

# Drainage Asset Management Plan 2017-2026

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*Inverell Shire Council*

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## Contents

Introduction.....	5
Asset Management Drivers .....	5
Using this Plan .....	6
Understanding our Assets .....	8
Asset Inventory.....	8
Asset Register .....	9
Condition Profile.....	10
Current Condition .....	10
Projected Condition.....	11
Setting Standards & Measuring Performance.....	12
Statutory Requirements .....	12
Levels of Service .....	12
Desired Levels of Service .....	12
Planning for the Future .....	14
Population .....	14
Property Development.....	14
Urban Salinity & Water Table.....	15
Climate Change.....	15
Operating & Maintaining the Drainage Network.....	17
Inspections.....	17
Level 1 – Routine Maintenance Inspections.....	17
Level 2 – Condition Inspections.....	17
Level 3 – Detailed Engineering Inspections.....	18
Routine Maintenance .....	18
Gross Pollutant Traps .....	18
Reactive Maintenance .....	19
Renewing and Expanding the Drainage Network.....	20
Renewal.....	20
Projected Renewal Requirements.....	24
Budgeted Renewal.....	24
Expansion.....	25
Rationalising the Network and Retiring Old Assets.....	26
Managing the Risks.....	27
Asset Management Practices .....	28
Finance & Database.....	28
Geographical Information Systems .....	28
Information Inputs.....	28
Information Outputs.....	28
Plan Improvement & Monitoring .....	29
Monitoring and Review .....	29
Improvement Plan.....	29
References.....	30
Appendix A .....	31
Appendix B.....	33

## Figures

Figure 1 : Inverell Stormwater Catchments .....	8
Figure 2 : Pipe and Node numbering system .....	9
Figure 3 : 2015 Asset Condition Profile .....	11
Figure 4 : 2026 Projected Condition Profile .....	11
Figure 5 : Causes of urban salinity (Slinger & Tenison, 2007) .....	15
Figure 6 : Central Slopes Rainfall and Temperature (CSIRO, 2015) .....	16
Figure 7 : Projected Required Renewal Funding .....	25
Figure 8 : LTFFP Funding Provided .....	25

## Tables

Table 1 : Strategic Plan Strategies .....	7
Table 2 : Drainage Node inventory .....	9
Table 3 : Drainage Assets Inventory .....	9
Table 4 : Condition Rating General Descriptions .....	10
Table 5 : Useful lives of drainage assets .....	11
Table 6 : Community Performance Measures .....	13
Table 7 : Technical Performance Measures .....	13
Table 8 : Population Projections (NSW Department of Planning and the Environment, 2014) ....	14
Table 9 : Population Change (NSW Department of Planning and the Environment, 2014) .....	14
Table 10 : Available Maintenance Funding .....	19
Table 11 : Failure Mode – Cost of Service .....	21
Table 12 : Failure Mode - Structural Integrity/Asset Mortality .....	21
Table 13 : Failure Mode - Performance/Reliability/Availability .....	22
Table 14 : Failure Mode - Capacity/Utilisation .....	23
Table 15 : Critical Risks .....	27
Table 16 : Improvement Plan .....	29

