

ITEM 2.2 WATERWAYS PORTFOLIO ASSET MANAGEMENT PLAN - 62133369 (Cont.)

#1 Waterways Portfolio Asset Management Plan



Moreton Bay Regional Council

Waterways Portfolio Asset Management Plan

June 2021

Moreton Bay Regional Council

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Supporting Information

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Waterways Portfolio Asset Management Plan

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Definitions for Abbreviations

Term	Definition
ACR	Asset Consumption Ratio
AI	Action Item
AM	Asset Management
AMP	Asset Management Plan
AMT	Asset Management Team within Infrastructure Planning
ASR	Asset Sustainability Ratio
CRCMP	Caboolture River Catchment Management Plan
CSR	Customer Service Request
DCP	Development Control Plan
DWCP	Drainage, Waterways and Coastal Planning
ECM	Engineering Construction and Maintenance or; Enterprise Content Management component of Technology One
ePID	Electronic Project Identification Document for Project Prioritisation / Approval
EPP	Environmental Protection Policy
ES	Environmental Services
EVs	Environmental Values
FY	Financial Year
GIS	Geographical Information System
GPT	Gross Pollutant Trap
HBV	High Biodiversity Value
IPWEA	Institute of Public Works Engineering Australasia
ISO	International Organisation for Standardisation
LMP	Lake Management Plan
LTFP	Long Term Financial Forecast
LWA	Land and Water Australia
MBRC	Moreton Bay Regional Council
NATSPEC	National Building Specification
PAMP	Portfolio Asset Management Plan
SAMP	Strategic Asset Management Plan
SHMP	Stream Health Monitoring Program
SIP	Strategic Infrastructure Planning
TMR	Department of Transport & Main Roads
TOMAS	MBRC's Asset Management System (based on Technology One platform)
TRV	Total Replacement Value
TWCMP	MBRC Total Water Cycle Management Plan
WPAMP	Waterways Portfolio Asset Management Plan

Waterways Portfolio Asset Management Plan

Executive Summary

The Waterways Portfolio Asset Management Plan (WPAMP) outlines Moreton Bay Regional Council's (MBRC's) approach to the management of the waterways assets (both natural and constructed assets) located throughout the MBRC area. The Moreton Bay Region contains approximately 988 linear kilometres¹ of natural waterways.

The primary function of waterways assets is to improve and protect the health of natural waterways by reducing erosion and sedimentation issues and allowing fish passage. Various elements of a waterway serve different purposes in nature when man-made infrastructure is provided. For instance, the riparian zone for waterways provides several functions critical to the health of waterways. These functions include water quality improvement (e.g. through filtration), habitat provision, reducing erosion, and flow attenuation. Much of council works in the waterways portfolio is confined to within the riparian zone of a natural waterway. Bank stabilisation assets provide a stabilising function to a natural waterway bank that is prone to the effects of erosive forces from rain, overland flow and flooding as can be seen in Figure 1.



Figure 1 - Example of recently constructed bank stabilisation works at Pine Rivers Park, South Pine River

The waterways portfolio is made up of various financial and non-financial assets, with non-financial assets (natural waterways and riparian revegetation) making up over 96% of the portfolio. The financial assets have an estimated replacement value of \$1.4M. Below is a description of the various financial and non-financial assets for the waterways portfolio. It should be noted that natural waterways are part of the natural landscape and are not considered to be financial assets that are subject to capital or operational spend. Council has sought to record these natural waterways within this asset portfolio so as to provide a mechanism and framework for the management of assets that underpin the ecological function and long-term viability of our region's waterways. Below are some definitions to assist with the terminology used throughout this document.

Riparian Revegetation assets are works performed by council within the riparian zone of a natural waterway to repair or restore environmental value and diversity through the use of

¹ Based upon total length of Main Waterways within the MBRC Region. Does not include various tributaries that feed these waterways

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Waterways Portfolio Asset Management Plan

natural techniques such as selected plant species and installation. These works are considered as operational as these are regarded as non-financial assets. Riparian revegetation assets are vital to ensuring natural waterways are continued to be protected into the future and as such these assets are captured to ensure they are managed in a sustainable manner ensuring the ongoing support to the environmental values of the natural waterways on which they reside.

Natural Waterways are non-financial assets such as rivers or creeks which track the overall ecological function and long-term viability of the region’s waterways. Council does not perform any works on the natural waterways themselves but rather confines its works to the riparian zones that abut these waterways.

Waterway Protection assets include a mixture of natural vegetation and hard engineered structures to provide protection to waterway banks from erosion, sedimentation and other issues related to flooding. Riparian revegetation assets are captured within this classification type that represent the areas where council has repaired or restored sections of riparian zone on a natural waterway that was suffering damage or loss of value. Bank stabilisation assets are constructed natural assets captured within this classification type that represent areas of a natural waterway bank repaired or restored sections of natural waterway bank suffering from significant erosion or erosion that is detrimental to adjacent infrastructure or public safety.

Waterway Structures aim to provide fish passage through already existing culvert structures or causeways located within the waterway.

Table 0.1 - Waterways Asset Types

Asset Classification Type	Asset Type Description	Qty	Expected Useful Life (Years)	Current Average Age (Years)	Financial Asset / Non - Financial Asset	Current Replacement Cost
Natural Waterways	River or Creek	988 km	N/A	N/A	Non-Financial	N/A (see note)
Waterway Protection (constructed)	Riparian Revegetation	125 ha	100	5	Non-Financial	N/A (see note)
	Bank Stabilisation	2 no.	50	2	Financial	\$1,312,441
Waterway Structures (constructed)	Fishway	2 no.	15	2	Financial	\$160,490
TOTAL						\$1,472,930

NOTE: Rivers, creeks and riparian revegetation are not financially recognised. Unit of measure noted where applicable

Figure 2 below shows the age profile for assets, which indicates the number of assets and their total current replacement cost within each age band. For riparian revegetation assets (non-financial assets), the cost reflects an estimate of approximately \$8.6 million representing the initial investment made to create the asset and is based on an average cost per hectare derived from recent projects. The value does not include natural waterway assets (rivers and creeks).

As age reflects the year in which the assets were built, the profile also indicates the pattern in which they were acquired over time. The majority of waterways assets were constructed within the last 10 years, with over 70% of these being within the last 5 years. During this time council has actively invested in riparian revegetation management and the acquisition of these assets represents vegetation management areas that council has sought out to routinely maintain via contemporary weed management practises. Whilst these assets are not financially recognised, they represent a significant investment to Council if they were to be reconstructed at any given time due to loss (eg through fire or flood).

Waterways Portfolio Asset Management Plan



Figure 2 - Age Profile

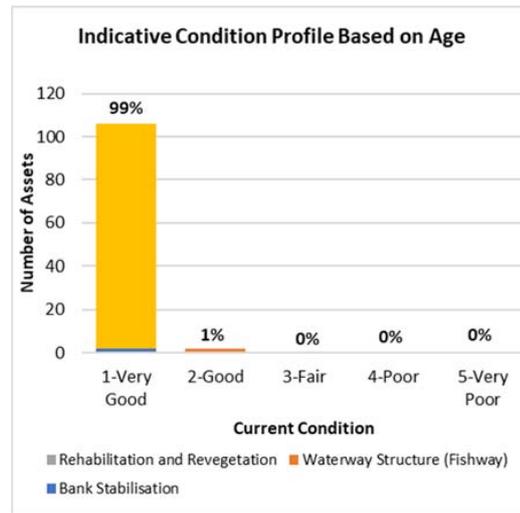


Figure 3 - Condition profile

Figure 3 shows the age-based condition profile for assets. MBRC’s asset register does not currently contain condition data against the waterway assets (including natural waterways) and an estimate of condition has been made based upon asset age and useful life. The estimated condition indicates that all financial assets - ie. constructed waterways assets are expected to be in very good condition. This is in part due to their relatively young age. To support future improvements to this asset management plan, it is recommended that Council investigates a condition rating methodology for all waterways assets (including natural waterways) to obtain an accurate representation of condition. This would potentially involve the review of any regular testing that occurs to determine an overall condition for the natural waterways, working in partnership with the State Government.

Whilst MBRC has previously performed ad-hoc testing on the natural waterways assets to assess the overall stream health, there is no formal testing or maintenance regime in place. This should be considered in conjunction with the activities performed by State Government. MBRC’s investment and contribution into the waterways asset portfolio is predominantly focused on the investment in riparian vegetation, bank stabilisation and fishway assets which all support and improve the function and condition of the natural waterways assets.

At present, all maintenance performed on constructed waterways assets (ie waterways protection and waterways structures) is routine however there is insufficient budget allocation to cover all maintenance activities for all assets in any given year. The long-term goal is to undertake 80% or more of planned maintenance tasks across all waterway assets leaving the remaining 20% or less as reactive. The long-term benefit of planned maintenance is that it can often be carried out more cost efficiently and it reduces risk to Council and the community.

Due to the waterways asset portfolio largely comprising of non-financial assets, current and recommended funding is more significantly weighted towards new acquisitions, maintenance and operating costs rather than capital renewal and replacement. As natural waterways do not attract any capital or operational spend, the below funding items are related only to constructed waterways assets only.

The current levels of funding are:

- \$250K per annum for routine weed management on riparian revegetation assets
- Approximately \$10.6M for constructed riparian rehabilitation and revegetation projects over 20 years, or an average of \$560K per annum.
- Approximately \$43.0M for new projects over the next 15 years.

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Council is actively investing in the construction of new riparian revegetation projects across the region and it is envisaged that this program of works will continue.

A lifecycle assessment was carried out to determine the future capital cost requirements for the constructed waterways assets. Figure 4 summarises the results from the lifecycle modelling for the level of capital expenditure projected to be required over the next 50 years on financial assets only. Riparian revegetation assets are not represented in Figure 4 as they are non-financial assets requiring ongoing maintenance and any renewal of them is not expected to be required within the next 50 years.

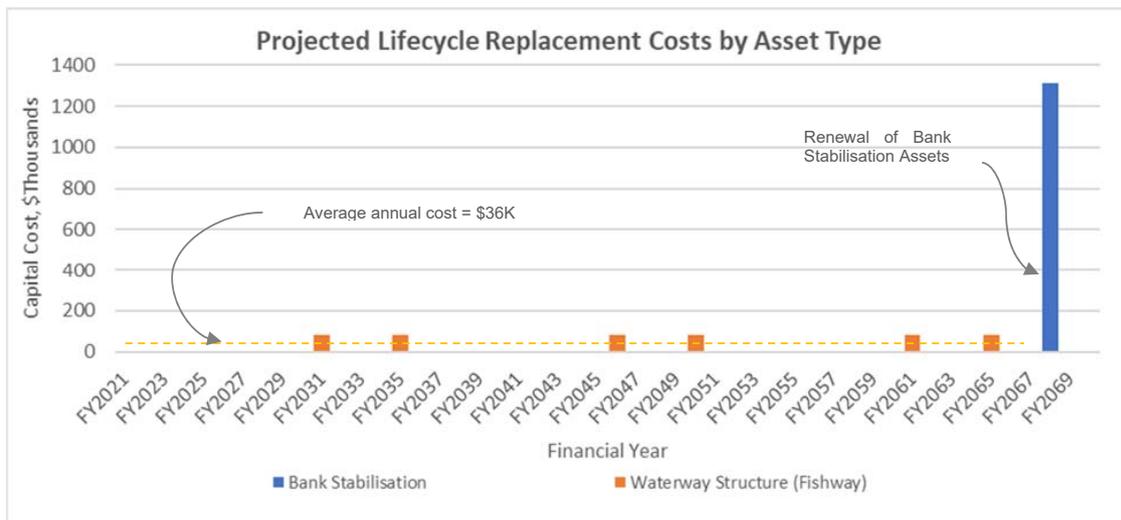


Figure 4 - Projected 50-year lifecycle replacement costs for waterways assets

Due to the portfolio’s young age there has been no need for extensive investment in the renewal and refurbishment of MBRC’s waterways assets to date. However, the fishway at Leitchs Road is a short life asset that is nearing the end of its expected life and will need more attention to monitoring and maintenance as well as periodic replacement as represented by the orange columns in the chart above.

A proposed preventative maintenance strategy has been developed for the waterways asset portfolio and is summarised in the table below. As described above, whilst MBRC does not have a formal maintenance regime in place for the natural waterways assets (ie rivers and creeks), the maintenance program recommended below will indirectly support and improve the overall function and health of these rivers/creeks. The budget impost for the inspection of the fishway and bank stabilisation assets is expected to be minimal. Further maintenance budget for weed management of riparian assets needs to be considered. It is recommended that the waterways maintenance budget be increased as set out below to give the assets their best chance at displacing weed populations and maintaining an adequate level of service. The frequency of weed management activities has been predetermined by MBRC’s maintenance staff with knowledge of ecological processes and can be found in Appendix A.

Table 0.2 - Reactive and Preventative Maintenance

Asset Type	Activities	Type	Frequency	Annual Budget
Riparian Revegetation (Waterways Protection)	Weed Management	Planned (Routine)	6 times per year (see Appendix A)	\$376,314
		Planned (Programmed)	Determined by Asset Maintenance	-
		Reactive	-	-

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Asset Type	Activities	Type	Frequency	Annual Budget
Bank Stabilisation (Waterways Protection)	Weed Management	Planned (Routine)	Biannual	\$11,200
		Planned (Programmed)	Determined by Asset Maintenance	-
		Reactive	-	-
Fishway (Waterways Structures)	Routine Inspection	Planned (Routine)	Biannual	\$2,400
	Inspection Post Flow Event including Litter and Debris Removal	Reactive	Post Flow Event	\$7,500
Total (rounded)				\$400,000

To sustain the existing waterways asset portfolio, and provide the expected community and technical levels of service described in this asset management plan, **the recommended budget allocations are outlined below:**

- **Increase the current maintenance budget of \$250K for planned and reactive maintenance by an additional \$50K per annum over 3 years from FY2023 to a total of \$400K per annum by FY2025.**
- **Continue to invest** in currently identified and budgeted riparian rehabilitation and revegetation projects; on **average \$560K per annum**
- **Continue to invest** in new waterways asset acquisitions as per the current program, i.e. **~\$43M over the next 15 years**
- **Include future renewal provision of \$320K for capital replacement of the two fishways (each asset renewed twice) across a 30 year period.**

Figure 5 and Tables 0.3 and 0.4 summarise the recommended budget requirements for the next 25 years including proposed new acquisitions which will make up a significant portion of the annual expenditure.

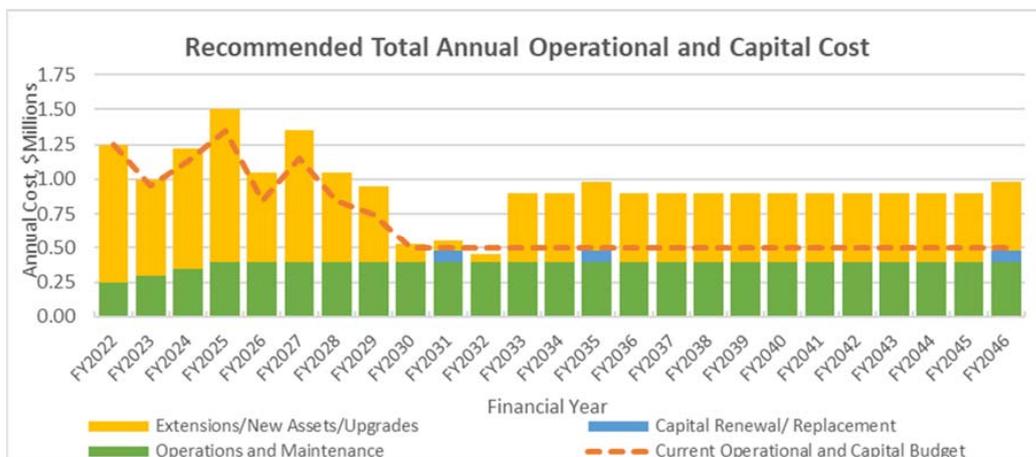


Figure 5 - Recommended total annual operational and capital budgets

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Table 0.3 Recommended annual operational and capital budgets; FY2022-FY2033 (\$ thousands)

Cost Type	FY2022	FY2023	FY2024	FY2025	FY2026	FY2027	FY2028	FY2029	FY2030	FY2031	FY2032	FY2033
Operations and Maintenance	250	300	350	400	400	400	400	400	400	400	400	400
Extensions/New Assets/Upgrades	1,000	700	875	1,100	650	950	650	550	125	75	50	500
Capital Renewal/Replacement	0	0	0	0	0	0	0	0	0	80	0	0
TOTAL Estimated Annual Cost (\$'000s)	1,250	1,000	1,225	1,500	1,050	1,350	1,050	950	525	555	450	900

Table 0.4 - Recommended annual operational and capital budgets; FY2034-FY2045 (\$ thousands)

Cost Type	FY2034	FY2035	FY2036	FY2037	FY2038	FY2039	FY2040	FY2041	FY2042	FY2043	FY2044	FY2045
Operations and Maintenance	400	400	400	400	400	400	400	400	400	400	400	400
Extensions/New Assets/Upgrades	500	500	500	500	500	500	500	500	500	500	500	500
Capital Renewal/Replacement	0	80	0	0	0	0	0	0	0	0	0	0
TOTAL Estimated Annual Cost (\$'000s)	900	980	900									

As part of the justification for the increased maintenance spending and adjustments to the capital spend, an analysis was carried out to determine the future condition of the waterways asset portfolio with the recommended budget and if the currently adopted budgets were continued.

Figure 6 below illustrates that with the currently adopted funding schedule the condition of the assets will decline to a point in time at around the year 2073 when the portfolio as a whole will fail meet the required standard. The impact of this is likely to be poor quality waterways, potential for fish kills and other ecological or environmental adverse effects.

With the recommended funding the overall portfolio is expected to continue to meet service levels and strategic objectives well into the future and avoid significant future rehabilitation and renewal costs.

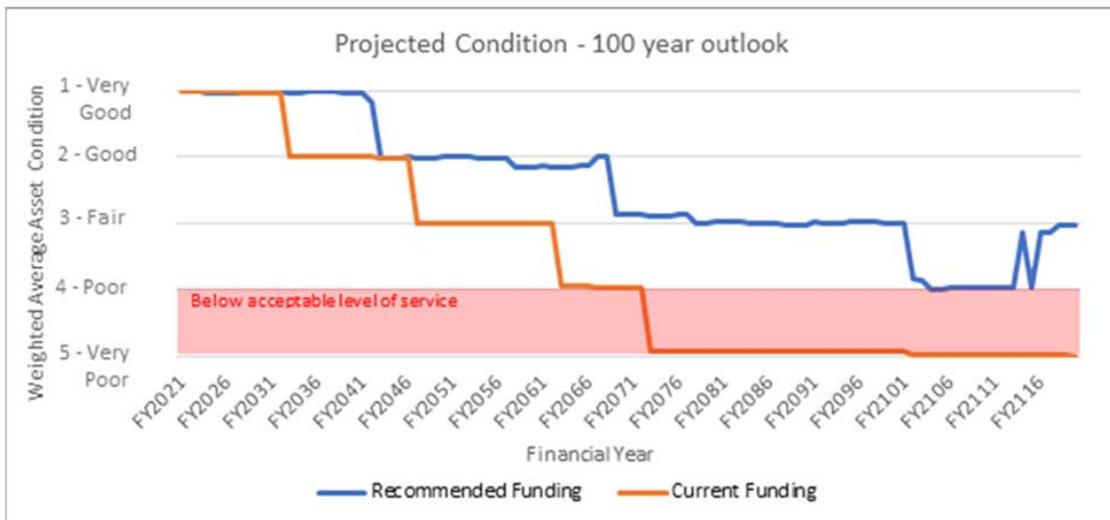


Figure 6 - Projected condition of MBRC's waterways assets over 100 years

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In Figure 7 the left heatmap illustrates that majority of the assets are at condition state of 1 (very good) and will not require intervention for some time. This is because these assets have a long useful life (100yrs) and are estimated to be in a very good condition.

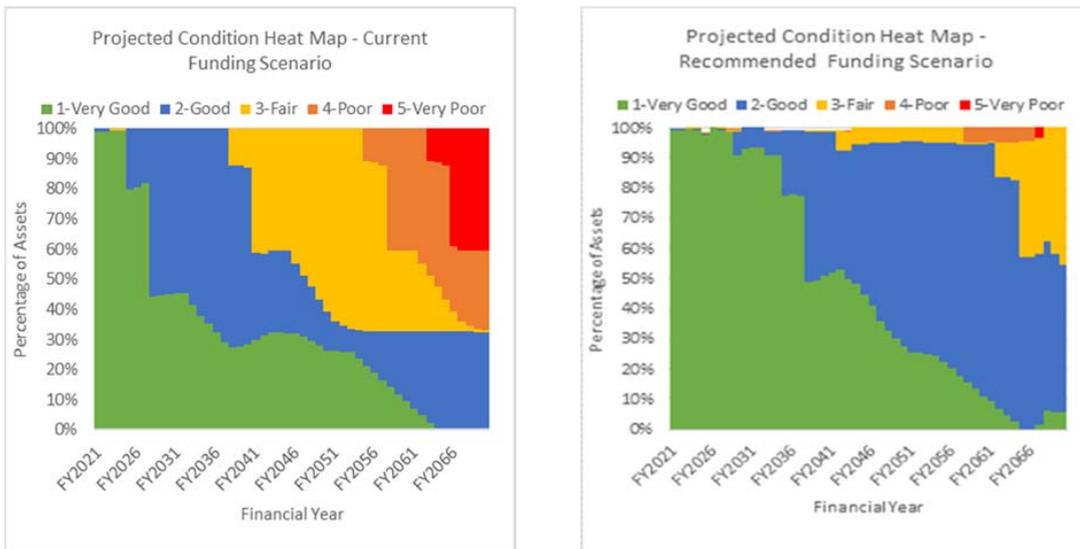


Figure 7 - Heatmaps for projected condition with current and recommended funding

The sustaining principles behind the recommended budgets are also illustrated through the following financial sustainability indicators showing an improved position:

- Asset sustainability ratio (ASR)
- Asset consumption ratio (ACR)

The financial sustainability indicators represent financially recognised assets only.

Figure 8 shows the asset sustainability ratio which measures renewal and replacement capital expenditure against depreciation of the asset. The intent is for capital investment to offset depreciation to maintain the value of the portfolio, and inherently demonstrate maintaining the portfolio itself. This is not particularly relevant for new or young asset portfolios whereby minimal capital expenditure is required early in the life of the asset however it can be seen in later years the ASR spikes upward with the renewal of bank stabilisation assets being triggered.

