Sunshine Coast Council
COUNCIL

Sunshine Coast Council Asset Management Plan 2017/18 - 2022/23

Stormwater

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Acknowledgements

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Disclaimer

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Version control:

Version	Date	Revision Details	Author	Reviewed By	Approved By
1	June 2010	Development of asset management plan	Jen Ison		
2	October 2012	Revision of asset management plan	G. Bebington	C Campbell	
3	October 2014	Revision of asset management plan	G. Bebington	A. Dreyer	
4	Feb 2016	Revision of asset management plan	G. Bebington	A Dreyer	
5.	Feb 2017	Revision of asset management plan	A.Priest	A.Dreyer	
6.	Dec 2017	Removed ref. to Noosa flood study in appendix.	A.Priest	A.Dreyer	

Contents

1 Executive Summary

1.1 What council provides

Council provides a Stormwater network to enable the delivery of a sustainable level of service to existing and future customers in the most cost effective way, while managing risk and adhering to statutory and legislative requirements. This Plan is intended to demonstrate how council will achieve this outcome by applying the principles of responsible asset management.

Council's Stormwater network has a current replacement value of $1.132 billion and a written down value of $896 million as at 30 June 2016.

This significant investment to council must be maintained and rehabilitated over the useful life of the assets, and future replacements must be forecast and financed. The current value includes the capitalised book value of built assets only, and excludes the value of natural and soft assets. Many of these assets are currently not capitalised, these include earcth channels, natural drainage lines and informal retardation and sediment basins. Other uncapitalised assets include: channel armouring, levee banks, weirs, flood bypass channels, and overland flow paths. Consequently it is likely that these have not previously been recognised by the financial management system, and have therefore not been properly funded. Although a basic estimate of their maintenance and rehabilitation requirements has been provided in this Plan, the data requires verification.

Although existing renewal forecasts do not accurately predict the year by year financial need, the overall average gap will still need to be addressed and provision made for addressing the shortfalls. It is expected that the proposed improvement plans outlined in Section 6 will enable more accurate short, medium and long term forecasting, when these plans are implemented. A large proportion of asset data still requires collection and/or verification. Until this is performed, it is not possible to accurately predict short and medium term rehabilitation requirements. The financials have therefore been calculated on the smoothed average rehabilitation requirements across the useful life of the assets, and do not necessarily reflect the actual year by year need.

Until the funding gap is closed, and any backlog eliminated, it should be noted that a corresponding decrease in all levels of service can be anticipated. This could be accompanied by an increased risk of premature asset failure, possible liability claims against council, and a likelihood of non-compliance with both statutory and legislative requirements. It is also not known whether the useful asset lives have been artificially shortened due to the previous under-funding and no allowance has been made for this in the estimates.

A relative unknown in predicting the useful life of an asset, is the issue of structural versus functional obsolescence. There is currently a rising trend in the number of assets having to be replaced well before the predicted date. Recent examples include the relining of old butt-jointed pipes which have collapsed, culvert replacement due to corrosive elements and undersized pipes and culvert crossings.

Occasionally an asset will also need to be replaced before the end of its useful life, due to it no longer providing the required level of service, despite its structural condition being sound. An example of this has been the recent relining of number a number of stormwater pipes, at a cost of $1.5 million, despite the pipes only having consumed approximately 40 per cent of their useful life. Due to the unpredictability of these failures, it is difficult to accurately make allowance for expenditure of this nature.

Council is currently preparing priority infrastructure plans which will identify the quantum of trunk infrastructure required to support the predicted growth in the region for the next 10 years. However, these plans do not identify the local infrastructure required, nor the ongoing costs associated with this increase in infrastructure. After the completion of the Priority Infrastructure Plan the financial forecasts will be reviewed to

ensure the predicted trunk infrastructure and the ongoing costs are included.

In preparing this asset management plan, it has come to light that council has limited information on current asset quantities and conditions. Despite the incomplete information available, it is predictable that network deterioration, asset growth and addressing the existing backlog of maintenance and rehabilitation, will require an increase in expenditure by up to 300 per cent per annum in the future. Although it is presently not possible to accurately determine at exactly what point this will become necessary, it is certain that the expenditure will need to be made available to ensure continued functionality of the Stormwater assets.

Continuous improvement of asset management processes, knowledge and data will result in more efficient service delivery and performance for council and its customers. Three improvement projects have been scoped for immediate implementation in the following financial year. These projects will improve council's processes, knowledge and data, and deliver the following benefits:

- Ensure that all drainage assets are identified and recorded
- Provide updated condition assessments
- Enable more accurate forecasting of future demand
- Identify risks and reduce council liability
- Establish more financially sustainable levels of service
- Ensure more reliable future capital works prioritisation
- Improve maintenance scheduling

This Plan will be reviewed on an ongoing basis as the assumptions forming the basis of the Plan are tested, and as better data becomes available. The financial forecasts will be reviewed on an annual basis and will be supplemented with additional information from the priority infrastructure plans

1.2 What does it cost?

There are two key indicators of cost to maintain the Stormwater network.

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

Projected maintenance and capital renewal expenditure – 1 Year

The life cycle cost to provide the Stormwater service is estimated at $18.6 million per annum. Council's planned life cycle expenditure for year one of the asset management plan is $8.058 million which gives a life cycle sustainability index of .43

Projected maintenance and capital renewal expenditure – 10 Year

The maintenance and capital renewal expenditure required to provide the Stormwater management service for the next 10 years is estimated at $116.8 million. This is an average of 11.7 million per annum.

Council's average annual maintenance and capital renewal expenditure for the next 10 years is $10.9 million, giving a 10 year sustainability index of .93.

1.3 Next steps

A number of the actions resulting from this Plan are:

1. Review of roles and responsibilities
2. Review of systems (linkages/dependencies)
3. Review current asset management processes
4. Knowledge of assets
    - Capture/verify data for all asset classes
    - Identify all natural assets (waterways, wetlands, etc.) and capture relevant details
    - Develop policy for asset management of natural assets

5. Levels of service
    - Develop process to review and set sustainable LOS, including public consultation
    - Formally authorise ‘Fit for Purpose’ designs where appropriate, for low risk projects, to help bridge the financial gap
    - Review process of drainage assessment for new developments and building certifications, to reduce comebacks
6. Condition assessments
    - Implement maintenance management system for each asset class with regular condition inspections.

2. INTRODUCTION

2.1 Background

This Plan is to demonstrate responsive management of assets (and services provided from assets), compliance with regulatory requirements, and to communicate funding required to provide the necessary levels of service. Modelling within this plan is completed to represent a ten year planning period, with a full revision of the plan every five years as a minimum and an update of financial elements completed annually.

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

- SCC Corporate Plan 2017 - 2021
- Transport Infrastructure Act 1994
- Local Government Act 2009
- Sunshine Coast Planning Scheme 2014
- SCC Operational Plans 2017/18

This Plan covers all council-owned stormwater infrastructures, this includes:

- Pipes >=300mm either RCP or HDPE (note: FRCP pipes will not be accepted unless approved by SMU)
- Pits
- Culverts/structures
- Open drains, this includes all variants of open drains
- Retardation basins
- Water quality devices including Gross Pollutant Traps (GPT's), bio-pods, sediment basins
- Miscellaneous infrastructure including all other stormwater-related assets such as floodways.

Table 2.1 Assets covered by this Plan using FAIM only data

Asset category	Dimension	Replacement value
Pipe	1122 Kilometres of pipe ranging from 300mm diameter to 3600mm diameter	$807,242,300.
Pit	Quantity 47,376	$174,725,715.
Culvert / structure	73.426 Kilometres of box culverts	$43,407,380.
Water quality	Quantity 1269	$106,839,151.
TOTAL		**$1,132,214,547.**

Asset Exclusions:

- Private stormwater infrastructure
    - Inter-allotment drainage infrastructure (all stormwater pipes less than 300mm diameter, with some cases of larger pipe sizes also in this category)
    - Roofwater drainage in private allotments, including all pipework and outlets to road kerb and channel
    - Stormwater infrastructure servicing private property
    - Rural driveway access pipes

    - Private waterways or informal open drains on private property
- Waterways administered by other Government Departments
    - Rivers and creeks – Department of Environment and Heritage Protection
    - Estuaries and open ocean – Department of Environment and Heritage Protection
    - Locks and weirs
    - Dams – Department of Natural Resources or in private ownership
    - Main Roads drainage infrastructure – Queensland Department of Main Roads
- Related drainage assets controlled by other council units:
    - Bridges
    - Canals and lakes
    - Natural areas with council as the Trustee, unless the area contains a formal constructed drain
    - Kerb and channel
    - Locks and weirs
    - Road table drains
    - Land component of drainage reserves and easements
    - Local area drains in council properties and parks
    - Flood warning system
- Swales:
    - These are generally intended to facilitate overland or inter-allotment flows. Most will not be required for Council drainage purposes, although they may be located within Council drainage easements. In such cases they are therefore designated as private drainage assets, to be maintained by the respective property owners as required.
    - There may be particular cases where Council does require ownership of swales and in all these instances prior written authorisation and acceptance must be sort from the manager of Transport Infrastructure Management. Where doubt exists, guidance from the Stormwater Management Unit should be obtained.

Key stakeholders in the preparation and implementation of this Plan are:

Stormwater Management Unit	• Asset custodian/manager • Responsible for the development and implementation of this asset management plan • 10 year Stormwater Capital Works program • Local area flooding and drainage investigations • Provide expert technical advice
Planning and Environment	• Strategic Flood Studies
Civil Asset Management	• Operate and maintain stormwater assets
Finance	• Annual and long term financial plan

Asset Management and Capital Plan Unit	• Corporate asset management leadership and capital planning advice
Sunshine Coast councillors	• Plan adoption and asset management leadership
Director – Infrastructure Services	• Executive management endorsement, sign off and executive ownership
Community	• Input into public documents and specific projects

2.2 Goals and objectives of asset management

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

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

- Taking a life cycle approach
- Developing cost-effective management strategies for the long term
- Providing a defined level of service and monitoring performance
- Understanding and meeting the demands of growth through demand management and infrastructure investment
- Managing risks associated with asset failures
- Sustainable use of physical resources
- Continuous improvement in asset management practices[1].

This Plan is prepared under the direction of council's vision, mission, goals and objectives.

Council's vision is:

"To be Australia's most sustainable region – healthy, smart, and creative".

Relevant council goals and objectives and how these are addressed in this Plan are outlined in Table 2.2.

Table 2.2 Council goals and how these are addressed in this Plan

Goal (theme)	Objective (emerging priorities)	How goal and objectives are addressed in AMP
Robust economy	Infrastructure for economic growth	Facilitate the delivery of key infrastructure projects for our preferred economic growth
Ecological sustainability	Environmentally friendly infrastructure and urban design	• Ensure new developments meet high standards of ecological sustainability and urban design • Develop guidelines to promote excellence in ecological sustainable development with

[1] IIMM 2006 Sec 1.1.3, p 1.3

Goal (theme)	Objective (emerging priorities)	How goal and objectives are addressed in AMP
		architects, designers, environmental groups and the development industry • Review council infrastructure plans, design standards and procurement policies to maximise sustainable outcomes
Innovation and creativity	Partnerships and alliances that drive innovation	Foster partnerships with governments, business and the community to encourage innovation and sustainability
Health and wellbeing	Safe and healthy communities	Manage community health risks and improve community health standards
Social cohesion	A sense of identity and belonging	Support community programs and infrastructure that encourage interaction, contribute to place making and a sense of community
Managing growth	Council's services and assets meet the needs of our growing community	• Determine the types and levels of services provided by council • Develop long term asset management plans which are linked to financial • Management plans • Maintain and renew council assets to agreed standards • Develop and implement five year and longer term rolling capital works programs according to strategic priorities
Great governance	Strong financial management	Develop long term financial plans and indicators to achieve optimum use of resources and alignment to strategic priorities

2.3 Plan framework

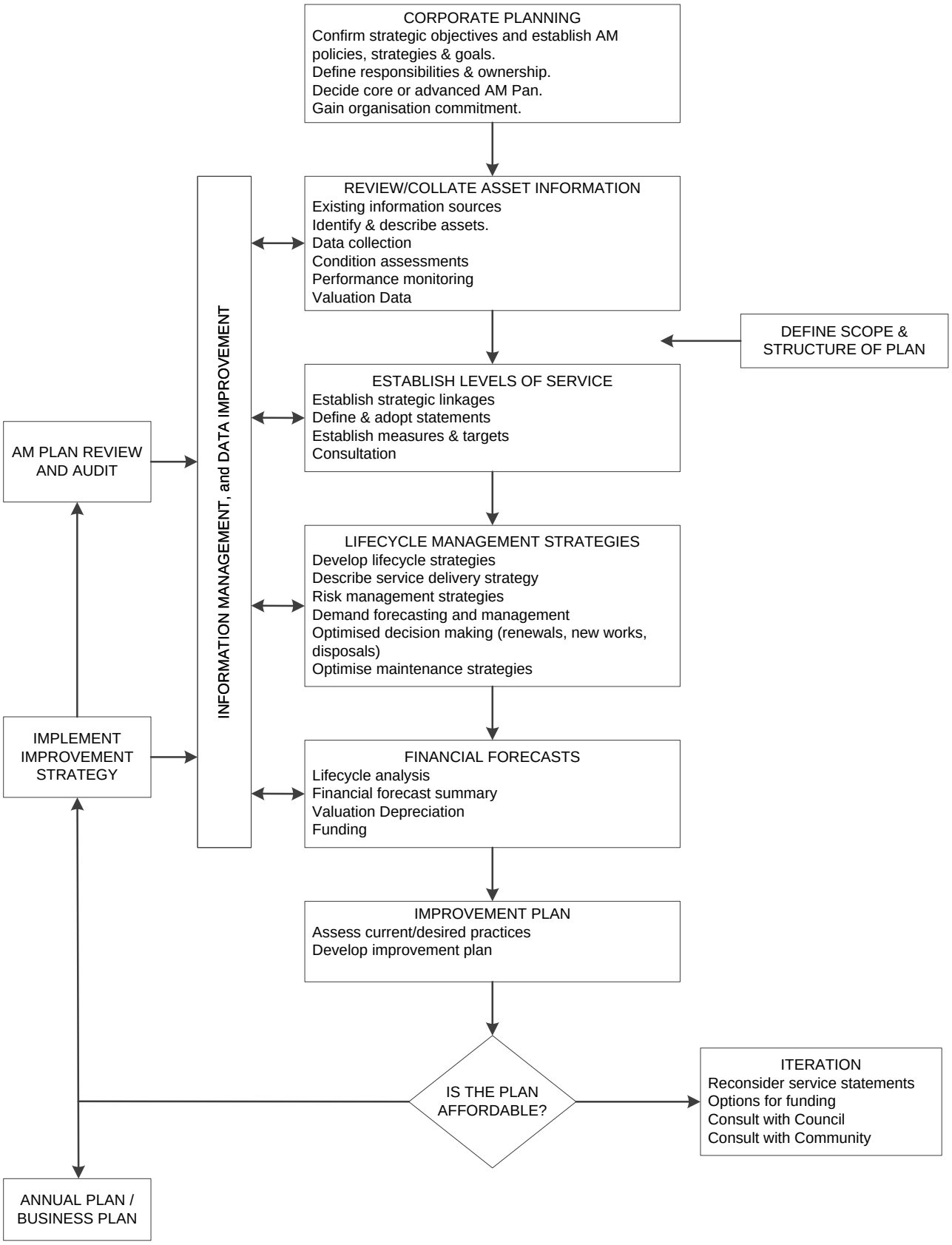
Key elements of the Plan are

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

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

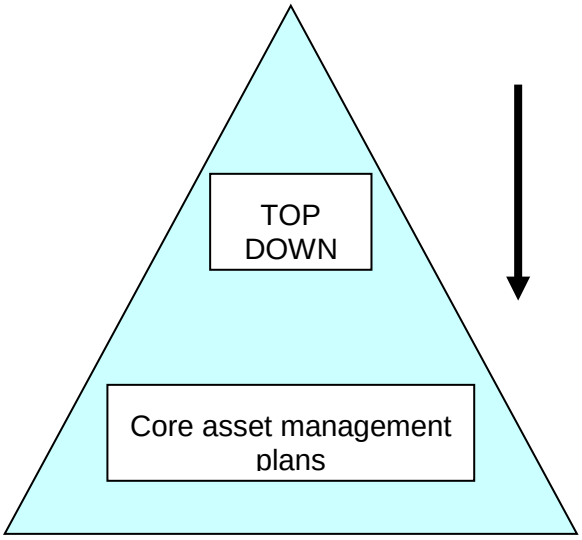
Road map for preparing an asset management plan

Source: IIMM Figure 1.5.1, p.1.11



2.4 Core and advanced asset management

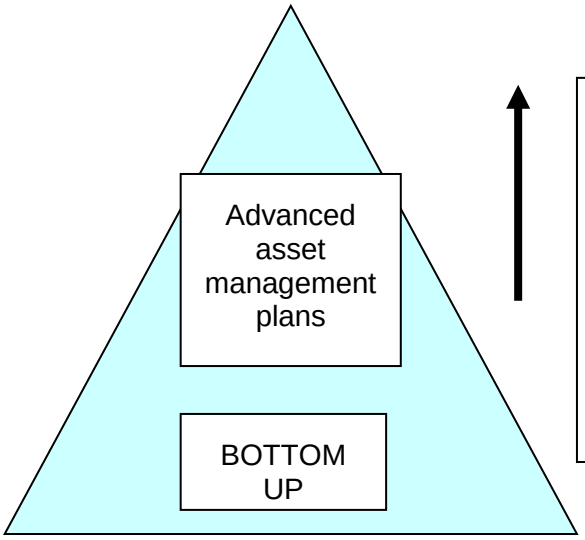
This Plan is prepared as a 'core' asset management plan in accordance with the International Infrastructure Management Manual (IIMM). It is prepared to meet minimum legislative and organisational requirements for sustainable service delivery and long term financial planning and reporting. Core asset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



Systems / knowledge approach

- Based on what we know
- Current financial and physical data
- Uses current levels of service (not desired)
- Inconsistent data sets a major constraint
- Provides a base to move forward
- Provides a detailed improvement plan

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



Asset / component data

- Finding out what we don't know
- Analysis to individual assets and services
- Support optimisation of activities and programs to meet desired levels of service
- Implemented improvement plan

3. LEVELS OF SERVICE

3.1 Customer research and expectations

Council has not carried out any research on customer expectations. This will be investigated for future updates of the Plan.

