



# INFRASTRUCTURE ASSET MANAGEMENT PLAN (2010-2029)



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## **ABBREVIATIONS**

<b>AAAC</b>	Average annual asset consumption
<b>AMP</b>	Asset management plan
<b>ARI</b>	Average recurrence interval
<b>BOD</b>	Biochemical (biological) oxygen demand
<b>CRC</b>	Current replacement cost
<b>CWMS</b>	Community wastewater management systems
<b>DA</b>	Depreciable amount
<b>DoH</b>	Department of Health
<b>EF</b>	Earthworks/formation
<b>IRMP</b>	Infrastructure risk management plan
<b>LCC</b>	Life Cycle cost
<b>LCE</b>	Life cycle expenditure
<b>MMS</b>	Maintenance management system
<b>PCI</b>	Pavement condition index
<b>RV</b>	Residual value
<b>SS</b>	Suspended solids
<b>vph</b>	Vehicles per hour

## GLOSSARY

### **Annual service cost (ASC)**

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

### **Asset class**

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

### **Asset condition assessment**

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

### **Asset management**

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

### **Assets**

Future economic benefits controlled by the entity as a result of past transactions or other past events (AAS27.12). Property, plant and equipment including infrastructure and other assets (such as furniture and fittings) with benefits expected to last more than 12 month.

### **Average annual asset consumption (AAAC)\***

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

### **Brownfield asset values\*\***

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

### **Capital expansion expenditure**

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

### **Capital expenditure**

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

### **Capital funding**

Funding to pay for capital expenditure.

### **Capital grants**

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

### **Capital investment expenditure**

See capital expenditure definition

### **Capital new expenditure**

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

### **Capital renewal expenditure**

Expenditure on an existing asset, which returns the service potential or the life of the asset up to that which it had originally. It is periodically required expenditure, relatively large (material) in value compared with the value of the components or sub-

components of the asset being renewed. As it reinstates existing service potential, it has no impact on revenue, but may reduce future operating and maintenance expenditure if completed at the optimum time, eg. resurfacing or resheeting a material part of a road network, replacing a material section of a drainage network with pipes of the same capacity, resurfacing an oval. Where capital projects involve a combination of renewal, expansion and/or upgrade expenditures, the total project cost needs to be allocated accordingly.

**Capital upgrade expenditure**

Expenditure, which enhances an existing asset to provide a higher level of service or expenditure that will increase the life of the asset beyond that which it had originally. Upgrade expenditure is discretionary and often does not result in additional revenue unless direct user charges apply. It will increase operating and maintenance expenditure in the future because of the increase in the council's asset base, eg. widening the sealed area of an existing road, replacing drainage pipes with pipes of a greater capacity, enlarging a grandstand at a sporting facility. Where capital projects involve a combination of renewal, expansion and/or upgrade expenditures, the total project cost needs to be allocated accordingly.

**Carrying amount**

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

**Class of assets**

See asset class definition

**Component**

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

**Cost of an asset**

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

**Current replacement cost (CRC)**

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

**Current replacement cost "As New" (CRC)**

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

**Cyclic Maintenance\*\***

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

**Depreciable amount**

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

**Depreciated replacement cost (DRC)**

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

**Depreciation / amortisation**

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

**Economic life**

See useful life definition.

**Expenditure**

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

**Fair value**

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

**Greenfield asset values \*\***

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

**Heritage asset**

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

**Impairment Loss**

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

**Infrastructure assets**

Physical assets of the entity or of another entity that contribute to meeting the public's need for access to major economic and social facilities and services, eg. roads, drainage, footpaths and shared paths. These are typically large, interconnected networks or portfolios of composite assets. The components of these assets may be separately maintained, renewed or replaced individually so that the required level and standard of service from the network of assets is continuously sustained. Generally the components and hence the assets have long lives. They are fixed in place and are often have no market value.

**Investment property**

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

- (a) use in the production or supply of goods or services or for administrative purposes; or
- (b) sale in the ordinary course of business (AASB 140.5)

**Level of service**

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

**Life Cycle Cost \*\***

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

**Life Cycle Expenditure \*\***

The Life Cycle Expenditure (LCE) is the actual or planned annual maintenance and capital renewal expenditure incurred in providing the service in a particular year. Life Cycle Expenditure may be compared to Life Cycle Expenditure to give an initial indicator of life cycle sustainability.

**Loans / borrowings**

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

**Maintenance and renewal gap**

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

**Maintenance and renewal sustainability index**

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

**Maintenance expenditure**

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

**Materiality**

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

**Modern equivalent asset.**

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

**Non-revenue generating investments**

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

**Operating expenditure**

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

**Pavement management system**

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

**Planned Maintenance\*\***

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

**PMS Score**

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

**Rate of annual asset consumption\***

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

**Rate of annual asset renewal\***

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

**Rate of annual asset upgrade\***

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

**Reactive maintenance**

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

**Recoverable amount**

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

**Recurrent expenditure**

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

**Recurrent funding**

Funding to pay for recurrent expenditure.

**Rehabilitation**

See capital renewal expenditure definition above.

**Remaining life**

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

**Renewal**

See capital renewal expenditure definition above.

**Residual value**

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

**Revenue generating investments**

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

**Risk management**

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

**Section or segment**

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

**Service potential**

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

**Service potential remaining\***

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

**Strategic Management Plan (SA)\*\***

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

**Sub-component**

Smaller individual parts that make up a component part.

**Useful life**

Either:

- (a) the period over which an asset is expected to be available for use by an entity, or
- (b) the number of production or similar units expected to be obtained from the asset by the entity.

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

**Value in Use**

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

Source: DVC 2006, Glossary

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

Additional glossary items shown \*\*

## 1. EXECUTIVE SUMMARY

### What the City of Melville Provides

The City of Melville (CoM) provides a road, footpath and drainage network in partnership with other levels of government and internal and external stakeholders to enable safe and timely travel within and across the city. The Infrastructure asset group consists of over 1300 roads (531 km), 2780 paths (823,675 m<sup>2</sup>) and over 300 km of stormwater drainage pipes, 7000 pits and 67 drainage sumps.

### What does it Cost

There are two key indicators of cost to provide the Infrastructure Asset service.

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

The life cycle cost to provide the infrastructure service is estimated at \$7,723,500 per annum. The City's planned life cycle expenditure for year 1 of the asset management plan is \$6,739,000 which gives a life cycle sustainability index of 87%. This indicates that across the entire Infrastructure asset group, current expenditure is less than what is required to maintain the assets in their current condition.

The total maintenance and capital renewal expenditure required to provide the Infrastructure service in the next 10 years is estimated at \$92,053,000. This is an average of \$9,205,300 per annum.

The City's maintenance and capital renewal expenditure for year 1 of the Infrastructure Asset Management Plan (IAMP) of \$6,739,000 gives a 10 year sustainability index of 73%. This suggests that in the mid to short term, 10 years, the current maintenance and renewal expenditure is approximately ¾ of what it should be.

This low index represents a significant peak in road assets identified as requiring works in the 2010-2019 period, with a peak of over \$40 million in 2009/2010. This peak highlights both the failure to adequately fund road renewal over the past decade, but also demonstrates the simplicity of the modelling used. However, when averaged over the life of this plan, the recommended annual renewal expenditure of \$4.6 million is supported by previous work undertaken using more sophisticated modelling. This work suggested an annual spend of some \$4.5 million.

### Plans for the Future

The City plans to operate and maintain the infrastructure network to achieve the following strategic objectives.

1. Ensure the Road, Path and Stormwater Drainage networks are maintained at a safe and functional standard as set out in this IAMP
2. To achieve optimal use of resources by ensuring maximum life is obtained from an asset without compromising safety.
3. Capital and maintenance activities are undertaken in a manner to extend/prolong the life of the original asset and ensure its suitability to current user requirements.

### Measuring our Performance

#### Quality

Infrastructure assets will be maintained in usable condition at all possible times. Defects found or reported that are outside our service standard will be repaired. See our maintenance response service levels for details of defect prioritisation and response time.

#### Function

Our intent is that an appropriate infrastructure network is maintained in partnership with other levels of government and both internal and external stakeholders to ensure that safe and efficient road, path and drainage networks are maintained.

Infrastructure asset attributes will be maintained at a safe level and associated signage and equipment be provided as needed to ensure public safety. We need to ensure key functional objectives are met:

- Road network is safe and suitable for traffic volumes and speeds.
- Path network is safe and suitable for pedestrian and cyclist volumes.
- Stormwater Drainage networks are safe and appropriate for catchment areas to prevent excess flooding and damage.

### **Safety**

We inspect all Road, Path and Stormwater Drainage assets regularly and prioritise and repair defects in accordance with our inspection schedule to ensure they are safe. A condition audit of Paths was completed in 2009 and a condition audit of Roads is scheduled for mid 2010.

## **The Next Steps**

This actions resulting from this IAMP are:

1. Establish an Asset Management Working Group to ensure a corporate approach to asset management
2. Investigate integrating the finance and asset management systems
3. Update and maintain all building data in the AM system
4. Review financial data and processes, particularly those relating to asset valuations and depreciation
5. Ensure the financial (Finance 1) asset register is updated on an annual basis.
6. Set performance targets and implement recording processes for levels of service.
7. Quantify desired levels of service.
8. Investigate the establishment of asset recording within the financial system allowing all capital and maintenance costs to be attributed to each individual asset
9. Develop infrastructure budgets to clearly identify, operational costs, maintenance, renewal and new works
10. Audit all stormwater drainage infrastructure to determine year of construction.
11. Segregate road and path assets into sub classes and allocate costs across these classes.
12. Undertake a condition audit of all roads inclusive of car parks and kerbs
13. Continue to develop the Long Term Financial Plan for roads to reflect creations, acquisitions, renewals and upgrades
14. Increase renewal spending on roads to \$4.5 million per annum, with transfers to reserve of any unexpended funds
15. Maintain current renewal spending on paths and review once all slab paths have been replaced
16. Review the consumption rate of drainage and transfer this amount to reserve on an annual basis

## 2. INTRODUCTION

### 2.1 Background

This IAMP has been developed to demonstrate responsive management of infrastructure assets (and services provided from assets), compliance with regulatory requirements, and to communicate funding required providing the required levels of service.

The asset management plan is to be read with the following associated planning documents:

- City of Melville Plan for the Future 2008-2012
- Neighbourhood Plan
- People, Places, Participation A Community Plan for the City of Melville 2007 - 2017
- Asset Management Policy (Policy No. 13-PL-008)
- Asset Management Deployment Strategy
- Financial Sustainability – Forward Financial Planning and Funding Allocation Policy (Policy No. 13-PL-001)
- Borrowings and Asset Financial Policy (Policy No. 13-006)
- Accounting Policy (Policy No. 13-PL-007)
- Strategic Financial Plan – The City’s long term Financial Plan which outlines all aspects of the key financial strategy objectives and commitments and how future expenditure needs will be funded.
- Annual Budget of capital, operating and maintenance expenditure.
- Other internal policies and standards – these tools for asset creation and subsequent management are needed to support AM strategies.
- Risk Management (Policy No. 26-PL-001)

This IAMP covers the following infrastructure assets:

Category	Custodian	Sub Category	Responsible Officer
Infrastructure	Manager Operations	Footpaths	Verge Infrastructure Supervisor
		Roads	Civil Assets Maintenance Supervisor
		Drainage	Senior Design Engineer

Asset category	Dimension	Replacement Value (\$ million)
Roads	531 km (1309 roads)	179.81
Drainage (Stormwater)	Approximately 300 km of pipes, 7000 pits and 67 sumps	47.19
Footpaths	823,675 Sqm (#2782)	39.10
<b>TOTAL</b>		<b>266.10</b>

Table 2.1: Infrastructure covered by this Plan

Key stakeholders in the preparation and implementation of this asset management plan are:

**Internal stakeholders include:**

The Elected Council	Community representation and administration
The Executive Management Team (EMT)	City representation and administration
The Operations Management Team (OMT)	Identification and dimension of service requirements
The Asset Management Team	Asset management plan development, implementation, operation, monitoring, and review including continuous improvement
The Finance Department	Strategic Financial Plan development
Operational Departments involved in the creation of infrastructure	Design parameters and standards
All City departments that provide support Services	Operation and Administration

**External Stakeholders Include:**

The City of Melville Community	End-user involvement
City of Melville Tenants	End-user involvement
Visitors to the City of Melville	End-user involvement
Local Government Insurance Scheme	Minimization of Risk
State Emergency Services	Police, Fire and Emergency Services
State Utilities	End-user involvement
Swan River Trust	Regulatory Body re-pollutant (storm water) discharge
State Business Community	End-user involvement

## 2.2 Goals and Objectives of Asset Management

The CoM exists to provide services to its Community. Some of these services are provided by infrastructure assets which the City has acquired by 'purchase', by contract, by construction by council staff and by donation of assets constructed by developers and others.