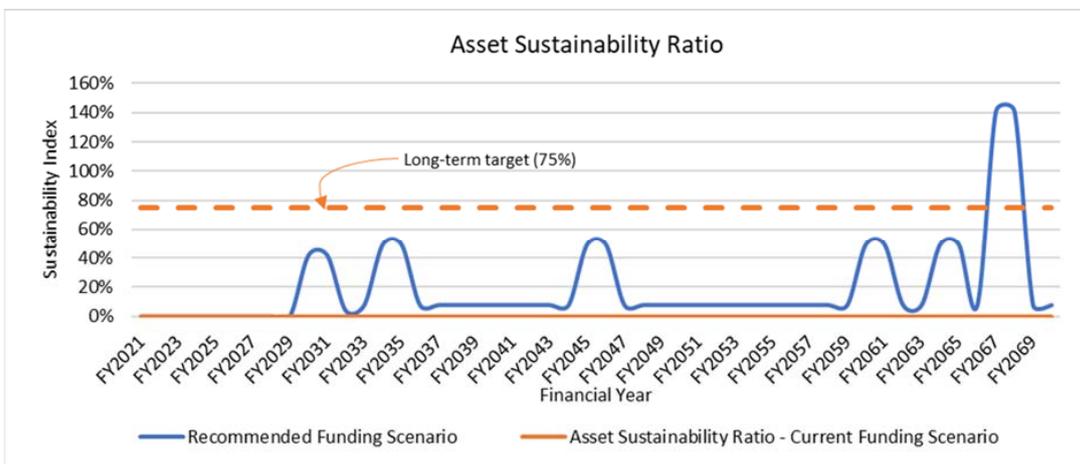


Figure 8 - Projected sustainability ratio based on current and recommended funding scenarios

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The ACR is the net (depreciated) value of the infrastructure assets divided by their gross current replacement cost as illustrated in Figure 9. Council's desired range is an ACR value of between 40% to 80%.

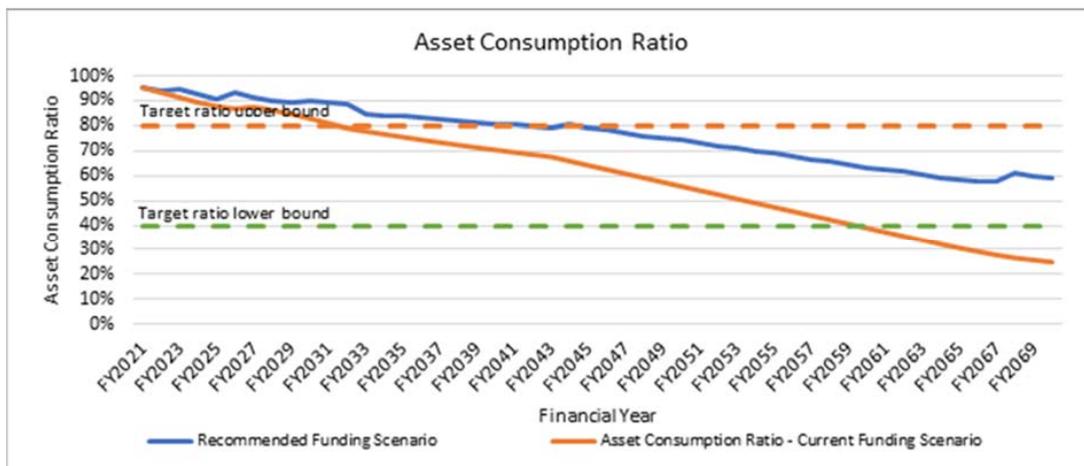


Figure 9 - Projected asset consumption ratio based on current and recommended funding scenarios

The asset consumption ratio seeks to demonstrate that the asset portfolio is being maintained within a sustainable and economic range. With the currently adopted funding the asset portfolio would deteriorate to an unacceptable level beyond 2069 and is similarly noted for the recommended funding scenario.

Key Issues

- Currently, the maintenance budget of \$250,000 for weed management is insufficient to cover all riparian revegetation assets, leaving the remainder of the assets un-serviced and at compromise of weed invasion. The ongoing maintenance should be increased as set out in the recommended maintenance section to this plan in order to ensure the assets are adequately maintained.

Asset Type	Existing Maintenance	Proposed Maintenance	Current FY2021 Budget	Proposed FY2022 Budget	Proposed FY2023 Budget	Proposed FY2024 Budget	Proposed Budget FY2025+
Riparian Revegetation	Some planned (routine) weed management activities are delivered for a portion of assets	Planned (routine) maintenance activities for all assets in 21/22.	\$250K	\$250K	\$300K	\$350K	\$400K
Total			\$250K	\$250K	\$300K	\$350K	\$400K

As per Council's strategic asset management framework, it is imperative that Council adopts a more proactive approach to managing waterways assets including planned, preventative and routine maintenance.

The recommended funding adjustments, both for capital renewal/replacement and routine and planned maintenance, will allow Council to achieve its strategic asset management objectives including:

- Organisational commitment to effective asset management

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- Managing risk appropriately
- Delivery of services to agreed standards
- Optimise asset performance
- Minimise asset failure through earlier intervention

Following further development of asset condition and performance measures, and completion of inspection of all assets, an ongoing assessment and review will be made of the effectiveness of asset management and maintenance strategies. Any major revisions to the capital and operational budgets for waterways assets will be presented to Council for further consideration.

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Waterways Portfolio Asset Management Plan

1 Purpose

The purpose of the Waterways Portfolio Asset Management Plan (WPAMP) is to outline MBRC's approach to the management of waterways assets. In accordance with MBRC's Infrastructure Asset Management Policy² and Strategic Asset Management Plan, the WPAMP serves to:

- Demonstrate organisational commitment to responsible, effective and sustainable management of the assets.
- Demonstrate informed decision making and management of risk.
- Communicate and justify funding requirements
- Document service standards
- Ensure compliance with regulatory requirements
- Demonstrate continuous review and improvement of asset management processes, systems, data and technology
- Provide a high level of assurance to executive management, Councillors and the community regarding MBRC's asset management systems, processes, practices and outcomes.

This WPAMP will be reviewed and updated on an annual³ basis. MBRC's approach to asset management has been aligned to the ISO 55000 series of standards for infrastructure asset management, as outlined in Council's Strategic Asset Management Plan (SAMP).

- Natural Waterway
 - River and Creeks
- Waterway Protection
 - Riparian Revegetation
 - Bank Stabilisation
- Waterway Structures
 - Fishways

A combination of financial and non-financial assets are covered in this iteration of the WPAMP. The non-financial assets will have maintenance requirements covered off in the maintenance plan whilst the financial assets will be discussed in both renewals and maintenance sections.

Council considers riparian revegetation assets non-financial due to their inherent "nature" or type. Riparian revegetation assets do not require capital renewal but rather ongoing maintenance costing. Therefore, there are no renewal costs or forecasting graphs provided throughout this asset management plan for riparian revegetation assets. It is however important to note that when accounting for gross replacement costs, the construction cost associated with each revegetated area has been allocated as the replacement cost of the asset. It is deemed that this is an accurate representation of replacement cost for forecasting purposes.

² Policy No.: 2150-043

³ Refer Section 4.0 of MBRC's Strategic Asset Management Plan

Waterways Portfolio Asset Management Plan

2 Asset Information

Waterways support a diverse range of flora and fauna species by providing habitat and energy sources for their growth. Waterways are important, not only because of the inherent value of their diverse ecosystems, but also for their role in providing water for the community, as well as recreational uses. To maintain these values and uses, we need to protect our waterways and ensure they are in the best possible health.

The ecological health of waterways is vital to the well-being and productivity of the individuals, communities and economies that they flow through. It is vitally important that our waterways and catchments are managed to maintain and enhance healthy ecosystems that support the livelihoods and lifestyles of residents and visitors of the Moreton Bay Region.

Waterway assets assist in supporting the environmental health of the waterway that they reside within. They do this by allowing the physical and ecological processes associated with a waterway to take place without degradation or hinderance.

For the purpose of this asset management plan, the spatial reference to the region's waterways have been adopted from the 2016 Planning scheme and the Total Water Cycle Management Plan. These waterways are a combination of creeks and rivers. There are 63 identified 'Waterways' within the Moreton Bay Region spanning 988 linear kilometres.

2.1 Asset Types & Hierarchy

Waterways assets work in conjunction with stormwater drainage assets including pipes, structures and channels to collectively manage the urban water cycle throughout the Moreton Bay Region.

Appendix D summarises the key stakeholder accountabilities and responsibilities for the Waterway asset portfolio. The Drainage, Waterways and Coastal Planning Manager is the nominated asset owner for Waterways assets. The asset owner is responsible for making strategic decisions in the key stages of asset management during the asset life cycle in relation to:

- Design
- Procurement (new assets)
- Operation
- Maintenance (including inspections and condition assessment)
- Renewal/Replacement
- Upgrades
- Decommission or disposal

Table 2.1 - Waterway Asset Types

Asset Classification Type	Asset Type Description	Qty	Expected Useful Life (Years)	Current Average Age (Years)	Financial Asset / Non - Financial Asset	Current Replacement Cost
Natural Waterways	River or Creek	988 km	N/A	N/A	Non-Financial	N/A (see note)
Waterway Protection (constructed)	Riparian Revegetation	125 ha	100	5	Non-Financial	N/A (see note)
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Asset Classification Type	Asset Type Description	Qty	Expected Useful Life (Years)	Current Average Age (Years)	Financial Asset / Non - Financial Asset	Current Replacement Cost
Waterway Structures (constructed)	Fishway	2 no.	15	2	Financial	\$160,490
TOTAL						\$1,472,930

NOTE: Rivers, creeks and riparian revegetation are not financially recognised. Unit of measure noted where applicable

Natural Waterway

The terms “Natural Waterway” and “Natural Watercourse” are interchangeable for the purpose of this asset management plan. Under the Water Act 2000, a watercourse or drainage feature is defined as follows;

*A watercourse is a **river, creek** or other **stream**, including a stream in the form of a branch or a tributary, in which water flows permanently or intermittently, regardless of the frequency of flow event -*

- (a) in a natural channel, whether artificially modified or not; or*
- (b) in an artificial channel that has changed the course of the stream.*

Rivers are larger waterways that tend to connect creeks and floodplains to estuarine systems. Rivers usually occur within the lower regions of a catchment. There are 4 major rivers in the Moreton Bay Region.

Creeks are smaller waterways that tend to connect streams to floodplains and rivers. Creeks usually occur in the middle to upper regions of a catchment.

Streams are the smallest of the waterway types that tend to connect gullies and overland flows to creeks. Streams usually occur in the upper regions or headwaters of a catchment.

Natural waterways considered within this asset management plan are non-financial assets which form part of a hierarchy for management. These waterways are captured in the system to allow important attributes to be captured and relevant child assets to be attached in a relationship structure.

Riparian Revegetation

The riparian zone is usually described as the interface between a stream and the land surrounding its banks. Riparian vegetation differs from other surrounding vegetation as the increased soil moisture promotes the growth of a range of species that thrive in higher ground moisture conditions. The riparian zone is comprised of the stream bank and verge which can have distinct vegetation types.

The riparian zone for waterways provides several functions critical to the health of waterways. These functions include water quality improvement (e.g. through filtration), habitat provision, reducing erosion, and flow attenuation. Anthropogenic pressures (e.g. development) can encroach into riparian areas and significantly reduce their benefits. The clearing of riparian vegetation has resulted in this vegetation type being classified as an endangered regional ecosystem under the Vegetation Management Act 1999. The riparian zone varies in width and composition based on the reach of the waterway that it abuts.

The riparian assets included in this plan are considered non-financial however their replacement value has been estimated based on a cost per unit area produced by assessing recent revegetation projects estimating a weighted average rate. Figure 10 represents a typical cross section of a waterway showing the zones that riparian and other vegetation categories exist.

Waterways Portfolio Asset Management Plan

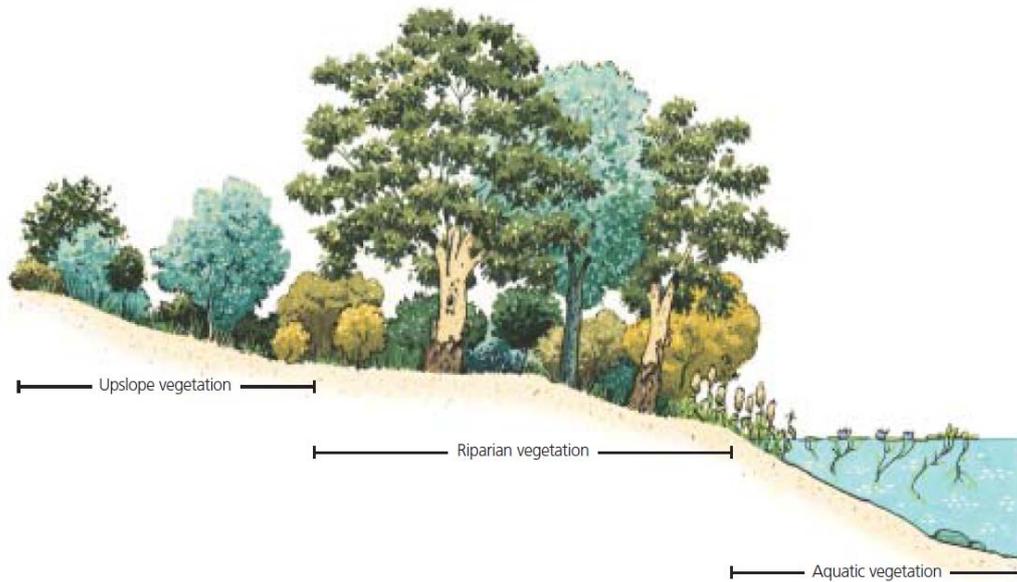


Figure 10 - Typical Waterway Section showing "Riparian Vegetation" Zone (Source: LWA 2007)

The series of photographs below shows a section of riparian revegetation works recently completed by Council.



Figure 11 - Greenwood Cr Park before and after Revegetation Works

Waterways Portfolio Asset Management Plan

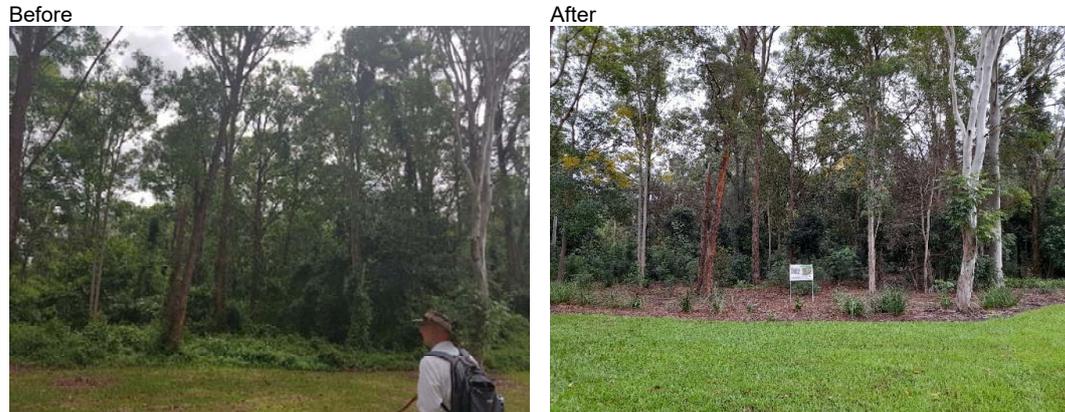


Figure 12 - Greenwood Cr Park before and after Revegetation Works



Figure 13 - Greenwood Cr Park before and after Revegetation Works

Bank Stabilisation

Bank stabilisation assets are used to provide a stabilising function to a waterway bank that is prone to the effects of erosive forces from rain, overland flow and flooding. This can occur during the establishment period of recent revegetation works when plants are immature, and the slope is not yet established. Bank stabilisation is a common objective for watercourse restoration projects. Bank stabilisation assets may be required where a stream reach is highly confined and subject to high flows, or infrastructure is threatened by erosion and unstable banks. The below photograph shows recently completed bank stabilisation project on a section of the South Pine River, at Pine Rivers Park - a Council managed public park.

Waterways Portfolio Asset Management Plan



Figure 14 - Bank stabilisation works at Pine Rivers Park, South Pine River



Figure 15 - Aerial view of completed bank stabilisation works at Pine Rivers Park, South Pine River

As can be seen in the above pictures, this can be achieved through hard engineering techniques (revetment works and log pile fields) and/or soft engineering techniques including weed management, revegetation and/or bioengineering methods (fascines, brush mattresses, brush layer, and vegetated geogrids) that rely on the use of natural products and/or live plants to create resilient, ecologically-sustainable stabilising structures.

The below photos show a section of the North Pine River which was suffering from flood induced erosion. Bank stabilisation works were undertaken at this site with a combination of rock rip rap toe protection, re-profiled and engineering bank, targeted revegetation and erosion control.

Waterways Portfolio Asset Management Plan

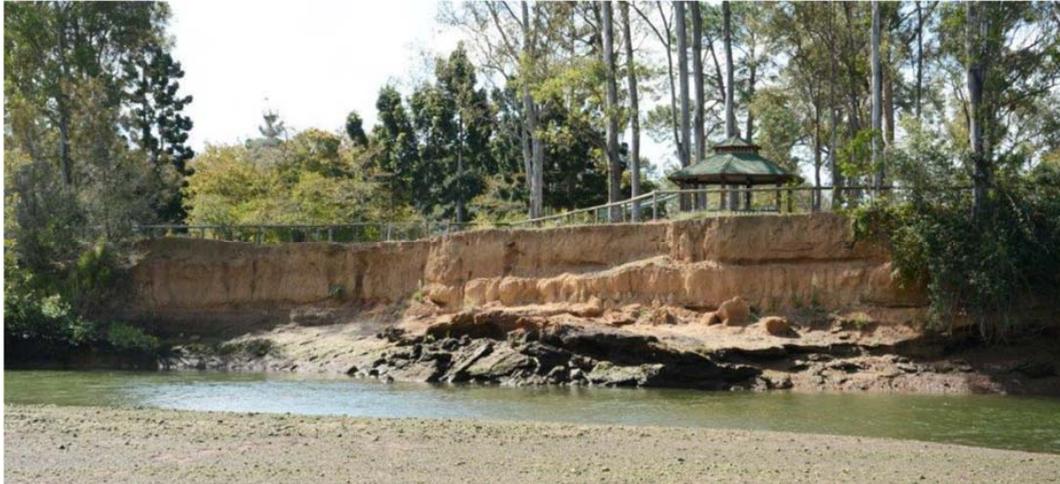
Before



After



Before



After



Figure 16 - Before and after views of bank stabilisation works

Fishway

The Queensland Government Department of Agriculture and Fisheries defines fishways as structures that are “constructed onto large waterway barriers such as dams, weirs and tidal barriers, to help provide adequate fish movement across the barrier. They are used as a last

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Waterways Portfolio Asset Management Plan

resort when there is insufficient water flow above or through the barrier to assist fish movement. There are three types that have been successfully used on waterway barriers in Queensland:

- *rock ramp fishways*
- *vertical slot fishways*
- *fish locks*

The vertical height of the waterway barrier usually dictates the type of fishway required.”

Council currently has two fishways constructed and recorded in the asset management system (Leitch’s Road Fishway pictured below) these assets are known as rock ramp fishways. The asset consists of an existing pedestrian causeway which has been retrofitted to allow fish passage. Rocks have been placed in a particular arrangement to allow passage of the fish species that pass through this section of the waterway. Works were undertaken after the findings of a study into barriers to fish passage indicated that the crossing at this location was impeding the migration of endemic fish species located in the river. Future works are planned upstream to remove further barriers to fish passage.



Figure 17 - Fishway at Leitchs Road on the South Pine River

2.2 Asset Prioritisation

Prioritisation of waterway reaches for maintenance and protection works is a key criterion to ensuring waterways health. At present, MBRC does not have an adopted framework for the prioritisation of waterway works. A list of project candidates was included in the Planning Scheme 2016 and has been included in the TWCMP. Prioritisation of riparian zones and waterway reaches across MBRC outside of the TWCMP has not yet been completed and further investigation is required to develop a prioritisation methodology and framework for assessment.

Currently, maintenance is performed on riparian revegetation assets via a schedule which is administered by Asset Maintenance. There has been no priority placed on the assets as they are listed with maintenance rotation frequency which determines their maintenance levels. This approach should be further refined to ensure an equitable process is applied to the asset portfolio and the maintenance need.

AI-WW01	Develop a prioritisation process for maintenance of Waterway Assets
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2.3 Asset Relationships

A waterway asset is a spatially defined, biophysical component of the environment (for example, a river, creek or stream) that has values associated with it. The values associated with these assets can be classified as environmental, social, cultural or economic.

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Waterways generally incorporate several supporting 'child' assets including riparian revegetation, fishways and other structures to collectively operate as a 'system'.

Linking 'parent' waterway assets and supporting 'child' assets to form a 'system' within Council's asset register will assist in the management of waterways.

AI-WW02	Implement a process to link waterways assets with child assets within TOMAS
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2.4 Asset Attributes

Asset attributes provide unique information regarding the characteristics and status of an asset type. Council has not assessed the attributes required for these assets outside of what is required for valuation purposes. Currently, Council does not have any attributes captured for waterways assets. It is recommended that Council undertakes an assessment to ascertain what attributes are important to waterway management and implement those into the asset management system. Council will also need to undertake an assessment and capture process to capture all attribute data on existing waterways assets and load the data into the AMS.

AI-WW03	Review waterways asset attributes with stakeholders and update the asset management system
AI-WW04	Implement a process for automating the collection of attributes for new waterways assets
AI-WW05	Capture missing asset attributes on all Waterways assets in TOMAS

2.5 Waterway Values

The Queensland State Government defines waterways by the Environmental Values (EVs) that they provide. EVs are the qualities that make water suitable for supporting aquatic ecosystems and human uses. These qualities need to be protected from the effects of habitat alteration, waste releases, contaminated runoff and changed flows to ensure healthy aquatic ecosystems and waterways that are safe for community use. All tidal and non-tidal waters, including wetlands, lakes and groundwater, have EVs. Aquatic ecosystem health is an EV of all Queensland waters. Waterway values should be understood and included in asset lifecycle processes for the waterways asset portfolio.

2.5.1 High Value Waterways

High Value Waterways are considered high importance in terms of how they support the regions social, cultural or economic values. Waterways are considered high value if they have one, or more, of the following characteristics;

- formally recognised significance
- presence of highly threatened or rare species and communities
- high naturalness values (for example, aquatic invertebrate communities or riparian vegetation) or special waterway features (for example, drought refuges or important bird habitat)
- high social, cultural or economic values (for example, recreational fishing, Aboriginal cultural heritage, urban or rural water sources).

The EPP Water and Wetland Biodiversity Policy 2019 details high value waterways from a regional perspective.

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Waterways Portfolio Asset Management Plan

2.5.2 High Biodiversity Value Waterway Reaches

High Biodiversity Value (HBV) waterway reaches have been identified in the Moreton Bay Region based on the presence of rare and locally significant species of aquatic macroinvertebrates (or HBV species) (Nolte, 2011). To be classed as a HBV stream reach, one or more HBV species must be sustained and the stream reach is characterised by having good habitat connectivity.

20 waterways within the Moreton Bay Region have been identified as having high biodiversity value and are included in the table below.

