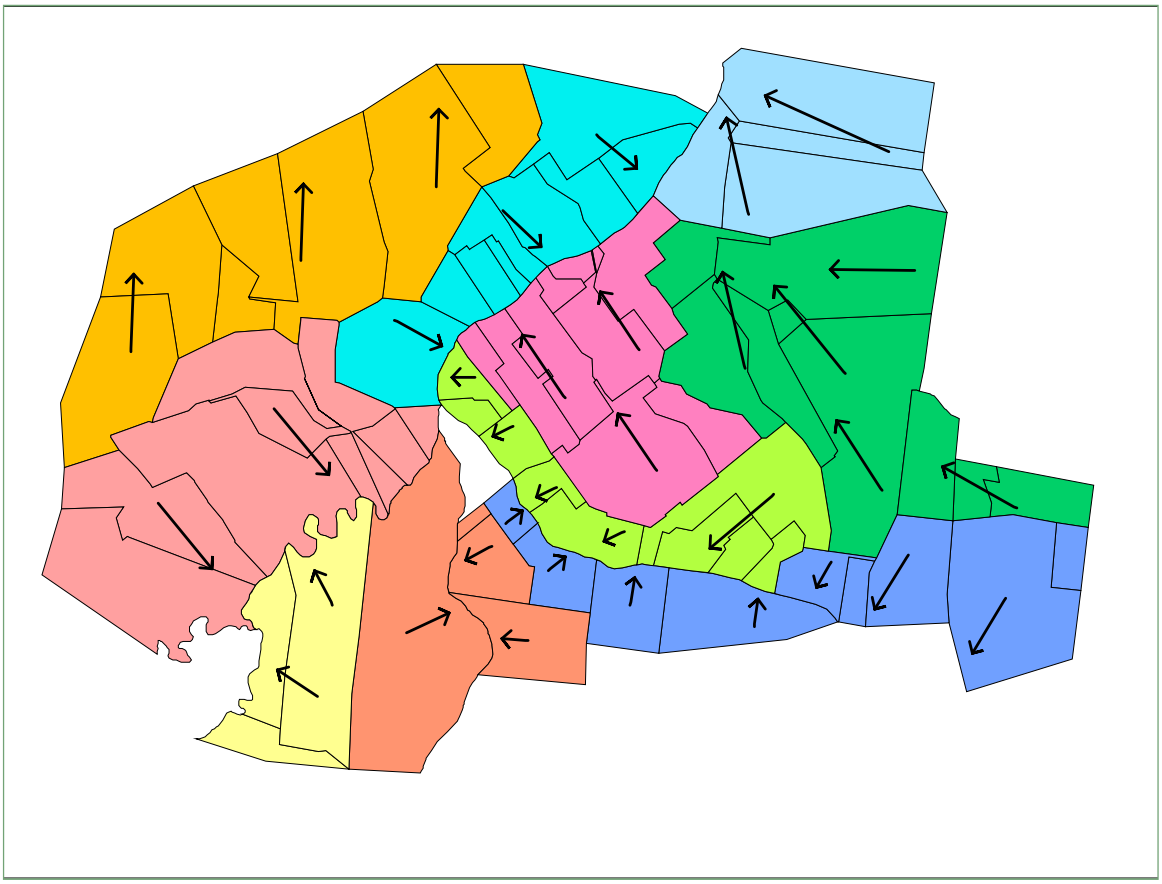

Figure 1 : Inverell Stormwater Catchments

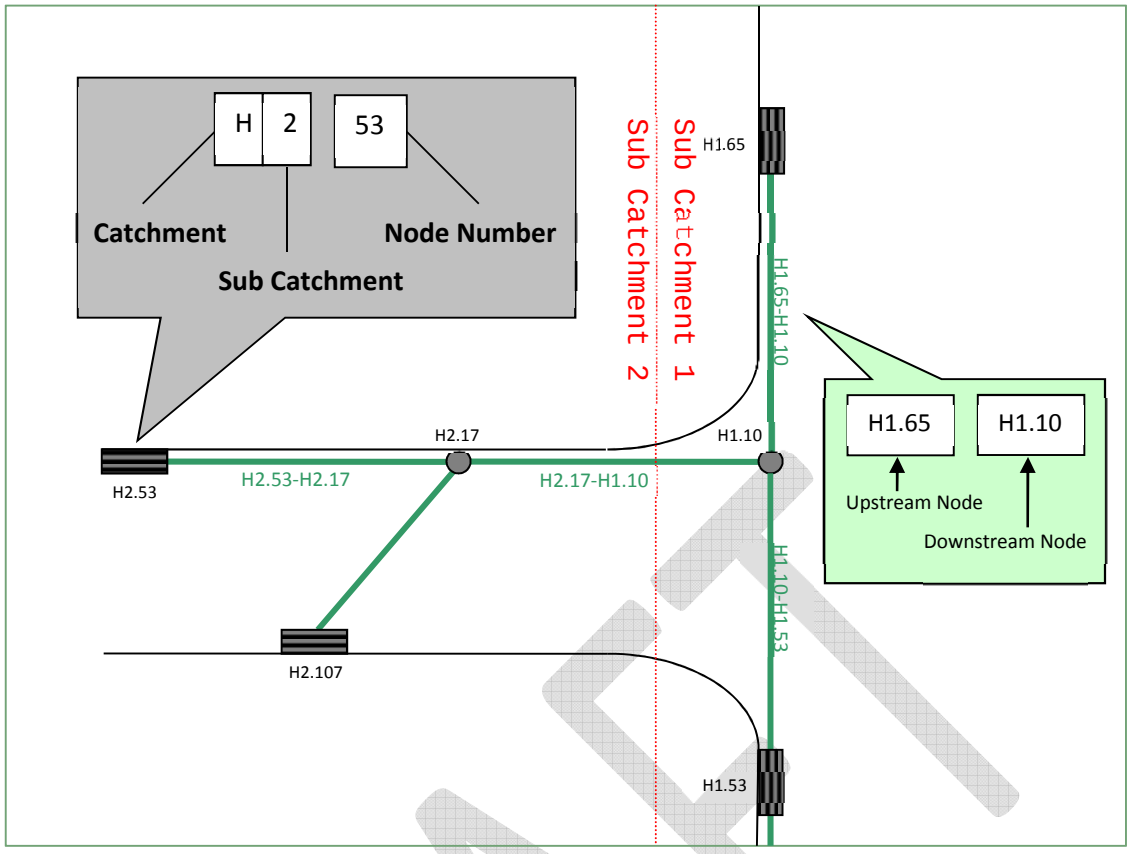

Figure 2 : Pipe and Node numbering system

Catchments are identified by a letter and sub catchments by a number. Nodes within a sub catchment are each given a number resulting in each node having a unique ID expressed as its catchment and sub catchment and number within that sub catchment. Pipes are then numbered based upon their upstream and downstream nodes. Each pipe must have an upstream and downstream node; these can be kerb inlet pits, headwalls, junction pits, surface pits or outlets.

Surface water channels are given a sequential asset number and are identified only by a general description and their location within a catchment. Kerb and gutter assets are separated by their construction method, but are numbered according to their downstream node for ease of management.

The size, number and type of assets that make up the drainage network are shown in Table 2 and Table 3.

Pit Type	Number
Kerb Inlet Pit	1,505
Surface Inlet Pit	767
Headwalls and Outlets	229
Junction Pit (Non-catching)	911
Gross Pollutant Traps	2

Table 2 : Drainage Node inventory

Asset Type	Length (m)
<300mm Drainage Pipe	583
300–450mm Drainage Pipe	50,933
>450mm Drainage Pipe	18,731
Surface Water Channel	12,554
Kerb and Gutter	141,455

Table 3 : Drainage Assets Inventory

Asset Register

The organisation uses Technology One Enterprise Suite software to manage its assets. The system includes an asset register that is fully integrated with the financial and work management modules allowing all work to be captured against the assets affected.

The system also allows for defects to be listed against an asset and work orders to be generated from these, aiding in the collection of long term life cycle cost data. All assets, defects and work orders can also be linked directly to the mapping system to allow accurate location information to be included.

Condition Profile

Inverell Shire Council rates the condition of its assets on a one to five scale in line with the uniform grading framework adopted as part of the NSW Government's integrated planning and reporting reforms.

Rating	Status	Definition
1	Excellent	No work required Asset/Component is in as new condition. Normal maintenance required but no deterioration identified.
2	Good	Only minor maintenance work required Provides a good level of service with some maintenance required. Deterioration identified but renewal not yet required.
3	Fair	Maintenance work required Still meets of level of service requirements but requires regular ongoing maintenance and minor repairs.
4	Poor	Renewal required Level of service impaired..
5	Very Poor	Urgent renewal/upgrading required. Asset/Component no longer provides required level of service. End of useful life.

Table 4 : Condition Rating General Descriptions

While specific quantifiable indicators are used to assess each component's condition state, all states are closely aligned to the general descriptions outlined in Table 4

The condition rating system reflects the performance, integrity and durability of the principal components of each asset. The assessment of the nature and extent of defects for each component type is included in Council's Asset Condition Inspection Manual which provides examples for each condition rating.

Within the useful life of an asset, the condition may fluctuate from one condition state to another. Judgment is exercised to determine whether the condition of an asset has changed to such an extent as to justify assigning a new condition state for the asset.

If an asset's condition state improves, one of the following must have occurred:

a) The original evaluation of condition level was incorrect, or
b) Works of a capital nature were carried out on the asset improving its condition. (Any such works should be capitalised and added to the value of the asset).

It is possible for an asset condition state to move to a non-adjacent condition state between valuations, either as a result of major works or as a consequence of deterioration over a valuation period.

Current Condition

The condition profiles in Figure 3 were developed following an inspection and condition assessment program that was carried out in 2015. Visual inspection was completed for a sample of the network by assessing the stormwater system that was visible from maintenance and catch pits. Inverell Shire Council regularly collects condition information as part of its routine maintenance inspection program and these

condition profiles will be updated regularly as information becomes available.

Projected Condition

Council has adopted the following useful lives for drainage asset components.

Asset Type	Useful Life(yrs)
Drainage Pipes	100
Drainage Pits	100
Surface Channel	100
Kerb and Gutter	70

Table 5 : Useful lives of drainage assets

All assets covered by this plan are assumed to degrade evenly over their useful lives so that in each condition state an asset is will have the following proportion of its useful life remaining:

- CS1 = 100%
- CS2 = 75%
- CS3 = 50%
- CS4 = 25%
- CS5 = 0%

Both the adopted useful lives and the straight line degradation method are considered approximations and will be updated and improved as more asset information becomes available.

If the Long Term Financial Plan renewal identified in that section of the plan is expended on the assets as suggested, the condition profile of the assets in 2026 at the end of this plan should closely resemble Figure 4.

While the projected condition shows an increase in the number of assets in condition state 3, it is important to acknowledge that this is a conscious decision by Council to ensure that the community is extracting the most value from these assets. In this condition state the assets remain fit for purpose and replacing them would mean losing the remaining service potential of the asset for little gain.

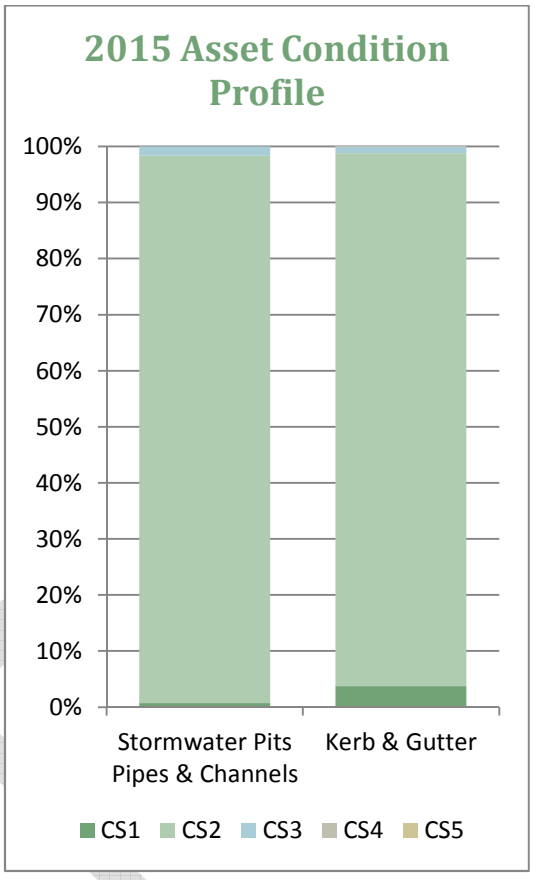

Figure 3 : 2015 Asset Condition Profile

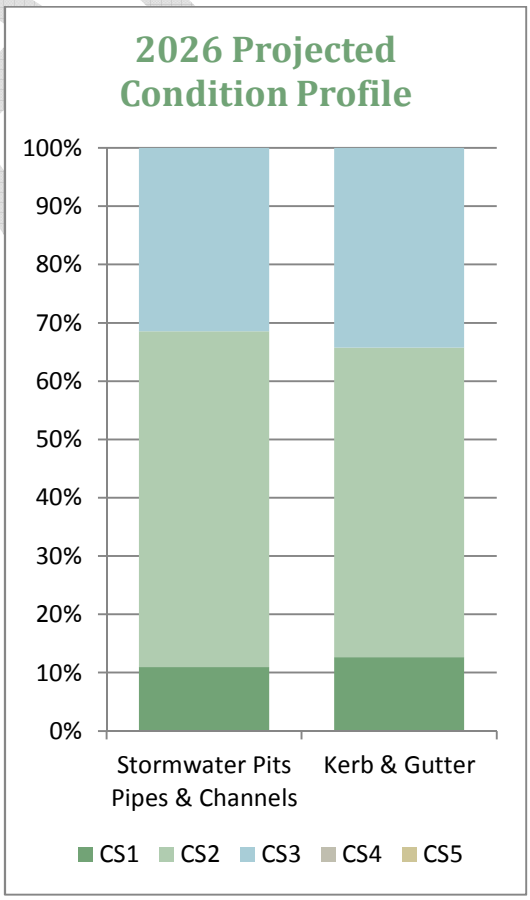

Figure 4 : 2026 Projected Condition Profile

Setting Standards & Measuring Performance

A key objective of asset management is to match the standard of service the organisation provides with what the community expects. To ensure we are meeting the expectations of our community it is important for Council to describe what level of service we intend to deliver and then to measure both what we have done to deliver that service and how well it has been received by our community.

Statutory Requirements

Statutory requirements often set the framework for minimum levels of service that infrastructure is required to meet. However, legislation associated with drainage infrastructure does not generally prescribe a set of standards or principles that must be applied. The legal responsibilities entailed upon Council are therefore general and often subject to local interpretation along general principles of duty of care and prudent financial management.

Levels of Service

Levels of service are a key business driver and influence all of Inverell Shire Council's asset management decisions. Level of service statements describe the outputs we intend to deliver to the community in relation to services attributes such as function, capacity, safety and cost effectiveness. Council has adopted the following levels of service for its drainage assets.

Inverell Shire Council will provide drainage assets that:

- minimise flooding of urban areas;
- are adequate for the expected volume of water;
- are well designed and free flowing;
- minimise the environmental impact of urban runoff on water quality;
- enhance the urban landscape;
- do not present a hazard to the community; and
- are economically, socially and environmentally sustainable.

Each of the above statements is supported by one or more performance measures that indicate how successfully we are delivering on that commitment. Council has defined performance measures in two terms, Community Performance Measures and Technical Performance Measures.

Community performance measures relate to how the community receives the service in terms of the expectations listed above. These are generally measured using metrics relating to the number of complaints received, time to respond and overall satisfaction with the aspects of the service. The organisations performance against these measures is to be reported back to the community annually.

Supporting the community performance measures are technical performance measures developed to measure how the organisation provides the service.

Desired Levels of Service

Desired levels of service are used to indicate what service the community would like to receive from the assets in the future. This allows Council to work toward providing a better service from the drainage assets over the life of the plan.

Council will consult with the community to determine whether the current levels of service meet the community's expectations for the drainage network (See Improvement Plan action 1.2). Consultation will be carried out in accordance with Council's Community Engagement Strategy.

Key Performance Measure	Level of Service	Performance Measure process	Performance Target	Current Performance 2014-15
Function	Sealed urban Roads are not obstructed by flooding	Number of incidents of flooding of sealed urban roads as recorded in customer request system.	<10 per annum	3
	Private property is not subjected to flooding from overflow of Council's system in 1 in 10yr event.	Number of incidents of flooding of residences as recorded in customer request system.	Zero	Zero
		Number of incidents of flooding of non-residence inhabited buildings as recorded in customer request system.	<5 per annum	1
Safety	Drainage infrastructure is free of hazards	Number of reported accidents/ incidents resulting in potential liability claims	Zero	
Environment	Minimise the environmental impact of urban runoff on water quality	Number of reported incidents of environmental pollution from drainage system.	<3 per annum	Zero

Table 6 : Community Performance Measures

Key Performance Measure	Level of Service	Performance Measure process	Performance Target	Current Performance 2014-15
Cost Effectiveness	Assets are maintained in the most cost effective manner.	Information collected annually from maintenance management systems	Maintenance Cost <$1000/km/yr	$870/km
	Assets are renewed as required	Comparison of budget for renewal with required renewal modelling from this plan	Budget matches AMP requirements	Budget exceeded requirement
Condition	Assets are in good condition	Proportion of Level 2 inspections returning a fair overall rating	90% of Level 2 inspections return an overall rating of fair or better.	100%
Function	Flooding of urban areas is minimised and system remains free flowing	Time to respond to overflow	95% of incidences responded to within adopted timeframe	Not yet measured – timeframes to be adopted with this plan.

Table 7 : Technical Performance Measures

Planning for the Future

This section of the Drainage Asset Management Plan attempts to predict future demand for services in order to identify the most effective means of managing that demand. This allows Council to make optimised decisions regarding its asset investment proposals. It is important to note that demand forecasts are often proven wrong given the passage of time. Influences on demand such as changes in government policy, technological advances and community preferences cannot be predicted with certainty over long periods. As a consequence, assumptions made about factors may change between and during the development of forecasts.

Assumptions are often based on judgements that consider past performance and the likelihood of future change. Therefore the following forecasts should be treated with some caution and taken as possible future outcomes rather than definitive statements. Any assumptions essential to the following forecasts have been noted for each factor considered

Population

Perhaps the most commonly understood factor influencing demand is population change. It is generally the key driver for growth in all areas and drives demand for services provided by Council and, in turn, the number and type of assets that are required to provide these services.

Population projections for the Inverell Shire local government area are outlined in Table 8 and Table 9. The NSW Department of Planning and the Environment predicts that the Shire's population will grow modestly to 2031. Demand for services provided by Council's drainage assets will continue to grow slowly with this increase in population.

Property Development

Expansion of the drainage network is typically driven by property development and the release of new subdivisions. Developers are required to install drainage systems which become Council assets either as soon as they enter service or at the end of a maintenance period, depending on the conditions of the development approval.

The most recent exercise in demand forecasting was completed for the 2009 Living Lands Strategy. This strategy predicted annual yields of 32 residential lots per year based on historical data. This reinforces the prediction of slow growth in demand for drainage infrastructure.

TOTALS:	2011	2016	2021	2026	2031
Total Population	16,600	17,200	17,750	18,200	18,600
Total Households	6,700	7,050	7,350	7,650	7,900
Average Household Size	2.44	2.39	2.36	2.33	2.30
Implied Dwellings	7,600	8,000	8,350	8,650	8,950

Table 8 : Population Projections (NSW Department of Planning and the Environment, 2014)

CHANGE	2011 to 2016	2016 to 2021	2021 to 2026	2026 to 2031
Total Population Change	600	550	500	400
Average Annual Population Growth	0.7%	0.6%	0.5%	0.4%
Total Household Change	350	300	300	250
Average Annual Household Growth	1.1%	0.9%	0.7%	0.7%

Table 9 : Population Change (NSW Department of Planning and the Environment, 2014)

Urban Salinity & Water Table

Urban salinity refers to the processes that cause, and the impacts that result from, the mobilisation and re-distribution of salt in urban environments.

Vegetation composition, cover and health, patterns of water use, additional sources of salt, and the design, construction and maintenance of infrastructure can all contribute to urban salinity. These changes can alter the natural water cycle, inhibit drainage and impede ground water flow. Figure 5 shows some examples of how development in urban areas can affect the water table.

Surrounding land use and geology can also add to the complex array of local or site specific issues as these factors also influence recharge rates, water movement and ground water discharge. High saline water tables or saline water supplies in urban areas can lead to saline discharge sites, damaged buildings and fixtures, and damage to Council's infrastructure. For Local Government and other urban stakeholders, this translates to additional costs associated with extra repairs and maintenance, reduced life span of infrastructure, preventative action and increased operating costs.

Inverell Shire Council needs to be aware of the danger salinity and high water tables present to the drainage network and ensure that materials and methods used in the development and maintenance of the networks are resistant to its effects.

The organisation also needs to be aware of the affect inadequate drainage can have on increasing salinity and ensure that the network can drain the local environment effectively to prevent salinity problems.

Climate Change

The most obvious possible impact of climate change on the drainage network is the predicted change in rainfall in the region. The consensus according to the CSIRO (see Figure 6) is that the region will experience little change or slightly less annual rainfall to 2030. Although the average annual rainfall is expected to remain the same or decrease, the Garnaut Climate Change Review found:

"As well as changes to annual average rainfall, the character of daily rainfall may change. There is expected to be an increase in the intensity of rainfall events in some areas, and the number of days without rainfall is also expected to increase. This suggests that the future precipitation regime may have longer dry spells broken by heavier rainfall events" (Garnaut, 2008, p. 115)

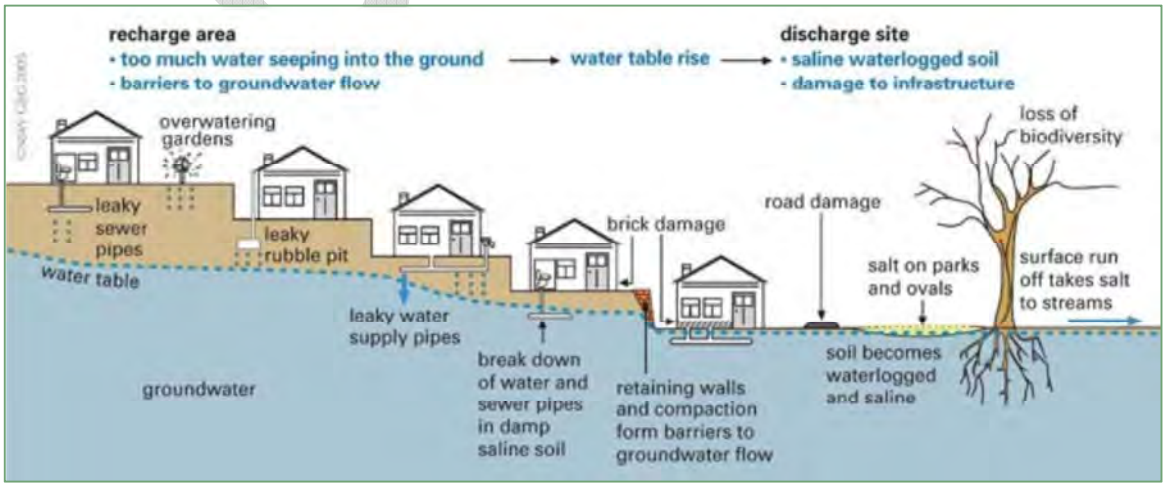

Figure 5 : Causes of urban salinity (Slinger & Tenison, 2007)

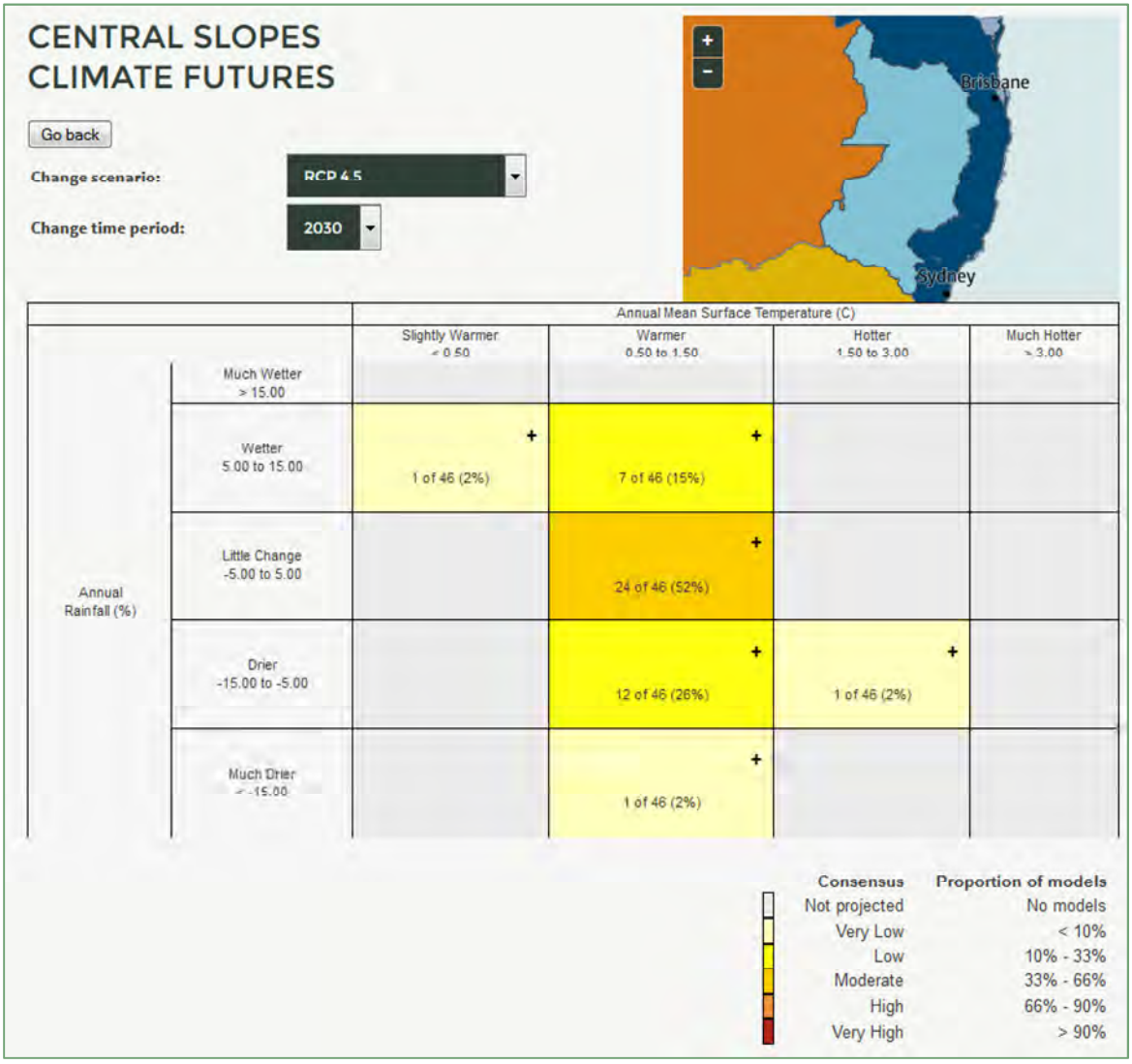

Figure 6 : Central Slopes Rainfall and Temperature (CSIRO, 2015)

More intense rainfall events are likely to place increased pressure on the drainage network to carry larger volumes of stormwater runoff. Inverell Shire needs to consider planning for a more robust network than has been required in the past to ensure that these heavier rainfall events don't cause flash flooding in the townships.

More information will be available about the expected effect of climate change on rainfall when Engineers Australia releases the update to Australian Rainfall and Runoff.

Operating & Maintaining the Drainage Network

Maintenance is the regular on-going work that is necessary to keep assets operating. Maintenance does not increase the service potential of an asset or keep it in its original condition; it slows down deterioration and delays when rehabilitation or replacement is necessary. This part of the plan details the specific maintenance activities Council will undertake to keep its drainage assets performing to the required level of service.

Inspections

Inspections are formalised assessments undertaken to identify defects and hazards as well as to assess the overall condition of the assets. They are carried out both in response to requests by the community and as part of a regular inspection programme by knowledgeable, skilled personnel. The result of routine inspections, as well as information relating to the speed and quality of Council's response to identified hazards, is to be presented to the Council's Civil & Environmental Services Committee on an annual basis. Council carries out a three level hierarchical inspection regime as detailed below.

Level 1 – Routine Maintenance Inspections

Routine Maintenance Inspections are visual inspections to check the general serviceability of the asset, particularly for the safety of users, and to identify emerging issues. They may be carried out in conjunction with routine maintenance of the asset.

Level 1 inspections provide a check of the asset inventory held in the Register, identification of any hazards or defects present and may recommend a Level 2 inspection be carried out if warranted by observed distress or unusual behaviour of the asset.

Defects or hazards identified during these inspections are either programmed for response during routine maintenance or responded to immediately via reactive maintenance, depending on the risk they present and the relative importance of the component in the asset hierarchy. The results are also collated for later reporting and to aid in decision making.

Minimum inspection frequency is dictated by the criticality of the asset; assets that have previously been rated poorly are also required to be inspected more frequently.

Level 2 – Condition Inspections

Condition Inspections assess and rate the condition of the assets. This information is used as a basis for assessing the effectiveness of past maintenance treatments, identifying current maintenance needs, modelling and forecasting future changes in condition and estimating future budget requirements.

Level 2 inspections are much more detailed than Level 1 inspections. The inspections measure the extent and severity of defects in the components of the drainage network and compile information about the condition of each component, including physical investigation of the degradation of the structure where necessary.

The condition rating system reflects the performance, integrity and durability of the principal components of each asset. The assessment of the nature and extent of defects for each component type is included in Council's Asset Condition Inspection Manual which provides examples for each condition rating and a weighting system to calculate an overall condition rating for each structure or segment type. The condition ratings have been developed to align with ISO standards where available.

Inspections are programmed to target 20% of all assets each financial year to ensure that every asset is subject to a Level 2 inspection at least every five years. The results of the Level 2 inspections are used to give an indication of the condition of the entire network which is used to assess the performance of the maintenance budget and is reported in the annual report each year.

Level 3 – Detailed Engineering Inspections

A Detailed Engineering Inspection is an extensive inspection which may include physical testing and structural analysis to assess the assets structural integrity, to identify and quantify the current and projected deterioration of the asset and to assess appropriate management options.

Level 3 inspections must be carried out by an experienced and qualified engineer and are usually completed as a result of a recommendation in a Level 2 inspection report which has rated the asset in poor or very poor condition and raised significant concerns about its continued performance. Level 3 inspections may also be necessary in order to provide a load rating for a structure or to assess the condition of an asset prior to carrying out programmed works such as rehabilitation, reconstruction or relining.

The inspecting engineer will provide a written report of the results of a Level 3 Inspection to the Director Civil and Environmental Services with a copy to the Manager Civil Engineering within 60 days of the inspection. The report may include assessments of load capacity and condition, recommendations for further testing, remedial action and future inspection and monitoring or a complete "Structure Management Plan" for individual structures as deemed necessary by the inspecting engineer or as requested by management.

Routine Maintenance

The primary failure mode of drainage systems is blockages due to the ingress of debris into the system or the misalignment or failure a pit or pipe. While it is possible to filter some debris at entrance points, this will not always be effective and may contribute to blockage at the filter. Drainage pits also allow for sedimentary collection of some material. Routine maintenance therefore consists of an inspection and cleaning programme, with other issues responded to as reactive maintenance.

Council will endeavour to inspect 5- 10% of the visible pits and outlets in the network per year. This will include cleaning out those pits or the pipes that are attached to them where significant debris is found by the inspectors.

Gross Pollutant Traps

Council has installed three Ecosol RSF500 Gross Pollutant Traps (GPTs) in the Inverell drainage network. One RSF500/105 unit is installed on an outlet into the Spring Creek on Borthwick Street and the other two RSF500/67 units are installed in tandem at an outlet into the Macintyre River on Ring Street. Each of these GPTs requires regular maintenance to empty the pollutant net.

The manufacturer recommends inspection of the traps once a month during the rainy season and once every three months during dryer times. This is a simple process as the nets can be seen from the surface without entering or opening the pits.

Under normal conditions the nets should only need to be emptied once every 6-12 months. This is carried out by a small team using a backhoe to lift the net out of the pit and emptying it into a truck to be disposed of at the landfill.

Reactive Maintenance

Maintaining Council's drains through regular investment is the most effective way to preserve the condition of the assets and reduce the risk of defects occurring and intervention becoming necessary. However, even with regular investment, defects will occur; reactive maintenance refers to works that are carried out as a matter of urgency, usually to repairs these defects for reasons of safety.