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

- Taking a life cycle approach,
- Developing cost-effective management strategies for the long term,
- Providing a defined level of service and monitoring performance,

- Understanding and meeting the demands of growth through demand management and infrastructure investment,
- Managing risks associated with asset failures,
- Sustainable use of physical resources,
- Continuous improvement in asset management practices.<sup>1</sup>

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

The City of Melville's vision is:

Taking into account the social, cultural, economic and environmental areas that the community sees as important to contributing to a high level of the quality life in the City of Melville, our vision is to:

- Create a safe, attractive City where the consequences of our actions for future generations are taken into account.
- Ensure that natural and built facilities are, where practicable, accessible to everyone.
- Generate a sense of place, belonging and community spirit.
- Ensure that all voices are heard through the creation of opportunities to participate in decisions that affect the lives of our community.

The linkage between the vision and values and the Key Result Areas and outcomes for the community are shown in the diagram below.



<sup>1</sup> IIMM 2006 Sec 1.1.3, p 1.3

## 2.3 Linkage to Key Strategies

The IAMP is a vital component of City's overall strategic planning process. It links to the annual budget and to other Corporate Strategies are listed below.

- City of Melville Plan for the Future 2008-2012
- People, Places, Participation A Community Plan for the City of Melville 2007 - 2017
- Asset Management Policy (Policy No. 13-PL-008)
- Asset Management Deployment Strategy
- Financial Sustainability – Forward Financial Planning and Funding Allocation Policy (Policy No. 13-PL-001)
- Borrowings and Asset Financial Policy (Policy No. 13-006)
- Accounting Policy (Policy No. 13-PL-007)
- Strategic Financial Plan – The City's long term Financial Plan which outlines all aspects of the key financial strategy objectives and commitments and how future expenditure needs will be funded.
- Annual Budget of capital, operating and maintenance expenditure.
- Other internal policies and standards – these tools for asset creation and subsequent management are needed to support AM strategies.
- Risk Management (Policy No. 26-PL-001)
- Risk Management Plan
- Capital works Program

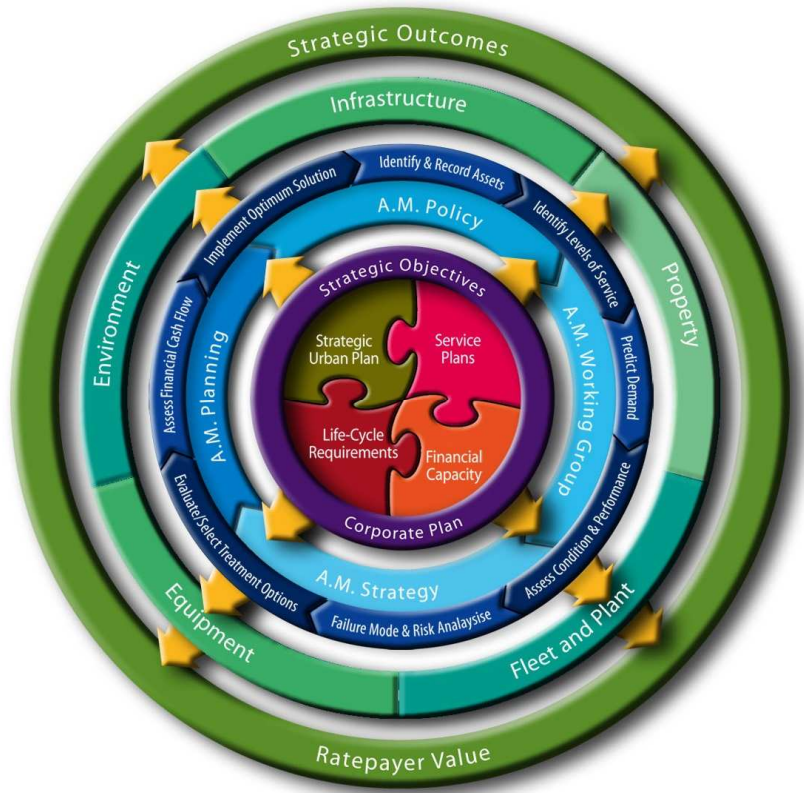
## 2.4 Strategic and Corporate Processes

Strategic asset management at the CoM commences with the identification and analysis of community demands for services. The CoM's strategic and corporate plans reflect and translate community needs and Government policy into broad service delivery plans and strategies.

Fundamental to the development of corporate plans is the integration of the strategic asset management plan with the CoM's human resources, information technology and financial strategies. This integration of asset management into the strategic planning process maintains the focus on the delivery of services while encouraging innovation in the utilisation of existing assets and the development of alternative methods of service delivery.

The CoM's main focus of strategic asset management is to achieve the optimal delivery of services through the efficient and effective management of assets. This outcome will be supported by comprehensive strategic plans that address capital investment, the operation and maintenance of existing and new assets and the rationalisation and disposal of surplus assets.

The IAMP forms the basis for short term budgets (5 years), medium term planning (10 years), and long term projections (20 years) for capital, operations and maintenance budgets.



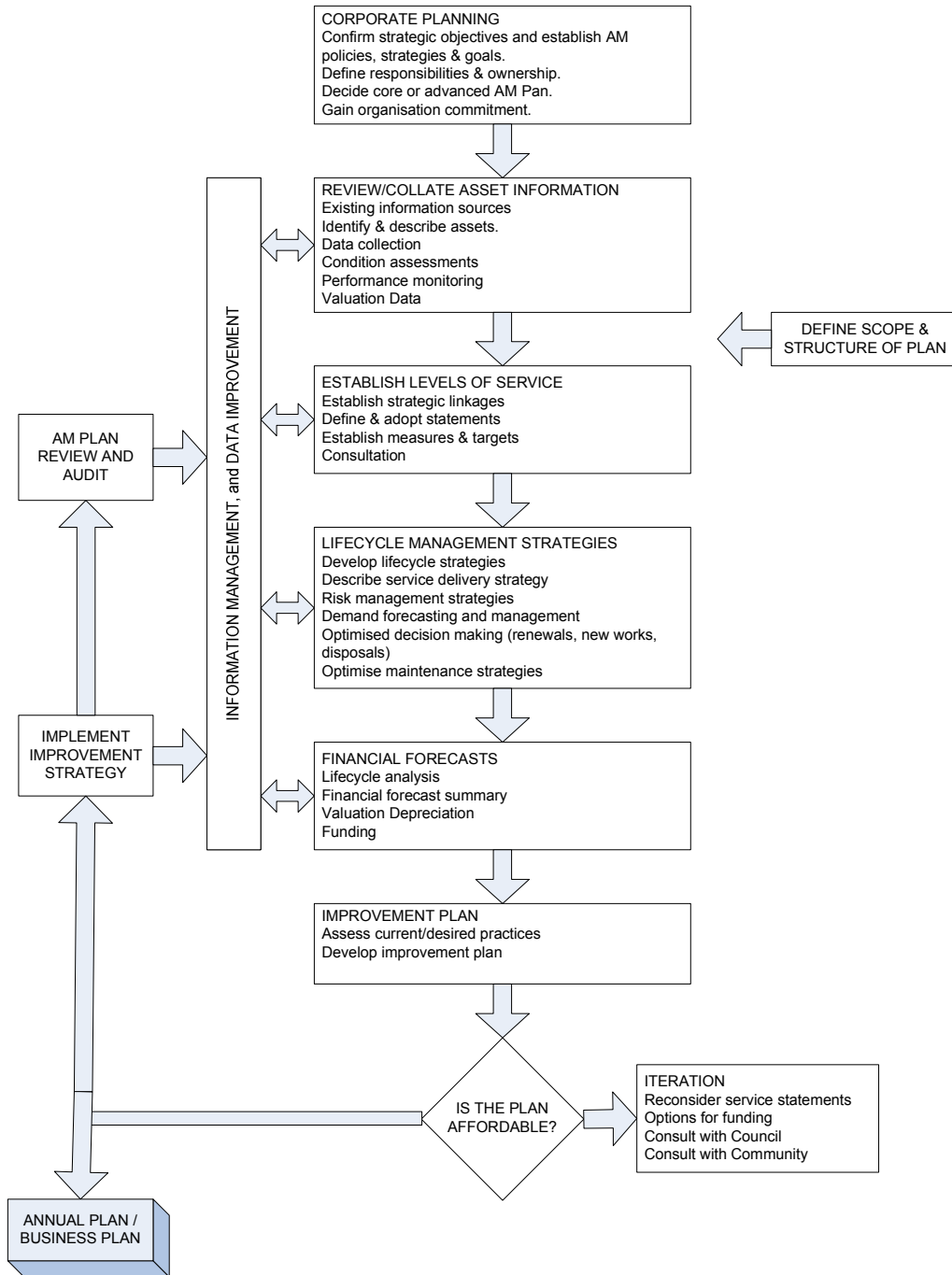
**Figure 4 - Strategic Asset Management Process**

## 2.5 Plan Framework

Key elements of the plan are

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

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



**Road Map for preparing an Asset Management Plan**

Source: IIMM Fig 1.5.1, p 1.11

## 2.6 Core and Advanced Asset Management

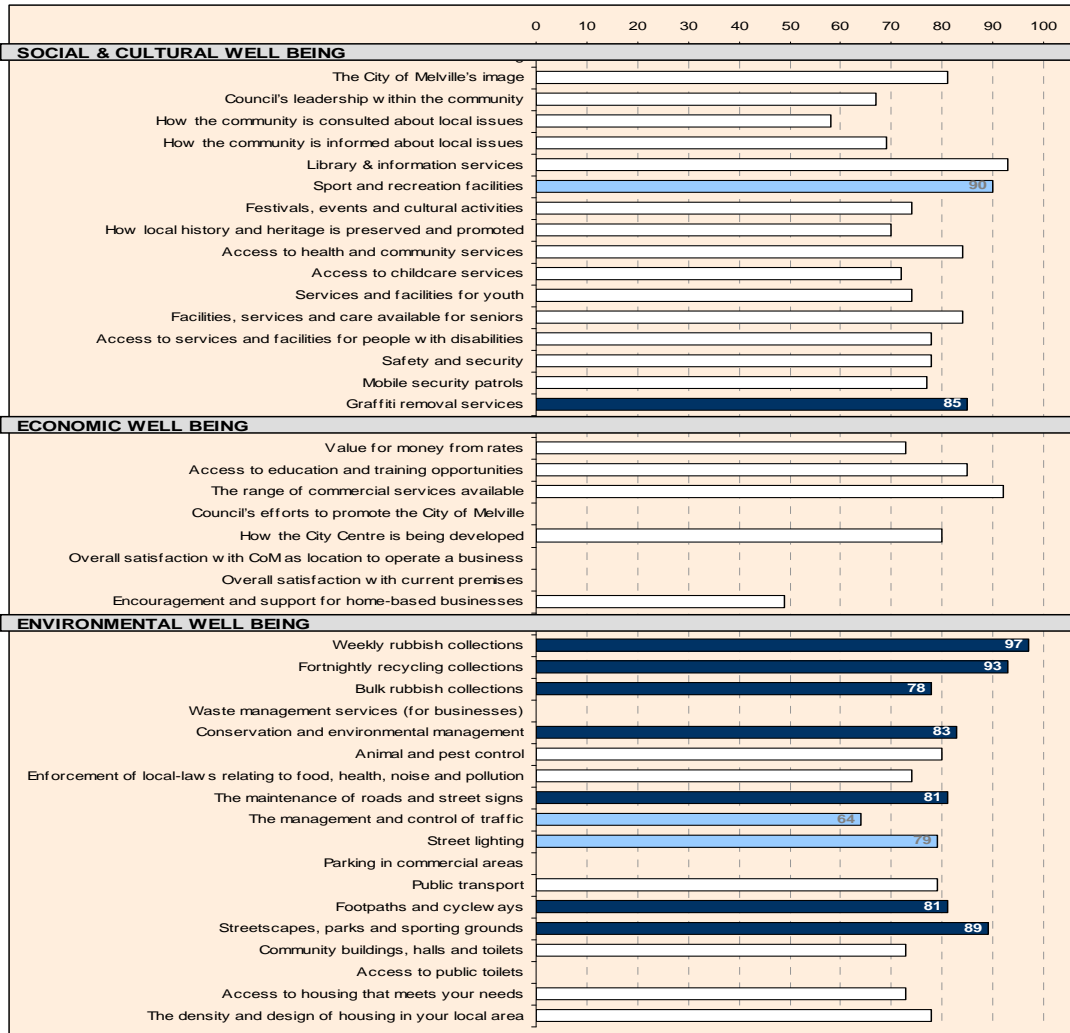
This IAMP is prepared as a 'core' asset management plan in accordance with the International Infrastructure Management Manual. It is prepared to meet minimum legislative and organisational requirements for sustainable service delivery and long term financial planning and reporting. Core asset management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

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

### 3. LEVELS OF SERVICE

#### 3.1 Customer Research and Expectations

The CoM participates in a Community Business and Perceptions Survey every two years and the results are benchmarked against 17 other City's in Comparative Performance Measures in Local Government Customer Satisfaction survey. This telephone survey polls a sample of residents on their level of satisfaction with the City's services. The most recent customer satisfaction survey reported satisfaction levels for the following services. The CoM uses this information in developing the Strategic Management Plan and in the allocation of resources in the budget.



