Asset Management Plan

Drainage

Maitland City Council

8 June 2022

The Power of Commitment

Executive summary

Maitland City Council's (MCC) asset portfolio has an estimated financial value of over $1.7B (in 2022$) across seven asset classes. These asset classes are:

- **Roads and Road Inventory** (all road types, kerb and gutter, paths, signs and traffic equipment)
- **Drainage** (trunk drains, culverts and conduits, floodgates and detention basins)
- **Bridges and Major Structures** (road bridges, pedestrian bridges, retaining walls, lookouts and wharfs)
- **Recreation** (parks, buildings, sporting facilities and open spaces)
- **Buildings** (all MCC owned and operated buildings)
- **Aquatic Centres** (Maitland and East Maitland Aquatic Centres)
- **Plant and Equipment** (plant and equipment used to maintain all MCC asset such as excavators and mowers).

Asset Management Plans (AM Plans) have been developed for each of these asset classes to demonstrate responsive management of assets and associated services, compliance with regulatory requirements, and communicate the level of funding necessary to provide the required levels of service for each asset class.

This AM Plan is for **Drainage assets.** The AM Plan outlines requirements to deliver expected services to the community including Levels of Service; Future Demand and Lifecycle Management activities, informing specific asset investment decisions.

This AM Plan builds upon the previous drainage AM Plan (completed in 2014) as well as planning work defined in other MCC documents. This plan has been prepared by GHD in close consultation with MCC staff.

What council provides

MCC is expected to provide drainage assets to the community that are:

- Safe and functionable
- Of appropriate quality
- Reliable
- Compliant with relevant legislation
- Delivered in a cost efficient and sustainable manner.

To meet these expectations, MCC manages a range of drainage assets including ~420 km of pipes, 146 detention basins and more than 17,900 pits, outlets and headwalls with a replacement value (in 2022$) of approximately **$249 M**. These are summarised as follows:

Table E.1 Asset inventory summary

Asset	Asset elements	Total Qty (estimated)	$ Cost breakdown (millions)	% Cost total
Trunk Drains	Natural and engineered	50	$15,781,920	6%
Detention Basins	All types	146	$30,199,004	12%%
Floodgates	Dual Guillotine	2	$105,701	<1%
	Flap	23	$121,556	<1%
	Guillotine	5	$132,126	<1%
	Inspection Pit	8	$84,561	<1%
	Open	4	TBA	TBA
Gross Pollutant Traps	Engineered and proprietary	186	$14,317,100	6%

Asset	Asset elements	Total Qty (estimated)	$ Cost breakdown (millions)	% Cost total
Pipes	Box Culvert	0.9 km	$1,204,490	1%
	Concrete Pipe	421.6 km	$151,390,686	61%
	Concrete Twin	0.5 km	Included	Included
	Large Culvert	0.7 km	$2,650,856	<1%
	PVC	4.4 km	$587,616	<1%
Pits and Headwalls	All types	17,939	$31,653,346	13%
Pumps	Chamber	1	$917,442	<1%
	Controls	1	Included	Included
	Pumps	2	Included	Included
Grand Total			**$249,146,402**	**100%**

Current asset status

Not every asset is of equal importance or presents the same failure risk. It is therefore important to know which assets are most critical to service delivery. Understanding which assets are critical, and why, helps to focus investment decisions.

Critical assets are those assets that have high **consequences or impacts** if they fail and a high **probability or likelihood** of failing. As an indication of probability of failure asset consumption of drainage assets has been calculated based on condition data available, asset age and opinions of appropriate MCC staff. This confirms that the majority of drainage assets are within the first half of their expected life and therefore have a low probability of failure. This is reflective of the historic management strategies applied by MCC in management and maintenance of the MCC road network.

MCC's risk management framework has also been used to determine its risk exposure. This data highlights the following:

– From MCC's subjective condition assessments of drainage assets, noting the majority of drainage assets are buried infrastructure, they may not meet the agreed condition target levels. However based on performance (of current operational assets) it is generally accepted by MCC that the assets meet their "functional" level of service and require only standard operations and maintenance interventions.
– **<1%** of drainage assets are a "**very high**" business risk, with a further **26%** of assets being a "**high**" business risk. This equates to a financial replacement estimate (in 2022$) of ~**$64.3 M. These high risk/high priority** assets are made up of predominately flood gates (42 of), trunk drains (39 km) and pipes (15 km) across a variety of suburbs.

Also note that trunk drains and flood gates have the highest possible Consequence of Failure rating allocated, due to the consequence of these not functioning as intended during major storm events. Whilst no data is available on trunk drains for inclusion in this AM Plan, based on this consequence of failure rating they will always be prioritised as a high risk asset. Trunk drains are therefore regarded as a high priority asset with a recommended action to collect appropriate asset condition data to enable inclusion and assessment in future iterations of this AM Plan.

Future demand

The Maitland Local Government Area is in a period of extraordinary population growth. Most recent population estimates from the Australian Bureau of Statistics for 2020/21 shows the population grew by 3.5%. These accelerated growth rates are predicted to continue for the next five to ten years, with Maitland's population expected to exceed 104,700 by 2041.

Our current growth rate is the fifth highest in NSW and the highest outside of Greater Sydney.
To accommodate this continued growing population, the majority (>90%) are expected to live in new greenfield developments, all of which require new MCC owned and operated assets (such as roads, drainage, paths, recreation etc). New greenfield developments have conservatively been estimated at around 700 new lots per year for the next 10 years.

From the anticipated growth, it is estimated that on average 14 km (approximately 3% annual growth) of new drainage pipes and culverts are to be constructed annually. This would also include more than 600 new drainage pits and headwalls. The specific size, type and location of these drainage assets are yet to be confirmed. Future financial expenditure required to meet this growth as well as replace/renew the existing asset class averages **$3.7 M** over a ten-year period.

Sustaining the asset portfolio

The estimated capital cost over time to renew MCC's drainage assets to the target condition and level of service is shown in Figure E.1 below. As indicated by the horizontal line, the theoretical average annual cost to sustain this asset class (based on long term replacement cycles, asset age/condition and estimated growth) is estimated to be in the order of **$3.8 M** in 2022 dollars. Most of this reinvestment relates to pipes which make up around half of the total cost.

This information now provides a target for short term assessments – particularly with regards to priority assets identified and those that have reached the end of their estimated life. Risk exposure can be further reduced through applying appropriate risk reduction measures or obtaining more accurate condition data that confirms extending asset life is practical.

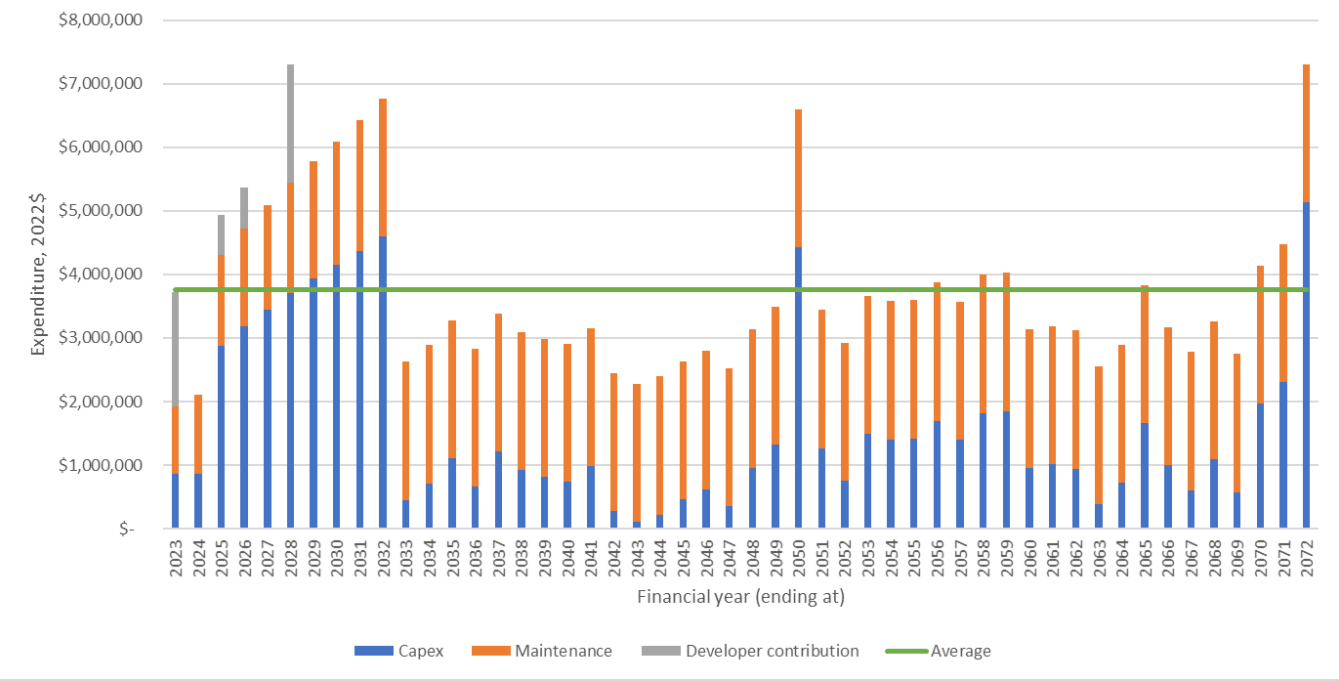

Figure E.1 Financial projection – Total

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1. Introduction

1.1 Asset portfolio

Maitland City Council's (MCC) asset portfolio has an estimated financial value of over $1.7B (in 2022$) across seven asset classes. These asset classes are:

- **Roads and Road Inventory** (all road types, kerb and gutter, paths, signs and traffic equipment).
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Asset Management Plans (AM Plans) have been developed for each of these asset classes to demonstrate responsible management of assets and associated services, compliance with regulatory requirements, and communicate the level of funding necessary to provide the required levels of service for each asset class.

The AM Plans provide a rational framework to enable systematic and repeatable processes to manage costs, risks and levels of service. They attempt to identify expected future costs and assist in predicting future barriers to efficient and effective service delivery.

1.2 Content of this asset management plan

This AM Plan is for **Drainage assets.** MCC own and operate a drainage network consisting of 467.9 km of trunk drains, minor culverts and stormwater pipes. The drainage asset class also includes floodgates, detention basins, gross pollutant traps and a small quantity of pumps.

The AM Plan outlines the general approach and methodology taken in preparing the Plan as well as discussing key outputs. The specific sections included in the AM Plan are as follows:

- ***Levels of service*** – Specifies the services and levels of service to be provided by MCC.
- ***Future demand*** – How the growth of the Maitland region will impact on future service delivery and how this growth is to be met.
- ***Lifecycle management*** – How MCC are/will manage its existing and future assets to provide the required services.
- ***Financial summary*** – What funds are required to provide the required services.
- ***Improvement and monitoring plan*** – Next steps required to enable continuous improvement of AM Planning outputs.

1.3 Asset management framework

MCC's asset management policy, plans, strategies, tactics, and activities are part of an integrated, overarching *Asset Management Framework*. This framework defines the relationship between key asset management plans and business processes, and how they interact with MCC's broader corporate plans and activities to deliver the Community Strategic Plan and its service outcomes. The key elements of MCC's Asset Management Framework, and their inter-relationships, are shown in Figure 1.1.