When responding to defects with reactive maintenance the organisation takes a safety first approach. Where there are clear implications for public safety we will act to allay the danger. Where danger is not implicit we will balance our actions and responses against other criteria and priorities as set out in this plan

In general when notified that an overflow occurs, Council will respond to clear blockages within:

- 4 Hours where there is an immediate danger to a residential dwelling
- 24 Hours where there is an immediate danger to any other building
- 30 days where there is no immediate danger of flooding affecting a building.

The organisation's performance in responding to identified defects within the adopted timeframe is to be measured and reported annually to Council's Civil and Environmental Services Committee.

In order to fund both reactive and routine maintenance, Council has set aside the following funding in its Long Term Financial Plan:

Year	Budget
2016-2017	$96,000
2017-2018	$98,530
2018-2019	$101,120
2019-2020	$103,780
2020-2021	$106,520
2021-2022	$109,330
2022-2023	$112,210
2023-2024	$115,170
2024-2025	$118,210
2025-2026	$121,320

Table 10 : Available Maintenance Funding

Renewing and Expanding the Drainage Network

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

When deciding whether an item of expenditure is to be capitalised Council refers to the decision tree in the CPA publication *Valuation and Depreciation - A guide for the not-for-profit and public sector under accrual based accounting standards (2013)*.

Renewal

Asset renewal is major work which restores, rehabilitates, replaces or renews an existing asset to its original service potential. This is generally required when an asset has reached the end of its useful life or has failed. It is periodically required expenditure, relatively large (material) in value compared with the value of the components or sub-components of the asset being renewed. As it reinstates existing service potential, it has no impact on revenue, but may reduce future operating and maintenance expenditure if completed at the optimum time

Due to the variations in the physical life of stormwater drainage assets, renewal and rehabilitation is undertaken reactively as assets fail or are identified as being about to fail as part of ongoing condition assessments.

Inverell Shire follows an Optimised Renewal Decision Making (ORDM) process when making decision about renewal of its drainage assets. ORDM is a process that assists organisations to assess the optimal renewal technique or activities that are available to extend, augment or reduce the service delivered by infrastructure assets, in line with business objectives. The key elements when performing ORDM are:

- Identifying and analysing the modes of failure
- Identifying viable treatment options
- Undertaking an economic evaluation of these options
- Selecting the most strategically cost effective option for the organisation.

In a stormwater drainage system, the potential modes of failure that may lead to renewal include:

- Cost of Service.
- Performance/Reliability/Availability
- Structural Integrity
- Capacity/Utilisation

The ORDM processes for each of the failure modes are summarised in Table 11 to Table 14 (Concrete Pipe Association of Australasia, 2010).

This section of the plan also provides a forecast of the notional renewal funding required to keep the assets in satisfactory condition and compares it to the available funding provided in Council's Long Term Financial Plan.

ODRM Process	Cost of Service
Causes	• Excessive maintenance costs • High number of failures due to poor condition • Future liabilities, rehabilitation or replacement works necessary • High operating costs due to poor condition • Equipment or asset obsolete – Repairs and spare parts costly or not available – New asset would be more efficient, save money
Effects	• Excessive subsidies required • Drain on recurrent cash flow • Future liabilities for renewal works • Higher operating costs
Significance	• Degree to which costs exceeded income generated (return on asset) • Business viability – ability to carry non-performing assets or raise additional income
Treatment Options	• Raise income derived from asset, depends on: – Customer response – Present cost levels – Predictive cost increases • Reduce high cost activities, maintenance and operations • Negotiate lower level of service, performance, reliability, etc. • Defer all capital investment • Mothball asset • Dispose of asset • Transfer asset
Evaluation	• Complete ORDM evaluation on various treatment options • Assess and determine strategy in the light of total business picture

Table 11 : Failure Mode – Cost of Service

ODRM Process	Structural Integrity/Asset Mortality (End of physical life)
Causes	• Structural integrity of asset has decayed below level requirement to meet normal working stresses • Loading on asset exceeds capacity: – internal pressure – external pressure
Effects	• Leaks/inflow (voids created) • Collapse • Property damage • Personal damage (see Risk Management/Consequence of Failure)
Significance	• Degree of damage caused • Risk to life • Effect on customers • Consequences of failure
Treatment Options	• Reduce loading on asset (divert flows) • Improve ability to repair quickly • Rehabilitate asset before failure • Replace asset
Evaluation	• Evaluate cost/benefits of each options • Benefits to include all consequences of failure costed to probability of failure • Rank cost/benefit against all opportunities for investment

Table 12 : Failure Mode - Structural Integrity/Asset Mortality

ODRM Process	Performance/Reliability/Availability
Causes	• Decay of asset condition • Failure of component (e.g. joint/connection) • Failure of associated unit (secondary failure) • Blockages caused by: – Roots – Rubbish – Refuse – Damage – Silt
Effects	• Interruption of supply or service (blockage) • Overflow of asset. Flooding damage to property, etc. • Reduced level of service (reliability/partial service)
Significance	• Degree to which service is effected • Number of customers effected and time • Consequences of failure, e.g. safety/damage
Treatment Options	• Improve planned maintenance/condition monitoring • Reduce repair time • Install redundancy/back up standby/overland flow/rerouting • Improve condition monitoring • Install warning devices/predictive model • Overhaul (or rehabilitate) asset to achieve necessary reliability • Replace asset • Complete emergency routine to suit storm events
Evaluation	• Evaluate cost/benefits including business consequences of not meeting reliability standards • Equate costs of consequences of failure to probability • Rank cost/benefit against all opportunities for investment

Table 13 : Failure Mode - Performance/Reliability/Availability

ODRM Process	Capacity/Utilisation	
	Exceeds design capacity	Inadequate utilisation
Causes	• Increased area being drained • Changes in rainfall and/or groundwater levels • Changes to catchment topography • Increased customer expectations, demands for service • Blockage of service (silt)	• Decline in demand • Loss of area being drained • System changes • Reduced intensities
Effects	• Inability to meet demands on system	• Cost of operating assets is above ability to pay
Significance	• Degree to which capacity is exceeded (flooding impact) • Number of customers effected • Risk involved, safety, etc.	• Is it an unwarranted burden on the business (not core activity/non-performing asset)
Treatment Options	• Operate system differently: – interconnection – rerouting catchment and transfer • Boost asset capacity (pump) • Augment asset/duplicate • Replace asset/enlarge • Reduce levels of service • Build new asset	• Mothball assets • Dispose of assets – rationalisation • Identify cost as CSO and derive other income • Transfer liability to others
Evaluation	• Evaluate costs/benefits/income of each option • Benefit/consequence of failing to meet demands against probability of occurrence • Rank cost/benefit against all opportunities for investment	• Overall impact on business or organisation

Table 14 : Failure Mode - Capacity/Utilisation

Renewal of the drainage network is focussed on delivering the seven key principles outlined in the adopted level of services statements (See the ***Setting Standards & Measuring Performance*** section of this plan for more information):

- minimise flooding of urban areas;
- are adequate for the expected volume of water;
- are well designed and free flowing;
- minimise the environmental impact of urban runoff on water quality;
- enhance the urban landscape;
- do not present a hazard to the community; and
- are economically, socially and environmentally sustainable.

To ensure new works align with these principles, all projects will be subject to a planning process that includes calculation of their whole of life costs and analysis of their alignment with the above before they are included in the operational plan. The project proposal templates are included in Appendix BAppendix .

Projected Renewal Requirements

Council intends to ensure that assets do not fail to provide a satisfactory level of service. This means providing enough renewal funding to replace or renew any asset that reaches condition state 4 or 5 throughout the life of this plan.

Figure 7 shows the notional funding required for each year of the plan to renew enough of the assets to meet this target and highlights that as the end of the plan nears, the funding required begins to increase. This is by virtue of the fact that most drainage assets are currently in condition states 1 and 2 and less intervention is needed until a greater proportion reaches state 3.

The required renewal funding is based on modelling of each class as a whole and assumes that all assets are spread evenly throughout the condition states. It does not identify specific projects that need to be undertaken to repair or renew assets and is instead intended to show the gradual progression of deterioration that all assets moves through as they near the ends of their useful lives. The renewal requirements identified are therefore often unlikely to be required to be spent in the years indicated. For example, while a pipe asset may lose a proportion of its value into a lower condition state each year, this doesn't mean there are necessarily any issues with the pipe. Intervention will only occur when it is necessary for a project to be completed to the return the asset to its required service level.

Ongoing condition assessment of all asset classes will ensure that up to date information is provided to plan for renewal forecasting as the assets age and the level of service they provide begins to decline. This plan will be monitored and updated to ensure that changes are reflected when condition information is reviewed each year.

Budgeted Renewal

Councils Long Term Financial Plan 2017-2026 (LTFP) provides the available level of funding to implement the requirements of this Asset Management Plan. The LTFP is used to formulate the annual Operational Plans and budgets and includes provision for funding from grants and borrowings as well as rates and charges. Figure 8 shows the funding available in the LTFP for each year of the plan. The Long Term Financial Plan 2017-2026 includes funding from a proposed special rate variation, intended in part to address the shortage of renewal funding required to return Council's infrastructure to a satisfactory condition.

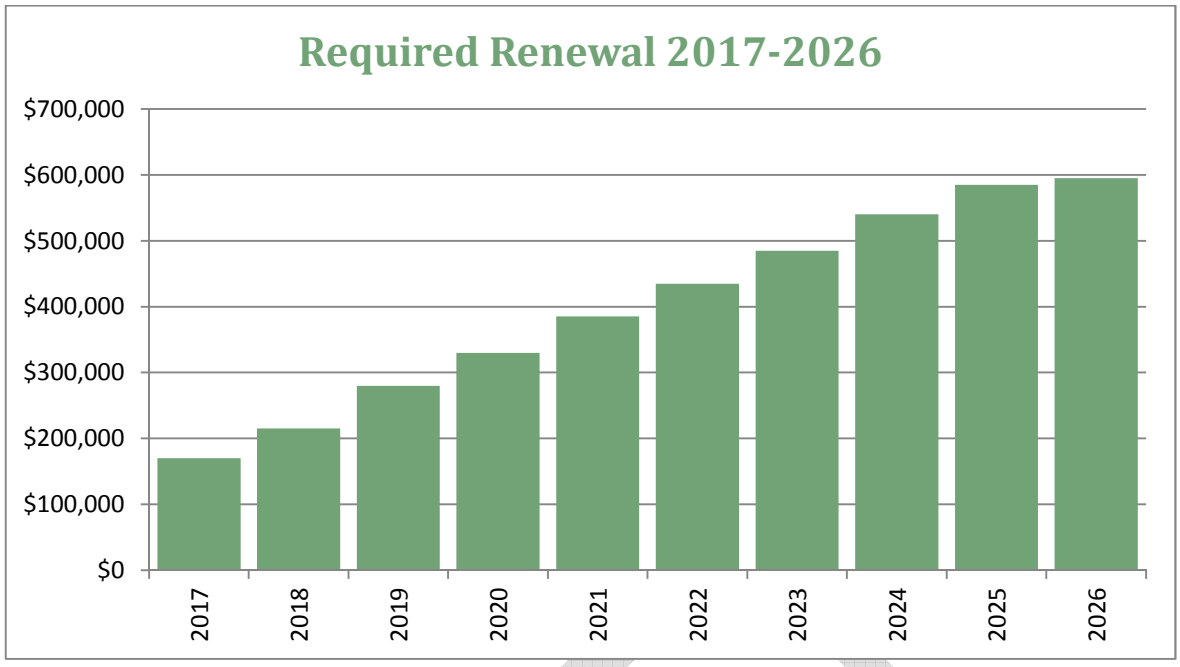

Figure 7 : Projected Required Renewal Funding

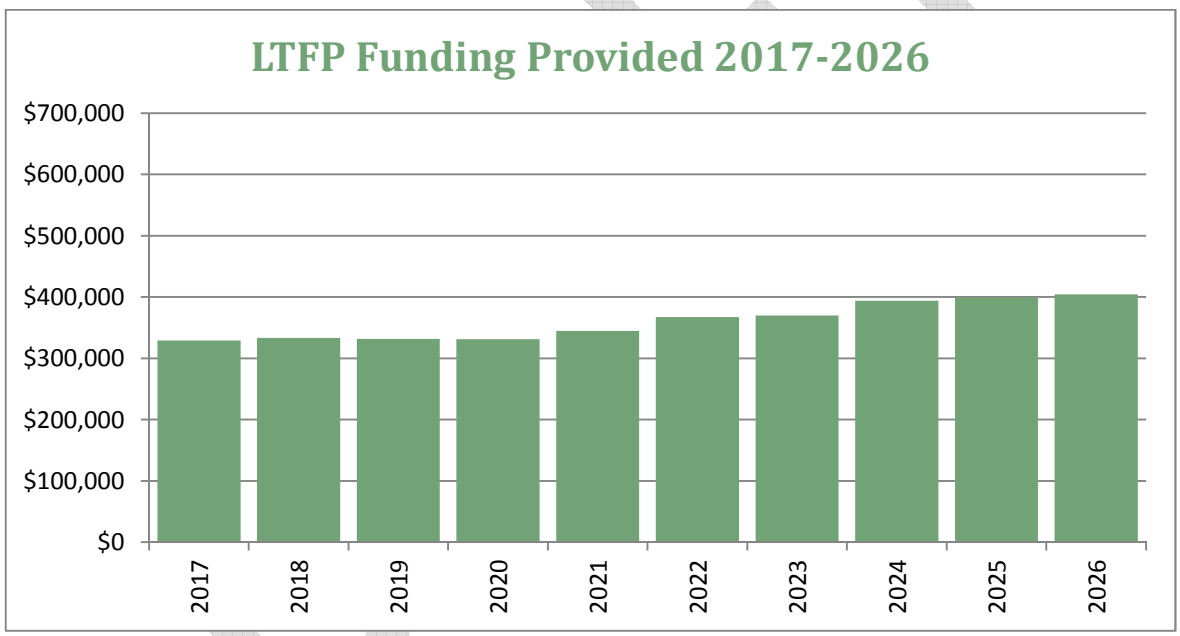

Figure 8 : LTFP Funding Provided

Expansion

Capital expansion is expenditure which enhances an existing asset to provide a higher level of service or expenditure that will increase the life of the asset beyond that which it had originally.

Inverell Shire Council has adopted a "Renew before New" approach to planning its long term capital works. This approach recognises that Council should prioritise maintaining, repairing and replacing the current drainage network over development of new or expanded services which add to the ongoing maintenance and replacement burden.

As such no new capital works are included in annual operating plans except where identified as part of the ORDM process.

Rationalising the Network and Retiring Old Assets

Rationalising assets and services can reduce costs, generate operational savings for reinvestment, and allow the delivery of more integrated, customer-focused services. It enables Council to improve our most important assets for the future, and help fund the work through reducing the cost to provide inefficient or unnecessary assets.

At present all Council drainage assets are providing a service to alleviate urban flooding, and no rationalisation of the network is anticipated in the near future.

Council will continue to assess how well its drainage network is serving the community while carrying out its regular inspection program and ORDM process. Following review, those assets that are deemed surplus to Council's requirements will generally be mothballed as there is unlikely to be any benefit in removing them.

Managing the Risks

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

Critical risks, being those assessed as 'Very High' - requiring immediate corrective action and 'High' – requiring prioritised corrective action identified in the infrastructure risk management plan are summarised in Table 15

For more information on the assessment process refer to Council's Infrastructure Risk Management Plan.

Asset at Risk	What can Happen	Risk Rating (VH, H)	Risk Treatment Plan
Drainage Network	Localised flooding due to inadequate infrastructure	H	Review new version of Aust. Runoff and Rainfall and identify critical assets that will not meet new projections
Drainage Network	Polluted or contaminated surface water is released into natural environment from drainage system	H	Manage within existing inspection programs
Drainage Pits	Pit lids present traffic or pedestrian hazard	H	Manage within existing inspection programs
Open surface channels and accessible confined spaces	Injury or death to person inside channel or pipe	H	Manage within existing inspection programs

Table 15 : Critical Risks

Asset Management Practices

Finance & Database

Council uses Technology One Enterprise Suite as its primary database software. The selected modules form a robust financial and works management system.

Geographical Information Systems

MapInfo Professional is used to store location based asset data. Data is stored in the MapInfo TAB format in GDA94 datum and accessed through the Exponare platform or directly from Technology One via integration.

Council is updating its guidelines for the management of its spatial data. These guidelines will inform the policies, procedures and processes that Council uses to manage its spatial data (See Improvement Plan Action 1.8).

Information Inputs

The key information flows into this asset management plan are:

- The asset register data on size, age, value, remaining life of the drainage network;
- Council strategic and operational plans,
- Service requests from the community,
- Network assets information,
- The unit rates for categories of work/materials,
- Current levels of service, expenditures, service deficiencies and service risks,
- Projections of various factors affecting future demand for services and new assets acquired by Council,
- Future capital works programs,
- Financial asset values.

Information Outputs

The key information flows from this asset management plan are:

- The projected Works Program and trends,
- The resulting budget and long term financial plan expenditure projections,

These will impact the Long Term Financial Plan, Delivery Plan, Annual Budget and Operational Plans.

Procedures for the flow of information are heavily dependent upon the needs of the above mentioned plans. Specific requirements for information from this asset management plan will be defined during the process of updating council's other long term planning documents and will be included in future revisions (See Action 1.5 of Improvement Plan).

Plan Improvement & Monitoring

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

- The degree to which the required cash flows identified in this plan are incorporated into council's long term financial plan;
- The degree to which 4 year detailed works programs, budgets, business plans and organisational structures take into account the 'global' works program trends provided by this plan;
- Progress toward achieving the outcomes listed in the Improvement Plan

Monitoring and Review

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

Improvement Plan

The asset management improvement plan generated from this asset management plan is shown in Table **16**.

Action ID	Action	Outcome	Responsibility	Due Date
1.1	Develop and implement shire-wide waterway management strategies.	Reduce the risk to the community arising from emergency events.	Manager Environmental Engineering	End 2018
1.2	Consult the community on the current levels of service and determine desired levels of service for inclusion in AM plan where necessary	Ensure plan is providing for community expectations. Provide targets for AM plan	Integrated Planning and Reporting Manager	End 2016
1.3	Improve condition assessment manual and programme of condition assessment including regular reporting cycle	Provide better understanding of useful lives for forward planning.	Asset Management Coordinator	June 2017
1.4	Continue improvement of asset data and confirm asset locations	Improved inventory and spatial data for use in forward planning and asset location.	Asset Management Coordinator	Ongoing
1.5	Develop formalised procedures for information flows into and out of the asset management plan	Ensure relevant information is shared.	Asset Management Coordinator, Manager Finance	End 2016
1.7	Develop formal capital evaluation process for allocation of funding.	Provide better information about life cycle costs for future works	Asset Management Coordinator, Manager Finance	End 2016

Table 16 **: Improvement Plan**

References

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Appendix A

Asset Condition Inspection Manual

Asset Condition Inspection Manual

Inverell Shire Council

Document Control

Title: Asset Condition Inspection Manual

Document Number:

Date	Revision	Author	Reviewer	Approved Date
06/04/2016	Version 3.0	D. Strugnell	B. McInnes	

This manual was developed by Inverell Shire Council.
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Contents

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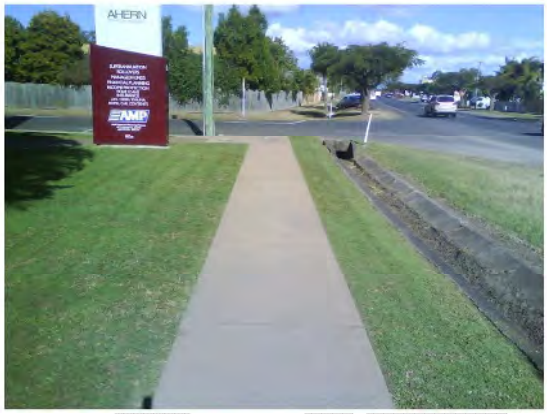
Paths

A path is a hard surfaced area for use by pedestrians and/or cyclists. Paths are most often located on verges in the road reserve although some are located in off road areas such as parks and nature reserves. They are generally constructed of concrete or pavers but may be constructed of other materials such as crushed rock, bitumen chip seal bark chips or natural earth. Other ancillary items assessed as part of the path network include pram ramps, signs and railings.

Defects associated with concrete paths include, cracking, spalling, stepping and panel displacement. Ratings are applied over the whole segment taking all defect types into account.

Condition 1

No work required (normal maintenance)



Assets in this state are in very good condition. There are no visible defects and only normal maintenance work is required.

Condition 2

Only minor maintenance work required

Good condition - only very minor defects visible and minor maintenance required to remedy them.

Condition 3

Maintenance work required

In this state a number of defects are visible but the asset remains quite serviceable. Routine maintenance is required to remedy issues.

Condition 4

Renewal work required

In this state the path asset is in below average condition. There are quite a few obvious defects visible that require some renewal work to repair

Condition 5

Urgent renewal or upgrading required.

At this stage the asset is in very poor condition and should be referred to capital works program for reconstruction.

Road Edges

Road edges are concrete or masonry structures designed to provide road drainage, and to act as a barrier to prevent vehicles from leaving the road carriageway. This includes concrete kerbs, drains, and edge restraints.

Defects associated with road edges include, cracking, spalling, vertical displacement and rotation. Ratings are applied over the whole segment taking all defect types into account.

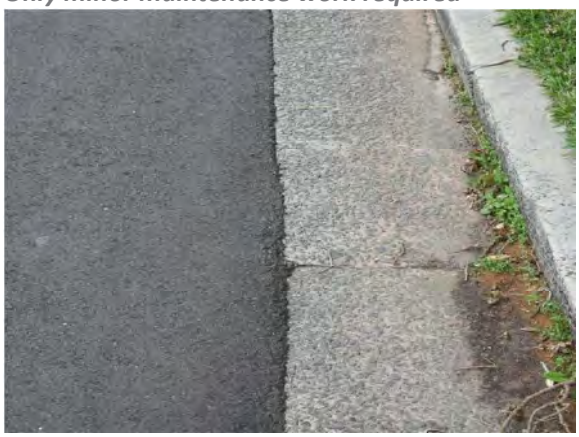
Condition 1

No work required (normal maintenance)

Assets in this state are in very good condition. There are no visible defects and only normal maintenance work is required.

Condition 2

Only minor maintenance work required



Good condition - only very minor defects visible and minor maintenance required to remedy them.

Condition 3

Maintenance work required

In this state a number of defects are visible but the asset remains quite serviceable. Routine maintenance is required to remedy issues.

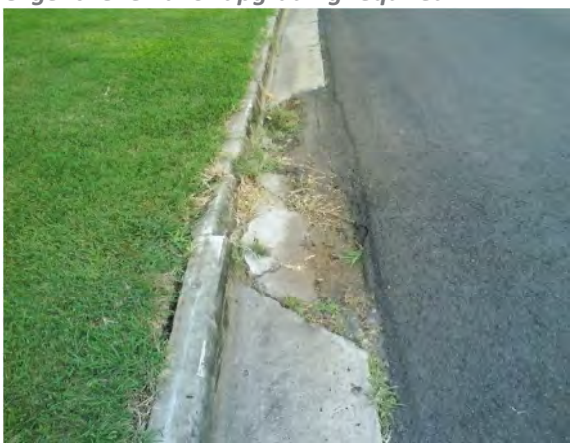
Condition 4

Renewal work required

In this state the asset is in below average condition. There are quite a few obvious defects visible that require some renewal work to repair

Condition 5

Urgent renewal or upgrading required.



At this stage the asset is in very poor condition and should be referred to capital works program for reconstruction.

Road Islands

Road islands are structures such as roundabouts, raised medians and pedestrian refuges constructed in the road carriageway to provide for traffic. They are generally constructed of concrete and may either be poured in-situ or prefabricated and anchored to the road pavement.

Defects associated with road islands include, cracking, spalling and joint displacement. Ratings are applied over the whole component taking all defect types into account.

Condition 1

No work required (normal maintenance)

Assets in this state are in very good condition. There are no visible defects and only normal maintenance work is required.

Condition 2

Only minor maintenance work required

Good condition - only very minor defects visible and minor maintenance required to remedy them.

Condition 3

Maintenance work required

In this state a number of defects are visible but the asset remains quite serviceable. Routine maintenance is required to remedy issues.

Condition 4

Renewal work required

In this state the asset is in below average condition. There are quite a few obvious defects visible that require some renewal work to repair

Condition 5

Urgent renewal or upgrading required.

At this stage the asset is in very poor condition and should be referred to capital works program for reconstruction.

Stormwater Channels

Stormwater surface channels are lined or unlined open channels that are located outside the road carriageway and provide for urban stormwater drainage and flood mitigation. Unlined drains are simple ditches formed in natural earth while lined drains generally consist of a concrete base slab and some form of batter protection such as fabric formed concrete, shotcrete, gabions or rock mattress.

Defects associated with stormwater surface channels include, cracking, spalling and displacement of concrete materials and loss of tension and displacement in gabion and rock mattress cage structures. Ratings are applied over the whole component taking all defect types into account. Unlined drains are not assessed.

Fabric Formed - Condition 1

No work required (normal maintenance)

Assets in this state are in very good condition. There are no visible defects and only normal maintenance work is required.

Fabric Formed - Condition 2

Only minor maintenance work required

Good condition - only very minor defects visible and minor maintenance required to remedy them.

Fabric Formed - Condition 3

Maintenance work required

In this state a number of defects are visible but the asset remains quite serviceable. Routine maintenance is required to remedy issues.

Fabric Formed - Condition 4

Renewal work required

In this state the asset is in below average condition. There are quite a few obvious defects visible that require some renewal work to repair

Fabric Formed - Condition 5

Urgent renewal or upgrading required.

At this stage the asset is in very poor condition and should be referred to capital works program for reconstruction.

Rock Gabion - Condition 1

No work required (normal maintenance)

Assets in this state are in very good condition. There are no visible defects and only normal maintenance work is required.

Rock Gabion - Condition 2

Only minor maintenance work required

Good condition - only very minor defects visible and minor maintenance required to remedy them.

Rock Gabion - Condition 3

Maintenance work required

In this state a number of defects are visible but the asset remains quite serviceable. Routine maintenance is required to remedy issues.

Rock Gabion - Condition 4

Renewal work required

In this state the asset is in below average condition. There are quite a few obvious defects visible that require some renewal work to repair

Rock Gabion - Condition 5

Urgent renewal or upgrading required.

At this stage the asset is in very poor condition and should be referred to capital works program for reconstruction.

Stormwater Pits

Stormwater pits are chambers constructed below ground, designed to accept rainwater from surface inlets and/or one or more upstream stormwater pipes and to discharge this rainwater into a single downstream stormwater pipe.

Defects associated with stormwater pits include, cracking, spalling and displacement of concrete materials and cracking, warping, rust and displacement of steel materials. Ratings are applied over the whole component taking all defect types into account.

Condition 1

No work required (normal maintenance)

Assets in this state are in very good condition. There are no visible defects and only normal maintenance work is required.

Condition 2

Only minor maintenance work required

Good condition - only very minor defects visible and minor maintenance required to remedy them.

Condition 3

Maintenance work required

In this state a number of defects are visible but the asset remains quite serviceable. Routine maintenance is required to remedy issues.

Condition 4

Renewal work required

In this state the asset is in below average condition. There are quite a few obvious defects visible that require some renewal work to repair

Condition 5

Urgent renewal or upgrading required.

At this stage the asset is in very poor condition and should be referred to capital works program for reconstruction.

Stormwater Pipes & Culverts

Culverts and stormwater pipes are pipes designed for carrying stormwater. They are constructed underground are generally made of reinforced concrete. They are designed to convey large volumes of low pressure water during rain events and discharge this water into table drains and natural watercourses or detention basins.

Defects associated with these assets include, cracking, spalling and displacement of concrete materials and cracking, warping, rust and displacement of steel materials. Ratings are applied over the whole component taking all defect types into account. Footpath structures that are formed from culverts are also assessed this way.

Condition 1

No work required (normal maintenance)

Assets in this state are in very good condition. There are no visible defects and only normal maintenance work is required.

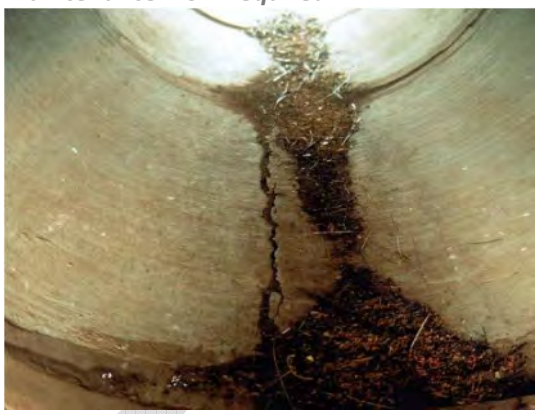
Condition 2

Only minor maintenance work required

Good condition - only very minor defects visible and minor maintenance required to remedy them.

Condition 3

Maintenance work required



In this state a number of defects are visible but the asset remains quite serviceable. Routine maintenance is required to remedy issues.

Condition 4

Renewal work required

In this state the asset is in below average condition. There are quite a few obvious defects visible that require some renewal work to repair

Condition 5

Urgent renewal or upgrading required.

At this stage the asset is in very poor condition and should be referred to capital works program for reconstruction.

Road Pavement Base

Road pavement base assets are the load bearing layers of a road pavement. On sealed roads this consists of the layer/s under the bitumen surface. On unsealed roads the base is the layer of imported material that usually forms the load bearing layer and the wearing surface. Base layers are generally constructed of gravel with the exception of floodways which typically have a concrete base layer.

Road pavement base layers have significantly different patterns of consumption based on their construction material, their environment and whether or not they are bound with a surface layer.

Unsealed road base assets are inspected visually and rated according to ROCOND 90 (Page 44 and 45) taking into account their depth, material quality and crossfall.

Sealed road base components are not visible and cannot be assessed directly by non-destructive methods; they are instead assessed based upon the symptoms of base failure that are visible in the surface layer.

Patches, crocodile cracking, roughness and rutting are the defect types most commonly associated with failure in the base layer. Patches and Crocodile Cracking are assessed based on ROCOND 90 (Pages 10 & 12-13 respectively, Please note the S,M,X rating for severity was modified to 1,2,3 for calculation of the PCI). Rutting and Roughness are assessed using a laser profilometer device.

Calculation of the pavement base condition was supplemented with the factors below in determining overall condition rating:

- School Bus Usage
- Traffic Volumes
- Heavy Vehicle Volumes
- Five Year Accident History
- Seal Width

Each defect type and usage indicator is weighted based on its relevance to the pavements condition and the type of road pavement being measured. Regional, Urban and Rural roads have different requirements for some indicators due to the different levels of service the community expects from each type of road. Further information on how the above defects are assessed and weighted to derive Councils Pavement Condition Rating can be found in Council's Sealed Roads Rehabilitation Program 2015-2018.

The weighted defect ratings are then combined to give a pavement condition index from 0-100 which is used to calculate the overall condition rating applied.

The PCI is calculated from the following, using the defect and indicator weightings shown below

$$Weighted\ Element\ Rating\ = \left(\frac{Element\ Rating}{Maximum\ Score}\right) \times Weighting$$

TABLE 1 : PCI COMPONENT WEIGHTINGS

PCI Component	Regional		Rural		Urban	
	Max	Weight	Max	Weight	Max	Weight
Cracking Severity	3	3	3	3	3	3
Crack Extent	3	8	3	8	3	8
Patches	5	8	5	8	5	8
Roughness	200	20	291	20	291	20
Rutting	16	15	40	15	40	15
School Bus Route	3	5	3	5	3	5
Traffic Volume	6	10	6	10	6	10
Heavy Vehicle Traffic Volume	5	10	5	10	5	10
Seal Width Deficiency	5	15	5	15	5	15
Accident History	10	6	10	6	10	6

Example Unsealed Base Photos

The following pictures give an example of what an unsealed road in each condition state would be expected to look like. **They are not used as a reference for rating unsealed pavements.**

Condition 1

No work required (normal maintenance)

Assets in this state are in very good condition. There are no visible defects and only normal maintenance work is required.

Condition 2

Only minor maintenance work required

Good condition - only very minor defects visible and minor maintenance required to remedy them.

Condition 3

Maintenance work required

In this state a number of defects are visible but the asset remains quite serviceable. Routine maintenance is required to remedy issues.

Condition 4

Renewal work required

In this state the asset is in below average condition. There are quite a few obvious defects visible that require some renewal work to repair

Condition 5

Urgent renewal or upgrading required.

At this stage the asset is in very poor condition and should be referred to capital works program for reconstruction.