## 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 from 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.

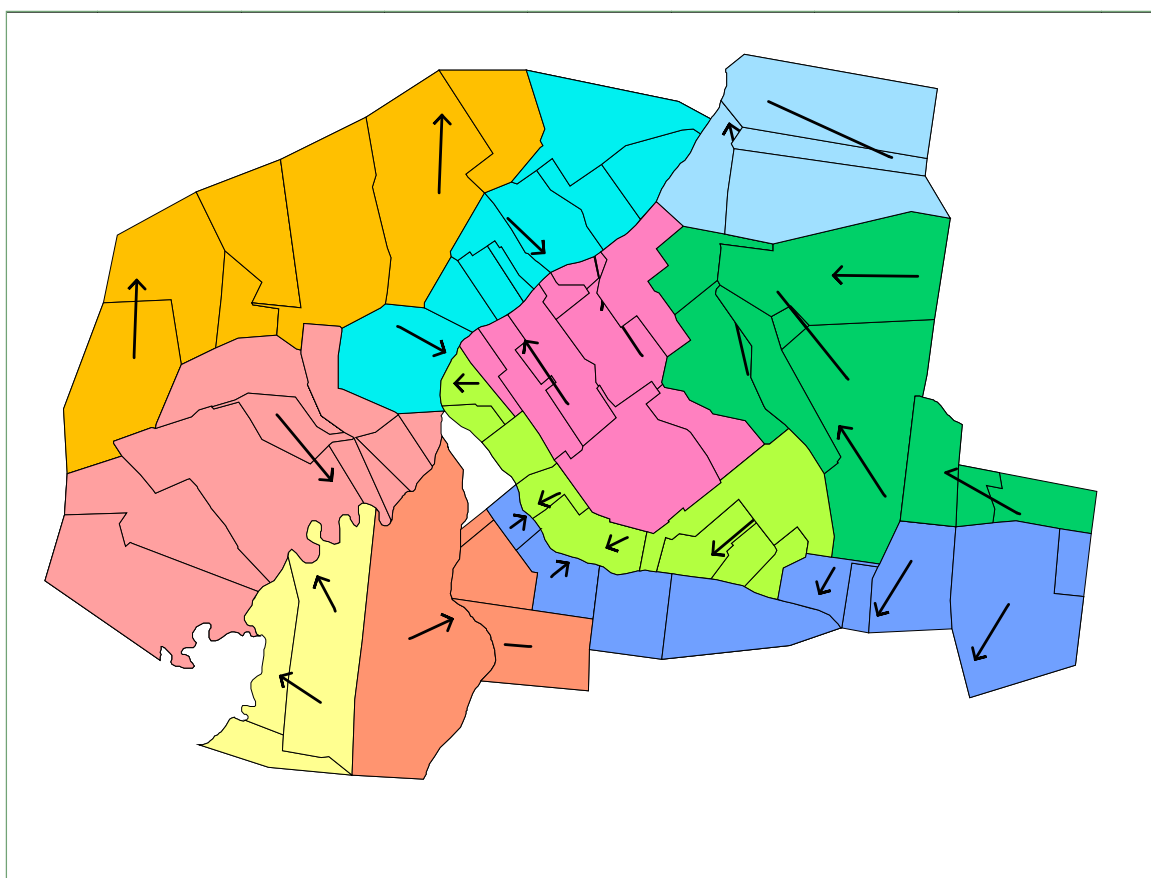