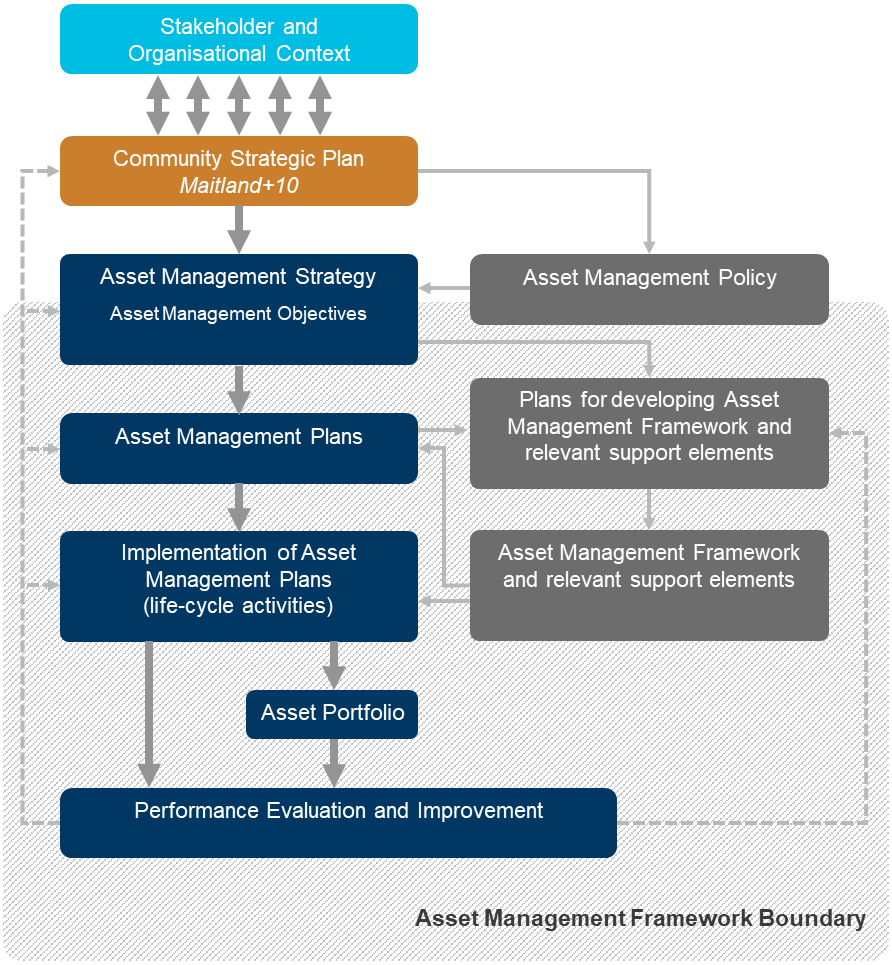

Figure 1.1 Asset management framework

AM Plans are a key element of this framework being a crucial link between city wide strategic asset management goals through to the implementation of tactical service delivery requirements. How the AM Plans relate to other MCC documents and planning outputs is illustrated in the figure below. The AM Plans are a central piece to the Asset Management Framework by consolidating (for each asset class) asset portfolio, master planning and lifecycle information to inform asset status and long-term financial reporting.

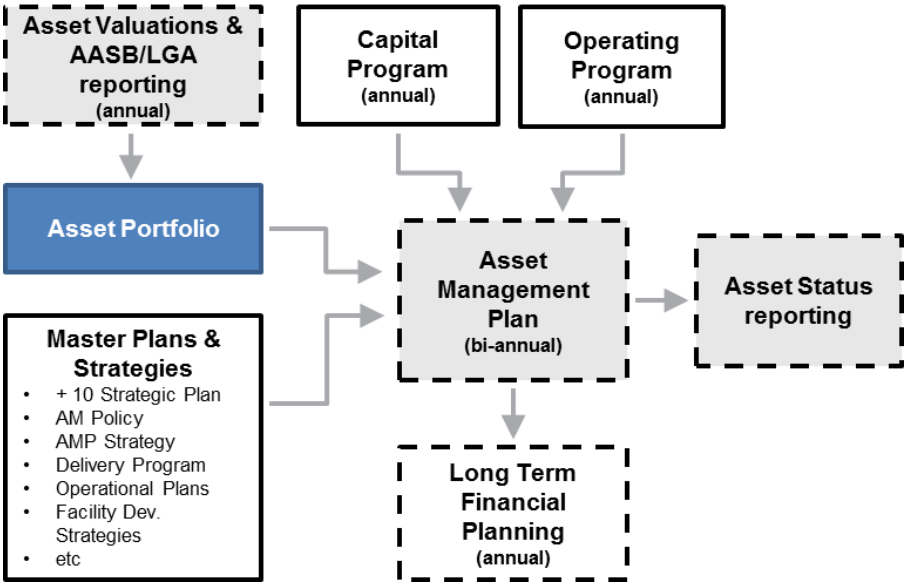

Figure 1.2 AM plan relationship to other Maitland City Council documents

1.4 Asset management objectives

MCC is responsible for providing services relating to drainage assets to the community within the broader portfolio of Council assets. To support the inherent goal of meeting levels of service, MCC has adopted key infrastructure Asset Management Objectives and corresponding Tactics, all of which are relevant to this asset class. These objectives are:

- **Objective 1, Health and Safety:** To be a local government leader in how we effectively manage the health and safety risks related to how we use, operate and maintain our assets.
- **Objective 2, Community Focus:** Our asset portfolio supports the Maitland community's growing and changing demand for connectivity, recreational, sporting and community infrastructure and services.
- **Objective 3, Community Focus:** Our asset portfolio supports the Maitland community's growing and changing demand for connectivity, recreational, sporting and community infrastructure and services.
- **Objective 4, Empowered and Engaged People**: Our people understand their role in delivering service outcomes and are empowered to consider their decisions and actions from a customer service perspective.
- **Objective 5, Growing Maintenance Maturity:** The maturing knowledge and understanding of our assets supports effective application of our condition and risk-based maintenance approach.
- **Objective 6, Project Delivery:** Our project delivery capability and capacity enable us to consistently meet the expectations and timeframes of our stakeholders.
- **Objective 7, Balanced Growth:** Our city retains its unique balance of heritage, urban, rural, natural character, amenity, lifestyle and physical assets while accommodating growth.
- **Objective 8, Economic Prosperity:** Our infrastructure and asset management practices support and enable the economic prosperity of our City.

1.5 Drainage service delivery program

To meet these objectives, assets are rated in terms of risk and criticality. Criticality assists lifecycle management decision making by defining which assets are most important to the service delivery program. To inform the MCC's service delivery needs, this AM Plan provides:

- Details of the community expectations (where available) and legislative/regulatory requirements.
- A discussion on the asset management implications from the growth of the Maitland region.
- Lifecycle management strategy recommendations (capital rehabilitation, replacement projects and/or maintenance works) commensurate with asset data available.
- Indications of long-term sustainable funding amounts for maintaining adequate services.

1.6 Asset management data model

All asset management data reporting in this AM Plan is documented in an Excel-based Asset Management Planning data model, provided separately to this AM Plan. The logic in this model is based on lifecycle processes, asset condition data and assumptions documented in this AM Plan. Key data inputs and assumptions have been provided by MCC staff.

2. Levels of service

2.1 Introduction

One of the basic cornerstones of sound asset management is to provide the level of service that current and future communities want and are prepared to pay for. To achieve this, MCC needs to plan for the provision of desired service levels, for a sustainable cost, over the life span of its assets. Establishing levels of service requires knowledge of customers and stakeholders, and an understanding of their expectations and requirements in terms of drainage assets.

This section of the AM Plan covers the following:

– Customer research and expectations
– Strategic and corporate goals relevant to levels of service
– Legislative requirements
– Current Levels of Service
– Desired (Target) Levels of Service

2.2 Customer research and expectations

Understanding the customer's expectations are a key input into levels of service and prioritising works across multiple asset types. This understanding will be balanced against legislative requirements and the customers' ability/willingness to pay.

The community expects that MCC's drainage system is maintained and operated to a level that localised flooding is minimised and the environment is protected including the management of stormwater release (quality and quantity) to downstream water systems. For regional flooding events, the community expects these to be practically managed in consultation with neighbouring local government areas, emergency service departments and the Department of Planning Industry and Environment who manage regional flood protection assets.

The specific community levels of service expectations are captured in the current Community Strategic Plan. The following table summarises the typical customer expectations that are considered in determining the level of service.

Table 2.1 Typical customer expectations for drainage assets

Service Criteria	Technical measures may relate to
Safety	Minimisation of flooding mitigate injuries, accidents and loss of life from flooding and drainage-related issues.
Quality and quantity	The drainage system is designed, constructed and maintained at a level that enables functional drainage across Maitland, particularly in major storm events.
Reliability	The drainage system and assets work as designed at all times, particularly in major storm events.
Environmental	Quality and quantity of stormwater received by downstream natural water systems as well as the speed at which the water is discharged.
Cost Efficiency	Life cycle costs are managed effectively and efficiently to deliver services within known budget constraints.
Legislative Compliance	Compliance with all applicable legislation.
Sustainability	Long term plans are prepared and implemented to ensure services are delivered for future generations.

2.3 Asset Management Challenges

Within this and other strategic themes of the Community Strategic Plan are a number of challenges that must be confronted in order to achieve the desired community outcomes. These challenges, consistent with the Asset Management Strategy, are summarised as follows and influence outcomes of this AM Plan.

- **Growing and changing demand:** MCC is facing a significant population growth over the coming decades, with an estimated cumulative population growth of 35% over the next 20 years.
- **Aging infrastructure:** Many of MCC's existing assets are approaching the end of the expected lives. As such, their physical condition has deteriorated and will continue to deteriorate at an accelerated pace in the coming years.
- **Legislative Landscape:** The current legislative environment emphasises a need for local government to recognise the equitable recovery of costs from owning and operating infrastructure over the full lifecycle of assets.
- **Heritage Assets:** MCC has a significant number of heritage buildings and infrastructure dating from the early 1800's which present additional challenges and costs for the preservation and maintenance of our unique past.
- **Preserving and restoring natural assets:** The natural environment and unique character of the Hunter River floodplain are an important part of the Maitland's appeal to residents and visitors. In dealing with population growth and urban expansion it is essential that we not only preserve but increase our areas of natural vegetation and green open space.
- **Resilience and sustainability:** While the natural and riverine assets of our city are among its most appealing attributes, they bring with them risks including potential vulnerability to bushfires and floods. Our asset management decision making must be cognizant of these risks and seek to improve the resilience of our flood mitigation facilities and infrastructure in a sustainable way.
- **Improving delivery capability:** Across both our capital project and maintenance service delivery processes we have the opportunity to significantly improve our asset information, tools, business processes and skills, and in doing so increase our productivity, efficiency and the value for money of our services.

2.4 Legislative requirements

MCC has to meet many legislative requirements including Australian and State legislation and State regulations in day-to-day service delivery tasks. These are listed in the following table.

Table 2.2 Legislative requirements

Legislation	Objective/Intent
Local Government Act	Sets out roles, purpose, responsibilities and powers of local governments including the preparation of a long-term financial plans supported by asset management plans for sustainable service delivery.
Protection of the Environment Operations Act 1997	The framework for the protection of the environment through design, construction, operation and maintenance practices.
Fisheries Management Act 1994	Defines requirements for the preservation and conservation of fish habitats and threatened communities.
Threatened Species Conservation Act 1995	Defines requirements for the conservation of biological diversity, key habitat and ecologically sustainable development.
Native Vegetation Conservation Act 1997	Defines requirements for the conservation and management of native vegetation.
Water Management Act 2000	The framework for the maintenance of creeks and other natural waterways so flow isn't impeded and the systems are as free as possible of weed species.

2.5 Levels of service

2.5.1 Common levels of service

For the purpose of this AM Plan, the levels of service for drainage assets and subsequent targets are either "Functional" or "Not Functional", meaning the asset in its current state generally meets (or not) an original design intent, at a high level, of draining the immediate locality. Achieving this intent (or not) is based on one of the core failure modes defined in Section 4.5 of this plan (capacity, condition, financial efficiency, reliability).

Traditionally most drainage assets are located underground. Establishing the condition and performance of these assets is difficult and a costly exercise. It is also likely that design and performance standards for these drainage assets have changed over time. For example, drainage assets may have originally been designed for say a 50% Annual Exceedance Probability (50% AEP ~ 2 year average recurrence interval) at the time of design. With the passage of time, the applicable performance standard may now be a 20% or 10% AEP (analogous to the 5 or 10 yr ARI) with a larger overland flow assessment.

Furthermore, it is likely that the design rainfall for these events has increased as well, resulting in very different storm events. Assessments for major floodplains now also include climate change risk. Major waterways typically need to cater for larger events, and the Hunter River is assessed for *extreme* frequency events and assessed on the *Probable Maximum Flood (AR&R 2019)*. The Hunter River and associated infrastructure other than flood gates are not part of this plan as this infrastructure is managed by the NSW Government through the Department of Planning Industry and Environment.