Road Pavement Subgrade

Road pavement subgrade is the natural material that has been formed to create a surface on which a road is constructed. It consists of the bulk earthworks required to form the road, including cutting and filling in hilly areas and of any stabilisation that is applied. Subgrade assets are considered to have very long lives with no deterioration and little to no management, so condition assessment is not required. All components are given a standard rating of "2", consistent with the NSW Government's integrated planning and reporting reform guidelines and industry practice.

Road Pavement Surface

Road pavement surface assets are the top layer of a road pavement. They are constructed of either asphalt or bitumen chipseal and provide a wearing course for traffic as well as binding and waterproofing for the underlying base layers.

Surface assets are visually assessed and rated according to seal age and other defects found. Local surface defects, longitudinal and transverse cracking, and edge breaks are the defect types most commonly associated with failure in the surface layer.

Local surface defects, cracking and edge breaks are assessed based on ROCOND 90 (Pages 11, 12-13 & 30 respectively, Please note the S,M,X rating for severity was modified to 1,2,3 for calculation of the SCI).

Each defect type is weighted based on its relevance to the surface's condition and the type of road pavement being measured. Urban and Rural roads have different requirements for some indicators due to the different levels of service the community expects from each type of road.

Segments with an age of less than 15 years received a Seal Condition Rating on 1 or 2 while segments older than 15 years receiving a Seal Condition Rating of 3-5 depending on its Surface Condition Index (SCI). The weighted defect ratings are then combined to give a surface condition index from 0-100 which is used to calculate the overall condition rating applied.

The SCI is calculated from the following using the defect weightings shown below.

$$Weighted\ Defect\ Rating\ = \left(\frac{Defect\ Rating}{Maximum\ Score}\right) \times Weighting$$

TABLE 2 : SCI COMPONENT WEIGHTINGS

SCI Component	Max Score	Weight Urban	Weight Rural
Edge Break Extent	3	19	13
Edge Break Severity	3	8	4
Local Surface Defects	5	23	13
Cracking Extent	3	30	40
Cracking Severity	3	20	30

Example Sealed Surface Photos

The following pictures give an example of what a sealed road surface in each condition state may look like. **They are not used as a reference for rating sealed surfaces.**

Condition 1

No work required (normal maintenance)

Assets in this state are in very good condition. There are no visible defects and only normal maintenance work is required.

Condition 2

Only minor maintenance work required

Good condition - only very minor defects visible and minor maintenance required to remedy them.

Condition 3

Maintenance work required

In this state a number of defects are visible but the asset remains quite serviceable. Routine maintenance is required to remedy issues.

Condition 4

Renewal work required

In this state the asset is in below average condition. There are quite a few obvious defects visible that require some renewal work to repair

Condition 5

Urgent renewal or upgrading required.

At this stage the asset is in very poor condition and should be referred to capital works program for reconstruction.

Road Ancillary Items

Ancillary items that are assessed include signs, barriers and guide posts. These items are assessed over the entire segment and rated according to ROCOND 90 (pages 34, 48, 53 & 52 respectively).

Bridges

Bridges are structures carrying a road, path, railway, etc. across a river, road, or other obstacle. This includes all types of structures from single span simply supported bridges, to large box culverts, to complex steel suspension bridges. Inverell Shire Council manages any culvert with a centreline length of six metres or more as a bridge.

Bridge structures are assessed according to the methodology developed by ARRB group. This involves inspection and condition assessment of every visible component and reporting of the overall bridge condition state.

Figure 1 provides an example of the information included in a bridge inspection report.

Structure Condition Inspection Report — L2/1 — Sheet Page 1 of 47

Structure ID	ISC049	Owner	Local Government Agency
Structure Name	Macintyre River - Stannifer Road		
Region	Unknown/Not Applicable		
Local Authority	Not Applicable	Coordinates	-29.81301373, 151.2634226
Road Number	-	Road Name	Stannifer Road
Chainage			
Road Type		Waterway	Macintyre River
Year Built	2013		
Structure Type	Bridge	Function	Road over waterway
Superstructure Type	Units without slab	Superstructure Material	Unknown
Span Arrangement	4/10	Overall Length (m)	40
Overall Width (m)	10.4		

General Comment

Stannifer Rd begins at Elsmore Rd and generally heads south. Superstructure consists of double-webbed T-beams. Unknown if girders are RC or PSC. Pier and abutment walls act as bridge foundations.

Date Inspected	29/10/2014	Inspected By	Joshua Seskis	Inspection Type	Programmed	Entered By	John Dickson
Date Reviewed	18/11/2014	Reviewed By	Anthony Rooke	Date of Last Inspection		Next Inspection Due	10/2019
Original Rating	CS2	Original Comment	Structure was found in fair condition at time of inspection.				
WL1 Rating		WL1 Comment					
WR1 Rating		WR1 Comment					

Overall Inspection Comment

Structure in fair condition. Unknown if cracks in girders are structural or shrinkage related. Should be investigated and monitored. Elastomeric bearings required in place of foam bearings at A1.

Component Condition Inspection Report — L2/2

Component Location				Exposure Class	Quantity	Unit	Quantity per Condition State				Defect	Action Required?
Modification	Group	Component	Standard Number				1	2	3	4	- Location of defect - Description of defect - Reference of sketches and photos	
O	AP1	GR1	72S	1	16.2	Lin. m	16.2	0	0	0	Approach and bridge rail connected via standard transition between W-beam guardrail and thrie beam. No defects noted. Refer photos 8 and 9.	
O	AP1	AP1	70O	1	1	Ea.	1	0	0	0	First section of approach 1 consists of asphalt wearing surface. Bridge approach not considered beyond guardrail. Minor spalling noted as fragments of asphalt have been carried onto approach slab. Refer photos 10 and 11.	
O	AP1	AP2	70C	1	1	-	0	1	0	0	Second section of approach 1 consists of concrete approach slab. Approach slab exhibiting moderate settlement cracking. Refer photos 12-18.	
O	AP1	GR2	72S	1	16.2	Lin. m	0	16.2	0	0	Approach and bridge rail connected via standard transition between W-beam guardrail and thrie beam. Minor loss of tension apparent in top reinforcing cable. Refer photos 19 and 20.	✔
O	A1	J1	11O	1	10.4	Lin. m	0	10.4	0	0	Joint appears to be compression joint seal with steel armouring. Joint seal appears to have lost adhesion to the armouring in some locations. Armouring also appears to be rusting. Moisture staining on abutment 1 headstock indicates minor moisture penetration through joint. Refer photos 21, 22 and 54.	

FIGURE 1 : SAMPLE BRIDGE CONDITION REPORT

Appendix B

Project Proposal Templates

SMALL PROJECT PROPOSAL – DRAINAGE <YR>

<PROJECT TITLE> #<NO>

BACKGROUND	*Provide a brief explanation of the background and/or context of the project.*
OBJECTIVE	*What is the aim of this project?* *A useful way to frame the objective is to answer the question 'why are you doing the project?' The result is a one sentence statement, or series of statements, starting with the word 'To'*
OUTCOMES	*Target Outcomes are expressed in the past tense and usually start with a word ending in 'ed', such as improved, increased, enhanced or reduced. They are the benefits that the project intends to achieve and must be linked to levels of service as per the AMP.*
OUTPUTS	*What things will be delivered by the project? Outputs link with outcomes, in that the outputs are used by the project's customers to achieve the outcomes. E.g. Kerb and Gutter on the eastern side of MacIntyre Street for 200m.*
PROJECT LOCATION	
PROJECT ORIGINATOR	*What or who is the impetus for this project? E.g. Drainag AMP, Council, Govt grant*
PROJECT MANAGER	*Who will manage the project?*
RESOURCES	*What human resources, internal, external, consultants and/or working groups will be required for the project? Is the project is being conducted within existing operational resources or have specific funds been supplied? If the project has a specific budget, provide details of the proposed expenditures. Must include details of predicted effect on future maintenance and operations as a summary of Whole of Life costs.*
STAKEHOLDERS	*List the key stakeholders or stakeholder groups who will impact the project or be impacted by the project and describe how they will be engaged.*
ASSUMPTIONS	*Provide a list of any underlying assumptions and/or constraints.*
RISK MANAGEMENT	*What will be the process used to manage risks throughout the project, particularly in relation to risk identification, review and reporting? See the Risk Management section of the AMP for more information.*
RELATED PROJECTS	*List any projects which are dependent on this project, or projects that are interdependent on this project, or projects upon which this project is dependent. Briefly describe the relationship.*
STANDARDS	*What guidelines, standards or methodologies will be applied manage the project?*
QUALITY CONTROL	*What levels of review will be undertaken throughout the development of the project outputs? For example the timing of output reviews, how the reviews will be conducted and who will be involved. (Only required for Large Projects)*

PROJECT PLAN

List the major activities, scheduled start, scheduled finish and who has been assigned accountability. Milestones are indicated by a blank scheduled start date. The activities appearing in the predecessor column must be completed before the activity described can begin.

Id	Description	Who is Responsible	Scheduled Start	Scheduled Finish	Predecessor

Paths Asset Management Plan 2017-2026

Inverell Shire Council

Document Control

Title: Paths Asset Management Plan 2017-2026

Document Number:

Date	Revision	Author	Reviewer	Approved Date
12/09/2015	Draft Version 0.1	D. Strugnell		
14/10/2015	Draft Version 0.2	D. Strugnell		
30/03/2015	Version 1.0	D. Strugnell	B. McInnes	

This asset management plan was developed by Inverell Shire Council.
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Contents

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Introduction

Local government assets deliver important community services. Their effective management is crucial to the sustainable delivery of those services to meet community needs and aspirations now and in the future. The aim of this plan is to enhance the sustainable delivery and management of Inverell Shire Council's path assets by encouraging 'whole of life' and 'whole of organisation' approaches and the effective identification and management of the assets. It encourages a long-term view of asset management and requires Council to understand and meet the impacts of social, economic and environmental change in ways that ensure sustainable use of our resources.

This plan is concerned with urban path assets which include the shire's footpaths, grassed verges, bike paths and walking trails in the towns of Inverell, Ashford, Delungra and Gilgai. It does not include other ancillary assets such as seating, garbage bins and landscaping which are covered by the Open Space and Recreation Asset Management Plan.

The total replacement cost of assets covered by this plan is $7.22 million. This is made up of:

- Concrete Paths $3.47 million
- Bitumen Paths $118,000
- Paved Paths $1.97 Million
- Gravel Paths $20,000
- Bridges and Structures $1.64 million

Asset management plans are a vital component in Inverell Shire's strategic planning process. They form the basis of short, medium and long term planning for capital, operations and maintenance budgets, and link to key corporate strategies including the following documents:

- Inverell Shire's Asset Management Policy and Asset Management Strategy
- Inverell Shire's Strategic Long Term Plan and Long Term Financial Plan
- Annual Operational Plan and Budget
- Inverell Shire's Risk Register.

This asset management plan is also informed by a number of other planning documents previously prepared by Council including:

- The Inverell Pedestrian Access and Mobility Plan 2014
- The Inverell Bike Plan 2014
- The Footpath Maintenance Procedure
- Inverell Town Centre Renewal Plan

Asset Management Drivers

Paths facilitate the movement of pedestrians for transport and recreation in urban areas. They provide an important service to many members of the community who rely on them as their primary means of transport.

Inverell Shire Council must exercise its duty to maintain, operate and improve path assets under increasing pressures that include:

- Limited budgets: with competition for funding across a range of services
- Limited resources: both human resources and materials
- Mature networks: which have a significant maintenance demand
- Increased accountability: to customers and funding providers
- Increasing public expectations: the public are increasingly informed and expect a higher level of service form their assets.

In the face of these challenges, Council is responsible for effectively accounting for and managing its assets and having regard

for the long term and cumulative effects of its decisions. This is a core function of local government authorities and is reflected in the Charter in section eight of the Local Government Act. Furthermore, a strong and sustainable local government system requires a robust planning process to ensure that these assets are managed in the most appropriate way on behalf of local communities.

To ensure this is the case NSW Local Government has implemented an Integrated Planning and Reporting Framework. The Integrated Planning and Reporting framework recognises that most communities share similar aspirations: a safe, healthy and pleasant place to live, a sustainable environment, opportunities for social interaction, opportunities for employment, reliable infrastructure, etc. The difference lies in how each community responds to these needs. That is what shapes the character of individual towns and cities. It also recognises that the council plans and policies should not exist in isolation and that they are in fact connected.

This framework allows NSW councils to draw their various plans together, to understand how they interact and to get the maximum leverage from their efforts by planning holistically for the future. The framework is outlined in Figure 1.

Figure 1 : Integrated Planning & Reporting Framework (NSW Division of Local Government, 2013)

Asset management plans form part of Council's Resourcing Strategy that supports the community's Strategic Plan. The Strategic Plan provides a vehicle for the community to express its long term aspirations. However, these aspirations will not be achieved without sufficient resources – time, money, assets and people – to carry them out. The Resourcing Strategy is a critical link when it comes to translating strategic objectives into actions.

The asset management actions necessary to achieve the Strategic Plan Strategies and Delivery Plan Term Achievements relevant to Council's path assets are outlined in Table 1

Using this Plan

The Paths Asset Management Plan 2017-2026 provides core resource information for users. It will be continuously reviewed and updated to improve its quality and to ensure continuing relevance. This document has been written with the intention of being informative and readily understood by persons interested in the actions of Council and particularly in path infrastructure matters. It does not contain detailed technical information but rather seeks to provide an overview of the Council's assets and the directions that must be taken to ensure their sustainability.

This asset management plan is prepared as a 'core' asset management plan in accordance with the International Infrastructure Management Manual 2015. It has been prepared to initially meet minimum legislative and organisational requirements for the sustainable management of path infrastructure and long-term financial planning and reporting. This plan is considered a 'core' plan due to its top-down approach where key analysis has been applied at the 'system' or 'network' level of asset management planning as outlined in Figure 2.

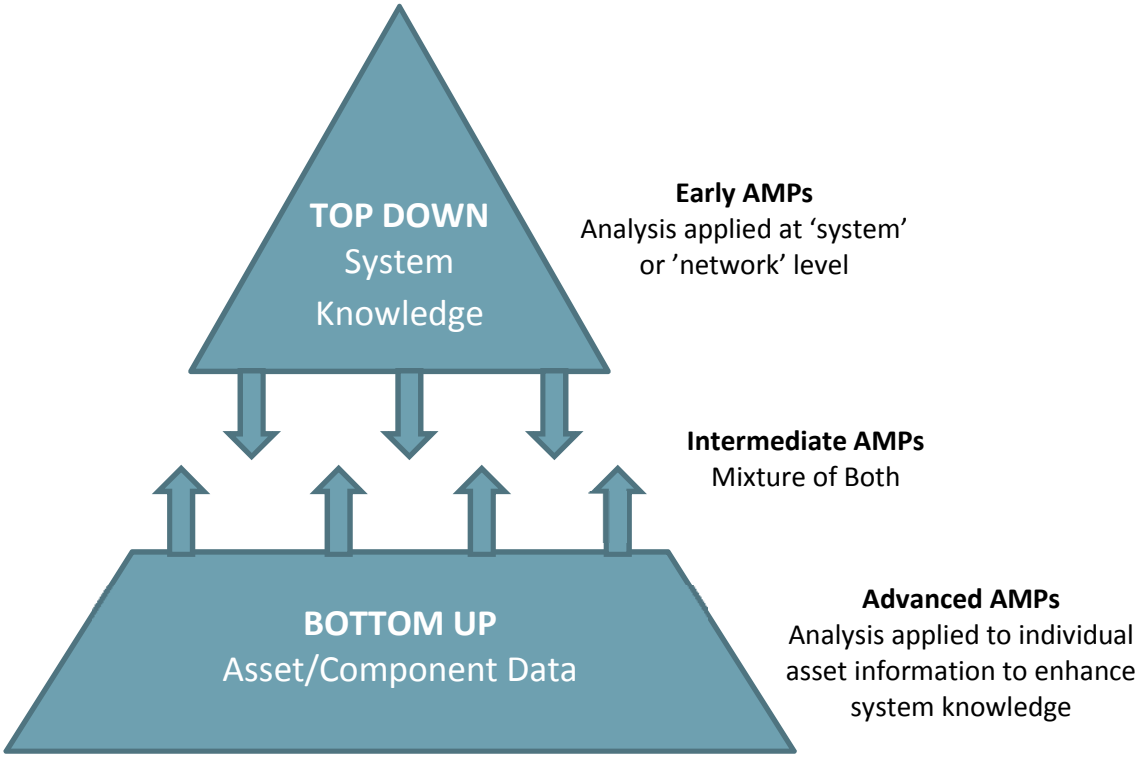

Figure 2 : 'Top Down' vs. 'Bottom Up' Approaches (Institute of Public Works Engineering Australasia, 2011)

Strategic Plan Strategies	Term Achievements	Asset Management Plan Actions
R.06 Council ensures it is able to provide resources to effectively deliver its Strategy and Programs.	R.06.01 Council provides adequate resources to deliver its programs and has introduced measures to increase its capacity to deliver cost effective and efficient services. R.06.02 Council's financial sustainability is being managed through best practices, diverse investment strategies and asset management control.	Implement AMP to ensure Council's assets are managed and maintained to target service levels Outputs of this plan are to include a report on the sustainability of the path network
R.02 Inverell exhibits the qualities of and operates as one of the three principle centres, (Inverell, Armidale and Tamworth) of the New England North West area as reflected by its strong economic, cultural and social diversity.	R.02.01 Inverell's attractive Central Business District provides an expanding range of economic, social and lifestyle services to the New England North West area and South Queensland.	Adopt level of service and performance measures relating to amenity of paths including those in CBD
C.03 Promote an ordered and safe Community.	C.03.01 Compliance and regulation programs have been developed and implemented to provide a safe environment for citizens and visitors.	Carry out regular inspection and reporting as per maintenance plan requirements.
C.05 Create clean and attractive streets and public places.	C.05.01 Council's maintenance programs are improving and enhancing the cleanliness and safety of streetscapes.	Adopt performance measures relating to amenity and safety of paths
C.07 Provide local opportunities for recreation, cultural and social activities.	C.07.02 The Shire's recreational areas and facilities are contemporary and conducive to the community's wellbeing.	Adopt performance measures relating to function of paths for recreation
C.10 Contribute to the health of the community by promoting healthy lifestyles and practices.	C.10.01 Council is actively supportive and involved in programs and initiatives that promote and contribute healthy lifestyles and practices.	Implement AMP to ensure Council's path assets support this objective
C.15 The social well-being and health of individuals and communities within the Shire is being maintained and improved.	C.15.01 Strategies are in place to respond to the social and health needs of the community.	Implement AMP to ensure Council's path assets support this objective
S.01 Sound Local Government Administration, Governance and Financial Management are provided.	S.01.02 A sound long term financial position is maintained. S.01.07 A contemporary system of risk management and internal control is operating. S.01.09 Best Value principles specified in the Local Government Act along with contemporary asset management processes have been implemented for asset sustainability.	Outputs of this plan are to include a report on the required financial expenditure to ensure the sustainability of the path network. This plan includes an inspection regime and risk management procedure consistent with Council's Risk management policies and industry best practice.
S.02 Council displays leadership, community engagement and	S.02.01 Council is managing its statutory requirements and the needs	Report on progress against performance

Strategic Plan Strategies	Term Achievements	Asset Management Plan Actions
collaboration with others.	of a participatory community in a transparent and balanced way.	measures in the annual report. Engage the community to develop desired levels of service and agree on a funding strategy to achieve them.
S.03 Council provides equitable services, consistent with available resources and priorities to meet the Shire's identified needs and preferences.	S.03.01 Services and programs that Council provides are determined based on equity, customer requirements and community benefits, best value and excellence.	This plan includes an evaluation procedure for maintenance and capital works that takes into account these areas.
S.08 Civil infrastructure is secured, maintained and used to optimum benefit.	S.08.01 An asset management strategy is in operation for civil infrastructure that optimises its use and maintained to agreed standards fit for contemporary purpose.	Implement AMP to ensure Council's assets are managed and maintained to target service levels
S.12 Provision of safe and efficient networks to ensure connectivity between populations	S.12.02 A sustainable and strategic approach to the management of Council's Assets is undertaken.	Implement AMP to ensure Council's assets are managed and maintained to target service levels
S.14 Increase the number of people walking and cycling, particularly for journeys within the community.	S.14.01 Programs and initiatives are being implemented that encourage alternate methods of transport that increase community health and wellbeing.	Implement AMP to ensure Council's path assets support this objective

Table 1 : Strategic Plan Strategies

Understanding our Assets

Understanding what assets Council owns and controls, along with key supporting information such as their use, condition, age, location and value is a key step to ensuring best practice asset management. Without this knowledge Council cannot ensure that the decisions it makes regarding the assets are in the best interests of the community.

Asset Use and Users

The first step in understanding Council's path assets is to consider what they are used for and who uses them.

The primary purpose of Inverell Shire's path networks is to facilitate the movement of pedestrians and cyclists in and around the Shire's urban areas. Walking usually forms a part of all trips taken in the urban area particularly within the central business districts of our towns. It is typically the first and last part of any trip taken so provision of an effective pedestrian path network is important for all members of the community. It is particularly important for some of the Shire's residents who rely on paths as a safe, efficient and effective means of moving throughout the community. This includes people who often do not have access to other means of transport including the disabled, children and the elderly.

In addition to this, paths play an important role in the health of the community by providing for recreational walking, running and cycling (where shared facilities are provided).

There is increasing evidence that encouraging walking and cycling as a form of transport is of great economic benefit to the community. A study by Sinclair Knight Merz and Price Waterhouse Coopers for the Queensland Department of Transport and Main Roads found that, for a typical off-road path in an inner urban area, economic benefits per kilometre walked or cycled are: decongestion (20.7 cents per kilometre walked or cycled), health (up to 168.0 cents per kilometre), vehicle operating costs (35.0 cents per kilometre), infrastructure savings (6.8 cents per kilometre) and environment (5.9 cents per kilometre) (SKM and PWC, 2011).

On the day of the 2011 Census around 5.7% of the population of Inverell Shire walked all the way to work. The national average was 3.7%. This indicates that Inverell Shire already has an active population of walkers. It is expected that this figure will increase as the footpath network is expanded to more destinations. In contrast to this only 0.5% of the population of Inverell Shire cycled to work as opposed to 1% of the population nationally (ABS, 2012), and the 16.7% of NSW residents who ride a bicycle in a typical week, according to the National Cycling Survey 2015. (Austroads, 2015).

The National Cycling Survey also asked participants what could be done to encourage bicycle riding and what priority they placed on each of these actions. The results of this question for NSW respondents are shown in Figure 3.

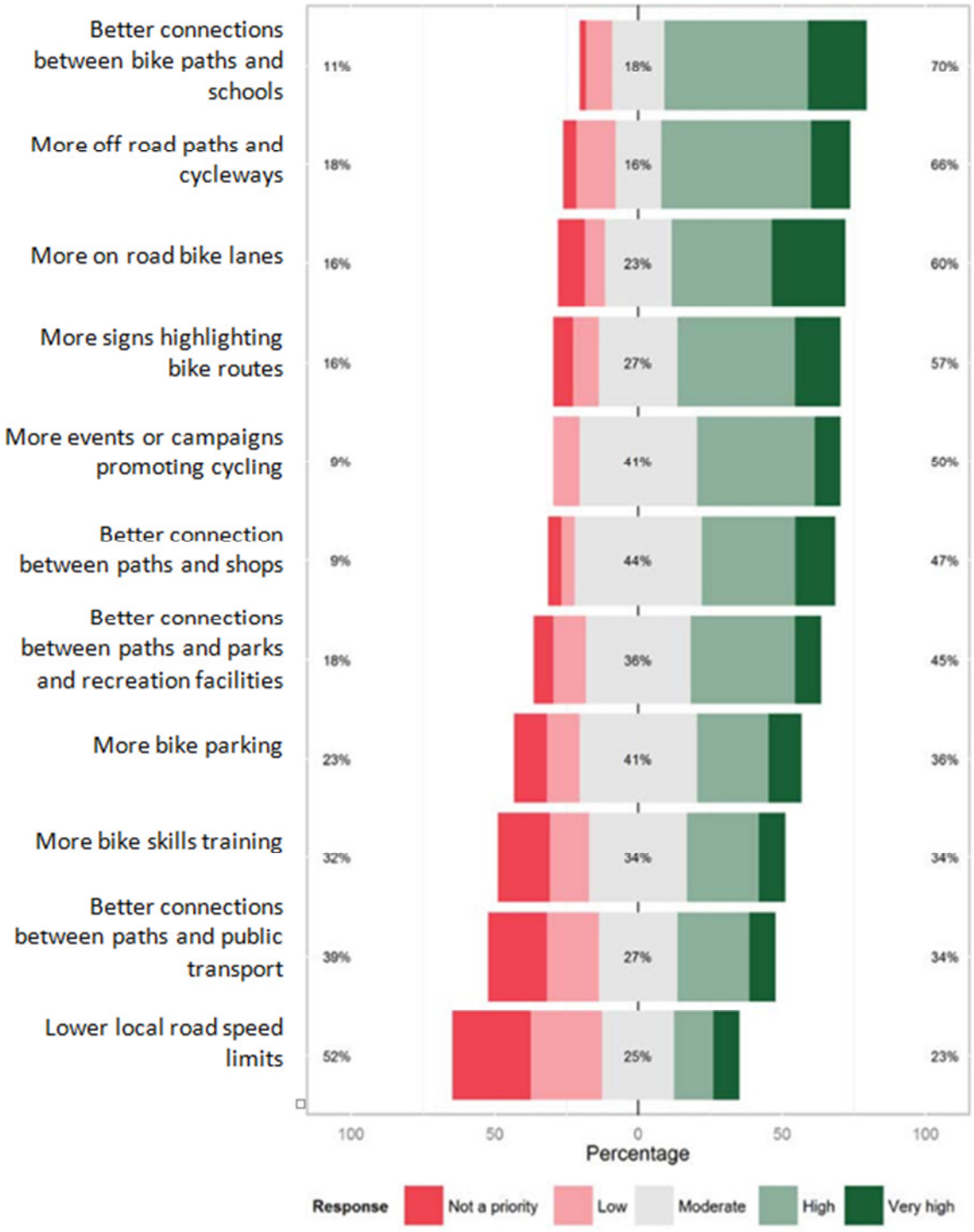

Figure 3 : Priority of actions that could be taken to encourage cycling (Austroads, 2015)

It is clear from these results that the highest priority for most cyclists was the provision of an expanded network of cycling infrastructure that links them to their destinations.

Asset Inventory

An asset data model provides a framework to structure and store asset data in an information system, segmenting an asset base into appropriate classifications based upon its construction and the service it provides. Inverell Shire Council has developed an inventory structure for its path assets that separates the paths into routes and segments.

The type and size of the assets that make up the path network are shown in Table 2 .

Asset Type	Area (m^2)
Paved Paths	18,935
Concrete Paths	57,740
Bitumen Paths	1,967
Gravel Paths	692
Path Structures	670

Table 2 : Path Assets Inventory

Asset Hierarchy

All path assets are classified according to a hierarchy that takes into account their specific function, types of users and user numbers. The hierarchical classifications are used to assist in prioritising works programs and to develop intervention levels and response times to remedy defects. Council has developed the following hierarchies for the assets covered by this plan.

Class	Description
Class 1	Constructed High traffic (CBD)
Class 2	Constructed Medium traffic (Key routes and areas around schools, homes for the aged etc.)
Class 3	Constructed Low Traffic (Other constructed urban paths)
Class 4	Unconstructed Verges

Table 3 : Path asset hierarchy

Asset Register

A good asset register is the foundation for enabling most asset management functions. To be able to operate and maintain the assets, staff need to be able to locate and identify them. To accurately value assets, sufficient data is needed to calculate replacement cost (e.g. size, type) and remaining life (age, expected life, condition). Council is also beginning to gather data on maintenance history and costs to support lifecycle optimisation and increase knowledge of the probability and consequence of asset failure for risk management purposes.

The organisation uses Technology One Enterprise Suite to manage its assets. The system includes an asset register that is fully integrated with the financial and work management modules allowing all work to be captured against the assets affected.

The system also allows for defects to be listed against an asset and work orders to be generated from these, aiding in the collection of long term life cycle cost data. All assets, defects and work orders can also be linked directly to the mapping system to allow accurate location information to be included.

Condition Profile

Inverell Shire Council rates the condition of its assets on a one to five scale in line with the uniform grading framework adopted as part of the NSW Government's integrated planning and reporting reforms as outlined in Table 4.

Rating	Status	Definition
1	Excellent	No work required Normal maintenance required but no deterioration identified.
2	Good	Only minor maintenance work required Provides a good level of service with some maintenance required. Deterioration identified but renewal not yet required.
3	Fair	Maintenance work required Still meets of level of service requirements but requires regular ongoing maintenance and minor repairs.
4	Poor	Renewal required Level of service impaired.
5	Very Poor	Urgent renewal/upgrading required. Asset/Component no longer provides required level of service. End of useful life.

Table 4 : Condition Rating General Descriptions

The condition rating system reflects the performance, integrity and durability of the principal components of each asset. The assessment of the nature and extent of defects for each component type is included in Council's Asset Condition Inspection Manual (Appendix A) which provides examples for each condition rating.

Within the useful life of an asset, the condition may fluctuate from one condition state to another. Judgment is exercised to determine whether the condition of an asset has changed to such an extent as to justify assigning a new condition state for the asset.

If an asset's condition state improves, one of the following must have occurred:

a) The original evaluation of condition level was incorrect, or
b) Works of a capital nature were carried out on the asset improving its condition. (Any such works should be capitalised and added to the value of the asset).

It must be recognised that it is possible for an asset to move to a non-adjacent condition state between valuations, either as a result of major works or as a consequence of deterioration over a valuation period.

Current Condition

The following condition profiles were developed following an inspection and condition assessment program that was carried out in 2015. Visual inspection was completed for a sample of the path network.

While the current condition profile in Figure 4 shows that Council has kept its assets in very good condition, there is still an ongoing renewal requirement to keep the assets performing.

Inverell Shire Council continues to collect condition information as part of its routine maintenance inspection program and these condition profiles will be updated regularly as information becomes available.

Projected Condition

The Useful Life of an asset is the period over which it is expected to provide a service to the community. The actual time between commissioning a new asset and disposing of it will vary significantly within each class, but for the purpose of this plan Council has adopted the following useful lives:

Asset Type	Useful Life(yrs)
Concrete Paths	100
Paved Paths	70
Path Bridges and Structures	100

Table 5 : Useful lives of path assets

All assets covered by this plan are assumed to degrade evenly over their useful lives so that in each condition state an asset will have an equal proportion of its life remaining. Both the adopted useful lives and the straight line degradation method are considered approximations and will be updated and improved as more asset information becomes available.

If the Long Term Financial Plan renewal identified in that section of the plan is expended on the assets as suggested, the condition profile of the assets in 2026 at the end of this plan should closely resemble Figure 5.

While the projected condition shows an increase in the number of assets in condition state 3, it is important to acknowledge that this is a conscious decision by Council to ensure that the community is extracting the most value from these assets. In this condition state the assets remain fit for purpose and replacing them would mean losing the remaining service potential of the asset for little gain.