Table 2.2- High Biodiversity Value Waterway Reaches

Waterway Name	Catchment	Landuse
Antibidawa Creek	Caboolture River	Forest / Rural
Caboolture River South	Caboolture River	Forest / Rural / Non-urban living
Gregors Creek	Caboolture River	Forest / Rural / Non-urban living
Lucy's Creek	Caboolture River	Forest / Rural
Zillman's Creek	Caboolture River	Rural
Tributary 1 to Camp Creek	Mary River	Forest / Rural
Tributary 2 to Camp Creek	Mary River	Forest / Rural
Scrub Creek	Mary River	Forest
Cedar Creek	Pine Rivers	Forest / Non-urban living
Kobble Creek	Pine Rivers	Rural / Non-urban living
Mosquito Creek	Pine Rivers	Non-urban living
North Pine River	Pine Rivers	Forest / Rural
Raynbird Creek	Pine Rivers	Forest / Rural
South Pine River	Pine Rivers	Forest / Non-urban living
Ningi Creek	Pumicestone Passage	Forest (Timber Plantation)
Delanays Creek	Stanley River	Forest / Rural
Neurum Creek	Stanley River	Forest
Mountford Creek	Stanley River	Forest
Tributary to Stony Creek	Stanley River	Forest
Stony Creek	Stanley River	Forest

2.5.3 High Ecological Value Areas

As per Schedule 1 of the EPP Water, HEV Areas are identified as being of high ecological importance. In these areas, water quality is required to either be maintained (no worsening) or certain water quality standards achieved. HEV areas have been identified within the Caboolture River catchment as part of the Caboolture River Catchment Management Plan (CRCMP) and are listed as follows:

- Beerburum State Forest
- River and Caboolture River catchments
- Charlie Moorhead Nature Refuge
- Godwin Beach Reserve
- Wararba Creek Conservation Park
- Caboolture River catchment

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Waterways Portfolio Asset Management Plan

- Sheep Station Creek Conservation Park
- Beachmere Conservation Park

AI-WW06	Review Values of Waterways with internal stakeholders and update in the system
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3 Levels of Service

The following subsections summarise the community and technical levels of services for the Waterways asset portfolio, including current performance and long term expected performance.

Refer to Appendix B of Council's Strategic Asset Management Plan for definitions of community and technical levels of service.

3.1 Community Levels of Service

Table 3.1- Community Levels of Service

Service attribute	Service objective	Performance measure process	Current (2021) performance	Expected performance in 10 years (LTFF)
Quality	Waterway assets are designed and constructed to meet industry best practice	Design, construction and maintenance is managed by trained and competent personnel No. of CRs <5% of assets per year receive CRs relating to the amenity/physical condition of waterway assets.	Waterway assets are designed and constructed in accordance with contemporary standards.	<5% of assets per year receive CRs relating to the amenity/physical condition of waterway assets. No issues are expected with the delivery of quality waterway assets within the current funding allocation.
	Community satisfaction with quality and condition of existing waterway assets	No. of CRs or defects logged in TOMAS	No analysis has been undertaken, performance unknown	Possible degradation in community satisfaction as waterway asset stock increases and budget remains unchanged
Function	Waterway assets are designed and constructed appropriately for their siting	Community feedback	No analysis has been undertaken, performance unknown	Possible degradation in community satisfaction as waterway asset stock increases and budget remains unchanged
Capacity/ Utilisation	Waterway assets are provided in areas experiencing erosion issues that are not acceptable	Programmed inspections are undertaken by appropriately qualified and experienced staff.	Existing waterway assets have been provided in isolated areas of known erosion.	This is expected to continue

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3.2 Technical Levels of Service

Table 3.2- Technical Levels of Service

Service attribute	Service objective	Activity measure process	Current performance	Desired optimum position	Agreed sustainable position
Acquisition	Construct riparian assets as needed to facilitate Moreton Bay infrastructure and regional strategic development plans	Internal DWCP waterway rehabilitation planning	Currently, all planned riparian assets can be delivered Circa \$43M over 15 years	Internal planned projects are to be delivered Circa \$43M over 15 years	Internal planned projects are to be delivered Circa \$43M over 15 years
Operations	Undertake condition inspections on riparian assets to assess their health	% of assets being inspected	No condition inspections have been undertaken	Undertake condition inspections on a representative set of riparian assets	Undertake condition inspections on a representative set of riparian assets
Maintenance	Undertake weed management on riparian assets on a scheduled basis	Riparian assets are scheduled to have weed management works completed at a predetermined frequency; work orders are completed in TOMAS	Maintenance activities are currently unscheduled \$250K pa	All maintenance activities are scheduled, and 0% assets miss their maintenance works \$463K pa plus \$900K pa for new assets	All maintenance activities are scheduled, and 0% assets miss their maintenance works Additional \$50K pa over 3 years to \$400K by FY2025
Renewal	Renew assets as required	Fishways are renewed as required	Renewals are programmed for future works	\$320K for renewal of Fishways over 30yr period	\$320K for renewal of Fishways over 30yr period
Waterway Management Planning	Catchment management plans are prepared to guide the management of all waterways and associated assets	No. of catchment management plans completed	TWCMP Project is implementing catchment management plans. Currently, Caboolture CMP in final draft. Further work required for Pine, Pumicestone and Stanley River catchments.	1 CMP developed biennially Internal cost only	1 CMP developed biennially Internal cost only

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Service attribute	Service objective	Activity measure process	Current performance	Desired optimum position	Agreed sustainable position
Condition Assessment	Condition assessments are performed to provide data on asset condition	Condition assessments are performed by suitably qualified and experienced personnel. Condition data is recorded in MBRC's asset register	Condition is not currently captured on waterway assets	Condition assessments are performed at the recommended frequency \$2.4K pa (included in above)	Condition assessments are performed at the recommended frequency \$2.4K pa (included in above)

AI-WW07	Review CR workorders to ascertain performance against Community Levels of Service
AI-WW08	Assess ability to leverage current Artificial Intelligence practices for condition assessments of Waterways Assets

4 Future Demand

Moreton Bay Region is one of Australia's fastest growing regions. Its regional population is forecast to grow by a further 50% to approximately 690,000⁴ by 2041. That means an additional 240,000 residents over the next 25 years. In accordance with the State Government's South East Queensland Regional Plan 2017, Moreton Bay Region is also expected to deliver an additional 88,300 dwellings by this time.

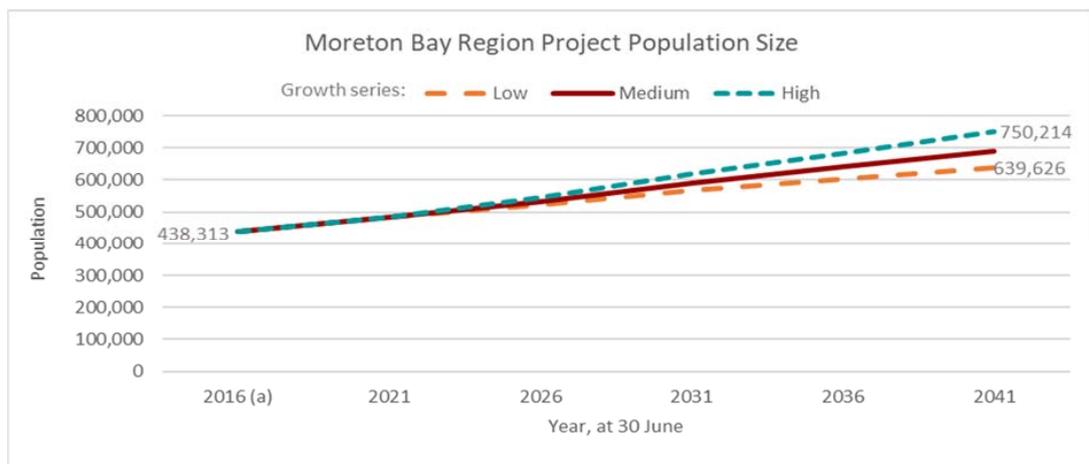


Figure 18 - Moreton Bay Region projected population growth. Source: Queensland Government

Growth management is identified as a key issue in Council's Corporate Plan and well-planned growth is emphasised in the Community Plan.

⁴ Medium growth series

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Waterways Portfolio Asset Management Plan

Future trunk waterways infrastructure will be progressively delivered to service future demand within the region in accordance with Council's adopted program. The full list of projects and associated costs is provided in Appendix B.

4.1 Climate Change and Adaption

The impacts of climate change can have a significant impact on the assets we manage and the services they provide. In the context of the asset management planning process climate change can be considered as both a future demand and a risk.

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

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

Opportunities identified to date for management of climate change impacts on existing assets are shown in Table 4.1.

Table 4.1 - Managing the Impact of Climate Change on Assets

Climate Change Description	Projected Change	Potential Impact on Assets and Services	Management
Change in storm event intensity resulting in higher energy flood waters	Weather events likely to continue to become more intense and frequent as an effect of climate change	Riparian assets that are not designed to endure larger intensity flood events may suffer flood and erosion damage	Ensure that riparian assets are designed with appropriate flood information and utilise best practice design and construction methods
Change in rainfall patterns resulting in lower environmental flows and more frequent and prolonged drought conditions	Rainfall likely to become less frequent and resulting in less available water.	Riparian assets that are not drought hardy will likely decline in condition over time	Ensure that riparian assets are designed with drought hardy native plants and utilise best practice

AI-WW09	Review current operational and capital projects
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5 Asset Lifecycle Management

5.1 Asset Capacity & Performance

Asset capacity & performance is not currently measured for waterways assets. Development and implementation of a performance monitoring plan for waterways assets is recommended and should incorporate quantitative performance indicators based on industry research.

The Moreton Bay Region has a diverse network of creeks, catchments and coastal areas that are central to the values and lifestyles of residents and visitors. These water assets are vital to the ecological, social and economic wellbeing of our community. Waterways play a vital role in the movement and cycling of sediment and nutrients and strengthen the rich agricultural soils in many areas of the region. Rivers are an important interface between the surrounding catchments and the downstream receiving waters of marine ecosystems.

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Many of the values provided by waterways rely on the environmental condition of those waterways. When environmental condition is degraded, some of these values may be diminished or lost. This means that communities are less able to enjoy and use waterways and, in some cases, significant social and economic costs can be incurred. For example, a reduction in waterway condition (such as from algal blooms) can reduce recreation and tourism opportunities while also affecting rare or threatened native species.

The environmental condition of waterways is determined by key drivers such as habitat, water quality, water regimes and connectivity. Broader catchment condition, land use, natural events such as floods and bushfire, development and the potential impacts of climate change can all directly influence the environmental condition and values of waterways.

Management of waterways in good condition is vital to the ongoing health of all waterways. Identifying waterways that are in good condition and preserving their health is the lowest cost for maximum benefit in waterways management. Waterways that are in “near natural” good condition are seldom found in urbanised areas and are usually sited in the undisturbed rain forested headwaters of a catchment.

Waterway management needs to consider how all factors affect waterway condition and therefore the values of waterways. Waterway management activities will be targeted towards the key drivers of environmental condition that support the multiple values of waterways.

AI-WW10	Research current waterways asset performance measurement practices & implement a process for capturing performance data
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5.2 Condition & Profile

Moreton Bay Regional Council’s approach to assessing the condition of its waterways assets aligns to the 1 to 5 grading scale used for other asset classes and is described in the summary table below.

Table 5.1 - Condition rating scale summary

Condition Score	Subjective rating	Notional Remaining Useful Life*	Description
1	Very Good ('as new')	90% - 100%	Free of defects with little or no deterioration evident. Only planned maintenance required.
2	Good	56% - 90%	Free of defects affecting structural performance, integrity and durability. Deterioration of a minor nature and only minor maintenance required plus planned maintenance.
3	Fair	25% - 56%	Moderate to significant deterioration. Developed defects are present but do not affect short term / medium term structural integrity. Moderate loss of capacity. Moderate maintenance required.
4	Poor	6% - 25%	Significant deterioration and defects. Moderate maintenance is required. Rehabilitate / renew in the short term and flag for future part / full replacement. This may include moderate loss of capacity.
5	Very Poor	0% - 6%	Failed or failure imminent. The asset is Asset unserviceable and may be hazardous. Major work / replacement required

* Remaining life is expressed as a percentage of the total expected useful life.

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It should be noted that the above scale is somewhat generic and may require further refinement to make it more relevant to the waterways asset portfolio.

5.2.1 Waterway Condition

Waterway condition is very strongly influenced by the characteristics, processes and actions in the surrounding landscape such as the type and extent of catchment and riparian vegetation, regional climate and land use. When waterway condition declines, the values that waterways provide can be degraded or lost. Values that are most dependent on environmental condition (such as clean drinking water) are lost first and those values with less reliance on condition are then gradually affected. Irrigation water and drinking water for stock can become unusable if the water quality is too poor.

Water quality (the physical, chemical and biological attributes of water) is a key measure of waterway condition. It determines the suitability of water for a particular purpose, with better quality water able to support a wider range of uses than poor quality water. Good water quality is vital for supporting many types of plants and animals. Water quality also affects the health of receiving waters, including coastal and marine environments. Many key marine species (for example, seagrass) are sensitive to changes in nutrient loads and sediment and are adversely affected by declining water quality inputs from upstream catchments.

Biodiversity in streams plays an important role in water quality and invariably, habitat is key criteria in obtaining good biodiversity. Large wood and native instream vegetation are important habitat in rivers. They provide shelter, food sources and breeding sites for a variety of instream animals, including threatened fish species, as well as contributing to biological processes within the river channel. Large woody habitat is an important structural component of rivers, assisting in the formation of features such as scour pools and channel bars and in stabilising the river channel. In large lowland rivers, large woody habitat may be the only stable substrate and an important instream source of nutrients.

There may be instances where the removal of large woody habitat or instream vegetation is warranted to maintain the social or economic values of a waterway, reduce an immediate threat to public infrastructure or reduce public risk. In such cases, waterway managers will need to balance the habitat benefits against the level of risk. Alternatives to the removal of large woody habitat may exist, such as anchoring or realignment.

Councils Stream Health Monitoring Program (SHMP) monitors stream health using biological indicators, namely macroinvertebrate communities that live in the streams. Biotic response of freshwater life to environmental impact is assessed using a scale of Stream Health Classes.

The initial round of stream health monitoring for the Moreton Bay Region was conducted between 2004 and 2010. Between 2011 and 2015, a second round of stream health monitoring was completed. Table 9 below provides freshwater stream health results from this second round of monitoring. As waterways are not financial assets, the condition scores obtained from the SHMP do not represent a trigger for renewal but rather provide Council with an indication of overall waterway health.

Table 5.2 - Stream Health Monitoring Results

Stream Health Class	Stream Health Description	Length of stream per condition score (km)	Proportion per condition (%)
A	Near Natural	46.3	4.6
B	Minimally Disturbed	70.8	7.1
C	Slightly Disturbed	315.9	31.5
D	Moderately Disturbed	509.1	50.6
E	Polluted	56.2	5.6
F	Severely Polluted	6	0.6

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Waterway condition is difficult to define and manage without dividing the assessment process up into individual stream reaches. Waterway stream reaches in the MBRC region were defined as part of early waterway management practices. These reaches have been utilised in studies contributing to the TWCMP and will continue to be used as part of the asset management process for waterways. Reaches are delineated by changes in physical and biological characteristics or processes such as erosion/deposition rates, stream order, riparian zone species or land use. The reach is a basic stream management unit which represents the length of a stream with reasonably uniform characteristics. Each waterway reach should be progressively assessed for the following criteria to determine condition;

- Riparian Vegetation Condition
- Waterway Channel Condition
- In-Stream Condition (Water Quality and Biodiversity)

The Rehabilitation Manual for Australian Streams further discusses the process for describing reach condition.

The condition of a waterway reach is largely determined by the hydrology of the waterway. Floods and flood frequencies can dramatically affect the condition of a channel between seasons. The geomorphology of a waterway plays an important part in understanding and managing the condition of the channel. Fluvial morphology and flood events change conditions in channel beds and can have profound effects on pools, riffles and other low flow channels that provide connectivity for native fish species.

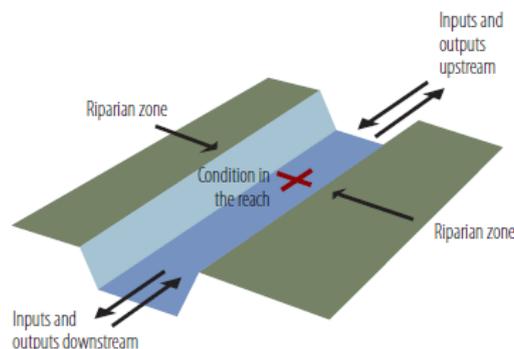


Figure 19 - Reach Components affecting Condition (Source: CRC Catchment Hydrology)

Preventing further loss of connectivity and restoring passage for native fish are critical aspects of maintaining and improving their population viability. Longitudinal connectivity within the river channel is essential for many species of native fish to spawn and recolonise. If fish passage is blocked, critical spawning sites may be inaccessible. The provision of fish passage also facilitates the movement of other aquatic native plants and animals.

Barriers to the passage of native fish range from large dams and weirs to smaller structures such as culverts and road crossings. It is important to ensure that new structures required within the river channel are designed to include fish passage so that existing connectivity is not further reduced. Strategies to improve fish passage include:

- removing redundant structures within the river
- constructing fishways or undertaking fish passage works at existing structures
- considering fish passage in the delivery of environmental water.

ITEM 2.2 WATERWAYS PORTFOLIO ASSET MANAGEMENT PLAN - 62133369 (Cont.)

Waterways Portfolio Asset Management Plan

AI-WW11	Perform a suitable condition assessment of waterways reaches across the region
AI-WW12	Review the Stream Health Monitoring Program and assess appropriateness as an ancillary monitoring program

5.2.2 Riparian Revegetation Asset Condition

The condition of riparian vegetation along the banks of waterways has an important role in their inherent stability. In areas where riparian vegetation is fully intact, waterway banks are stabilised by the root systems which provides some protection against erosive forces from the flow of water in the waterways.

The Caboolture River waterways management strategy performed a riparian condition assessment through a “rapid appraisal” methodology. The method involved assessing habitat values of the site, condition of the ground cover, intactness of the riparian canopy cover, continuity of riparian vegetation, and a species list for each site including exotic weeds. The assessment utilised a ranking system of 1 to 5 similar to the IPWEA scoring criteria, however the scores are opposite to the ranking utilised in the MBRC condition ranking framework with 1 being worst condition and 5 being the best condition. This methodology could be replicated throughout the rest of the region with the correct budget allocation. The Stream Health Monitoring Program also utilises a rapid appraisal methodology for riparian vegetation condition at specific monitoring sites. This should also be assessed for its’ suitability moving forward across the region.

A formal condition assessment process needs to be formulated. Due to the nature of assessing riparian vegetation condition, a detailed reach by reach analysis is usually forgone for a more rapid desktop approach. A framework and methodology for condition assessing waterway reaches should be developed and undertaken by suitably qualified and experienced personnel.

When developed, the condition rating system will be consistent with the 1 – 5 grading system as detailed below in Table 5.3. It is important that consistent condition grades be used in reporting various assets across an organisation. This supports effective communication. At the detailed level assets may be measured utilising different condition scales, however, for reporting in the AM plan they are all translated to the 1 – 5 grading scale.

Table 5.3 - Example Condition Grading for Riparian Assets

Asset Management Condition Score	Cab Waterways Management Strategy	Stream Health Monitoring Score	Riparian Condition	Riparian Condition Description
1	5	4	Excellent	Verge and bank vegetation is native with virtually intact canopy present on both sides of the stream. Vegetation is in an <i>undisturbed state or disturbance is insignificant</i> . No hoofed animals (stock) present.
2	4	3	Good	Verge and bank vegetation is native with virtually intact canopy present on both sides of the stream. <i>Minor disturbance</i> (clearing, weeds, etc.) present. No hoofed animals (stock) present.
3	3	2	Fair	Verge vegetation clearly disturbed. Bank vegetation partly cleared and/or disturbed by stock.

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Waterways Portfolio Asset Management Plan

Asset Management Condition Score	Cab Waterways Management Strategy	Stream Health Monitoring Score	Riparian Condition	Riparian Condition Description
4	2	1	Poor	Verge vegetation cleared on both sides of the stream. Bank vegetation cleared, or some vegetation present but severely modified by grazing and other land use.
5	1	0	Very Poor	Vegetation and stream channel completely modified, such as concrete-lined channels bordered by lawn, parkland, urban or industrial development.

AI-WW13	Develop condition inspection process that can be utilised for riparian revegetation assets
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5.2.3 Recommended Condition Inspection Plan

Development and implementation of a condition inspection plan for waterways assets is recommended based on the condition inspection process outlined in Table 5.4. The condition inspection plan will ensure all missing condition data is captured for waterways assets.

Table 5.4 - Recommended Condition Inspection Plan

Asset Type	Inspection Type	Frequency	Resource
Waterways	Stream Health Monitoring Program	As Required*	Contract - Administered by Environmental Services
Riparian Revegetation	Rapid Condition Inspection	3 years*	Contract
Bank Stabilisation	Rapid Condition Inspection	3 years*	Contract

* Frequency to be determined by MBRC Staff and relevant external experts

Assessing the condition of the waterway channel and the in-stream water quality is an expert field and requires the advice of a suitably qualified and experienced person. Waterway condition assessments should be outsourced to consultancies that specialise in the field of waterway management and should be undertaken on a frequency determined by MBRC staff.

AI-WW14	Develop test point & inspection methodologies for all inspection types across the Waterways Asset Portfolio
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5.3 Defect Management

5.3.1 Current Defect Management Plan

Defects are used to record identified issues that do not represent an immediate safety or operational risk to MBRC and are continually monitored throughout asset inspections. Defects are currently managed and prioritised according to risk. At present, a suite of defect types has not been developed for waterways assets.

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Waterways Portfolio Asset Management Plan

5.3.2 Recommended Defect Management Plan

Defects should be managed through a risk-based approach based on defect severity and asset priority. Defects that exceed a specified acceptable level of risk should be bundled into work packages and actioned through programmed maintenance in addition to routine maintenance activities.

Currently Council does not collect defect data on waterways assets. Development and implementation of a defect management plan that documents the risk-based approach and business processes for managing waterways asset defects is recommended.

AI-WW15	Develop a defect management plan documenting the risk-based approach, intervention levels & business processes for managing defects for all waterway assets
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5.4 Risk Management Plan

Risks for waterways assets are assessed using Council’s Enterprise Risk Management (ERM) framework to identify and evaluate the risk, scoring the likelihood and consequence and the process to eliminate or mitigate the risk.

Risks considered during the development of this plan have highlighted matters that should be considered as part of an ongoing risk management process for waterways assets. The risk management assessment for waterways assets is provided in Appendix C as a concise table of risks. Some of the broader risks associated with waterways are discussed below. The TWCMP contains proposed mitigation measures which seeks to address some or all of the items discussed below.