It is understood that the older urban parts of Maitland (such as the CBD) have aged drainage assets, that for the most part are still functional but may not meet modern performance standards. For the purpose of this AM Plan, these assets may be considered "functional" if they are generally operational, whilst acknowledging their capacity may not meet today's standards. Any assessment of drainage assets as "non-functional" would be based on criteria such as a history of drainage complaints, known capacity issues, structural failure (including blockage), high maintenance history or actual physical inspection data.

Should asset condition be estimated based on age alone (as an alternate to inspection data as per other asset classes), it could trigger significant upgrades and capital investment of MCC's original drainage system despite the drainage assets having a residual life. MCC will manage these triggers by exception to balance cost and risk. (Note that an upgrade may be a duplication of an existing asset or diversion of flows, and not necessarily a replacement).

2.5.2 Dams

MCC owns and maintains one prescribed dam within this asset class, being at Diamond Circuit, Rutherford. Dams registered, or "declared" under the *Dams Safety Act, 2015* must have specific Dam Safety Management System (DSMS).

The DSMS for the Diamond Circuit Detention Basin is a standalone system that addresses the specific requirements for the operation, maintenance and improvement of the basin. Documentation relating to this DSMS is to be read in conjunction with this AM Plan. Notification requirements to Dams Safety NSW for any proposed changes to the Diamond Circuit Detention Basin are not currently identified in this version of the AM Plan.

Other water storage facilities such as wet or dry basins and water quality basins generally have the same asset management philosophy as other drainage infrastructure, including a common level of service as articulated in Section 2.5.1.

2.6 Target levels of service

To assist in prioritising asset management activities over the spectrum of MCC's drainage assets, the following target level of services categories have been defined by MCC and applied to the asset hierarchy. Target condition ratings have also been allocated, in accordance with MCC's condition assessment process (with "1" being excellent condition and "5" being unserviceable).

These allocations were defined and agreed with applicable Council staff and managers.

Table 2.3 Target levels of service

Level 3	Level 5	Target LOS	Target Condition
Trunk Drains	Natural	Functional (meets original design intent)	3 - Significant maintenance required.
	Engineered	Functional (meets original design intent)	4 - Significant renewal/upgrade required.
Minor culverts and conduits	Pipes	Functional (meets original design intent)	4 - Significant renewal/upgrade required.
	Culverts	Functional (meets original design intent)	4 - Significant renewal/upgrade required.
	Junction pits – grated	Functional (meets original design intent)	4 - Significant renewal/upgrade required.
	Junction pits – ungrated	Functional (meets original design intent)	4 - Significant renewal/upgrade required.
	Kerb inlet pits	Functional (meets original design intent)	4 - Significant renewal/upgrade required.
	Outlet pits	Functional (meets original design intent)	4 - Significant renewal/upgrade required.
	Headwalls	Functional (meets original design intent)	4 - Significant renewal/upgrade required.
Floodgates	Sluice	Functional (meets original design intent)	2 - Minor maintenance required plus planned maintenance.
	Flap	Functional (meets original design intent)	2 - Minor maintenance required plus planned maintenance.
	Guillotine	Functional (meets original design intent)	2 - Minor maintenance required plus planned maintenance.
	With Building	Functional (meets original design intent)	2 - Minor maintenance required plus planned maintenance.
Detention basins	Dam	Functional (meets original design intent)	2 - Minor maintenance required plus planned maintenance.
	Wet detention	Functional (meets original design intent)	3 - Significant maintenance required.
	Dry detention	Functional (meets original design intent)	3 - Significant maintenance required.
	Water quality basins	Functional (meets original design intent)	3 - Significant maintenance required.
	Wetlands / Water Body	Functional (meets original design intent)	4 - Significant renewal/upgrade required.
Gross Pollutant Traps	Proprietary system	Functional (meets original design intent)	3 - Significant maintenance required.
	Engineered system	Functional (meets original design intent)	3 - Significant maintenance required.
	Isolated system	Functional (meets original design intent)	3 - Significant maintenance required.
Pumps	Chamber	Functional (meets original design intent)	2 - Minor maintenance required plus planned maintenance.
	Controls	Functional (meets original design intent)	2 - Minor maintenance required plus planned maintenance.
	Pumps	Functional (meets original design intent)	2 - Minor maintenance required plus planned maintenance.

2.7 Asset condition

In understanding levels of service as well as asset performance, MCC use a 1 to 5 condition rating scale (1 = excellent condition, 5 = poor condition) to set target levels of service, manage asset condition against this target as well as inform risk assessments in probability of failure estimates (discussed in section 4.6). These condition targets not only represent expected asset condition, but also the type and level of maintenance strategy to be applied.

Understanding the application of these conditional ratings as defined in this AM Plan can be complex and are primarily for the use of MCC's asset professionals to inform decision making. The following table aims to articulate how asset condition ratings/targeted are interpreted.

Table 2.4 Asset condition explained

Condition Rating	Maintenance Strategy	Maintenance Principles and Intervention level
1	Predictive Maintenance (Proactive)	***Asset Management Principles*** – Proactive maintenance approach that uses condition monitoring and high frequency inspections during operation to detect possible failures and fixes them before it fails. – Higher cost of maintenance. – Low level of failures or defects and complaints expected from the community. ***Maintenance Invention Level*** – High frequency of inspections, condition monitoring and planned preventative maintenance. – Only tolerate normal preventative and planned maintenance interventions. ***Asset Examples:*** – Maitland Park, Art Gallery, No.1 Sportsground and Arterial Roads.
2	Preventative / Planned Maintenance	***Asset Management Principles*** – Type of proactive maintenance that keeps assets in good working order and reduces the need for major repairs. – Aims to limit failures to minor corrective maintenance levels only before intervention. – Lower cost than predictive maintenance. – Reduces high consequence failures. ***Maintenance Invention Level*** – Frequency of inspections lower than predictive, including monitoring condition and intervening when failures are still minor in nature (e.g. potholes). – Assets remain safe but we will tolerate a time frame to allow a defect to be repaired. ***Asset Examples:*** – Distributor Roads, Library, Road and Pedestrian bridges.
3 and 4	Corrective Maintenance	***Asset Management Principles*** – Maintenance is carried out following a detection of a failure or defect. This is where we make conscious decisions to allow 'safe' failures to occur and the cost for downtime and repair is known to be lower than a preventative or predictive maintenance program. – Lower cost than preventative maintenance. – Assessment made to let fail then fix within a nominated time frame. ***Maintenance Invention Level*** – Condition rating 3 - tolerate some major corrective maintenance before intervening.

Condition Rating	Maintenance Strategy	Maintenance Principles and Intervention level
		– Condition rating 4 – intentionally delay intervention to a point where major corrective maintenance needs to occur. ***Asset Examples:*** – Plant and Equipment, Local roads, non-critical drainage assets.
5	Run to Failure (Breakdown Maintenance)	***Asset Management Principles*** – Simplest maintenance strategy where assets are allowed to operate until they essential break or fail to operate as designed. – Asset receives little to no maintenance until failure or unsafe. – Strategy used mostly where asset failure has low safety or financial consequence. – Lowest cost intervention. ***Maintenance Invention Level*** – Other than basic maintenance like cleaning and visual inspection, nothing is done until the asset is not functional. ***Asset Examples*** – Bike racks, streetlights, garbage bins.

2.8 Known service deficiencies

Known and/or perceived service deficiencies affect the current and future performance of assets. The known deficiencies have been incorporated into this iteration of the AM Plan in the course of the assessment through the comparison of current level of service and condition against the above target levels of service and condition.

At this point in time MCC is not measuring and reporting on actual levels of service for these assets. The method to transparently collect and report on service level performance of an asset is currently being assessed as part the ongoing improvement program and will be reported upon in future iterations of the AM Plan.

Service deficiencies of assets are currently captured through condition assessment data and/or a qualitative judgment from appropriate MCC staff. From MCC's subjective condition assessments of drainage assets, noting the majority of drainage assets are buried infrastructure, they may not meet the agreed condition target levels. However based on performance (of current operational assets) it is generally accepted by MCC that the assets meet their "functional" level of service and require only standard operations and maintenance interventions.

3. Future demand

3.1 Introduction

Future demand is a measure of how much customers will consume the services provided by the assets as well as additional (new) assets required to meet predicted population growth. Understanding and predicting demands enable asset managers to plan and identify the best way to meet future conditions.

MCC are currently in a period of extraordinary population growth, with 2020/21 growth rates estimated by the Australian Bureau of Statistics of 3.5% - a rate that is estimated as being maintained for the next five to ten years. This growth will see Maitland's population grow to more than 104,700 by 2041. This growth rate is the fifth highest in NSW and the highest outside of Greater Sydney. To house this continued growing population, the majority (>90%) are expected to live in new greenfield developments, all of which require new MCC owned and operated assets. New greenfield developments have conservatively been estimated at around 700 new lots per year for the next 10 years.

In addition to new assets, this growth will place a greater demand on parts of the existing asset base, potentially requiring additional (or different) maintenance strategies to be applied.

3.2 Demand forecasts

3.2.1 Forecast methodology

To enable proactive planning, development and management of additional demand on assets created by this growth, MCC have estimated growth projections for drainage related assets based on the average growth rates experienced between the periods of 2017 and 2021. Combined with published growth rates available in annual reports as well as the estimated lot quantities defined in the development capacity survey completed by MCC's Planning and Environment group, annual asset growth rates were estimated and projected for a period of 10 years (2022 to 2032). This enabled the estimation of asset quantities and costs such as roads, kerb and gutter, footpaths, drainage structures etc, required to service the estimated greenfield lots as well as enhancements to existing assets.

For associated recreation land and drainage reserves, a five-year growth rate was derived from an internal survey of dedicated land.

3.2.2 New assets from growth

New assets required to meet growth will be acquired from land developments and re-construction needed as a result of growth by developer contribution and Council budgets. Land Developments are managed by Councils development contribution plans (Sec 7.11) and conditions imposed with development approvals. Acquiring these new assets will commit council to fund ongoing operations and maintenance costs for the period that the service provided from the assets is required. These future costs are identified and considered in developing forecasts of future operating and maintenance costs.

From the anticipated growth, it is estimated that on average 14 km (approximately 3% annual growth) of new drainage pipes and culverts are to be constructed annually. This would also include more than 600 new drainage pits and headwalls. The specific size, type and location of these drainage assets are yet to be confirmed.

Based on the above methodology, the predicted trend for each of these asset types over the coming ten years is illustrated in Figure 3.1 and Figure 3. below.