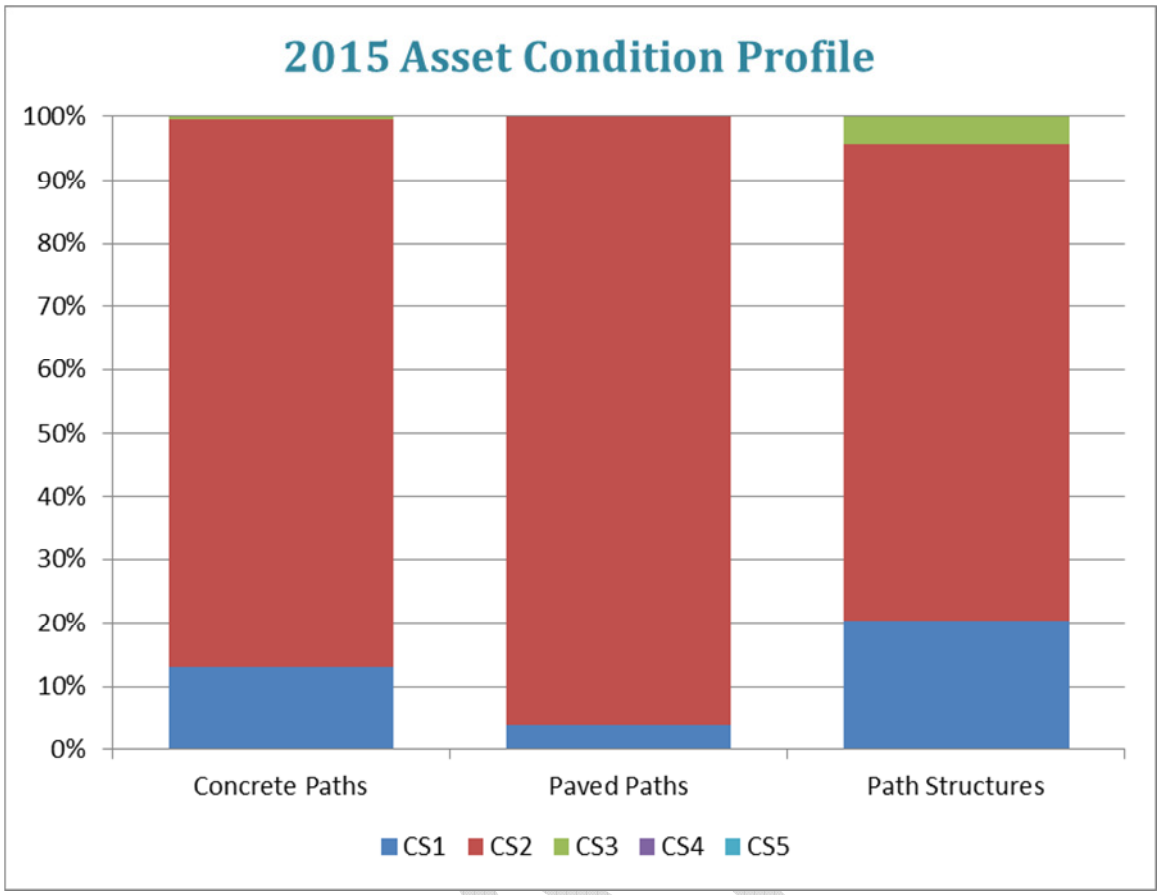

Figure 4 : 2015 Asset Condition Profile

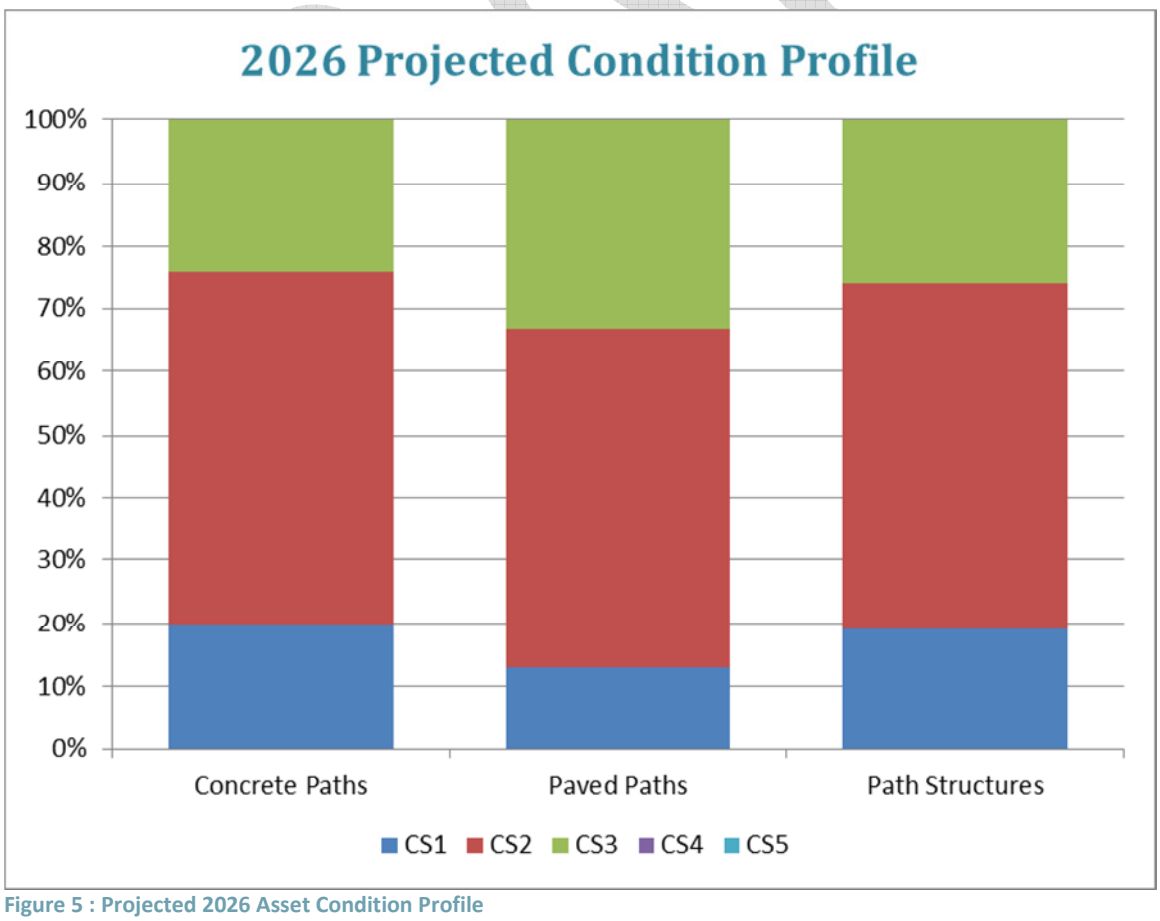

Figure 5 : Projected 2026 Asset Condition Profile

Setting Standards & Measuring Performance

A key objective of asset management is to match the standard of service the organisation provides with what the community expects. To ensure we are meeting the expectations of our community it is important for Council to describe what level of service we intend to deliver and then to measure both what we have done to deliver that service and how well our community has received the service.

Statutory Requirements

Statutory requirements often set the framework for minimum levels of service that infrastructure is required to meet. The following legislative instruments and torts are relevant to this asset management plan.

Disability Discrimination Act 1992 and Disability Standards for Accessible Public Transport 2002

The Disability Discrimination Act 1992 (DDA) provides protection for everyone in Australia against discrimination based on disability. It encourages everyone to be involved in implementing the Act and to share in the overall benefits to the community and the economy that flow from participation by the widest range of people.

Disability Standards for Accessible Public Transport (DSAPT) have been prepared under the DDA to specify rights and responsibilities about equal access and opportunity to public transport for people with a disability.

The standards establish minimum accessibility requirements to be met by providers and operators of public transport conveyances, infrastructure and premises. As an organisation that is responsible for the supply or maintenance of public transport infrastructure, Inverell Shire Council is classified as a provider. The standards take into account the range of disability covered by the DDA and establish standards for access paths, manoeuvring areas, ramps and boarding devices, allocated spaces, handrails, doorways, controls, symbols and signs, the payment of fares and the provision of information for public transport.

DSAPT were approved by the Commonwealth Parliament on 23 October 2002. All conveyances, premises and infrastructure brought into use for public transport after the commencement of the standards must comply with the standards. A compliance timetable allows between 5 to 30 years for existing facilities to be made compliant.

Disability Inclusion Act 2014

The Disability Inclusion Act 2014 (the Act) and Regulation commenced in NSW on 3 December 2014 and replaced the Disability Services Act 1993.

The Act contains commitments to making communities more accessible and inclusive for people with disability by ensuring all public authorities (including local councils) develop disability inclusion action plans.

Under the Disability Inclusion Regulation 2014, Inverell Shire Council is required to have an Action Plan in place by 1 July 2017. One of the key outcome areas of a Disability Inclusion Access Plan is providing liveable communities. Creating liveable communities for people with disability includes building an accessible transport network, ensuring that transport disadvantage is reduced and improving the experience of users with a disability.

It is important that this asset management plan be updated when Council adopts its Disability Inclusion Action Plan to ensure that both plans are reflective of each other (See Improvement Plan Action 1.3).

Tort of Negligence and the Civil Liability Act 2002

The elements of the law of torts are concerned with the accidental injury to person and property. Negligence, essentially, is the failure to take care against unreasonable risk of foreseeable injury to others.

Prior to 2001, Councils had relied upon a common law principle that highway authorities benefitted from immunity to negligence by nonfeasance. In effect, an authority could not be found liable only because they had failed to take positive steps to remove a risk (an omission by the defendant, for example not repairing a trip hazard). This principle had been relied on not only for claims relating to the road itself but also paths adjacent to the road. The High Court's decision in Brodie v Singleton Shire Council and Ghantous v Hawkesbury City Council on 31 May 2001 removed this long-standing immunity, and the liability of highway authorities has since been determined by the application of general negligence principles.

The common law principles governing negligence liability were then reformed by the Civil Liability Act 2002 (NSW). It alters the common law by requiring a greater degree of probability in determining whether there is a foreseeable risk of harm to which a reasonable person would have responded. In addition, the legislation lists four factors that should be considered amongst other relevant things:

- probability of the risk of injury
- gravity of the harm
- burden of eliminating the risk
- utility of the defendant's conduct.

To ensure the above requirements are met, Council takes a proactive approach to ensuring that the service provided does not present a significant risk of injury, loss or damage to the public. This includes carrying out a regular inspection programme and planning to respond to identified defects within a reasonable timeframe, depending on the risk they present. This is implemented in the ***Operating & Maintaining the Road Network*** section of this plan.

Levels of Service

Levels of service are a key business driver and influence all of Inverell Shire Council's asset management decisions. Level of service statements describe the outputs we intend to deliver to the community in relation to services attributes such as function, capacity, safety and cost effectiveness. Council has adopted the following level of service for its path assets.

Inverell Shire Council will provide an urban path network that follows the following six key principles

- ***Connected*** - A well-connected path network that provides good access to key destinations; integrates with public transport and ensures short distances to stops from the area served; and has continuous routes without barriers that are difficult to cross (e.g. major roads, railways).
- ***Comfortable*** - the network will meet design standards with respect to path widths, gradients and disabled access; provide good quality, well-maintained surfaces that are free from obstructions and appropriate for impaired people; ensure that cyclists do not conflict with pedestrians and ensure that users feel safe when using paths.
- ***Convenient*** - the network will be as continuous as practicable; ensure that streets can be crossed easily and safely; minimise delays to users at all existing facilities and provide adequate and safe storage areas for waiting pedestrians and cyclists such that the flow of other users is not impeded.
- ***Convivial*** - paths will provide a high standard of urban design so that they are attractive to users; include interesting routes; are substantially free from litter, debris and other deposits; and provide a safe environment for users.
- ***Conspicuous*** – the environment surrounding the path shall have clear signposting; a coherent layout and design where it is obvious how to get to various facilities; readily available supporting information (e.g. published local maps, information boards, tourist information); and clearly visible street names and sufficient repeater street signs and place name plates.
- ***Cost Effective*** – provision of the path network will be economically sustainable and provide the best value for money over the life of the assets.

Each of these principles is supported by one or more performance measures that indicate how successfully we are delivering on that commitment.

Council has defined performance measures in two terms, Community Performance Measures and Technical Performance Measures.

Community Performance Measures

Community performance measures relate to how the community receives the service in terms of the expectations listed above. These are generally measured using metrics relating to the number of complaints received, time to respond and overall satisfaction with the aspects of the service measured by surveying the community.

Community satisfaction surveys have not yet been implemented but will be developed in the first year of the plan (See Improvement Plan action 1.1). The organisation's performance against these measures will be reported back to the community annually.

Key Principle	Level of Service	Performance Measure process	Performance Target	Current Performance
Connected	A well-connected path network that provides good access to key destinations	Community complaints or requests received regarding connectivity of network	Less than 1 per km per annum	0.02 per km per annum
	Integration with public transport networks	Community satisfaction with connectivity as per annual survey	85% satisfied	Not yet available
Comfortable	Users feel safe when using paths	Community complaints or requests received regarding safety of network	Less than 1 per km per annum	0.68 per km per annum
		Community satisfaction with network safety as per annual survey	85% satisfied	Not yet available
	The network is easy to use and comfortable	Community satisfaction with network comfort as per survey	85% satisfied	Not yet available
Convenient	The network is as continuous as practicable. Streets, rivers and other obstacles can be crossed easily and without excessive delays	Community satisfaction with network convenience as per survey	85% satisfied	Not yet available
		Number of survey respondents who regularly use paths for cycling	Increase from previous survey	Not yet available
		Number of survey respondents who regularly use paths for walking	Increase from previous survey	Not yet available
Convivial	The path network is clean, free from litter and attractive to users	Community complaints or requests received regarding amenity of network	Less than 1 per km per annum	0.14 per km per annum
		Community satisfaction with network amenity as per survey	85% satisfied	Not yet available
Conspicuous	The network has clear signposting; a coherent layout and design and it is obvious how to get to various facilities	Community satisfaction with network safety signposting and layout as per survey	85% satisfied	Not yet available

Table 6 : Community Performance Measures

Key Principle	Level of Service	Performance Measure process	Performance Target	Current Performance
Connected	All identified destinations are linked to the network or links are included in the forward capital works plan	Number of destinations not linked or not included to be linked in forward capital plan	Zero	Zero
Comfortable	The network meets design and disabled access standards	Number of instances of failure of design and disability access in network found during routine inspections	Less than 1 failure found per km per annum	Zero
Convenient	Streets can be crossed safely	Number of reported road traffic accidents involving pedestrians or cyclists using paths per annum	Zero	Zero
Convivial	Paths provide a safe environment for users	Time to respond to identified defects	95% of defects responded to within adopted timeframe	Not yet available
		Number of claims or potential claims made per annum	Less than 0.1 per km per annum	0.275/km
	Paths are attractive, clean and free of litter and other debris	Time to respond to cleaning complaints	95% responded to within one week	Not yet available
Conspicuous	Paths are clearly signposted	All intersections of Class 2 paths have signage indicating direction to major destinations (CBD, Lake Inverell etc.)	100% compliance	Plan to implement path signage in development.
	Up to date maps, and information are available for all town networks	Map and supporting information availability and currency	Maps, and information are available for all town networks and updated annually	In development
Cost Effective	Provision of the path network is economically sustainable and provides the best value for money over the life of the assets	Proportion of Level 2 inspections returning a fair overall rating	90% of Level 2 inspections return an overall rating of fair or better.	96.1% of Inspections
		Network operating cost change compared to Local Government Construction Index	Cost to operate network does not exceed previous year by more than LGCI.	Unknown

Table 7 : Technical Performance Measures

Technical Performance Measures

Supporting the community performance measures are technical performance measures developed to measure how the organisation provides the service. These focus on the technical aspects of service provision such as cost effectiveness, condition and compliance with technical standards and specifications.

The organisation performance against these measures is to be reported annually to the Council's Civil and Environmental Services Committee.

Desired Levels of Service

Desired levels of service are used to indicate what service the community would like to receive from the assets in the future. This allows Council to work toward providing a better service from the path assets over the life of the plan.

Council will consult with the community during the first year of this plan to determine whether the current levels of service meet the community's expectations for the path network (See Improvement Plan action 1.2). Consultation will be carried out in accordance with Council's Community Engagement Strategy.

Planning for the Future

This section of the Paths Asset Management Plan attempts to predict future demand for services in order to identify the most effective means of managing that demand. This allows Council to make optimised decisions regarding its asset investment proposals.

It is important to note that demand forecasts are often proven wrong given the passage of time. Influences on demand such as changes in government policy, technological advances and community preferences cannot be predicted with certainty over long periods.

Therefore, the following forecasts should be treated with some caution and taken as possible future outcomes rather than definitive statements. Any assumptions essential to the following forecasts have been noted for each factor considered

Population

Perhaps the most commonly understood factor influencing demand is population change. It is generally the key driver for growth in all areas and drives demand for services provided by Council and, in turn, the number and type of assets that are required to provide these services.

Population projections for the Inverell Shire local government area are outlined in Table 8, Table 9 and Table 10. The NSW Department of Planning and the Environment predicts that the Shire's population will grow modestly to 2031. Demand for services provided by Council's path assets will continue to grow slowly with this increase in population.

The effect of an ageing population on the path network as predicted in Table 8 is expected to be more pronounced especially in regard to the design standards required to facilitate travel by the frail and aged on an urban path network

Age Groups	2011	2016	2021	2026	2031
0-14	3,500	3,550	3,600	3,550	3,550
15-29	2,850	2,800	2,650	2,650	2,650
30-44	2,800	3,000	3,150	3,250	3,150
45-59	3,150	3,250	3,300	3,250	3,400
60-74	2,850	2,950	3,100	3,250	3,400
75+	1,450	1,600	1,850	2,200	2,400

Table 8 : Demographic projections for Inverell Shire (NSW Department of Planning and the Environment, 2014)

Totals:	2011	2016	2021	2026	2031
Total Population	16,600	17,200	17,750	18,200	18,600
Total Households	6,700	7,050	7,350	7,650	7,900
Average Household Size	2.44	2.39	2.36	2.33	2.30
Implied Dwellings	7,600	8,000	8,350	8,650	8,950

Table 9 : Population Projections (NSW Department of Planning and the Environment, 2014)

Change	2011 to 2016	2016 to 2021	2021 to 2026	2026 to 2031
Total Population Change	600	550	500	400
Average Annual Population Growth	0.7%	0.6%	0.5%	0.4%
Total Household Change	350	300	300	250
Average Annual Household Growth	1.1%	0.9%	0.7%	0.7%

Table 10 : Population Change (NSW Department of Planning and the Environment, 2014)

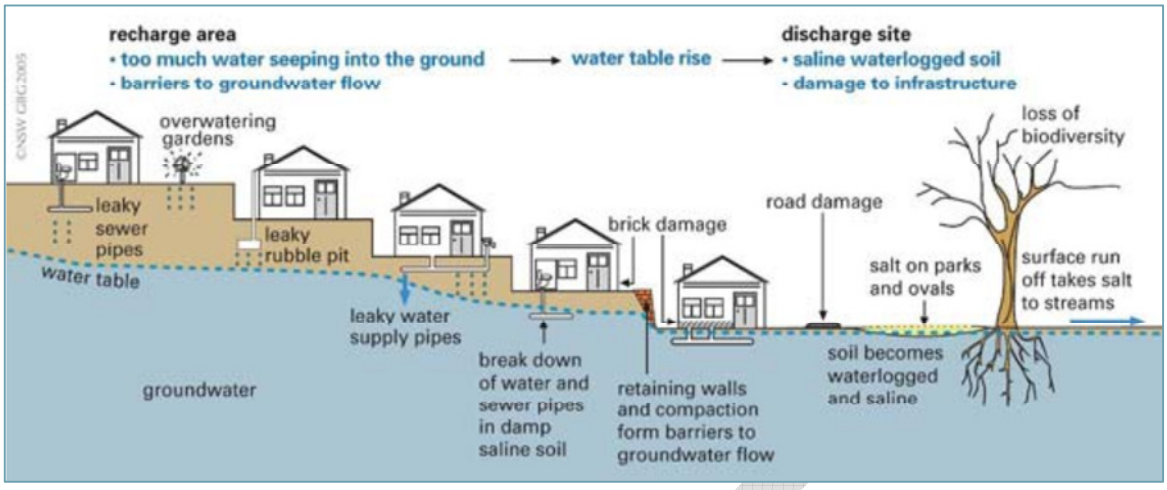

Figure 6 : Causes of urban salinity (Slinger & Tenison, 2007)

Urban Salinity & Water Table

Urban salinity refers to the processes that cause, and the impacts that result from, the mobilisation and re-distribution of salt in urban environments.

Vegetation composition, cover and health, patterns of water use, additional sources of salt, and the design, construction and maintenance of infrastructure can all contribute to urban salinity. These changes can alter the natural water cycle, inhibit drainage and impede ground water flow. Figure 6 shows some examples of how development in urban areas can affect the water table.

Surrounding land use and geology can also add to the complex array of local or site specific issues as these factors also influence recharge rates, water movement and ground water discharge.

High saline water tables or saline water supplies in urban areas can lead to saline discharge sites, damaged buildings and fixtures, and damage to Council's infrastructure. For Local Government and other urban stakeholders, this translates to additional costs associated with extra repairs and maintenance, reduced life span of infrastructure, preventative action and increased operating costs.

Inverell Shire Council needs to be aware of the danger that salinity and high water tables present to the footpath network and ensure that materials and methods used in the development and maintenance of the networks are resistant to its effects. This is especially important when deciding on the material qualities required for paved paths as bricks are particularly prone to damage caused by salinity.

Climate Change

Although climate change is expected to have little direct impact on most of the path network assets, the Garnaut Climate Change Review did find that:

"There is expected to be an increase in the intensity of rainfall events in some areas, and the number of days without rainfall is also expected to increase. This suggests that the future precipitation regime may have longer dry spells broken by heavier rainfall events" (Garnaut, 2008, p. 115)

More intense rainfall events are likely to lead to greater riverine flooding which could have a significant impact on infrastructure located in the flood hazard area, especially the bridges and paths crossing and alongside the Macintyre River floodway in Inverell. Council needs to consider this when planning to replace or expand its network.

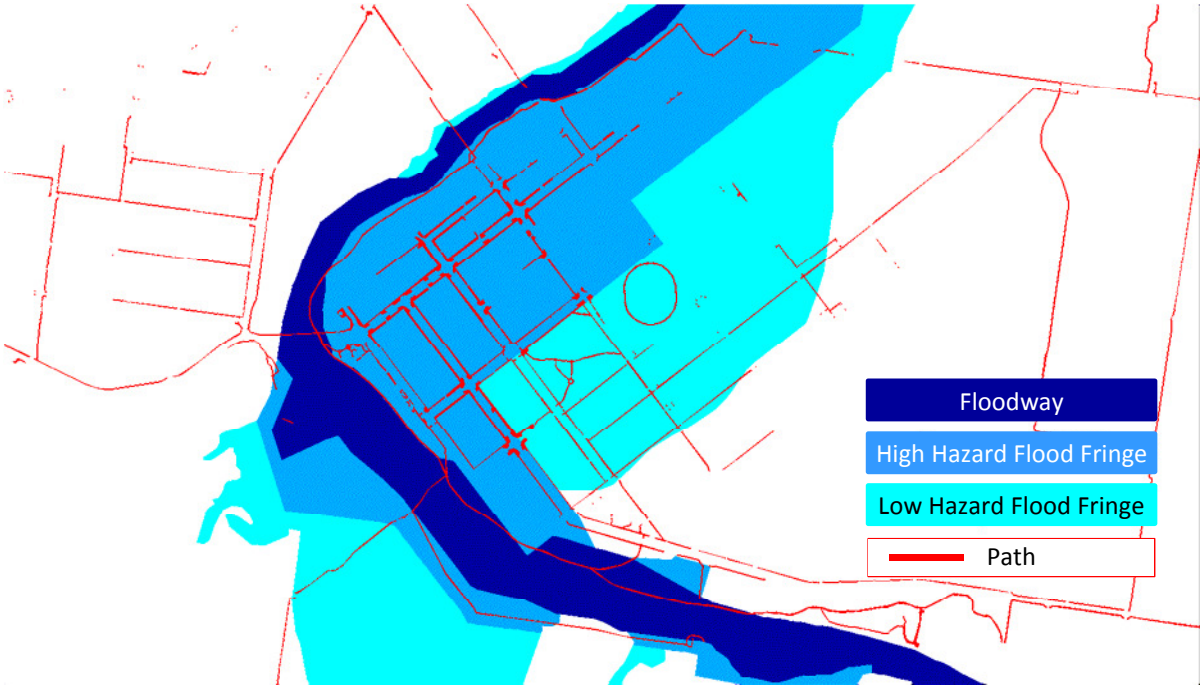

Figure 7 : Map of the Inverell Path network showing over 59% of Inverell Paths in the flood hazard area

More information will be available about the expected effect of climate change on rainfall when Engineers Australia releases the update to Australian Rainfall and Runoff.

Perhaps the most significant impact of climate change on the path network will be the community's awareness of the issue motivating an increasing number of people to seek alternatives to driving.

Awareness of climate change in Australia remains among the highest measured in the world - 97% say they know "a great deal" (24%) or "something" (73%) about the issue (Pugliese & Lyons, 2010). This is expected to drive a continuing growth in demand for convenient cycling, walking and public transport facilities.

State and Federal Government Policies and Strategies

The National Cycling Strategy has been developed as a coordinating framework that identifies responsibilities of all levels of government, community and industry stakeholders to encourage more people to get on their bicycles and start riding for a better life.

The National Cycling Strategy 2011-16 was published in September 2010. It recognises that increasing the number of people who ride a bike for transport and recreation has a host of benefits to individuals and society. The vision for the Strategy is to double the number of people cycling in Australia by 2016.

The strategy is in line with the NSW Long Term Transport Master Plan (LTTMP) and the Regional Transport Plans; which also focus on improving walking and cycling connections within major centres. Their purpose is to increase opportunities for people to walk and ride their bikes more often in order to help reduce congestion, particularly around schools, employment centres and universities.

This focus has led to increasing pressure on local government to provide infrastructure that supports these strategies which has in turn encouraged increased availability of state government grant funding.

Operating & Maintaining the Path Network

Maintenance is the regular on-going work that is necessary to keep assets operating. Maintenance does not increase the service potential of an asset or keep it in its original condition; it slows down deterioration and delays when rehabilitation or replacement is necessary. This part of the plan details the specific maintenance activities Council will undertake to keep its path assets performing to the required level of service.

Inspections

Inspections are formalised assessments undertaken to identify defects and hazards as well as to assess the overall condition of the assets. They are carried out both in response to requests by the community and as part of a regular inspection programme by knowledgeable, skilled personnel. The result of routine inspections, as well as information relating to the speed and quality of Council's response to identified hazards, is to be presented to the Council's Civil & Environmental Services Committee on an annual basis. Council carries out a three level inspection regime as detailed below.

Level 1 – Routine Maintenance Inspections

Routine Maintenance Inspections are visual inspections to check the general serviceability of the asset, particularly for the safety of users, and to identify emerging issues. They may be carried out in conjunction with routine maintenance of the asset.

Level 1 inspections provide a check of the asset inventory held in the Register, identification of any hazards or defects present and may recommend a Level 2 inspection be carried out if warranted by observed distress or unusual behaviour of the asset.

Class 1, 2 and 3 assets are included in a regular inspection programme and Class 4 assets are informally inspected during inspection of the adjacent street. In every case a defect reported to Council through its customer request system is subject to a Level 1 Inspection at which point the inspector will determine the risk that the defect presents to the community.

Defects or hazards identified during these inspections are either programmed for response during planned maintenance or responded to immediately via reactive maintenance, depending on the risk they present and the relative importance of the component in the asset hierarchy. The results are also collated for later reporting and to aid in decision making. Each defect is rated according to the severity of the identified physical defect and the condition of the environment in which the defect is found.

Figure 8 : A typical CBD footpath in Inverell that can require regular inspection due to movement in the pavers causing trip hazards and unevenness

Physical defect ratings

Physical defects rated include trip hazards, slipperiness, unevenness, ponding and other defects. They relate to the severity of the defect itself.

Trip Hazards

Trip hazards are identified as a height difference between two adjacent surface levels. They are often found at concrete panel joints or between pavers and are rated according to their depth.

Rating	Description
1	<10mm
2	10-20mm
3	20-30mm
4	30-40mm
5	>40mm

Table 11 : Trip Hazard rating

Slipperiness

Slipperiness is defined as difficulty standing on or walking or riding across a path because it is smooth, wet, slimy or covered with debris. It is rated subjectively by the inspector.

Rating	Description
1	Very Slight
2	Slight
3	Moderate
4	Very Slippery
5	Extremely Slippery

Table 12 : Slipperiness rating

Unevenness

Unevenness is irregularity in the surface of a path that makes it difficult to traverse. It is rated subjectively by the inspector.

Rating	Description
1	Very Slight
2	Slight
3	Moderate
4	Very Uneven
5	Extremely Uneven

Table 13 : Unevenness rating

Ponding

Ponding is the presence of a local depression in the surface of the path which allows water to pool. It is rated according to the measured depth of the depression.

Rating	Description
1	<10mm
2	10-20mm
3	20-30mm
4	30-40mm
5	>40mm

Table 14 : Ponding Rating

Other Defects

Some physical defects cannot be described using one of the above methods and are rated as “other defects”. These can include deep holes in a grassed verge, edge drops on a concrete path, bicycle pedal entanglement risks on a footbridge; or any number of other unspecified defects. The inspector will describe the defect in a comment and rate them subjectively according to the injury risk they present.

Rating	Description
1	Very Low – not likely to result in injury
2	Low – Potential to cause minor injury or accident
3	Moderate – Potential to cause injury or accident requiring first aid treatment
4	High – Likely to cause injury or accident requiring medical treatment
5	Very High – Very likely to cause significant injury or accident

Table 15 : Other Defect Rating

Environmental condition ratings

Environmental conditions rated include lighting shadows and obfuscation. They relate to the environment in which the defect is found.

Lighting

Lighting is rated based on the presence of light sources and their effectiveness in making a defect more conspicuous. It is rated subjectively by the inspector.

Rating	Description
1	Excellent lighting
2	Good lighting
3	Adequate lighting
4	Inadequate lighting
5	No lighting

Table 16 : Lighting rating

Shadows

Shadows are rated based on their presence and their effect on a person's ability to perceive the hazard. They are rated subjectively by the inspector.

Rating	Description
1	No shadow
2	Little shadow
3	Some shadow
4	Moderate shadow
5	Heavy shadow or complex obfuscating shadow patterns

Table 17 : Shadows rating

Obfuscation

Obfuscation is the presence of an object or environmental condition (such as glare) that affects a person's ability to perceive the hazard. It is rated subjectively by the inspector.

Rating	Description
1	Clearly visible from 5m in all directions
2	Visible from 3m in all directions
3	Adequately visible
4	Only visible upon close inspection
5	Not readily visible

Table 18 : Obfuscation rating

The inspector combines the rating for the physical defect and the rating for the environmental defect to provide an overall risk rating as shown in Table 19.

It is important to note that the table requires at least one physical defect and one environmental risk to obtain a rating. If there is more than one environmental risk, the risk with the highest rating is the lead risk. If there is more than one physical defect each will be assessed and recorded separately.

Physical Rating	Environmental Rating				
	1	2	3	4	5
5	VH	VH	VH	VH	VH
4	H	H	H	VH	VH
3	H	H	H	H	VH
2	M	M	M	H	H
1	L	L	L	L	L

Table 19 : Overall Risk Rating calculation table

If a risk is rated as high (H), then the location of the footpath and the volume of traffic must be considered. If the footpath is outside a building used by the elderly, children or the disabled; or is frequently used such as a mall, main street or school, then the rating is moved up the next level. The rating may also be moved up one level if there are other factors that may increase the risk such as the potential for ongoing debris contaminating the surface (such as leaves or gravel from an adjacent driveway) or the defect being hard to see due to the pattern of pavers.

Minimum inspection frequency is dictated by the criticality of the asset in the network; Class 1 assets are inspected once every fourteen days, Class 2 assets bi-annually and Class 3 assets annually.

Design and safety

In addition to identifying defects and hazards in the path network inspectors also take note of any instance where a path asset no longer meets the required standards for design and safety. These are noted during routine inspections and used to inform programmed maintenance as well as the optimised renewal decision making process outlined in the ***Renewing and Expanding the Road Network*** section of this plan.

Level 2 – Condition Inspections

Condition Inspections assess and rate the condition of the assets. This information is used as a basis for assessing the effectiveness of past maintenance treatments, identifying current maintenance needs, modelling and forecasting future changes in condition and estimating future budget requirements.

Level 2 inspections are much more detailed than Level 1 inspections. The inspections measure the extent and severity of defects in the asset as well as the general condition of the asset overall.

The condition rating system reflects the performance, integrity and durability of the principal components of each asset. The assessment of the nature and extent of defects for each component type is included in Council's Asset Condition Inspection Manual (Appendix A) which provides examples for each condition rating and a method to calculate an overall condition rating for each structure or path.

Inspections are programmed to target 20% of all assets each financial year to ensure that every asset is subject to a Level 2 inspection at least every five years. The results of the Level 2 inspections are used to give an indication of the condition of the entire network which is used to assess the performance of the maintenance budget and is reported in the annual report each year.

Level 3 – Detailed Engineering Inspections

A Detailed Engineering Inspection is an extensive inspection which may include physical testing and structural analysis to assess the asset's structural integrity, to identify and quantify the current and projected deterioration of the asset and to assess appropriate management options. They are generally only required for complex structures within the path network such as bridges and stairways.

Level 3 inspections must be carried out by an experienced and qualified engineer and are usually completed as a result of a recommendation in a Level 2 inspection report which has rated the asset in poor or very poor condition and raised significant concerns about its continued performance. Level 3 inspections may also be necessary in order to provide a load rating for a structure or to assess the condition of an asset prior to carrying out programmed works such as rehabilitation or reconstruction.

The inspecting engineer will provide a written report of the results of a Level 3 Inspection to the Director Civil and Environmental Services with a copy to the Manager Civil Engineering within 60 days of the inspection.