Figure 1 : Inverell Stormwater Catchments



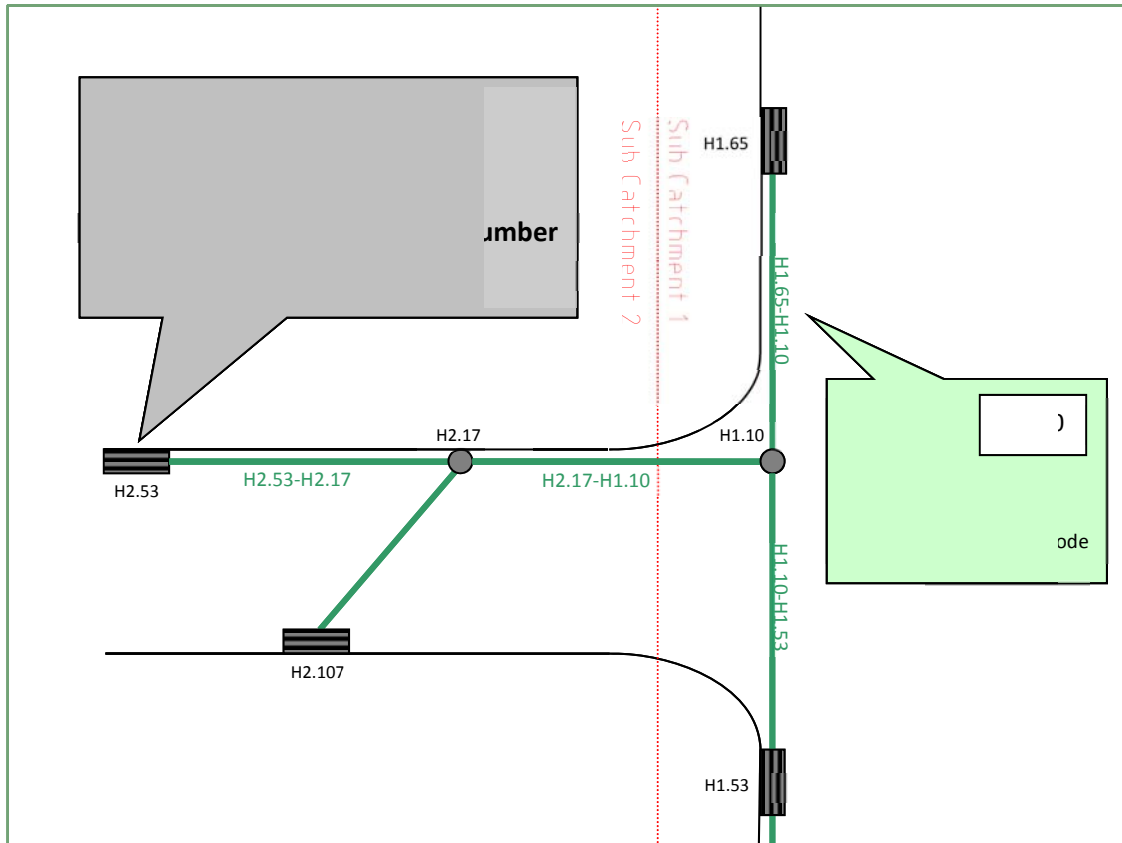


Figure 2 : Pipe and Node numbering system

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.