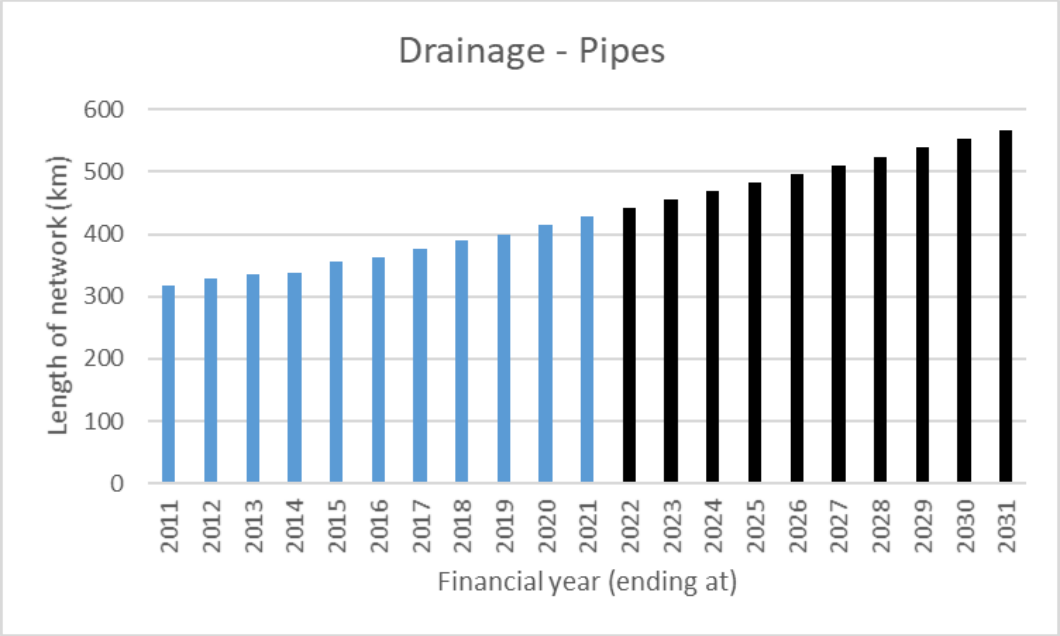

Figure 3.1 Estimated increase in drainage pipes

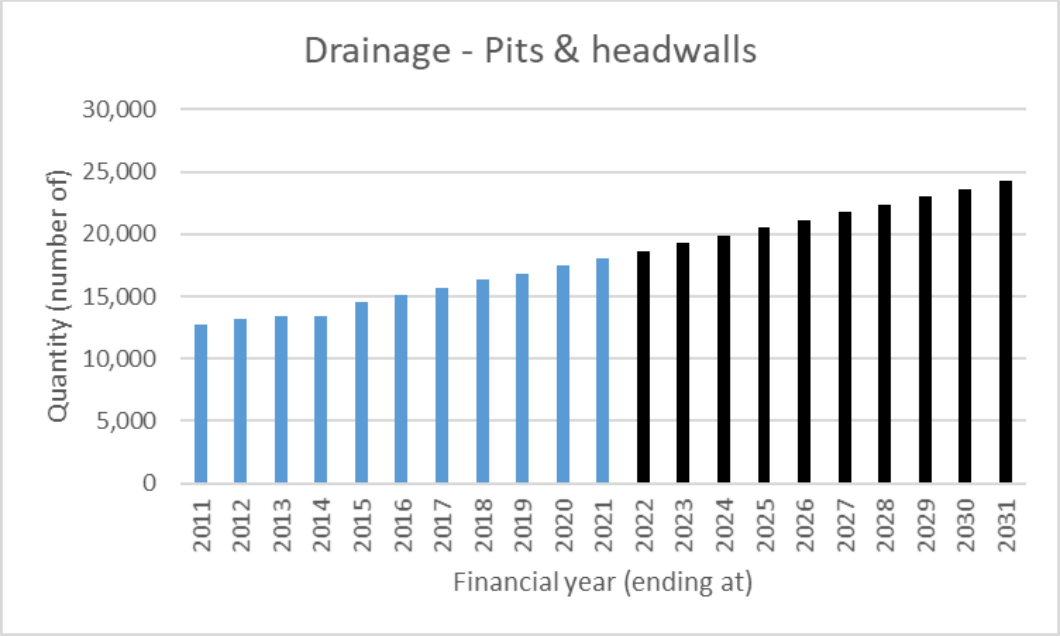

Figure 3.2 Estimated increase in drainage pits and headwalls

3.3 Demand management

Consideration of the future growth and impact on services drives the planning and demand management strategies. Strategies to be implemented in this current cycle of asset management planning include improved resource management and maintenance.

3.3.1 Resources

To manage the surge in capital development over the next ten years, additional resources will be required. It is anticipated these additional resource requirements will be procured from both new MCC recruits as well as external resources such as design consultants, contract staff and third-party construction contractors.

3.3.2 Maintenance

From these new assets will come additional operations and maintenance requirements on top of the existing asset base. Consistent with the tactics included in the Asset Management Strategy, maintenance tactics will be applied as defined in the Lifecycle Management section of this AM Plan.

3.3.3 Financial Impacts: Capital

To meet the needs of this growth capital investment is required. This includes constructing the identified new assets from growth as well as capital expenditure required to renew or replace ageing assets within the existing asset portfolio.

Table 3.1 summarises capital investment requirements for this asset class, which is consistent with MCC's current Long Term Financial Plan. Over the ten-year period, this investment estimate is **$32.0 M** (an average of **$3.2 M** per year).

3.3.4 Financial Impacts: Developer contributions

In addition to these capital costs there are additional developer contributions for assets to be constructed as part of the greenfield subdivision developments, specifics of which are yet to be defined. Table 3.2 summarises capital investment requirements for this asset class. Over the ten-year period, this investment estimate is **$5.0 M**, invested across 4 of the 10 years.

3.3.5 Financial Impacts: Maintenance

Based on the above demands, additional maintenance expenditure will be required. Table 3.3 summarises MCC's estimated maintenance expenditure necessary to maintain levels of service for new road and road inventory assets from growth over the next ten years as well as for the existing drainage asset class. Note that these estimates are included in MCC's current Long Term Financial Plan.

Table 3.1 Capital estimated expenditure including new assets from growth 2022 to 2032

	FY 2022/23	FY 2023/24	FY 2024/25	FY 2025/26	FY 2026/27	FY 2027/28	FY 2028/29	FY 2029/30	FY 2030/31	FY 2031/32	TOTAL
Stormwater drainage	$860,000	$860,000	$2,869,000	$3,182,000	$3,452,000	$3,708,000	$3,943,000	$4,151,000	$4,368,000	$4,594,000	**$31,987,000**

Table 3.2 Capital estimated expenditure for developer contribution works 2022 to 2032

	FY 2022/23	FY 2023/24	FY 2024/25	FY 2025/26	FY 2026/27	FY 2027/28	FY 2028/29	FY 2029/30	FY 2030/31	FY 2031/32	TOTAL
Stormwater drainage	$1,797,350	-	$638,308	$651,074	-	$1,867,069	-	-	-	-	**$4,953,801**

Table 3.3 Maintenance estimated expenditure 2022 to 2032

	FY 2022/23	FY 2023/24	FY 2024/25	FY 2025/26	FY 2026/27	FY 2027/28	FY 2028/29	FY 2029/30	FY 2030/31	FY 2031/32	TOTAL
Stormwater drainage	$1,067,000	$1,244,000	$1,434,000	$1,538,000	$1,633,000	$1,734,000	$1,841,000	$1,946,000	$2,057,000	$2,174,000	**$16,668,000**

4. Lifecycle management plan

4.1 Introduction

This section defines assets owned (including future new assets from growth) and broad plans required to manage and operate the assets at the agreed levels of service (defined in Section 2) while optimising life cycle costs. This section includes:

– Asset Details and Age Profiles
– Maintenance and Renewal Planning
– Asset Lifecycle Activities and Cost Data
– Asset Failure Modes and Consumption Estimates
– Asset Risk Data and Risk Exposure Estimates
– Lifecycle Management Plans

Lifecycle management strategies and tactics, consistent with MCC's AM Strategy are also highlighted throughout this section.

4.2 Background data

4.2.1 Asset hierarchy

Asset information is needed to support decision making. The asset hierarchy provides the framework for drainage assets into appropriate classifications to assist with lifecycle planning and management. The asset hierarchy used for this AM Plan is shown below. This hierarchy is "rolled down" to additional levels in supporting data.

Table 4.1 Asset hierarchy

Level 1	Level 2	Level 3	Level 4	Level 5	Level 6
Drainage	Location/Catchment	Trunk Drains	Section / ID	Natural	Asset Detail (type, size etc)
				Engineered	Asset Detail (type, size etc)
				Junction pits – grated	Asset Detail (type, size etc)
		Pipes	Section / ID	Pipes	Asset Detail (type, size etc)
				Culverts	Asset Detail (type, size etc)
				Junction pits – grated	Asset Detail (type, size etc)
				Junction pits – ungrated	Asset Detail (type, size etc)
				Kerb inlet pits	Asset Detail (type, size etc)
				Outlet pits	Asset Detail (type, size etc)
				Headwalls	Asset Detail (type, size etc)
		Floodgates	Section / ID	Sluice	Asset Detail (component, size etc)
				Flap	Asset Detail (component, size etc)
				Guillotine	Asset Detail (component, size etc)
				With Building	Asset Detail (component, size etc)
		Detention basins	Section / ID	Dam	Asset Detail (type, size etc)

Level 1	Level 2	Level 3	Level 4	Level 5	Level 6
		Detention basins Detention basins Gross Pollutant Traps Pumps	Section / ID Section / ID Section / ID Section / ID	Wet detention	Asset Detail (type, size etc)
				Dry detention	Asset Detail (type, size etc)
				Water quality basins	Asset Detail (type, size etc)
				Wetlands / Water Body	Asset Detail (type, size etc)
		Detention basins Gross Pollutant Traps Pumps Gross Pollutant Traps	Section / ID Section / ID Section / ID Section / ID	Proprietary system	Asset Detail (type, size etc)
				Engineered system	Asset Detail (type, size etc)
				Isolated system	Asset Detail (type, size etc)
				Chamber	Asset Detail (type, size etc)
				Controls	Asset Detail (type, size etc)
		Gross Pollutant Traps	Section / ID	Pumps	Asset Detail (type, size etc)

4.2.2 Asset information and targets

At an appropriate level of the hierarchy, asset information and targets are assigned. This assists in deriving the Maximum Potential Life of an asset and the subsequent Effective Remaining Life. The Maximum Potential Life (MPL) is the time from installation to replacement, with typical maintenance and refurbishment activities taking place during this time frame.

Within the asset hierarchy, the following is allocated in addition to MPL:

– Target level of service (LOS) (defined in Section 2.5).
– Target condition (between “1 and 5” as defined in Section 4.5).
– Consequence of failure (CoF) (between “C1 and C5” as defined in Section 4.6.3, Table 4.9).

MPL, level of service, condition and consequence of failure figures assigned to assets are aligned to industry experience and are agreed/confirmed with MCC staff and managers. Where required, MCC staff have provided judgement (or exception) figures that override these targets. These are summarised in the following table.

Table 4.2 Asset lifecycle information

Level 3	Level 5	MPL (years)	Target LOS	Target Condition	CoF Rating
Trunk Drains	Natural	100	Functional (meets original design intent)	3 - Significant maintenance required.	5
	Engineered	100	Functional (meets original design intent)	4 - Significant renewal/upgrade required.	5
Minor culverts and conduits	Pipes	100	Functional (meets original design intent)	4 - Significant renewal/upgrade required.	3
	Culverts	100	Functional (meets original design intent)	4 - Significant renewal/upgrade required.	3
	Junction pits – grated	100	Functional (meets original design intent)	4 - Significant renewal/upgrade required.	3
	Junction pits – ungrated	100	Functional (meets original design intent)	4 - Significant renewal/upgrade required.	3
	Kerb inlet pits	100	Functional (meets original design intent)	4 - Significant renewal/upgrade required.	3

Level 3	Level 5	MPL (years)	Target LOS	Target Condition	CoF Rating
	Outlet pits	100	Functional (meets original design intent)	4 - Significant renewal/upgrade required.	3
	Headwalls	100	Functional (meets original design intent)	4 - Significant renewal/upgrade required.	3
Floodgates	Sluice	100	Functional (meets original design intent)	2 - Minor maintenance required plus planned maintenance.	5
	Flap	100	Functional (meets original design intent)	2 - Minor maintenance required plus planned maintenance.	5
	Guillotine	100	Functional (meets original design intent)	2 - Minor maintenance required plus planned maintenance.	5
	With Building	100	Functional (meets original design intent)	2 - Minor maintenance required plus planned maintenance.	5
Detention basins	Dam	100	Functional (meets original design intent)	2 - Minor maintenance required plus planned maintenance.	5
	Wet detention	100	Functional (meets original design intent)	3 - Significant maintenance required.	3
	Dry detention	100	Functional (meets original design intent)	3 - Significant maintenance required.	3
	Water quality basins	100	Functional (meets original design intent)	3 - Significant maintenance required.	4
	Wetlands / Water Body	100	Functional (meets original design intent)	4 - Significant renewal/upgrade required.	3
Gross Pollutant Traps	Proprietary system	20	Functional (meets original design intent)	3 - Significant maintenance required.	3
	Engineered system	50	Functional (meets original design intent)	3 - Significant maintenance required.	3
	Isolated system	10	Functional (meets original design intent)	3 - Significant maintenance required.	3
Pumps	Chamber	60	Functional (meets original design intent)	2 - Minor maintenance required plus planned maintenance.	4
	Controls	20	Functional (meets original design intent)	2 - Minor maintenance required plus planned maintenance.	4
	Pumps	20	Functional (meets original design intent)	2 - Minor maintenance required plus planned maintenance.	4

4.3 Asset profiles

4.3.1 Asset inventory and replacement costs

To focus need for investments, it is helpful to understand the number of assets and replacement value of assets against the hierarchy. The drainage asset class has an estimated total replacement value (in 2022$) of approximately **$249 M** including:

– ~420 km of pipes
– More than 17,900 pits, outlets and headwalls
– 146 detention basins
– More than 220 individual asset types inclusive of floodgates, gross pollutant traps and pumps
– 39 km of trunk drains

The breakdown of these replacement costs (in percentage and $) is illustrated in the following table and figures. Note that replacement values included in this AM Plan are based on the valuations completed by MCC 2022 and other historical cost data (inflated to 2022 dollars).