The report may include assessments of load capacity and condition, recommendations for further testing, remedial action and future inspection and monitoring or a complete "Structure Management Plan" for individual structures as deemed necessary by the inspecting engineer or as requested by management.

Reactive Maintenance

Maintaining Council's paths through regular investment is the most effective way to preserve the condition of the assets and reduce the risk of defects occurring and intervention becoming necessary. However, even with regular investment, defects will occur; reactive maintenance refers to works that are carried out as a matter of urgency, usually to repairs these defects for reasons of safety.

When responding to defects with reactive maintenance the organisation takes a safety first approach. Where there are clear implications for public safety we will act to

allay the danger. Where danger is not implicit we will balance our actions and responses against other criteria and priorities as set out in this plan

The time to respond to a defect is dependent on the defect's overall risk rating and the asset's hierarchical classification as outlined in Table 20.

In addition to the below Council will respond immediately to any trip hazard if it has been notified that a fall has occurred.

The organisation's performance in responding to identified defects within the adopted timeframe is to be measured and reported annually to Council's Civil and Environmental Services Committee.

Risk Rating	Action	Class	Response Time
L	Consideration should be given as to whether action needs to be taken	1	As resources permit
		2	As resources permit
		3	As resources permit
		4	As resources permit
M	Program into maintenance works	1	20 working days
		2	30 working days
		3	As resources permit
		4	As resources permit
H	Make safer	1	2 working days
		2	5 working days
		3	10 working days
		4	10 working days
	Effect repairs (either temporary or permanent)	1	3 weeks
		2	3 weeks
		3	4 weeks
		4	4 weeks
VH	Make safe	1	4 hours
		2	4 hours
		3	2 working days
		4	2 working days
	Effect immediate repair or replacement	1	10 working days
		2	10 working days
		3	4 weeks
		4	4 weeks

Table 20 : Defect response times

To meet the above targets Council has provided significant ongoing maintenance funding for the network of over $3000 per kilometre per annum for the life of this plan.

This funding will ensure that defects are responded to in line with the above, and that Council's infrastructure do not pose an unnecessary risk to the public.

Council needs to be aware of the effect of new work on its ongoing maintenance. If the projects identified in the expansion program of this plan are funded Council's annual maintenance burden will increase. As such, it is important that all expansion projects considered for funding include an assessment of their whole of life costs.

Renewing and Expanding the Path Network

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

When deciding whether an item of expenditure is to be capitalised Council refers to the decision tree in the CPA publication *Valuation and Depreciation - A guide for the not-for-profit and public sector under accrual based accounting standards (2013)*.

Renewal

Asset renewal is major work which restores, rehabilitates, replaces or renews an existing asset to its original service potential. This is generally required when an asset has reached the end of its useful life or has failed. It is periodically required expenditure that is relatively large in value compared with the value of the components or sub-components of the asset being renewed. As it reinstates existing service potential, it has no impact on revenue, but may reduce future operating and maintenance expenditure if completed at the optimum time.

Due to the long physical life of path assets, renewal and rehabilitation is undertaken reactively as assets fail or are identified as being about to fail as part of ongoing condition assessments.

Inverell Shire follows an Optimised Renewal Decision Making (ORDM) process when making decision about renewal of its assets. ORDM is a process that assists organisations to assess the optimal renewal technique or activities that are available to extend, augment or reduce the service delivered by infrastructure assets, in line with business objectives. The key elements when performing ORDM are:

- Identifying and analysing the modes of failure
- Identifying viable treatment options
- Undertaking an economic and level of service evaluation of these options
- Selecting the most strategically cost effective option for the organisation.

In a path network, the potential modes of failure that may lead to renewal include:

- Cost of Service.
- Performance/Reliability/Availability
- Structural Integrity
- Capacity/Utilisation

The ORDM processes for each of the failure modes are summarised in Table 21 to Table 24

This section of the plan also provides a forecast of the notional renewal funding required to keep the assets in satisfactory condition and compares it to the available funding provided in Council's Long Term Financial Plan.

ORDM Process	Cost of Service
Causes	• Excessive maintenance costs • High number of failures due to poor condition • Future liabilities, rehabilitation or replacement works necessary • High operating costs due to poor condition • Equipment or asset obsolete – Repairs and spare parts costly or not available – New asset would be more efficient, save money
Effects	• Excessive subsidies required • Drain on recurrent cash flow • Future liabilities for renewal works • Higher operating costs
Significance	• Degree to which costs exceeded income generated (return on asset) • Business viability – ability to carry non-performing assets or raise additional income
Treatment Options	• Raise income derived from asset, depends on: – Customer response – Present cost levels – Predictive cost increases • Reduce high cost activities, maintenance and operations • Negotiate lower level of service, performance, reliability, etc. • Defer all capital investment • Mothball asset • Dispose of asset • Transfer asset
Evaluation	• Complete ORDM evaluation on various treatment options • Assess and determine strategy in the light of total business picture

Table 21 : Failure Mode – Cost of Service

ORDM Process	Performance/Reliability/Availability
Causes	• Decay of asset condition • Failure of component (e.g. joint, panel) • Failure of associated unit (secondary failure e.g. culvert)
Effects	• Interruption of service (closure of path) • Reduced level of service (Surface quality poorer / partial closure service)
Significance	• Degree to which service is effected • Number of customers effected and time • Consequences of failure, e.g. safety/damage
Treatment Options	• Improve planned maintenance/condition monitoring • Reduce repair time • Re-route traffic • Improve condition monitoring • Develop predictive model • Overhaul (or rehabilitate) asset to achieve necessary reliability • Replace asset
Evaluation	• Evaluate cost/benefits including business consequences of not meeting reliability standards • Equate costs of consequences of failure to probability • Rank cost/benefit against all opportunities for investment

Table 22 : Failure Mode - Performance/Reliability/Availability

ORDM Process	Structural Integrity/Asset Mortality (End of physical life)
Causes	• Structural integrity of asset has decayed below level requirement to meet normal working stresses
Effects	• Collapse • Cracks, Spalling • Tree roots • Personal damage (see Risk Management/Consequence of Failure)
Significance	• Degree of damage caused • Risk to life • Effect on customers • Consequences of failure
Treatment Options	• Improve ability to repair quickly • Rehabilitate asset before failure • Replace asset • Mothball asset • Dispose of asset
Evaluation	• Evaluate cost/benefits of each options • Benefits to include all consequences of failure costed to probability of failure • Rank cost/benefit against all opportunities for investment

Table 23 : Failure Mode - Structural Integrity/Asset Mortality

ORDM Process	Capacity/Utilisation	
	Exceeds design capacity	**Inadequate utilisation**
Causes	• Increased number of users • New destinations • New user type (changed to shared path or to cycleway) • Increased customer expectations, demands for service	• Decline in demand • Destinations no longer generating traffic
Effects	• Inability to meet demands on network	• Cost of operating assets is above ability to pay
Significance	• Degree to which capacity is exceeded • Number of customers effected • Risk involved, safety, etc.	• Is it an unwarranted burden on the business (not core activity/non-performing asset)
Treatment Options	• Operate system differently: – Interconnection between routes • Boost asset capacity (widen) • Augment asset/duplicate • Reduce levels of service • Build new asset	• Mothball assets • Dispose of assets – rationalisation • Identify cost as CSO and derive other income • Transfer liability to others
Evaluation	• Evaluate costs/benefits/income of each option • Benefit/consequence of failing to meet demands against probability of occurrence • Rank cost/benefit against all opportunities for investment	• Overall impact on organisation

Table 24 : Failure Mode - Capacity/Utilisation

Projected Renewal Requirements

Council intends to ensure that assets do not fail to provide a satisfactory level of service. This means providing enough renewal funding to replace or renew any asset that reaches condition state 4 or 5 throughout the life of this plan.

Figure 9 shows the notional funding required for each year of the plan to renew enough of the assets to meet this target and highlights that as the end of the plan nears, the funding required begins to increase. This is by virtue of the fact that most path assets are currently in condition states 1 and 2 and less intervention is needed until a greater proportion reaches state 3.

The required renewal funding is based on modelling of each class as a whole and assumes that all assets are spread evenly throughout the condition states. It does not identify specific projects that need to be undertaken to repair or renew assets and is instead intended to show the gradual progression of deterioration that all assets moves through as they near the ends of their useful lives. The renewal requirements identified are therefore often unlikely to be required to be spent in the years indicated. For example, while a foot bridge asset may lose a proportion of its value into a lower condition state each year, this doesn't mean there are necessarily any issues with the bridge. Intervention will only occur when it is necessary for a project to be completed to the return the asset to its required service level.

Ongoing condition assessment of all asset classes will ensure that up to date information is provided for renewal forecasting as the assets age and the level of service they provide begins to decline. This plan will be monitored to ensure that changes are reflected when condition information is reviewed each year.

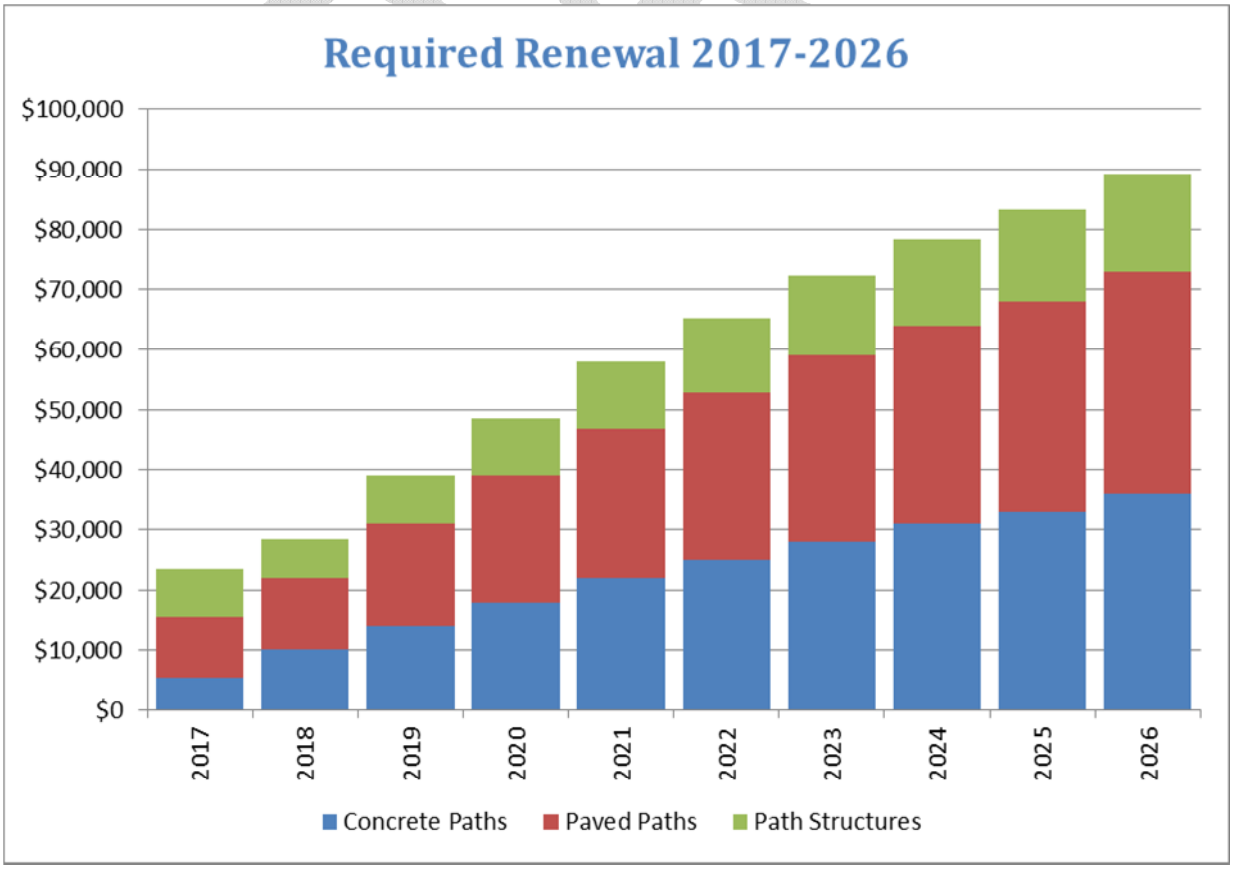

Figure 9 : Indicative Required Renewal

Budgeted Renewal

Councils Long Term Financial Plan 2017-2026 (LTFP) provides the available level of funding to implement the requirements of this Asset Management Plan. The LTFP is used to formulate the annual Operational Plans and budgets and includes provision for funding from grants and borrowings as well as rates and charges.

Figure 10 shows the funding available in the LTFP for each year of the plan. The Long Term Financial Plan 2017-2026 includes funding from a proposed special rate variation, intended in part to address the shortage of renewal funding required to return Council's infrastructure to a satisfactory condition.

At present 100% of the required funding to keep the assets providing a satisfactory level of service is provided for in the Long Term Financial Plan.

If the projects outlined in the expansion plan are funded the required renewal will increase, however this is not expected to have an impact on the overall condition profile of the class during the life of this plan as any new assets constructed are projected to remain in condition state 1 for the first 25 years of their useful lives.

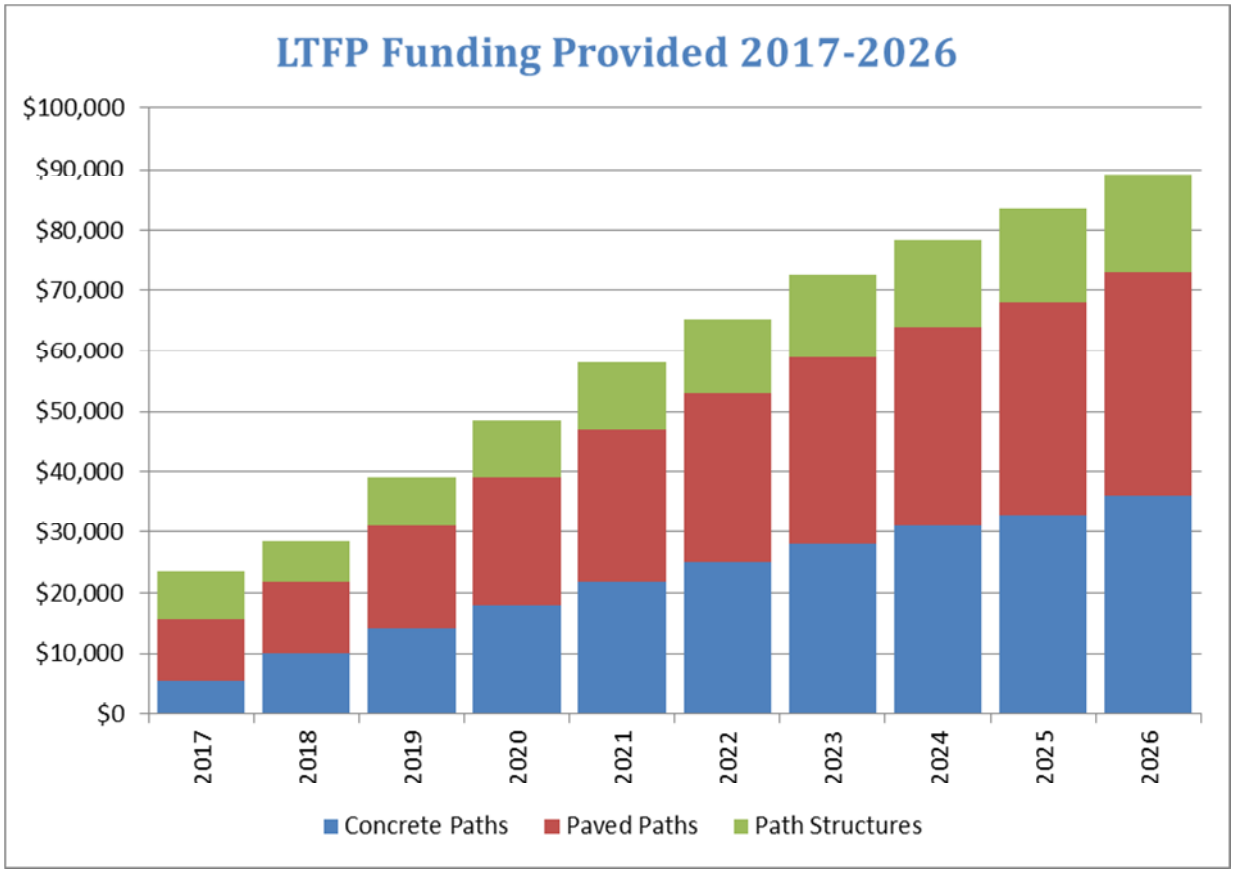

Figure 10 : LTFP Renewal Funding Provided

Expansion

Capital expansion is expenditure which enhances or expands an existing asset network to provide a higher level of service or that will increase the life of the assets beyond that which they had originally.Expansion of the path network is focussed on delivering the six key principles outlined in the adopted level of services statements (See the ***Setting Standards & Measuring Performance*** section of this plan). To ensure expansion works align with these principles, all projects will subject to a planning process that includes calculation of their whole of life costs and analysis of their alignment with these principles before they are included in the operational plan. The project proposal templates are included in Appendix B. Table 25 contains a list of projects identified for future expansion works. Council has not set aside any funding to achieve these works in its long term financial plan, instead focusing on ensuring renewal is funded. To achieve its strategic objectives it is likely that Council will have to obtain funding from other sources to complete these works. Council has a strong track record of attracting funding to construct projects identified as priorities in its long term plans. Capital expenditure in recent years has been linked to such grant funding.

Priority	Project Name	Estimate
1	INVERELL Warialda Road - Auburnvale to Froude	$27,775
2	INVERELL Evans Street - Wood to Mansfield	$25,880
3	INVERELL Evans Street - Mansfield to Lawrence	$25,393
4	INVERELL Gilchrist Street - Swan to Leonard	$13,063
5	INVERELL Gilchrist Street Leonard to Vernon	$26,566
6	INVERELL Brown Street - School to Shirley	$5,706
7	INVERELL Brown Street & Wade Street - Shirley to Wade Shops	$22,975
8	INVERELL Oswald Street - Home for Aged to High school	$47,719
9	INVERELL Oswald Street - Howard to Oconnor	$21,697
10	INVERELL Oconnor Street - Oswald to Brae	$16,037
11	INVERELL Clive Street - Highway to Wood	$21,639
12	INVERELL Clive Street - Wood to Short	$73,738
13	INVERELL Henderson Street - Wood to Arthur	$21,363
14	INVERELL Henderson Street - Mansfield to Wood	$26,500
15	INVERELL Wynne Street - Old Bundarra to William	$28,260
16	INVERELL Aurburn Vale Road - Hindmarsh to Wesley	$42,222
17	INVERELL Auburn Vale Road & Harland St - Wesley to Brownleigh vale	$40,120
18	INVERELL Wynne Street - William to Borthwick	$38,810
19	INVERELL Harland Street - Borthwick to Brownleigh Vale	$51,482
20	INVERELL Froude Street - Highway to Carlyle	$21,504
21	INVERELL Froude Street - Carlyle to Harland	$34,490
22	INVERELL Captain Cook Drive - Toilets to Campbell Park	$7,055
23	DELUNGRA Gunnee Street - School to Burnett	$18,928
24	DELUNGRA Gunnee Street - Highway to Burnett	$13,676
25	DELUNGRA Gunnee Street - Highway to Railway Street	$13,245
26	DELUNGRA Railway Street - Gunnee to Macintyre	$16,740
27	GILGAI Old Stannifer - Church to Wood	$13,169
28	INVERELL Highway - Moore Street to Glen Innes Access Road	$2,897
29	INVERELL Vernon Street - Highway to Urabatta	$30,718
30	INVERELL Vernon Street - Urabatta to Gilchrist	$34,630
31	INVERELL Mawson Street - Wynne to Eugene	$32,245
32	INVERELL Waratah Avenue - Eugene to Linking Together Centre	$18,390
33	INVERELL Swanbrook Road - Gaps in current path	$56,138
34	INVERELL Wood Street & Ross Street - Rivers to School Crossing	$53,199

Priority	Project Name	Estimate
35	INVERELL Rivers Street - Wood to Mansfield	$54,398
36	INVERELL Rivers Street - Lawrence to Mansfield New	$38,206
37	INVERELL River Street - Lawrence to Mansfield	$9,812
38	ASHFORD Bukkulla Street - Frazer to David	$26,473
39	ASHFORD Duff Street - Bukkulla to Footbridge	$17,526
40	ASHFORD Duff Street - Footbridge to Frome	$5,459
41	GILGAI Wood Street - Hall to Old Stannifer	$19,788
42	INVERELL Arthur Street - Ross to Henderson	$18,559
43	INVERELL Arthur Street - Henderson to Granville	$29,369
44	INVERELL Arthur Street - Granville to Chester	$30,122
45	INVERELL Arthur Street - Chester to Greaves	$29,633
46	INVERELL Arthur Street - Greaves to Bennett	$29,268
47	INVERELL Arthur Street - Bennett to Clive	$6,333
48	YETMAN River Street - Shop to Warialda st	$4,207
49	YETMAN River Street - Warialda to Macintyre	$14,944
50	YETMAN River Street - Macintyre to park	$4,123
51	GILGAI Hall Street - Church to Wood	$12,560
52	INVERELL Byron Street - Wood to Arthur	$15,404
53	INVERELL Oswald Street - O'Connor to Whittingham	$23,918
54	INVERELL Whittingham Street - Brae to Oswald	$15,856
55	INVERELL Ring Street - Brae to George	$45,452
56	INVERELL George Street - Hatcher to Ring	$79,334
57	INVERELL Ring Street - Bridge to King	$11,795
58	INVERELL Ring Street - Bridge to Byron	$18,964
59	INVERELL Cycleway - River behind Kamilaroi oval	$115,291
60	INVERELL Harland Street - Lang to Auburnvale	$11,839
61	ASHFORD Bukkulla Street - Ely to David	$25,196
62	ASHFORD David Street - Bukkulla to Frome	$18,848
63	GILGAI Hall Street - Marsh to Church	$12,734
64	INVERELL Harland Street - Lang to Froude	$11,058
65	INVERELL Harland Street - Froude to Gordon	$11,439
66	INVERELL Harland Street - Gordon to Lewin	$11,674
67	INVERELL Harland Street - Lewin to Highway	$15,051
68	INVERELL Oliver Street - Lawrence to St Elmo Medical Centre	$7,896
69	INVERELL Hopper Street - Vernon to Jacaranda	$13,479
70	INVERELL Hopper Street - Jacaranda to Park	$4,304
71	INVERELL Bannockburn Road - School to Shirley	$17,020
72	INVERELL Shirley Street - Bannockburn to Lindsay	$16,441
73	INVERELL Shirley Street - Lindsay to Gilchrist	$24,180
74	INVERELL Lindsay Avenue - Shirley to Butler	$11,636
75	INVERELL Lindsay Avenue - Butler to Walking track entrance	$16,047
76	INVERELL Shirley Street - Bannockburn to Brown	$19,019
77	INVERELL Brown Street - High to Andrew	$13,432
78	INVERELL Brown Street - Urabatta to High	$13,481
79	INVERELL Urabatta Street - Bannockburn to Brown	$19,051
80	INVERELL Froude Street - Harland to Kuna	$44,645
81	INVERELL Kuna Avenue - Froude to Gordon	$9,738
82	INVERELL Gordon Street - Kuna to Park	$23,385
83	DELUNGRA Highway - Dumboy to Macintyre (north side)	$16,535
84	DELUNGRA Highway - Dumboy to Showgrounds	$18,694
85	DELUNGRA Highway - Macintyre to current path (south side)	$8,717
86	DELUNGRA Highway - Macintyre to Dumboy (south side)	$17,055
87	GILGAI Marsh Street - Hall to Old Stannifer	$17,286

Priority	Project Name	Estimate
88	INVERELL Lions Park - Past public toilet to link to Rosslyn	$9,367
89	INVERELL Rosslyn Street - Lions Park Link to Rosslyn Street	$15,819
90	INVERELL Highway & Rosslyn Street - Link to lions park	$16,592
91	INVERELL Highway - Rosslyn to Hindmarsh	$12,581
92	INVERELL May Street - Brae to Rotary Park	$32,916
93	INVERELL George Street - Oconnor to Whittingham	$23,147
94	INVERELL George Street - Whittingham to Daycare Centre	$18,049
95	INVERELL George Street - Daycare Centre to Hatcher	$17,680
96	INVERELL Wood Street - TAFE to Rivers	$16,328
97	INVERELL Lawrence Street - Granville to Henderson	$14,647
98	INVERELL Granville Street - Vivian to Lawrence	$23,799
99	INVERELL Granville Street - Lawrence to Mansfield	$6,543
100	INVERELL Mansfield Street - Granville to Henderson	$14,110
101	INVERELL Mansfield Street - Rivers to Ross	$9,019
102	INVERELL Mansfield Street - Oliver to Evans	$13,844
103	INVERELL Mansfield Street - Oliver to Byron	$13,049
104	INVERELL Oliver Street - St Elmo Medical Centre to Mansfield	$17,104
105	ASHFORD Duff Street - Inverell to Kneipp	$34,294
106	ASHFORD Kneipp Street - Duff to Martyn	$20,392
107	ASHFORD Martyn Street - Kneipp to Kneipp Ln	$7,588
108	GILGAI Bundarra Road - Bus Stop to Park	$31,014
109	INVERELL Clive Street - Bike path to Lookout	$7,746
110	INVERELL Short Street - Moore to Brewery	$48,853
111	INVERELL Brewery Street - Short to Sapphire	$10,256
112	INVERELL Brewery Street - Mather to Sapphire	$24,182
113	INVERELL Brewery Street - Highway to Mather	$11,325
114	INVERELL Macintyre Street - Aged Homes to Old Bundarra (w/o Culvert)	$68,170
115	INVERELL Macintyre Street - Aged Homes to Old Bundarra Culvert	$21,600
116	INVERELL Macintyre Street - Aged Homes to Raglan	$49,037
117	YETMAN Macintyre Street - River St to Simspon	$24,495
118	YETMAN Warialda Street - Simpson to Campbell	$31,182
119	YETMAN Warialda Street - River to Simspon	$25,959
120	INVERELL Sports Precinct - Under Bridge Path to Eucalypt drive	$36,221
121	INVERELL Eucalypt Drive - Entrance Gates to Canteen	$89,827
122	INVERELL Sports Precinct - Canteen to Mens Shed	$26,858
123	INVERELL Sports Precinct - Canteen to Netball	$130,126
124	DELUNGRA Wallangra Street - School to Macintyre	$11,484
125	DELUNGRA Wallangra Street - Macintyre to Dumboy	$17,027
126	DELUNGRA Dumboy Street - Wallangra to Burnett	$13,951
127	DELUNGRA Dumboy Street - Burnett to Highway	$14,080
128	DELUNGRA Macintyre Street - Highway to Railway	$16,972
129	ASHFORD Martyn Street - Albury to Bala	$13,778
130	YETMAN Campbell Street - Warialda to Macintyre	$13,631
131	GILGAI Park Street - Church to Wood	$13,077
132	INVERELL Sapphire Street - Brewery to Park	$18,778
133	INVERELL Macintyre Street - Raglan to Bundarra Widening	$67,650
134	INVERELL Ashford Road - Cemetery Link	$97,243
135	INVERELL Bundarra Road - Pioneer Village Link	$71,504
136	ASHFORD Frome Street - Duff to David	$46,171
137	YETMAN Macintyre Street - Campbell to Simspon	$29,857
138	GIGLAI Wood Street - Old Stannifer to Park	$24,698
139	GILGAI Park Street - Bundarra to Church	$14,203

Table 25 : Identified Forward Capital Works

Rationalising the Network and Retiring Old Assets

Rationalising assets and services can reduce costs, generate operational savings for reinvestment, and allow the delivery of more integrated, customer-focused services. It enables Council to improve our most important assets for the future, and help fund the work through reducing the cost to provide inefficient or unnecessary assets.

At present one of Council's long term goals is to increase the number of people walking and riding in the shire and its current assets along with a significant expansion plan are key to realising this. As such, no rationalisation of the network is anticipated in the foreseeable future.

Council will continue to assess how well its path network is serving the community by carrying out the regular inspection program and monitoring the level of service performance measures.

Managing the Risks

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

Critical risks, being those assessed as 'Very High' - requiring immediate corrective action and 'High' – requiring prioritised corrective action identified in the infrastructure risk management plan are summarised in Table 26

For more information on the assessment process refer to Council's Infrastructure Risk Management Plan.

Asset at Risk	What can Happen	Risk Rating (VH, H)	Risk Treatment Plan
Assets in floodplain	Greater intensity rainfall leads to more frequent and larger riverine flooding events	H	Assess flood prone areas for presence of critical assets and include in future planned upgrade programs
Constructed Paths	Pavement ages past its useful life	H	Provide adequate renewal funding budget
All path assets	Council fails to meet its target to increase number of people walking and cycling in the shire	H	Investigate funding sources for path network expansion and provide funding in LTFP
All path assets	Council fails to meet its obligations under disability legislation	H	Audit disability access as part of development of Disability Action Plan. Include identified problems in expansion and upgrade plan.
Constructed Paths	Trip, slip and fall hazards	H	Manage within existing controls. Continue regular inspections and maintenance response.

Table 26 : Critical Risks

Asset Management Practices

Finance & Database

Council uses Technology One Enterprise Suite as its primary database software. The selected modules form a robust financial and works management system.

Geographical Information Systems

MapInfo Professional is used to store location based asset data. Data is stored in the MapInfo TAB format in GDA94 datum and accessed through the Exponare platform or directly from Technology One via integration.

Council is updating its guidelines for the management of its spatial data. These guidelines will inform the policies, procedures and processes that Council uses to manage its spatial data (See Improvement Plan Action 1.8).

Information Inputs

The key information flows into this asset management plan are:

- The asset register data on size, age, value, remaining life of the path network;
- Council strategic and operational plans,
- Service requests from the community,
- Network assets information,
- The unit rates for categories of work/materials,
- Current levels of service, expenditures, service deficiencies and service risks,
- Projections of various factors affecting future demand for services and new assets acquired by Council,
- Future capital works programs,
- Financial asset values.

Information Outputs

The key information flows from this asset management plan are:

- The projected Works Program and trends,
- The resulting budget and long term financial plan expenditure projections,

These will impact the Long Term Financial Plan, Delivery Plan, Annual Budget and Operational Plans.

Procedures for the flow of information are heavily dependent upon the needs of the above mentioned plans. Specific requirements for information from this asset management plan will be defined during the process of updating council's other long term planning documents and will be included in future revisions (See Action 1.5 of Improvement Plan).

Plan Improvement & Monitoring

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

- The degree to which the required cash flows identified in this plan are incorporated into council's long term financial plan;
- The degree to which 4 year detailed works programs, budgets, business plans and organisational structures take into account the 'global' works program trends provided by this plan;
- Progress toward achieving the outcomes listed in the Improvement Plan

Monitoring and Review

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

Improvement Plan

The asset management improvement plan generated from this asset management plan is shown in Table 27.

Action ID	Action	Outcome	Responsibility	Due Date
1.1	Develop and implement Community Satisfaction Survey	Monitor performance of plan and gain insight into desired levels of service	Asset Management Coordinator	End 2016
1.2	Consult the community on the current levels of service and determine desired levels of service for inclusion in AM plan where necessary	Ensure plan is providing for community expectations. Provide targets for AM plan	Integrated Planning and Reporting Manager	End 2016
1.3	Update AMP to reflect adoption of Disability Access Inclusion Plan	Better integration between adopted council plans	Asset Management Coordinator	End 2017
1.4	Continue improvement of asset data and confirm asset locations in GIS system.	Improved inventory and spatial data for use in forward planning	Asset Management Coordinator	End 2017
1.5	Develop formalised procedures for information flows into and out of the asset management plan	Ensure relevant information is shared.	Asset Management Coordinator	End 2017
1.7	Develop formal capital evaluation process for allocation of funding.	Provide better information about life cycle costs for future works	Finance Manager	End 2016
1.8	Develop spatial data guidelines	Ensure location based information is accurate, relevant and up to date	GIS Officer	End 2016

Table 27 : Improvement Plan

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Appendix A

Asset Condition Inspection Manual

Appendix B

Project Proposal Templates

Road Asset Management Plan 2017-2026

Inverell Shire Council

Document Control

Title: Road Asset Management Plan 2017-2026

Document Number:

Date	Revision	Author	Reviewer	Approved Date
20/03/2015	Draft Version 0.1	D. Strugnell		
12/09/2015	Draft Version 0.2	D. Strugnell		
30/03/2016	Version 1.0		B. McInnes	

This asset management plan was developed by Inverell Shire Council.
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Introduction

Local government assets deliver important community services. Their effective management is crucial to the sustainable delivery of those services to meet community needs and aspirations now and in the future. The aim of this plan is to enhance the sustainable management of Inverell Shire Council's road assets by encouraging 'whole of life' and 'whole of organisation' approaches and the effective identification and management of risks associated with the use of the assets. It encourages a long-term view of asset management and requires Council to understand and then meet the impacts of social, economic and environmental change in ways that ensure sustainable use of physical and financial resources.