Table 3.1 Community satisfaction survey levels

Performance Measure	Satisfaction Level				
	Very satisfied	Fairly satisfied	Satisfied	Somewhat satisfied	Not satisfied
Community satisfaction with stormwater/drainage performance	This has currently not been measured and will be undertaken during the development of advanced asset management plans. Advanced plans to be implemented within the next 5 years.				

Council will use this information in developing the strategic management plan and in allocation of resources in the budget.

3.2 Legislative requirements

Council has to meet many legislative requirements including Australian and state legislation and state regulations. These are outlined in Table 3.2.

Table 3.2 Legislative requirements

Legislation	Requirement
Local Government Act	Sets out role, purpose, responsibilities and powers of local governments including the preparation of a long term financial plan supported by asset management plans for sustainable service delivery.
Disaster Management Act 2003	Sets out roles and responsibilities of local and state government in a disaster event.
Occupational Health & Safety Act	Sets out roles and responsibilities to secure the health, safety and welfare of persons at work
Environmental Protection Act	Sets out role, purpose, responsibilities to protect Queensland's environment while allowing for development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends
Water Act	Sets out role, purpose, responsibilities for the sustainable planning and management of the State's water resources.
Vegetation Management Act	The purpose of this Act is to regulate the clearing of vegetation
Sustainable Planning Act	Achieve sustainable planning outcomes through: Managing the process by which development takes place. Managing the effects of development on the environment. Continuing the coordination and integration of local, regional and state planning
Fisheries Act	The main purpose of this Act is to provide for the use, conservation and enhancement of the community's fisheries resources and fish habitats

3.3 Current levels of service

Council has defined service levels in two terms.

Community levels of service relates to how the community receives the service in terms of safety, quality, quantity, reliability, responsiveness, cost/efficiency and legislative compliance.

Table 3.3 Customer requirements

Requirement	Reference(s)
1. Safety, capacity, availability, functionality, condition,	Customer surveys, customer service requests, workshops, political direction, focus groups
2. No human risk	Customer Service Requests, Safety legislation
3. No inundation of property	Customer Service Requests, political direction
4. Water Quality	Customer Service Requests, focus groups

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

Service criteria	Technical measures may relate to:
Quality	Quality of open channel
Quantity	Meters of pipe in an area
Availability	Does an area have a formalised stormwater system
Safety	Number of risks/accidents reported

Council's current service levels are detailed in Table 3.3.1

Table 3.3.1 Current service levels – Stormwater

Asset Group	Key Performance Indicator	Level of Service	Performance Measure Process	Target Performance	Current Performance	Actions to meet Target Performance
Pipe, pit, culvert network and open drain network	1. Condition	Asset condition (Structural)	Programmed inspection regime	Inspection to meet AAS 27	2% CCTV inspections	Develop and implement inspection regimes
		Asset maintenance and rehabilitation (Functional)	Inspections	85% of assets better than specified intervention levels	Age based asset info, reactive maintenance	Develop and implement asset rehab program
	2. Capacity	Compliance with flood study recommendations	Audit	95% compliance	80% compliance, (estimate) not audited	Accelerate network upgrade over next 5 years
	3. Customer satisfaction	Meet response times	Response time	CSR response and evaluation < 15 working days	Response < 20 days	Improve evaluation and response times
Open drain and water quality Retardation basins, sediment basins	1. Condition	Asset condition (Structural)	Programmed inspection regime	Inspection to meet AAS 27	5% inspections	Develop and implement inspections
		Asset maintenance and rehabilitation (Functional)	Inspections	85% of assets better than specified intervention levels	Age based asset info, reactive maintenance	Develop and implement asset rehab program
	2. Capacity	Compliance with flood study recommendations	Audit	95% compliance	80% compliance, (estimate) not audited	Accelerate network upgrade over next 5 years
	GPT/Functionality	Water Sensitive Urban Design (WSUD)	Inspection and testing	85% compliance	Quarterley inspections on identified site	Inspect and maintain
	SQID Performance	Compliance with Water Quality Objectives	Inspections and testing	95% compliance	80% (estimate), ot measured	Implement inspection and testing regime, provide maintenance

Asset group	Key Performance Indicator	Level of service	Performance measure process	Target performance	Current performance	Actions to meet target performance
Miscellaneous infrastructure	1. Public safety	Lowest sustainable human risk	Safety audit	Disaster management standards	Not measured	Expand network, then maintain
	2. Disaster Management Plan	Legislative	Compliance audit	100% compliance	80% compliance, estimate	Install backup and SES link
	Condition, capacity	Compliance with required LOS	Inspection, performance to AAS 27 requirements	95% compliance	Not measured	Develop and implement inspect and maintain
						TOTAL REQUIRED Funds and Resources

3.4 Desired levels of service

At present, indications of desired levels of service are obtained from various sources including residents' feedback to councillors and staff, service requests and correspondence. Council has yet to quantify desired levels of service. This will be done in future revisions of this Plan.

4. FUTURE DEMAND

4.1 Demand forecast

There are a number of unique factors that directly impact on the demand for stormwater drainage infrastructure and services. These factors include:

- Climate change and weather patterns – long and short term
- Population growth
- Development – new and in-fill
- Increased legislative demands
- Increased environmental demands
- Increased demand for asset rehabilitation and maintenance
- Increased risk of failure in ageing infrastructure
- More sophisticated flood predictions
- Increased demand for customer service
- Increased resource demands for above

Demand factor trends and impacts on service delivery are summarised in Table 4.1.

Table 4.1 Demand factors, projections and impact on services

Demand factor	Present position		Projection		Impact on services
Population	278,202 (2013) *adjusted to align with the new de-amalgamated LGA boundary as of 1 January 2014		508,000 (2031)		• Increased runoff from urbanisation. • Reduced natural area runoff • Expectation of higher maintenance service levels • Higher demand on existing stormwater network capacity. • Increase of pollutants entering stormwater system
Demographics	16% over 65 years old 1.5% over 85 years old 24% under 18 years old		21.7% over 65 years old 3.2% over 85 years old 21% under 18 years old		AS above
Number persons/household	23%	1 person	23%	1 person	Higher demand on existing stormwater network capacity.
	40%	2 person	40%	2 person	
	15%	3 person	15%	3 person	
	15%	4 person	15%	4 person	
	6%	5 person	6%	5 person	

4.2 Changes in technology

Technology changes are forecast to have some potential effect on the delivery of services covered by this Plan. Historically changes in technology have had the effect of reducing whole-of-life costs. Changes in technology will be embraced where possible to reduce future whole-of-life costs.

Table 4.2 Changes in technology and forecast effect on service delivery

Technology change	Effect on service delivery
Trenchless technology & pipe relining	Less disturbance in high populated areas
Water sensitive urban design	Higher maintenance and replacement costs, unclear design life and more bio-pods
Sustainable designs of stormwater infrastructure both new and retrofitting	Initial high cost to install Once installed low replacement and maintenance cost.
Advanced design on GPT's	Better water capture of pollutants and easier methods to clean and clear or more complicated
Advanced water harvesting systems	Initial high cost to install Resale of water potential revenue income for council Higher cost to monitor water quality

4.3 Demand management plan

Council currently broadly identifies demand forecast through the following strategies:

- Infrastructure Charges Scheme
- South East Queensland Regional Plan
- Urban Stormwater Management Plan
- Urban Stormwater Strategy
- Adopted flood studies (See appendix 1 for list)
- 10 year Capital Works Program
- SCC Corporate Plan 2014 - 2019
- SCC Operational Plans 2016/17

Some detailed demand forecasting is currently performed through the:

- Long term financial plan
- Current flood studies

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

Opportunities identified to date for demand management are shown in Table 4.3. Further opportunities will be developed in future revisions of this Plan.

Table 4.3 Demand management plan summary

Service activity	Demand management plan
Climate change and weather patterns – long and short term	To be developed
Population growth	To be developed
Development – new and in-fill	To be developed
Increased legislative demands	To be developed
Increased environmental demands	To be developed
Increased demands for asset rehabilitation and maintenance	To be developed
Increased risk of failure in ageing infrastructure	To be developed
Functional obsolescence of existing services	To be developed
More sophisticated flood predictions	To be developed
Increased demand for customer service	To be developed
Increased resourcing demands for above	To be developed
Stormwater drainage	New developments to include onsite retention of stormwater flows to limit discharge to existing discharge flows Water harvesting options to be investigated with each new development
Maintenance of stormwater drainage network	SCC Corporate Plan 2014 - 2019 SCC Operational Plans 2016/17 SCC Budget 2016/17 and outyears

4.4 New assets from growth

The new assets required to meet growth will be acquired from land developments such as the growth of Caloundra South etc. It is currently estimated that council acquires on average $18 million per annum of new stormwater assets through development, with an anticipation that this will increase over the life of this Plan. Uncertainty regarding the type of assets which may be provided through such developments such as Caloundra South, has the potential to greatly increase whole-of-life costs into the future depending on the type and number of assets which council will acquire.

Acquiring these new assets will commit council to fund ongoing operations and maintenance costs for the period that the service provided from the assets is required. These future costs are identified and considered in developing forecasts of future operating and maintenance costs. Further work needs to be undertaken to validate.

5 Life cycle management plan

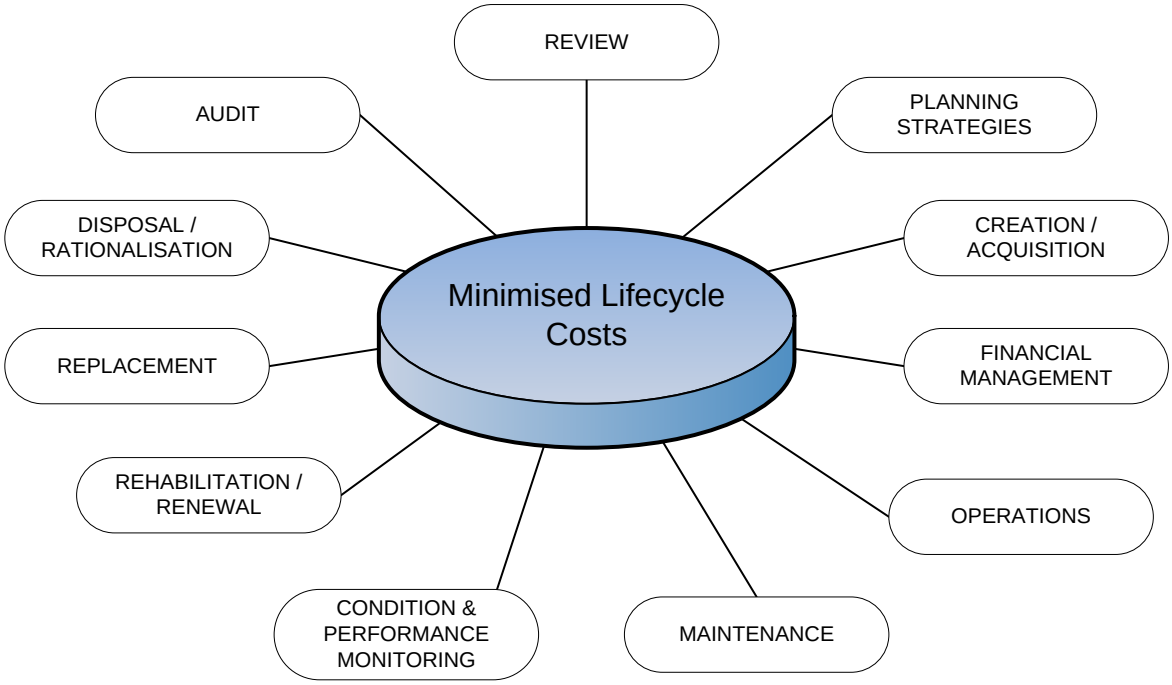
The life cycle management plan details how council plans to manage and operate the assets at the agreed levels of service (defined in Section 3) while minimising life cycle costs.

5.1 Background data

Life cycle asset management takes account of the whole-of-life implications for acquiring, operating, maintaining and disposing of Waste and Resources assets. The objectives of life cycle planning are to:

- Establish the total cost of an asset over its useful life
- Establish a sound basis on which asset management decisions are made
- Plan for the impact of refurbishment, maintenance, and renewals
- Increase the service delivery capacity for the asset

The standard asset's life cycle costs are depicted in the following diagram:



5.1.1 Physical parameters

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

Pipe	Diameters from 300mm to 3600mm
Pit	Includes manholes, junctions, end caps
Culvert / structure	Box and pipe culverts Includes headwalls, wingwalls and aprons
Open drain	All types of open drains
Water quality	Water quality devices including bio pods, SQIDS and GPTs
Miscellaneous infrastructure	Floodways

The typical asset life for each asset category is shown in Table 5.1.1 and is based on:

- GIS data – we have the most confidence in this data set
- Table below identifies the useful lives currently adopted by council for the Stormwater assets. Useful lives are on best practice based on information from industrial groups such as the Institute of Public Works Engineers, Australia (IPWEA).