Table 4.3 Asset inventory summary

Asset	Asset elements	Total Qty (estimated)	$ Cost breakdown (millions)	% Cost total
Trunk Drains	Natural and engineered	50 of	$15,781,920	6%
Detention Basins	All types	146 of	$30,199,004	12%%
Floodgates	Dual Guillotine	2	$105,701	<1%
	Flap	23	$121,556	<1%
	Guillotine	5	$132,126	<1%
	Inspection Pit	8	$84,561	<1%
	Open	4	TBA	TBA
Gross Pollutant Traps	Engineered and proprietary	186 of	$14,317,100	6%
Pipes	Box Culvert	0.9 km	$1,204,490	1%
	Concrete Pipe	421.6 km	$151,390,686	61%
	Concrete Twin	0.5 km	Included	Included
	Large Culvert	0.7 km	$2,650,856	<1%
	PVC	4.4 km	$587,616	<1%
Pits and Headwalls	All types	17,939 of	$31,653,346	13%
Pumps	Chamber	1 of	$917,442	<1%
	Controls	1 of	Included	Included
	Pumps	2 of	Included	Included
Grand Total			**$249,146,402**	**100%**

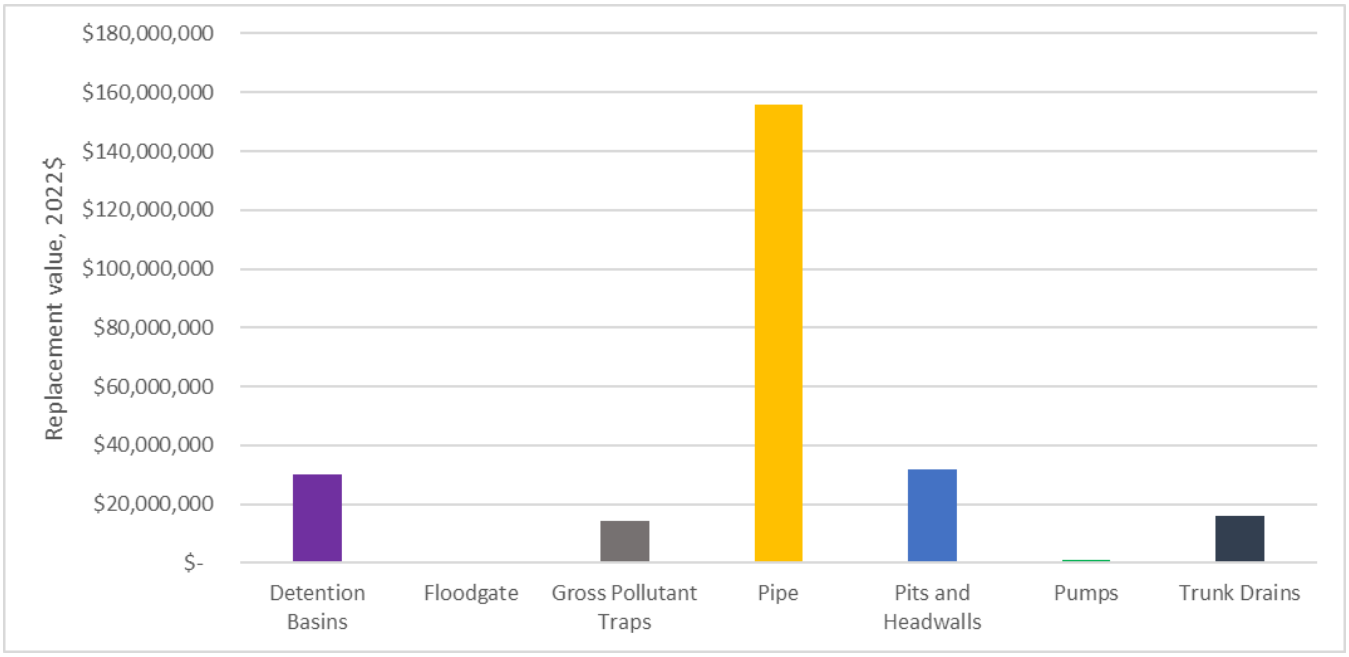

Figure 4.1 Asset installation profile

4.3.2 Installation profile of assets

To assist MCC with asset management decision making including future funding needs analysis, it is helpful to understand the installation profile of the asset portfolio. The following graphs show the replacement value of the assets by year of installation, in 2022 dollar value. This indicates that a large portion of drainage assets have been constructed or renewed in the last 20 years.