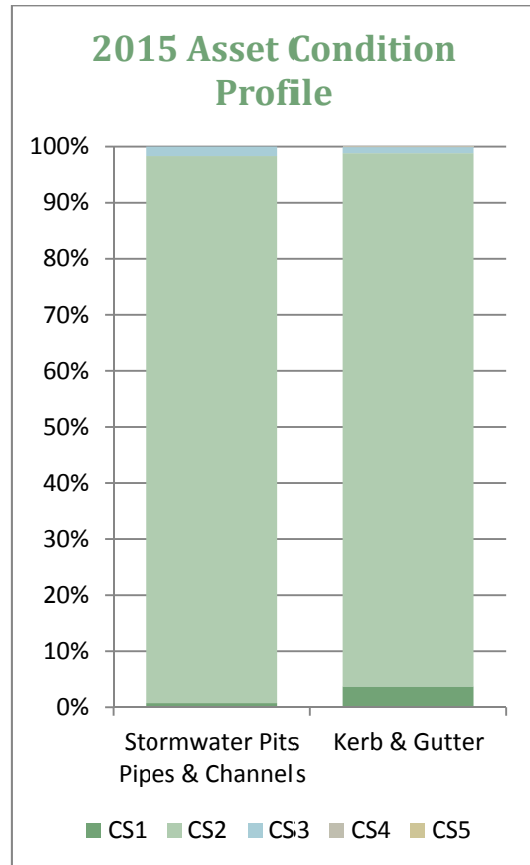


Figure 3 : 2015 Asset Condition Profile

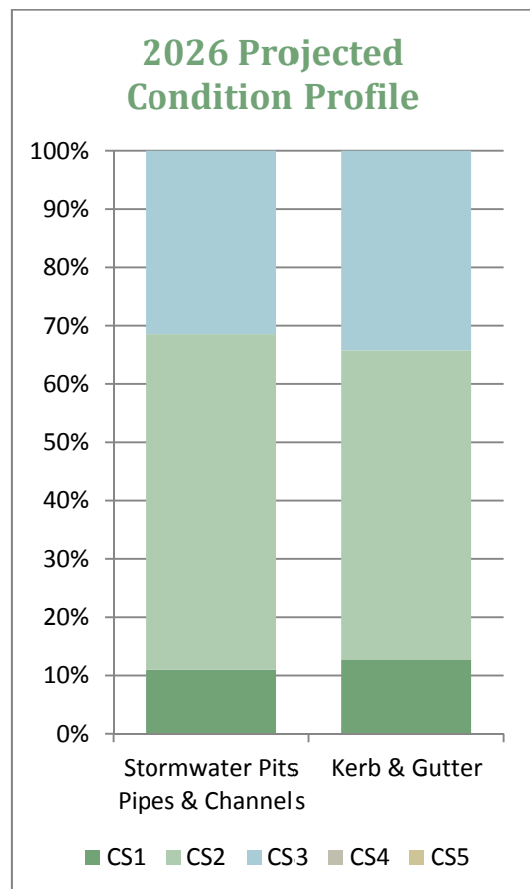


Figure 4 : 2026 Projected Condition Profile

## 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
<b>Function</b>	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
<b>Safety</b>	Drainage infrastructure is free of hazards	Number of reported accidents/ incidents resulting in potential liability claims	Zero	
<b>Environment</b>	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
<b>Cost Effectiveness</b>	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
<b>Condition</b>	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%
<b>Function</b>	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.

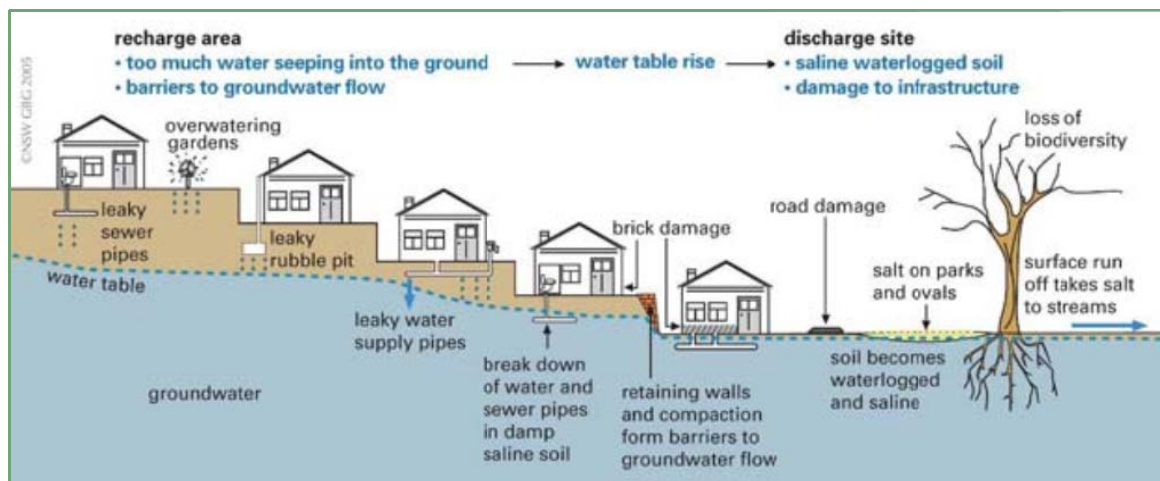
Inverell Shire Council needs to be aware of the danger salinity and high water tables present to the drainage network and ensure that materials and methods used in the development and maintenance of the networks are resistant to its effects.