Table 5.1.1 typical useful life

Asset group	Asset type	Useful life
Piped network	AC pipe	70
	Concrete pipe	70
	uPVC	70
	HDPE	70
Pits	Pits, inlets, outlets and endwalls	50
Culverts / structures	Culverts - box and pipe	70
Open drain	Concrete/rock constructed drain	70
	Earth and vegetated drains (surface only)	25
	Canals, revetment walls, weirs, channel armouring, levee banks	50
Water quality - Natural	Detention basins, overland flowpaths, and drainage reserves	25
- Artificial	Concrete Stormwater Quality Improvement Device (SQID)	50
Miscellaneous	Floodways	50

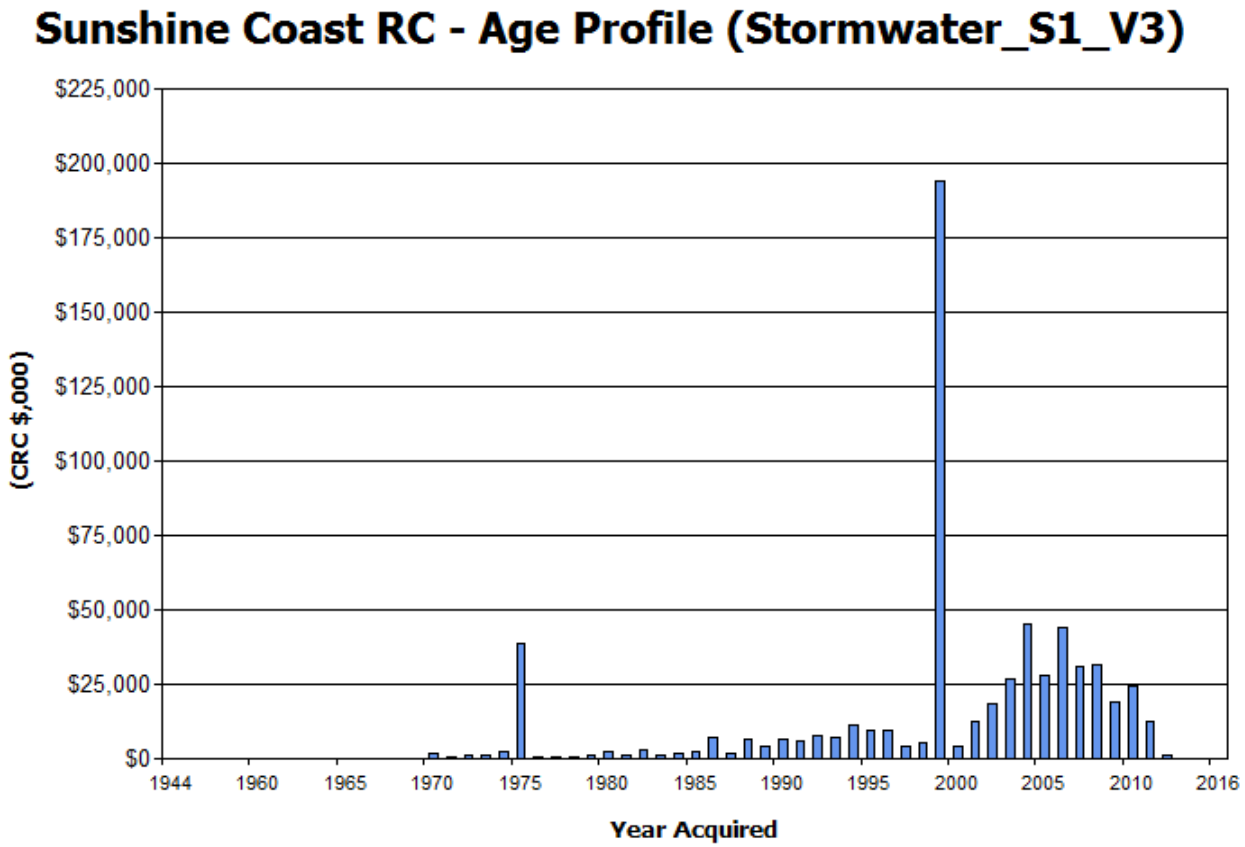


Figure 2 Asset age profile

Acquisition dates of assets and financial asset write on processes needs to be reviewed as a part of the improvement plan, especially for the years 2004-2005. It is evident that a large quantity of existing assets were entered into the financial asset management system in this period, this appears to be based on the asset recognition date and not the date that the assets were constructed.

The age profile of council's assets (based on data from council's financial asset register and GIS) is shown in Figure 2.

5.1.2 Asset capacity and performance

Council's services are generally provided to meet design standards where these are available.

Locations where deficiencies in service performance are known are detailed in Table 5.1.2.

Table 5.1.2 Known service performance deficiencies

Location	Service deficiency
Whole of council	Water quality
Whole of council	Stormwater reuse
Whole of council	Asset renewal/replacement
Whole of council	Asset condition inspections
Whole of council	Asset inspection and maintenance work

The above service deficiencies were identified from historical records, GIS and local knowledge by council staff.

5.1.3 Asset condition

- Current age profiles may not be accurate, particularly with pre-1970 built assets, as in some cases the date of construction is estimated not actual

- Current conditions are generally estimated or unknown, due to existing inspections not covering the full asset range, or not being fully documented. This applies to both built and natural assets.
- Existing asset data is incomplete, as many asset groups e.g. open drains, natural waterways, wetlands, are not presently listed. This is due primarily to the current systems not capturing these asset classes.
- Condition is measured using 1–5 scale.

5.1.4 Asset valuations

The value of assets as at 30 June 2016 covered by this Plan is summarised below. Assets were last valued at 30 June 2016. Assets are valued at Greenfield rates.

Current replacement cost	$ 1.132 Billion
Depreciated replacement cost	$ 896 million
Annual depreciation expense:	$ 11.7 million

*** Note: The currently identified open drain network is estimated to only represent 20 per cent of the actual.**

Council's sustainability reporting reports the rate of annual asset consumption and compares this to asset renewal and asset upgrade and expansion.

Asset consumption	1.00 per cent of depreciation amount (annual depreciation expense/depreciable amount)
Asset renewal	0.30 per cent of depreciable amount (annual capital renewal expenditure/ depreciable amount)
Annual upgrade/expansion	0.30 per cent of depreciable amount

5.2 Risk management plan

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

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

Table 5.2 Critical risks and treatment plans

Asset at risk	What can happen	Risk rating (VH, H)	Risk treatment plan
Stormwater pipe network including culverts and pits	Collapse, blockage, flooding	H	CCTV condition inspection program, maintenance program to be audited and assessed and renewal program to be adjusted to priorities problem areas. Asset management program to be implemented to assist with the above.
New donated assets	Incorrect asset information and incorrect design	H	Greater involvement by asset owner at development assessment, construction and handover stages to rectify design faults before completion of project, DA staff looking after stormwater to consult with asset owners
Open drain	Erosion, bank collapse, property flooding	H	Detailed mapping and maintenance schedule to be developed
Overland flow paths	Properties and roads can be flooded	H	All significant overland flow paths to be mapped.

5.3 Routine maintenance plan

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

5.3.1 Maintenance plan

Maintenance includes reactive, planned and cyclic maintenance work activities.

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

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

Cyclic maintenance is replacement of higher value components/sub-components of assets that is undertaken on a regular cycle including manhole lid replacement, road inlet repairs, culvert repairs, etc. This work generally falls below the capital/maintenance threshold.

Maintenance expenditure trends are shown in Table 5.3.1

Table 5.3.1 Maintenance expenditure trends

Year	Maintenance expenditure (includes reactive, planned and cyclic)
2014/15	$ 4.9 mil
2015/16	$5,1 mil
2016/17	$ 5.0 mil

Council's current level of data capture does not allow for a break-up of the maintenance activities. The new SAM system should assist with collecting this data in future.

Maintenance expenditure levels are considered to be inadequate to meet required service levels. Future revision of this asset management plan will include linking required maintenance expenditures with required service levels.

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

5.3.2 Maintenance issues

Currently, some key issues which impact on maintenance are:

- Lack of a maintenance management system and accurate asset database
- High proportion of asset types not listed on asset database
- High proportion of customer service requests and emergent drainage issues
- Available resources
- Disposal of SQID contaminants
- Maintenance budgets

5.3.3 Strategies

The table below identifies the various maintenance strategies, both implemented and potential future directions of council.

Strategy / objective	Activities	References
To Implement a Strategic Asset Management (SAM) system.	Obtain required resources. Planned regular inspections, documenting defects. Prioritisation of works. Provide monthly maintenance schedules. Recording of maintenance performed and materials used. Forecast expenses and replacement of assets.	International Infrastructure Management Manual

5.3.4 Current activities

Council's current maintenance and operation activities are detailed below.

Asset group / type	Major maintenance actions	Frequency	LOS satisfied
GPTs / SQIDs	Cleaning	As per schedule	Performance
Piped network and open drain network	CCTV inspections, routine maintenance, repairs.	Some scheduled Mostly irregular reactive	Condition Condition/performance Customer satisfaction
Other	Various	Mostly reactive	Performance

5.3.5 Standards and specifications

Maintenance work is carried out in accordance with the following standards and specifications:

- Current work instructions
- Service Level Agreements
- Main Roads Technical Specification
- AusSpec Specifications
- IPWEAQ Standard Engineering Drawings
- Manual of Uniform Traffic Control Devices

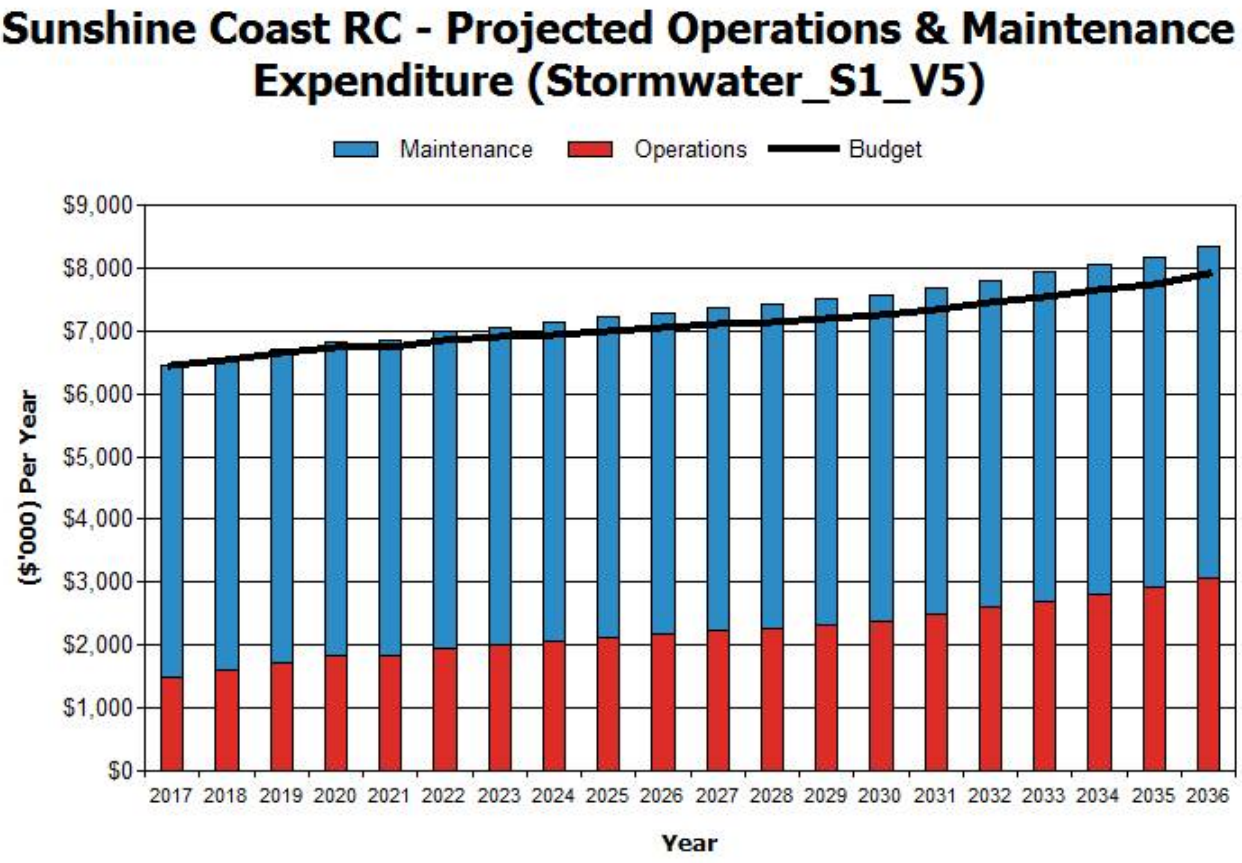


Figure 4 Current planned maintenance expenditure

5.3.6 Summary of future maintenance expenditures

Future maintenance expenditure is forecast to trend in line with the value of the asset stock as shown in Figure 4. Note that all costs are shown in current 2012 dollar values. Further validation of maintenance costs needs to be undertaken once the impact on type and number of assets from the development are known.

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

Maintenance is funded from council's operating budget. This is further discussed in Section 6.2.

5.4 Renewal / replacement plan

Renewal expenditure is major work which does not increase the assets' design capacity but restores, rehabilitates, replaces or renews an existing asset to its original service potential. Work over and above restoring an asset to original service potential is upgrade/expansion or new works expenditure.

Key issues affecting future rehabilitation and renewal of drainage assets are:

- Existing database not a true reflection of stormwater assets
- Renewal cost not reflecting total costs such as planning and design fees, environmental considerations, project supervision etc.
- Statutory or legislative requirements
- 'Fit for purpose' options
- Depreciation strategies
- Environmental issues
- Unrealistic public expectation in certain cases
- Ownership issues pertaining to natural drainage lines.

5.4.1 Rehabilitation / renewal strategies

The table below identifies the various rehabilitation and renewal strategies, both implemented and potential future directions of council.

Strategy / Objective	Activities	References
Implement a strategic asset management system enabling development of a suitable asset register, database, and strategic asset management planning and modelling.	Record current condition, historical information, analysis. Look at revegetating new and rehabilitation projects with native species	Asset register/database
To develop an optimised rehabilitation/renewal program based on condition data & deterioration modelling.	Record maintenance/operational costs against an asset and loaded into new SAM software.	New strategic asset management (SAM) system
To obtain sufficient resources to maintain/provide the specified levels of service	Provide detailed renewal financial requirements and condition inspections	SCRC City Plan/Financial Plan

5.4.2 Current activities

Council's current rehabilitation / renewal activities are detailed below.

Asset group/type	Renewal timing	Comment	LOS satisfied
Piped network system	Renewal/replacement of pipes where identified for replacement through inspections, flood studies or CRMs	Generally subjective at present - combination of pro-active and re-active	Condition / performance / customer satisfaction
Culverts and pits	Renewal/replacement of pipes where identified for replacement through inspections, flood studies or CRMs	Generally subjective at present - combination of pro-active and re-active	Condition / performance / customer satisfaction
Open drain network	Rehabilitation of open drains, wetlands, sediment basins where identified through inspections or water quality objectives	Generally subjective at present - combination of pro-active and re-active	Condition / performance / customer satisfaction
Water quality	Renewal/replacement of SQIDs where identified through inspections or CRMs	Some programmed through flood studies and inspections, otherwise generally re-active	Some measured against flood study recommendations, otherwise not measured
Other	Floodways Various	Meteorology recommendations Generally re-active	Performance Not measured

5.4.3 Renewal plan

Assets requiring renewal are identified from estimates of remaining life obtained from council's financial asset register. Renewal projects are inspected to verify if the asset is still required; the accuracy of remaining life estimate, and to develop a preliminary renewal estimate. Verified proposals are ranked by priority and available funds and scheduled in council's 10 year Capital Works Program. The priority ranking criteria is detailed in Table 5.4.3.

Table 5.4.3 Renewal / rehabilitation - Stormwater priority ranking criteria

Criteria	Weighting
Community / social benefit	5%
Corporate alignment	20%
Risk assessment	25%
Financial considerations	10%
Environmental impacts	20%
Economic benefits	10%
Demand	10%
TOTAL	100%

Renewal will be undertaken using the most cost effective renewal methods where practical.

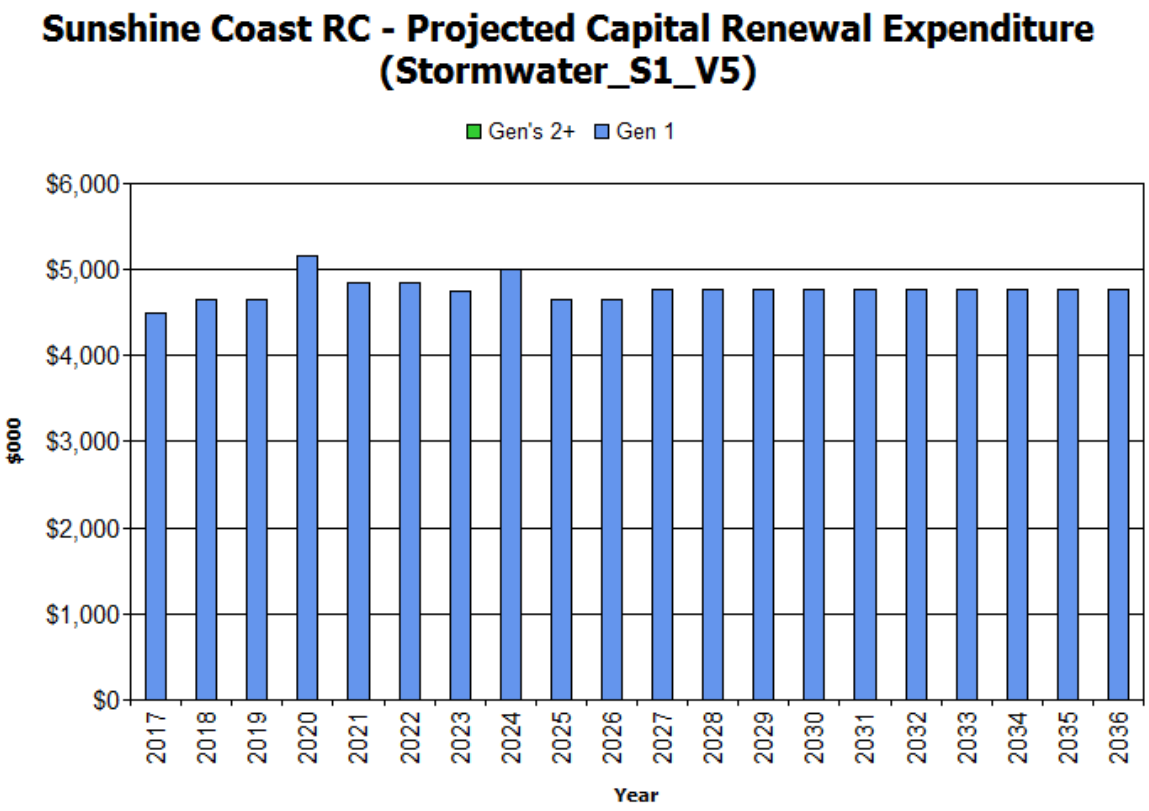


Figure 5 Projected Capital Renewal Expenditure

5.4.4 Renewal standards

Renewal work is carried out in carried out in accordance with the following standards and specifications.