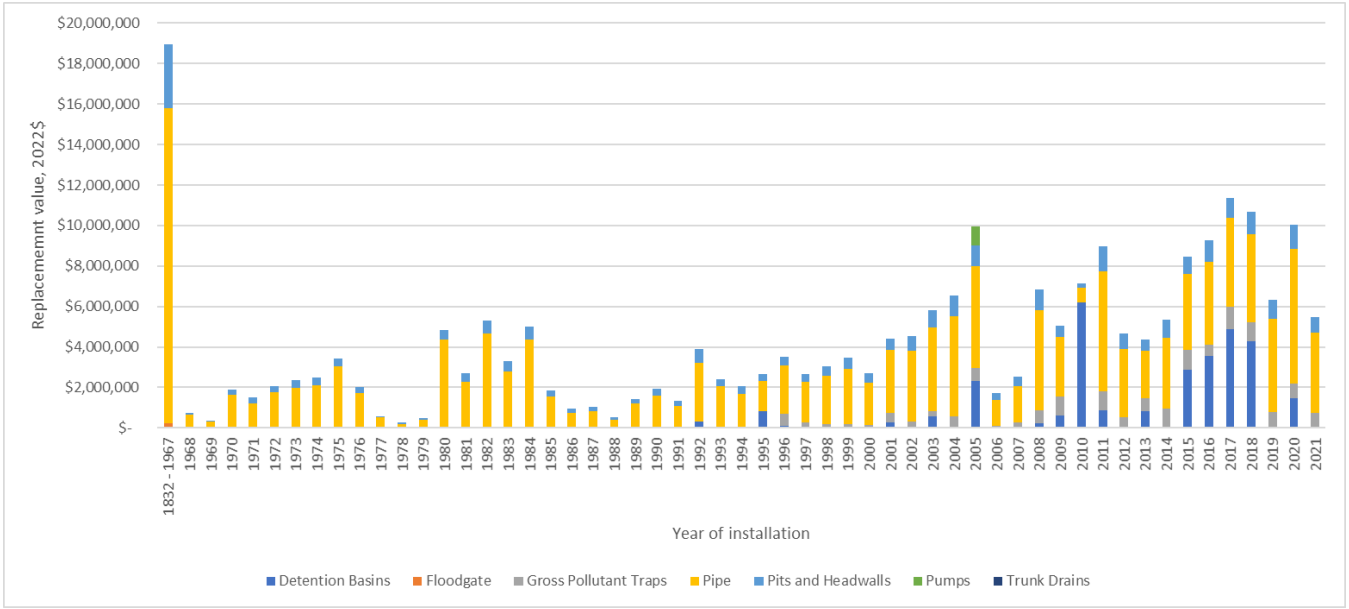

Figure 4.2 Installation profile: Total

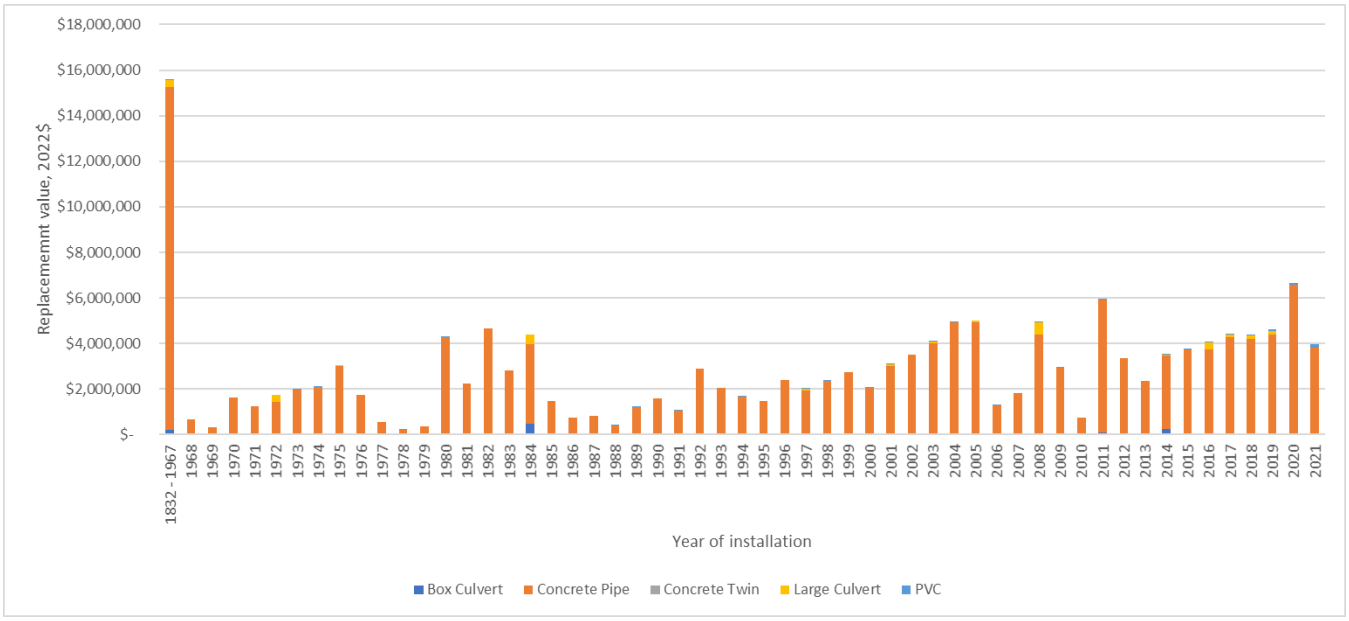

Figure 4.3 Installation profile: Pipes

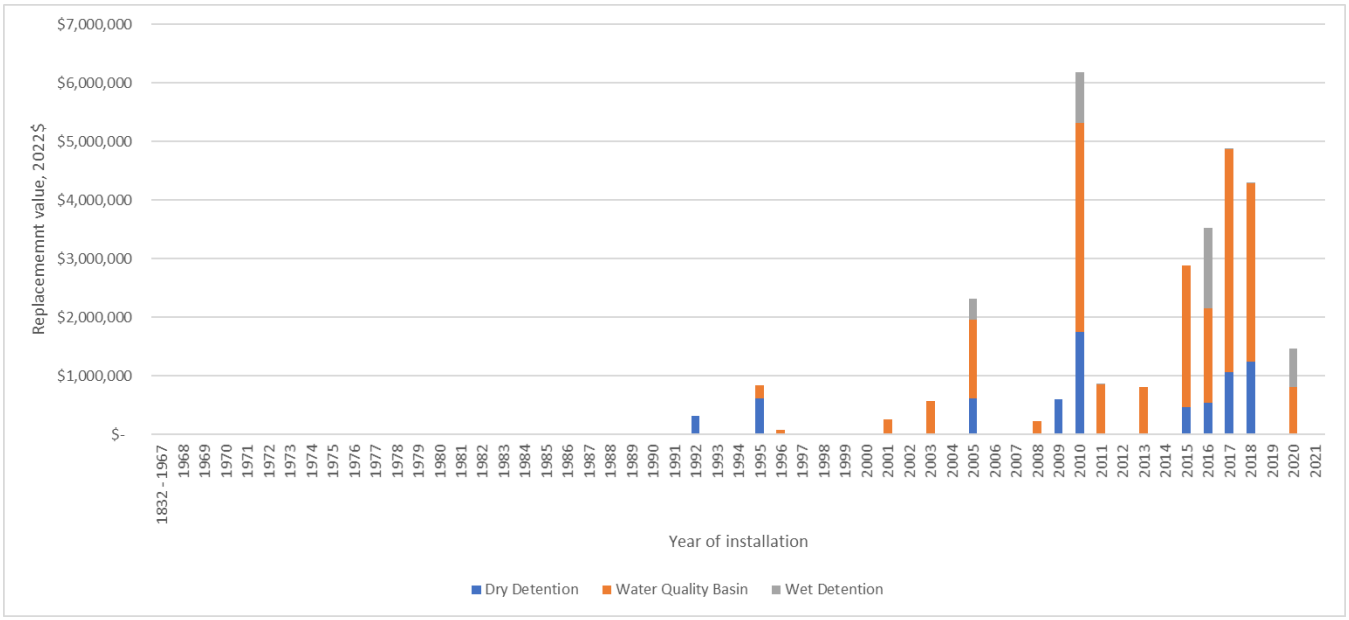

Figure 4.4 Installation profile: Detention basins

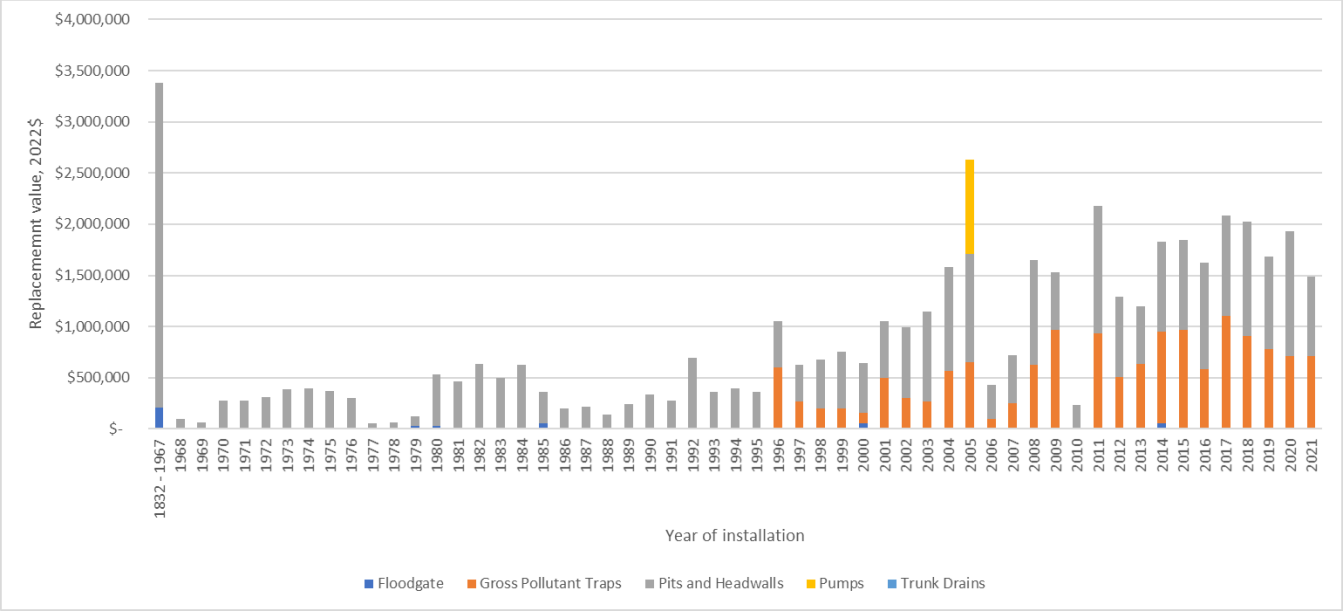

Figure 4.5 ***Installation profile: All other drainage assets***

4.4 Asset lifecycle activities

Lifecycle activities can be categorized into the following main areas:

- ***Create or Acquire:*** Activities that provide new or donated/gifted assets that increase service potential, performance capability or capacity.
- ***Operate***: The active process of using an asset which may consume resources such as manpower, energy, chemicals, and materials.
- ***Maintain:*** Activities necessary to retain an asset as near as practicable in its original condition but excluding refurbishment / rehabilitation or replacement.
- ***Refurbish or Rehabilitate:*** Activities to sustain the original service potential or substantially extend the life of existing assets by replacing component systems or assemblies without increasing service potential, performance capability or capacity.
- ***Enhance:*** Activities that augment or upgrade existing assets to increase service potential, performance capability or capacity.
- ***Replace:*** Activities that replace existing assets with assets of equivalent service potential, performance capability or capacity.
- ***Dispose:*** Work that permanently removes assets from service.

The lifecycle activities and associated costs for the MCC owned roads and road furniture are further described in the following sections.

4.4.1 Maintenance expenditure/budgets

Estimated Operating and Maintenance (O&M) and capital investment costs for the roads and road inventory for future financial years 2022 to 2032 is as defined in Section 3.3.3. These costs have been estimated by MCC based on historic maintenance expenditure and required maintenance effort for new assets from growth and are consistent to MCC's long term financial plan. This equates to an average annual O&M expenditure for existing and new (future) assets of **$1.67 M.**

4.4.2 Maintenance and renewal planning

MCC currently carries out maintenance activities that are necessary to keep drainage assets operating, including emergency maintenance for instances where portions of the asset fail and detrimentally affect service and the safety of the facility users. Maintenance includes reactive, planned and cyclic maintenance work activities.

- ***Reactive maintenance*** is unplanned repair work carried out in response to service requests and management/supervisory directions.
- ***Planned maintenance*** activities include inspection, assessing the condition against failure/breakdown experience, prioritising, scheduling, actioning the work and reporting what was done to develop a maintenance history and improve maintenance and service delivery performance.
- ***Cyclic maintenance*** is replacement of higher value components/sub-components of assets that is undertaken on a regular cycle. This work generally falls below the capital/maintenance threshold.

4.4.3 Standards and specification

Maintenance work on drainage assets is completed in accordance with MCC's Manual of Engineering Standards.

4.4.4 Capital works

New works are those works that create a new asset that did not previously exist or works which upgrade or improve an existing asset beyond its existing capacity. They may result from growth, social or environmental needs. New assets from growth, identified in Section 3 of this AM Plan as well as other minor capital works for the existing asset base are planned, developed and implemented as per MCC's annual capital works program (value $3.2 M).

4.5 Asset failure modes and consumption estimates

4.5.1 Failure modes

There are several different ways that an asset can fail to provide its required level of service. These are known as the failure modes of an asset. Each of these failure modes could have a different probability or consequence of failure. Most asset failures can be classified under one of the following four failure modes.

- **Utilisation (capacity):** The demand exceeds the capacity of the existing asset or network of assets, or vice versa in some cases (e.g. usage of a building maybe greater than design capacity due to population increase).
- **Physical Mortality (condition):** The condition of the asset (or a component of the asset) is such that it has reached the end of its effective life (e.g. failure of a backflow prevention device, etc.).
- **Financial Efficiency (cost):** The asset is not being maintained at the lowest lifecycle cost, that is, the cost to execute the current maintenance strategies over time exceed that of the replacement cost.
- **Level of Service:** The asset no longer performs reliably, does not meet the agreed target level of service or does not meet mandatory regulatory requirements (e.g. pool water quality does not meet health targets).

Decisions about the refurbishment and replacement of an asset and the timing of these activities should be based on a sound determination of its predominant or critical failure mode (the failure mode with the highest consequence and probability of occurrence).

4.5.2 Remaining life and asset consumption

For assets within this AM Plan, remaining life and asset consumption was determined at an appropriate level in the hierarchy simply as follows:

- Install year + estimated MPL – current year (2022).

– Applying a ***remaining life factor*** (which is a reduction factor based on the asset condition rating and current level of service). A good condition correlates to a high residual life factor, and a poor condition correlates to a low residual life factor as illustrated below.

If the result of this method did not appear appropriate based on what is inherently known about the asset, a judgement on residual life was applied which overrides the above.

These elements are described as follows:

– ***Install Year:*** The year an asset was first installed or replaced.

– ***Estimated MPL:*** As per Section 4.2.2.

– ***Condition Rating:*** A condition rating was applied to each asset based on available condition data or judgment of MCC staff as per Section 2.7

The “remaining life factor” was applied based on combined performance rating of condition and level of service is as shown below.

Table 4.4 Remaining life factor

Combined Performance	Residual life factor
1	0.99
2	0.90
3	0.66
4	0.325
5	0.075

Based on the remaining life predictions, the consumption of each asset in the hierarchy has been calculated on a least remaining life basis. The Asset Consumption Distribution graphs shown in the following figures illustrate the value of assets that are new (0% consumed) through to assets that have reached their maximum potential life (100% consumed). These graphs provide a good indication of which assets are at the end or nearing the end of their life and require replacing or a significant maintenance intervention.

Level of Service Rating: A target level of service has been allocated for each asset. Historically, actual levels of service for assets have not been consistently or formally documented meaning level of service performance cannot be consistently defined at this stage. This will be addressed in future iterations of this AM Plan.