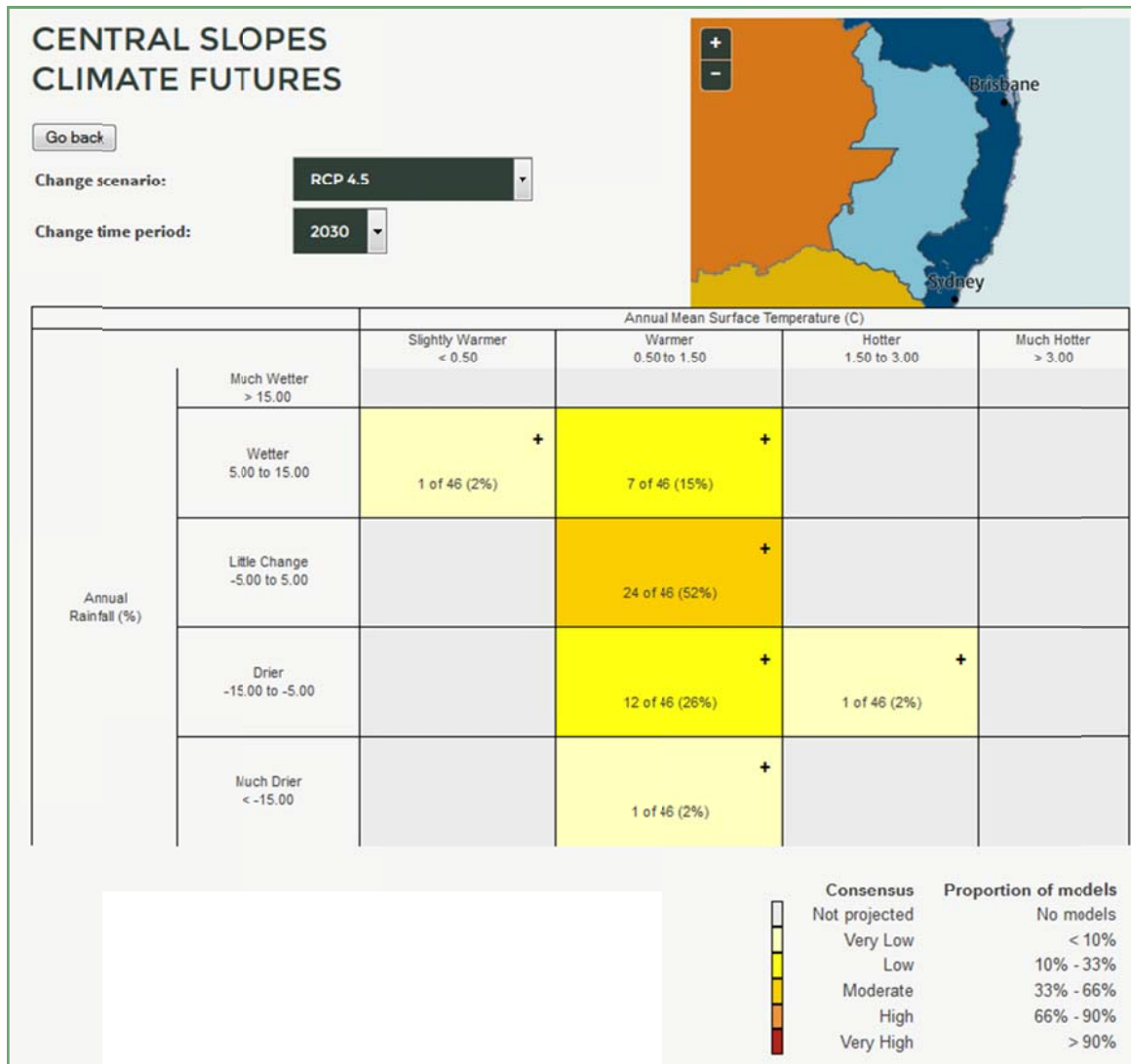
The organisation also needs to be aware of the affect inadequate drainage can have on increasing salinity and ensure that the network can drain the local environment effectively to prevent salinity problems.