Land Clearing and Management Practices

Land clearing and riparian vegetation removal can have widespread impacts on waterway health including the direct loss of flora and fauna. The clearing of vegetation around waterways also has a direct impact on erosion and sedimentation processes thus contributing to a larger sediment load within the regions waterway and receiving environment.

Stock Access to Waterways

It is known that cattle and other livestock are generally permitted access to waterways within the MBRC region. Grazing animals are a threat to waterway health due to issues associated with waste generation, stream bank degradation and grazing of vegetation. Livestock can pose a health risk to the water supply as well as adversely affecting waterway aquatic ecology. It is well known that exclusion of livestock from waterways by fencing is an effective means to reducing the impacts of livestock on waterways.

The below photo taken at the Leitchs Road Fishway shows livestock accessing the South Pine River.

Waterways Portfolio Asset Management Plan



Figure 20 - Livestock accessing Water at South Pine River



Figure 21 - Unrestricted Stock access to waterway within Stanley River Catchment (Source: Alluvium 2014)

Urbanisation of the catchments

As catchments develop and urbanise over time the fraction of imperviousness for the catchment increases. Changes to the fraction impervious results in changes to the hydrology of the catchment and thus changes to the environmental aspects of waterways. Increased urbanisation and construction of stormwater network assets contributes to an increase in peak hydrologic discharges. As the health of the regions waterways is heavily reliant on environmental flows, urbanisation has a direct impact on the overall health of the waterways. The effect of urbanisation is most pronounced for the more frequent storms.

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Weed / Pest Invasion

Weeds and pest animals have a direct impact on a range of aspects related to waterway health. Aquatic weeds can displace native flora, cause health issues with livestock and create water quality issues associated with the displacement of native aquatic species. Across Australia, weed and pest animals have major economic, environmental and social impacts, causing damage to natural landscapes, agricultural lands, waterways and coastal areas.



Figure 22 - Cats Claw (an Endemic Weed) dominating Riparian Vegetation in a reach of the Stanley River (Source: Alluvium 2014)

Erosion and Sedimentation

Erosion and sedimentation have been directly linked to the decline in waterway health and is a well-known waterway management issue in South East Queensland. Erosion and sedimentation in waterways are linked to turbidity, suspended solids and nutrient issues as well as the increase and migration of bed sediments which can also have an effect on pools and riffles and other vital aquatic habitat.



Figure 23 - Erosion Scarp at Wylie Park (prior to Bank Stabilisation works) on North Pine River, just upstream of the Gympie Rd Bridge

Waterways Portfolio Asset Management Plan



Figure 24 - the site of an erosion scarp at Wylie Park after bank stabilisation works

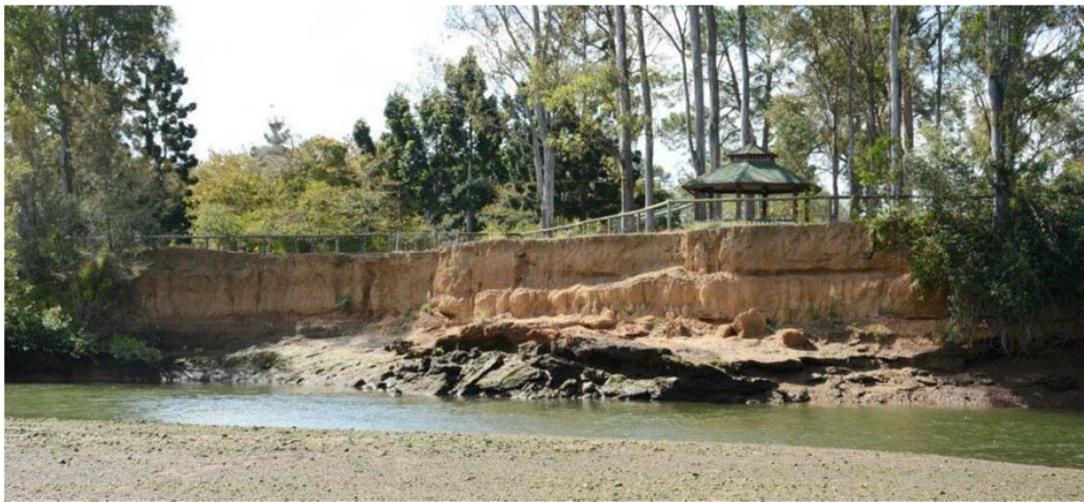


Figure 25 - Looking across the river at erosion scarp located at Wylie Park



Figure 26 - After completion of bank stabilisation works

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Waterway Barriers

Barriers to water flow in waterways such as weirs and dams can have a marked effect on aquatic health if not designed correctly to sustain environmental flows and to allow fish passage. Appropriate environmental flows and fish passage is vital to the longevity, resilience and overall health of a waterway.

Bush Fire

Increased runoff rates from catchments that have been recently burnt by bushfire can cause flooding issues and transport high sediment loads through the system. The increased sediment loads also carry and increased load of nutrients which can contribute to water quality issues including algal blooms. Sediments can also reduce available instream habitats, cause low oxygen levels in the water and disrupt the natural breeding cycles of aquatic native animals or cause fish deaths.

Flooding

Flood impacts can range widely but are primarily related to accelerated rates of river channel erosion, which can be attributed to past clearing of native vegetation in catchments and on riparian land. Impacts include avulsion (the abandonment of the main river channel in favour of a new course), channel widening, infilling of large pools by sediment, erosion of important habitat, damage to native riparian vegetation and loss of large wood for instream habitat. Fences protecting riparian vegetation may be lost or damaged. Floods can affect estuaries and wetlands, primarily through the delivery of large amounts of sediments and nutrients. Flood events can also accelerate the spread of invasive species. Debris (such as logs and branches) may accumulate above bridges or culverts and erosion of the channel may threaten infrastructure. Waste from sewage treatment facilities may enter waterways and stock may be killed during floods.

Acid Sulfate and Potential Acid Sulfate Soils

Acid sulphate soils can result in major environmental, health and engineering impacts, affecting water quality, aquatic plants and animals and infrastructure. Fish kills are the most obvious effect of acid sulfate soils. Where fish are not immediately killed, the corrosive nature of sulfuric acid increases their susceptibility to fungal infections, which can lead to diseases such as epizootic ulcerative syndrome (also known as 'red spot'). Acid sulfate soils present a major challenge to the development, management and use of riverine, estuarine and coastal areas.

Geomorphology

Fluvial Geomorphology is the study of the interactions between the physical shapes of rivers, their water and sediment transport processes, and the landforms they create. Whilst geomorphic processes are understood to be a natural part of stream life cycles, geomorphic change can pose a risk to a watercourse through risks such as erosion, stock access and land clearing are left unmanaged. The geomorphic process of a stream combined with the unmanaged risks mentioned above can lead to premature degradation of a stream to a point where most values of the stream are not able to be retained/protected and are lost.

5.5 Maintenance Plan

Maintenance is performed under two categories for waterways assets;

- **Planned Maintenance** - Maintenance that is planned to occur based on asset type and priority with the purpose of maintaining ongoing serviceability and extending service life. Planned maintenance involves both routine maintenance activities that are performed on

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Waterways Portfolio Asset Management Plan

regular schedules and programmed maintenance activities including the actioning of defects in a cost-effective and efficient manner.

- **Reactive Maintenance** - Maintenance carried out to restore partial asset failures and is typically in response to customer service requests (CR's).

5.5.1 Current Maintenance Plan

Current maintenance activities and expenditure for waterways assets is summarised in Table 5.5. Current maintenance practices for waterways assets encompass the management of riparian revegetation assets only. Council has a program in place which allows for weed management of areas which have previously undergone riparian revegetation. Council budget allocated for this program is currently \$250,000 per annum.

Weed management activities include “cutting and painting”, foliar spraying, hand pulling and mechanical removal of target weed species within riparian revegetation areas. The program is outsourced to contract and is administered internally by the Asset Maintenance team.

The budget is fully allocated each year and is not sufficient enough to cover all of the riparian assets meaning that the assets receive less than an annual frequency of maintenance each year. This creates a risk that weeds will re-emerge and continue to proliferate due to ineffective control. Currently the budget allows for approximately 68.6 hectare of riparian revegetation assets to be maintained (based on an average cost of \$400/ha). This represents approximately 55% of the total riparian revegetation assets.

Table 5.5 - Current Maintenance Activities

Asset Type	Activities	Frequency	Annual Budget
Riparian Revegetation Assets	Weed Management	On rotation as required and determined by Asset Maintenance staff (see Appendix A)	\$250,000
Total (rounded)			\$250,000

Currently riparian revegetation assets are the only assets within the waterways portfolio that have a program covering maintenance activities. The remaining assets such as the Leitchs Road fishway, and bank stabilisation assets do not have any formalised maintenance programs or budgets. This presents a risk that the assets are not being maintained to their required standard or frequency and are potentially degrading at a faster rate than is accounted for through age deterioration.

5.5.2 Recommended Maintenance Plan

Development of a maintenance plan for waterways assets is recommended to address existing deficiencies and provide a mechanism for transitioning from a reactive to planned maintenance approach. The maintenance plan will incorporate the recommended maintenance activities outlined in Table 5.6 and document the following key requirements for maintenance of waterways assets;

- Routine maintenance activities required for all waterways asset types including scheduled frequencies based on asset priority
- Programmed maintenance activities required for waterways assets including defect management procedures outlining;
- Defect intervention levels and process for identifying and bundling defects into programmed maintenance packages based upon risk

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- Process for escalating defects that can't be actioned through programmed maintenance for delivery through capital works programs.
- Roles and responsibilities for all maintenance activities performed for waterways assets
- Workload measurement techniques to determine adequacy levels of resources required to perform planned and reactive work. Reactive work should diminish with time as planned maintenance work increases and therefore, re-allocation of resources is essential.
- Audit processes/procedures for monitoring and reviewing contractor performance and quality of completed work.

Table 5.6 - Recommended Maintenance Activities

Asset Type	Activities	Type	Frequency	Annual Budget
Riparian Revegetation	Weed Management	Planned (Routine)	Determined by Asset Maintenance	\$376,314
		Planned (Programmed)	Determined by Asset Maintenance	-
		Reactive	-	-
Bank Stabilisation	Weed Management	Planned (Routine)	Determined by Asset Maintenance	\$11,200
		Planned (Programmed)	Determined by Asset Maintenance	-
		Reactive	-	-
Fishway	Routine Inspection	Planned (Routine)	Annually	\$2,400
	Inspection Post Flow Event including Litter and Debris Removal	Reactive	Post Flow Event	\$7,500
Total (rounded)				\$400,000

Currently there are no allocated operations funds associated with riparian assets with a \$250,000 spend being allocated to a "Natural Area" management program. At present, \$250,000 budget is spent on a portion of the assets leaving the remainder un-serviced. Council has not appropriately seeded the required budget for weed management of riparian assets and further maintenance budget is required.

The amount of \$376,314 is based upon required maintenance intervals per riparian asset and a base cost of \$500/ha. This is a figure based on expert advice by internal staff members that have extensive knowledge of riparian weed management. Refer to Appendix A for further information

It is recommended that a riparian maintenance management manual be drafted to document the specific requirements of riparian maintenance across the region.

Council should also look to establish a framework to engage and work with community groups in the ongoing maintenance and management of waterways assets, in particular riparian revegetation assets.

AI-WW16	Develop and implement a Maintenance Manual for Waterways Assets
AI-WW17	Develop and implement a framework to engage with community groups in the maintenance and management of waterways assets

It should be noted that the maintenance budget allocation includes the already budgeted \$250K which is currently spent on weed management. This amount should be subtracted from the overall required budget allocation leaving \$150K required to bring the maintenance budget up to the recommended amount.

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Table 5.7 - Proposed Maintenance Budget (Riparian Assets)

Asset Type	Existing Maintenance	Proposed Maintenance	Current FY2021 Budget	Proposed FY2022 Budget	Proposed FY2023 Budget	Proposed FY2024 Budget	Proposed Budget FY2025+
Riparian Revegetation	Some planned (routine) maintenance activities are delivered for a portion of assets	Planned (routine) maintenance activities for all assets in 21/22.	\$250K	\$250K	\$300K	\$350K	\$400K
Total			\$250K	\$250K	\$300K	\$350K	\$400K

Maintenance of waterways assets is currently performed by a mixture of internal Council staff and external contractors with roles and responsibilities falling across several Council departments. The current resource plan for waterways assets is outlined in Table 5.8.

5.5.3 Current Resource Plan

Currently weed management is undertaken by external contractors and is administered by Asset Maintenance personnel. Reactive maintenance and condition inspections are not undertaken. As shown in Table 5.8 below.

Table 5.8 - Existing Resource Plan

Activity	Riparian Assets	Fishways	Bank Stabilisation
Planned Maintenance (Routine & Programmed)	Weed Management (Contractor)	-	-
Reactive Maintenance	-	-	-
Reviewing Condition & Programming Renewals	-	-	-

5.5.4 Recommended Resource Plan

It is recommended that the majority of maintenance activities for waterways assets be performed by external contractors due to the need for specialist skills, plant & equipment however council should assess its capability to undertake these tasks. The recommended resource plan for maintenance of waterways assets is outlined in Table 5.9. Development and implementation of a process for external contractors to record maintenance activities and inspections electronically using TOMAS is recommended via e-contractor.

Table 5.9 - Recommended Resource Plan

Activity	Riparian Assets	Fishways	Bank Stabilisation
Planned Maintenance (Routine & Programmed)	Weed management (Contractor)	Inspection and debris removal (Asset Maintenance)	Inspection and debris removal (Asset Maintenance)
Reactive Maintenance	-	Post flow event inspection and debris removal (Asset Maintenance)	-
Reviewing Condition & Programming Renewals	To be determined	To be determined	To be determined

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Waterways Portfolio Asset Management Plan

AI-WW18	Develop a detailed maintenance plan for waterways assets based on the Resource Plan
AI-WW19	Implement recommended resource plan for waterways assets identifying potential improvements to existing Council resources & necessary training requirements.
AI-WW20	Review current maintenance process for external contractors to record all maintenance activities & inspections electronically using TOMAS (e-contractor)

5.6 Renewal Plan

The purpose of developing a renewal plan is to identify assets that need to be replaced to maintain the current level of service and to avoid asset failure due to deterioration.

In preparing this asset management plan, a condition-based model was prepared to determine the base annual renewal costs associated with the waterways asset portfolio. The model developed for the WPAMP has a 100-year planning horizon to capture the full lifecycle of all assets. However, the results reported in this plan generally only cover a 10, 25 or 50 year period as appropriate.

The deterioration curve used in the asset lifecycle model uses a parabolic deterioration scale and is based on the IPWEA asset deterioration profile as illustrated by Figure 27.

For example, assets in condition 1 (very good or 'as-new' condition) are expected to have a remaining useful life of 90-100% of their expected life. Assets in condition 2 (good condition) are expected to have a remaining useful life of 56-90% of their expected life. If a condition 2 asset has a 60-year life, its remaining life is estimated to be between 34 (56% x 60) and 54 (90% x 60) years.

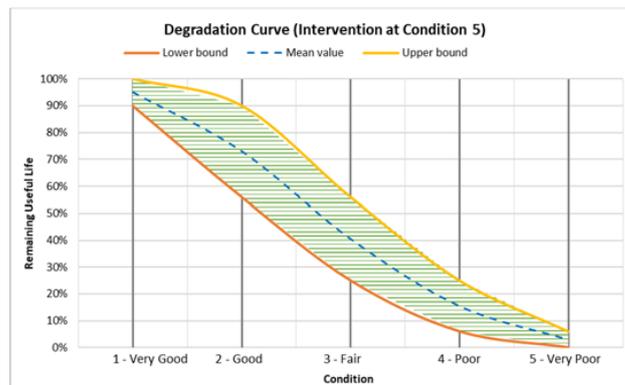


Figure 27 - Asset Deterioration Curve

For lifecycle modelling of MBRC's waterways assets the trigger for replacement was when the asset reached condition 5 (very poor condition). This intervention level may be reviewed in future revisions of the asset management plan or, varied across different asset types to reflect the criticality and different levels of service provided by the assets.

An overview of the modelling process is provided by Figure 28 below. The model was used to project the future net value and condition of the asset portfolio for both the current funding level and recommended budget amount. Section 5.6.1 includes a comparison of the model outcomes for both the current and recommended budgets as a means of benchmarking the results and measuring the effectiveness of the recommended increased budgets. A summary of the projected lifecycle renewal costs is provided in Appendix E. Appendix F and Appendix G demonstrate the predicted condition of the assets based on current and recommended renewal funding.

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Waterways Portfolio Asset Management Plan

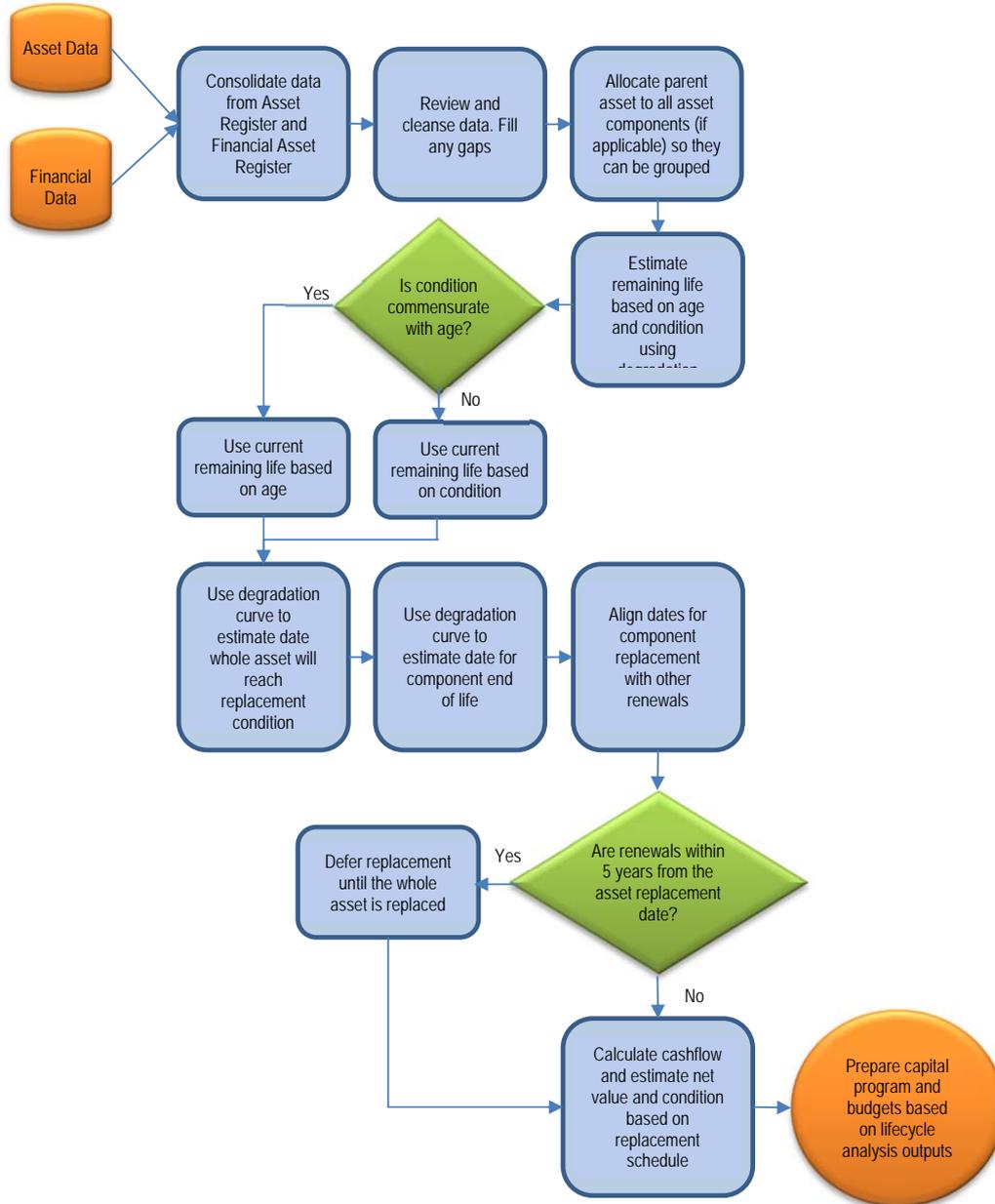


Figure 28 - Flow chart for determining lifecycle capital costs and program

5.6.1 Current Renewal Plan

Currently there are no renewals forecast for riparian revegetation assets due to the long useful life of these natural assets and the fact that they do not degrade and typically improve in quality with age. Further to this, due to MBRC only embarking on the construction of riparian assets within the last 10 years with majority of those assets built within the last 5 years, their remaining useful lives are in excess of 90 years in most cases. This means that it will be some 90 years until an age-based renewal trigger is reached. However, when MBRC implements a condition assessment framework for these assets, renewals forecasting can then be implemented based on condition triggers.

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Council does actively undertake revegetation works along waterways and has the opportunity to utilise current costs of projects as replacement cost figures. Council should investigate further the costing method for replacement of riparian revegetation assets.

5.6.2 Recommended Renewal Plan

Figure 29 summarises the results from the lifecycle modelling for the level of capital expenditure projected to be required over the next 50 years for financially recognised assets. Replacement of non-financial assets is captured under operational costs.

The recommended renewal plan is summarised below:

- Include future provision of \$320K for capital replacement of the two fishways (each asset renewed twice) across a 30 year period.

The long-term average funding required for renewal and replacement of waterways assets is approximately \$10K per year for waterway assets. As the riparian revegetation assets are considered non-financial, their replacement costs are not considered. This contributes to the low forecast annual renewal cost as 96% of the asset portfolio is made up of riparian assets.