- Stormwater drainage assets will be kept in a serviceable condition
- Priority will be given to defects likely to result in public injury
- SQIDS/GPT/Baskets will be maintained to prevent infiltration to natural systems

5.4.5 Summary of future renewal expenditure

Projected future renewal expenditures are forecast to increase over time as the asset stock ages. The costs are summarised in Figure 5. Note that all costs are shown in current 2014 dollar values.

The projected capital renewal program is shown in Appendix B.

Unfunded renewal, i.e. those assets identified for renewal and not scheduled for renewal in capital works programs are to be included in the risk assessment process in the risk management plan.

With an ongoing pipe assessment program started in 2014/15 financial year it has been noted that the stormwater pipe network will need upgrading / renewal early than forecasted.

Renewals are to be funded from council's capital works program and grants where available. This is further discussed in Section 6.2.

5.5 Creation / acquisition / upgrade plan

New works are those works that create a new asset that did not previously exist, or works which upgrade or improve an existing asset beyond its existing capacity. They may result from growth, increase in level of service, social or environmental needs. Assets may also be acquired at no cost to council from land development. These assets from growth are considered and discussed in Section 4.4.

5.5.1 Creation / acquisition / augmentation strategies

Table 5.5.1 identifies the various creation/acquisition/augmentation strategies, both implemented and potential future directions of council.

Table 5.5.1 Stormwater current strategies

Strategy / objective	Activities	References
To identify the drainage and water quality assets which will be required to service development and population growth in the next 20 years.	TIP to develop LGIP plans for all drainage assets to accommodate future growth	SCRC Corporate Plan, LGIP – stormwater drainage and water quality objectives.
To profile the gap between desired standard and existing standard and determine funding requirements	Undertake a full analysis of the drainage network based on current standards compared to desired standards.	SCRC Corporate Plan/MMS/ asset registers

5.5.2 Current activities

Council's current creation/acquisition/augmentation activities are detailed in Table 5.5.2.

Table 5.5.2 Stormwater current activities

Asset group / type	New capital project timing	Growth/development supported	LOS satisfied
All	Capital works projects detailed within the program spreadsheets, prioritised in accordance with the Prioritisation Assessment	Population/tourism growth	Legislative requirements met, SCRC Corporate Plan met, and agreed Customer Satisfaction ratings.

5.5.3 Summary of creation / acquisition / augmentation costs

Council will fund creation / acquisition / augmentation costs from a variety of funding sources. This will include:

- Loans
- Infrastructure charges from new development
- Depreciation for the consumed asset replacement associated with an augmentation project
- General rates
- External funding sources.

5.5.4 Selection criteria

New assets and upgrade / expansion of existing assets are identified from various sources such as councillor or community requests, proposals identified by strategic plans or partnerships with other organisations. Candidate proposals are inspected to verify need and to develop a preliminary renewal estimate. Verified proposals are ranked by priority and available funds and scheduled in future works programmes. The priority ranking criteria is detailed below.

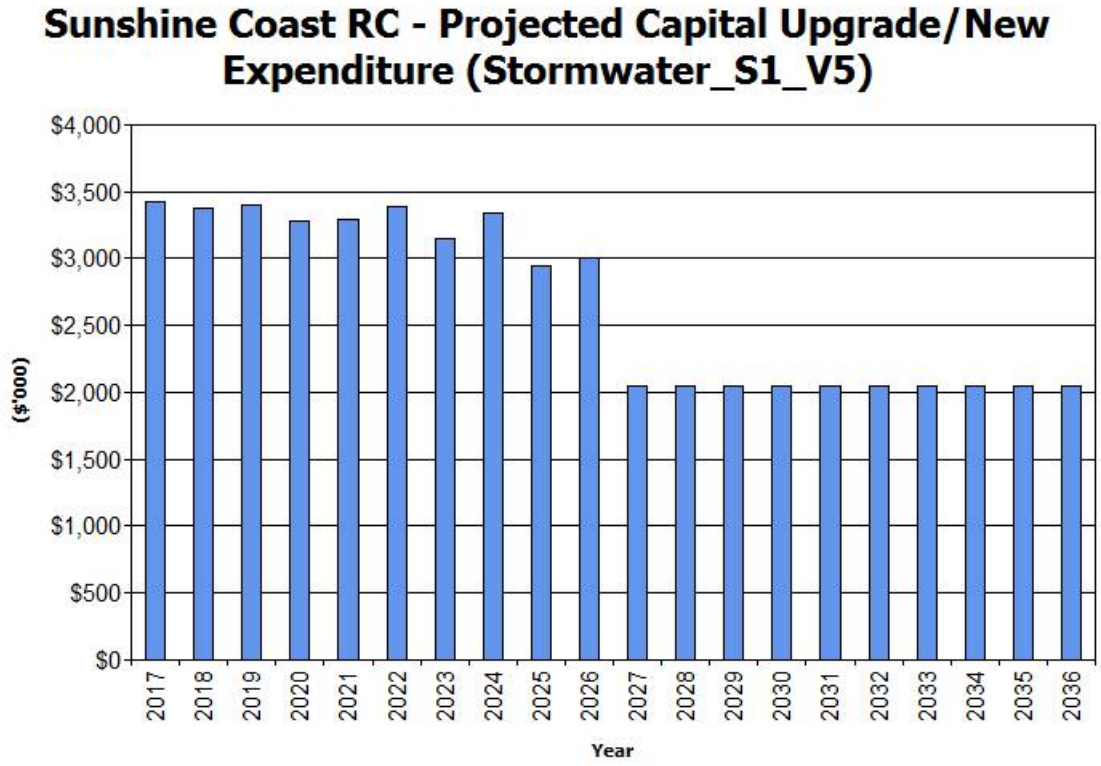


Figure 6

Projected Capital Upgrade/New Expenditure

Table 5.5.4 New – Stormwater priority ranking criteria

Criteria	Weighting
Community / social benefit	5%
Corporate alignment	20%
Risk assessment	25%
Financial considerations	10%
Environmental impacts	20%
Economic benefits	10%
Demand	10%
TOTAL	**100%**

Listed below are a number of known new capital projects and augmentation.

Note: The costs are estimates only, and include planning, design and construction, but do not include any life cycle costs.

Table 5.4.2 New – New Capital Projects and Augmentation

Asset group / type	Indicative creation year	Comments	Capital cost
Pipe network	2014 to 2020	Stormwater pipe relining program from CCTV program	$2,000,000 annually
Pipe and box culvert	2014 to 2020	Upgraded network from inspection program or flood studies	$600,000
Pipe network	2015	Region wide – augment pipe network	$1,200,000
Water Quality	2015 to 2019	Region wide water quality improvement	$150,000
Water quality	2017/18	Currimundi Lake / Mooloolah River water quality improvement	$100,000
Pipe network	2018/19	Kings Beach network upgrade	$1,350,000

5.5.5 Standards and specifications

Standards and specifications for new assets and for upgrade/expansion of existing assets are the same as those for renewal shown in Section 5.4.2.

5.5.6 Summary of future upgrade/new assets expenditure

Planned upgrade / new asset expenditures are summarised in Figure 6. The planned upgrade/new capital works program is shown in Appendix C. All costs are shown in current 2010 dollar values. New assets and services are to be funded from council's Capital Works Program and grants where available. This is further discussed in Section 6.2.

5.6 Disposal plan

Disposal includes any activity associated with disposal of a decommissioned asset including sale, demolition or relocation. Assets identified for possible decommissioning and disposal are shown in Table 5.6. These assets will be further reinvestigated to determine the required levels of service and see what options are available for alternate service delivery, if any.

Table 5.6 Assets identified for disposal

Asset	Reason for disposal	Comments	Cash flow from disposal
Piped system, culverts, pits, SQIDs	As per MMS/asset register/ database	Remove to landfill	nil
Open drain	As per MMS/asset register/ database	Reuse as fill where possible	nil

Where cash flow projections from asset disposals are not available, these will be developed in future revisions of this asset management plan.

6. FINANCIAL SUMMARY

This section contains the financial requirements resulting from all the information presented in the previous sections of this Plan.

As no maintenance management system currently exists to more accurately forecast financial requirements for stormwater drainage, the predictions are based on smoothed averages for all asset groups. The forecasts therefore are unable to identify any crests and troughs in future years, but are merely an average of the forecast across the useful life of the assets.

The financial projections will be improved as further information becomes available on desired levels of service and current and projected future asset performance.

6.1 Financial statements and projections

The financial projections are shown in Figure 7 for planned operating (operations and maintenance) and capital expenditure (renewal and upgrade/expansion/new assets).

Note that all costs are shown in current 2016/2017 dollar values.

6.1.1 Sustainability of service delivery

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

Long term - life cycle cost

Life cycle costs (or whole-of-life costs) are the average costs that are required to sustain the service levels over the longest asset life. Life cycle costs include maintenance and asset consumption (depreciation expense).

Life cycle costs can be compared to life cycle expenditure to give an indicator of sustainability in service provision. Life cycle expenditure includes maintenance plus capital renewal expenditure. Life cycle expenditure will vary depending on the timing of asset renewals.

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

The life cycle gap for services covered by this asset management plan is $7.7 million per annum.

Medium term – 10 year financial planning period

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

This may be compared to existing or planned expenditures in the 20 year period to identify any gap. In a core asset management plan, a gap is generally due to increasing asset renewals.

Figure 8 shows the projected asset renewals in the 20 year planning period from the asset register. The projected asset renewals are compared to planned renewal expenditure in the Capital Works Program and capital renewal expenditure in year one of the planning period as shown in Figure 7. Table 6.1.1 shows the annual and cumulative funding gap between projected and planned renewals.

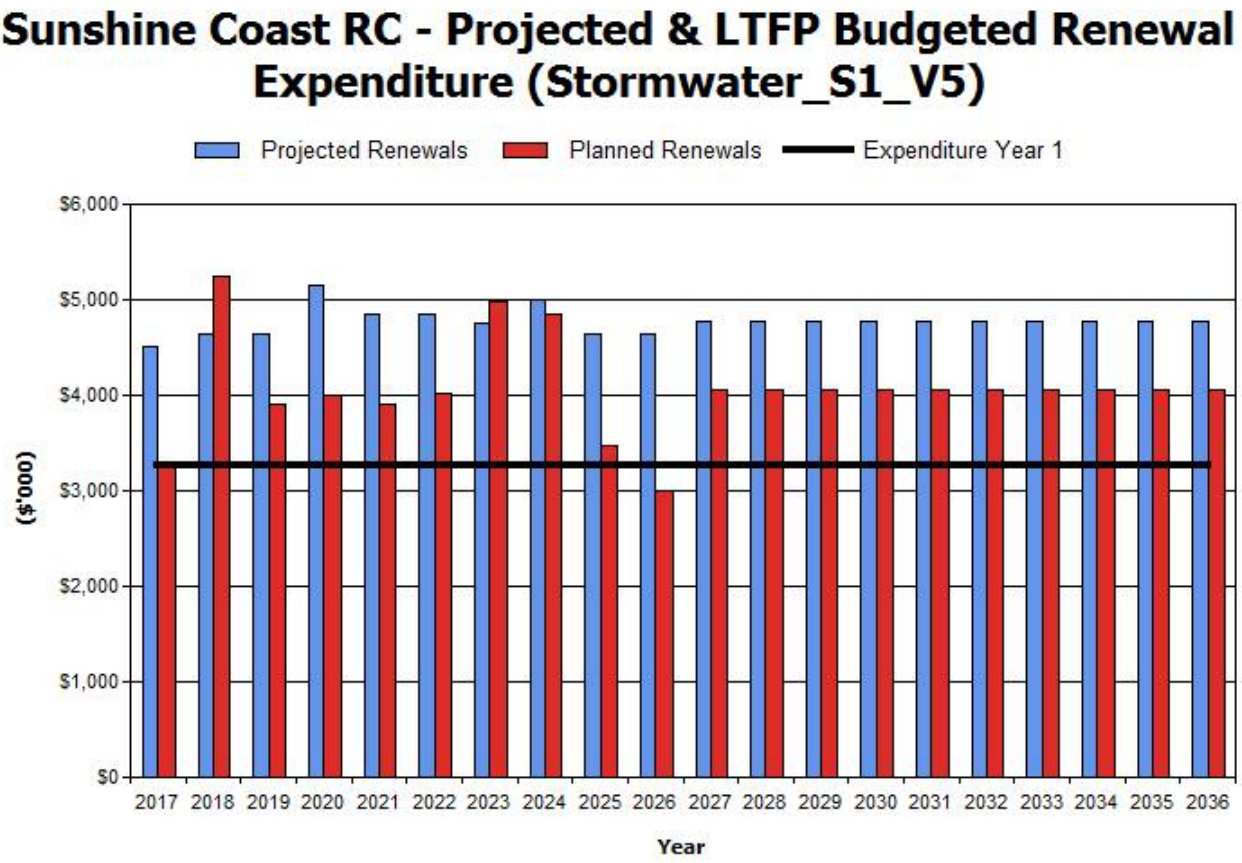


Figure 7 Projected and Budget expenditure

Table 6.1.1 shows the gap between projected and planned renewals.

Table 6.1.1 Projected and planned renewals and expenditure gap

Year End June 30	Total Operations Expenditure ($'000)	Total Maintenance Expenditure ($'000)	Projected Capital Renewal Expenditure ($'000)	Planned Capital Upgrade/New Expenditure ($'000)	Planned Disposals ($'000)	Planned Capital Renewal Expenditure ($'000)	Shortfall in Renewal Expenditure (Projected - Planned) ($'000)	Cumulative Renewal Funding Shortfall ($'000)
2014	$426.01	$7,061.49	$0.00	$900.00	$0.00	$3,053.00	-$3,053.00	-$5,850.01
2015	$433.29	$7,140.59	$0.00	$500.00	$0.00	$2,581.00	-$2,581.00	-$8,431.01
2016	$440.72	$7,221.26	$0.00	$750.00	$0.00	$2,435.00	-$2,435.00	-$10,866.01
2017	$448.22	$7,302.79	$641.94	$830.00	$0.00	$2,010.00	-$1,368.06	-$12,234.07
2018	$456.08	$7,388.19	$45.50	$1,630.00	$0.00	$2,205.00	-$2,159.50	-$14,393.57
2019	$463.72	$7,471.29	$2.00	$945.00	$0.00	$2,285.00	-$2,283.00	-$16,676.57
2020	$471.73	$7,558.24	$75.60	$1,740.00	$0.00	$2,119.00	-$2,043.40	-$18,719.97
2021	$479.95	$7,647.57	$39.27	$2,180.00	$0.00	$2,570.00	-$2,530.73	-$21,250.70
2022	$488.25	$7,737.84	$4.38	$2,270.00	$0.00	$2,726.00	-$2,721.62	-$23,972.32
2023	$496.61	$7,828.68	$22.79	$2,270.00	$0.00	$2,726.00	-$2,703.21	-$26,675.53
2024	$505.03	$7,920.09	$33.07	$2,270.00	$0.00	$2,726.00	-$2,692.93	-$29,368.46
2025	$513.49	$8,012.09	$72.29	$2,270.00	$0.00	$2,726.00	-$2,653.71	-$32,022.17
2026	$522.01	$8,104.68	$30.65	$2,270.00	$0.00	$2,726.00	-$2,695.35	-$34,717.52
2027	$530.59	$8,197.87	$1,352.74	$2,270.00	$0.00	$2,726.00	-$1,373.26	-$36,090.78

Year End June 30	Total Operations Expenditure ($'000)	Total Maintenance Expenditure ($'000)	Projected Capital Renewal Expenditure ($'000)	Planned Capital Upgrade/New Expenditure ($'000)	Planned Disposals ($'000)	Planned Capital Renewal Expenditure ($'000)	Shortfall in Renewal Expenditure (Projected - Planned) ($'000)	Cumulative Renewal Funding Shortfall ($'000)
2028	$539.22	$8,291.66	$224.35	$2,270.00	$0.00	$2,726.00	-$2,501.65	-$38,592.43
2029	$547.91	$8,386.06	$43.99	$2,270.00	$0.00	$2,726.00	-$2,682.01	-$41,274.45
2030	$556.65	$8,481.07	$31.72	$2,270.00	$0.00	$2,726.00	-$2,694.28	-$43,968.72
2031	$565.45	$8,576.71	$1.02	$2,270.00	$0.00	$2,726.00	-$2,724.98	-$46,693.70
2032	$574.31	$8,672.97	$40.75	$2,270.00	$0.00	$2,726.00	-$2,685.25	-$49,378.94

Providing services in a sustainable manner will require matching of projected asset renewals to meet agreed service levels with planned capital works programs and available revenue.