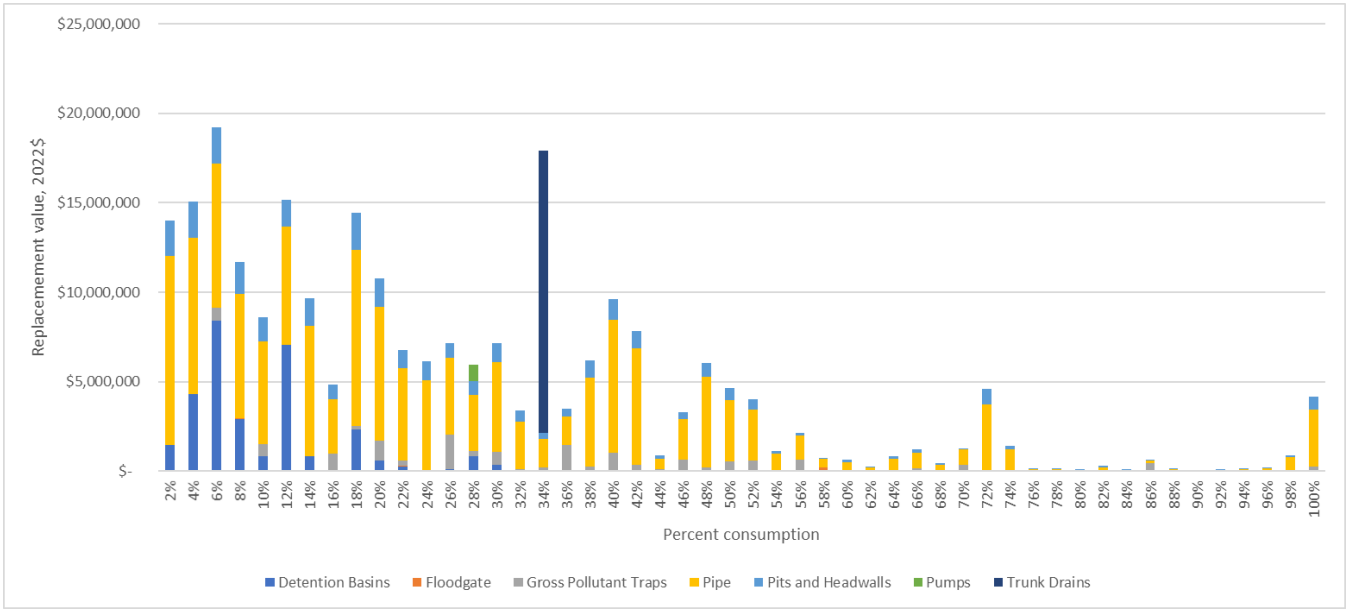

Figure 4.6 Asset consumption: Total

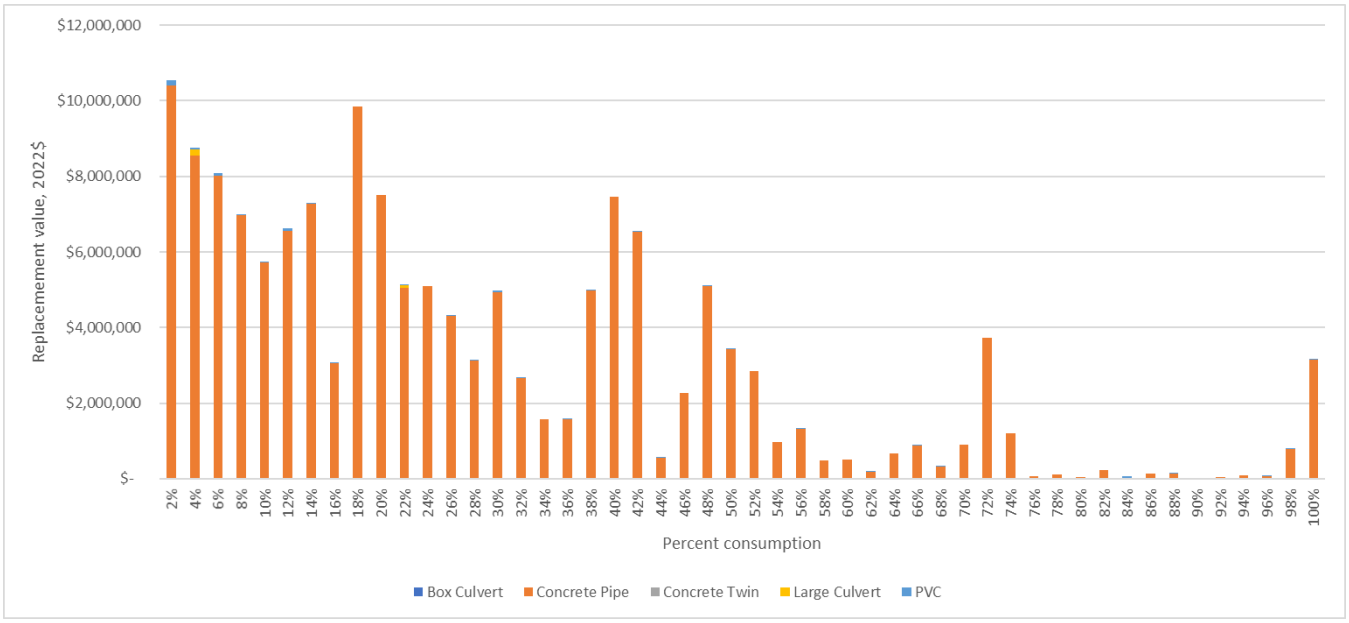

Figure 4.7 Asset consumption: Pipes

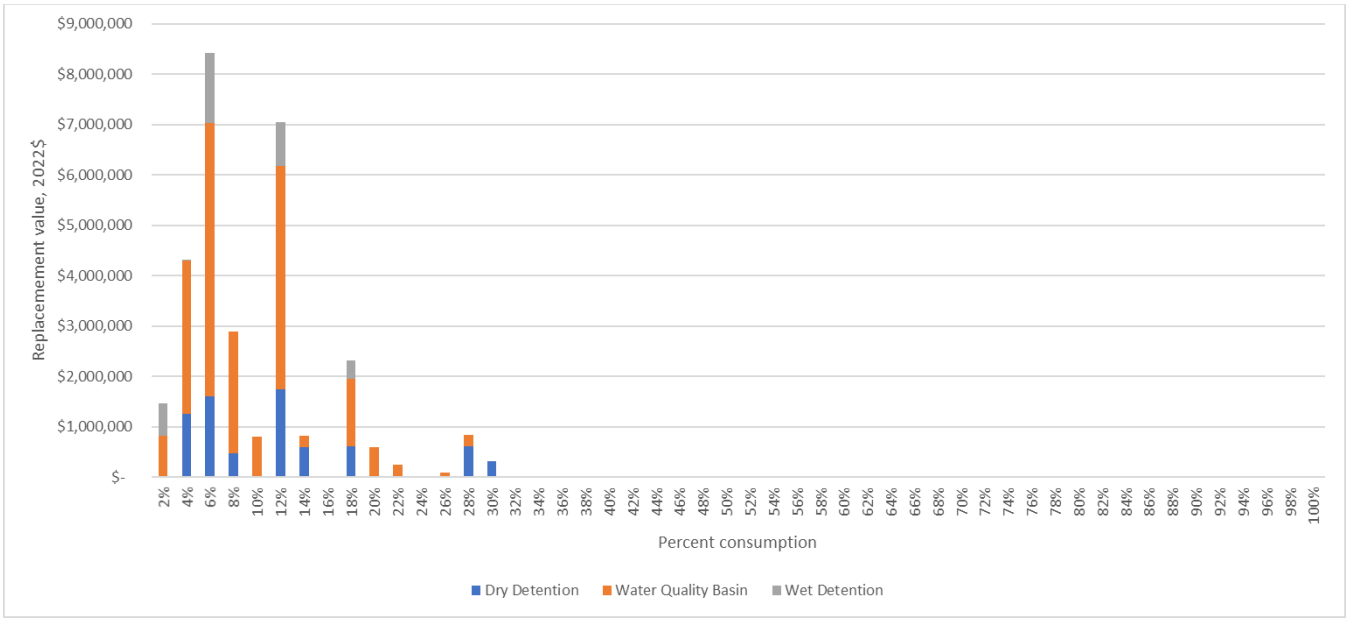

Figure 4.8 Asset consumption: Detention basins

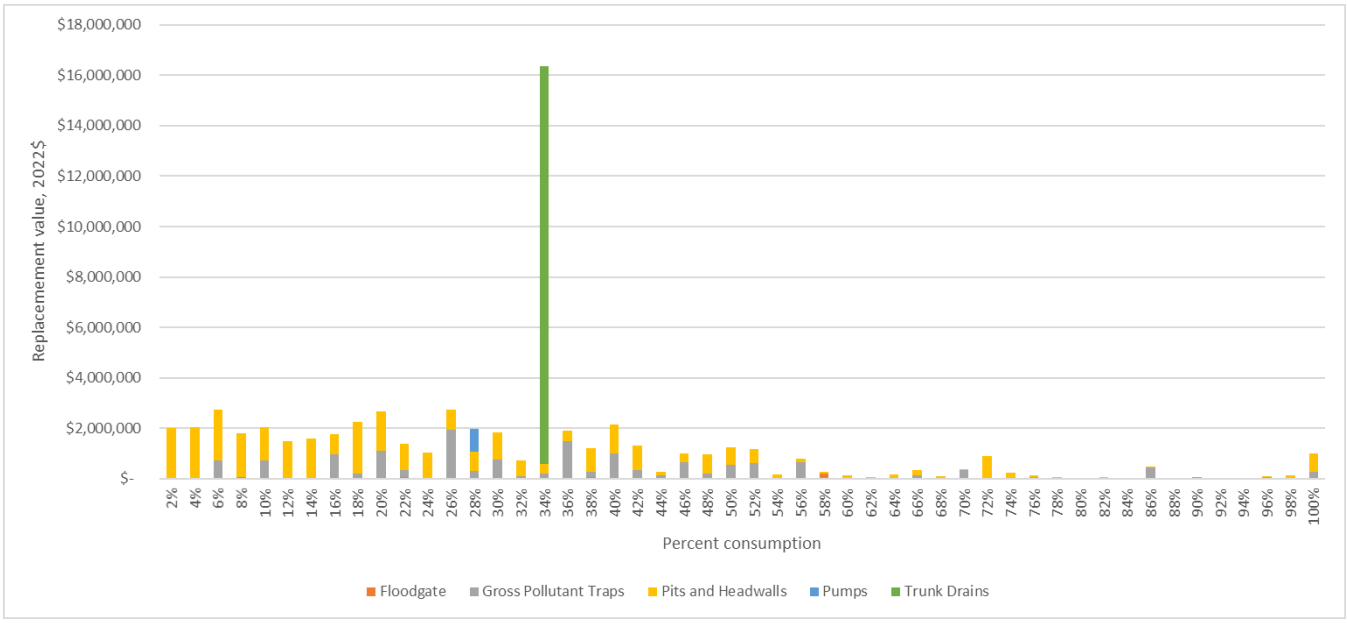

Figure 4.9 *Asset consumption: All other drainage assets*

4.6 Asset risk data and risk exposure estimates

4.6.1 Overview

Not every asset is of equal importance or presents the same failure risk. Understanding which assets are critical and how they might fail helps focus lifecycle management strategies on what is most important. Critical drainage assets are those that have major consequences or impacts if they fail and a high probability or likelihood of failing.

The asset consumptions determined in the preceding section provide an insight into the likelihood or probability of assets failing. To determine which of these assets are critical the consequence of failure must also be assessed and included in the analysis.

To determine the risk exposure of the assets, the following simple calculation is applied:

Risk Exposure = Probability of Failure (Pof) x Consequence of Failure (CoF).

The basis of determining the relative priority for each asset is the calculation of a Business Risk Exposure (BRE) rating index. The BRE is a probability-consequence risk matrix determination, using MCCs risk matrix structure as shown in the figure below.

Probability of Failure						
P5	Almost Certain	7	14	17	23	25
P4	Likeley	6	9	16	19	24
P3	Possible	3	8	15	18	22
P2	Unlikely	2	5	11	13	21
P1	Rare	1	4	10	12	20
		Insignificant	Minor	Moderate	Major	Catastrophic
		C1	C2	C3	C4	C5

Consequence of Failure

Figure 4.10 *Risk matrix*

4.6.2 Probability of failure

The probability of failure was derived by using the asset consumption defined in the previous section and MCC's likelihood scale (included in the MCC's Risk Management process), as illustrated in the following table.

Assets that are reaching the end of their estimated life (i.e. high% asset consumption) have a high probability of failure. Assets that are at the start of their estimated life (i.e. low % consumption) have a low probability of failure.

Table 4.5 Probability of failure

% Life consumed	Level	Probability / likelihood	Descriptor	Probability of occurrence
0% to 20%	P1	Rare	May occur only in exceptional circumstances	More than 20 years
21% to 40%	P2	Unlikely	Could occur at some time	Within 10-20 years
41% to 60%	P3	Possible	Might occur at some time	Within 3-5 years
60% to 80%	P4	Likely	Will probably occur in most circumstances	Within 2 years
80% to 100%	P5	Almost certain	Expected to occur in most circumstances	Within 1 year

4.6.3 Consequence of failure

Consequence of Failure was determined in a workshop with MCC staff using the following consequence ratings. These ratings are based on the ratings included the MCC's corporate Risk management process. Consequence of Failure ratings applied for each asset is defined in Table 4.6.

Table 4.6 Consequence of failure

Level	Consequence	Operational & Technical	Financial	Social	Environmental
C1	Insignificant	None or negligible service disruptions	Financial loss < $10K	No injuries No litigation exposure No media interest	None or negligible environmental impacts
C2	Minor	Isolated disruption to non-essential services	Financial loss between $10K and $50K	First Aid treatment Acceptable exposure to litigation Local media coverage	On site environmental impact immediately contained
C3	Moderate	Isolated disruption to essential services Wide disruption to non-essential services	Financial loss between $50K and $200K	Medical treatment required Moderate exposure to litigation Regional media coverage	On site environmental impact contained with outside assistance
C4	Major	Wide disruption to essential services Some non-essential services unavailable	Financial loss between $200K and $1M	Extensive (multiple) injuries Some state/national media coverage Major exposure to litigation	Off-site environmental impact with no detrimental effects
C5	Catastrophic	Essential and non-essential services unavailable	Financial loss >$1M	Loss of life Extensive state/national media coverage Unacceptable exposure to litigation	Toxic release off site

4.6.4 Asset risk exposure estimate

The following section includes risk maps showing the total replacement value of assets for Risk Exposure by asset type, based on the risk methodology and criteria described above. The risk maps have enabled the identification and prioritisation of higher risk assets that need to become candidates for closer inspection (to verify if they truly are high risk), renewal or replacement.

The determination of the BRE is a function of the selected PoF and CoF figures for each individual asset. Using the Risk Matrix shown in Figure 4.10, a ranking was determined (Very High, High, Medium or Low) for each asset included in the hierarchy.