This plan is concerned with Road assets, which includes the shire's road and street pavements, bridges, signage and related infrastructure. The plan does not include certain elements within the road reserve such as footpaths, street furniture, underground drainage or other infrastructure assets located on parks and reserves that will be covered under separate asset management plans.

Defining Asset Management

The international standard for asset management (ISO55000:2014) defines asset management as the "coordinated activity of an organisation to realise value from assets". This includes all activities the organisation undertakes from planning, purchase, operation, and maintenance to disposal of assets. It also encompasses integration of asset and service outcomes.

The International Infrastructure Management Manual recognises the goal of asset management is "To meet a required level of service, in the most cost effective manner, through the management of assets for present and future users". It is important to recognise that the singular purpose of the assets in all cases is to provide a service and as such the focus of this plan is on the services provided by the shires road assets rather than on the assets themselves.

The key elements of infrastructure asset management are:

- providing a defined level or 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 that meet the defined level of service;
- identifying, assessing and appropriately controlling risks; and
- having a long-term financial plan which identifies required expenditure and how it will be funded.

Asset management represents more than simply an integration of existing management systems and data. It builds on existing processes and tools to form a continuous improvement framework that complements and supplements existing practice.

An Asset Management Plan (AMP) is a long-term plan that specifies the activities, resources and timescales required for an individual asset, or grouping of assets, to achieve the organisation's asset management objectives.

Asset Management Drivers and Benefits

It is widely accepted that transport infrastructure is vital to the economic and social well-being of our nation. For Inverell Shire Council, like most local authorities, the road network is the most valuable community asset under Council's control and provides one of the most vital services to the community.

Local Governments exercise their duties to maintain, operate and improve their road network under increasing pressures that include:

- Limited budgets: with competition for funding across a range of services

- Limited resources: both human resources and materials
- Mature networks: which have a significant maintenance demand
- Increased accountability: to customers and funding providers
- Increasing public expectations: the public are increasingly informed and expect a higher level of service form their assets.

Despite these challenges, Council is responsible for effectively accounting for and managing its assets and having regard for the long term and cumulative effects of its decisions. This is a core function of local government authorities and is reflected in the Charter in s8 of the Local Government Act. Furthermore, a strong and sustainable local government system requires a robust planning process to ensure that these assets are managed in the most appropriate way on behalf of local communities.

Asset management plans form part of Council's Resourcing Strategy that supports the community's Strategic Plan. The Strategic Plan provides a vehicle for the community to express its long term aspirations. However, these aspirations will not be achieved without sufficient resources – time, money, assets and people – to carry them out. The Resourcing Strategy is a critical link when it comes to translating strategic objectives into actions.

The asset management actions necessary to achieve the Strategic Plan Strategies relevant to Council's road assets are outlined in Table 1.

Using this plan

The Road Asset Management Plan provides core resource information for users. It will be continuously reviewed and updated to improve its quality and to ensure continuing relevance. This document has been written with the intention of being informative and readily understood by persons interested in the actions of Council and particularly in road infrastructure matters. It does not contain detailed technical information but rather seeks to provide an overview of the Council's assets and the directions that must be taken to ensure their sustainability.

This asset management plan is prepared as a 'core' asset management plan in accordance with the International Infrastructure Management Manual 2015. It has been prepared to initially meet minimum legislative and organisational requirements for the sustainable management of road & transport infrastructure and long-term financial planning and reporting.

The plan is considered a 'core' plan due to its top-down approach where key analysis has been applied at the 'system' or 'network' level of asset management planning.

Strategic Plan Strategies	Term Achievements	Asset Management Plan Actions
R.06 Council ensures it is able to provide resources to effectively deliver its Strategy and Programs.	R.06.01 Council provides adequate resources to deliver its programs and has introduced measures to increase its capacity to deliver cost effective and efficient services. R.06.02 Council's financial sustainability is being managed through best practices, diverse investment strategies and asset management control.	Implement AMP to ensure the Council's assets are managed and maintained to target service levels Outputs of this plan are to include a report on the sustainability of the road network
C.03 Promote an ordered and safe Community.	C.03.01 Compliance and regulation programs have been developed and implemented to provide a safe environment for citizens and visitors.	Carry out regular inspection and reporting on road safety as per routine maintenance plan requirements.
C.05 Create clean and attractive streets and public places.	C.05.01 Council's maintenance programs are improving and enhancing the cleanliness and safety of streetscapes.	Include improving the amenity of streetscapes as a performance measure.
S.01 Sound Local Government Administration, Governance and Financial Management are provided.	S.01.02 A sound long term financial position is maintained. S.01.07 A contemporary system of risk management and internal control is operating. S.01.09 Best Value principles specified in the Local Government Act along with contemporary asset management processes have been implemented for asset sustainability.	Outputs of this plan are to include a report on the required financial expenditure to ensure the sustainability of the road network. This plan includes an inspection regime and risk management procedure consistent with Council's Risk management policies and industry best practice.
S.02 Council displays leadership, community engagement and collaboration with others.	S.02.01 Council is managing its statutory requirements and the needs of a participatory community in a transparent and balanced way.	Report on progress against performance measures in the annual report. Engage the community to develop desired levels of service and agree on a funding strategy to achieve them.
S.03 Council provides equitable services, consistent with available resources and priorities to meet the Shire's identified needs and preferences.	S.03.01 Services and programs that Council provides are determined based on equity, customer requirements and community benefits, best value and excellence.	This plan includes an evaluation procedure for maintenance and capital works that takes into account these areas.
S.08 Civil infrastructure is secured, maintained and used to optimum benefit.	S.08.01 An asset management strategy is in operation for civil infrastructure that optimises its use and maintained to agreed standards fit for contemporary purpose.	Implement AMP to ensure Council's assets are managed and maintained to target service levels
S.10 Maintain and enhance a safe, efficient and effective local road network.	S.10.01 Road network capacity, safety and efficiency are improved and traffic congestion is reduced.	AMP includes level of service and performance measure to ensure the road network is well connected, well designed and free flowing
S.12 Provision of safe and efficient networks to ensure connectivity between population centres.	S.12.02 A sustainable and strategic approach to the management of Council's Assets is undertaken. S.12.05 A Bridge Management Plan has been developed and implemented that meets the community needs and Council's duty of care obligations to the community.	Implement AMP to ensure Council's assets are managed and maintained to target service levels

TABLE 1 : ASSET MANAGEMENT ACTIONS RELATING TO STRATEGIC PLAN STRATEGIES

Understanding our Assets

Understanding what assets Council owns and controls, along with key supporting information such as their condition, age, location and value is a key step to ensuring best practice asset management. Without this knowledge Council cannot be confident that the decisions it makes regarding the assets are in the best interests of the community.

Asset Inventory

A good asset register is the foundation for enabling most asset management functions. To be able to operate and maintain the assets, staff need to be able to locate and identify them. To accurately value assets, sufficient data is needed to calculate replacement cost (e.g. size, type) and remaining life (age, expected life, condition). Council is also beginning to gather data on maintenance history and costs to support lifecycle optimisation and increase knowledge of the probability and consequence of asset failure for risk management purposes.

Council uses Technology One Enterprise Suite software to manage its asset data. The system includes an asset register that is fully integrated with the financial and work management modules allowing all work to be captured against the assets affected. The system also allows for defects to be listed against an asset and work orders to be generated from these, aiding in the collection of long term life cycle cost data. All assets, defects and work orders can also be linked directly to the GIS mapping system to allow accurate location information to be included.

An asset data model provides a framework to structure and store asset data in an information system, segmenting an asset base into appropriate classifications. Inverell Shire Council has developed a hierarchical inventory structure for its road assets that groups them based on their function and their geographic location within the road network. The structure is outlined in Figure 1.

At the top level of the inventory structure, known as the "asset class", is the *Road*. This encompasses all of the assets along a route with a common Road Name, Road ID and management arrangement i.e. Local, Regional or State. Under this is the "asset group" level of individual road *Segments* which are numbered sequentially along the road.

Segments are based on uniformity of purpose, construction type, traffic volumes and topography and contain all of the assets for a given distance along a road. They are described based on their construction type and are

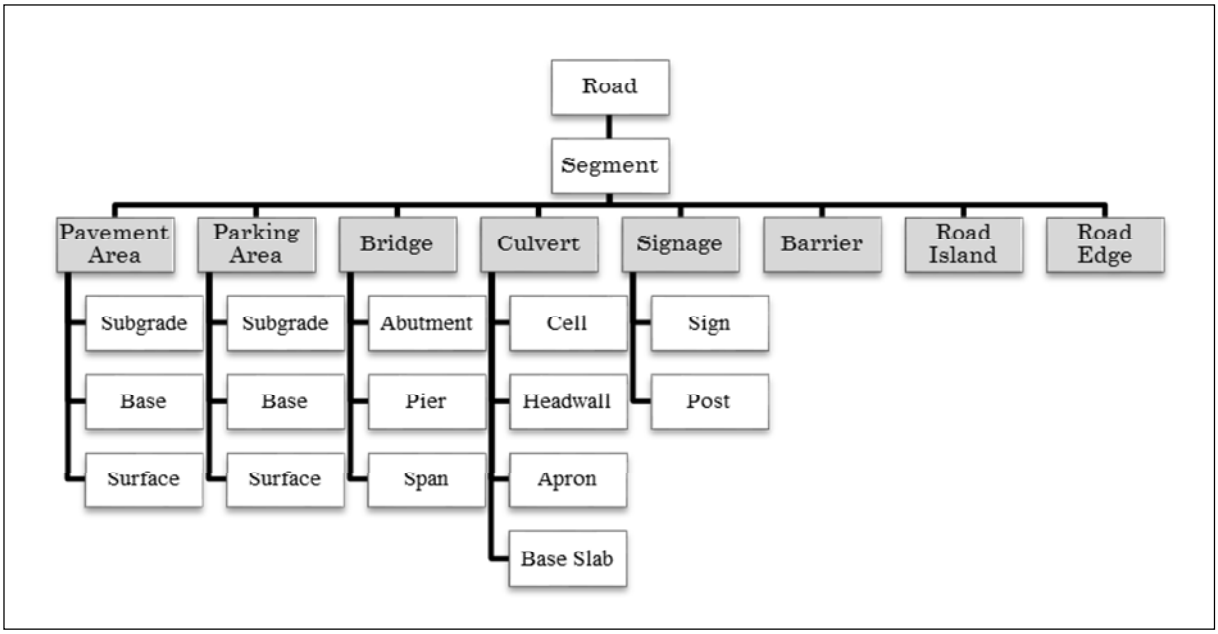

FIGURE 1 : ROAD ASSET INVENTORY STRUCTURE

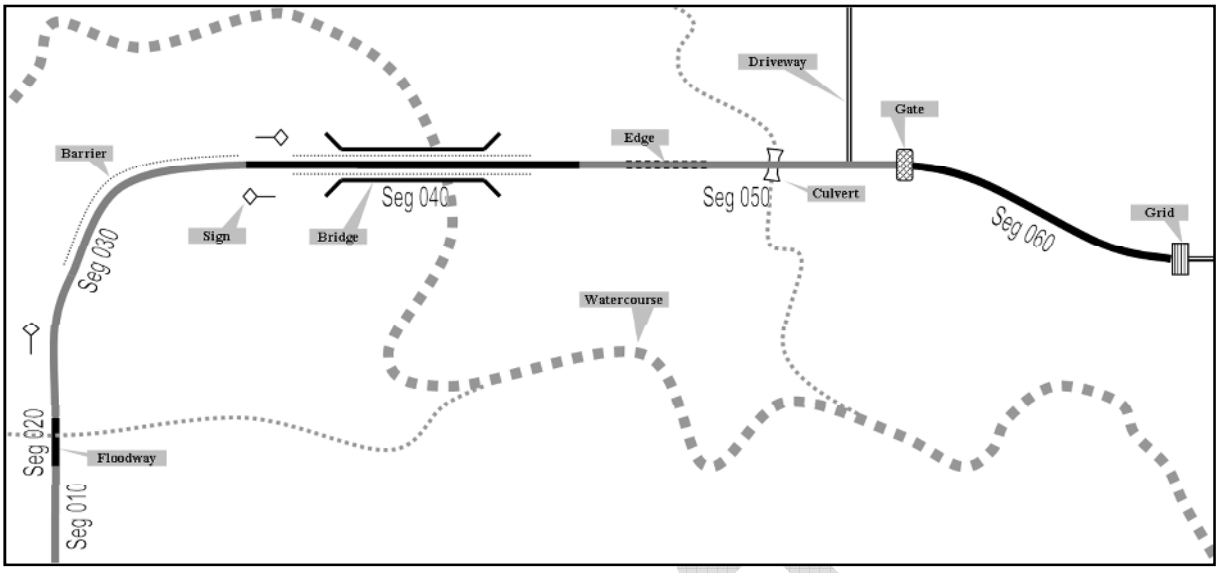

FIGURE 2 : ASSET STRUCTURE EXAMPLE

classed as Sealed Road, Unsealed Road, Floodway, Bridge or Major Culvert. Major Culverts are segments that include a culvert with a road centreline length greater than six metres (from wingwall to wingwall). These culverts are managed and included in the asset register as bridges.

An individual segment can contain a number of other assets and asset categories, for example the Bridge Segment (Seg 040) in Figure 2 contains the *Pavement Area* at each approach, the *Bridge* structure itself, the *Signage* at the end of the bridge and the *Barriers* on either side. Each segment contains a number of assets that may be categorised based on their function, for instance the *Subgrade*, *Base* and *Surface* of the **traffic lanes** of a road are grouped together under the "asset category" *Pavement Area* while the same assets for the **on street parking** areas of that same road are group separately under *Parking Area*.

Each category may contain many or none of each of the individual assets, for example an Unsealed Road would not contain a surface asset, while Signage may include two posts and a culvert may contain several cells.

The type and size of the assets that make up the road network are shown in Table 2 .

Asset Type	Size	Value (000s)
Sealed Road Surfaces	5,515,445m^2	$20,659
Sealed Road Bases	5,463,068m^2	$121,318
Unsealed Road Bases	6,356,341m^2	$43,223
Concrete Road Bases	64,968m^2	$14,829
Signage	7,380	$2,443
Road Islands	6,683m^2	$1,634
Culverts	4,084	$54,907
Bridges	182	$52,394
Barriers	3,620m	$469
Off Street Car Parks	86,409 m^2	$3,308

TABLE 2 : ROAD ASSETS INVENTORY

Road Asset Class Hierarchy

All road segments are classified according to a hierarchy that takes into account their specific function, types of users and user numbers. The hierarchical classification is used to assist in prioritising works programs and to develop intervention levels and response times to remedy defects. The classifications for roads covered by this plan are outlined in Table 3.

The "State Highway" and "Main Road" classifications are the same as those used under the Roads Act. These types of roads are known as "Classified Roads" after having been the subject of a declaration order in the government gazette.

Classification	Definition	Code
State Highway	Roads classified under section 47 of the *Roads Act 1993* that have a Legal Class of Highway as legally described by Declaration Order in the Government Gazette. Whilst these roads are owned by Council, they are in practice maintained, controlled, funded and accounted for by Roads and Maritime Services (RMS) and are included for reference only.	HW
Main Road	Roads classified under section 46 of the *Roads Act 1993* that have a Legal Class of Main Road as legally described by Declaration Order in the Government Gazette. These roads are owned and operated by Council but are subject to funding from Roads and Maritime Services.	MR
Rural Arterial	Rural roads carrying high to moderate volumes of traffic and connecting local areas to regional roads or providing access from neighbouring shires into Council's rural areas. Roads identified by the community as being important for economic, environment or social reasons.	R1
Rural Collector	Rural roads carrying moderate volumes of local and commercial traffic and connecting local areas to arterial roads in Council's rural areas.	R2
Rural Access	Rural roads carrying low to moderate volumes of local traffic. Their primary function is to provide access to agricultural properties within Council's rural area.	R3
Rural Minor	Rural roads carrying low to very low volumes of local traffic. These roads generally provide limited residential and minor commercial access to one or two rural homesteads.	R4
Urban Arterial	Urban roads carrying high traffic volumes including commercial vehicles and providing the principal routes for vehicles in and around the major urban areas. Roads identified by the community as being important for economic, environment or social reasons.	U1
Urban Link	Urban roads carrying high to moderate volumes of traffic and providing a link between local areas in Council's urban areas.	U2
Urban Collector	Urban roads carrying moderate volumes of traffic and connecting local areas to link and arterial roads in Council's urban areas.	U3
Urban Access	Urban roads carrying mainly local traffic. Their primary function is to provide access to private properties but also provide for some through traffic.	U4
Urban Minor	Urban roads carrying only small volumes of local traffic. Mostly made up of urban laneways and small service roads.	U5

TABLE 3 : ASSET CLASS HIERARCHY

Outside of the above classifications, Council is also responsible for a number of roads that receive no scheduled maintenance. These are the formed and unformed tracks traversing the many council controlled road reserves throughout the Shire (often called paper roads), which are not included on the Shire's asset register and are not managed by this plan.

In order to determine the classification of a given road Council follows a procedure designed to take into account the current and future uses of the road and to decide how much of a social, economic and environmental benefit that road provides to the community.

This involves considering a number of aspects of service delivery such as:

- The road's purpose in relation to other roads in the area,
- the number and types of properties using the road to access the network,
- whether the road is used as a bus route or heavy vehicle route,
- how much traffic uses the road daily,
- whether the road provides access to an area of social, environmental or economic significance
- any predicted future change to the above aspects

Condition Profile

Inverell Shire Council rates the condition of its assets on a one to five scale in line with the uniform grading framework adopted as part of the NSW Government's integrated planning and reporting reforms.

The condition rating system reflects the performance, integrity and durability of the principal components of each asset. The assessment of the nature and extent of defects for each component type is included in Council's Asset Condition Inspection Manual (Appendix A) which provides examples for each condition rating and a weighting system to calculate an overall condition state for each structure or segment type. The condition states have been developed to align with Austroads, RMS and ISO standards where available.

While specific quantifiable indicators are used to assess each component's condition state, all states are closely aligned to the general descriptions outlined in Table 4

Within the useful life of an asset, the condition may fluctuate from one condition state to another. Judgment is exercised to determine whether the condition of an asset has changed to such an extent as to justify assigning a new condition state for the asset.

If an asset's condition state improves, one of the following must have occurred:

a) The original evaluation of condition level was incorrect, or
b) Works of a capital nature were carried out on the asset improving its condition. (Any such works should be capitalised and added to the value of the asset).

It must be recognised that it is possible for an asset to move to a non-adjacent condition state between valuations, either as a result of major works or as a consequence of deterioration over a valuation period.

Rating	Status	Definition
1	Excellent	No work required Asset/Component is in as new condition. Normal maintenance required but no deterioration identified.
2	Good	Only minor maintenance work required Provides a good level of service with some maintenance required. Deterioration identified but renewal not yet required.
3	Fair	Maintenance work required Still meets of level of service requirements but requires regular ongoing maintenance and minor repairs.
4	Poor	Renewal required Level of service impaired..
5	Very Poor	Urgent renewal/upgrading required. Asset/Component no longer provides required level of service. End of useful life.

TABLE 4 : CONDITION RATING GENERAL DESCRIPTIONS

Current Condition

In late 2014 Inverell Shire Council carried out a comprehensive, class-wide inspection and condition assessment program for all road infrastructure assets. This data was collected by expert independent inspectors and will act as a baseline against which we can compare our future condition inspection results.

While the current condition profile in Figure 3 shows that Council has generally kept its assets in good condition, there is an identified backlog of renewal work that is required to be completed to ensure that some of our aged assets meet the community's expectations.

Council's Long Term Financial Plan and Fit for the Future Roadmap provide for significant renewals and upgrades over the life of this plan (see the ***Renewing and Expanding the Road Network*** section of this plan, pp.26-28 for details).

Inverell Shire Council regularly collects condition information as part of its routine

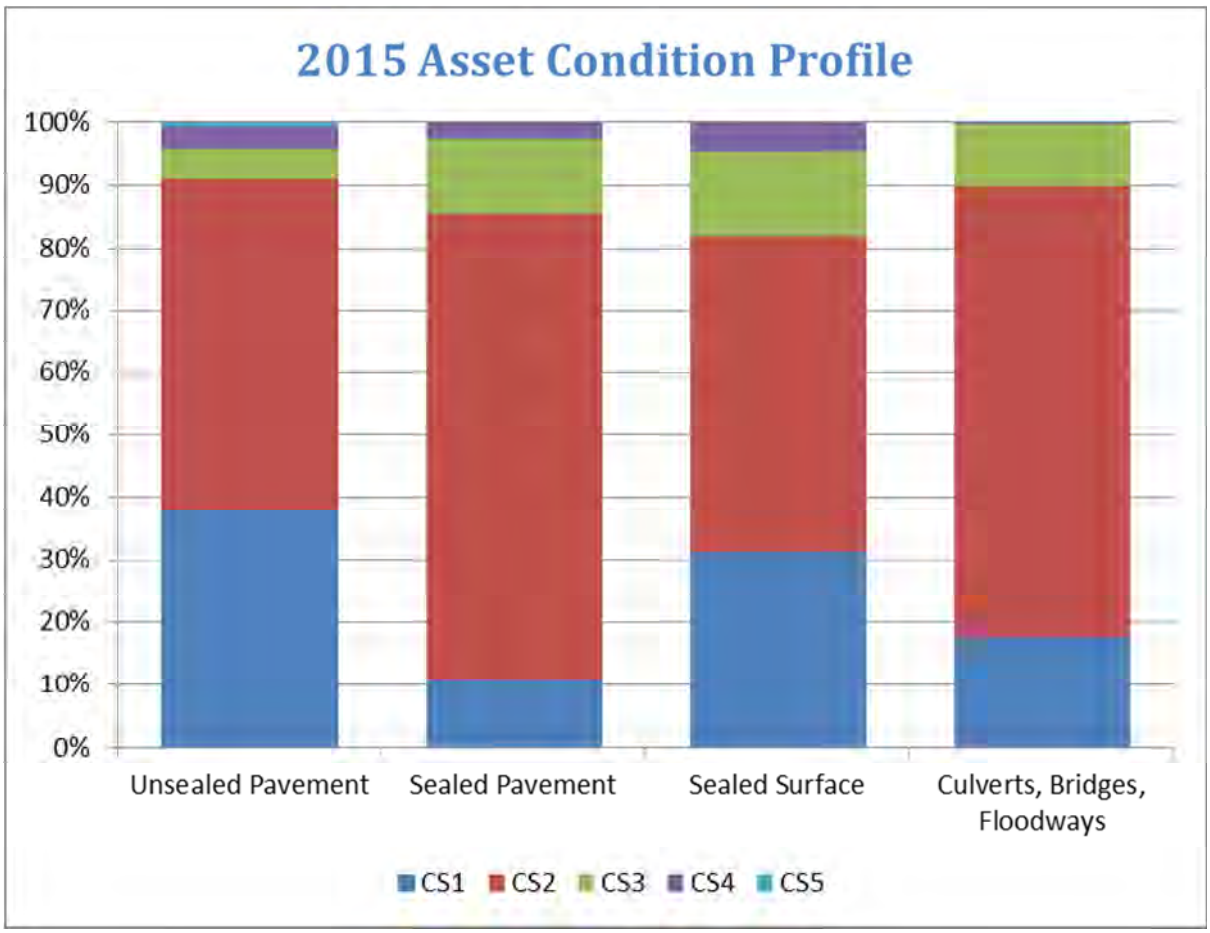

FIGURE 3 : 2015 ASSET CONDITION PROFILE

maintenance inspection program and these condition profiles will be updated as information becomes available. For more information on the inspection program see the ***Operating and Maintaining the Network*** section of this plan.

Projected Condition

The Useful Life of an asset is the period over which it is expected to provide a service to the community. It is the estimated or expected time between placing the asset into service and removing it from service, or the estimated period of time over which the future benefits embodied in an asset, are expected to be consumed by the community.

The actual time between commissioning a new asset and disposing of it will vary significantly within each class, but for the purpose of this plan Council has adopted the useful lives shown in .

Asset Type	Useful Life
Road Subgrade	Infinite
Sealed Road Base	75 years
Sealed Road Surface	25 years
Unsealed Road Base	50 years
Concrete Road Base (Floodways)	100 years
Road Signs	20 years
Road Islands (Roundabouts etc)	40 years
Culverts	100 years
Bridges	100 years
Road Barriers (Guardrail)	70 years
Off Street Car Parks	100 years

TABLE 5 : USEFUL LIVES OF ROAD ASSETS

Both the adopted useful lives and the degradation methods are considered approximations and will be updated and improved as more asset information becomes available.

It is vitally important that Council recognise that its assets have finite useful lives and to ensure

that their replacement is planned for. This is implemented in the ***Renewing and Expanding the Road Network*** section of this plan.

If the Long Term Financial Plan renewal identified in that section of the plan is expended on the assets as suggested, the condition profile of the assets in 2026 at the end of this plan should closely resemble Figure 4

Ongoing condition assessment of all asset classes will ensure that up to date information is provided to plan for condition forecasting as the assets age and the level of service they provide begins to decline. This plan will be monitored and updated to ensure that changes are reflected when condition information is reviewed each year.

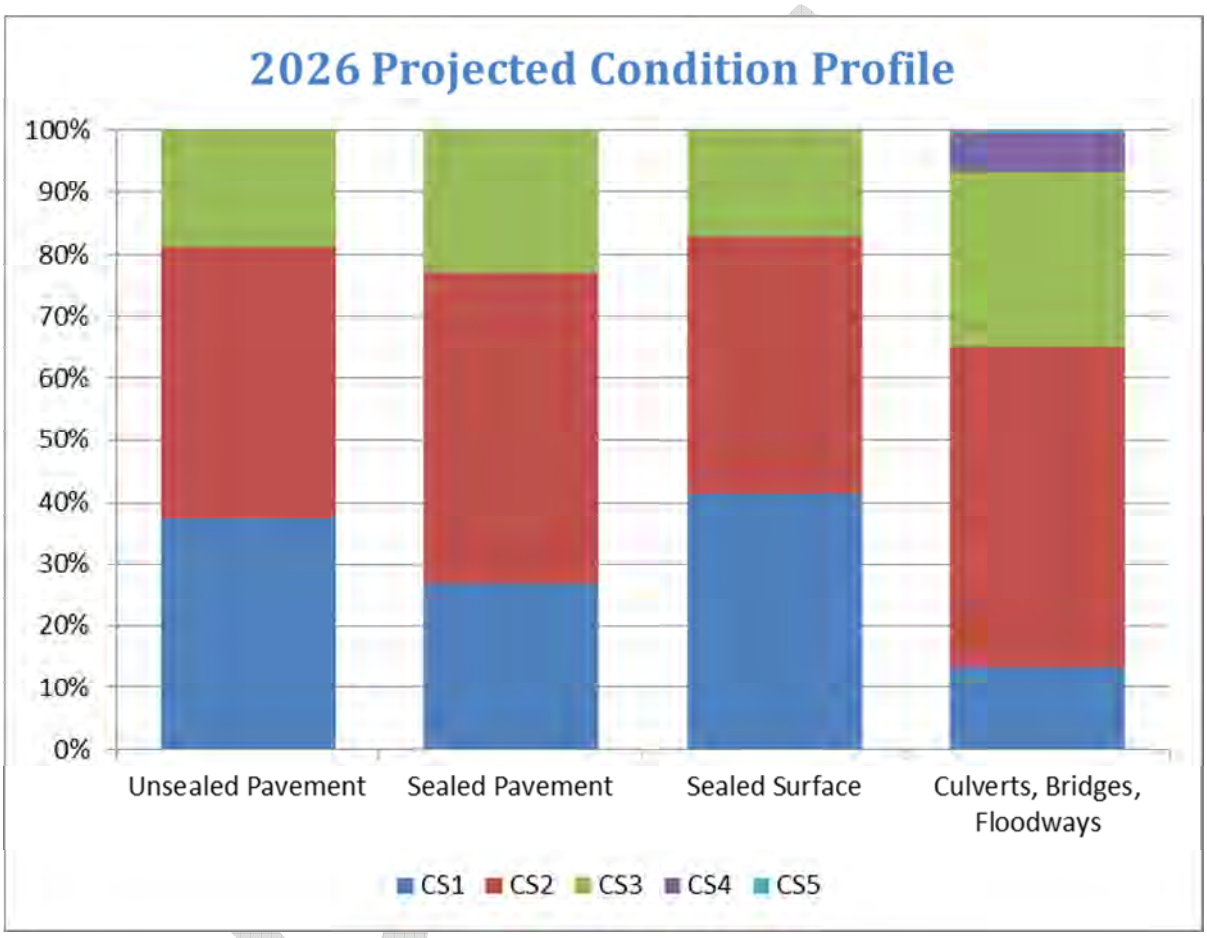

FIGURE 4 : 2026 PROJECTED ASSET CONDITION PROFILE

Setting Standards & Measuring Performance

A key objective of asset management is to match the standard of service the organisation provides with what the community expects. To ensure we are meeting the expectations of our community it is important for Council to describe what level of service we intend to deliver and then to measure both what we have done to deliver that service and how well our community has received the service.

Statutory Requirements

Statutory requirements often set the framework for minimum levels of service that infrastructure is required to meet. The following legislative instruments and torts are relevant to this asset management plan.

Roads Act 1993

The Roads Act 1993 set out the general principles for road management arrangements in New South Wales. Under the act Inverell Shire Council is the roads authority for all public roads within its Local Government area, except for any freeway, Crown public road, or any public road declared to be under the control of some other authority. The public roads are vested in fee simple in the Council.

Tort of Negligence and the Civil Liability Act 2002

The elements of the law of torts are concerned with the accidental injury to person and property. Negligence, essentially, is the failure to take care against unreasonable risk of foreseeable injury to others.

Prior to 2001, Councils had relied upon a common law principle that highway authorities benefitted from immunity to negligence by nonfeasance. In effect, an authority could not be found liable only because they had failed to take positive steps to remove a risk (an omission by the defendant, for example not repairing a pothole). The High Court's decision in Brodie v Singleton Shire Council and Ghantous v Hawkesbury City Council on 31 May 2001 removed this long-standing immunity.

The liability of highway authorities in cases of nonfeasance has since been determined by the application of the general negligence principles.

The common law principles governing negligence liability were then reformed by the Civil Liability Act 2002 (NSW). It alters the common law by requiring a greater degree of probability in determining whether there is a foreseeable risk of harm to which a reasonable person would have responded. In addition, the legislation lists four factors that should be considered amongst other relevant things:

- probability of the risk of injury
- gravity of the harm
- burden of eliminating the risk
- utility of the defendant's conduct.

To ensure the above requirements are met, Council takes a proactive approach to ensuring that the service provided does not present a significant risk of injury, loss or damage to the public. This includes carrying out a regular inspection programme and planning to respond to identified defects within a reasonable timeframe, depending on the risk they present. This is implemented in the ***Operating & Maintaining the Road Network*** section of this plan.

Levels of Service

Levels of service are a key business driver and influence all of Inverell Shire Council's asset management decisions. Level of service statements describe the outputs we intend to deliver to the community in relation to services attributes such as function, capacity, safety and cost effectiveness. Council has adopted the following level of service for its road assets.

Inverell Shire Council will provide road network that:

- is adequate for the expected volume and type of traffic;
- is well connected, well designed and free flowing;
- provides a comfortable ride and is safe for its users; and
- is economically, socially and environmentally sustainable.

Each of the above statements is supported by one or more performance measures that indicate how successfully we are delivering on that commitment.

Council has defined performance measures in two terms, Community Performance Measures and Technical Performance Measures. Each measures a different aspect of the provision of the service and used together they give Council and the Community a good indication as to how well each of the service statements are being provided.

Community Performance Measures

Community performance measures relate to how the community receives the service in terms of the expectations listed above. These are generally measured using metrics relating to the number of complaints received, time to respond and overall satisfaction with the aspects of the service measured by surveying the community.

Community satisfaction surveys have not yet been implemented but will be developed in the first year of the plan (See Improvement Plan action 1.1). Council's performance against these measures will be reported back to the community annually.

Technical Performance Measures

Supporting the community performance measures are technical performance measures developed to measure how Council provides the service. These focus on the technical aspects of service provision such as cost effectiveness, condition and compliance with technical standards and specifications.

Council's performance against these measures is to be reported annually to the Civil and Environmental Services Committee.

Desired Levels of Service

Desired levels of service are used to indicate what service the community would like to receive from the assets in the future. This allows Council to work toward providing a better service from the road assets over the life of the plan.