**Table 3.1.1 Community Satisfaction Survey Levels**

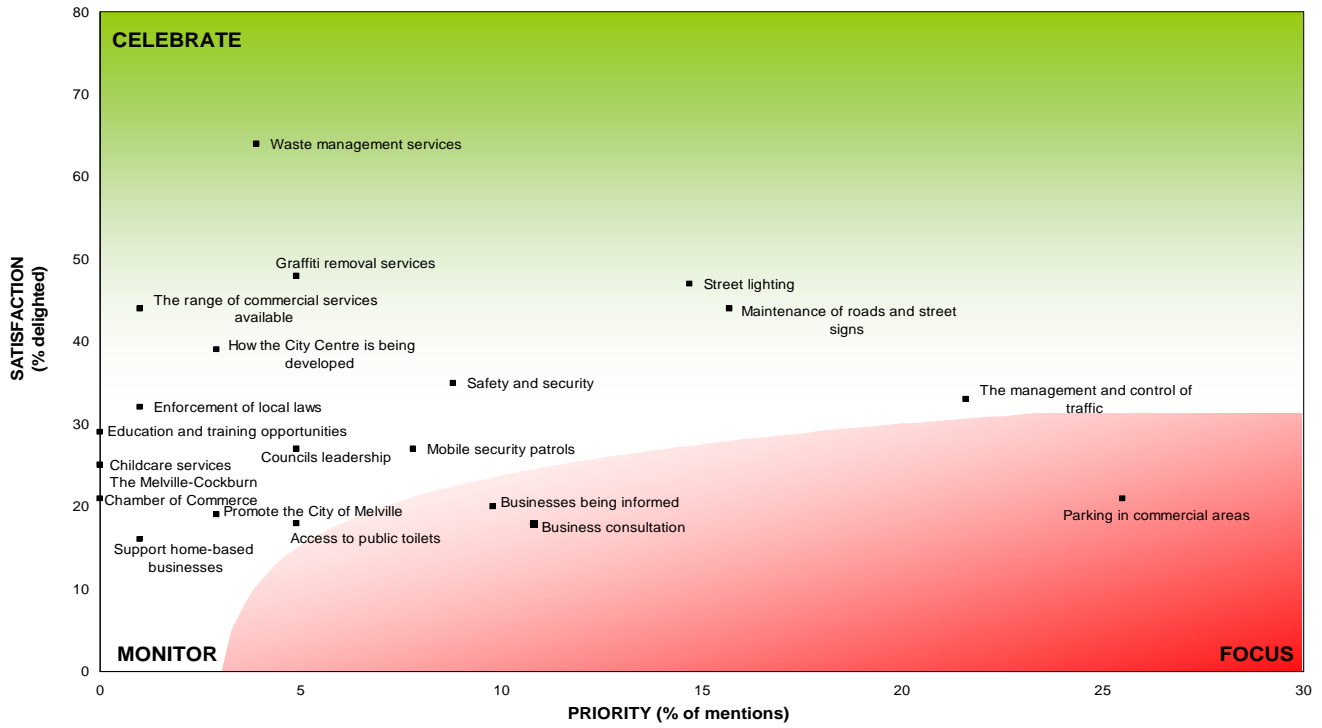


Table 3.1.2 Community Priorities Indicator (Among Residents)

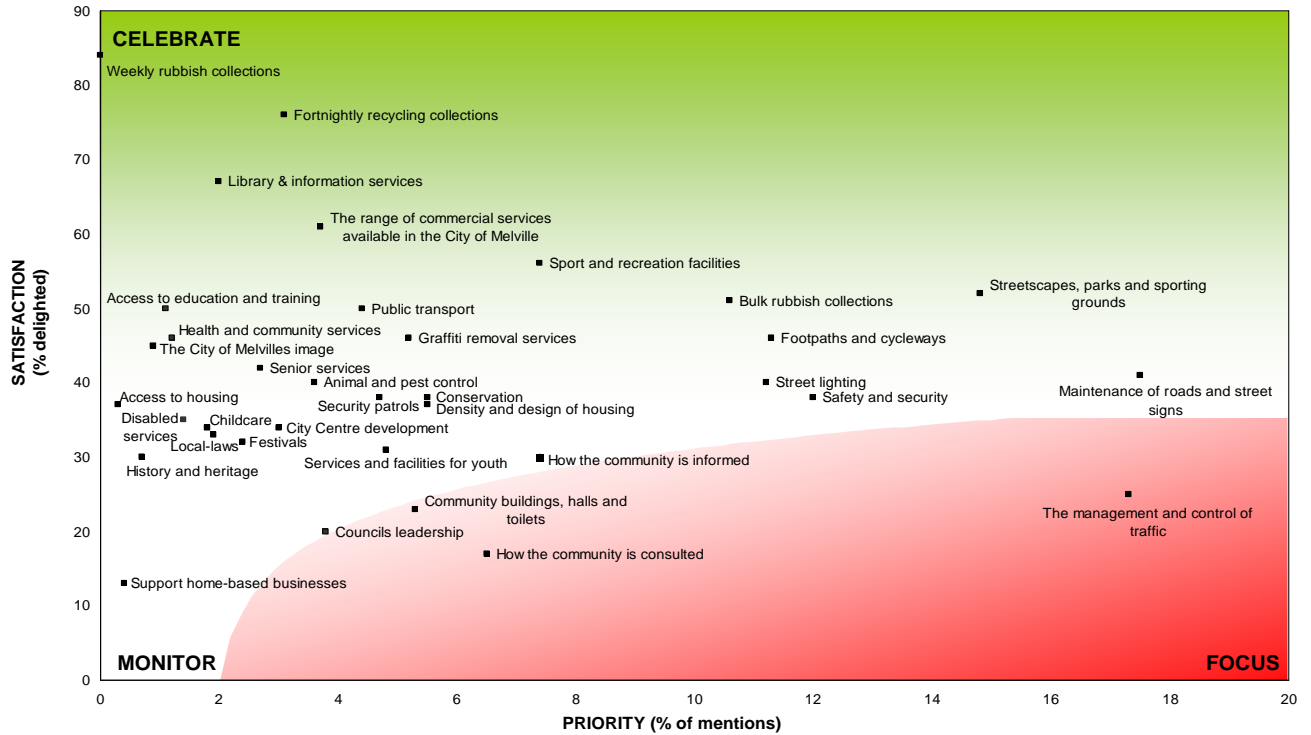


Table 3.1.3 Community Priorities Indicator (Among Businesses)

### 3.2 Legislative Requirements

The City has to meet many legislative requirements including Australian and State legislation and State regulations. These include:

Legislation	Requirement
Local Government Act 1995	Sets out role, purpose, responsibilities and powers of local governments including the preparation of a long term financial plan supported by asset management plans for sustainable service delivery.
Environmental Protection Act 1986	Require permit and flora survey prior to vegetation removal, relates to the prevention of pollution - either to land air or water. Defines two types of harm - material environmental harm or serious environmental harm.
Environment Protection Act (unauthorised discharges) Regulations 2004	States that pesticides cannot be discharged into the environment.
Aboriginal Heritage Act 1972	Preservation of the community places and objects used by traditional owners
Aboriginal Heritage Regulations 1974	Preservation of the community places and objects used by traditional owners
Dangerous Goods Safety Act 2004	Relates to the safe storage, handling and transport of certain herbicides
Poisons Act 1964	Regulates the possession and use of poisons
Health Act 1911	Discharging causing pollution to waterways
Wildlife Conservation Act 1950	Provides for the conservation and protection of native flora and fauna
Swan and Canning Rivers Management Act 2006 (SCRM Act 2006)	Regulates maintenance activities within proximity to the rivers
State Planning Policy 2.10 Swan Canning River System	Regulates maintenance activities within proximity to the rivers
Health (Pesticides) Regulations 1956	Regulates the possession and use of pesticides
Road Traffic Act 1974	Laws and legislations surrounding road networks.
Main Roads Act 1930	The power to legislate the maintenance and works on public roads.
Dividing Fences Act	Local government exempt from 50/50 contribution for dividing fences abutting public open space.

Disability Services Act (1993)	An Act for the establishment of the Disability Services Commission and the Ministerial Advisory Council on Disability, for the furtherance of principles applicable to people with disabilities, for the funding and provision of services to such people that meet certain objectives, for the resolution of complaints by such people, and for related purposes.
Disability Services Regulations (2004)	Current amendments to Disability Services Act (1993)
OSH Act 1984	The guidelines for employees and employers to undertake within the work environment
OSH Regulations 1996	The guidelines for employees and employers to undertake within the work environment

**Table 3.2: Legislative Requirements**

### 3.3 Strategic & Corporate Goals

The CoM’s Asset Management Policy sets out a broad framework to ensure a coordinated corporate approach to asset management within the organisation.

It also provides clear direction in the provision and management of all City of Melville assets that ensures sustainable outcomes and agreed levels of service, for present and future stakeholders. The policy is to assist with the management of infrastructure assets and to deliver infrastructure service that meets community expectations of; time, quality and value for money. Implementation of asset management as an organisational philosophy occurs through the Asset Management Practices Improvement Strategy.

The CoM, like many local government authorities has, until recent years, managed its assets on a day to day basis utilising the in-house technical knowledge retained by key staff members.

Whilst this approach served the organisation and the community well, the CoM now recognises the need to take a more business like and organisation wide approach to asset management and one which involves preparing asset management plans and a long term financial plan.

Essentially the corporate goal for infrastructure assets is to have a “whole of life cost” approach to the provision and maintenance of assets. The CoM is committed to the implementation of advanced asset management practices to ensure that the asset service levels are met at the optimum lifecycle cost.

### 3.4 Current Levels of Service

The CoM has defined its current service levels in two ways.

1. Community Levels of Service relate to how the community receives the service in terms of safety, quality, quantity, reliability, responsiveness, cost/efficiency and legislative compliance.

2. Technical Levels of Service supporting the community service levels to ensure that the minimum community levels of service are met. These technical measures relate to service criteria such as:

- Quality
  - Quantity
  - Availability
  - Safety
- Smoothness of roads
  - Area of parks per resident
  - Distance from a dwelling to a sealed road
  - Number of injury accidents

The City’s current service levels are detailed in Table 3.3.