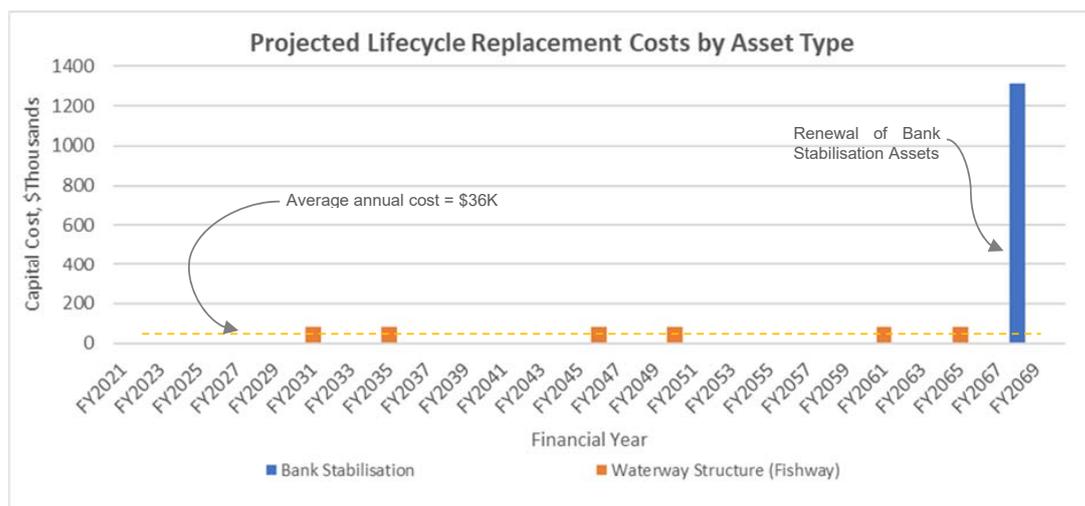


Figure 29 -Projected 50-year lifecycle replacement costs for waterways assets

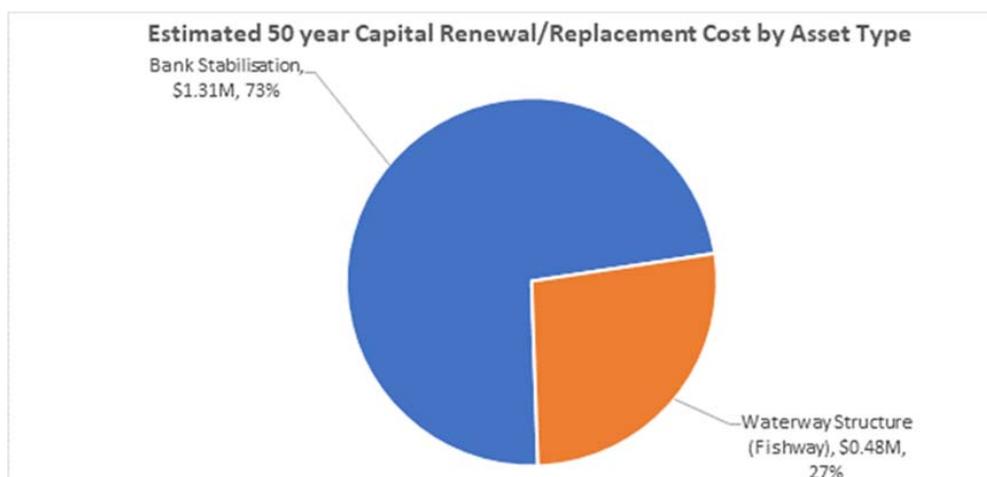


Figure 30 - 50 year estimated capital cost split by asset type

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Figure 30 illustrates an almost 70/30 split of funding over the next 50 years for bank stabilisation and waterways structure assets. Although currently there is only 2 waterways structures, they have a useful life of 15 years in comparison to 50 years for bank stabilisation assets and hence is renewed at a higher frequency (3.33 times more often) than bank stabilisation assets.

Figure 31 illustrates how the recommended capital budget (blue) is intended to meet the cumulative capital funding needs identified through the lifecycle modelling (orange). In this instance the two charts match as it is recommended that replacement of all waterway assets is fully funded in the year their replacement falls due (ie there is no need to defer replacement or spread costs over multiple years). The lifecycle model outputs and recommended funding amounts have been used to develop the indicative capital works program.

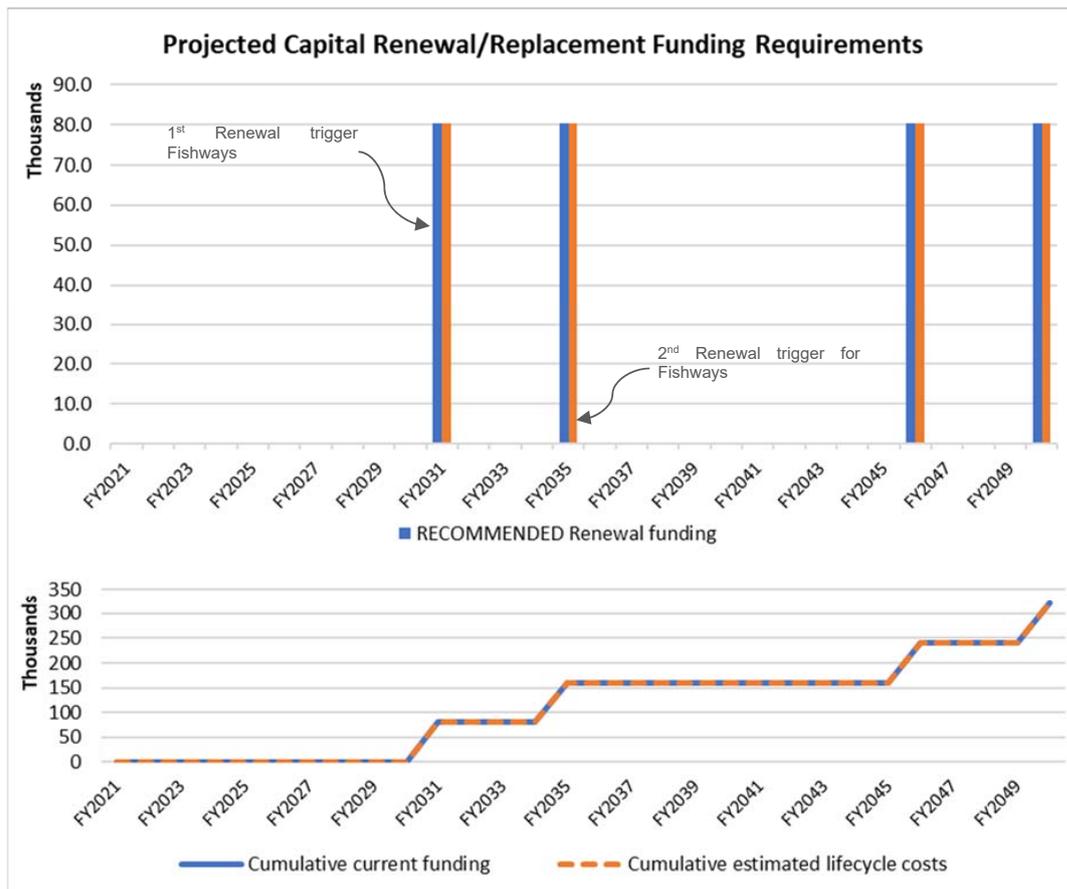


Figure 31 - Comparison of estimated lifecycle costs and the recommended capital renewal funding

The above renewal plan shows that there is a low annual funding requirement for waterways assts due to the majority of the assts being long life. At present, the renewal plan includes budget to replace the fishway only with triggers for every 15 years. It is likely that due to the low cost of renewal of the fishway, the annual smoothed option would not be considered as the cost every 15 years for the fishway can be easily absorbed. Council may wish to construct additional more sophisticated fishways at which point, the smoothed annual costs may be considered further.

As further condition data becomes available, the renewal allocation should be updated accordingly based on priority, condition, utilisation, star rating, criticality and remaining useful

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life. It is imperative that the recommended maintenance plan be implemented as soon as possible to avoid further premature deterioration of this asset base.

6 Systems

The asset management processes within MBRC are supported by a number of corporate management information systems. The corporate systems that support asset management activities are described in detail in Table 6.1 in Appendix B of the SAMP. The systems include:

- Financial information management system (Technology One)
- Asset information management system (TOMAS/Technology One)
- Performance planning and monitoring system (built on Technology One)
- Corporate electronic document system (ECM/Technology One)
- Geographical Information System (ArcGIS)
- Moreton Atlas (Corporate wide spatial system)

MBRC does not use a dedicated proprietary system for management of its waterways asset portfolio. Lifecycle modelling carried out for this asset management plan was modelled using Excel.

7 Financial Summary

7.1 Useful Life and Valuation Methodology

When assets are initially recognised, each asset is recorded with an estimated useful life which is used as a basis for determining depreciation. Table 7.1 below outlines the estimated useful life for waterways assets and their valuation methodology (refer also to MBRC's Non-current Asset Accounting Policy).

Table 7.1 - Waterways Assets Useful Lives

Asset Type	Estimated Useful Life	Valuation Methodology
Riparian Revegetation	100 years	Non-financial (not valued)
Bank Stabilisation	50 years	Fair Value methodology. The next revaluation will take place in FY 2021)
Fishway	15 years	

7.2 Financial Statements and Ratios

7.2.1 Valuations & Depreciation

The financial asset register shows the current replacement value for the waterways assets as approximately \$1.4M. However, this does not include the \$8.6M investment cost for riparian revegetation assets as these are currently not considered as financial assets. The estimated total replacement value (TRV) for the waterways assets is \$10 Million (including riparian revegetation). Riparian revegetation assets are important to consider as they make up over 96% of the portfolios total replacement value as shown in Figure 32.

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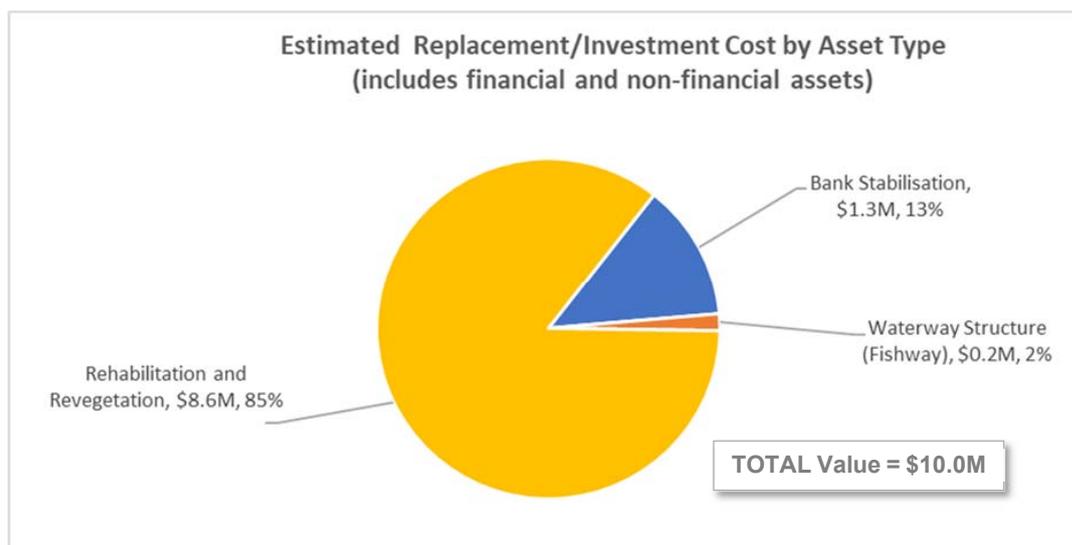


Figure 32 - Current replacement/investment cost by asset type for financial and non-financial assets

For the purpose of this asset management plan and for estimating the ongoing lifecycle costs, an estimate was made of the replacement values for all assets where possible. The assets were valued using the average replacement cost unit rates which were determined from the assets with known replacement values and dimensional attributes or qualities that could be established from the asset database.

The current capital plan (refer to Appendix B) includes a program to upgrade, extend or construct approximately \$43 Million new waterways assets over 15 years. This program is under further investigation and as such timing for delivery is yet to be determined and finalised.

The projected total replacement/investment value, including non-financial assets, is summarised in Table 7.2 and Table 7.3 and illustrated by Figure 33 below. It assumes that no disposals will take place over that period, all existing assets will be replaced at end of life, and that all scheduled capital projects will be built by their currently scheduled dates.

Table 7.2 - Projected TRV, net value and depreciation including new acquisitions (\$M) FY2022-FY2033

Description	FY2022	FY2023	FY2024	FY2025	FY2026	FY2027	FY2028	FY2029	FY2030	FY2031	FY2032	FY2033
Current Portfolio TRV	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Cumulative Value of Extensions/New Assets/Upgrades	1.0	1.7	2.6	3.7	4.3	5.3	5.9	6.5	6.6	6.7	6.7	7.2
Projected Total TRV	11.0	11.7	12.6	13.7	14.4	15.3	16.0	16.5	16.6	16.7	16.8	17.3
Projected Total Net Value	10.4	11.1	11.7	12.5	13.4	13.9	14.4	14.7	15.0	14.9	14.8	14.6
Projected Annual Depreciation	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3

Table 7.3 - Projected TRV, net value and depreciation including new acquisitions (\$M) FY2034-FY2045

Description	FY2034	FY2035	FY2036	FY2037	FY2038	FY2039	FY2040	FY2041	FY2042	FY2043	FY2044	FY2045
Current Portfolio TRV	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Cumulative Value of Extensions/New Assets/Upgrades	7.7	8.2	8.7	9.2	9.7	10.2	10.7	11.2	11.7	12.2	12.2	12.2

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Projected Total TRV	17.8	18.3	18.8	19.3	19.8	20.3	20.8	21.3	21.8	22.3	22.3	22.3
Projected Total Net Value	15.0	15.3	15.6	15.9	16.2	16.5	16.8	17.1	17.3	17.6	17.9	17.6
Projected Annual Depreciation	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4

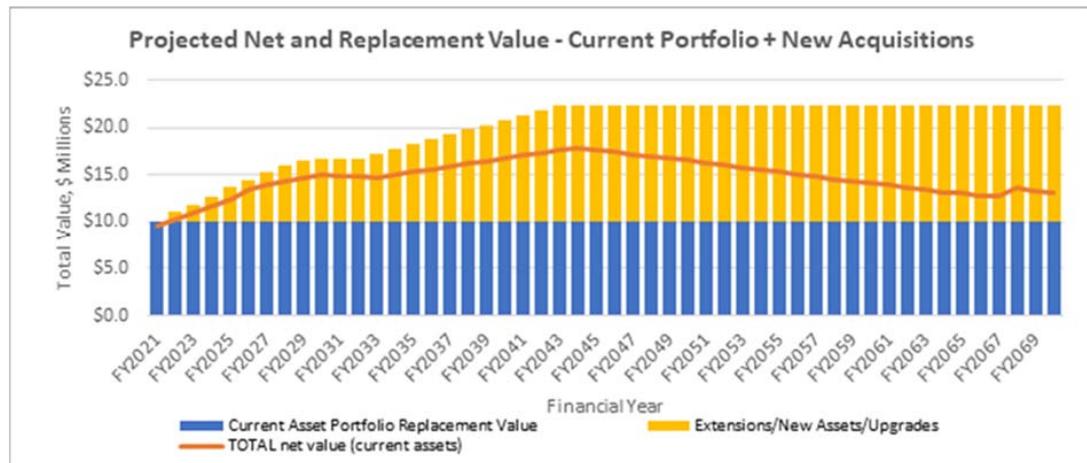


Figure 33 - Projected replacement and net value for current portfolio and new acquisitions (includes non-financial assets)

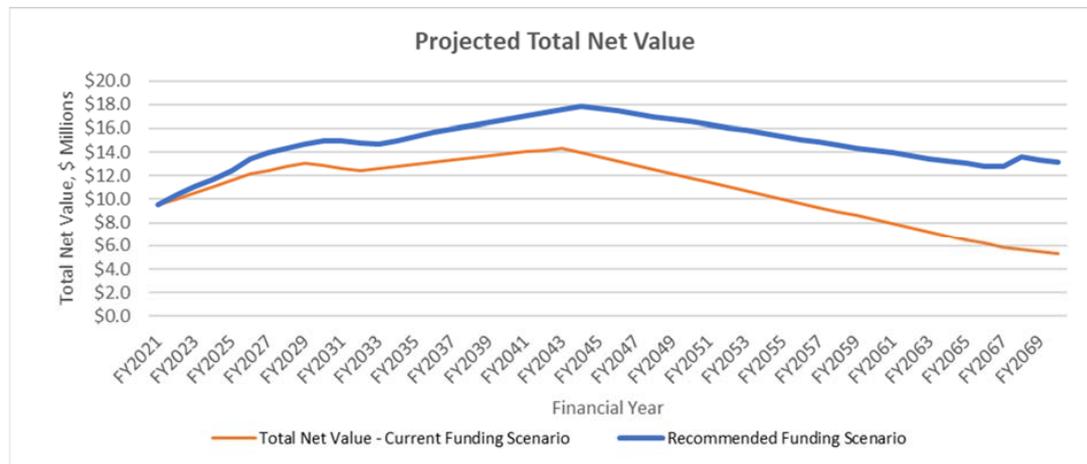


Figure 34 - Projected net asset value based on current and recommended funding scenarios

The projected net value for the current and proposed capital renewal funding is illustrated by Figure 34. Whilst both scenarios result in a decline in the net value of the asset base over time this can be expected from a relatively new asset base. However, the recommended funding will result in slower rate of reduction in the net value and beyond 2066 the trend will reverse and continue to climb back to a similar level as today over the subsequent 30 years. This demonstrates that the current renewal funding is inadequate and that the proposed funding is expected to provide a long-term sustainable outcome.

7.2.2 Financial Sustainability Ratios

The Asset Sustainability Ratio (ASR) demonstrates the extent to which the infrastructure assets managed by Council are being replaced as they reach the end of their useful lives. This ratio measures how much capital expenditure goes toward replacing existing assets each year

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Waterways Portfolio Asset Management Plan

relative to depreciation expense. The target range is approximately 90% to 110%. Being a high growth Council, Council's target range is approximately 75% which allows for balancing capital expenditure on existing assets with building of new infrastructure due to population growth.

Figure 35 shows the ASR for MBRC's waterways asset portfolio. The intent is for capital investment to offset depreciation to maintain the value of the portfolio, and inherently demonstrate maintaining the portfolio itself. The ASR shows that Council is investing heavily into the asset portfolio which has only minimal financial assets contributing to a low capital to depreciation ratio and therefore a high sustainability ratio.

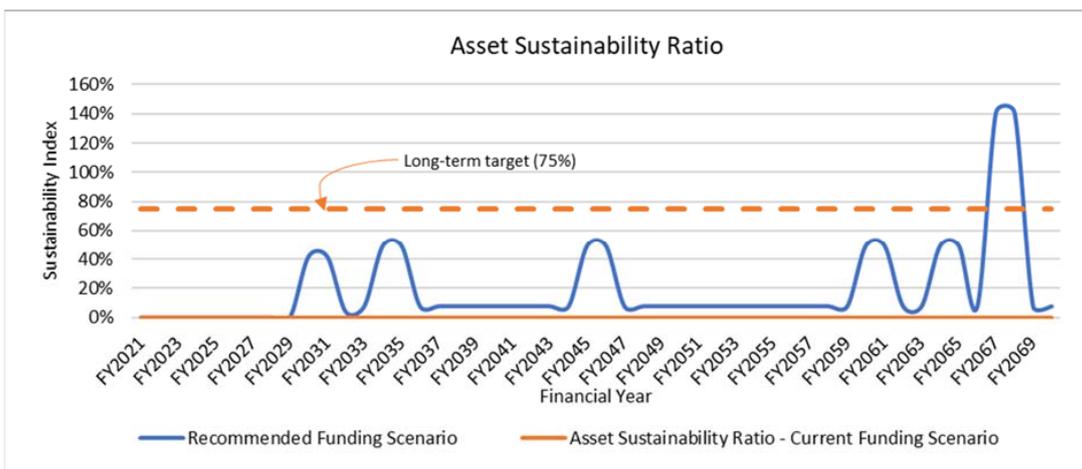


Figure 35 - Projected sustainability ratio based on current and recommended funding scenarios

The Asset Consumption Ratio (ACR) is the value of infrastructure assets divided by gross current replacement cost of infrastructure assets. This ratio seeks to highlight the extent of asset consumption. Council's desired range is between 40% to 80%.

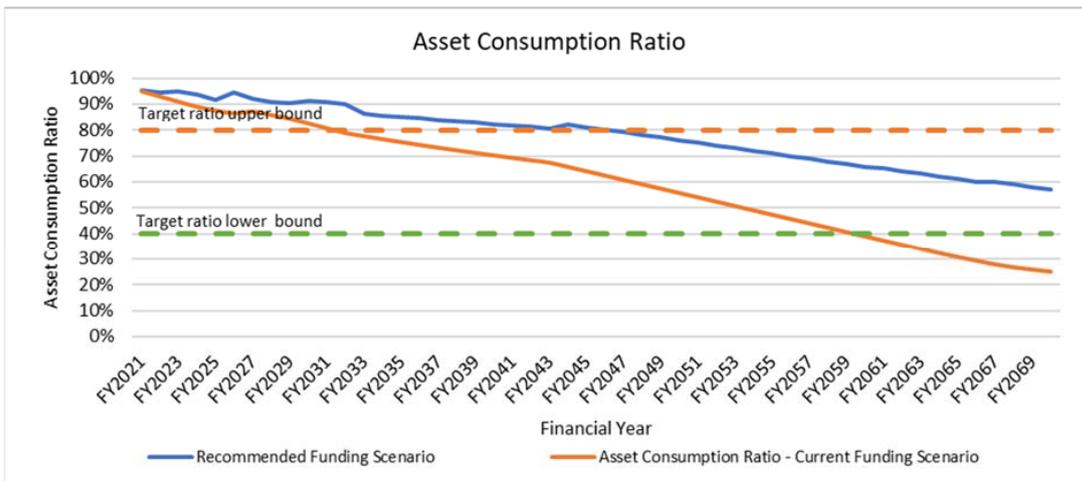


Figure 36 - Projected asset consumption ratio based on current and recommended funding scenarios

This ACR seeks to demonstrate that the asset portfolio is being maintained within a sustainable and economic range. Figure 36 shows that the asset base of the waterways portfolio is heavily consumed over its lifecycle.

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7.3 Forecast Costs

The age profile for MBRC’s waterways assets indicated that the current portfolio is still relatively young compared to its expected life. Assets with shorter service lives in the range of 15 years will need renewal or replacement in the near future and moreover their frequency is up to 3.3 times that of the bank stabilisation assets.

Section 5.5 described the justification and need for introducing planned preventative maintenance on top of the existing routine and reactive maintenance activities. Section 5.7 identified the funding that is predicted to be required for renewal or replacement of assets components over the next 50 years.

To sustain the existing waterways asset portfolio, and provide the expected community and technical levels of service described in this asset management plan, the recommended budget allocations are outlined below:

- **Increase the current maintenance budget of \$250K for planned and reactive maintenance by an additional \$50K per annum over 3 years from FY2023 to a total of \$400K per annum in FY2025.**
- **Continue to invest** in currently identified and budgeted riparian rehabilitation and revegetation projects; on **average \$560K per annum**
- **Continue to invest** in new waterways asset acquisitions as per the current program, i.e. **~\$43M over the next 15 years**
- **Include future renewal provision of \$320K for capital replacement of the two fishways (each asset renewed twice) across a 30 year period.**

The following chart and tables summarise the recommended funding need. The amounts shown for capital extensions, new assets and upgrades align to the amounts shown in the indicative capital works plan in Appendix H.