Council will consult with the community during the plan to determine whether the services are meeting the community's expectations and to develop desired levels of service should they fall short (See Improvement Plan action 1.2).

Level of Service	Performance Measure process	Performance Target	Current Performance
The road network is adequate for the expected volume and type of traffic.	Community complaints or requests received regarding capacity of network	Less than 1 per 100km per annum	Zero
	Community satisfaction with network capacity as per survey	85% satisfied	Not yet available
The road network is well connected, well designed and free flowing	Community complaints or requests received regarding network design, connectivity or flow	Less than 1 per 100km of rural road per annum	Zero
		Less than 5 per 100km of urban road per annum	1.4 per 100km
	Community satisfaction with network design, connectivity and flow as per survey	85% satisfied	Not yet available
The road network provides a comfortable ride and is safe for its users	Community complaints or requests received regarding poor ride	Less than 10 per 100km of unsealed road per annum	8.25/100km
		Less than 2 per 100km of sealed road per annum	
	Community satisfaction with ride quality as per survey	85% satisfied	Not yet available
	Community complaints or requests received regarding road safety	Less than 10 per 100km per annum	1.5/100km
	Community satisfaction with network safety as per survey	85% satisfied	Not yet available
	Number of accidents reported by Centre for Road Safety	Less than 0.2 fatal accidents per 1000 population per annum	0.06 per 1000 population
		Less than 5 nonfatal accidents per 1000 population per annum	2.37 per 1000 population
The road network is economically, socially and environmentally sustainable.	Community satisfaction with sustainability as per survey	85% satisfied	Not yet available
	Community complaints or requests received regarding sustainability	Less than 1 per 100km per annum	0.05/100km

TABLE 6 : COMMUNITY PERFORMANCE MEASURES

Level of Service	Performance Measure process	Performance Target	Current Performance
The road network is adequate for the expected volume and type of traffic.	Proportion of Level 2 inspections returning a fair overall rating	80% of Level 2 inspections return an overall rating of fair or better.	Not Yet Available
The road network is well connected, well designed and free flowing	Proportion of traffic surveys in which less than 10% of vehicles experience headway of less than 4 seconds	More than 90% of surveys taken	97.5% of surveys
	Proportion of traffic surveys in which the 85th percentile speed is found to be more than 10km below the posted limit or design speed of the segment.	Less than 10% of surveys taken	4.2% of surveys
The road network provides a comfortable ride and is safe for its users	Proportion of routine Level 1 inspections returning a fair overall rating.	80% of Level 1 inspections return an overall rating of fair or better.	Not yet available
	Time to respond to identified defects	Adopted response times met 90% of the time.	Not yet available
	Average roughness rating as per roughness surveys.	80% of roughness surveys on unsealed roads return IRI of less than 9	100% surveys less than 9 IRI
		80% of roughness surveys on sealed roads return IRI of less than 4	91.7% surveys less than 4 IRI
The road network is economically, socially and environmentally sustainable.	Network operating cost change compared to Local Government Cost Index (LGCI)	Cost to operate network does not exceed previous year by more than LGCI.	Unknown

TABLE 7 : TECHNICAL PERFORMANCE MEASURES

Planning for the Future

This section of the Road Asset Management Plan attempts to predict future demand for services in order to identify the most effective means of managing that demand. This allows Council to make optimised decisions regarding its asset investment proposals.

It is important to note that demand forecasts are often proven wrong given the passage of time. Influences on demand such as changes in government policy, technological advances and community preferences cannot be predicted with certainty over long periods. As a consequence, assumptions made about factors may change between and during the development of forecasts. Assumptions are often based on judgements that consider past performance and the likelihood of future change. Therefore the following forecasts should be treated with some caution and taken as possible future outcomes rather than definitive statements. Any assumptions essential to the following forecasts have been noted for each factor considered

Population

Perhaps the most commonly understood factor influencing demand is population change. It is generally the key driver for growth in all areas and drives demand for services provided by Council and, in turn, the number and type of assets that are required to provide these services.

Population projections for the Inverell Shire local government area are outlined in Table 8 and Table 9. The NSW Department of Planning and the Environment predicts that the Shire's population will grow modestly to 2031.

The number of vehicles per person using the road network reached a peak in 2005 (Bureau of Transport and Regional Economics, 2012) therefore future growth in traffic volumes is expected to be at the same rate as the population change above.

The less than one per cent predicted growth per annum is expected to have little impact on Inverell Shire Council's roads due to the significant capacity available throughout the network.

Higher Mass Vehicles

Total domestic road freight has grown six-fold over the last four decades, from around 27 billion tonne kilometres in 1971 to over 180 billion tonne kilometres in 2007. (A tonne kilometre is one tonne of freight moved one kilometre.) Over that period the average productivity of road freight vehicles - that is, the freight carried per registered freight vehicle, including light commercial vehicles - has more than doubled. As a result, the 2007 road freight task required half as many vehicles as would have been required in the absence of productivity growth.

Totals:	2011	2016	2021	2026	2031
Total Population	16,600	17,200	17,750	18,200	18,600
Total Households	6,700	7,050	7,350	7,650	7,900
Average Household Size	2.44	2.39	2.36	2.33	2.30
Implied Dwellings	7,600	8,000	8,350	8,650	8,950

TABLE 8 : POPULATION PROJECTIONS (NSW DEPARTMENT OF PLANNING AND THE ENVIRONMENT, 2014)

Change	2011 to 2016	2016 to 2021	2021 to 2026	2026 to 2031
Total Population Change	600	550	500	400
Average Annual Population Growth	0.7%	0.6%	0.5%	0.4%
Total Household Change	350	300	300	250
Average Annual Household Growth	1.1%	0.9%	0.7%	0.7%

TABLE 9 : POPULATION CHANGE (NSW DEPARTMENT OF PLANNING AND THE ENVIRONMENT, 2014)

Modelling suggests that future heavy vehicle productivity growth is likely to be more subdued. Fleet-wide heavy vehicle average loads are likely to increase by less than 5 per cent between 2010 and 2030, which contrasts sharply with the 40 per cent growth in average loads over the past two decades.

Increased uptake of higher productivity vehicles is likely to have a relatively small impact on national heavy vehicle productivity since freight that can take advantage of these larger vehicles represents less than 20 per cent of total road freight.

With the Australian road freight task projected to nearly double between 2010 and 2030, slower future freight productivity growth implies significant increases in the number of heavy vehicles to meet the projected future freight task (Bureau of Transport and Regional Economics, 2011).

Agricultural Practices and Land Use

There is a general trend in Australia toward aggregation of small farms into larger holdings, greater production intensity and increased use of larger farm equipment that has more mobility between holdings (Productivity Commission, 2005). Larger farm equipment moving between holdings and increasingly intensive production methods are likely to place greater strain on Council's rural road network causing an increase in maintenance and in some cases the need for upgrades to the road surface. The aggregation of smaller farms may lead to fewer property access roads being required however the effect is expected to be minimal and largely offset by more intensive production driving greater output from the farms.

Climate Change

One of the ways climate change will impact the road network is through the predicted change in rainfall in the region. The consensus according to the CSIRO is that the region will experience little change or slightly less annual rainfall to 2030.

Adding water to unsealed road pavements is an important part of their maintenance and decreased rainfall is expected to place further burdens on road grading activities as locating sufficient water will become more difficult. Should further prolonged droughts be experienced as expected, water may have to be carted in from long distances, increasing costs and eventually forcing some unsealed roads to receive only "dry" grades. This has the potential to lead to an increase in the number of grades required to keep a road reasonably trafficable or a lower level of service being provided to those roads as the surface deteriorates more quickly.

The life of bituminous surface treatments is affected by ambient temperature. An increase in temperature will accelerate the rate of deterioration of seal binders and require earlier surface dressings/reseals, which could lead to higher renewal costs

Although climate change is expected to reduce the average annual rainfall in the region, the Garnaut Climate Change Review found that:

"… the future precipitation regime may have longer dry spells broken by heavier rainfall events" (Garnaut, 2008, p. 115)

More intense rainfall events are likely to lead to greater riverine flooding which could have a significant impact on infrastructure located in the flood hazard area, especially the bridges and culverts crossing watercourses throughout the shire. Council needs to consider this when planning to replace or expand its network.

More information will be available about the expected effect of climate change on rainfall when Engineers Australia releases the update to Australian Rainfall and Runoff.

Availability of local gravel

Inverell Shire Council regularly extracts in excess of 100,000 tonnes of gravel from quarries within the Shire each year.

Finding sufficient, good quality gravel to meet road construction demands is becoming

increasingly difficult as current reserves are becoming exhausted and exploration for new sources has been difficult to undertake. In the long term it is anticipated that Council will have to undertake significant expansion of its gravel supply chain to keep up with demand or face increasing cost to haul gravel further distances.

Bitumen Price

As bitumen can only be effectively manufactured from a relatively small number of crude oils, bitumen supply and cost will be greatly influenced in the future by the worldwide availability of suitable crude oils.. In general, within the life of this asset management plan, an expectation of increased oil prices and ultimately of diminishing oil supply will occur.

In the short to medium term and as a consequence of the above, the approaches proposed for managing the future increased costs of bitumen are:

(i) adopt as much re-cycling of bitumen surfacings and pavements as practical;
(ii) extend the life of bitumen surfacings and pavements as much as possible; and,
(iii) replace the use of bitumen surfacings and pavements as much as possible with alternative materials in the longer term

These approaches will need the strengthening of technical expertise to adapt to the re-cycling and extension of existing bitumen surfacings and the sound evaluation of alternative surfacings (Austroads, 2010).

Property Development

Expansion of the urban road network is often driven by property development such as the release of new subdivisions. Developers are required to construct roads which become Council assets either as soon as they enter service or at the end of a maintenance period, depending on the conditions of the development approval.

The most recent exercise in demand forecasting was completed for the 2009 Living Lands Strategy(LLS).

This strategy predicted annual yields of 32 residential lots per year based on historical data. This is unlikely to add significant burden to ongoing maintenance and replacement budgets.

The LLS also noted that during the period 1998-2009 there was a larger increase in the number of rural residential lots than residential and while it did not predict future growth for rural residential land development, it is noted that between 1998 and 2008 there were an average of 39 new rural residential lots created per year.

Substantial ongoing rural residential development could hamper cost recovery in the future as population densities decline and Council is left managing a larger road network.

Operating & Maintaining the Road Network

Maintenance is the regular on-going work that is necessary to keep assets operating. Maintenance does not increase the service potential of an asset or keep it in its original condition; it slows down deterioration and delays when rehabilitation or replacement is necessary. This part of the plan details the specific maintenance activities Council will undertake to keep its road assets performing to the required level of service.

Inspections

Inspections are formalised assessments undertaken to identify defects and hazards as well as to assess the overall condition of the assets. They are carried out both in response to requests by the community and as part of a regular inspection programme by knowledgeable, skilled personnel. The result of routine inspections, as well as information relating to the speed and quality of Council's response to identified hazards, is to be presented to the Council's Civil & Environmental Services Committee on an annual basis. Council carries out a three level inspection regime as detailed below.

Level 1 – Routine Maintenance Inspections

Routine Maintenance Inspections are visual inspections to check the general serviceability of the asset, particularly for the safety of users, and to identify emerging issues. They may be carried out in conjunction with routine maintenance of the asset.

Level 1 inspections provide a check of the asset inventory held in the Register, identification of any hazards or defects present and may recommend a Level 2 inspection be carried out if warranted by observed distress or unusual behaviour of the asset.

Defects or hazards identified during these inspections are either programmed for response during planned maintenance or responded to immediately via reactive maintenance, depending on the risk they present and the relative importance of the component in the asset hierarchy. The results are also collated for later reporting and to aid in decision making. Each defect is rated according to its severity.

The inspector collects information on the severity and extent of each defect which is passed on to the relevant supervisor for action. The supervisor rates each defect subjectively based on his knowledge of the road, its traffic and its maintenance and defect history.

Council carries out routine inspections on all of its maintained road assets every six months.

Design and safety

In addition to identifying defects and hazards in the road network inspectors also take note of any instance where a road asset no longer meets the required standards for design and safety. These are noted during routine inspections and used to inform programmed maintenance as well as the renewal decision making process outlined in the ***Renewing and Expanding the Road Network*** section of this plan.

Level 2 – Condition Inspections

Condition Inspections assess and rate the condition of the assets. This information is used as a basis for assessing the effectiveness of past maintenance treatments, identifying current maintenance needs, modelling and forecasting future changes in condition and estimating future budget requirements.

Level 2 inspections are much more detailed than Level 1 inspections. The inspections measure the extent and severity of defects in the asset as well as the general condition of the asset overall.

The condition rating system reflects the performance, integrity and durability of the principal components of each asset. The assessment of the nature and extent of

defects for each component type is included in Council's Asset Condition Inspection Manual (Appendix A) which provides examples for each condition rating and a weighting system to calculate an overall condition rating for each structure or segment type. The condition ratings have been developed to align with Austroads, RMS and ISO standards where available

Inspections are programmed to target 20% of all assets each financial year to ensure that every asset is subject to a Level 2 inspection at least every five years. The results of the Level 2 inspections are used to give an indication of the condition of the entire network which is used to assess the performance of the maintenance budget and is reported in the annual report each year.

Level 3 – Detailed Engineering Inspections

A Detailed Engineering Inspection is an extensive inspection which may include physical testing and structural analysis to assess the assets structural integrity, to identify and quantify the current and projected deterioration of the asset and to assess appropriate management options.

Level 3 inspections must be carried out by an experienced and qualified engineer and are usually completed as a result of a recommendation in a Level 2 inspection report which has rated the asset in poor or very poor condition or raised significant concerns about its continued performance. Level 3 inspections may also be necessary in order to provide a load rating for a structure or to assess the condition of an asset prior to carrying out programmed works such as rehabilitation, reconstruction or widening.

The inspecting engineer will provide a written report of the results of a Level 3 Inspection to the Director Civil and Environmental Services with a copy to the Manager Civil Engineering within 60 days of the inspection. The report may include assessments of load capacity and condition, recommendations for further testing, remedial action and future inspection and monitoring or a complete "Structure Management Plan" for individual structures as deemed necessary by the inspecting engineer or as requested by management.

Routine Maintenance

Routine maintenance includes regular maintenance activities such as light grading and grass cutting along with cyclical maintenance activities such as heavy grading and gravel patching.

Unsealed Roads

Routine maintenance of unsealed road pavements generally consists of two major activities:

- Patrol maintenance comprises light grading to smooth road surfaces, restoring crossfall, clearing blocked drains and culverts, and the restoration of signs and roadside furniture.
- Periodic or cyclical maintenance comprises heavy formation grading, gravel patching, pavement re-compaction, reshaping of cross sections and restoration of drainage systems – cleaning, replacing, scour checks etc.

Sealed Roads

Routine maintenance of sealed roads consists of several activities for each of the assets present in the segment:

- the bituminous surface – pothole patching, crack filling/sealing, sweeping, surface correction, minor sealing, and debris clearing
- the pavement – excavating and replacing, scarifying and reshaping, minor stabilising (patching)
- surface drains – Reshaping of cross sections and restoration of drainage systems - cleaning, replacing, scour checks etc.
- culverts, pipes, pits, subsoil drains, flood-ways – cleaning, repairing
- vegetation/roadside – mowing, slashing, trimming, litter collection, sweeping, repairs to retaining structures

- signs and road furniture – cleaning, repairing, replacing, painting
- pavement markings – repainting, replacing

Council's Maintenance and Operations Budget is included in Appendix B

Reactive Maintenance

Maintaining Council's roads through regular investment is the most effective way to preserve the condition of the assets and reduce the risk of defects occurring and intervention becoming necessary. However, even with regular investment, defects will occur; reactive maintenance refers to works that are carried out as a matter of urgency, usually to repair these defects for reasons of safety.

When responding to defects with reactive maintenance Council takes a safety first approach. Where there are clear implications for public safety we will act to allay the danger. Where danger is not implicit we will balance our actions and responses against other criteria and priorities as set out in this plan

In order to prioritise reactive maintenance Council takes a risk management approach when identifying and responding to defects. An inspector collects information on the severity and extent of each defect which is passed on to the relevant supervisor for action. The supervisor takes the extent and severity into account and rates each defect based on those factors and their knowledge of the road, its traffic and its maintenance and defect history. The defects are rated based upon the risk they present as per Table 10.

Rating		Action Required
L	Low	Managed by routine procedures
M	Medium	Planned action required
H	High	Prioritised action required
VH	Very High	Immediate corrective action required

TABLE 10 : DEFECT RISK RATINGS

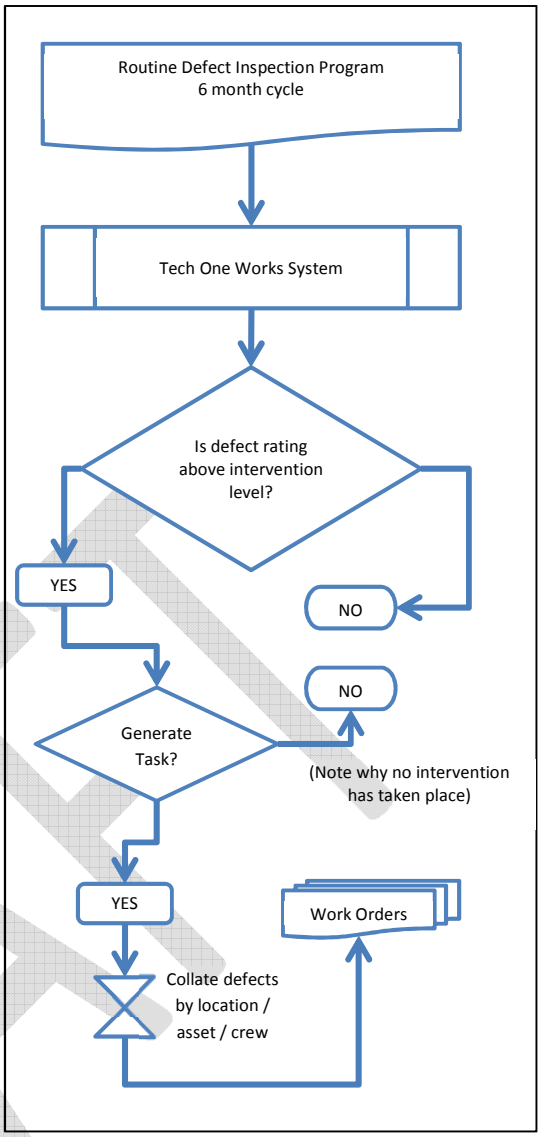

FIGURE 5 : REACTIVE MAINTENANCE PROCESS

Depending on the risk rating applied to the defect the supervisor then either adds it to the defect history of the asset to be monitored, adds it to the routine maintenance program or prepares a work order to immediately rectify the problem or reduce the risk. The process is outlined in Figure 5.

Which course of action is chosen along with the time allowed to respond to the defect is dependent on the defect's risk rating and the asset's hierarchical classification as outlined in Table 11 and Table 12.

Council's performance in responding to identified defects within the adopted timeframe is measured and will be reported annually to Council's Civil and Environmental Services Committee.

Risk Rating	Action	Class	Response Time
L	Consideration should be given as to whether action needs to be taken	U1	As resources permit
		U2	As resources permit
		U3	As resources permit
		U4	As resources permit
		U5	As resources permit
M	Programme into maintenance works	U1	4 weeks
		U2	6 weeks
		U3	8 weeks
		U4	As resources permit
		U5	As resources permit
H	Make safer	U1	2 working days
		U2	2 working days
		U3	2 working days
		U4	1 week
		U5	2 weeks
	Effect repairs (either temporary or permanent	U1	2 weeks
		U2	4 weeks
		U3	4 weeks
		U4	6 weeks
		U5	6 weeks
VH	Make safe	U1	4 hours
		U2	4 hours
		U3	1 working day
		U4	1 working day
		U5	1 working day
	Effect immediate repair or replacement	U1	1 week
		U2	1 week
		U3	2 weeks
		U4	4 weeks
		U5	4 weeks

TABLE 11 : DEFECT RESPONSE TIMES URBAN ROADS

Risk Rating	Action	Class	Response Time
L	Consideration should be given as to whether action needs to be taken	MR	As resources permit
		R1	As resources permit
		R2	As resources permit
		R3	As resources permit
		R4	As resources permit
M	Programme into maintenance works	MR	4 weeks
		R1	6 weeks
		R2	8 weeks
		R3	As resources permit
		R4	As resources permit
H	Make safer	MR	2 working days
		R1	2 working days
		R2	2 working days
		R3	1 week
		R4	1 week
	Effect repairs (either temporary or permanent	MR	2 weeks
		R1	4 weeks
		R2	4 weeks
		R3	6 weeks
		R4	6 weeks
VH	Make safe	MR	4 hours
		R1	4 hours
		R2	4 hours
		R3	1 working day
		R4	1 working day
	Effect immediate repair or replacement	MR	1 week
		R1	2 weeks
		R2	2 weeks
		R3	4 weeks
		R4	4 weeks

TABLE 12 : DEFECT RESPONSE TIMES RURAL ROADS

Renewing and Expanding the Road Network

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

When deciding whether an item of expenditure is to be capitalised Council refers to the decision tree in the CPA publication *Valuation and Depreciation - A guide for the not-for-profit and public sector under accrual based accounting standards (2013)*.

Renewal

Renewal expenditure is major work which does not increase the asset's design capacity but restores, rehabilitates, replaces or renews an existing asset to its original service potential.

Council has adopted a "Renew before New" approach to planning its long term capital works. This approach recognises that Council should prioritise maintaining, repairing and replacing the current network over development of new or expanded services which add to the ongoing maintenance and replacement burden.

This section of the plan provides a forecast of the notional renewal funding required to keep the assets in satisfactory condition and compares it to the available funding provided in Council's Long Term Financial Plan.

Any renewal forecast for Road Islands, Signs, Barriers or Car Parks is generally below the capitalisation threshold (i.e. not considered "material") and the cost of renewing these assets is instead expensed as maintenance.

The required renewal funding is based on modelling of each class as a whole and assumes that all assets are spread evenly throughout the condition states. It does not identify specific projects that need to be undertaken to repair or renew assets and is instead intended to show the gradual progression of deterioration that all assets moves through as they near the ends of their useful lives. The renewal requirements identified are therefore often unlikely to be required to be spent in the years indicated. For example, while a bridge asset may lose a proportion of its value into a lower condition state each year, this doesn't mean there are necessarily any issues with the bridge. Intervention will only occur when it is necessary for a project to be completed to the return the asset to its required service level.

Ongoing condition assessment of all asset classes will ensure that up to date information is provided to plan for renewal forecasting as the assets age and the level of service they provide begins to decline. This plan will be monitored and updated to ensure that changes are reflected when condition information is reviewed each year.

Projected Renewal Requirements

Council intends to ensure that assets do not fail to provide a satisfactory level of service. This means providing enough renewal funding to replace or renew any asset that reaches condition state 4 or 5 throughout the life of this plan.

Figure 6 shows the notional funding required for each year of the plan to renew enough of the assets to meet this target and highlights that as the end of the plan nears, the funding required begins to increase. This is by virtue of the fact that many road assets are currently in condition states 1 and 2 and less intervention is needed until a greater proportion reaches condition state 3.

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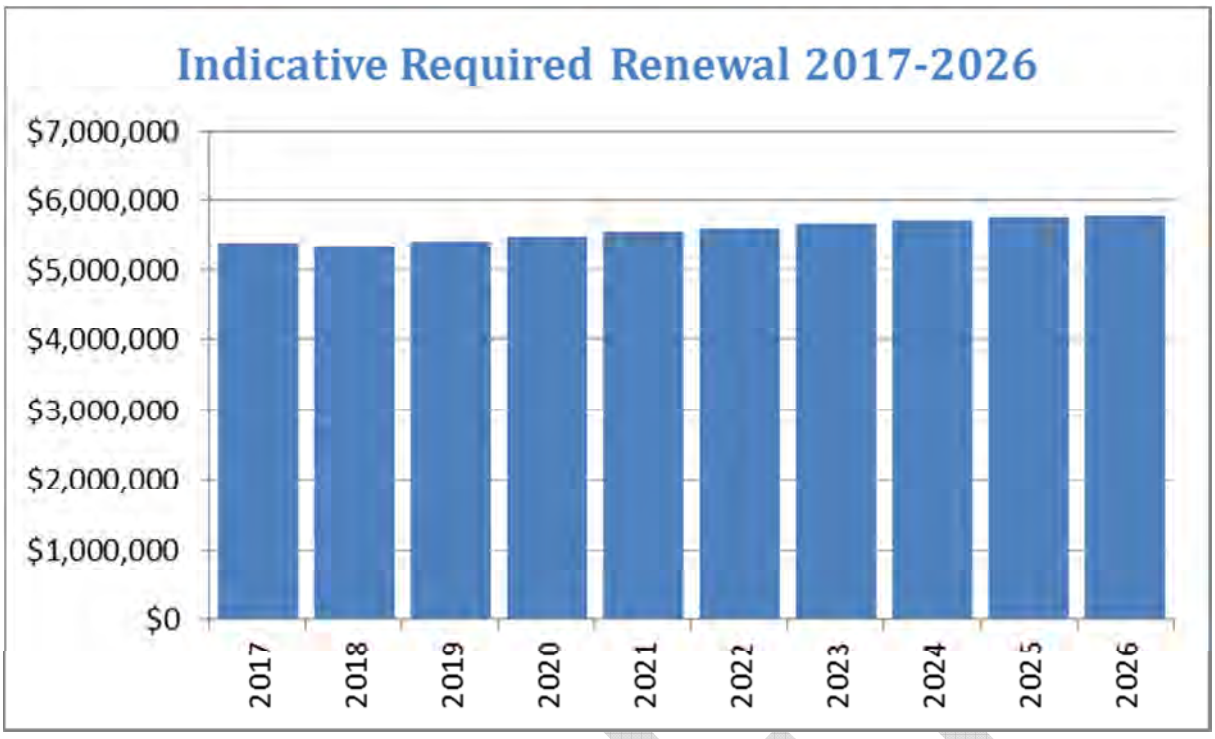

FIGURE 6 : INDICATIVE REQUIRED RENEWAL

Budgeted Renewal

Councils Long Term Financial Plan 2017-2026 (LTFP) provides the available level of funding to implement the requirements of this Asset Management Plan. The LTFP is used to formulate the annual Operational Plans and budgets and includes provision for funding from grants and borrowings as well as rates and charges. Figure 7 shows the funding available in the LTFP for each year of the plan.

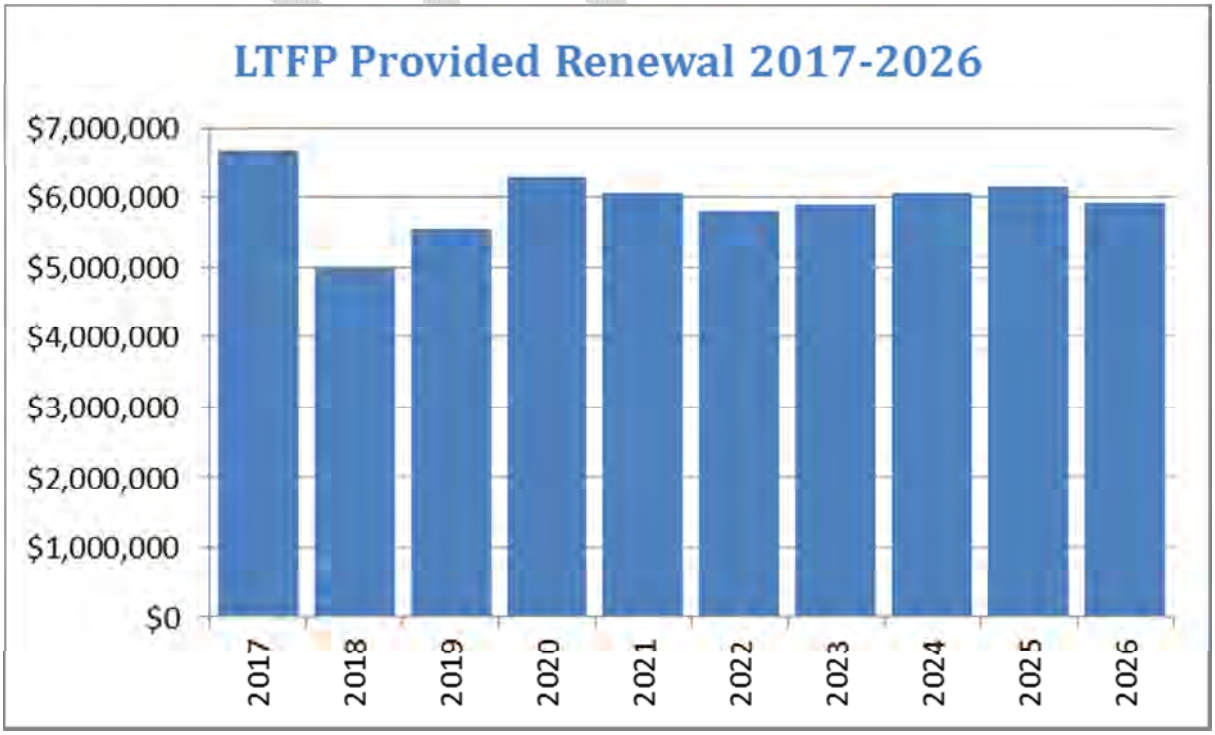

FIGURE 7 : LTFP PROVIDED RENEWAL

The Long Term Financial Plan 2017-2026 includes funding from a proposed special rate variation, intended in part to address the backlog of renewal funding required to return Council's road assets to a satisfactory condition.

It must be noted that there is significant funding included early in the plan to reduce Council's infrastructure backlog. With the extra funding provided by the special rate variation, Council intends to reduce its backlog to zero by 2026 (as shown in Figure 8) after which renewal funding will be closely matched to the ongoing requirements of this plan. This course of action was endorsed as part of Council's improvement strategy under the NSW Government's Fit For the Future program and included in Council's Fit For the Future roadmap which was approved by IPART.

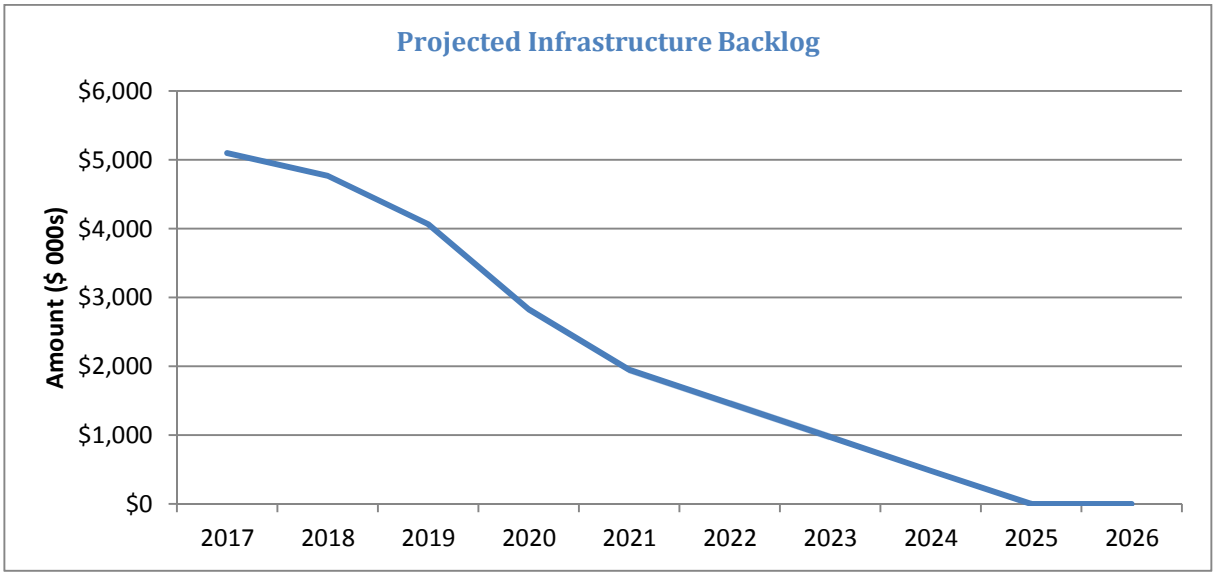

FIGURE 8 : PROJECTED BACKLOG

Expansion

Expansion expenditure is major work which upgrades or increases the level of service provided by an asset or asset class. This includes improvements to an asset to provide a better service as well as new assets to provide an expanded service. In the short term Council's focus is on correcting the backlog of renewal works. In the medium to long term there is scope for improvement of the road network, particularly through upgrading current roads to provide a better level of service.