**Infrastructure - Paths**

<b>Key Performance Measure</b>	<b>Level Of Service</b>	<b>Performance Measure Process</b>	<b>Performance Target</b>	<b>Current Performance</b>
<b>COMMUNITY LEVELS OF SERVICE</b>				
<b>Quality</b>	Good walking surface	1. Customer Complaints 2. Customer Requests	1. Reduce Complaints throughout year 2. No Requests relating to surface	1. Not currently measured 2. Not currently measured
<b>Function</b>	Suitable Network Adequate Width	1. Customer Complaints 2. Customer Requests 3. Adherence to Travel smart ideals	1. Reduce Complaints throughout year 2. No Target 3. No Target	1. Not currently measured 2. Not currently measured
<b>Safety</b>	Free From Trip Hazards No Obstructions Separated From Traffic	1. Insurance Claims/Accident reports 2. Insurance Claims/Accident reports 3. Customer Complaints	1. Reduce Reports throughout year 2. Reduce Reports throughout year 3. Reduce Complaints throughout year	1. Not currently measured 2. Not currently measured 3. Not currently measured

<b>Infrastructure -Paths</b>				
<b>Key Performance Measure</b>	<b>Level Of Service</b>	<b>Performance Measure Process</b>	<b>Performance Target</b>	<b>Current Performance</b>
<b>TECHNICAL LEVELS OF SERVICE</b>				
<b>Condition</b>	Structural Integrity Reduce hazards to agreed level	1. Condition Survey	1. No footpath below 'Level 3' (IIMS)	1. Less than 6% of network < Level 3
<b>Accessibility</b>	Comply with DIAP for all new works Network footpaths to suit usage	1. As Con in construction 2. Community Travel Smart Plan	1. Code requirement 2. 100% complaint	1. Being met 2. Not currently measured
<b>Cost Effectiveness</b>	Replace 'slab' paths Cost effective construction	1. Prioritised in Forward works program 2. Tender Process	1. Remove all 'Slab' paths 2. Minimise rate for construction	1. Ongoing 2. .Not currently measured
<b>Safety</b>	Provide a network from trip hazards and obstructions	1. Footpath audit	1. Completed every 5 years 2. 80% of network free from hazards	1. Done 2. Not currently measured

**Infrastructure - Roads**

<b>Key Performance Measure</b>	<b>Level Of Service</b>	<b>Performance Measure Process</b>	<b>Performance Target</b>	<b>Current Performance</b>
<b>COMMUNITY LEVELS OF SERVICE</b>				
<b>Quality</b>	'Rideability'	1. Customer Service Requests relating to rideability 2. Number of Potholes	1. Zero requests 2. Zero requests	1. Not currently measured 2. Not currently measured
<b>Function</b>	Meets user requirements for: - Road Width - Use of Traffic control Devices - Accessibility	1. Customer Complaints 2. Customer Requests	1. Respond within 48 hours 2. Respond within agreed timeframe	1. Not currently measured 2. Not currently measured
<b>Safety</b>	Reduce Hazards Increase Safety	1. Number of accidents 2. Customer Complaints 3. Customer Requests	1. Zero accidents 2. Respond within agreed timeframe 3. Respond within agreed timeframe	1. Not currently measured 2. Not currently measured 3. Not currently measured

<b>Infrastructure Roads</b>				
<b>Key Performance Measure</b>	<b>Level Of Service</b>	<b>Performance Measure Process</b>	<b>Performance Target</b>	<b>Current Performance</b>
<b>TECHNICAL LEVELS OF SERVICE</b>				
<b>Condition</b>	Condition of Seal Condition of Kerbing Condition of Drainage	1. Age and Condition rating 2. Age and Condition rating 3. Functionality	1. No roads > Level 4 rating in Roman 2. No Target 3. No Target	1. Ongoing 2. 1. Not currently measured 3. Not currently measured
<b>Function</b>	Road width meets requirements Turning Circles adequate Traffic control treatments Construction suitable	1. Traffic Volumes counts 2. Meets Design standards 3. Meets Design standards 4. Meets Design standards	1. No Target 2. No Target 3. No Target 4. No Target	1. Not currently measured 2. Not currently measured 3. Not currently measured 4. Not currently measured
<b>Cost Effectiveness</b>	Maintain roads at the 85% percentile (condition level based upon Dtimes modelling)  Limit reactive repairs	1. Condition Survey's 2. Forward Works Program 3. Monitoring reactive works	1. Survey undertaken every 5 yrs 2. Reviewed Annually 3. Ongoing	1. Achieved - next planned FY 2010/11 2. Achieved 3. Not currently measured
<b>Safety</b>	Clear signage Good Line marking Reduce Pooling Maintain Traffic Control Devices	1. Annual Inspections 2. Meets Design standards 3. Meets Design standards 4. Annual Inspections	1. No Target 2. No Target 3. No Target 4. No Target	1. Not currently measured 2. Not currently measured 3. Not currently measured 4. Not currently measured

**Infrastructure - Drainage**

Key Performance Measure	Level Of Service	Performance Measure Process	Performance Target	Current Performance
<b>COMMUNITY LEVELS OF SERVICE</b>				
<b>Quality</b>	Prevention of Pooling	1. Customer Complaints 2. Customer Requests	1. Reduce Complaints throughout year 2. No Target	1. Unknown 2. Not currently measured
<b>Function</b>	Reduce Flooding	1. Customer Complaints 2. Customer Requests 3. Adherence to Travel smart ideals	1. Reduce Complaints throughout year 2. No Target 3. No Target	1. Unknown 2. Not currently measured 3. Not currently measured
<b>Safety</b>	Free From Trip Hazards Not accessible by children Protected from traffic knocks	1. Insurance Claims/Accident reports 2. Insurance Claims/Accident reports 3. Customer Complaints	1. Reduce Reports throughout year 2. Reduce Reports throughout year 3. Reduce Complaints throughout year	1. Unknown 2. Unknown 3. Unknown
<b>TECHNICAL LEVELS OF SERVICE</b>				
<b>Condition</b>	Structural Integrity	1. Condition Survey	1. Replace as per resurfacing schedules	1. Replacement mostly matches resurfacing schedule
<b>Effectiveness</b>	At Interception Pits deal with 5 ARI Flows At Sag Pits deal with 20 ARI Flows	1. Network Review 2. Customer Flooding Complaints	1. Once very 5 years 2. Reduce Complaints throughout year	1. Not currently measured 2. Noting drainage issues on FWP
<b>Safety</b>	Reduce Flooding and property damage	1. Customer Flooding Complaints	1. Reduce Complaints throughout year	1. Not currently measured

**Table 3.3: Current Levels of Service**

**3.4 Desired Levels of Service**

At present, indications of desired levels of service are obtained from various sources including the 2009 Customer Satisfaction survey, residents' feedback to Councillors and staff, service requests and correspondence. The City has yet to quantify desired levels of service. This will be done in future revisions of this asset management plan.

## 4. FUTURE DEMAND

### 4.1 Demand Forecast

Factors affecting demand include population change, changes in demographics, seasonal factors, vehicle ownership, consumer preferences and expectations, economic factors, agricultural practices, environmental awareness, etc.

The CoM is located in Perth's southwest, around 8 kilometres from the Perth GPO. The CoM is bounded in the north by the Swan River, in the east by the Canning River and the City of Canning, in the south by the City of Cockburn, and in the west by the City of Fremantle and the Town of East Fremantle.

The CoM is a predominantly residential area, with some industrial and commercial land uses. The City encompasses a total land area of about 52 square kilometres, including around 18 kilometres of river foreshore.

The City of Melville includes the suburbs of Alfred Cove, Applecross, Ardross, Attadale, Bateman, Bicton, Booragoon, Brentwood, Bull Creek, Kardinya, Leeming, Melville, Mount Pleasant, Murdoch, Myaree, Palmyra, Willagee and Winthrop.

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

Demand factor	Present position (taken from 2006 ABS Census)	Projection 2031	Impact on services
Population	Current Population as at 30 June 2008: 99,351 Change from previous year: +0.65%	Projected growth between Census in 2006 and 2031 is from 99,151 to 108,563  2031 vision – significant growth in Perth Metro population and Commercial requirements  Greater Murdoch development – Fiona Stanley Hospital precinct	Minor impact on services  Significant impact on Roads, Paths and Drainage requirements
Demographics	Analysis of age structure in 2006 compared to the Perth Statistical Division shows a smaller proportion of people in the younger age groups (0 to 17) but a larger proportion of people in the older age groups (60+).	Projected growth in aged population. 28,340 or 26.1% predicted to be over the age of 60 in 2031 an increase of almost 6%. 22.5% between ages 0 -19yrs which is a very slight drop in the younger age groups.	Universal Access will be required

**Table 4.1: Demand Factors, Projections and Impact on Services**

### 4.2 Changes in Technology

Technology changes are forecast to have little effect on the delivery of services covered by this plan. Those changes related to climate change, energy consumption and water usage are subject to ongoing investigation and review. Significant impacts will be qualified in future revisions of this asset management plan.

### 4.3 Demand Management Plan

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

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

Service Activity	Demand Management Plan
Road Maintenance and Upgrade	Upgrades to meet current and changing legislative requirements.
Footpath Maintenance and Upgrade	Upgrades to meet current and changing legislative requirements and changing community and pedestrian route requirements
Drainage Maintenance and Upgrade	Upgrades to meet current and changing legislative requirements. Upgrades to meet changes in environment and capacity requirements.

**Table 4.3: Demand Management Plan Summary**

### 4.4 New Assets from Growth

There are no significant new infrastructure assets currently identified as required to meet growth. Demand will be met by the management, renewal or upgrading of existing infrastructure assets. The associated future costs will be identified and considered in developing forecasts of future operating and maintenance costs and included in future revisions of this asset management plan.

It is however identified that there will be an addition of some minor areas to our road, footpath and drainage networks as part of development such as the Murdoch Precinct works. Any such additions are, by size and scale as compared against our networks, considered insignificant.

## 5. LIFECYCLE MANAGEMENT PLAN

The lifecycle management plan details how the City plans to manage and operate the assets at the agreed levels of service (defined in section 3) while optimising life cycle costs.

### 5.1 Background Data

#### 5.1.1 Physical parameters

The infrastructure assets covered by this IAMP are shown below.

#### Roads

Roads – District Distributor A (sub arterial)	6,260 km
Roads – District Distributor B (sub arterial)	38,730 km
Roads – Local Distributor (Collector)	91,060 km
Roads – Access (local)	395,010 km

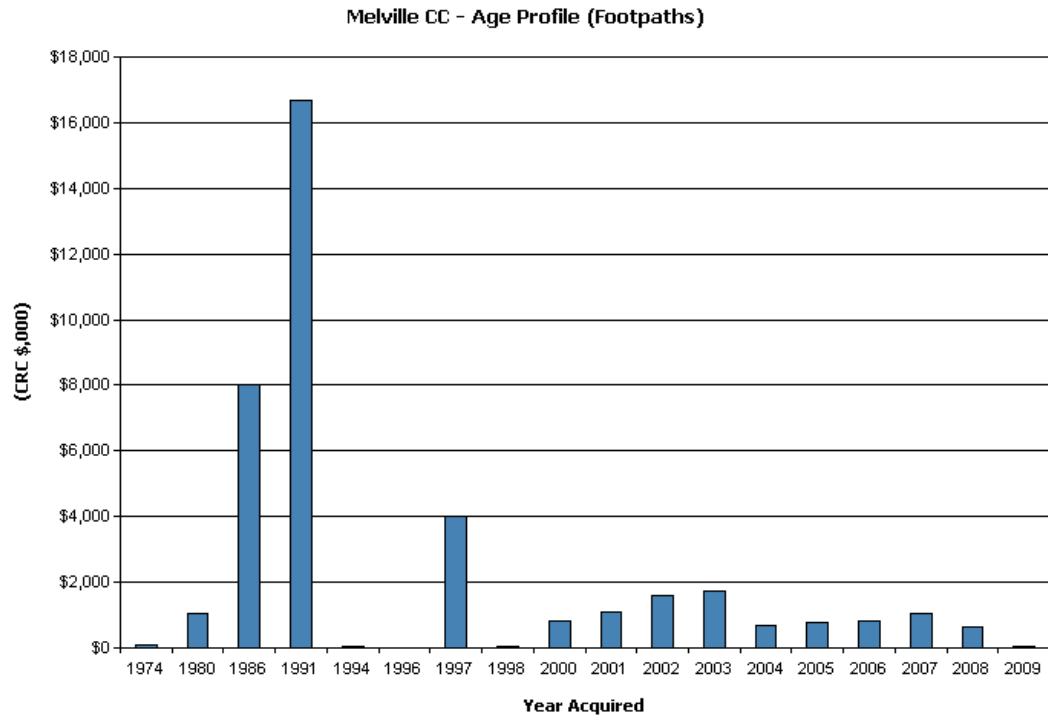
#### Drainage

Stormwater Drainage Pipes	Approximately 300 km
Stormwater Drainage Pits	Approximately 7000
Drainage Sumps	67