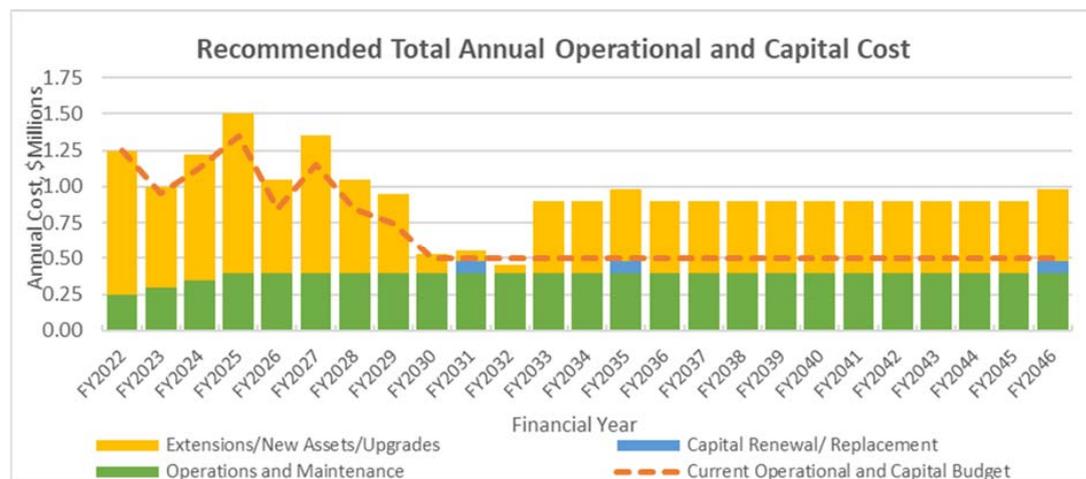


Figure 37 - Recommended total annual operational and capital budget

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Table 7.4 Recommended annual operational and capital budgets; FY2022-FY2033 (\$ thousands)

Cost Type	FY2022	FY2023	FY2024	FY2025	FY2026	FY2027	FY2028	FY2029	FY2030	FY2031	FY2032	FY2033
Operations and Maintenance	250	300	350	400	400	400	400	400	400	400	400	400
Extensions/New Assets/Upgrades	1,000	700	875	1,100	650	950	650	550	125	75	50	500
Capital Renewal/Replacement	0	0	0	0	0	0	0	0	0	80	0	0
TOTAL Estimated Annual Cost (\$'000s)	1,250	1,000	1,225	1,500	1,050	1,350	1,050	950	525	555	450	900

Table 7.5 - Recommended annual operational and capital budgets; FY2034-FY2045 (\$ thousands)

Cost Type	FY2034	FY2035	FY2036	FY2037	FY2038	FY2039	FY2040	FY2041	FY2042	FY2043	FY2044	FY2045
Operations and Maintenance	400	400	400	400	400	400	400	400	400	400	400	400
Extensions/New Assets/Upgrades	500	500	500	500	500	500	500	500	500	500	500	500
Capital Renewal/Replacement	0	80	0	0	0	0	0	0	0	0	0	0
TOTAL Estimated Annual Cost (\$'000s)	900	980	900									

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8 Improvement and Monitoring

During the preparation of the Waterways Portfolio Asset Management Plan the following improvement items have been identified and are set out in Table 8.1 below.

Table 8.1 - WPAMP Action Items

Action No.	Detail	Responsibility	Due date
AI-WW01	Develop a prioritisation process for maintenance of Waterway Assets	AMT & DWCP	Q1 21/22
AI-WW02	Implement a process to link waterways assets with child assets within TOMAS	DWCP & AMT	Q2 21/22
AI-WW03	Review waterways asset attributes with stakeholders and update the asset management system	AM, AMT & DWCP	Q2 21/22
AI-WW04	Implement a process for automating the collection of attributes for new waterways assets	AMT	Q2 22/23
AI-WW05	Capture missing asset attributes on all Waterways assets in TOMAS	AMT	Q2 22/23
AI-WW06	Review Values of Waterways with internal stakeholders and update in the system	AMT	Q2 22/23
AI-WW07	Review CR workorders to ascertain performance against Community Levels of Service	AMT & DWCP	Q2 21/22
AI-WW08	Assess ability to leverage current Artificial Intelligence practices for condition assessments of Waterways Assets	AMT & DWCP	Q4 22/23
AI-WW09	Review current operational and capital projects	AMT, DWCP & SIP	Q4 22/23
AI-WW10	Research current waterways asset performance measurement practices & implement a process for capturing performance data	AMT & DWCP	Q2 21/22
AI-WW11	Perform a suitable condition assessment of waterways reaches across the region	AMT & DWCP	Q4 21/22
AI-WW12	Review the Stream Health Monitoring Program and assess appropriateness as an ancillary monitoring program	AMT, DWCP, ES & SIP	Q2 22/23
AI-WW13	Develop condition inspection process that can be utilised for riparian revegetation assets	AMT, DCP & ES	Q2 22/23
AI-WW14	Develop test point & inspection methodologies for all inspection types across the Waterways Asset Portfolio	AMT, DWCP, ES & SIP	Q4 21/22
AI-WW15	Develop a defect management plan documenting the risk-based approach, intervention levels & business processes for managing defects for all waterway assets	AMT, DWCP, ES & SIP	Q2 22/23
AI-WW16	Develop and implement a Maintenance Manual for Waterways Assets	DWCP	Q1 22/23
AI-WW17	Develop and implement a framework to engage with community groups in the maintenance and management of waterways assets	AMT, DWCP, ES	Q2 22/23
AI-WW18	Develop a detailed maintenance plan for waterways assets based on the Resource Plan	DWCP & AMT	Q2 21/22

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Action No.	Detail	Responsibility	Due date
AI-WW19	Implement recommended resource plan for waterways assets identifying potential improvements to existing Council resources & necessary training requirements.	DWCP	Q2 22/23
AI-WW20	Review current maintenance process for external contractors to record all maintenance activities & inspections electronically using TOMAS (e-contractor)	AMT & DWCP	Q4 21/22

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Waterways Portfolio Asset Management Plan

9 Appendices

Table 9.1 - List of Appendices

Appendices	Title	Referenced Section
Appendix A	Riparian Revegetation Asset Maintenance Schedule	Executive Summary, 5.5.1, 5.5.2
Appendix B	Project List (Waterways)	4.0, 7.2.1
Appendix C	Risk Management Plan	5.4
Appendix D	Waterways Asset RACI Matrix Report	2.1
Appendix E	Overall Asset Type Replacement / Renewal Graphs	5.6
Appendix F	Waterway Asset Projected Condition - Overall	5.6
Appendix G	Waterway Asset Projected Condition by Asset Type	5.6
Appendix H	Waterways Rehabilitation and Revegetation Operational Projects Program (106903)	7.3
Appendix I	References	-

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Waterways Portfolio Asset Management Plan

Appendix A - Riparian Revegetation Asset Maintenance Schedule

ASSET NUMBER	LONG DESCRIPTION	SUBURB	AREA M ²	Area Ha	MAINTENANCE ROTATIONS	RIPARIAN SYSTEM
A00598253	Bert Hall Park 2	FERNY HILLS	5676	0.57	6	Cabbage Tree Creek
A00598290	Brook Park	FERNY HILLS	12361	1.24	6	Kedron Brook Creek
A00598357	Norfolk Downs Estate Park	NARANGBA	31383	3.14	6	Tributary of Burpengary Creek
A00598940	Brisbane Road Park 4	WARNER	4741	0.47	6	Four Mile Creek
A00599034	Yebri Street Park 1	KALLANGUR	8183	0.82	6	Yebri Creek
A00599042	Balstrup Park	KALLANGUR	8069	0.81	6	Fresh water Creek
A00599238	Alan Smith Park 2	HIGHVALE	3567	0.36	6	South Pine River
A00599305	David Dwyer Reserve	KALLANGUR	15001	1.50	6	Yebri Creek
A00599749	Russell Family Park	HIGHVALE	24055	2.41	6	South Pine River
A00599802	Sandpiper Avenue Park - Bushland	NORTH LAKES	23786	2.38	6	Tributary Saltwater Creek
A00600503	Bird Song Place Park 2	BUNYA	15745	1.57	6	tributary of Bergin Creek
A00600590	Dawson Creek Reserve 2	HIGHVALE	21995	2.20	6	Tributary of South Pine
A00600944	Leslie Patrick Park 3	ARANA HILLS	10911	1.09	6	Kedron Brook Creek
A00601157	Mount Glorious Road Reserve 4	HIGHVALE	10975	1.10	6	South Pine River
A00602131	Douglas Franklin Reserve	CLOSEBURN	4313	0.43	6	Cedar Creek
A00602137	Yellow Button Close Reserve 9	WARNER	22626	2.26	6	Four Mile Creek
A00603004	Buchanans Park 3	BURPENGARY	9649	0.96	6	Burpengary Creek
A00603622	Cash Street Park 2	D'AGUILAR	6366	0.64	6	Tributary of One Mile Creek
A00603838	MJ Brown Park 2	MARGATE	2771	0.28	6	Bells Creek
A00604302	Grace Crescent Park 2	NARANGBA	15276	1.53	6	Burpengary Creek
A00604546	Seacrest Park 2	MARGATE	5645	0.56	6	Bells Creek
A00604583	Rangeview Park 3	WAMURAN	15658	1.57	6	Tributary of Wararba Creek
A00605046	George Georges Park 1	EVERTON HILLS	5275	0.53	6	Tributary of Cabbage Tree Creek
A00605101	4 Mile Creek	WARNER	31659	3.17	6	Four Mile Creek
A00605128	Ryder Road Reserve 3	HIGHVALE	17591	1.76	6	Tributary of South Pine River
A00605593	Mallard Street Park 2	MANGO HILL	8443	0.84	6	Tributary of Freshwater Creek
A00605986	Jean Hooper Park 3	MANGO HILL	11997	1.20	6	Freshwater Creek
A00606797	Reiners Road Park 1	HIGHVALE	13505	1.35	6	South Pine River

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Waterways Portfolio Asset Management Plan

ASSET NUMBER	LONG DESCRIPTION	SUBURB	AREA M ²	Area Ha	MAINTENANCE ROTATIONS	RIPARIAN SYSTEM
A00640219	Bongaree Caravan Park	BONGAREE	12960	1.30	6	Tributary of Bongaree Creek
A00668538	Mercury Parade Reserve 1	MANGO HILL	6565	0.66	6	Tributary of Freshwater Creek
A00669138	Tarong Avenue Reserve	NORTH LAKES	7045	0.70	6	Tributary Saltwater Creek
A00744356	Aspire Parade Reserve 2	GRIFFIN	19458	1.95	6	Fresh Water Creek
A00805897	Jan Sked Reserve 2	CASHMERE	34272	3.43	6	One Mile Creek
A00805902	Brisbane Road Park 9	WARNER	17810	1.78	6	Four Mile Creek
A00806345	Currimundi Court Reserve 2	BURPENGARY	7846	0.78	6	Tributary of Burpengary Creek
A00806346	Tinney Road Reserve Central 2	UPPER CABOOLTURE	9481	0.95	6	Sheep Station Creek
A00806349	Edward D Allison Park 4	DRAPER	6042	0.60	6	Cedar Creek
A00806352	Powerful Owl Court Park 3	BUNYA	12137	1.21	6	Bergin Creek
A00806398	Tyler Reserve 4	BUNYA	13368	1.34	6	Bergin Creek
A00806402	Dawn Road Reserve West (Zone 2)	ALBANY CREEK	12755	1.28	6	Tributary of Albany Creek
A00806405	Dawn Road Reserve 1 (Zone 3)	ALBANY CREEK	17039	1.70	6	Tributary of Albany Creek
A00806406	Dawn Road Reserve (Zone 1)	ALBANY CREEK	16630	1.66	6	Tributary of Albany Creek
A00806407	Kim Grayson Park 7	ALBANY CREEK	3696	0.37	6	Albany Creek
A00806595	Fernwood Reserve - Creek 2	FERNY HILLS	4276	0.43	6	Cabbage Tree Creek
A00806614	Sky Drive Park 2	HIGHVALE	8858	0.89	6	Tributary of South Pine River
A00806890	Samford Parklands 14	YUGAR	6703	0.67	6	South Pine River
A00806891	Harold Brown Park 3	CAMP MOUNTAIN	9659	0.97	6	Samford Creek
A00806897	Undambi Rotary Reserve 3	SAMFORD VALLEY	15916	1.59	6	South Pine River
A00806908	North Lakes Environmental Reserve- Zone W4	DECEPTION BAY	8026	0.80	6	Tributary of Saltwater Creek
A00806945	Roseberry Place Park 3	DECEPTION BAY	16892	1.69	6	Little Burpengary Creek
A00806947	North Lakes Environmental Reserve- Zone W5	DECEPTION BAY	9187	0.92	6	Saltwater Creek
A00806949	North Lakes Environmental Reserve- Zone W6a	DECEPTION BAY	4491	0.45	6	Saltwater Creek
A00806957	North Lakes Environmental Reserve- Zone Wb	DECEPTION BAY	8537	0.85	6	Saltwater Creek
A00807489	Park Vista Drive Park 4	MANGO HILL	12643	1.26	6	Saltwater Creek
A00807491	Park Vista Drive Park (North 2)	MANGO HILL	17800	1.78	6	Saltwater Creek
A00807563	Anzac Avenue Park (North) 2	MANGO HILL	7560	0.76	6	Salt water Creek

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Waterways Portfolio Asset Management Plan

ASSET NUMBER	LONG DESCRIPTION	SUBURB	AREA M ²	Area Ha	MAINTENANCE ROTATIONS	RIPARIAN SYSTEM
A00807565	Capestone Boulevard Park 5	MANGO HILL	1243	0.12	6	Tributary of Saltwater Creek
A00807568	Capestone Boulevard Park 3	MANGO HILL	2649	0.26	6	Tributary of Saltwater Creek
A00807569	Maryvale Road Reserve 3	MANGO HILL	30533	3.05	6	Freshwater creek
A00807571	Bell Air Estate Park 3	BELLMERE	3181	0.32	6	Caboolture River
A00807589	Colburn Way Reserve 3	BELLMERE	7670	0.77	6	Wararba Creek
A00807590	Swan Road Reserve 2	BELLMERE	6911	0.69	6	Wararba Creek
A00807591	Richards Court Reserve 4	BELLMERE	7913	0.79	6	Tributary of Wararba Creek
A00807599	Platypus Creek Environmental Reserve 6	CABOOLTURE SOUTH	9095	0.91	6	Tributary of Caboolture River
A00807607	Caboolture Arboretum 7A	CABOOLTURE SOUTH	9190	0.92	6	Tributary of Caboolture River
A00807612	Peterson Road Park (West) 2	MORAYFIELD	7909	0.79	6	Tributary of Creek Station Creek
A00807724	Burpengary Environmental Reserve 2	BURPENGARY	25397	2.54	6	Tributary of Gympie Creek
A00807732	Fodora Place Park 2	BURPENGARY EAST	6850	0.68	6	Tributary of Burpengary Creek
A00807909	Melsa Park 4	BONGAREE	20216	2.02	6	Tributary of Bongaree Creek
A00808128	Sandheath Place Reserve 5	BEACHMERE	33875	3.39	6	Tributary of Ningi Creek
A00808408	Grice Crescent Reserve 4	NINGI	14590	1.46	6	Tributary of Ningi Creek
A00808684	Grice Crescent Reserve 5	NINGI	10921	1.09	6	Tributary of Ningi Creek
A00808685	Sandstone Boulevard, north edge of Riverstone Street Park 2	NINGI	10026	1.00	6	Tributary of Ningi Creek
A00808781	Meldale Road Park East 2	MELDALE	11269	1.13	6	Elimbah Creek
A00808782	Kirrang Drive Reserve 3	ELIMBAH	3467	0.35	6	Tributary of 6 Mile Creek
A00808794	Scribbly Gum Circuit Park 3	CABOOLTURE	5494	0.55	6	King Johns Creek
A00808802	Wormwell Court Park 3	CABOOLTURE	7095	0.71	6	Tributary of King Johns Creek
A00808803	Brown Street and Pettigrew Street 2	CABOOLTURE	4763	0.48	6	Lagoon Creek
A00808807	Keast Street Park 6	CABOOLTURE	6030	0.60	6	Lagoon Creek
A00808810	Keast Street Park 7	CABOOLTURE	10302	1.03	6	Lagoon Creek
A00808980	Pettigrew Street Park (East 1)	CABOOLTURE	11597	1.16	6	Lagoon Creek
A00809010	Lagoon Creek Reserve 3	CABOOLTURE	5638	0.56	6	Lagoon Creek
A00809223	Mayes Circuit Park 4	CABOOLTURE	7538	0.75	6	Lagoon Creek
A00809224	Mcnaught Road - Environmental Reserve 4	CABOOLTURE	7312	0.73	6	King John Creek
A00809268	Willowleaf Circuit Park 3	UPPER CABOOLTURE	8767	0.88	6	Tributary of Caboolture River
A00809293	Kensington Court Reserve 4	UPPER CABOOLTURE	4518	0.45	6	Tributary of Caboolture River

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Waterways Portfolio Asset Management Plan

ASSET NUMBER	LONG DESCRIPTION	SUBURB	AREA M ²	Area Ha	MAINTENANCE ROTATIONS	RIPARIAN SYSTEM
A00809295	Pauls Road Reserve 5	UPPER CABOOLTURE	6344	0.63	6	Tributary of Caboolture River
A00809296	Parkridge Estate Park 5	UPPER CABOOLTURE	9400	0.94	6	Tributary of Caboolture River
A00809300	Pauls Road Reserve 6	UPPER CABOOLTURE	4339	0.43	6	Tributary of Caboolture River
A00809303	North Lakes Environmental Reserve - Zone E4	NORTH LAKES	42756	4.28	6	Saltwater Creek
A00809683	Kowari Crescent Park 2	NORTH LAKES	9828	0.98	6	Tributary Saltwater Creek
A00809962	Aurora Boulevard Park - Bushland 2	NORTH LAKES	6973	0.70	6	Tributary Saltwater Creek
A00810088	Kropp Road Park - Bushland 2	WOODFORD	17155	1.72	6	Monkeybong Creek
A00810575	Ryan Gully Reserve 4	D'AGUILAR	12530	1.25	6	Tributary of Monkeybong Creek
A00811170	Crampton Drive Reserve 4	WOODFORD	17699	1.77	6	One Mile Creek
A00813257	Curran Street Reserve 4	D'AGUILAR	19650	1.97	6	Tributary of Monkeybong Creek
A00813387	Raaen Road Reserve 2	D'AGUILAR	13573	1.36	6	Tributary of One Mile Creek
A00813457	Depina Drive Park 2	WAMURAN	10735	1.07	6	Tributary of Wararba Creek
A00813614	Sumsion Road Reserve 3	WAMURAN	8462	0.85	6	Tributary of Wararba Creek
A00813632	Scott Lane Park 3	WOODFORD	11332	1.13	6	Monkeybong Creek
A00813748	Campbells Reserve 3	WAMURAN	16806	1.68	6	Warabra Creek
A00813749	Devit Road Reserve 2	WAMURAN	22494	2.25	6	Warabra Creek
A00813759	Cove Road Environmental Reserve 2	STANMORE	11984	1.20	6	Stanley River
A00813761	H E Corbould Park 5	BEACHMERE	15491	1.55	6	Godwin Beach Creek

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Waterways Portfolio Asset Management Plan

Appendix B - Project List (Waterways)

Source - Moreton Bay Regional Council Planning Scheme (MBRC, 2017)

Table 9.2 - Project List

Project Reference	Trunk infrastructure	Estimated Timing	Cost (Land)	Cost (Works)
BCC_CTC_RC	Riparian Corridor	2016 - 2031	\$4,827,141	\$2,189,551
BUR_BUR_RC	Riparian Corridor	2016 - 2026	\$355,878	\$2,370,515
BUR_LBC_RC	Riparian Corridor	2026	\$45,812	\$297,098
CAB_CAB_RC	Riparian Corridor	2016 - 2031	\$1,277,330	\$3,202,373
CAB_GYM_RC	Riparian Corridor	2021	\$18,945	\$1,164,020
CAB_KJC_RC	Riparian Corridor	2021 - 2026	\$477,462	\$190,263
CAB_LAG_RC	Riparian Corridor	2021 - 2026	\$3,210,670	\$2,096,250
CAB_SSC_RC	Riparian Corridor	2016 - 2021	\$1,271,896	\$2,920,333
CAB_WAR_RC	Riparian Corridor	2016	\$43,893	\$3,377,689
HAY_FWC_RC	Riparian Corridor	2016 - 2031	\$2,195,248	\$634,171
HAY_GRI_RC	Riparian Corridor	2026	\$2,920	\$151,145
HAY_SWC_RC	Riparian Corridor	2016 - 2031	\$5,295,758	\$1,828,334
LPR_ALB_RC	Riparian Corridor	2021	\$392,017	\$503,360
LPR_CON_RC	Riparian Corridor	2041	\$0	\$1,491,323
LPR_COU_RC	Riparian Corridor	2021	\$98,207	\$360,261
LPR_FMC_RC	Riparian Corridor	2016 - 2031	\$47,751	\$1,041,820
LPR_FWC_RC	Riparian Corridor	2041	\$0	\$84,711
LPR_GRI_RC	Riparian Corridor	2021 - 2031	\$925,792	\$2,260,148
LPR_KFC_RC	Riparian Corridor	2041	\$0	\$335,129
LPR_NPR_RC	Riparian Corridor	2016 - 2021	\$87,067	\$5,915,357
LPR_OMC_RC	Riparian Corridor	2016	\$49,630	\$1,076,370
LPR_PIN_RC	Riparian Corridor	2031	\$398,935	\$63,339
LPR_SAM_RC	Riparian Corridor	2041	\$0	\$30,698
LPR_SAN_RC	Riparian Corridor	2041	\$0	\$1,188,902
LPR_SPR_RC	Riparian Corridor	2016 - 2021	\$343,259	\$2,349,328
LPR_TOD_RC	Riparian Corridor	2016 - 2031	\$1,276,016	\$703,168
LPR_YEB_RC	Riparian Corridor	2021	\$103,509	\$1,455,991
PUM_NIN_RC	Riparian Corridor	2026	\$148,838	\$2,048,443
RED_RCE_RC	Riparian Corridor	2041	\$0	\$1,262,863
STA_BRC_RC	Riparian Corridor	2031	\$420,548	\$323,135
STA_STA_RC	Riparian Corridor	2031	\$16,129	\$0
UPR_TER_RC	Riparian Corridor	2021	\$24,863	\$0
TOTAL			\$23,355,514	\$42,916,087

NOTE 1: Timing and status of project is currently under assessment

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Waterways Portfolio Asset Management Plan

Appendix C - Risk Management Plan

Table 9.3 - Risk Management Plan

Risk Category	Risk Type	Causation	Consequences	Existing Control Measures	Likelihood	Consequence	Residual Risk Rating
Strategic	Financial	Inadequate resources	Imbalance between intended service level and available resources.	Budget allocations and resourcing.	Possible	Moderate	M6 - Medium
Strategic	Legal, regulatory and liability	Change of legislation	Legislative non-compliance with applicable laws & codes.	Notification of legal changes, Professional Advice, Water Strategy, TWCMP	Almost Certain	Minor	L4 - Low
Strategic	Legal, regulatory and liability	Limitations due to design and construction of waterways assets	Failure to achieve codes / design requirements.	Final acceptance inspections, design standards (Planning Scheme Policies), design guidelines (Water by Design), Construction Specifications (NATSPEC).	Possible	Moderate	M9 - Medium
Strategic	Service delivery	Inadequate waterways asset capacity	Reduction in water quality and health of downstream receiving waters	Strategic plans (Water Strategy, TWCMP), upgrade/ improvement programs, AM plan, budget allocations, planning resources`	Possible	Moderate	M9 - Medium
			Failure to protect ancillary/adjacent infrastructure	Final acceptance inspections, design standards (Planning Scheme Policies), design guidelines (Water by Design), Construction Specifications (NATSPEC).	Possible	Moderate	M9 - Medium
Strategic	Service delivery	Natural or man-made disaster.	Significant damage, loss of performance affecting infrastructure	Emergency management plan, business continuity plan, maintenance repairs/ replacement planning.	Unlikely	Major	H8 - High