## 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)





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
<b>Causes</b>	<ul style="list-style-type: none"> <li>• Excessive maintenance costs</li> <li>• High number of failures due to poor condition</li> <li>• Future liabilities, rehabilitation or replacement works necessary</li> <li>• High operating costs due to poor condition</li> <li>• Equipment or asset obsolete <ul style="list-style-type: none"> <li>– Repairs and spare parts costly or not available</li> <li>– New asset would be more efficient, save money</li> </ul> </li> </ul>
<b>Effects</b>	<ul style="list-style-type: none"> <li>• Excessive subsidies required</li> <li>• Drain on recurrent cash flow</li> <li>• Future liabilities for renewal works</li> <li>• Higher operating costs</li> </ul>
<b>Significance</b>	<ul style="list-style-type: none"> <li>• Degree to which costs exceeded income generated (return on asset)</li> <li>• Business viability – ability to carry non-performing assets or raise additional income</li> </ul>
<b>Treatment Options</b>	<ul style="list-style-type: none"> <li>• Raise income derived from asset, depends on: <ul style="list-style-type: none"> <li>– Customer response</li> <li>– Present cost levels</li> <li>– Predictive cost increases</li> </ul> </li> <li>• Reduce high cost activities, maintenance and operations</li> <li>• Negotiate lower level of service, performance, reliability, etc.</li> <li>• Defer all capital investment</li> <li>• Mothball asset</li> <li>• Dispose of asset</li> <li>• Transfer asset</li> </ul>
<b>Evaluation</b>	<ul style="list-style-type: none"> <li>• Complete ODRM evaluation on various treatment options</li> <li>• Assess and determine strategy in the light of total business picture</li> </ul>

Table 11 : Failure Mode – Cost of Service

ODRM Process	Structural Integrity/Asset Mortality (End of physical life)
<b>Causes</b>	<ul style="list-style-type: none"> <li>• Structural integrity of asset has decayed below level requirement to meet normal working stresses</li> <li>• Loading on asset exceeds capacity: <ul style="list-style-type: none"> <li>– internal pressure</li> <li>– external pressure</li> </ul> </li> </ul>
<b>Effects</b>	<ul style="list-style-type: none"> <li>• Leaks/inflow (voids created)</li> <li>• Collapse</li> <li>• Property damage</li> <li>• Personal damage (see Risk Management/Consequence of Failure)</li> </ul>
<b>Significance</b>	<ul style="list-style-type: none"> <li>• Degree of damage caused</li> <li>• Risk to life</li> <li>• Effect on customers</li> <li>• Consequences of failure</li> </ul>
<b>Treatment Options</b>	<ul style="list-style-type: none"> <li>• Reduce loading on asset (divert flows)</li> <li>• Improve ability to repair quickly</li> <li>• Rehabilitate asset before failure</li> <li>• Replace asset</li> </ul>
<b>Evaluation</b>	<ul style="list-style-type: none"> <li>• Evaluate cost/benefits of each options</li> <li>• Benefits to include all consequences of failure costed to probability of failure</li> <li>• Rank cost/benefit against all opportunities for investment</li> </ul>

Table 12 : Failure Mode - Structural Integrity/Asset Mortality

ODRM Process	Performance/Reliability/Availability
<b>Causes</b>	<ul style="list-style-type: none"> <li>• Decay of asset condition</li> <li>• Failure of component (e.g. joint/connection)</li> <li>• Failure of associated unit (secondary failure)</li> <li>• Blockages caused by:               <ul style="list-style-type: none"> <li>– Roots</li> <li>– Rubbish</li> <li>– Refuse</li> <li>– Damage</li> <li>– Silt</li> </ul> </li> </ul>
<b>Effects</b>	<ul style="list-style-type: none"> <li>• Interruption of supply or service (blockage)</li> <li>• Overflow of asset. Flooding damage to property, etc.</li> <li>• Reduced level of service (reliability/partial service)</li> </ul>
<b>Significance</b>	<ul style="list-style-type: none"> <li>• Degree to which service is effected</li> <li>• Number of customers effected and time</li> <li>• Consequences of failure, e.g. safety/damage</li> </ul>
<b>Treatment Options</b>	<ul style="list-style-type: none"> <li>• Improve planned maintenance/condition monitoring</li> <li>• Reduce repair time</li> <li>• Install redundancy/back up standby/overland flow/rerouting</li> <li>• Improve condition monitoring</li> <li>• Install warning devices/predictive model</li> <li>• Overhaul (or rehabilitate) asset to achieve necessary reliability</li> <li>• Replace asset</li> <li>• Complete emergency routine to suit storm events</li> </ul>
<b>Evaluation</b>	<ul style="list-style-type: none"> <li>• Evaluate cost/benefits including business consequences of not meeting reliability standards</li> <li>• Equate costs of consequences of failure to probability</li> <li>• Rank cost/benefit against all opportunities for investment</li> </ul>