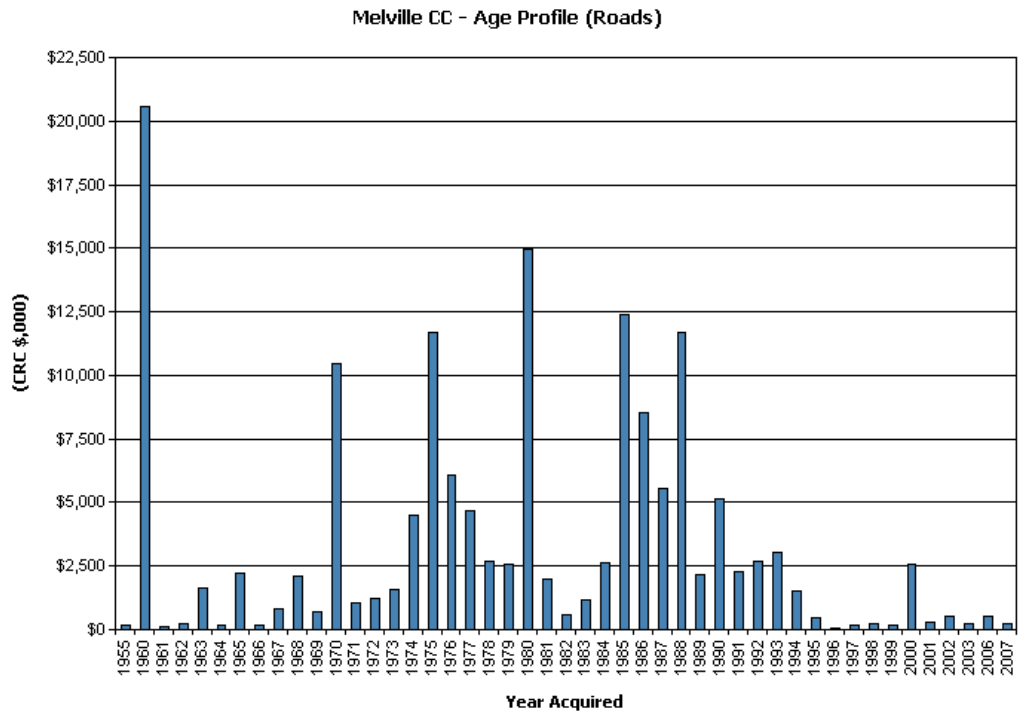
#### Paths

Bitumen	62,759 m <sup>2</sup> (86)
Bricked Paved	30,581 m <sup>2</sup> (96)
Concrete	696,971 m <sup>2</sup> (2477)
Concrete/Bitumen	54 m <sup>2</sup> (1)
Concrete/Brick	5,396 m <sup>2</sup> (10)
Gravel/Sand	5,678 m <sup>2</sup> (16)
Limestone	5,304 m <sup>2</sup> (15)
Slab	12,495 m <sup>2</sup> (67)
Slab/Concrete	3,492 m <sup>2</sup> (11)
Timber	946 m <sup>2</sup> (3)

The age profile of the City's infrastructure assets is shown below.



10



**Fig 2: Infrastructure Asset Age Profiles**

A drainage age profile is not shown as they are currently unknown.

5.1.2 Asset Capacity and Performance

The CoM's services are generally provided to meet design standards where these are available. Locations where deficiencies in service performance are known are detailed in Table 5.1.2.

Location	Service Deficiency
Road Network	Estimated \$4.5m per annum road resurfacing requirement across the CoM network to maintain network in current condition
Path Network	Replacement of all concrete slab paths within the CoM area (15,987 m <sup>2</sup> ), as a specific capital replacement program

**Table 5.1.2: Known Service Performance Deficiencies**

5.1.3 Asset condition

The condition profile of the City's Infrastructure assets is measured using the 1 – 5 rating system outlined below. This system is used to measure the condition of components and subcomponents to arrive at the average condition rating for each asset. The aim is to manage the condition of each asset to at least level 3, with priority defined in accordance with the established hierarchy.

- 1 **Excellent.** As new and structurally sound. No evidence of deterioration, damage or discoloration. Fully functional and fit for purpose. Excellent appearance. No work required.
- 2 **Good.** Structurally sound. Minor deterioration and wear to surfaces. Fully functional and fit for purpose. Good appearance. Few customer concerns. Only minor work required.
- 3 **Average.** Minor cracking in structural elements. Minor deterioration, discoloration, wear or damage to surfaces. Minor evidence of weatherproof breaches, dampness or mildew. Fittings generally operational with minor breakages or defects. Functional but occasional restrictions on use. Deterioration affecting appearance. Some customer concerns. Some work required.
- 4 **Poor.** Asset structure functional but signs of significant cracking or distortion. Breaches of weatherproofing evident. Surfaces in need of significant repair or replacement with works required to reconstruct some of the base/foundation elements Services have limited function with frequent failures. Appearances affected by cracking, staining, overflows or breakages. Regular customer complaints. Some replacement/ rehabilitation needed within 1-2 years.
- 5 **Failed.** Asset has serious problems and the Integrity of structure is questionable, serious cracking, distortion and surface failures compromising operation and/or safety. Wearing course badly damaged or non existent. Asset is generally not fit for purpose or for use by customers. Urgent replacement/ rehabilitation required.

Where data from the condition monitoring program indicates changes to the intervention period, the strategic, operational, maintenance, renewal, and financial plans will be updated as appropriate.

The City of Melville Road Hierarchy (or order of importance) is shown below:

City of Melville - Road Hierarchy



5.1.4 Asset valuations

The value of assets as at 30<sup>th</sup> June 2009 covered by this asset management plan is summarised below. Assets were last revalued at 30<sup>th</sup> June 2009. Assets are valued at Greenfield.

	Current Replacement Cost	Depreciated Replacement Cost	Annual Depreciation Expense
Drainage	\$47,187,000	\$30,660,000	\$309,000
Paths	\$39,098,000	\$23,364,000	\$977,500
Roads	\$179,811,000	\$109,332,000	\$4,672,000
<b>Total</b>	<b>\$266,096,000</b>	<b>\$163,356,000</b>	<b>\$5,958,500</b>

## 5.2 Risk Management Plan

An assessment of risks associated with service delivery from infrastructure assets has identified critical risks to the CoM. The risk assessment process identifies credible risks, the likelihood of the risk event occurring, the consequences should the event occur, develops a risk rating, evaluates the risk and develops a risk treatment plan for non-acceptable risks. These credible risks, their evaluation and treatment plans are addressed in the Corporate Risk Management Plan which is still in production.

## 5.3 Routine Maintenance Plan

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

### 5.3.1 Maintenance plan

Maintenance includes reactive and planned maintenance work activities, as well as the renewal of assets.

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

Planned maintenance is repair work that is identified and managed through a maintenance management system (MMS). MMS 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.

Renewal is the replacement of higher value components/sub-components of assets that is undertaken on a regular cycle including road resurfacing. This work returns an asset to its past condition and capabilities, and thus differs from a Capital Upgrade which will enhance the capability of an asset.

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

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

### 5.3.2 Standards and specifications

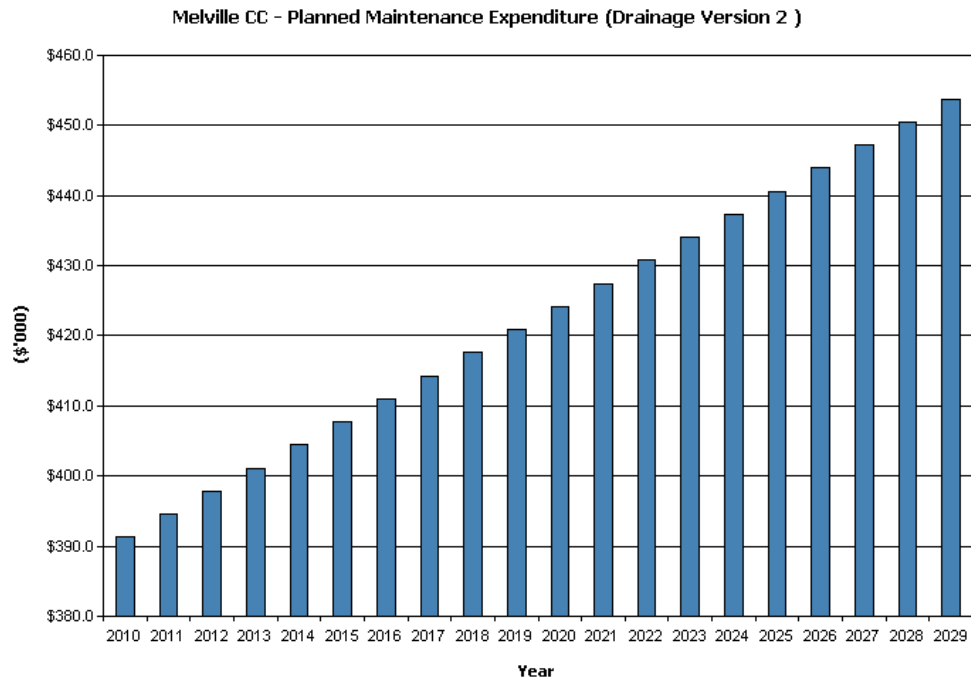
Maintenance work is carried out in accordance with the following Standards and Specifications.

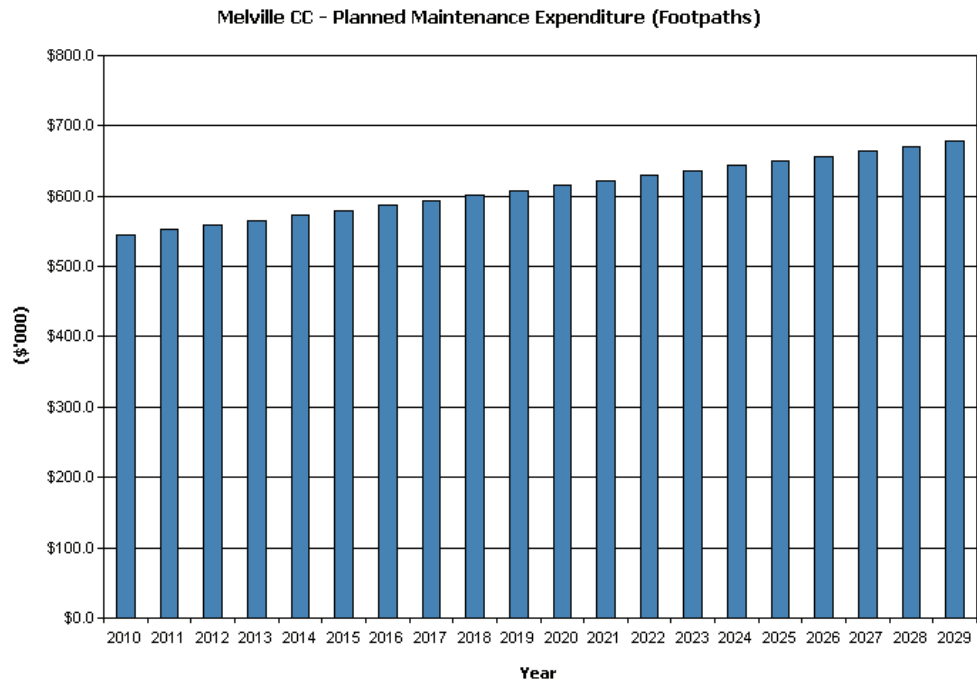
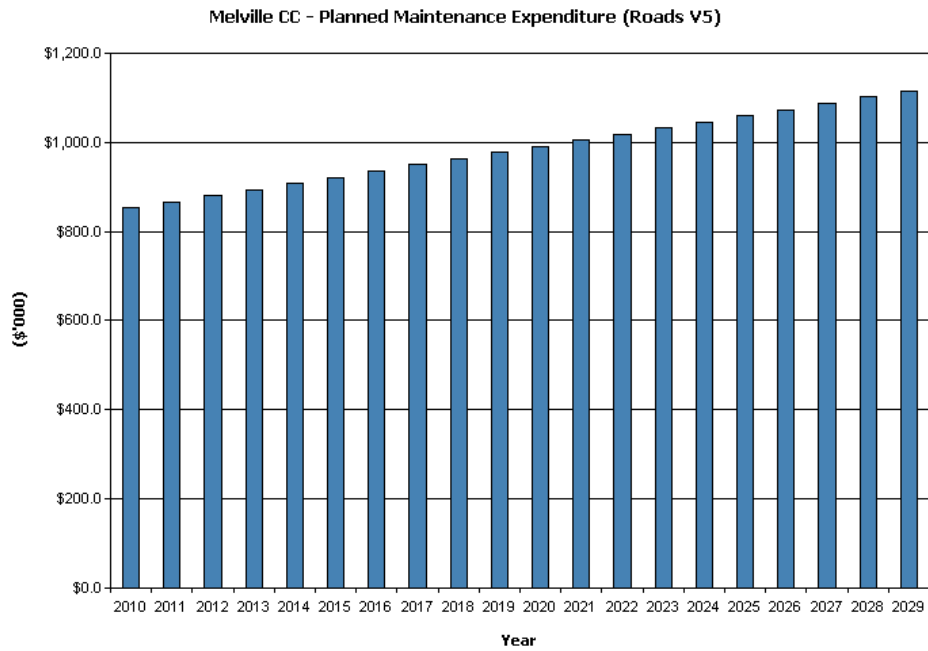
Australian Standards
Occupational Health and Safety Standards
Main Roads Landscape specification
City of Melville Policy 13 PL 008 Asset Management
City of Melville Asset Management Strategy
City of Melville Disability Access and Inclusion Plan (DAIP)
City of Melville Policy 21-PL-001 Road verges
City of Melville Policy 21-PL-002 Street and commercial centre landscape standards
City of Melville Policy 21-PL-003 Verge maintenance adjacent to private property
AAPA specifications
City of Melville Policy 07 PL002 sump frontages, minor reserves, road verges
AS/NZS 1158 - 2005 Lighting for roads and public spaces
AAS 27 Asset Management Accounting Strategy
AS 2865 National Standard safe working in a confined space

AS 4000: 1997 Admin manual General conditions of Contract
City of Melville Local law relating to Parks, Recreation Grounds and Public Reserves

### 5.3.3 Summary of future maintenance expenditures

Future maintenance expenditure is forecast to trend in line with the value of the asset stock as shown in Fig 4. Note that all costs are shown in current 2010 dollar values.