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Waterways Portfolio Asset Management Plan

Risk Category	Risk Type	Causation	Consequences	Existing Control Measures	Likelihood	Consequence	Residual Risk Rating
Strategic	Service delivery	Inability to capture maintenance activities to Corporate system.	Poor maintenance history and planning capability.	Correct use and implementation of corporate AM system.	Unlikely	Minor	L4 - Low
Strategic	Service delivery	Failure to apply a whole of life concept to provision of asset and services.	Compromised service performance / value for money.	Communication between stakeholders, awareness for Whole of Life concept.	Possible	Moderate	M9 - Medium
Operational	Health & safety	Public access to waterways assets	Potential hazard for public injury	Routine maintenance, design guidelines, H&S audits & inspections	Unlikely	Moderate	H6 - High
Operational	Service delivery	Asset deterioration due to lack of maintenance, land clearing, stock access, weed / pest invasion, erosion and sedimentation, bush fire or flooding	Waterways asset becomes unfit for purpose.	Planned maintenance, condition assessments and inspections, renewal planning, AMP, TWCMP, Water Strategy.	Possible	Moderate	M9 - Medium
Operational	Health & safety	Poor design outcomes resulting in public safety risks	Waterways assets present public safety risks (slips/trips/falls, exposed earth/shear face etc.)	Planned & reactive monitoring of waterway assets, Safety in Design Process	Unlikely	Moderate	M6 - Medium
Operational	Service delivery	Asset deterioration due to age or lack of maintenance.	Waterways asset becomes unfit for purpose.	Planned maintenance, condition assessments and inspections, renewal planning, AMP.	Possible	Moderate	M9 - Medium

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Waterways Portfolio Asset Management Plan

Appendix D - Waterways Asset RACI Matrix Report

by Selected Asset

<u>Asset selection:</u>		<u>Definitions:</u>
Asset Class	Waterways	<ul style="list-style-type: none"> • Responsible parties are those who do the work to complete the task. • Accountable individuals or groups ultimately must answer for the completion of the deliverable or task. • Consulted parties are involved in making the decision or completing the task (e.g., Subject Matter Experts) • Informed individuals are kept up to date on progress (e.g., copied on email), often only on completion of the activity or decision
Asset Group/s	Waterway, Waterway Protection, Waterway Structures	
Asset Type/s	All types	

System Requirement	Activity Group	Activity	Sub-activity	Department or Role			
				Responsible	Accountable	Consult	Inform
Governance, Policy and Strategy	Leadership and Governance	Provide leadership, direction and commitment to asset management		AMSC	CEO	SLT	IP_DWCP, ECM_AMTC, IP_AMGT
		Determine organisational context for services delivered by assets		IP_DWCP	CEO	COMM, ECM_AMTC	IP_AMGT
		Develop understanding of the needs and expectations of stakeholders		IP_DWCP	ECM	COMM	ELCO
		Determine organisation roles, responsibilities and authorities		SLT	CEO	IP_DWCP, ECM_AMTC, IP_AMGT	ELCO
		Management reviews		SLT	CEO	IP_DWCP, ECM_AMTC, IP_AMGT	ELCO
	Asset Management and Policy	AM Policy preparation and revision		IP_AMGT	AMSC	SLT	IP_DWCP, ECM_AMTC
		AM Policy endorsement		ELCO	CEO	IP_AMGT, AMSC, SLT	FCS_G&ES
	Strategic planning	Develop MBRC consolidated Strategic Asset Management Plan		IP_AMGT	ECM_IP	IP_DWCP, ECM_AMTC, FCS_ACC	AMSC, SLT
		Strategic Asset Management Plan endorsement		ELCO	CEO	IP_AMGT, AMSC, SLT	FCS_G&ES
	Communications and engagement	Develop service/network strategy and/or master plans		IP_DWCP	ECM	COMM, PL_SP&P, ECM_AMTC	IP_AMGT, FCS_ACC
		Promote awareness of asset management policies and documentation		IP_AMGT	ECM_IP	IP_DWCP, ECM_AMTC	AMSC
	Change management	Promote awareness of asset management activities and engage with stakeholders		IP_AMGT	ECM_IP	IP_DWCP, ECM_AMTC, FCS_ACC	AMSC
		Assessment of impact of change and develop change management plan		IP_AMGT	ECM_IP	IP_DWCP, ECM_AMTC, FCS_ACC	AMSC, SLT

ITEM 2.2 WATERWAYS PORTFOLIO ASSET MANAGEMENT PLAN - 62133369 (Cont.)

Waterways Portfolio Asset Management Plan

System Requirement	Activity Group	Activity	Sub-activity	Department or Role				
				Responsible	Accountable	Consult	Inform	
		Endorsement of proposed changes and change management plan		SLT	ECM	IP_AMGT	IP_DWCP, ECM_AMTC, FCS_ACC	
AM Resource Capacity and Capability	Asset Management Competence	Asset Management competence assessment		IP_AMGT	ECM_IP	IP_DWCP, ECM_AMTC	AMSC, SLT	
		Asset management training		IP_AMGT	ECM_IP	IP_DWCP, ECM_AMTC	AMSC, SLT	
	Resources	Internal resource capability and capacity assessment		IP_DWCP, ECM_AMTC	ECM	IP_AMGT	AMSC, SLT	
		Assess resource gaps and addition requirements		IP_DWCP, ECM_AMTC	ECM	IP_AMGT	AMSC, SLT	
		Outsourcing procurement and management		IP_DWCP, ECM_AMTC	ECM	IP_AMGT	AMSC, SLT	
Asset Management Systems and Data Management	Asset Management System	Develop asset management systems requirements		IP_AMGT	ECM_IP	IP_DWCP, ECM_AMTC, FCS_ICT	AMSC, SLT	
		Systems management		FCS_ICT	F&CS	IP_AMGT, IP_DWCP, ECM_AMTC	AMSC, SLT	
		Information standards and requirements documentation		IP_AMGT	ECM	IP_DWCP, ECM_AMTC	FCS_ICT, PL_SP&P	
		Data review and cleansing		IP_AMGT	ECM	IP_DWCP, ECM_AMTC	FCS_ACC	
	Non-financial asset data capture and maintenance	Spatial Data	ADAC checks		IP_AMGT	ECM_IP	PL_SP&P	PL_SP&P
			Asset data capture		IP_AMGT	ECM_IP	PL_SP&P	IP_DWCP, ECM_AMTC, FCS_ACC
		Non-spatial Data	Missing asset investigations and data capture		IP_AMGT	ECM_IP	IP_DWCP, ECM_AMTC	FCS_ACC
			Asset data capture		IP_AMGT	ECM_IP	IP_DWCP, ECM_PM	ECM_AMTC, FCS_ACC
	Proprietary software management	Non-spatial Data	Missing asset investigations and data capture		IP_AMGT	ECM_IP	IP_DWCP, ECM_AMTC	FCS_ACC
			Software acquisitions		IP_AMGT	ECM_IP	IP_DWCP, ECM_AMTC, FCS_ICT	AMSC
		Software management		FCS_ICT	F&CS	IP_AMGT	IP_DWCP, ECM_AMTC	
		Operation of software and management of outputs		IP_AMGT	ECM_IP	IP_DWCP, ECM_AMTC	AMSC	
Asset Management and Planning	Asset Management Plans	Prepare asset management plans		IP_AMGT	ECM	IP_DWCP, ECM_AMTC, FCS_ACC	AMSC	
		Asset management plan endorsement		ELCON	CEO	IP_AMGT	AMSC	

ITEM 2.2 WATERWAYS PORTFOLIO ASSET MANAGEMENT PLAN - 62133369 (Cont.)

Waterways Portfolio Asset Management Plan

System Requirement	Activity Group	Activity	Sub-activity	Department or Role				
				Responsible	Accountable	Consult	Inform	
	Levels of Service	Develop customer levels of service		IP_DWCP	ECM	IP_AMGT, ECM_AMTC	FCS_CE	
		Develop technical levels of service		IP_DWCP	ECM	IP_AMGT, ECM_AMTC, PL_SP&P	ECM_PM	
		Develop and review/improve technical design standards		IP_DWCP	ECM	IP_AMGT, ECM_AMTC, PL_SP&P	ECM_PM	
	Condition/Defect Monitoring	Level 1 Condition Assessment	Scheduling		ECM_AMTC	ECM	IP_DWCP	IP_AMGT
			Assessment and reporting		ECM_AMTC	ECM	IP_DWCP	IP_AMGT
			Upload condition data to relevant AM systems		ECM_AMTC	ECM	IP_DWCP, FCS ICT	IP_AMGT
		Level 2/3 Condition Assessment	Scheduling		IP_AMGT	ECM	IP_DWCP	AMSC
			Assessment and reporting		EXCON	IP_AMGT	IP_DWCP	ECM_AMTC
			Upload condition data to relevant AM systems		IP_AMGT	ECM	IP_DWCP, FCS ICT	ECM_AMTC
	Defects Identification	Assessment and reporting		ECM_AMTC, EXCON	ECM	IP_DWCP, IP_AMGT	ECM_AMTC	
		Upload defects data to relevant AM systems		ECM_AMTC, IP_AMGT	ECM	IP_DWCP, FCS ICT	ECM_AMTC	
	Lifecycle modelling	Assess asset condition and performance and review useful lives		IP_AMGT	ECM	IP_DWCP, ECM_AMTC	FCS_ACC	
		Develop models and determine lifecycle costs		IP_AMGT	ECM	IP_DWCP, ECM_AMTC	FCS_ACC	
		Project asset values and determine financial benchmarks		IP_AMGT	ECM	IP_DWCP, ECM_AMTC	FCS_ACC	
		Project and assess asset performance and condition under different funding scenarios		IP_AMGT	ECM	IP_DWCP	AMSC	
Undertake industry benchmarking			IP_AMGT	ECM	IP_DWCP	AMSC		
Financial management, data capture and reporting	Financial Register	Initial financial recognition		FCS_ACC	F&CS	IP_AMGT	IP_DWCP	
		Maintain financial asset register		FCS_ACC	F&CS	IP_AMGT	IP_AMGT	
	Asset Valuations	Revaluation of financial assets		FCS_ACC	F&CS	IP_AMGT	IP_DWCP	
		Valuation of non-financial assets		IP_AMGT	ECM	IP_DWCP	FCS_ACC	
		Develop and maintain a schedule of asset replacement cost unit rates		FCS_ACC	F&CS	IP_DWCP	IP_AMGT	
	Budgets/ePIDS	Raise ePIDS		IP_DWCP, ECM_AMTC	ECM	IP_AMGT	FCS_ACC	
		Annual budget submissions		IP_DWCP, ECM_AMTC	ECM	IP_AMGT	FCS_ACC	
	Financial reporting	Financial management of approved budgets		FCS_ACC	F&CS	IP_DWCP, ECM_AMTC	IP_AMGT	
		Dashboarding and reporting of financial performance		IP_AMGT	ECM	FCS_ACC	IP_DWCP, ECM_AMTC	
	Asset creation	New capital works	Design and specifications		IP_DWCP, ECM_AMTC	ECM	IP_AMGT, PL_SP&P	EXCON

ITEM 2.2 WATERWAYS PORTFOLIO ASSET MANAGEMENT PLAN - 62133369 (Cont.)

Waterways Portfolio Asset Management Plan

System Requirement	Activity Group	Activity	Sub-activity	Department or Role				
				Responsible	Accountable	Consult	Inform	
		Procurement and project management		ECM_PM	ECM	IP_DWCP	IP_DWCP, ECM_AMTC	
		Delivery, testing and commissioning		EXCON	ECM	ECM_PM	IP_DWCP, ECM_AMTC, IP_AMGT	
	Asset replacement	Design and specifications		IP_DWCP, ECM_AMTC	ECM	IP_AMGT, PL_SP&P	EXCON	
		Procurement and project management		ECM_PM	ECM	IP_DWCP	IP_DWCP, ECM_AMTC	
		Delivery, testing and commissioning		EXCON	ECM	ECM_PM	IP_DWCP, ECM_AMTC, IP_AMGT	
	Donated assets	Design and specifications		DEV	DEV	PL_SP&P	IP_AMGT	
		Procurement and project management		DEV	DEV	PL_SP&P	IP_AMGT	
		Delivery, testing and commissioning		DEV	DEV	PL_SP&P	IP_DWCP, ECM_AMTC, IP_AMGT	
	Asset Operation and Maintenance	Asset Maintenance	Asset/facilities maintenance		ECM_AMTC	ECM	IP_DWCP	IP_AMGT
			Develop asset/facilities maintenance plans		ECM_AMTC	ECM	IP_DWCP	IP_AMGT
Work order management				ECM_AMTC	ECM	IP_DWCP	IP_AMGT	
Operational service delivery		Operational planning and management		ECM_AMTC	ECM	IP_DWCP	IP_AMGT	
		Equipment management		ECM_AMTC	ECM	IP_DWCP	IP_AMGT	
Customer service requests		Monitoring and response to customer service requests		ECM_AMTC	ECM	IP_DWCP	IP_AMGT	
Leasing		Procurement and management of leases		CES_PS	C&ES	IP_DWCP	IP_AMGT	
Risk Management	Risk management	Review, update corporate risk management plan		IP_AMGT	ECM	IP_DWCP, ECM_AMTC	FCS_G&ES	
		Implement risk management recommendations		IP_DWCP, ECM_AMTC	ECM	IP_AMGT	FCS_G&ES	
Asset Performance and Utilisation	Utilisation	Assess asset/facility utilisation		IP_DWCP	ECM	ECM_AMTC	IP_AMGT	
	Capacity	Assess asset/facility capacity		IP_DWCP	ECM	ECM_AMTC	IP_AMGT	
	Dependability	Assess asset/facility availability, reliability, criticality etc.		IP_DWCP	ECM	ECM_AMTC	IP_AMGT	
	Performance	Monitor, analyse and evaluate asset performance		IP_DWCP	ECM	ECM_AMTC	IP_AMGT	
	Non-conformance	Identify nonconformity and undertake corrective action		IP_DWCP	ECM	IP_AMGT	IP_AMGT	
	Optimisation	Assess network/service configuration for optimisation and value management		IP_DWCP	ECM	IP_AMGT	IP_AMGT	
Environment and Sustainability	Environment and Sustainability	Environmental management		IP_DWCP	ECM	IP_AMGT, PL_EP&P, CES_ES	IP_AMGT	
		Energy management		IP_DWCP	ECM	IP_AMGT, CES_ES	IP_AMGT	

ITEM 2.2 WATERWAYS PORTFOLIO ASSET MANAGEMENT PLAN - 62133369 (Cont.)

Waterways Portfolio Asset Management Plan

System Requirement	Activity Group	Activity	Sub-activity	Department or Role			
				Responsible	Accountable	Consult	Inform
		Sustainability monitoring and assessment		IP_DWCP	ECM	IP_AMGT, CES_ES	IP_AMGT
		Assess impact of climate change and appropriate actions		IP_DWCP	ECM	IP_AMGT, CES_ES	IP_AMGT
Asset End of Life	Asset Disposals	Disposal planning		IP_DWCP	ECM_IP	PL_SP&P	ECM_AMTC, IP_AMGT, FCS_ACC
		Design and specifications		IP_DWCP	ECM	PL_SP&P	ECM_AMTC
		Disposal and site remediation		ECM_PM	ECM	ECM_AMTC, PL_SP&P	IP_AMGT, FCS_ACC
		Financial de-recognition		FCS_ACC	F&CS	IP_DWCP	IP_AMGT
Review and Audit	Asset Management Review and Audit	Internal audit		INAUDT	CEO	IP_DWCP, IP_AMGT, FCS_ACC	CEO, SLT
		External audit		EXAUDT	F&CS	IP_DWCP, IP_AMGT, FCS_ACC	CEO, ELCO
		Asset management maturity assessment		EXCON	IP_AMGT	IP_DWCP, IP_AMGT, FCS_ACC	AMSC
Innovation and improvement	Innovation	Explore and implement innovation improvements		INNO	ECM	IP_DWCP, ECM_AMTC	SLT, ELCO
	Continual improvement	Planning, management and implementation of asset management improvements		IP_AMGT	ECM_IP	IP_DWCP, ECM_AMTC, FCS_ACC	AMSC

Department/Role Abbreviation Descriptions:

Abbrev.	Definition
AMSC	AM Steering Committee
C&ES	Community and Environmental Services
CEO	Chief Executive Officer
CES_CR	Customer Responses
CES_CS	Cultural Services
CES_CSS&R	Community Service, Sport and Recreation
CES_ES	Environmental Services
CES_OPS	Operations
CES_PS	Property Services
COMM	Community
DEVL	Developers
ECM	Engineering, Construction and Maintenance
ECM_AMTC	Asset Maintenance
ECM_DEV	Development

Abbrev.	Definition
ECM_DM	Disaster Management
ECM_IP	Infrastructure Planning
ECM_MILL	The Mill
ECM_OPS	Operations
ECM_PM	Project Management
ECM_WS	Waste Services
ECODEV	Economic Development
ELCO	Elected Council
EXAUDT	External Audit
EXCON	External contractor/consultant
F&CS	Finance and Corporate Services
FCS_ACC	Accounting Services
FCS_CE	Community Engagement
FCS_G&ES	Governance and Executive Services
FCS ICT	Information and Communications Technology
FCS_PCS	People, Culture and Safety

Abbrev.	Definition
INAUDT	Internal Audit
INNO	Innovation Team
IP_AMGT	Asset Management
IP_B&FP	Building and Facilities Planning
IP_COMM	Communications
IP_DWCP	Drainage, Waterways and Coastal Planning
IP_ITP	Integrated Transport Planning
IP_PRP	Parks & Recreation Planning
IP_SIP	Strategic Infrastructure Planning
LEGAL	Legal Services
PL	Planning
PL_DS	Development Services
PL_EP&P	Environmental Planning and Policy
PL_SP&P	Strategic Planning and Placemaking
S&E	Strategy and Engagement
SLT	Senior Leadership Team

ITEM 2.2 WATERWAYS PORTFOLIO ASSET MANAGEMENT PLAN - 62133369 (Cont.)

Waterways Portfolio Asset Management Plan

Appendix E - Overall Asset Type Replacement / Renewal Graphs

Lifecycle modelling has been conducted at the asset type level to determine the future costs and timing for renewal and replacement of waterways assets.

The following graphs illustrate the results of the lifecycle modelling.

This appendix should also be read in conjunction with Appendices F and G that illustrate the impact of current and recommended funding on the condition of the portfolio as derived from the same models.

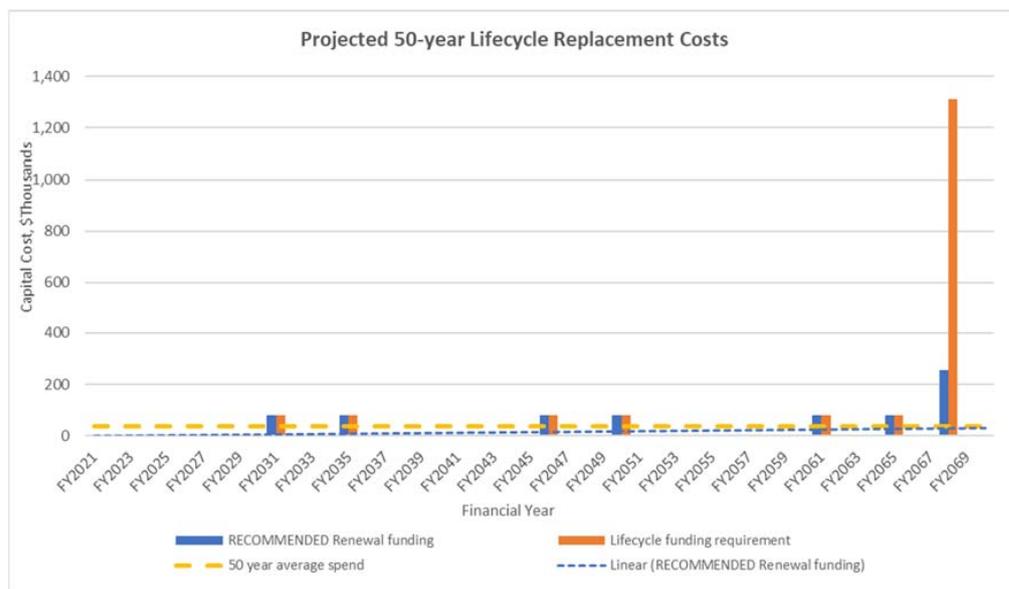


Figure 38 - Projected 50 year lifecycle capital renewal and replacement costs

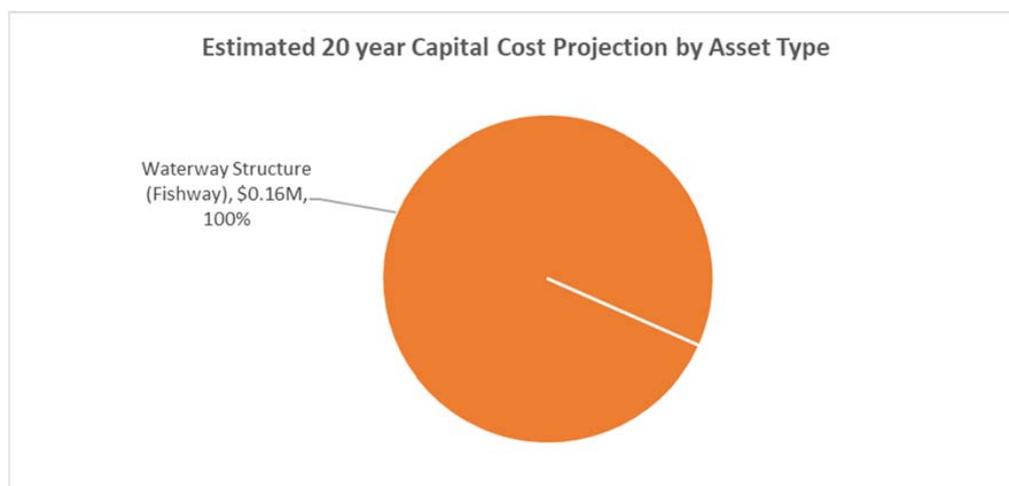


Figure 39 - Estimated total 20 year capital cost by asset type

ITEM 2.2 WATERWAYS PORTFOLIO ASSET MANAGEMENT PLAN - 62133369 (Cont.)