In summary, **<1%** of drainage assets, are a "**very high**" business risk, with a further **26%** of assets being a "**high**" business risk. This equates to a financial replacement estimate (in 2022$) of ~**$64.3 M.**

Also note that trunk drains and flood gates have the highest possible Consequence of Failure rating allocated, due to the consequence of these not draining as intended during major storm events. Based on this risk methodology, trunk drains will always be listed at least as a "high risk" asset regardless of condition. This enables MCC to prioritise this asset in ongoing operations and maintenance activities. However, MCC currently have no data on this asset type, therefore trunk drains are not included in this risk estimate.

Probability of Failure		Insignificant	Minor	Moderate	Major	Catastrophic
		1	2	3	4	5
P5	Almost Certain	$ -	$ -	$ 6,556,330	$ -	$ -
P4	Likeley	$ -	$ -	$ 10,443,286	$ -	$ 10,570
P3	Possible	$ -	$ -	$ 31,057,788	$ -	$ 264,252
P2	Unlikely	$ -	$ -	$ 56,383,822	$ 1,481,377	$ 15,892,906
P1	Rare	$ -	$ -	$ 104,292,396	$ 19,100,948	$ 58,135

Consequence of Failure

Figure 4.11 Asset risk exposure estimate: Total – replacement value

Probability of Failure		Insignificant	Minor	Moderate	Major	Catastrophic
		1	2	3	4	5
P5	Almost Certain	0%	0%	3%	0%	0%
P4	Likeley	0%	0%	4%	0%	<1%
P3	Possible	0%	0%	12%	0%	<1%
P2	Unlikely	0%	0%	23%	1%	6%
P1	Rare	0%	0%	42%	8%	<1%

Consequence of Failure

Figure 4.12 Asset risk exposure estimate: Total – percentage

4.6.5 High priority assets

High priority assets ("very high" and "high" risk assets) are summarised in Table 4.7. As highlighted above, trunk drains have the highest possible Consequence of Failure rating allocated, due to the consequence of these not draining as intended during major storm events. Based on this consequence of failure rating they will always be prioritised as a high risk asset under this methodology. Trunk drains are therefore listed in the table below with a recommended action to collect appropriate asset condition data to enable inclusion and assessment in future iterations of this AM Plan. Also note that as some high priority drainage assets are buried infrastructure, and based on their current performance, it is generally accepted by MCC that the assets meet their "functional" level of service and require only standard operations and maintenance interventions.

All high priority assets should be prioritised in future capital, operations and maintenance planning and delivery. Note that whilst this plan identified these assets as high priority, it does not necessarily mean a high cost intervention is required.

Table 4.7 High priority assets - summary

Category	Location/Catchment	Number of / Length
Floodgates	Wood Street	1
	Allan Street	3
	Belmore Bridge	1
	Bowden Street	2
	Cathedral Street	1
	Cathedral Street (west of)	2
	Cathedrel Street	2
	Cnr Ragland St and Radford St	2
	Free Church Street	1
	High Street	1
	Hunter Street	1
	James St and Odd Street	1
	Les Darcy Drive	2
	Melbourne Street	1
	Morpeth Road East Maitland	1
	Sempill Street	2
	St Andrews Street	2
	Trappaud Road	2
	Wood Street	2
	Cathedral Street (west of)	1
	Cathedrel Street	1
	Cnr Bent Street and Athel D'ombrain	1
	Fishery Creek Cessnock Road	1
	Free Church Street	2
	Hunter Street	2
	Maitland Railway Station	1
	St Andrews Street	1
	Belmore Bridge	1
	Roundabout	1
Trunk Drains	Aberglasslyn	3.3 km
	Ashtonfield	0.2 km
	Bolwarra Heights	1.8 km
	East Maitland	8.1 km
	Gillieston Heights	1.4 km
	LARGS	1.6 km
	Maitland	3.8 km
	Metford	2.4 km
	Rutherford	11.6 km
	Thornton	5.3 km

Category	Location/Catchment	Number of / Length
Gross Pollutant Traps	30 Bradmill Avenue	1
	Behind 3 Darfield Close	1
	Bolwarra Pk Dr, #Opposite 110	1
	Cananga Court, adjacent to #15	1
	Conder Close, end of the street at #11	1
	Downstream from library carpark	1
	Drainage Reserve at #116 Dalveen Road	1
	Forest Way, Opposite #9	1
	Garnett Road, opposite 14	1
	Metford Road, In Reserve (Golf Practice Range)	1
	opposite 17 Adelaide Street	1
	opposite 96 Dalveen Road	1
	Pumphouse Crescent, Adj to #35	1
Pipes	Bolwarra	0.3 km
	Bolwarra Heights	0.2 km
	East Maitland	2.3 km
	Gillieston Heights	0.2 km
	Horseshoe Bend	0.8 km
	Largs	0.5 km
	Lochinvar	0.1 km
	Lorn	1.2 km
	Louth Park	0.03 km
	Maitland	2.3 km
	Maitland Vale	0.3 km
	Morpeth	0.2 km
	Mount Dee	0.1 km
	Oakhampton Heights	0.02 km
	Raworth	0.06 km
	Rutherford	1.3 km
	South Maitland	0.04 km
	Telarah	3.7 km
	Tenambit	0.1 km
	Thornton	1.3 km

4.7 Renewal and enhancement plan

Short term renewal and enhancement plans are defined through MCC's annual capital and maintenance planning processes. Current renewal and enhancement plans incorporate high priority assets identified within this AM Plan consistent with the cost estimates included in the Capital Works Program. Renewal and enhancement of ageing assets over a longer period of time from this AM Plan are also consistent with the current Long Term Financial Plan. Both of these estimates are defined in Section 3.3.

4.8 Creation / acquisition / upgrade plan

New assets from growth as defined in Section 3, as well as major renewals based on the outputs of this AM model are included in future financial projections of the AM Plan. These new assets will be planned, scheduled and delivered on an annual basis as per MCC's capital programming and project delivery processes and within the limits of the Council endorsed four-year capital works budget.

4.9 Disposal plan

Disposal includes any activity associated with disposal of a decommissioned asset including sale, demolition or relocation. Rationalisation of roads or road inventory and the services they provide will be considered in future development of this plan.

5. Financial summary

5.1 Overview

This section contains the financial requirements resulting from all the information presented in the previous sections of this asset management plan. The financial projections will be improved as further information becomes available on desired levels of service and current and projected asset performance.

5.2 Financial projections for asset renewal

The estimated capital cost over time to renew MCC's drainage assets to the target condition and level of service is shown in

Figure 5.1 below. As indicated by the horizontal line, the theoretical average annual cost to sustain this asset class (based on long term replacement cycles, asset age/condition and estimated growth) is estimated to be in the order of **$3.8 M** in 2022 dollars. Most of this reinvestment relates to pipes which make up around half of the total cost.

This information now provides a target for short term assessments – particularly with regards to priority assets identified and those that have reach the end of their estimated life. Risk exposure can be further reduced through applying appropriate risk reduction measures or obtaining more accurate condition data that confirms extending asset life is practical.

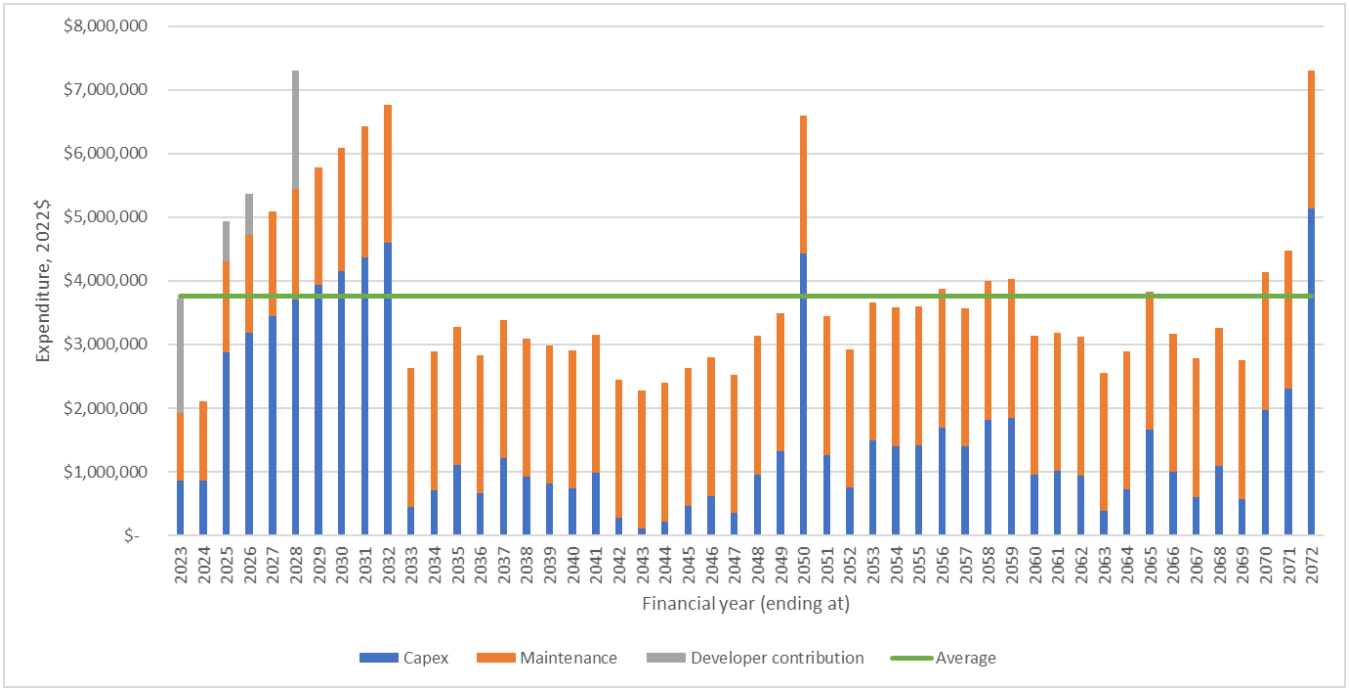

Figure 5.1 Financial projection – Total

5.3 Long term funding mechanisms

Long term funding mechanisms will be addressed Council's resourcing strategy and associated rate rises. These are currently being realised in the current capital/maintenance works program and the 2022 Long Term Financial Plan which was endorsed by Council in early 2022.

Appendices

Appendix A

Limitations and assumptions

Limitations

This report has been prepared by GHD for Maitland City Council and may only be used and relied on by Maitland City Council for the purpose agreed between GHD and Maitland City Council. GHD otherwise disclaims responsibility to any person other than Maitland City Council arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

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GHD has prepared this report on the basis of information provided by Maitland City Council which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

GHD has prepared financial information set out in this report ("Cost Estimate") using information reasonably available to the GHD employee(s) who prepared this report; and based on assumptions and judgments made by GHD and using information provided by Maitland City Council. The Cost Estimate has been prepared for the purpose of asset management planning and must not be used for any other purpose.

The Cost Estimate is a preliminary estimate only. Actual prices, costs and other variables may be different to those used to prepare the Cost Estimate and may change. Unless as otherwise specified in this report, no detailed quotation has been obtained for actions identified in this report. GHD does not represent, warrant or guarantee that the [works/project] can or will be undertaken at a cost which is the same or less than the Cost Estimate.

Where estimates of potential costs are provided with an indicated level of confidence, notwithstanding the conservatism of the level of confidence selected as the planning level, there remains a chance that the cost will be greater than the planning estimate, and any funding would not be adequate. The confidence level considered to be most appropriate for planning purposes will vary depending on the conservatism of the user and the nature of the project. The user should therefore select appropriate confidence levels to suit their particular risk profile.

Assumptions

- All data outcomes presented are commensurate with the data provided by MCC. Data provided is generally high level.
- Maintenance, capital and replacement costs are as per provided by MCC until financial year 2033.
- Maintenance cost for financial year 2033 onwards assumed to be the same value as financial year 2032.
- Capital expenditure for financial years 2033 onwards are based on the replacement costs, installation date, condition, and maximum potential life.
- Due to uncertainty on condition data, residual life has been calculated based on age.
- % consumed has been rounded to the nearest multiple of 2.
- Maximum potential life for new pipes from growth assumed to be 50 years.
- Total maintenance cost per year has been prorated proportional to the replacement cost of each asset.

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