A gap between projected asset renewals, planned asset renewals and funding indicates that further work is required to manage required service levels and funding to eliminate any funding gap.

Council will manage the gap by developing this Plan to provide guidance on future service levels and resources required to provide these services.

Council's long term financial plan covers the first 10 years of the 20 year planning period. The total maintenance and capital renewal expenditure planned over the 10 years is $116.8 million.

This is an average expenditure of $11.7 million per year.

6.2 Funding strategy

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

6.3 Valuation forecasts

Asset values are forecast to increase as additional assets are added to the asset stock from construction and acquisition by council and from assets constructed by land developers and others and donated to council. Figure 8 shows the projected replacement cost asset values over the planning period in current 2010 dollar values.

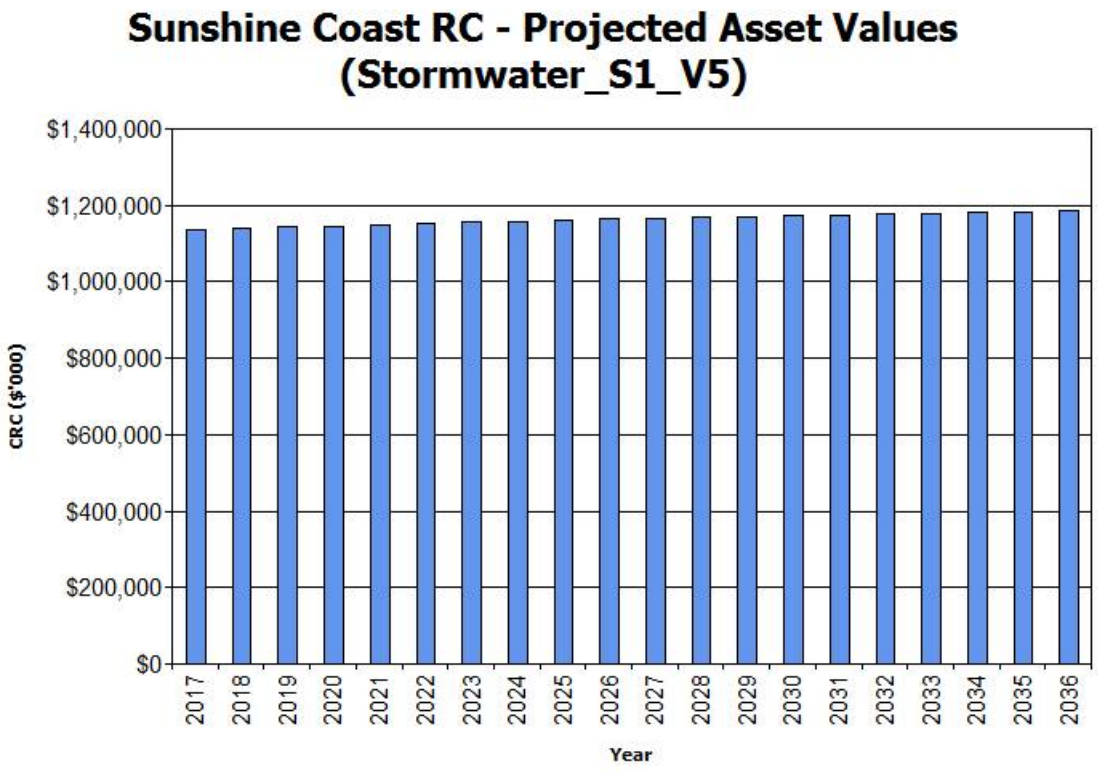


Figure 8 Projected asset values

Depreciation expense values are forecast in line with asset values as shown in Figure 9. The depreciated replacement cost (current replacement cost less accumulated depreciation) will vary over the forecast period depending on the rates of addition of new assets disposal of old assets and consumption and renewal of existing assets.

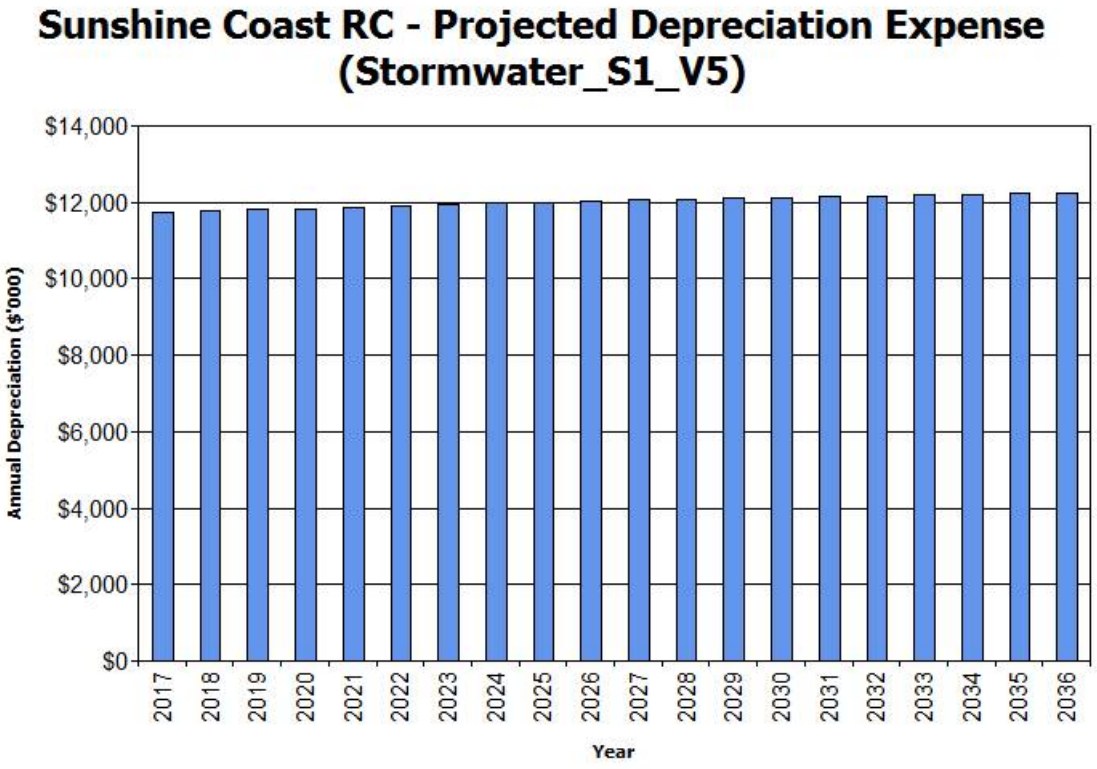


Figure 9 Projected depreciation expense

Forecast of the assets' depreciated replacement cost is shown in Figure 10.

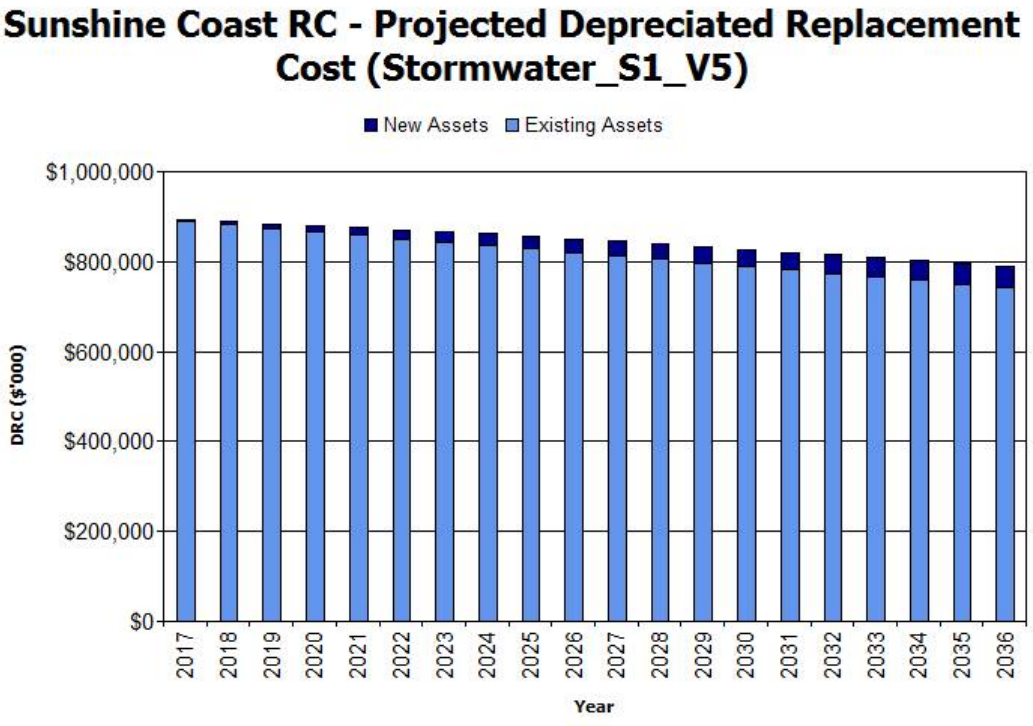


Figure 10 Projected depreciated replacement cost

6.4 Key assumptions made in financial forecasts

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

Key assumptions made in this asset management plan are:

- Asset data obtained from the GIS system
- An average construction installation date has been used
- Costings have come from councils financial data

Accuracy of future financial forecasts will be improved in future revisions of this Plan by the following actions:

- Improved data capture and asset management systems.
- Improved asset database and financial database
- Greater understanding of asset performance

7. ASSET MANAGEMENT PRACTICES

7.1 Accounting / financial systems

Sunshine Coast Council operates the Technology One system for management of financial information.

This system is managed by the Finance Business Unit. Technology One is interfaced with the Maximo Asset Management System (see below) to enable the transfer of financial asset information between the two systems.

7.2 Asset management systems

Sunshine Coast Council operates the Maximo asset maintenance management system for the management of asset information. However Council is currently out to tender for a Strategic Asset Management (SAM) system.Stormwater will be using this new system to manage their data. The asset management system will be linked to the finance system via a software interface.

Asset managers are responsible for maintaining data pertaining to their asset area.

Geographical data is held on all assets within ArcGIS to display and edit geographical data.

7.3 Information flow requirements and processes

The key information flows into this asset management plan are:

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

The key information flows from this asset management plan are:

- The assumed works program and trends
- The resulting budget, valuation and depreciation projections
- The useful life analysis.

These will impact council's long term financial plan, strategic business plan, annual budget and departmental business plans and budgets.

7.4 Standards and guidelines

- SCC Asset Management Policy
- Queensland Development Code- QDC MP 1.4 Building over or near relevant infrastructure
- Queensland Urban Design Manual (QUDM) 2013
- International Infrastructure Management Manual (IIMM) 2015
- Financial Sustainability Plan 2015 - 2025

7.5 Sustainability

This Plan is doing the following in sustainability:

- Develop appropriate and financially sustainable levels of service
- Council’s mission to be green and sustainable is fully supported at both constructed and natural asset level
- To look at all options to protect and enhance the environment
- Install water quality devices to improve the water quality of the receiving waters
- Look at option where possible for water harvesting.

8. PLAN IMPROVEMENT AND MONITORING

8.1 Performance measures

The effectiveness of the 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 and strategic management plan;
- The degree to which 1 to 5 year detailed works programs, budgets, business plans and organisational structures take into account the 'global' works program trends provided by the Plan.

8.2 Improvement plan

The asset management improvement plan generated from this asset management plan is shown in Table 8.2.

Table 8.2 Improvement plan

Task No	Process improvement	Urgency	Importance	Timeframe	Responsibility
1.	Review of roles and responsibilities	Medium	Medium	2016/17	TIM
2.	Review of systems (linkages / dependencies)	Medium	Medium	2017/18	TIM,SIM
3.	Review current asset management processes	Medium	Medium	2017/18	TIM and PD
4.	Review of data integrity	High	High	2017- 2019	TIM, SIM
5	Knowledge of assets • Capture/verify data for all asset classes	High	High	2017 - 2020	Spatial Information Management (SIM), Transport Infrastructure Management(TIM)
	• Identify all natural assets (waterways, channels, etc.) and capture relevant details.	High	High	2017 - 2020	TIM
	• Develop policy for asset management of natural assets	High	High	2019	TIM
	• Ensure all constructed and donated assets are captured. Review 'as constructed' processes.	Low	High	2017	Development Services (DS), SIM, TIM
6	Levels of service • Develop process to review and set Develop sustainable LOS, including public consultation. • Formally authorise	Medium	High	2018	CAM, TIM

Task No	Process improvement	Urgency	Importance	Timeframe	Responsibility
	'Fit for Purpose' designs where appropriate, for low risk projects, to help bridge the financial gap. • Review process of drainage assessment for new developments and building certifications, to reduce comebacks	High High	High High	2018/19 2018	TIM and CAM DS and TIM
7	Condition assessments • Implement Maintenance Management System for each asset class with regular condition inspections.	High	High	2018/19	TIM,, CAM, SIM
8	Asset accounting • Develop methodology for "capitalisation" of natural assets • Align new capital and recurrent expenditure to asset types.	High High	High High	2017/18 2019	Finance and Business Infrastructure Services (IS) and Finance and Business
9	Lifecycle planning • Whole-of-life costs of new capital disclosed and considered.	High	High	2019	TIM and Finance and Business.
10	Asset operations and maintenance • Electronic work orders used for tracking and analysis.	Low	Medium	Ongoing	IS, Information Technology (IT), Civil Asset Management (CAM)
11	Performance monitoring • Determine data and system requirements to monitor performance.	High	High	2018	TIM, CAM
12	Risk management • Apply risk management principles in developing budget. • Identify and monitor critical and high risk assets, to ensure continuous functionality	High High	High High	Ongoing 2017/18	TIM TIM
13	Design/project management • Maintain 10 year Capital Works Program to allow for sufficient design and project management. • Adopt and implement 'Fit for Purpose' designs where appropriate for low risk assets.	High High	High High	Ongoing Ongoing	IS IS

8.3 Monitoring and review procedures

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

The Plan has a life of four years and is due for revision and updating within two years of each council election.

Abbreviations

AAAC
Average annual asset consumption

AMP
Asset management plan

ARI
Average recurrence interval

BOD
Biochemical (biological) oxygen demand

CRC
Current replacement cost

CAM
Civil Asset Management (Branch)

CWMS
Community wastewater management systems

DA
Depreciable amount

DoH
Department of Health

EF
Earthworks/formation

GPT
Gross pollutant trap

IRMP
Infrastructure risk management plan

IPWEA
Institute of Public Works Engineers Australia

IS
Infrastructure Services (Department)

LCC
Life cycle cost

LCE
Life cycle expenditure

LOS
Level of Service

MMS
Maintenance management system

PCI
Pavement condition index

RV
Residual value

SS
Suspended solids

SCPS
Sunshine Coast Planning Scheme

TIM
Transport Infrastructure Management (Branch)

Glossary

Annual service cost (ASC)

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

Asset class

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

Asset condition assessment

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

Asset management

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

Assets

Future economic benefits controlled by the entity as a result of past transactions or other past events (AAS27.12).

Property, plant and equipment including infrastructure and other assets (such as furniture and fittings) with benefits expected to last more than 12 months.

Average annual asset consumption (AAAC)*

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

Brownfield asset values**

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

Capital expansion expenditure

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

Capital expenditure

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

Capital funding

Funding to pay for capital expenditure.

Capital grants

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

Capital investment expenditure

See capital expenditure definition.

Capital new expenditure

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

Capital renewal expenditure

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

Capital upgrade expenditure

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

discretional and often does not result in additional revenue unless direct user charges apply. It will increase operating and maintenance expenditure in the future because of the increase in the council's asset base, e.g. widening the sealed area of an existing road, replacing drainage pipes with pipes of a greater capacity, enlarging a grandstand at a sporting facility. Where capital projects involve a combination of renewal, expansion and/or upgrade expenditures, the total project cost needs to be allocated accordingly.

Carrying amount

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

Class of assets

See asset class definition.