Paths

**Fig 4: Planned Maintenance Expenditure**

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

Maintenance is funded from CoM's operating budget and grants where available. This is further discussed in Section 6.2.

## 5.4 Renewal/Replacement Plan

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

### 5.4.1 Renewal plan

Assets or their components requiring renewal are identified from estimates of remaining life obtained from the asset management system (Archibus and/or Roman). The accuracy of remaining life estimates and the development of a preliminary renewal estimate are determined by a condition audit of all assets and their components which is carried out at regular intervals. Ongoing revisions of this IAMP will better address this shortfall.

Proposals are scheduled in the forward works programme as renewal projects or as major "one off" projects.

Renewal is the renewal or replacement of components which have been identified through the condition audit process as having reached the intervention level (condition 4) or have failed (condition 5) and are therefore due for replacement or renewal and is budgeted for as 'capital expenses'.

Renewal will be undertaken using 'low-cost' renewal methods where practical. The aim of 'low-cost' renewals is to restore the service potential or future economic benefits of the asset by renewing the assets at a cost less than replacement cost.

Examples of low cost renewal include resurfacing a works rather than re-construction works in regard to a road asset.

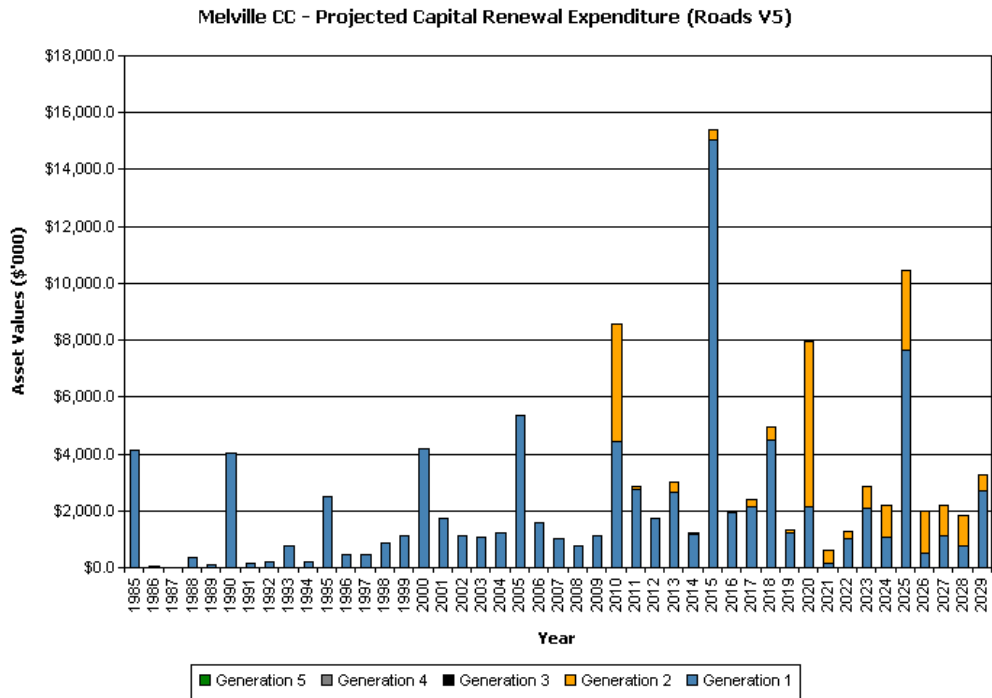
### 5.4.2 Renewal standards

Renewal work is carried out in accordance with the following Standards and Specifications.

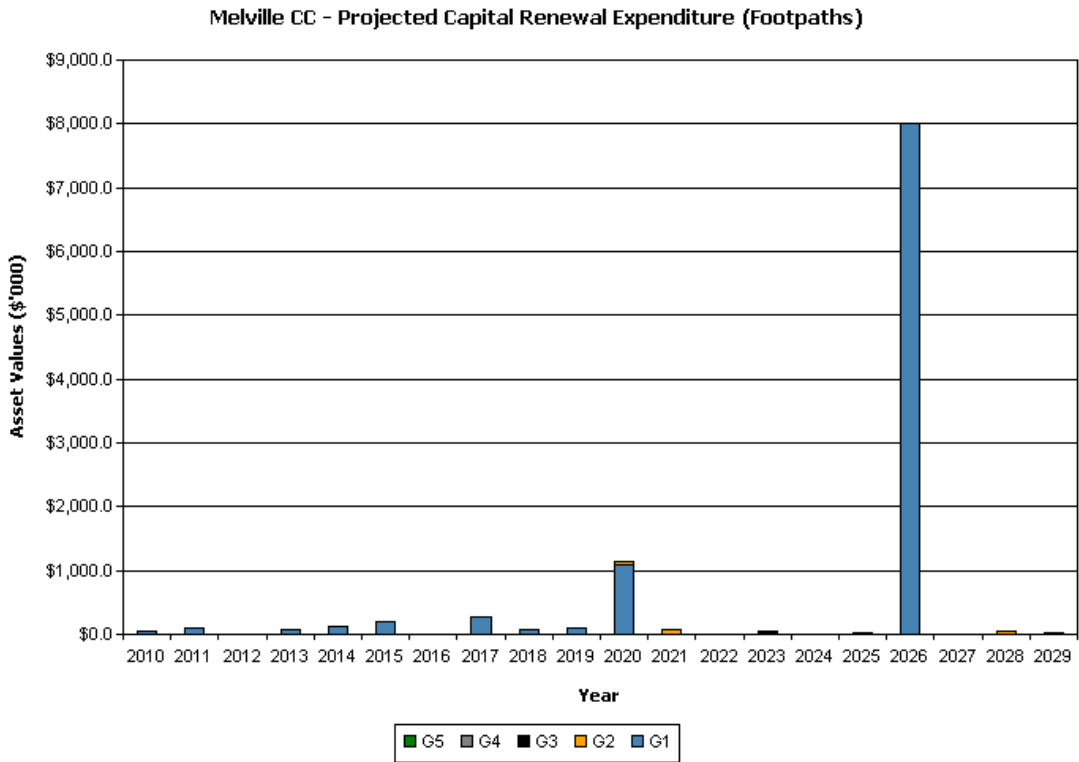
- Australian Asphalt Pavement Association
- Australian Standards
- Building Codes Australia

### 5.4.3 Summary of future renewal expenditure

Projected future renewal expenditures are forecast to increase over time as the asset stock ages. The costs are summarised in Fig 5. Note that all costs are shown in current 2010 dollar values.



Key: G = generation



**Fig 5: Projected Capital Renewal Expenditure**

A drainage graph is not presented as there are no renewal works within the timeframe of this report given the assumed 100 year life of the asset

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

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

### 5.5 Creation/Acquisition/Upgrade Plan

New works are those works that create a new asset that did not previously exist, or works which upgrade or improve an existing asset beyond its existing capacity. They may result from growth, social or environmental needs. Assets may also be acquired at no cost to the City from land development. Currently there are no new assets from growth being considered as discussed in Section 4.4.

#### 5.5.1 Selection criteria

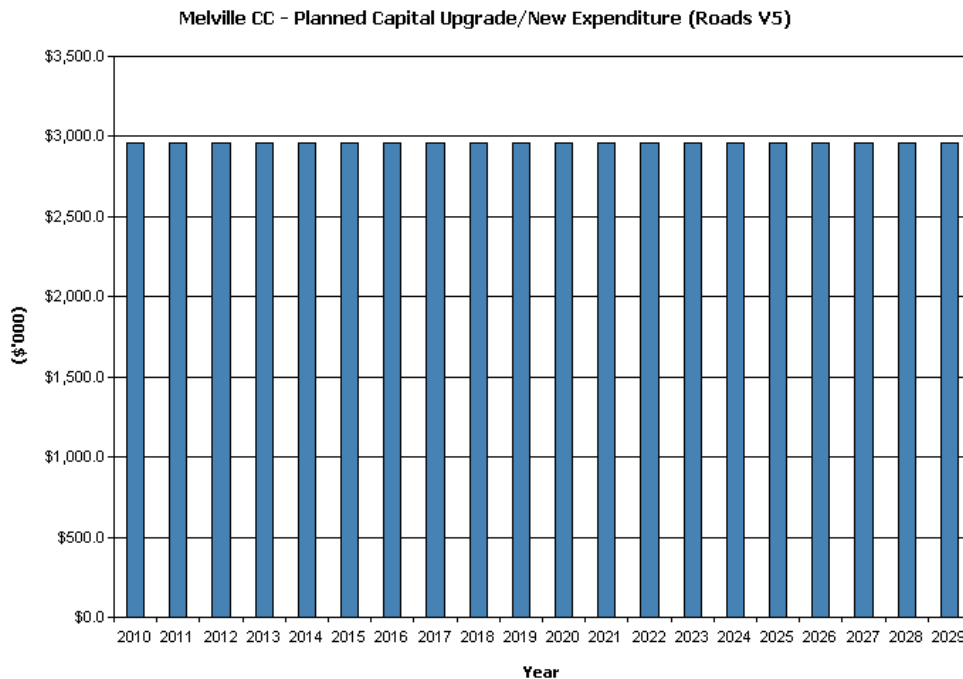
New assets and upgrade/expansion of existing assets are identified from various sources such as Councillor or Community requests, proposals identified by strategic plans or partnerships with other organisations. Candidate proposals are inspected to verify need and to develop a preliminary renewal estimate.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

#### 5.5.2 Standards and specifications

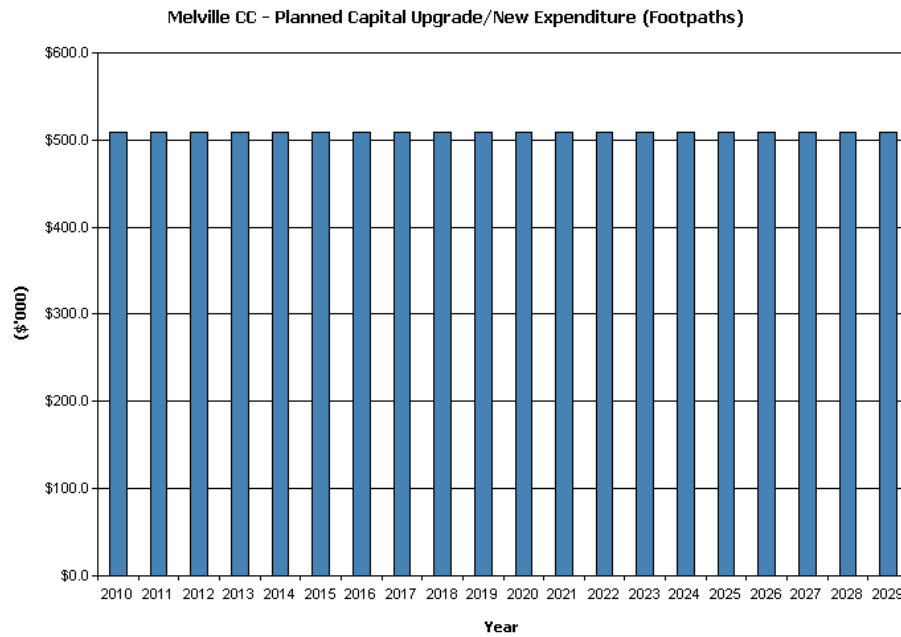
Standards and specifications for new assets and for upgrade/expansion of existing assets are the same as those for renewal shown in Section 5.4.2.

#### 5.5.3 Summary of future upgrade/new assets expenditure

Planned upgrade/new asset expenditures are summarised in Fig 6. The planned upgrade/new capital works program is shown in Appendix C. All costs are shown in current FY2009/10 dollar values.