Waterways Portfolio Asset Management Plan

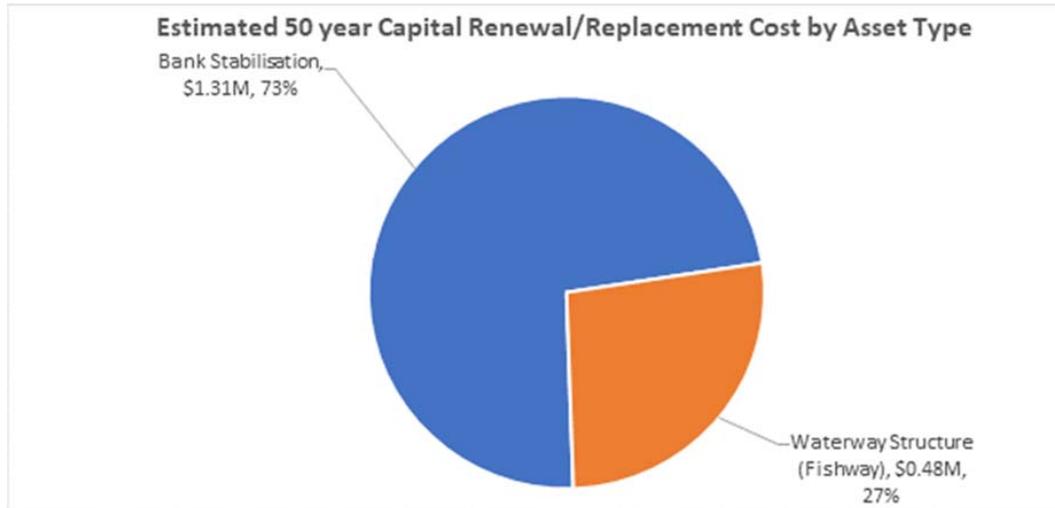


Figure 40- Estimated total 50 year capital cost by asset type

ITEM 2.2 WATERWAYS PORTFOLIO ASSET MANAGEMENT PLAN - 62133369 (Cont.)

Waterways Portfolio Asset Management Plan

Appendix F - Waterway Asset Projected Condition - Overall

The projected condition of MBRC’s waterway assets has been determined as part of the lifecycle modelling using the current funding and recommended funding as different model inputs. The following charts illustrate the projected condition for all waterways assets over a 100-year period. Below condition 4 is considered to be below an acceptable level of service and a trigger for replacement.

All Assets (Average of all waterway assets combined)

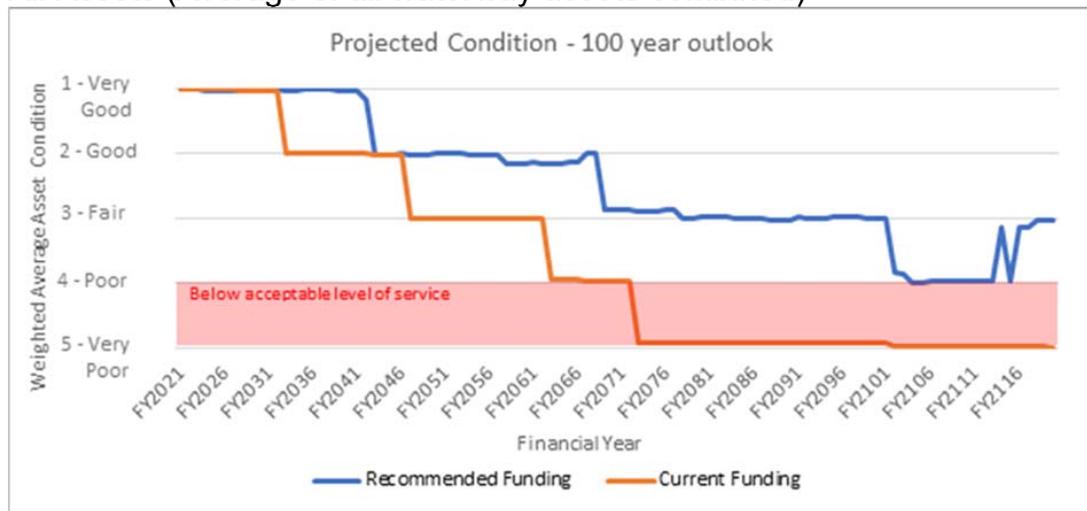
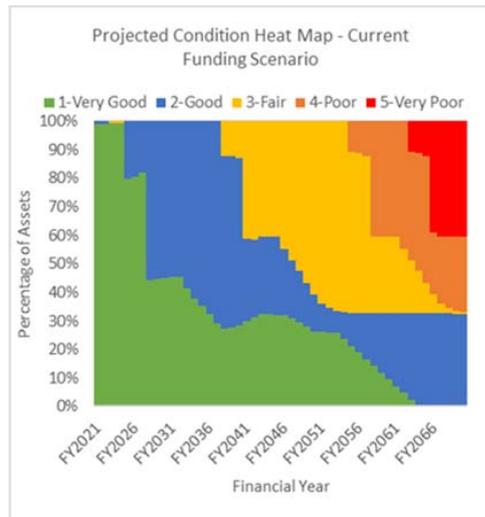


Figure 41 - Projected condition for all asset types

Current Funding:



Recommended Funding:

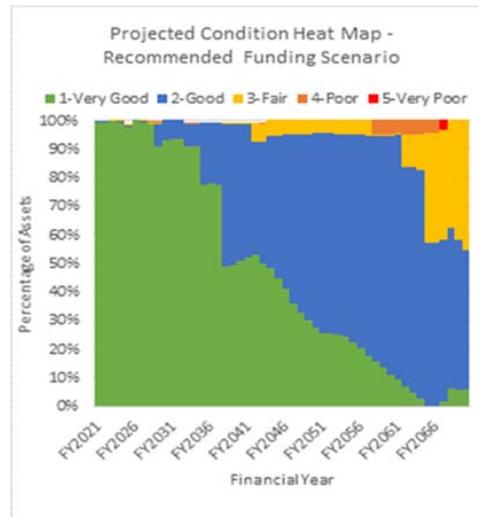


Figure 42 - Condition heat maps for all assets

ITEM 2.2 WATERWAYS PORTFOLIO ASSET MANAGEMENT PLAN - 62133369 (Cont.)

Waterways Portfolio Asset Management Plan

Appendix G - Waterway Asset Projected Condition by Asset Type

The projected condition of MBRC’s waterway assets has been determined as part of the lifecycle modelling using the current funding and recommended funding as different model inputs. The following charts illustrate the projected condition for each waterway asset type over a 100-year period. Below condition 4 is considered to be an unacceptable level of service.

Bank Stabilisation

Current Funding:

Recommended Funding:

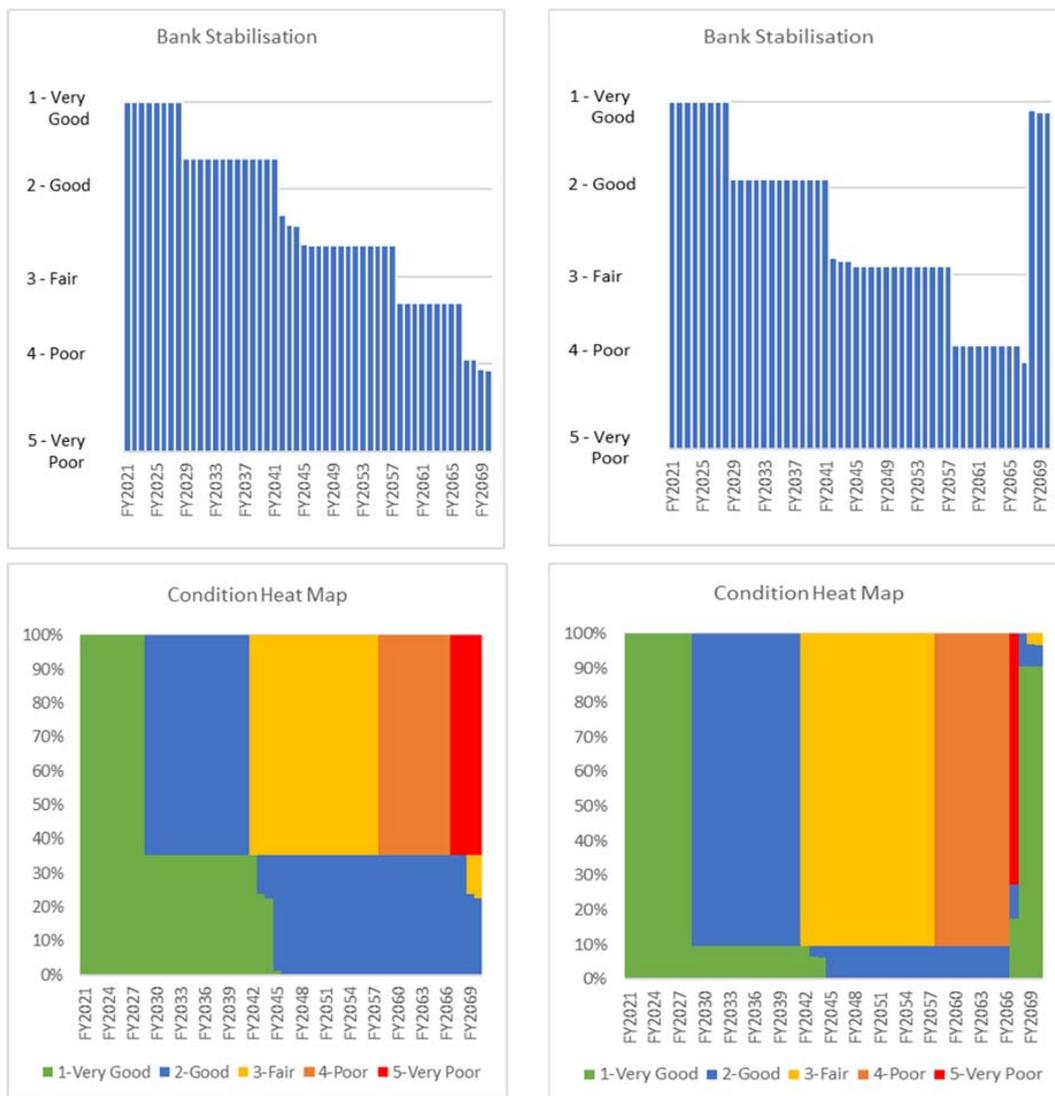


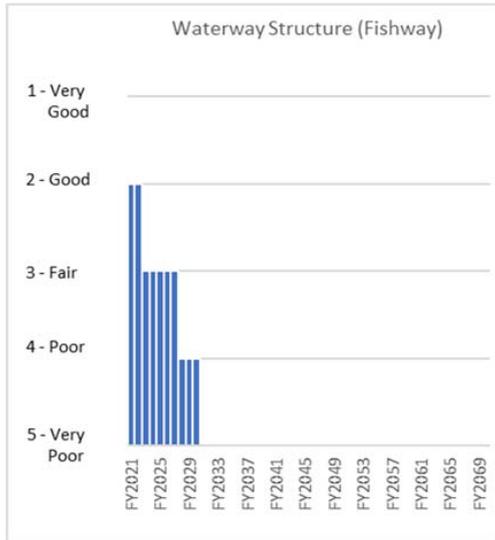
Figure 43 - Condition profiles and heat maps for Bank Stabilisation

ITEM 2.2 WATERWAYS PORTFOLIO ASSET MANAGEMENT PLAN - 62133369 (Cont.)

Waterways Portfolio Asset Management Plan

Waterways Structure (Fishway)

Current Funding:



Recommended Funding:

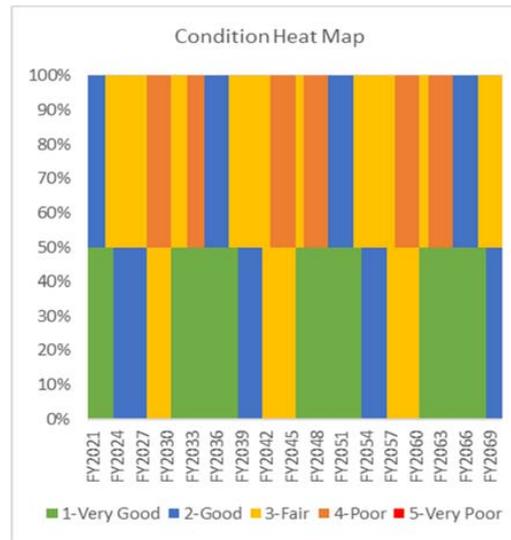
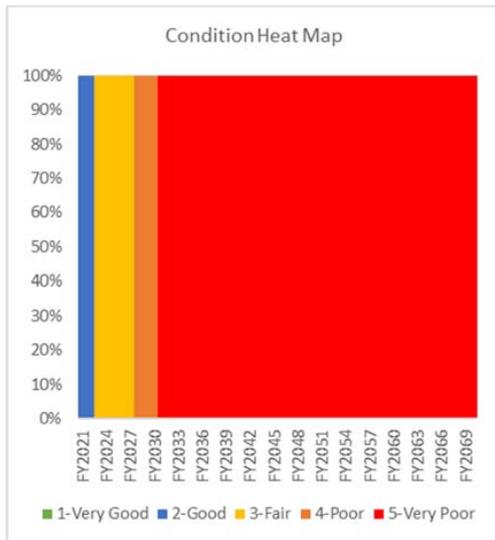
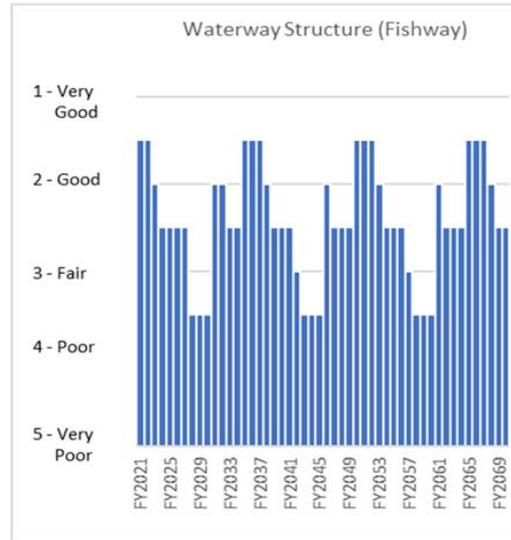


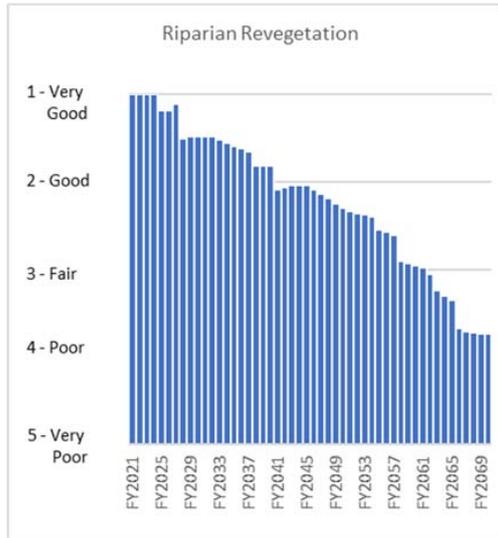
Figure 44 - Condition profiles and heat maps for Waterway Structure (Fishway)

ITEM 2.2 WATERWAYS PORTFOLIO ASSET MANAGEMENT PLAN - 62133369 (Cont.)

Waterways Portfolio Asset Management Plan

Riparian Revegetation

Current Funding:



Recommended Funding:

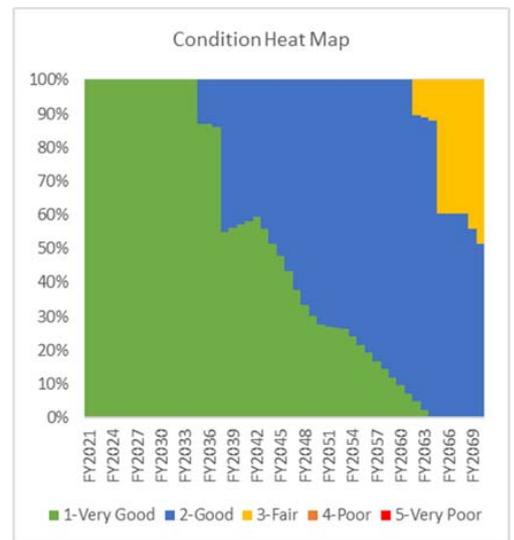
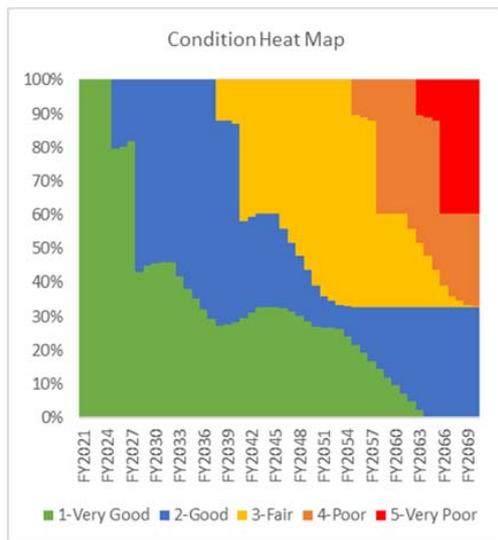
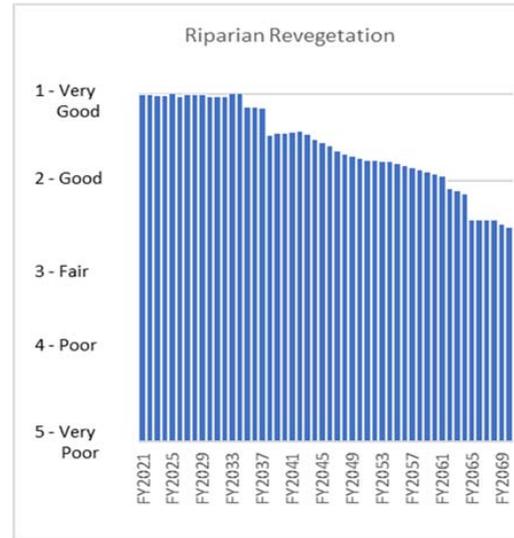


Figure 45 - Condition profiles and heat maps for Riparian Revegetation

ITEM 2.2 WATERWAYS PORTFOLIO ASSET MANAGEMENT PLAN - 62133369 (Cont.)

Waterways Portfolio Asset Management Plan

Appendix H - Waterways Rehabilitation and Revegetation Operational Projects Program

(ePID Program Number 106903)

ePID	Title	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31
101163	Burpengary - Burpengary Creek (Part) - Bank Rehabilitation and Revegetation	30,000	-	-	-	-	-	-	-	-	-	-
106897	Murrumba Downs - John Oxley Reserve - Riverbank Stabilisation	45,000	5,000	85,000	5,000	-	-	-	-	-	-	-
102250	Kallangur - Ross Reserve - Freshwater Creek Rehabilitation Stage 1	25,000	25,000	-	-	-	-	-	-	-	-	-
107594	Petrie - Tweeddale Reserve - Rehabilitation and Revegetation	-	-	-	-	-	65,000	-	-	-	-	-
108067	Kallangur - Freshwater Reserve - Freshwater Creek Riverine Rehabilitation Stage 2	-	-	25,000	316,200	35,000	30,000	25,000	-	-	-	-
108068	Kallangur - Balstrup Park - Freshwater Creek Riverine Rehabilitation Stage 3	-	-	-	25,000	373,000	35,000	30,000	25,000	-	-	-
108074	Kallangur - John W Mott Reserve - Freshwater Creek Riverine Rehabilitation Stage 4	-	-	-	25,000	356,000	356,000	45,000	40,000	35,000	-	-
108076	Kallangur - Kingfisher Park - Freshwater Creek Riverine Rehabilitation Stage 5	-	-	-	-	-	25,000	123,000	123,000	35,000	30,000	25,000
101525	Petrie - Merv Ewart Reserve - Sideling Creek Rehabilitation	160,000	125,000	75,000	-	-	-	-	-	-	-	-
101701	Clear Mountain - Richards Park - Rehabilitation and Revegetation	-	160,000	120,000	80,000	40,000	-	-	-	-	-	-
101825	Arana Hills - Wightman Reserve and Lemm Park - Cabbage Tree Creek Rehabilitation Stage 5	100,000	60,000	30,000	-	-	-	-	-	-	-	-
101929	Arana Hills - Brian Battersby Park - Cabbage Tree Creek Rehabilitation Stage 6	80,000	30,000	20,000	10,000	-	-	-	-	-	-	-
101826	Ferny Hills - Wightman Reserve - Cabbage Tree Creek Rehabilitation Stage 4	40,000	30,000	20,000	-	-	-	-	-	-	-	-

ITEM 2.2 WATERWAYS PORTFOLIO ASSET MANAGEMENT PLAN - 62133369 (Cont.)

Waterways Portfolio Asset Management Plan

ePID	Title	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31
101703	Ferny Hills - Hall Reserve - Cabbage Tree Creek Rehabilitation Stage 3	25,000	25,000	-	-	-	-	-	-	-	-	-
110561	Arana Hills - William Scott Park - Cabbage Tree Creek Rehabilitation Stage 7B	-	60,000	230,000	225,000	35,000	30,000	25,000	-	-	-	-
102256	Arana Hills - John Carter Reserve - Cabbage Tree Creek Rehabilitation Stage 8	-	-	25,000	80,000	25,000	25,000	25,000	-	-	-	-
101519	Wights Mountain - Harold Brown Park - Rehabilitation and Revegetation	110,000	85,000	55,000	-	-	-	-	-	-	-	-
101521	Camp Mountain - Henry Pearce Park - Rehabilitation and Revegetation	80,000	60,000	40,000	20,000	-	-	-	-	-	-	-
101293	Samford Valley - Greenwood Crescent Park - Rehabilitation and Revegetation	70,000	35,000	-	-	-	-	-	-	-	-	-
101790	Dayboro - North Pine River - Rehabilitation and Revegetation	70,000	35,000	-	-	-	-	-	-	-	-	-
101330	Closeburn - South Pine River and Cedar Creek - Riparian Management Project	40,000	40,000	40,000	-	-	-	-	-	-	-	-
105253	Wights Mountain - Mountain View Court - Revegetation and Rehabilitation	-	-	85,000	7,500	-	-	-	-	-	-	7,500
108052	Wights Mountain - Harold Brown Park Area 6 - Samford Creek Riverine Rehabilitation	-	-	5,000	71,000	25,000	25,000	25,000	-	-	-	-
108060	Wights Mountain - Harold Brown Park Area 1 - Samford Creek Riverine Rehabilitation Stage 2	-	-	-	10,000	15,000	80,000	25,000	25,000	25,000	-	-
101556	Woodford - Stanley River - Riparian Rehabilitation Partnership	100,000	100,000	-	-	-	-	-	-	-	-	-
Total		1,000,000	800,000	875,000	1,100,000	650,000	950,000	650,000	550,000	125,000	75,000	1,000,000

Waterways Portfolio Asset Management Plan

Appendix I – References

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