Component

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

Cost of an asset

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

Current replacement cost (CRC)

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

Current replacement cost 'as new' (CRC)

The current cost of replacing the original service potential of an existing asset, with a similar modern equivalent asset, i.e. the total cost of replacing an existing asset with an 'as new' or similar asset expressed in current dollar values.

Cyclic maintenance**

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

Depreciable amount

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

Depreciated replacement cost (DRC)

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

Depreciation / amortisation

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

Economic life

See useful life definition.

Expenditure

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

Fair value

The amount for which an asset could be exchanged or a liability settled, between knowledgeable, willing parties, in an arms length transaction.

Greenfield asset values **

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

Heritage asset

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

Impairment loss

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

Infrastructure assets

Physical assets of the entity or of another entity that contribute to meeting the public's need for access to major economic and social facilities and services, e.g. roads, drainage, footpaths and cycleways. These are typically large, interconnected networks or portfolios of composite assets the components of these assets may be

separately maintained, renewed or replaced individually so that the required level and standard of service from the network of assets is continuously sustained. Generally the components and hence the assets have long lives. They are fixed in place and are often have no market value.

Investment property

Property held to earn rentals or for capital appreciation or both, rather than for:

(a) Use in the production or supply of goods or services or for administrative purposes; or

(b) Sale in the ordinary course of business (AASB 140.5)

Level of service

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

Life cycle cost **

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

Life cycle expenditure **

The life cycle expenditure (LCE) is the actual or planned annual maintenance and capital renewal expenditure incurred in providing the service in a particular year.

Loans / borrowings

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

Maintenance and renewal gap

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

Maintenance and renewal sustainability index

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

Maintenance expenditure

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

Materiality

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

Modern equivalent asset

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

Non-revenue generating investments

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

Operating expenditure

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

Pavement management system

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

Planned maintenance**

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

develop a maintenance history and improve maintenance and service delivery performance.

PMS score

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

Rate of annual asset consumption*

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

Rate of annual asset renewal*

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

Rate of annual asset upgrade*

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

Reactive maintenance

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

Recoverable amount

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

Recurrent expenditure

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

Recurrent funding

Funding to pay for recurrent expenditure.

Rehabilitation

See capital renewal expenditure definition above.

Remaining life

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

Renewal

See capital renewal expenditure definition above.

Residual value

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

Revenue generating investments

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

Risk management

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

Section or segment

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

Service potential

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

Service potential remaining*

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

Strategic Management Plan (SMA)**

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

Sub-component

Smaller individual parts that make up a component part.

Sustainability

Meeting the needs of the present without compromising the ability of future generations to meet their own needs.

Useful life

Either:

(a) The period over which an asset is expected to be available for use by an entity, or

(b) The number of production or similar units expected to be obtained from the asset by the entity.

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

Value in use

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

Source: DVC 2006, Glossary

Note: Items shown * modified to use DA instead of CRC

Additional glossary items shown **

Appendix

1 List of Adopted Stormwater Models

Study	Month	Year	Catchment
Caloundra			
Too Way Creek Flood Study & Stormwater Management Plan	November	2001	Mooloolah River Coastal
Part 1 Existing Catchment & Waterway Conditions			
- Part 2 Technical Details			
- Part 3 Management Strategies			
Caloundra City storm tide study			Mooloolah River Coastal,
- counter disaster planning report	August	2003	
- development report	August	2003	
Caloundra City Council Flood Risk Assessment Report for Disaster Planning	December	2003	Mooloolah River Coastal
Joint Probability Assessment Storm Tide & Freshwater Flooding			
- Stage 1a Report Caloundra	March	2004	
- Stage 1b Report Maroochy Shire Council	October	2007	
Caloundra South Flood Study	April	2010	Bells Creek, Mellum Creek North, Mellum Creek South
Regional Floodplain Database: Hydrologic & Hydraulic Modelling Report Pumicestone Passage	June	2012	Mellum Creek Nort, Mellum Creek South, Bribie Island North
Cornmeal Creek			
Cornmeal Creek Maroochydore - Proposed Development of the Flood Plain - Volume 1	April	1977	Maroochy River Coastal
Cornmeal Creek Development of Flood Plain	October	1977	Maroochy River Coastal
Flooding in Cornmeal Creek	July	1986	Maroochy River Coastal
Flooding in Cornmeal Creek	May	1987	Maroochy River Coastal
Buderim East Master Drainage Scheme	February	1986	Mooloolah River North
BuderimWest Master Drainage Scheme		1986	Mooloolah River North & Eudlo Creek
Maroochydore Master Drainage Plan - Volume 1 - 3	May	1989	Maroochy River Coastal
- Supplementary Investigations	August	1989	
Cornmeal Creek Flood Study and Stormwater Management Plan	September	1998	Maroochy River Coastal
Report to determine Flood Lelves & Stormwater Drainage Sizes at the Sunshine SuperCentre, Maroochydore	June	1999	Maroochy River Coastal
Cornmeal Creek Flood Study and Stormwater Management Plan	July	2000	Maroochy River Coastal
Maroochydore Sports Complex Flood Study	December	2002	Eudlo Creek, Maroochy River Coastal
Cornmeal Creek/Wises Land Flood & Water Quality Study - Final Report	June	2003	Maroochy River Coastal

Water Quality Model Development	January	2003	Maroochy River Coastal
Flooding Assessment Proposed Wises Road Development, Buderim	August	2003	Maroochy River Coastal
Updated Flooding Assessment Proposed Wises Road Development at Allora & Southern Drive Maroochydore	August	2003	Maroochy River Coastal
Updated Flooding Assessment - Proposed Wises Farm Development	August	2003	Maroochy River Coastal
Wises Land / Christadale Developments review of Hydraulic Modelling	November	2003	Maroochy River Coastal
Cumberland Way Channel Rehabilitation Flood Report	July	2004	Maroochy River Coastal
Cornmeal Creek Flood Stduy Model Upgrade	June	2005	Maroochy River Coastal
Maroochy CBD Flood Study	April	2008	Maroochy River Coastal
Maroochydore Master Drainage Study	May	2010	Maroochy River Coastal
Coochin Creek			
Beerwah 100 Year ARI Flood Study	March	2002	Mellum Creek North
Coolum/Marcoola/Mudjimba/Pacific Paradise Drainage			
Master Drainage Plan for Coolum Beach	November	1978	Maroochy River Coastal
Master Drainage Plan for Pacific Paradise, Mudjimba and Marcoola	July	1978	Maroochy River Coastal
Proposed North Marcoola - Yaroomba Beach Drainage Scheme		1982	Maroochy River Coastal
- Storm Hydraulics	August	1982	
Hayatt Coeur De Lion Proposed Resort Development at Yaroomba Flood Study	February	1987	Maroochy River Coastal
Sunshine Motorway Stage 2 Section 3 Hydraulic Analysis	May	1991	Maroochy River Coastal
Impact Assessment - Flood Mitigation Works Marcoola North Relief Drain	November	1993	Maroochy River Coastal
Impact Assessment - Flood Mitigation Works Coolum Main Drain - Stumers Creek	November	1993	Maroochy River Coastal
Marcoola South Master Drainage Review	May	1998	Maroochy River Coastal
Seaside' at David Low Way, Coolum Beach	May	2002	Maroochy River Coastal
"The Boardwalk" - Revised Drainage Assessment Northern Catchment (formerly "Seaside")	January	2004	Maroochy River Coastal
Stumers Creek Ecological Health Assessment	May	2004	Maroochy River Coastal
Water Quality Modelling of Land Use Changes	October	2004	Maroochy River Coastal
Maroochy Estuary Sustainable Loads Study - Supplementary Report	October	2004	Maroochy River Coastal
Hyatt Regency Golf Cource, Coolum Stormwater Quality Management Plan for the Master Plan	June	2006	Maroochy River Coastal
Hyatt Regency Coolum Flood Study for the Master Plan	June	2006	Maroochy River Coastal
Pacific Paradise Flood Risk Assessment	August	2011	Maroochy River Coastal

Study	Month	Year	Catchment
Coondibah			
Bunbubah Creek Hydraulic Investigation	December	2005	Mooloolah River Coastal
Coonowrin Creek			
Glass House Mountains Coonowrin Creek Flood Study			Mellum Creek North
Coonowrin Creek Flood Study	September	2011	Mellum Creek North
Doonan Creek			
Report on Doonan Creek Flood Study	November	1996	Maoochy River Coastal
Doonan Creek Flood Study and Stormwater Management Plan - Volume 1 & 2	June	1999	Maroochy River Coastal
Flood Study for Pheasant Lane, Doonan	September	2002	Maroochy River Coastal
Doonan Creek Flood Study Model Upgrade	June	2005	Maroochy River Coastal
Brennan Subdivision, Eumundi Road, Doonan. Flood Study	December	2005	Maroochy River Coastal
East Maroochy			
Report on the February 1992 Flood and Revised Design Flood	October	1992	
East Maroochy River Catchment - Flood Study and Stormwater Management Plan	September	2000	Maroochy River Coastal
East Maroochy River Catchment - Flood Study and Stormwater Management Plan Vol 1 & 2	January	2001	Maroochy River Coastal
East Maroochy Flood Study	July	2005	Maroochy River Coastal
Eudlo Creek			
Eudlo Creek Flood Study - Township of Eudlo to Bruce Highway	March	1991	Eudlo Creek
Eudlo Creek Flood Study Survey		1999	Eudlo Creek
MaroochydoreRoad Crossing Eudlo Creek - Hydraulic Analysis - Draft Report	November	2000	Eudlo Creek
- A3 Drawings Addendum	November	2000	Eudlo Creek
Flood Study for H & S McDonald Lot 2 on RP28246	September	2001	Eudlo Creek
Flooding and Stormwater Management Plan for Eudlo Creek Catchment	June	2002	Eudlo Creek
Old Orchard Estate Eastern Catchment Flood Study	December	2002	Eudlo Creek
Eudlo Flats Rural Residential - Flood Impact Study	July	2003	Eudlo Creek
Eudlo Creek Flood Model Upgrade - Volume 1	July	2005	Eudlo Creek
Riview of Flooding & Stormwater for Application No REC04/0105 for Reconfiguration of a Lot 3 RP 57951- 521- Chevallum Rd, Chevallum	December	2005	Eudlo Creek
Energex Substation Flood Investigations Chevallum & Pacific Paradise	February	2012	Eudlo Creek
Maroochy River			
Maroochy River Study Data Collection Report Part 1 - Tidal Data	December	1982	Maroochy River Coastal
Maroochy River Study Data Collection Report Part 2 - January 1982 Flood Data	April	1982	Maroochy River Coastal

Maroochy River Study Data Collection Report Part 3 - June 1983 Flood Data	December	1984	Maroochy River Coastal
Maroochy River Study Model Testing Report	March	1985	Maroochy River Coastal
Maroochy River Study Model Testing Report	May	1987	Maroochy River Coastal
Final Planning Report - Maroochydore Road (Bruce Highway to Jones Road)	January	1992	Maroochy River Coastal
North & South Maroochy Rivers Flood Study	May	1998	Maroochy River Coastal
South Maroochy River Failure Impact Assessment Wappa Dam		2002	Maroochy River Coastal
Maroochy Shire Storm Tide Study - Development Report	November	2005	Maroochy River Coastal
- Counter Disaster Planning Report	November	2005	Maroochy River Coastal
Yandina Industrial Estate Hydraulic Investigation Report	April	2005	Maroochy River Coastal
North & South Maroochy Rivers Flood Study Model Upgrade	June	2005	Maroochy River Coastal
Maroochy River Floodplain Model	July	2005	Maroochy River Coastal
Maroochy River Model - Hydrology	November	2005	Maroochy River Coastal
Maroochy River Flood Study. Flood Management Options Report	January	2006	Maroochy River Coastal
Maroochy CBD Flood Study	November	2007	Maroochy River Coastal
PMP Modelling of Creek & River Catchments in Maroochy Shire	December	2007	Maroochy River Coastal
Maroochy River Flood Study	November	2009	Maroochy River Coastal
Maroochy River Flood Study	February	2010	Maroochy River Coastal
Mellum Creek			
Mellum & Little Rocky Creek Flood Study			Mellum Creek North
Mooloolah River			
Mooloolah River Hydraulic Scale Model			
- Supplementary Report 2 Hydrology	January	1981	Mooloolah River South
Hydrology of the Mooloolah River Catchment	February	1982	Mooloolah River South
Flood and Tidal Hydraulic Model Studies of Mooloolah River	September	1982	Mooloolah River South
Mooloolah River Tidal & Flood Investigations	December	1982	Mooloolah River South
Flood and Tidal Hydraulic Model Studies of Mooloolah River - Volume IV	August	1991	Mooloolah River South
Mooloolah & South Mooloolah Rivers Flood Study	June	1997	Mooloolah River South
Kawana Waters Bundilla Develoment	October	1999	Mooloolah River Coastal
Mooloolah River Bridge Hydraulic Analysis Report	February	2001	Mooloolah River Coastal

Mooloolah River - Currimundi Creek Floodplain Flood Study & Stormwater Management Plan	July	2002	Mooloolah River North & Mooloolah River South
Flood Study & Stormwater Management Plan for the Mooloolah River - Currimundi Creek Floodplain - RAFTS and MIKE21 Users Manual	October	2002	Mooloolah River North & Mooloolah River South
Bundilla Development Supporting Planning Study Flooding and Drainage	October	2002	Mooloolah River Coastal
Bundilla Development Flooding & rainage Study	February	2005	Mooloolah River Coastal
Palmview Future Growth Area Flood Study Vol 1 & 2	July	2010	
Mountain Creek			
Mountain Creek Park - Stage 3 Hydraulic Investigations	July	1989	Moolooah River Coastal
Hydraulic Assessment of Mountain Creek Flooding - Progress Report	April	1992	Moolooah River Coastal
- Final Report	July	1992	Moolooah River Coastal
Mountain Creek Flood Study and Stormwater Management Plan	August	1998	Moolooah River Coastal
Mountain Creek Flood Study and Stormwater Management Plan	March	1999	Moolooah River Coastal
Application for MCU and REC of Mountain Creek Meadows	February	1999	Moolooah River Coastal
Mountain Creek Flood Investigation	September	2003	Moolooah River Coastal
Mountain Creek Flood Study Stage 2	August	2004	Moolooah River Coastal
Upgrade of Existing Flood Studies Mountain Creek Flood Study	November	2005	Moolooah River Coastal
Mountain Creek Culvert Design 2D Flood Modelling Report	January	2007	Moolooah River Coastal
Obi Obi Creek			
Obi Obi & Walkers Creek Flood Study	June	1997	Obi Obi Creek
Flood Study & Stormwater Management Plan for Obi Obi Creek Catchment Vol 1-3			
Baroon Pocket Dam Spillway Capacity Upgrade Assessment Vol 1 & 2	April	2005	
Paynter Creek			
Paynter Creek Hdraulic model - Provision of Part (A) Results	August	1998	Paynter Creek
- Provision of part (B) Results	September	1999	Paynter Creek
Paynter Creek Flooding and Stormwater Management Plan - Progress Report 1 to 3	August	1998	Paynter Creek
- Draft Final Report	January	1999	Paynter Creek
- Appendices	January	1999	Paynter Creek
- Draft Final Report Chapters 9 - 13	February	1999	Paynter Creek
Paynter Creek Flooding and Stormwater Management Plan	October	2000	Paynter Creek
- Final report Flood Study			Paynter Creek
- Final Report Appendices			Paynter Creek
Paynter Creek ICP Report	November	2001	Paynter Creek