Examples of Upgrade / New works would include works such as the modification of an intersection to include a new roundabout or the upgrade of a small walking path with a significantly larger dual use path.



**Fig 6: Planned Capital Upgrade/New Asset Expenditure**

New assets and services are funded from the City's capital works program and grants where available. This is further discussed in Section 6.2.

### 5.6 Disposal Plan

Due to the nature of the infrastructure asset group, there are no disposal plans for the infrastructure assets, as an asset with normally be repaired, replaced and/or upgraded to extend its life.

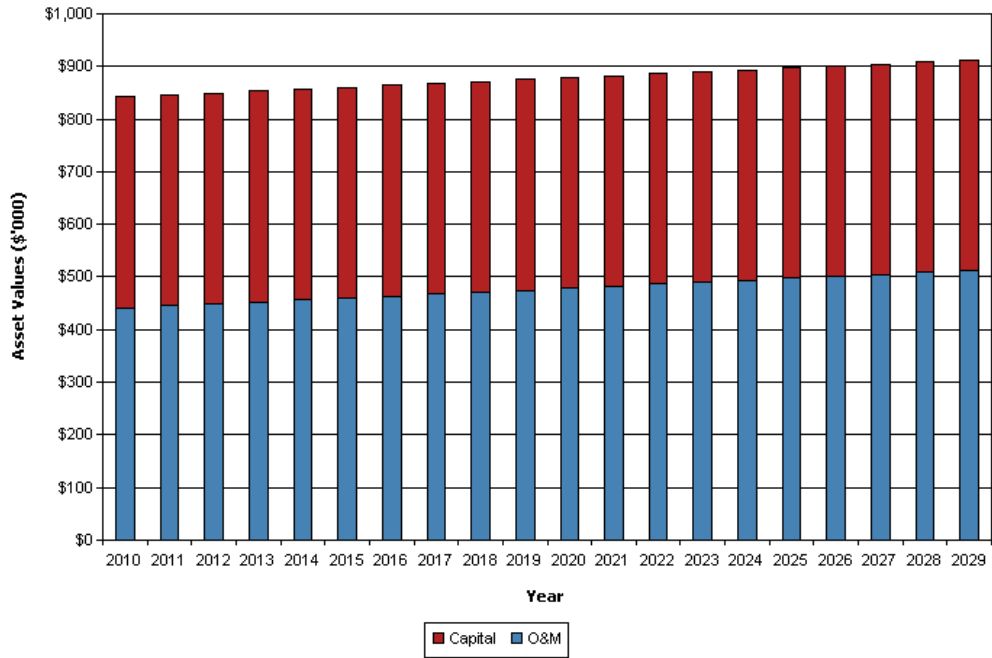
## **6. FINANCIAL SUMMARY**

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 future asset performance.

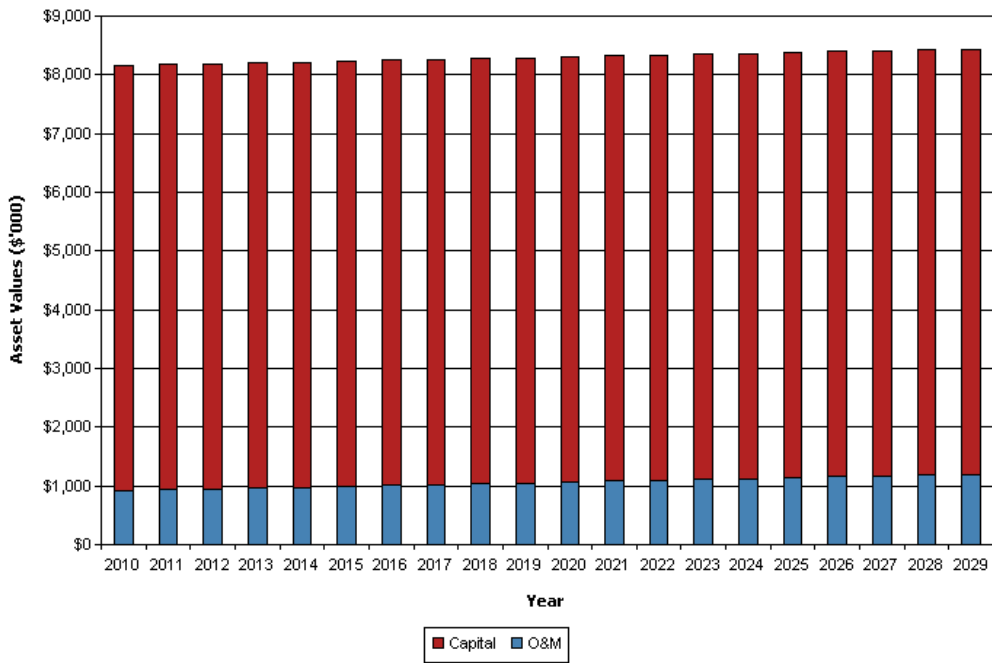
### **6.1 Financial Statements and Projections**

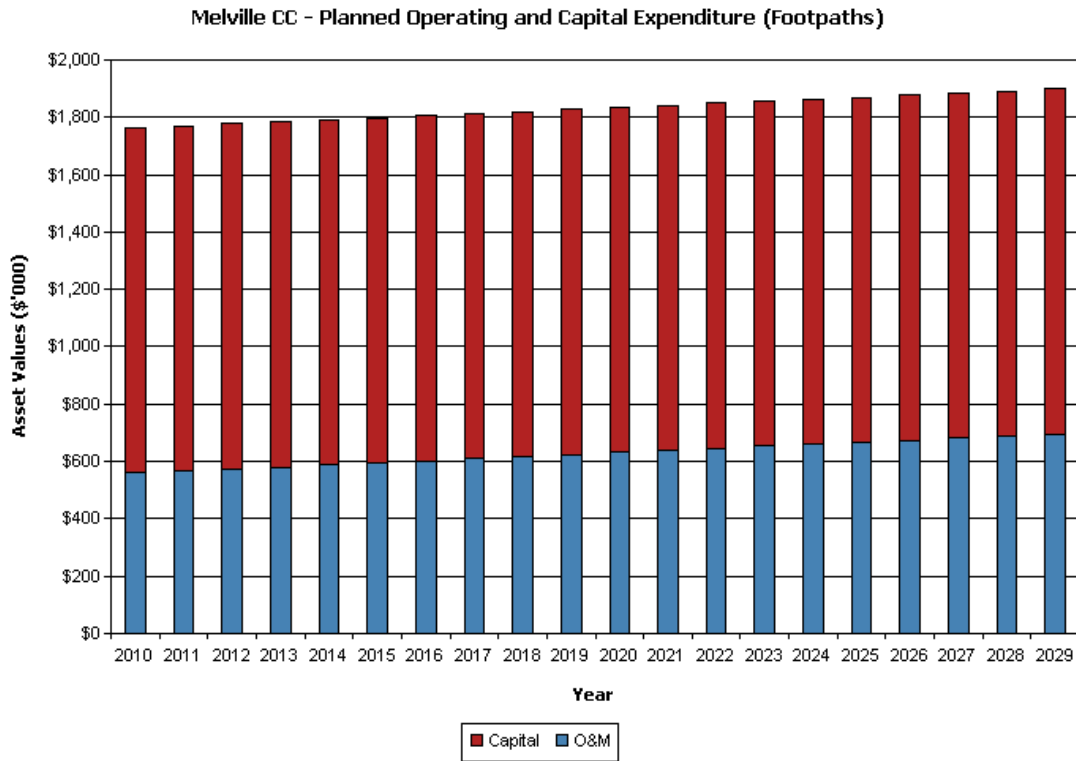
The financial projections are shown in Fig 7 for planned operating (operations and maintenance) and capital expenditure (renewal and upgrade/expansion/new assets).

Melville CC - Planned Operating and Capital Expenditure (Drainage Version 2)



Melville CC - Planned Operating and Capital Expenditure (Roads V5)





**Fig 7: Planned Operating and Capital Expenditure**

Note that all costs are shown in current FY 2010 dollar values.

6.1.1 Sustainability of service delivery

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

Long term - Life Cycle Cost

Life cycle costs (or whole of life costs) are the average costs that are required to sustain the service levels over the longest asset life. Life cycle costs include maintenance and asset consumption (depreciation expense). The annual average life cycle cost for the services covered in this asset management plan is as follows:

Asset	Annual Average Life Cycle Cost
Drainage	\$697,000
Paths	\$1,515,500
Roads	\$5,511,000
<b>Total</b>	<b>\$7,723,500</b>

Life cycle costs can be compared to life cycle expenditure to give an indicator of sustainability in service provision. Life cycle expenditure includes maintenance plus capital renewal expenditure. Life cycle expenditure will vary depending on the timing of asset renewals. The life cycle expenditure at the start of the plan is as follows:

<b>Asset</b>	<b>Life Cycle Expenditure</b>
Drainage	\$422,500
Footpaths	\$1,128,700
Roads	\$5,553,250
<b>Total</b>	<b>\$7,104,450</b>

Life Style Expenditure = Maintenance Costs + Planned Renewal Costs

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

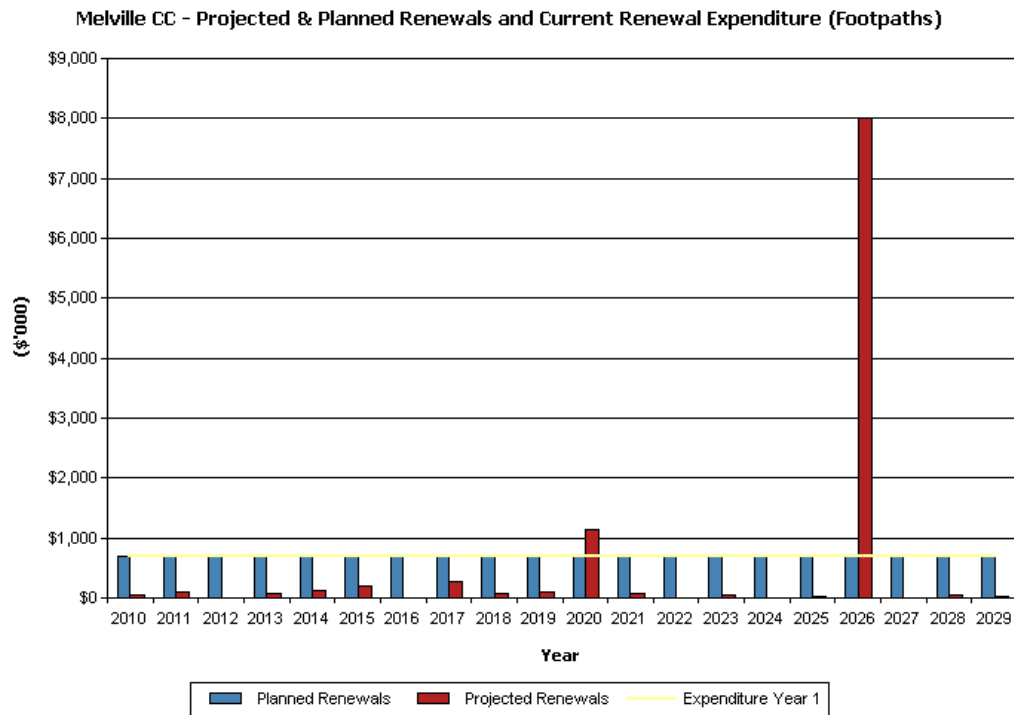
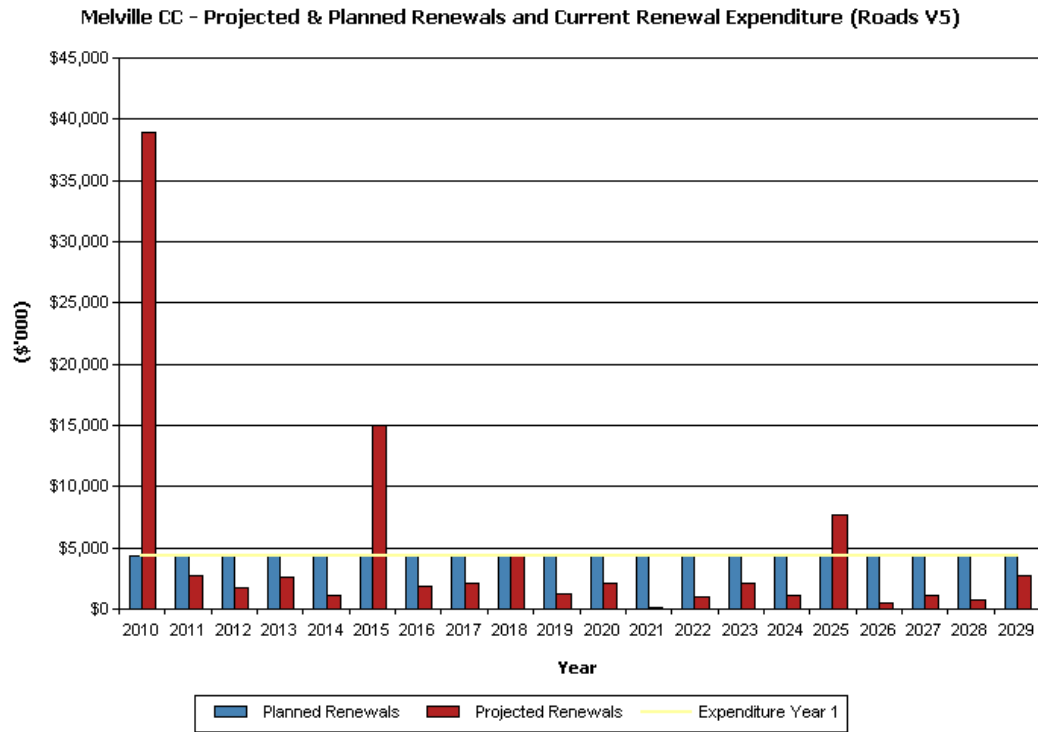
The life cycle gap for services covered by this asset management plan is \$396,500 per annum (\$5,958,500 – \$6,355,000). The life cycle sustainability index is 106%. This figure suggests that current expenditure across the whole Infrastructure Asset group is appropriate.