Table 13 : Failure Mode - Performance/Reliability/Availability

ODRM Process	Capacity/Utilisation	
	Exceeds design capacity	Inadequate utilisation
<b>Causes</b>	<ul style="list-style-type: none"> <li>• Increased area being drained</li> <li>• Changes in rainfall and/or groundwater levels</li> <li>• Changes to catchment topography</li> <li>• Increased customer expectations, demands for service</li> <li>• Blockage of service (silt)</li> </ul>	<ul style="list-style-type: none"> <li>• Decline in demand</li> <li>• Loss of area being drained</li> <li>• System changes</li> <li>• Reduced intensities</li> </ul>
<b>Effects</b>	<ul style="list-style-type: none"> <li>• Inability to meet demands on system</li> </ul>	<ul style="list-style-type: none"> <li>• Cost of operating assets is above ability to pay</li> </ul>
<b>Significance</b>	<ul style="list-style-type: none"> <li>• Degree to which capacity is exceeded (flooding impact)</li> <li>• Number of customers effected</li> <li>• Risk involved, safety, etc.</li> </ul>	<ul style="list-style-type: none"> <li>• Is it an unwarranted burden on the business (not core activity/non-performing asset)</li> </ul>
<b>Treatment Options</b>	<ul style="list-style-type: none"> <li>• Operate system differently: <ul style="list-style-type: none"> <li>– interconnection</li> <li>– rerouting catchment and transfer</li> </ul> </li> <li>• Boost asset capacity (pump)</li> <li>• Augment asset/duplicate</li> <li>• Replace asset/enlarge</li> <li>• Reduce levels of service</li> <li>• Build new asset</li> </ul>	<ul style="list-style-type: none"> <li>• Mothball assets</li> <li>• Dispose of assets – rationalisation</li> <li>• Identify cost as CSO and derive other income</li> <li>• Transfer liability to others</li> </ul>
<b>Evaluation</b>	<ul style="list-style-type: none"> <li>• Evaluate costs/benefits/income of each option</li> <li>• Benefit/consequence of failing to meet demands against probability of occurrence</li> <li>• Rank cost/benefit against all opportunities for investment</li> </ul>	<ul style="list-style-type: none"> <li>• Overall impact on business or organisation</li> </ul>

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.