Funding Options for Infrastructure Charges Plans & the Stormwater Management Infrastructure Charges Plan with Charges for Paynter Creek	November	2001	Paynter Creek
Upgrade of Existing Flood Studies Paynter Creek Flood Study	November	2005	Paynter Creek
Palmwoods Flooding Investigation	October	2006	Paynter Creek
Petrie Creek			
Petrie Creek Flooding Investigation	June	1974	Petrie Creek
Petrie Creek and Tuckers Creek Flooding Investigation	May	1987	Petrie Creek
Report on Nambour Master Drainage Study	September	1991	Petrie Creek
ppendices	September	1991	Petrie Creek
Flood Study Tuckers Creek Nambour	January	1994	Petrie Creek
Flooding & Stormwater Management Plan for Petrie Creek	September	1998	Petrie Creek
Petrie Creek Flooding and Stormwater Management Plan Vol 1-2	June	2002	Petrie Creek
- Hydraulic Structure Reference Sheets			Petrie Creek
Coes Creek Flood Study	August	2005	Petrie Creek
Upgrade of Exsting Flood Studies Petrie Creek Flood Study	December	2005	Petrie Creek
Pumicestone Creeks			
Pelican Waters Estate Northern Access Road Flood Study - Addendum	March	2003	Bells Creek
Lamerough Creek * Duck Holes Creeks Flood Study and Stormwater Management Plan Vol 1-3	October	2003	Bells Creek
Pelican Waters Northern Lake Flood Study Flow Interface	March	2008	Bells Creek
Pelican Waters Drainage Review	October	2011	Bells Creek
Pelican Waters Boulevard Hydraulic Analysis	October	2011	Bells Creek
Sippy Creek			
Flooding Studies Sippy Downs Development	December	1993	Mooloolah River North
Sippy Creek Flood Study and Stormwater Management Plan	January	1999	Mooloolah River North
Flooding and Stormwater Management Plan for Sippy Creek Catchment	May	2002	Mooloolah River North
Chancellor Park Lakes Water Quality Assessment & Management Options	June	2002	Mooloolah River North
Flood Study for Quality Homes PTY LTD at Lots 1 & 2 on RP839332 & Lot 3 on RP144896, Tanawha Tourist Drive Road, Tanawha	March	2003	Mooloolah River North
Flood Study of University Creek for Chancellor Park Estate Key Site 1	August	2003	Mooloolah River North
Sippy Creek Flood Model Upgrade	July	2005	
Concept Stormwater Management Plan for Proposed Residential Subdivision at Bellflower Road, Sippy Downs	December	2004	Mooloolah River North
Stage 1 & 2 Strategy 2D Flood Study of Proposed Residential Development Bellflower Road, Sippy Downs	August	2005	Mooloolah River North
Bellflower Stages 6 & 7 Flood Study	June	2009	Mooloolah River North
DRAFT Palmview Flood Study	July	2010	Mooloolah River South
Stanley River			

Hydrologic & Hydraulic Modelling Report: Stanley River	August	2012	Upper Stanley River
Twin Ridges			
Hydrological Study - South Maroochy Drainage Board	April	2000	Eudlo Creek
Twin Ridges Catchment Flooding and Stormwater Management Plan	June	2002	Eudlo Creek
Twin Ridges Flood Study Model Upgrade	June	2005	Eudlo Creek
Twin Ridges North Flood Study Regional Strategy & Planning	November	2011	Eudlo Creek
Twin Ridges North Flood Study Regional Strategy & Planning	September	2012	Eudlo Creek
Flood Study - Parklakes II Development, Bli Bli	August	2012	Eudlo Creek
Yandina Creek			
Yandina Highway Upgrading Flooding Assessment	December	1993	Maroochy River North
Yandina Bypass Detailed Flood Study	April	1995	Maroochy River North
Yandina Creek Flood Study	December	1996	Maroochy River Coastal
Yandina Creek Flood Study Addendum	July	1997	Maroochy River Coastal
Yandina Industrial Estate Hydraulic Investigation Report Department of State Development and Innovation	April	2005	Maroochy River North
Yandina Creek Flood Study Model Upgrade	July	2005	Maroochy River Coastal
Yandina Creek Flood Sudy Model Upgrade	February	2007	Maroochy River Coastal
Doonan & Yandina Creek Flood Study	June	2008	Maroochy River Coastal
Miscellaneous			
Review of the South Maroochy System - Planning Report	September	1993	
Flooding of Coastal Rivers in South East Queensland in February 1992	June	1999	
Benchark Development Sequencing Study	June	1999	
Priority Infrastructure Paln Project Management Plan	December	2001	
Mopping up Mooloolah with Mike		2002	
Guidelines for Pollutant Export Modelling in Brisbane	October	2003	
South Maroochy River Catchment Management Plan Scoping Study	February	2004	
Mooloolah Floodplain Model- Protocol for Use	May	2004	
Groundwater Monitoring Report 2003 - 2004. Eudlo Sub-Catchment & Surrounding Areas	August	2004	
Feasibility Assessment for Proposed Stormwater Management 'Design Objectives'	March	2005	
Hydrology Stratrgy Discussion Paper	June	2005	
Mary Basin draft water resource plan	November	2005	
Stage-Damage Relationships for Flood Damage Assessment in Maroochy Shire	June	2006	
Estimation of Tangible Flood Damages (Maroochy River, Mountain Creek & Sippy Creek Catchments)	November	2009	

Study	Key	ID	Author	Month	Year	Vers.	Copies	Location of copies & copy number					Div.	Catchment
								F&S	SLP	DAF Nam	DAF Mar	Digital		
Caloundra														
Too Way Creek Flood Study & Stormwater Management Plan			Connell Wagner	November	2001	2							2	Mooloolah River Coastal
Part 1 Existing Catchment & Waterway Conditions												PDF		
Part 2 Technical Details												PDF		
Part 3 Management Strategies												PDF		
Caloundra City Storm Tide Study			Connell Wagner										2	Mooloolah River Coastal,
Counter Disaster Planning Report				August	2003	2		1				PDF		
Development report				August	2003	2						PDF		
Caloundra City Council Flood Risk Assessment Report for Disaster Planning		1791	CSC	December	2003							PDF	2	Mooloolah River Coastal
Joint Probability Assessment Storm Tide & Freshwater Flooding			Connell Wagner											
Stage 1a Report Caloundra				March	2004	1						PDF		
Stage 1b Report Maroochy Shire Council				October	2007	3						PDF		
Caloundra South Flood Study			SKM	April	2010	1						PDF	2	Bells Creek, Mellum Creek North, Mellum Creek South
Regional Floodplain Database: Hydrologic & Hydraulic Modelling Report Pumicestone Passage			aurecon	June	2012	1						PDF	2	Mellum Creek North, Mellum Creek South, Bribie Island North
Cornmeal Creek	**CC**													
Cornmeal Creek Maroochydore - Proposed Development of the Flood Plain - Volume 1			Cardno & Davies	April	1977			2					8 & 4	Maroochy River Coastal
Cornmeal Creek Development of Flood Plain			Cardno & Davies	October	1977			2					8 & 4	Maroochy River Coastal
Flooding in Cornmeal Creek	CC1		Cardno & Davies	July	1986		2						8 & 4	Maroochy River Coastal
Flooding in Cornmeal Creek	CC2		Cardno & Davies	May	1987		1	1					8 & 4	Maroochy River Coastal
Buderim East Master Drainage Scheme	CC3		Antony Tod & Partners	February	1986		1	1					7	Mooloolah River North
BuderimWest Master Drainage Scheme			Rod Tate & Partners		1986			2					7	Mooloolah River North & Eudlo Creek
Maroochydore Master Drainage Plan - Volume 1 - Summary Report			SF	May	1989			1					8 & 4	Maroochy River Coastal
Volume 2 - Support Data			SF	May	1989			1						
Volume 3 - Master Drainage Plan Drawings			SF	May	1989			1						
Supplementary Investigations			SF	August	1989			1						
Cornmeal Creek Flood Study and Stormwater Management Plan			Murray & Associates	September	1998			1					8 & 4	Maroochy River Coastal
Report to determine Flood Lelves & Stormwater Drainage Sizes at the Sunshine SuperCentre, Maroochydore			Earl Covington & Associates	June	1999	C		1					8	Maroochy River Coastal

Study	Key	ID	Author	Month	Year	Vers.	Copies	Location of copies & copy number					Div.	Catchment
								F&S	SLP	DAF Nam	DAF Mar	Digital		
Cornmeal Creek Flood Study and Stormwater Management Plan	CC4		GHD	July	2000		1	1					8 & 4	Maroochy River Coastal
Maroochydore Sports Complex Flood Study			WBM	December	2002	1		1					7	Eudlo Creek, Maroochy River Coastal
Cornmeal Creek/Wises Land Flood & Water Quality Study - Final Report	CC5	1817	GHD	June	2003		1	1					7	Maroochy River Coastal
Water Quality Model Development			GHD	January	2003			1					7	Maroochy River Coastal
Flooding Assessment Proposed Wises Road Development, Buderim			Lawson & Treloar	August	2003	1						PDF	7	Maroochy River Coastal
Updated Flooding Assessment Proposed Wises Road Development at Allora & Southern Drive Maroochydore			Lawson & Treloar	August	2003	1		1				PDF	7	Maroochy River Coastal
Updated Flooding Assessment - Proposed Wises Farm Development	CC6	1818	Lawson & Treloar	August	2003		1	1					7	Maroochy River Coastal
Wises Land / Christadale Developments review of Hydraulic Modelling			Cardno	November	2003							PDF	7	Maroochy River Coastal
Cumberland Way Channel Rehabilitation Flood Report			JWP	July	2004			1					7	Maroochy River Coastal
Cornmeal Creek Flood Study Model Upgrade			Cardno	June	2005			1				PDF	8 & 4	Maroochy River Coastal
Maroochy CBD Flood Study			JWP	April	2008			1				PDF	8 & 4	Maroochy River Coastal
Maroochydore Master Drainage Study			WRM	May	2010			1					8 & 4	Maroochy River Coastal
Coochin Creek														
Beerwah 100 Year ARI Flood Study			Connell Wagner	March	2002	2						PDF	1	Mellum Creek North
Coolum/Marcoola/Mudjimba /Pacific Paradise Drainage	CM													
Master Drainage Plan for Coolum Beach	CM1		JWP	November	1978			4					9	Maroochy River Coastal
Master Drainage Plan for Pacific Paradise, Mudjimba and Marcoola	CM2		JWP	July	1978		6	6					8	Maroochy River Coastal
Proposed North Marcoola - Yaroomba Beach Drainage Scheme			Anthoy Tod & Partners		1982?			2					8	Maroochy River Coastal
Hayatt Coeur De Lion Proposed Resort Development at Yaroomba Flood Study			Anthony Tod & Partners	February	1987			1					8	Maroochy River Coastal
Sunshine Motorway Stage 2 Section 3 Hydraulic Analysis			Sinclair Knight	May	1991								8 & 9	Maroochy River Coastal
Impact Assessment - Flood Mitigation Works Marcoola North Relief Drain	CM3		Bill Carter & Assoc	November	1993		1	1					8	Maroochy River Coastal
Impact Assessment - Flood Mitigation Works Coolum Main Drain - Stumers Creek	CM3		Bill Carter & Assoc	November	1993		1						9	Maroochy River Coastal
Marcoola South Master Drainage Review			JWP	May	1998			1					8	Maroochy River Coastal

Study	Key	ID	Author	Month	Year	Vers.	Copies	Location of copies & copy number					Div.	Catchment
								F&S	SLP	DAF Nam	DAF Mar	Digital		
Seaside' at David Low Way, Coolum Beach			Tate	May	2002	0		1				PDF	9	Maroochy River Coastal
"The Boardwalk" - Revised Drainage Assessment Northern Catchment (formerly "Seaside")			Tate	January	2004			1					9	Maroochy River Coastal
Stumers Creek Ecological Health Assessment			frc environmental	May	2004							PDF	9	Maroochy River Coastal
Water Quality Modelling of Land Use Changes			WBM	October	2004	1		1					8	Maroochy River Coastal
Maroochy Estuary Sustainable Loads Study - Supplementary Report			WBM	October	2004	1		1					8	Maroochy River Coastal
Hyatt Regency Golf Cource, Coolum Stormwater Quality Management Plan for the Master Plan			Cardno	June	2006							PDF	8	Maroochy River Coastal
Hyatt Regency Coolum Flood Study for the Master Plan			Cardno	June	2006							PDF	8	Maroochy River Coastal
Pacific Paradise Flood Risk Assessment			HydraLogic	August	2011							PDF	8	Maroochy River Coastal
Coondibah														
Bunbubah Creek Hydraulic Investigation			JWP	December	2005	1		1				PDF	2	Mooloolah River Coastal
Coonowrin Creek														
Glass House Mountains Coonowrin Creek Flood Study								1				PDF	1	Mellum Creek North
Coonowrin Creek Flood Study			ENGENY Water Mangement	September	2011	1		1				PDF	1	Mellum Creek North
Doonan Creek	DC													
Report on Doonan Creek Flood Study	DC1		Cardno & Davies	November	1996		2	1					9	Maoochy River Coastal
Doonan Creek Flood Study and Stormwater Management Plan - Volume 1	DC2	1819	Geo-Eng	June	1999		3	2	2	3			9	Maroochy River Coastal
Volume 2			Geo-Eng	July	2000			1					9	Maroochy River Coastal
Flood Study for Pheasant Lane, Doonan			GHD	September	2002							PDF	9	Maroochy River Coastal
Doonan Creek Flood Study Model Upgrade			Cardno	June	2005	1		2				PDF	9	Maroochy River Coastal
Brennan Subdivision, Eumundi Road, Doonan. Flood Study			Cardno	December	2005	1						PDF	9	Maroochy River Coastal
East Maroochy	**EM**													
Report on the February 1992 Flood and Revised Design Flood	EM1		Max Winders & Assoc	October	1992		2							
East Maroochy River Catchment - Flood Study and Stormwater Management Plan			JWP	September	2000			1				PDF	8	Maroochy River Coastal

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East Maroochy River Catchment - Flood Study and Stormwater Management Plan		1820	JWP	January	2001		5	2	3,4	5			8	Maroochy River Coastal
- Volume 1 Flood study	EM2a		JWP	January	2001			1	3,4	5			8	Maroochy River Coastal
- Volume 2 Appendices	EM2b		JWP	January	2001			1,2	3,4	5			8	Maroochy River Coastal
East Maroochy Flood Study			URS	July	2005			1				PDF	8	Maroochy River Coastal
Eudlo Creek	**EC**													
Eudlo Creek Flood Study - Township of Eudlo to Bruce Highway	EC1		Connell Wagner	March	1991		2	1					5	Eudlo Creek
Eudlo Creek Flood Study Survey			Murry & Associates		1999?			1					5	Eudlo Creek
Maroochydore Road Crossing Eudlo Creek - Hydraulic Analysis - Draft Report			WBM	November	2000			1					5	Eudlo Creek
- A3 Drawings Addendum			WBM	November	2000			1					5	Eudlo Creek
Flood Study for H & S McDonald Lot 2 on RP28246			WBM	September	2001			1					5	Eudlo Creek
Flooding and Stormwater Management Plan for Eudlo Creek Catchment	EC2	1821	WBM	June	2002		6	2	5	6		PDF	5	Eudlo Creek
Old Orchard Estate Eastern Catchment Flood Study			Cardno	December	2002			1					5	Eudlo Creek
Eudlo Flats Rural Residential - Flood Impact Study			WBM	July	2003			1					5	Eudlo Creek
Eudlo Creek Flood Model Upgrade - Volume 1			WBM	July	2005	2		1				PDF	5	Eudlo Creek
Riview of Flooding & Stormwater for Application No REC04/0105 for Reconfiguration of a Lot 3 RP 57951-521- Chevallum Rd, Chevallum			JWP	December	2005							PDF	5	Eudlo Creek
Energex Substation Flood Investigations Chevallum & Pacific Paradise				Febuary	2012	1						PDF	5	Eudlo Creek
Maroochy River	**MR**													
Maroochy River Study Data Collection Report Part 1 - Tidal Data	MR1		Qld Govt Hydraulics Lab	December	1982		1	1					9	Maroochy River Coastal
Maroochy River Study Data Collection Report Part 2 - January 1982 Flood Data	MR2		Qld Govt Hydraulics Lab	April	1982		1	1					9	Maroochy River Coastal
Maroochy River Study Data Collection Report Part 3 - June 1983 Flood Data	MR3		Qld Govt Hydraulics Lab	December	1984		2	1					9	Maroochy River Coastal
Maroochy River Study Model Testing Report	MR4		Qld Govt Hydraulics Lab	March	1985		1	1					9	Maroochy River Coastal
Maroochy River Study Model Testing Report	MR5		Qld Govt Hydraulics Lab	May	1987		2	1					9	Maroochy River Coastal
Final Planning Report - Maroochydore Road (Bruce Highway to Jones Road)	MR6		Connell Wagner	January	1992		1	1					9	Maroochy River Coastal