The amount of funding available for each year of the plan is shown in Table 13 along with an estimate of the possible implications for the annual renewal budget. Specific projects have not yet been identified as these works are outside the scope of current Delivery Plan. This plan will be updated to include projects after the adoption of the new Delivery Plan following the 2016 Local Government Elections (See Improvement Plan action 1.10).

Identification of improvement projects will be driven by the demand forecasting undertaken in this plan and the community's desired levels of service. The effect of the proposed expansion projects on ongoing renewal and maintenance will also be included in the plan at that time.

Year	Expansion Funding	Possible Annual Renewal Impact
2017	$360,000	+$14,500
2018	-	-
2019	-	-
2020	-	-
2021	$225,000	+$9,000
2022	$515,000	+$20,600
2023	$470,000	+$18,800
2024	$345,000	+$13,800
2025	$269,000	+$10,760
2026	$556,000	+$22,240

TABLE 13 : EXPANSION FUNDING

N.B. Opportunity exists to divert this funding for renewal works should Council's asset management system identify renewal as a higher priority at the time

Rationalising the Network and Retiring Old Assets

Rationalising assets and services can reduce costs, generate operational savings for reinvestment, and allow the delivery of more integrated, customer-focused services. It enables Council to improve our most important assets for the future, and help fund the work through reducing the cost to provide inefficient or unnecessary assets. Making our transport network more efficient, sustainable and fit-for-purpose is key to Council delivering best value services.

For most road assets there is unlikely to be any market through which Council could hope to receive capital receipts from the disposal of its assets. This section of the plan will instead focus on assets identified for possible de-commissioning or retirement. These assets will be further investigated to determine the required levels of service and see what options are available for alternate service delivery, if any.

Following review, those assets that are deemed surplus to Council's requirements will generally be mothballed. Road reserves that are no longer required for the provision of legal access due to property amalgamations may be closed and sold with any proceeds to be used for future road maintenance and construction, however this is not likely to provide significant funding.

Managing the Risks

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

Critical risks, being those assessed as 'Very High' - requiring immediate corrective action and 'High' – requiring prioritised corrective action identified in the infrastructure risk management plan are summarised in Table 14

For more information on the assessment process refer to Council's Infrastructure Risk Management Plan.

Asset at Risk	What can Happen	Risk Rating (VH, H)	Risk Treatment Plan
Sealed Roads	Surface ages past its useful life leading to premature pavement failure	H	Increase renewal funding budget via special rate variation
Sealed Roads	Surface cracks and potholes not repaired leading to pavement defects and premature pavement failure	H	Increase maintenance budget via special rate variation
Unsealed Roads	Corrugations and loose surface not repaired leading to reduced level of service and loss of pavement material	H	Increase maintenance budget via special rate variation
Unsealed Roads	Lack of suitable gravel nearby leads to greater cost to purchase and cart gravel for re-sheeting works	H	Assess current quarry reserves and develop exploration program where necessary
Sealed Roads	Increasing cost of road building products such as bitumen	H	Adopt as much re-cycling of bitumen surfacings and pavements as practical; Ensure crack sealing and pothole patching are carried out as soon as possible to prolong asset life
Assets in floodplain	Greater intensity rainfall leads to more frequent and larger riverine flooding events	H	Assess flood prone areas for presence of critical assets and include in future planned upgrade programs

TABLE 14 : CRITICAL RISKS

Asset Management Practices

Finance & Database

Council uses Technology One Enterprise Suite as its primary database software. The selected modules form a robust financial and works management system.

Geographical Information Systems

MapInfo Professional is used to store location based asset data. Data is stored in the MapInfo TAB format in GDA94 datum and accessed through the Exponare platform or directly from Technology One via integration.

Council is updating its guidelines for the management of its spatial data. These guidelines will inform the policies, procedures and processes that Council uses to manage its spatial data (See Improvement Plan Action 1.8).

Information Inputs

The key information flows into this asset management plan are:

- The asset register data on size, age, value, remaining life of the road network;
- Council strategic and operational plans,
- Service requests from the community,
- Network assets information,
- The unit rates for categories of work/materials,
- Current levels of service, expenditures, service deficiencies and service risks,
- Projections of various factors affecting future demand for services and new assets acquired by Council,
- Future capital works programs,
- Financial asset values.

Information Outputs

The key information flows from this asset management plan are:

- The projected Works Program and trends,
- The resulting budget and long term financial plan expenditure projections,
- Financial sustainability indicators.

These will impact the Long Term Financial Plan, Delivery Plan, Annual Budget and Operational Plans.

Procedures for the flow of information are heavily dependent upon the needs of the above mentioned plans. Specific requirements for information from this asset management plan will be defined during the process of updating council's other long term planning documents and will be included in future revisions (See Action 1.5 of Improvement Plan).

Plan Improvement & Monitoring

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

- The degree to which the required cash flows identified in this plan are incorporated into council's long term financial plan;
- The degree to which 4 year detailed works programs, budgets, business plans and organisational structures take into account the 'global' works program trends provided by this plan;
- The degree to which sustainability ratios outlined below meet their targets
- Progress toward achieving the outcomes listed in the Improvement Plan

Sustainability Ratios

Providing services from infrastructure in a sustainable manner requires the matching and managing of service levels, risks, projected expenditures and funding to achieve financial sustainability over the life of the Asset Management Plan. The following ratios provide a set of Key Performance Indicators that will enable Council to more readily measure and report its overall asset management sustainability.

Asset Consumption Ratio

This ratio highlights how much of the service potential of Council's assets has been "consumed". It is expressed as the percentage of assets in "as new" condition and is calculated as written down value as a percentage of current replacement cost.

It is anticipated that the Shire will generally achieve a ratio at or above 75% for the life of this plan.

Council's Asset Consumption Ratio for Roads as at 30 June 2015 was 79.6%.

Asset Sustainability Ratio

This ratio indicates the extent to which the Shire replaces its road assets as they reach the end of their useful lives. It is expressed as the capital expenditure on renewal and replacement in a given period as a percentage of the depreciation expense for the same period. This has been difficult to calculate as maintenance, expansion and renewal funding have not historically been separated and there have been a number of changes to accounting practice that have affected the method by which depreciation is applied, making it hard to compare historical and contemporary figures.

This ratio is presently calculated only for the 2014/15 financial year. The period included for calculation will in future include the previous five years. The asset sustainability ratio should remain at around 90-100% moving forward.

Council's Asset Sustainability Ratio for Roads as at 30 June 2015 was 104.86%.

Asset Renewal Funding Ratio

The asset renewal funding ratio is a measure of the ability of Council to fund the renewals and replacement projected by this plan into the future. It compares the outlays budgeted in Council's Long Term Financial Plan (LTFP) to the projected renewal funding requirements identified by this plan. It is calculated as the net present value of LTFP projected outlays as a percentage of the net present value of AMP projected expenditures at a 7% discount rate.

The target ratio is 100% meaning that all renewals required by this plan are able to be funded into the future.

Council's Asset Renewal Funding Ration for Roads as at 30 June 2015 was 105.63%.

Monitoring and Review

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

Improvement Plan

The asset management improvement plan generated from this asset management plan is shown in Table 15.

Action ID	Action	Outcome	Responsibility	Due Date
1.1	Develop and implement Annual Satisfaction Survey	Monitor performance of plan and gain insight into desired levels of service	Asset Management Coordinator	End 2016
1.2	Consult the community on the current levels of service and determine desired levels of service for inclusion in AM plan where necessary	Ensure plan is providing for community expectations. Provide targets for AM plan	Integrated Planning and Reporting Manager	End 2016
1.3	Update AMP to reflect adoption of Disability Access Inclusion Plan	Better integration between adopted council plans	Asset Management Coordinator	End 2017
1.4	Continue improvement of asset data and confirm asset locations in GIS system.	Improved inventory and spatial data for use in forward planning	Asset Management Coordinator	End 2017
1.5	Develop formalised procedures for information flows into and out of the asset management plan	Ensure relevant information is shared.	Asset Management Coordinator	End 2017
1.7	Develop formal capital evaluation process for allocation of funding.	Provide better information about life cycle costs for future works	Finance Manager	End 2016
1.8	Develop spatial data guidelines	Ensure location based information is accurate, relevant and up to date	GIS Officer	End 2016
1.9	Undertaken a systematic review of the transport network to determine if levels of service provided match the community's requirements.	Rationalise the transport network to ensure customer value.	Management Team	End 2017
1.10	Update expansion program with specific projects identified in Delivery Plan	Ensure asset expansion and improvements meets the requirements of the new Delivery Plan	Asset Management Coordinator	2017

TABLE 15 : IMPROVEMENT PLAN

Works Cited

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Appendix A

Asset Condition Inspection Manual

Asset Condition Inspection Manual

Inverell Shire Council

Document Control

Title: Asset Condition Inspection Manual

Document Number:

Date	Revision	Author	Reviewer	Approved Date
06/04/2016	Version 3.0	D. Strugnell	B. McInnes	

This manual was developed by Inverell Shire Council.
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Contents

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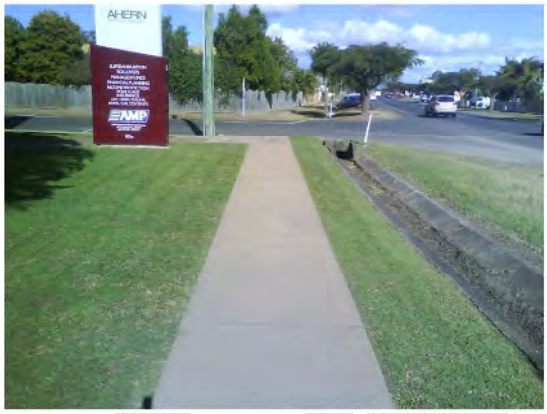
Paths

A path is a hard surfaced area for use by pedestrians and/or cyclists. Paths are most often located on verges in the road reserve although some are located in off road areas such as parks and nature reserves. They are generally constructed of concrete or pavers but may be constructed of other materials such as crushed rock, bitumen chip seal bark chips or natural earth. Other ancillary items assessed as part of the path network include pram ramps, signs and railings.

Defects associated with concrete paths include, cracking, spalling, stepping and panel displacement. Ratings are applied over the whole segment taking all defect types into account.

Condition 1

No work required (normal maintenance)



Assets in this state are in very good condition. There are no visible defects and only normal maintenance work is required.

Condition 2

Only minor maintenance work required

Good condition - only very minor defects visible and minor maintenance required to remedy them.

Condition 3

Maintenance work required

In this state a number of defects are visible but the asset remains quite serviceable. Routine maintenance is required to remedy issues.

Condition 4

Renewal work required

In this state the path asset is in below average condition. There are quite a few obvious defects visible that require some renewal work to repair

Condition 5

Urgent renewal or upgrading required.

At this stage the asset is in very poor condition and should be referred to capital works program for reconstruction.

Road Edges

Road edges are concrete or masonry structures designed to provide road drainage, and to act as a barrier to prevent vehicles from leaving the road carriageway. This includes concrete kerbs, drains, and edge restraints.

Defects associated with road edges include, cracking, spalling, vertical displacement and rotation. Ratings are applied over the whole segment taking all defect types into account.

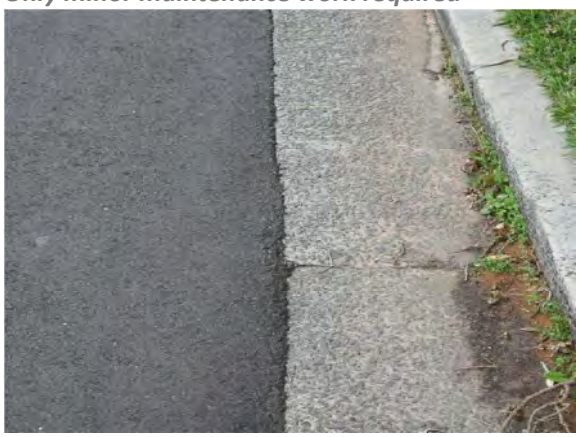
Condition 1

No work required (normal maintenance)

Assets in this state are in very good condition. There are no visible defects and only normal maintenance work is required.

Condition 2

Only minor maintenance work required



Good condition - only very minor defects visible and minor maintenance required to remedy them.

Condition 3

Maintenance work required

In this state a number of defects are visible but the asset remains quite serviceable. Routine maintenance is required to remedy issues.

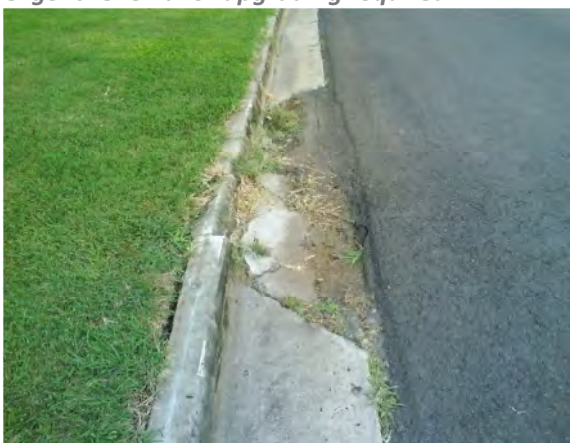
Condition 4

Renewal work required

In this state the asset is in below average condition. There are quite a few obvious defects visible that require some renewal work to repair

Condition 5

Urgent renewal or upgrading required.



At this stage the asset is in very poor condition and should be referred to capital works program for reconstruction.

Road Islands

Road islands are structures such as roundabouts, raised medians and pedestrian refuges constructed in the road carriageway to provide for traffic. They are generally constructed of concrete and may either be poured in-situ or prefabricated and anchored to the road pavement.

Defects associated with road islands include, cracking, spalling and joint displacement. Ratings are applied over the whole component taking all defect types into account.

Condition 1

No work required (normal maintenance)

Assets in this state are in very good condition. There are no visible defects and only normal maintenance work is required.

Condition 2

Only minor maintenance work required

Good condition - only very minor defects visible and minor maintenance required to remedy them.

Condition 3

Maintenance work required

In this state a number of defects are visible but the asset remains quite serviceable. Routine maintenance is required to remedy issues.

Condition 4

Renewal work required

In this state the asset is in below average condition. There are quite a few obvious defects visible that require some renewal work to repair

Condition 5

Urgent renewal or upgrading required.

At this stage the asset is in very poor condition and should be referred to capital works program for reconstruction.

Stormwater Channels

Stormwater surface channels are lined or unlined open channels that are located outside the road carriageway and provide for urban stormwater drainage and flood mitigation. Unlined drains are simple ditches formed in natural earth while lined drains generally consist of a concrete base slab and some form of batter protection such as fabric formed concrete, shotcrete, gabions or rock mattress.

Defects associated with stormwater surface channels include, cracking, spalling and displacement of concrete materials and loss of tension and displacement in gabion and rock mattress cage structures. Ratings are applied over the whole component taking all defect types into account. Unlined drains are not assessed.

Fabric Formed - Condition 1

No work required (normal maintenance)

Assets in this state are in very good condition. There are no visible defects and only normal maintenance work is required.

Fabric Formed - Condition 2

Only minor maintenance work required

Good condition - only very minor defects visible and minor maintenance required to remedy them.

Fabric Formed - Condition 3

Maintenance work required

In this state a number of defects are visible but the asset remains quite serviceable. Routine maintenance is required to remedy issues.

Fabric Formed - Condition 4

Renewal work required

In this state the asset is in below average condition. There are quite a few obvious defects visible that require some renewal work to repair

Fabric Formed - Condition 5

Urgent renewal or upgrading required.

At this stage the asset is in very poor condition and should be referred to capital works program for reconstruction.

Rock Gabion - Condition 1

No work required (normal maintenance)

Assets in this state are in very good condition. There are no visible defects and only normal maintenance work is required.

Rock Gabion - Condition 2

Only minor maintenance work required

Good condition - only very minor defects visible and minor maintenance required to remedy them.

Rock Gabion - Condition 3

Maintenance work required

In this state a number of defects are visible but the asset remains quite serviceable. Routine maintenance is required to remedy issues.

Rock Gabion - Condition 4

Renewal work required

In this state the asset is in below average condition. There are quite a few obvious defects visible that require some renewal work to repair

Rock Gabion - Condition 5

Urgent renewal or upgrading required.

At this stage the asset is in very poor condition and should be referred to capital works program for reconstruction.

Stormwater Pits

Stormwater pits are chambers constructed below ground, designed to accept rainwater from surface inlets and/or one or more upstream stormwater pipes and to discharge this rainwater into a single downstream stormwater pipe.

Defects associated with stormwater pits include, cracking, spalling and displacement of concrete materials and cracking, warping, rust and displacement of steel materials. Ratings are applied over the whole component taking all defect types into account.

Condition 1

No work required (normal maintenance)

Assets in this state are in very good condition. There are no visible defects and only normal maintenance work is required.

Condition 2

Only minor maintenance work required

Good condition - only very minor defects visible and minor maintenance required to remedy them.

Condition 3

Maintenance work required

In this state a number of defects are visible but the asset remains quite serviceable. Routine maintenance is required to remedy issues.

Condition 4

Renewal work required

In this state the asset is in below average condition. There are quite a few obvious defects visible that require some renewal work to repair

Condition 5

Urgent renewal or upgrading required.

At this stage the asset is in very poor condition and should be referred to capital works program for reconstruction.

Stormwater Pipes & Culverts

Culverts and stormwater pipes are pipes designed for carrying stormwater. They are constructed underground are generally made of reinforced concrete. They are designed to convey large volumes of low pressure water during rain events and discharge this water into table drains and natural watercourses or detention basins.

Defects associated with these assets include, cracking, spalling and displacement of concrete materials and cracking, warping, rust and displacement of steel materials. Ratings are applied over the whole component taking all defect types into account. Footpath structures that are formed from culverts are also assessed this way.

Condition 1

No work required (normal maintenance)

Assets in this state are in very good condition. There are no visible defects and only normal maintenance work is required.

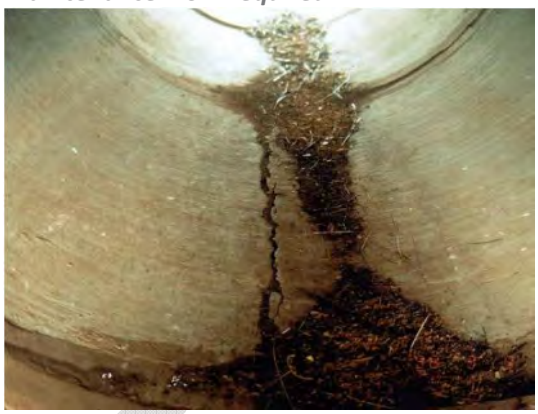
Condition 2

Only minor maintenance work required

Good condition - only very minor defects visible and minor maintenance required to remedy them.

Condition 3

Maintenance work required



In this state a number of defects are visible but the asset remains quite serviceable. Routine maintenance is required to remedy issues.

Condition 4

Renewal work required

In this state the asset is in below average condition. There are quite a few obvious defects visible that require some renewal work to repair

Condition 5

Urgent renewal or upgrading required.

At this stage the asset is in very poor condition and should be referred to capital works program for reconstruction.

Road Pavement Base

Road pavement base assets are the load bearing layers of a road pavement. On sealed roads this consists of the layer/s under the bitumen surface. On unsealed roads the base is the layer of imported material that usually forms the load bearing layer and the wearing surface. Base layers are generally constructed of gravel with the exception of floodways which typically have a concrete base layer.

Road pavement base layers have significantly different patterns of consumption based on their construction material, their environment and whether or not they are bound with a surface layer.

Unsealed road base assets are inspected visually and rated according to ROCOND 90 (Page 44 and 45) taking into account their depth, material quality and crossfall.

Sealed road base components are not visible and cannot be assessed directly by non-destructive methods; they are instead assessed based upon the symptoms of base failure that are visible in the surface layer.

Patches, crocodile cracking, roughness and rutting are the defect types most commonly associated with failure in the base layer. Patches and Crocodile Cracking are assessed based on ROCOND 90 (Pages 10 & 12-13 respectively, Please note the S,M,X rating for severity was modified to 1,2,3 for calculation of the PCI). Rutting and Roughness are assessed using a laser profilometer device.

Calculation of the pavement base condition was supplemented with the factors below in determining overall condition rating:

- School Bus Usage
- Traffic Volumes
- Heavy Vehicle Volumes
- Five Year Accident History
- Seal Width

Each defect type and usage indicator is weighted based on its relevance to the pavements condition and the type of road pavement being measured. Regional, Urban and Rural roads have different requirements for some indicators due to the different levels of service the community expects from each type of road. Further information on how the above defects are assessed and weighted to derive Councils Pavement Condition Rating can be found in Council's Sealed Roads Rehabilitation Program 2015-2018.

The weighted defect ratings are then combined to give a pavement condition index from 0-100 which is used to calculate the overall condition rating applied.

The PCI is calculated from the following, using the defect and indicator weightings shown below

$$Weighted\ Element\ Rating\ = \left(\frac{Element\ Rating}{Maximum\ Score}\right) \times Weighting$$

TABLE 1 : PCI COMPONENT WEIGHTINGS

PCI Component	Regional		Rural		Urban	
	Max	Weight	Max	Weight	Max	Weight
Cracking Severity	3	3	3	3	3	3
Crack Extent	3	8	3	8	3	8
Patches	5	8	5	8	5	8
Roughness	200	20	291	20	291	20
Rutting	16	15	40	15	40	15
School Bus Route	3	5	3	5	3	5
Traffic Volume	6	10	6	10	6	10
Heavy Vehicle Traffic Volume	5	10	5	10	5	10
Seal Width Deficiency	5	15	5	15	5	15
Accident History	10	6	10	6	10	6

Example Unsealed Base Photos

The following pictures give an example of what an unsealed road in each condition state would be expected to look like. **They are not used as a reference for rating unsealed pavements.**

Condition 1

No work required (normal maintenance)

Assets in this state are in very good condition. There are no visible defects and only normal maintenance work is required.

Condition 2

Only minor maintenance work required

Good condition - only very minor defects visible and minor maintenance required to remedy them.

Condition 3

Maintenance work required

In this state a number of defects are visible but the asset remains quite serviceable. Routine maintenance is required to remedy issues.

Condition 4

Renewal work required

In this state the asset is in below average condition. There are quite a few obvious defects visible that require some renewal work to repair

Condition 5

Urgent renewal or upgrading required.

At this stage the asset is in very poor condition and should be referred to capital works program for reconstruction.

Road Pavement Subgrade

Road pavement subgrade is the natural material that has been formed to create a surface on which a road is constructed. It consists of the bulk earthworks required to form the road, including cutting and filling in hilly areas and of any stabilisation that is applied. Subgrade assets are considered to have very long lives with no deterioration and little to no management, so condition assessment is not required. All components are given a standard rating of "2", consistent with the NSW Government's integrated planning and reporting reform guidelines and industry practice.

Road Pavement Surface

Road pavement surface assets are the top layer of a road pavement. They are constructed of either asphalt or bitumen chipseal and provide a wearing course for traffic as well as binding and waterproofing for the underlying base layers.

Surface assets are visually assessed and rated according to seal age and other defects found. Local surface defects, longitudinal and transverse cracking, and edge breaks are the defect types most commonly associated with failure in the surface layer.

Local surface defects, cracking and edge breaks are assessed based on ROCOND 90 (Pages 11, 12-13 & 30 respectively, Please note the S,M,X rating for severity was modified to 1,2,3 for calculation of the SCI).

Each defect type is weighted based on its relevance to the surface's condition and the type of road pavement being measured. Urban and Rural roads have different requirements for some indicators due to the different levels of service the community expects from each type of road.

Segments with an age of less than 15 years received a Seal Condition Rating on 1 or 2 while segments older than 15 years receiving a Seal Condition Rating of 3-5 depending on its Surface Condition Index (SCI). The weighted defect ratings are then combined to give a surface condition index from 0-100 which is used to calculate the overall condition rating applied.

The SCI is calculated from the following using the defect weightings shown below.

$$Weighted\ Defect\ Rating\ = \left(\frac{Defect\ Rating}{Maximum\ Score}\right) \times Weighting$$

TABLE 2 : SCI COMPONENT WEIGHTINGS

SCI Component	Max Score	Weight Urban	Weight Rural
Edge Break Extent	3	19	13
Edge Break Severity	3	8	4
Local Surface Defects	5	23	13
Cracking Extent	3	30	40
Cracking Severity	3	20	30

Example Sealed Surface Photos

The following pictures give an example of what a sealed road surface in each condition state may look like. **They are not used as a reference for rating sealed surfaces.**

Condition 1

No work required (normal maintenance)

Assets in this state are in very good condition. There are no visible defects and only normal maintenance work is required.

Condition 2

Only minor maintenance work required

Good condition - only very minor defects visible and minor maintenance required to remedy them.

Condition 3

Maintenance work required

In this state a number of defects are visible but the asset remains quite serviceable. Routine maintenance is required to remedy issues.

Condition 4

Renewal work required

In this state the asset is in below average condition. There are quite a few obvious defects visible that require some renewal work to repair

Condition 5

Urgent renewal or upgrading required.

At this stage the asset is in very poor condition and should be referred to capital works program for reconstruction.

Road Ancillary Items

Ancillary items that are assessed include signs, barriers and guide posts. These items are assessed over the entire segment and rated according to ROCOND 90 (pages 34, 48, 53 & 52 respectively).

Bridges

Bridges are structures carrying a road, path, railway, etc. across a river, road, or other obstacle. This includes all types of structures from single span simply supported bridges, to large box culverts, to complex steel suspension bridges. Inverell Shire Council manages any culvert with a centreline length of six metres or more as a bridge.

Bridge structures are assessed according to the methodology developed by ARRB group. This involves inspection and condition assessment of every visible component and reporting of the overall bridge condition state.

Figure 1 provides an example of the information included in a bridge inspection report.

Structure Condition Inspection Report — L2/1 — Sheet Page 1 of 47

Structure ID	ISC049	Owner	Local Government Agency
Structure Name	Macintyre River - Stannifer Road		
Region	Unknown/Not Applicable		
Local Authority	Not Applicable	Coordinates	-29.81301373, 151.2634226
Road Number	-	Road Name	Stannifer Road
Chainage			
Road Type		Waterway	Macintyre River
Year Built	2013		
Structure Type	Bridge	Function	Road over waterway
Superstructure Type	Units without slab	Superstructure Material	Unknown
Span Arrangement	4/10	Overall Length (m)	40
Overall Width (m)	10.4		

General Comment

Stannifer Rd begins at Elsmore Rd and generally heads south. Superstructure consists of double-webbed T-beams. Unknown if girders are RC or PSC. Pier and abutment walls act as bridge foundations.

Date Inspected	29/10/2014	Inspected By	Joshua Seskis	Inspection Type	Programmed	Entered By	John Dickson
Date Reviewed	18/11/2014	Reviewed By	Anthony Rooke	Date of Last Inspection		Next Inspection Due	10/2019
Original Rating	CS2	Original Comment	Structure was found in fair condition at time of inspection.				
WL1 Rating		WL1 Comment					
WR1 Rating		WR1 Comment					

Overall Inspection Comment

Structure in fair condition. Unknown if cracks in girders are structural or shrinkage related. Should be investigated and monitored. Elastomeric bearings required in place of foam bearings at A1.

Component Condition Inspection Report — L2/2

Component Location				Exposure Class	Quantity	Unit	Quantity per Condition State				Defect	Action Required?
Modification	Group	Component	Standard Number				1	2	3	4	- Location of defect - Description of defect - Reference of sketches and photos	
O	AP1	GR1	72S	1	16.2	Lin. m	16.2	0	0	0	Approach and bridge rail connected via standard transition between W-beam guardrail and thrie beam. No defects noted. Refer photos 8 and 9.	
O	AP1	AP1	70O	1	1	Ea.	1	0	0	0	First section of approach 1 consists of asphalt wearing surface. Bridge approach not considered beyond guardrail. Minor spalling noted as fragments of asphalt have been carried onto approach slab. Refer photos 10 and 11.	
O	AP1	AP2	70C	1	1	-	0	1	0	0	Second section of approach 1 consists of concrete approach slab. Approach slab exhibiting moderate settlement cracking. Refer photos 12-18.	
O	AP1	GR2	72S	1	16.2	Lin. m	0	16.2	0	0	Approach and bridge rail connected via standard transition between W-beam guardrail and thrie beam. Minor loss of tension apparent in top reinforcing cable. Refer photos 19 and 20.	✔
O	A1	J1	11O	1	10.4	Lin. m	0	10.4	0	0	Joint appears to be compression joint seal with steel armouring. Joint seal appears to have lost adhesion to the armouring in some locations. Armouring also appears to be rusting. Moisture staining on abutment 1 headstock indicates minor moisture penetration through joint. Refer photos 21, 22 and 54.	

FIGURE 1 : SAMPLE BRIDGE CONDITION REPORT

Appendix B

Routine Maintenance Plan

Inverell Shire Council Road Maintenance Budget 2017-2026

Maintenance Activity	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Bridge Culvert and Floodway Maintenance										
General maintenance	$ 206,770	$ 212,170	$ 217,700	$ 223,380	$ 229,200	$ 235,180	$ 241,310	$ 247,610	$ 254,080	$ 260,700
Total	**$ 206,770**	**$ 212,170**	**$ 217,700**	**$ 223,380**	**$ 229,200**	**$ 235,180**	**$ 241,310**	**$ 247,610**	**$ 254,080**	**$ 260,700**
Unsealed Road Maintenance										
Road Management	$ 34,600	$ 35,510	$ 36,420	$ 37,340	$ 38,290	$ 39,300	$ 40,320	$ 41,350	$ 42,410	$ 43,510
Gravel Patching	$ 95,450	$ 97,940	$ 100,500	$ 103,120	$ 105,810	$ 108,570	$ 111,390	$ 114,290	$ 117,270	$ 120,320
Grading	$ 1,228,710	$ 1,260,880	$ 1,293,870	$ 1,327,750	$ 1,362,530	$ 1,398,220	$ 1,434,820	$ 1,472,400	$ 1,510,960	$ 1,550,530
Signs & Furnishings	$ 50,460	$ 51,780	$ 53,120	$ 54,510	$ 55,920	$ 57,380	$ 58,890	$ 60,420	$ 62,000	$ 63,600
Timber Clearing	$ 40,000	$ 41,020	$ 42,080	$ 43,160	$ 44,260	$ 45,400	$ 46,560	$ 47,740	$ 48,980	$ 50,240
Total	**$ 1,449,220**	**$ 1,487,130**	**$ 1,525,990**	**$ 1,565,880**	**$ 1,606,810**	**$ 1,648,870**	**$ 1,691,980**	**$ 1,736,200**	**$ 1,781,620**	**$ 1,828,200**
Sealed Road Maintenance										
Heavy Patching	$ 262,516	$ 270,768	$ 279,337	$ 288,197	$ 297,261	$ 306,535	$ 316,115	$ 325,907	$ 336,036	$ 346,439
Linemarking	$ 40,000	$ 41,040	$ 42,110	$ 43,210	$ 44,330	$ 45,480	$ 46,660	$ 47,870	$ 49,110	$ 50,380
Road Management	$ 61,140	$ 148,700	$ 200,280	$ 251,890	$ 317,570	$ 349,280	$ 379,040	$ 412,840	$ 480,690	$ 506,570
Seal Maintenance	$ 1,686,240	$ 1,730,400	$ 1,775,600	$ 1,821,970	$ 1,869,480	$ 1,918,350	$ 1,968,480	$ 2,019,970	$ 2,072,790	$ 2,126,940
Shoulder Maintenance	$ 15,000	$ 15,400	$ 15,800	$ 16,220	$ 16,640	$ 17,080	$ 17,520	$ 17,980	$ 18,450	$ 18,930
Signs & Furnishings	$ 217,330	$ 222,950	$ 228,710	$ 234,620	$ 240,700	$ 246,910	$ 253,300	$ 259,860	$ 266,580	$ 273,450
Vegetation Control	$ 100,035	$ 102,680	$ 105,400	$ 108,190	$ 111,050	$ 113,990	$ 117,010	$ 120,110	$ 123,270	$ 126,520
Vegetation Control	$ 100,035	$ 102,680	$ 105,400	$ 108,190	$ 111,050	$ 113,990	$ 117,010	$ 120,110	$ 123,270	$ 126,520
Total	**$ 2,482,296**	**$ 2,634,618**	**$ 2,752,637**	**$ 2,872,487**	**$ 3,008,081**	**$ 3,111,615**	**$ 3,215,135**	**$ 3,324,647**	**$ 3,470,196**	**$ 3,575,749**
Total	**$ 4,138,286**	**$ 4,333,918**	**$ 4,496,327**	**$ 4,661,747**	**$ 4,844,091**	**$ 4,995,665**	**$ 5,148,425**	**$ 5,308,457**	**$ 5,505,896**	**$ 5,664,649**