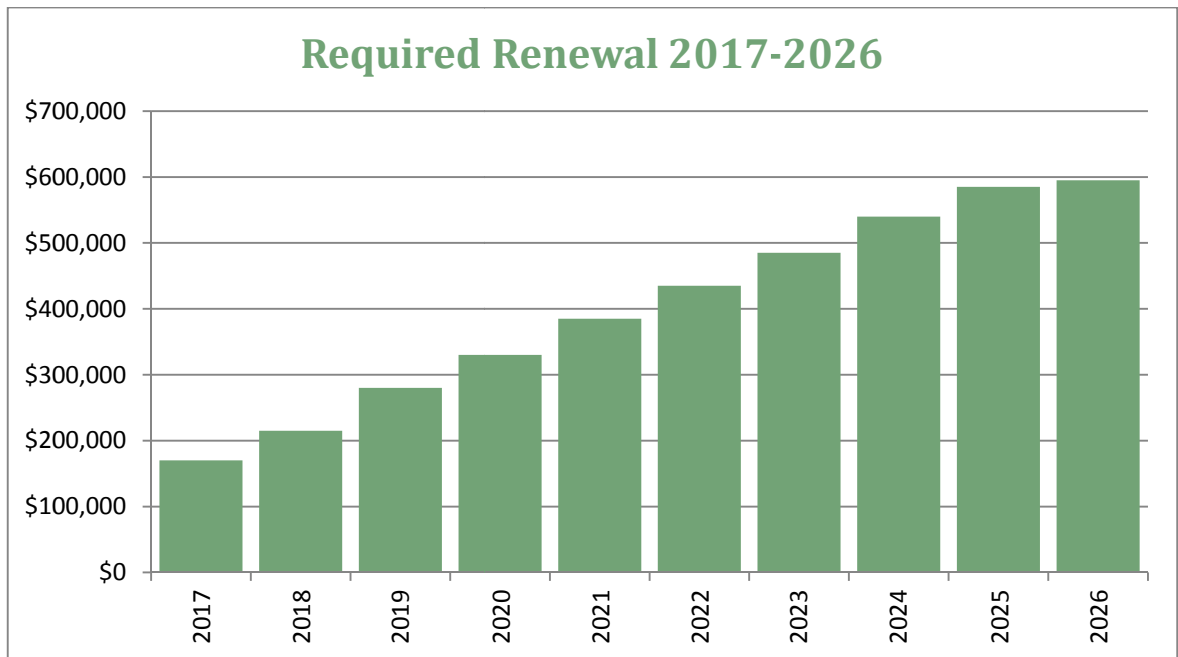


Figure 7 : Projected Required Renewal Funding

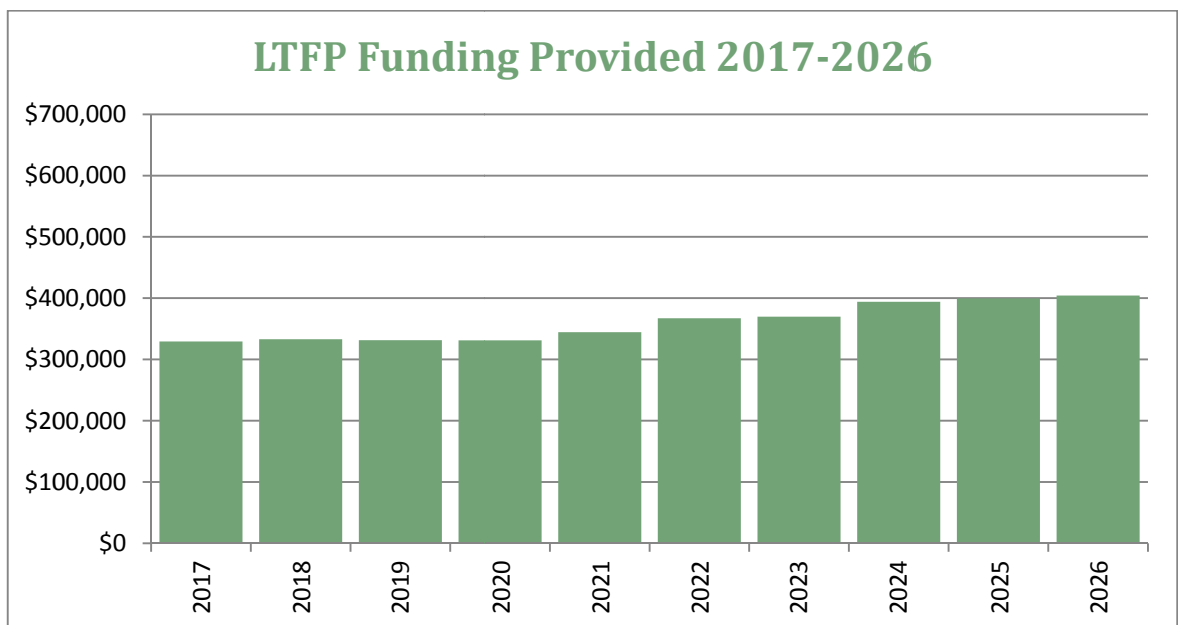


Figure 8 : LTFP Funding Provided

### 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





## Appendix B

### Project Proposal Templates