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North & South Maroochy Rivers Flood Study		1823	SKM	May	1998		2	1		2			9	Maroochy River Coastal
South Maroochy River Failure Impact Assessment Wappa Dam			GHD		2002?			1					9	Maroochy River Coastal
Maroochy Shire Storm Tide Study - Development Report			Connell Wagner	November	2005	1		1					9	Maroochy River Coastal
Counter Disaster Planning Report			Connell Wagner	November	2005	1		1				PDF	9	Maroochy River Coastal
Yandina Industrial Estate Hydraulic Investigation Report			Connell Wagner	April	2005	3						PDF	9	Maroochy River Coastal
North & South Maroochy Rivers Flood Study Model Upgrade			Cardno	June	2005	1		1				PDF	9	Maroochy River Coastal
Maroochy River Floodplain Model			QLD Gov	July	2005	2		1					9	Maroochy River Coastal
Maroochy River Model - Hydrology				November	2005			1					9	Maroochy River Coastal
Maroochy River Flood Study. Flood Management Options Report			MSC	January	2006			1					9	Maroochy River Coastal
Maroochy CBD Flood Study			MSC	November	2007	2		2					9	Maroochy River Coastal
PMP Modelling of Creek & River Catchments in Maroochy Shire			WRM	December	2007	1		1				PDF	9	Maroochy River Coastal
Maroochy River Flood Study			SCRC	November	2009	3		1					9	Maroochy River Coastal
Maroochy River Flood Study			SCRC	February	2010	4						PDF	9	Maroochy River Coastal
Mellum Creek														
Mellum & Little Rocky Creek Flood Study												PDF	1	Mellum Creek North
Mooloolah River	**ML**													
Mooloolah River Hydraulic Scale Model			Cardno & Davies											
Supplementary Report 2 Hydrology				January	1981							PDF	1 & 5	Mooloolah River South
Hydrology of the Mooloolah River Catchment			University of NSW	February	1982							PDF	1 & 5	Mooloolah River South
Flood and Tidal Hydraulic Model Studies of Mooloolah River			University of NSW	September	1982							PDF	1 & 5	Mooloolah River South
Mooloolah River Tidal & Flood Investigations			University of NSW	December	1982							PDF	1 & 5	Mooloolah River South
Flood and Tidal Hydraulic Model Studies of Mooloolah River - Volume IV	ML1		Cardno & Davies	August	1991		1						1 & 5	Mooloolah River South
Mooloolah & South Mooloolah Rivers Flood Study			Kinhill	June	1997		3					PDF	1 & 5	Mooloolah River South
Kawana Waters Bundilla Develoment			WRL	October	1999		1						4	Mooloolah River Coastal
Mooloolah River Bridge Hydraulic Analysis Report			SKM	February	2001	2	1						4	Mooloolah River Coastal

Study	Key	ID	Author	Month	Year	Vers.	Copies	Location of copies & copy number					Div.	Catchment
								F&S	SLP	DAF Nam	DAF Mar	Digital		
Mooloolah River - Currimundi Creek Floodplain Flood Study & Stormwater Management Plan			SKM	July	2002	0						PDF	4 & 5	Mooloolah River North & Mooloolah River South
Flood Study & Stormwater Management Plan for the Mooloolah River - Currimundi Creek Floodplain - RAFTS and MIKE21 Users Manual			SKM	October	2002	1		2					4 & 5	Mooloolah River North & Mooloolah River South
Bundilla Development Supporting Planning Study Flooding and Drainage			Cardno	October	2002		1						4	Mooloolah River Coastal
Bundilla Development Flooding & rainage Study			Cardno	February	2005			1					4	Mooloolah River Coastal
Palmview Future Growth Area Flood Study			SKM	July	2010	1.2								
Volume 1												PDF	1	Mooloolah River South
Volume 2 Appendices												PDF	1	Mooloolah River South
Mountain Creek	**MC**													
Mountain Creek Park - Stage 3 Hydraulic Investigations			WBM	July	1989			1					6	Moolooah River Coastal
Hydraulic Assessment of Mountain Creek Flooding - Progress Report			Connell Wagner	April	1992			1					6	Moolooah River Coastal
Final Report	MC1		Connell Wagner	July	1992		3	3					6	Moolooah River Coastal
Mountain Creek Flood Study and Stormwater Management Plan			Murray & Associates	August	1998			1					6	Moolooah River Coastal
Mountain Creek Flood Study and Stormwater Management Plan	MC2		Kinhill	March	1999	C	8	3	5,6	7,8			6	Moolooah River Coastal
Application for MCU and REC of Mountain Creek Meadows	MC3		Noel Covey, Cardno & Davies	February	1999		1						6	Moolooah River Coastal
Mountain Creek Flood Investigation			City Design	September	2003	1		1					6	Moolooah River Coastal
Mountain Creek Flood Study Stage 2	MC4		City Design	August	2004	1	2	1		2			6	Moolooah River Coastal
Upgrade of Existing Flood Studies Mountain Creek Flood Study			MSC	November	2005			2					6	Moolooah River Coastal
Mountain Creek Culvert Design 2D Flood Modelling Report			MSC	January	2007	1						PDF	6	Moolooah River Coastal
Obi Obi Creek														
Obi Obi & Walkers Creek Flood Study			KinHill	June	1997			3				PDF	5 & 10	Obi obi Creek
Flood Study & Stormwater Management Plan for Obi Obi Creek Catchment			GHD											
-Volume 1: Existing Catchment & Waterway Conditions				October	2002	1						PDF	5 & 10	Obi obi Creek
-Volume 2: Hydrologic & Hydraulic Details				April	2004	1						PDF	5 & 10	Obi obi Creek
-Volume 3: Proposed Stormwater Management Options				October	2001	1						PDF	5 & 10	Obi obi Creek

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								F&S	SLP	DAF Nam	DAF Mar	Digital		
Baroon Pocket Dam Spillway Capacity Upgrade Assessment			JWP	April	2005									
Volume 1												PDF	5	Obi obi Creek
Volume 2 Appendices												PDF	5	Obi obi Creek
Paynter Creek														
Paynter Creek Hdraulic model - Provision of Part (A) Results			Murray & Associates	August	1998			2					5 & 7	Paynter Creek
Provision of part (B) Results			Murray & Associates	September	1999			2					5 & 7	Paynter Creek
Progress Report 2			SKM	October	1998			1					5 & 7	Paynter Creek
Progress Report 3			SKM	November	1998			1					5 & 7	Paynter Creek
Draft Final Report			SKM	January	1999			2					5 & 7	Paynter Creek
Appendices			SKM	January	1999			1					5 & 7	Paynter Creek
Draft Final Report Chapters 9 - 13			SKM	Febraury	1999			2					5 & 7	Paynter Creek
Paynter Creek Flooding and Stormwater Management Plan		1824	SKM	October	2000		4			4			5 & 7	Paynter Creek
Final report Flood Study	PA1a							2		4		PDF	5 & 7	Paynter Creek
Final Report Appendices	PA1b							2		4			5 & 7	Paynter Creek
Paynter Creek ICP Report	PA2		MSC	November	2001		2	1		2			5 & 7	Paynter Creek
Funding Options for Infrastructure Charges Plans & the Stormwater Management Infrastructure Charges Plan with Charges for Paynter Creek			MSC	November	2001			4					5 & 7	Paynter Creek
Upgrade of Existing Flood Studies Paynter Creek Flood Study			MSC	November	2005	1		4				PDF	5 & 7	Paynter Creek
Palmwoods Flooding Investigation			MSC	October	2006			1					5 & 7	Paynter Creek
Petrie Creek	**PE**													
Petrie Creek Flooding Investigation	PE1		JWP	June	1974		3	1					7 , 9 & 10	Petrie Creek
Petrie Creek and Tuckers Creek Flooding Investigation	PE2		JWP	May	1987		1						7 , 9 & 10	Petrie Creek
Report on Nambour Master Drainage Study			GHD	September	1991			1					7 , 9 & 10	Petrie Creek
Appendices			GHD	September	1991			1					7 , 9 & 10	Petrie Creek
Flood Study Tuckers Creek Nambour			PPK	January	1994			1					7 , 9 & 10	Petrie Creek
Flooding & Stormwater Management Plan for Petrie Creek			MSC	September	1998			1					7 , 9 & 10	Petrie Creek
Petrie Creek Flooding and Stormwater Management Plan		1825	City Design	June	2002		5		3,4	5			7 , 9 & 10	Petrie Creek
Volume 1 Main Report	PE3a						5	2	3,4	5			7 , 9 & 10	Petrie Creek
Volume 2 Appendices	PE3b						5	2	3,4	5			7 , 9 & 10	Petrie Creek
Hydraulic Structure Reference Sheets	PE3c						2	2		2			7 , 9 & 10	Petrie Creek
Coes Creek Flood Study			JWP	August	2005	0						PDF	10	Petrie Creek
Upgrade of Exsting Flood Studies Petrie Creek Flood Study			MSC	December	2005	1						PDF	7 , 9 & 10	Petrie Creek

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Pumicestone Creek														
Pelican Waters Estate Northern Access Road Flood Study - Addendum			Cardno	March	2003							PDF	2	Bells Creek
Lamerough Creek * Duck Holes Creeks Flood Study and Stormwater Management Plan			Cardno	October	2003								2	Bells Creek
Volume 1 Existing Catchment & Waterway Conditions												PDF	2	Bells Creek
Volume 2 Hydrologic, Hydraulic & Water Quality												PDF	2	Bells Creek
Volume 3 Proposed Stormwater Management Works												PDF	2	Bells Creek
Pelican Waters Northern Lake Flood Study Flow Interface			Cardno	March	2008							PDf	2	Bells Creek
Pelican Waters Drainage Review			PB	October	2011	C						PDF	2	Bells Creek
Pelican Waters Boulevard Hydraulic Analysis			SKM	October	2011	3						PDF	2	Bells Creek
Sippy Creek	**SC**													
Flooding Studies Sippy Downs Development	SC1		Max Winders & Assoc	December	1993		1	1					6	Mooloolah River North
Sippy Creek Flood Study and Stormwater Management Plan			Murry & Associates	January	1999			1					6	Mooloolah River North
Flooding and Stormwater Management Plan for Sippy Creek Catchment	SC2	1826	WBM	May	2002		6	2	4,5	6		PDF	6	Mooloolah River North
Chancellor Park Lakes Water Quality Assessment & Management Options			WBM	June	2002	2	2	2				PDF	6	Mooloolah River North
Flood Study for Quality Homes PTY LTD at Lots 1 & 2 on RP839332 & Lot 3 on RP144896, Tanawha Tourist Drive Road, Tanawha			Covey	March	2003							PDF	6	Mooloolah River North
Flood Study of University Creek for Chancellor Park Estate Key Site 1 -Vol 1			Jensen Bowers	August	2003	1		1				PDF	6	Mooloolah River North
Volume 2 Appendicies												PDF	6	Mooloolah River North
Sippy Creek Flood Model Upgrade Vol 1			WBM	July	2005	1	2	2				PDF	6	Mooloolah River North
Volume 2 Appendicies													6	Mooloolah River North
Concept Stormwater Management Plan for Proposed Residential Subdivision at Bellflower Road, Sippy Downs			Brown	December	2004	A						PDF	6	Mooloolah River North
Stage 1 & 2 Strategy 2D Flood Study of Proposed Residential Development Bellflower Road, Sippy Downs			Brown	August	2005							PDF	6	Mooloolah River North
Bellflower Stages 6 & 7 Flood Study			Cardno	June	2009	1						PDF	6	Mooloolah River North
DRAFT Palmview Flood Study Vol. 1			SKM	July	2010	1.2								
Volume 2 Appendicies												PDF	1	Mooloolah River South

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Stanley River														
Hydrologic & Hydraulic Modelling Report: Stanley River			Worley Parsons	August	2012							PDF	1	Upper Stanley River
Twin Ridges	**TW**													
Hydrological Study - South Maroochy Drainage Board	TW1		Connell Wagner	April	2000		1	1					7	Eudlo Creek
Twin Ridges Catchment Flooding and Stormwatger Management Plan	TW2	1827	Connell Wagner	June	2002		7	1	3,4,5	6	7		7	Eudlo Creek
Twin Ridges Flood Study Model Upgrade			URS	June	2005			1				PDF	7	Eudlo Creek
Twin Ridges North Flood Study Regional Strategy & Planning			SCRC	November	2011	2						PDF	7	Eudlo Creek
Twin Ridges North Flood Study Regional Strategy & Planning			SCRC	September	2012	3		1				PDF	7	Eudlo Creek
Flood Study - Parklakes II Development, Bli Bli			Covey	August	2012	V03		1				PDF	7	Eudlo Creek
Yandina Creek	**YC**													
Yandina Highway Upgrading Flooding Assessment	YC1		WBM	December	1993	3	1	1					9	Maroochy River North
Yandina Bypass Detailed Flood Study	YC2		SKM	April	1995		1	1					9	Maroochy River North
Yandina Creek Flood Study	YC3	1828	GHD	December	1996		1	1					9	Maroochy River Coastal
Yandina Creek Flood Study Addendum	YC4		GHD	July	1997		2	1					9	Maroochy River Coastal
Yandina Industrial Estate Hydraulic Investigation Report Department of State Development and Innovation			Connell Wagner	April	2005	3						PDF	9	Maroochy River North
Yandina Creek Flood Study Model Upgrade			URS	July	2005			2					9	Maroochy River Coastal
Yandina Creek Flood Sudy Model Upgrade			URS	February	2007			2				PDF	9	Maroochy River Coastal
Doonan & Yandina Creek Flood Study			JWP	June	2008			2				PDF	9	Maroochy River Coastal

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Miscellaneous														
Review of the South Maroochy System - Planning Report			JWP	September	1993			1						
Flooding of Coastal Rivers in South East Queensland in February 1992			BoM	June	1999			1						
Benchark Development Sequencing Study			Cardno	June	1999			1						
Priority Infrastructure Paln Project Management Plan			Matthew Lindley	December	2001			1						
Mopping up Mooloolah with Mike			SKM		2002			1						
Guidelines for Pollutant Export Modelling in Brisbane			BCC	October	2003	7		1						
South Maroochy River Catchment Management Plan Scoping Study			JWP	February	2004			1						
Mooloolah Floodplain Model-Protocol for Use			SKM	May	2004			1						
Groundwater Monitoring Report 2003 - 2004. Eudlo Sub-Catchment & Surrounding Areas			Andrew Todd	August	2004			1						
Feasibility Assessment for Proposed Stormwater Management 'Design Objectives'			Ecological Engineerig	March	2005			1						
Hydrology Stratrgy Discussion Paper			Water Solutions	June	2005			2						
Mary Basin draft water resource plan			QLD Gov	November	2005			1						
Stage-Damage Relationships for Flood Damage Assessment in Maroochy Shire			WRM	June	2006			1						

For further details on these studies contact Cooridnator Flooding & Stormwater, Regional Stratergy and Planning Unit

2 Condition Monitoring Scale

Grade	Condition	Description	Response	Residual Life (Estimated % Asset Design Life Remaining)
0	Not Rated	Asset has been properly decommissioned, no longer exists (or should be removed from inaccurate plans), has not been conditioned rated (or assigned an extrapolated condition), or is unusable to be rated due to serviceability issues	Response will vary subject to circumstances. E.G. An abandoned asset may experience infiltration, voids, collapse etc., and pose a real danger that should be both monitored and managed.	NA
1	Very Good	Structural: Sound physical condition. Insignificant deterioration. Asset likely to perform adequately without major work for 25 years or more. Serviceability: No or insignificant loss of hydraulic capacity	No immediate action required. Maintain standard programmed condition assessment.	60 to 100%
2	Good	Structural: Acceptable physical condition; minor deterioration/minor defects evident Serviceability: Minor loss of hydraulic performance Negligible short-term failure risk but potential for deterioration in long-term (20 years plus). Only minor work required (if any)	No immediate action required other than possible cleaning. Maintain standard programmed condition assessment.	35 to 60%
3	Fair	Structural: Moderate to significant deterioration evident: Minor components or isolated sections of the asset need replacement or repair now but not affecting short term structural integrity. Serviceability: Moderate loss of hydraulic performance but asset still functions safely at adequate level of service. Failure unlikely within next 10 years but further deterioration likely and major replacement likely within the next 10 to 20 years. Work required but asset is still serviceable.	Take action as appropriate to address defects and if necessary, cleaning, silt removal, root cutting. Monitor with programme condition assessment for rehabilitation and/or renewal in medium term.	20 to 35%
4	Poor	Structural: Serious deterioration and significant defects evident affecting structural integrity.	Take immediate action as appropriate to address the defects. Immediately undertake risk assessment	10 to 20%

		Serviceability: Significant loss of hydraulic performance. Substantial work required in short term to keep asset serviceable. Failure likely in short to medium term. Likely need to replace most or all of asset within 10 years. No immediate risk to health or safety but works required within 10 years to ensure asset remains safe.	and further investigate options. Schedule appropriate action – rehabilitation or renewal in short term.	10% to 20%
5	Very Poor	Structural: Failed or failure imminent. Immediate need to replace most or all of asset. Serviceability: Health and safety hazards exist which present a possible risk to public safety, or asset cannot be serviced /operated without risk to personnel. Major work or replacement required urgently.	Take immediate action as appropriate to address the defects. Immediately undertake risk assessment and further investigate options. Schedule appropriate action – Immediate rehabilitation or renewal.	0 to 10%

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