Medium term – 10 year financial planning period

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

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

Fig 8 shows the projected asset renewals in the 20 year planning period from the asset register. The projected asset renewals are compared to planned renewal expenditure in the capital works program and capital renewal expenditure in year 1 of the planning period as shown in Fig 8. Table 6.1.1 shows the annual and cumulative funding gap between projected and planned renewals.



**Fig 8: Projected and Planned Renewals and Current Renewal Expenditure**

The projected renewals shown in Fig 8 the proposed renewal of roads, drainage and path assets, with details for roads for 2010 and paths from 2010 - 2029 detailed in Appendix A

Melville CC >> Planned Expenditures for Long Term Financial Plan (Roads V5)

Year End Jun-30	Total Operations Expenditure (\$'000)	Total Maintenance Expenditure (\$'000)	Projected Capital Renewal Expenditure (\$'000)	Planned Capital Upgrade/New Expenditure (\$'000)	Planned Disposals (\$'000)	Planned Capital Renewal Expenditure (\$'000)	Shortfall in Renewal Expenditure (Projected - Planned) (\$'000)	Cumulative Renewal Funding Shortfall (\$'000)
2010	\$63.02	\$852.81	\$38,951.64	\$2,960.00	\$0.00	\$4,280.00	\$34,671.64	\$34,671.64
2011	\$64.04	\$866.62	\$2,778.30	\$2,960.00	\$0.00	\$4,280.00	-\$1,501.70	\$33,169.94
2012	\$65.06	\$880.43	\$1,742.10	\$2,960.00	\$0.00	\$4,280.00	-\$2,537.90	\$30,632.03
2013	\$66.08	\$894.25	\$2,659.66	\$2,960.00	\$0.00	\$4,280.00	-\$1,620.34	\$29,011.70
2014	\$67.10	\$908.06	\$1,149.34	\$2,960.00	\$0.00	\$4,280.00	-\$3,130.66	\$25,881.03
2015	\$68.12	\$921.87	\$15,028.77	\$2,960.00	\$0.00	\$4,280.00	\$10,748.77	\$36,629.80
2016	\$69.14	\$935.68	\$1,917.01	\$2,960.00	\$0.00	\$4,280.00	-\$2,362.99	\$34,266.81
2017	\$70.17	\$949.49	\$2,156.38	\$2,960.00	\$0.00	\$4,280.00	-\$2,123.62	\$32,143.19
2018	\$71.19	\$963.30	\$4,503.42	\$2,960.00	\$0.00	\$4,280.00	\$223.42	\$32,366.61
2019	\$72.21	\$977.11	\$1,208.12	\$2,960.00	\$0.00	\$4,280.00	-\$3,071.88	\$29,294.73
2020	\$73.23	\$990.93	\$2,140.64	\$2,960.00	\$0.00	\$4,280.00	-\$2,139.36	\$27,155.38
2021	\$74.25	\$1,004.74	\$173.57	\$2,960.00	\$0.00	\$4,280.00	-\$4,106.43	\$23,048.95
2022	\$75.27	\$1,018.55	\$1,040.03	\$2,960.00	\$0.00	\$4,280.00	-\$3,239.97	\$19,808.98
2023	\$76.29	\$1,032.36	\$2,084.00	\$2,960.00	\$0.00	\$4,280.00	-\$2,196.00	\$17,612.99
2024	\$77.31	\$1,046.17	\$1,089.81	\$2,960.00	\$0.00	\$4,280.00	-\$3,190.19	\$14,422.80
2025	\$78.33	\$1,059.98	\$7,640.11	\$2,960.00	\$0.00	\$4,280.00	\$3,360.11	\$17,782.91
2026	\$79.35	\$1,073.79	\$530.54	\$2,960.00	\$0.00	\$4,280.00	-\$3,749.46	\$14,033.45
2027	\$80.37	\$1,087.61	\$1,102.75	\$2,960.00	\$0.00	\$4,280.00	-\$3,177.25	\$10,856.20
2028	\$81.39	\$1,101.42	\$789.51	\$2,960.00	\$0.00	\$4,280.00	-\$3,490.49	\$7,365.71
2029	\$82.41	\$1,115.23	\$2,699.30	\$2,960.00	\$0.00	\$4,280.00	-\$1,580.70	\$5,785.01

Melville CC >> Planned Expenditures for Long Term Financial Plan (Drainage Version 2 )

Year End Jun-30	Total Operations Expenditure (\$'000)	Total Maintenance Expenditure (\$'000)	Projected Capital Renewal Expenditure (\$'000)	Planned Capital Upgrade/New Expenditure (\$'000)	Planned Disposals (\$'000)	Planned Capital Renewal Expenditure (\$'000)	Shortfall in Renewal Expenditure (Projected - Planned) (\$'000)	Cumulative Renewal Funding Shortfall (\$'000)
2010	\$50.42	\$391.29	\$0.00	\$400.00	\$0.00	\$0.00	\$0.00	\$0.00
2011	\$50.85	\$394.58	\$0.00	\$400.00	\$0.00	\$0.00	\$0.00	\$0.00
2012	\$51.27	\$397.87	\$0.00	\$400.00	\$0.00	\$0.00	\$0.00	\$0.00
2013	\$51.70	\$401.16	\$0.00	\$400.00	\$0.00	\$0.00	\$0.00	\$0.00
2014	\$52.12	\$404.45	\$0.00	\$400.00	\$0.00	\$0.00	\$0.00	\$0.00
2015	\$52.54	\$407.73	\$0.00	\$400.00	\$0.00	\$0.00	\$0.00	\$0.00
2016	\$52.97	\$411.02	\$0.00	\$400.00	\$0.00	\$0.00	\$0.00	\$0.00
2017	\$53.39	\$414.31	\$0.00	\$400.00	\$0.00	\$0.00	\$0.00	\$0.00
2018	\$53.81	\$417.60	\$0.00	\$400.00	\$0.00	\$0.00	\$0.00	\$0.00
2019	\$54.24	\$420.89	\$0.00	\$400.00	\$0.00	\$0.00	\$0.00	\$0.00
2020	\$54.66	\$424.18	\$0.00	\$400.00	\$0.00	\$0.00	\$0.00	\$0.00
2021	\$55.09	\$427.47	\$0.00	\$400.00	\$0.00	\$0.00	\$0.00	\$0.00
2022	\$55.51	\$430.76	\$0.00	\$400.00	\$0.00	\$0.00	\$0.00	\$0.00
2023	\$55.93	\$434.05	\$0.00	\$400.00	\$0.00	\$0.00	\$0.00	\$0.00
2024	\$56.36	\$437.34	\$0.00	\$400.00	\$0.00	\$0.00	\$0.00	\$0.00
2025	\$56.78	\$440.62	\$0.00	\$400.00	\$0.00	\$0.00	\$0.00	\$0.00
2026	\$57.21	\$443.91	\$0.00	\$400.00	\$0.00	\$0.00	\$0.00	\$0.00
2027	\$57.63	\$447.20	\$0.00	\$400.00	\$0.00	\$0.00	\$0.00	\$0.00
2028	\$58.05	\$450.49	\$0.00	\$400.00	\$0.00	\$0.00	\$0.00	\$0.00
2029	\$58.48	\$453.78	\$0.00	\$400.00	\$0.00	\$0.00	\$0.00	\$0.00

Melville CC >> Planned Expenditures for Long Term Financial Plan (Footpaths)

Year End Jun-30	Total Operations Expenditure (\$'000)	Total Maintenance Expenditure (\$'000)	Projected Capital Renewal Expenditure (\$'000)	Planned Capital Upgrade/New Expenditure (\$'000)	Planned Disposals (\$'000)	Planned Capital Renewal Expenditure (\$'000)	Shortfall in Renewal Expenditure (Projected - Planned) (\$'000)	Cumulative Renewal Funding Shortfall (\$'000)
2010	\$14.59	\$545.00	\$49.71	\$509.00	\$0.00	\$694.00	-\$644.29	-\$644.29
2011	\$14.77	\$552.01	\$87.24	\$509.00	\$0.00	\$694.00	-\$606.76	-\$1,251.05
2012	\$14.96	\$559.01	\$0.00	\$509.00	\$0.00	\$694.00	-\$694.00	-\$1,945.05
2013	\$15.15	\$566.02	\$85.39	\$509.00	\$0.00	\$694.00	-\$608.61	-\$2,553.66
2014	\$15.34	\$573.02	\$131.48	\$509.00	\$0.00	\$694.00	-\$562.52	-\$3,116.19
2015	\$15.52	\$580.02	\$187.44	\$509.00	\$0.00	\$694.00	-\$506.56	-\$3,622.74
2016	\$15.71	\$587.03	\$2.18	\$509.00	\$0.00	\$694.00	-\$691.82	-\$4,314.56
2017	\$15.90	\$594.03	\$264.02	\$509.00	\$0.00	\$694.00	-\$429.98	-\$4,744.54
2018	\$16.09	\$601.04	\$68.79	\$509.00	\$0.00	\$694.00	-\$625.21	-\$5,369.75
2019	\$16.27	\$608.04	\$109.04	\$509.00	\$0.00	\$694.00	-\$584.96	-\$5,954.71
2020	\$16.46	\$615.04	\$1,137.46	\$509.00	\$0.00	\$694.00	\$443.46	-\$5,511.24
2021	\$16.65	\$622.05	\$63.99	\$509.00	\$0.00	\$694.00	-\$630.01	-\$6,141.25
2022	\$16.84	\$629.05	\$0.00	\$509.00	\$0.00	\$694.00	-\$694.00	-\$6,835.25
2023	\$17.02	\$636.06	\$46.56	\$509.00	\$0.00	\$694.00	-\$647.44	-\$7,482.68
2024	\$17.21	\$643.06	\$1.89	\$509.00	\$0.00	\$694.00	-\$692.11	-\$8,174.80
2025	\$17.40	\$650.06	\$16.07	\$509.00	\$0.00	\$694.00	-\$677.94	-\$8,852.73
2026	\$17.59	\$657.07	\$8,013.12	\$509.00	\$0.00	\$694.00	\$7,319.12	-\$1,533.61
2027	\$17.77	\$664.07	\$0.92	\$509.00	\$0.00	\$694.00	-\$693.08	-\$2,226.69
2028	\$17.96	\$671.08	\$56.43	\$509.00	\$0.00	\$694.00	-\$637.57	-\$2,864.27
2029	\$18.15	\$678.08	\$22.35	\$509.00	\$0.00	\$694.00	-\$671.65	-\$3,535.91

**Table 6.1.1: Projected and Planned Renewals and Expenditure Gap**

The planned renewal figure is expected to change over the 20 year period as comprehensive asset registers, breaking asset groups into their separate components, and condition audits of particularly the drainage assets are completed and the medium and long term renewal plans gain more accuracy.

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

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

The City will manage the ‘gap’ by developing this asset management plan to provide guidance on future service levels and resources required to provide these services, and reviewing the “remaining and design” life assumptions for individual sub-components of asset classes, i.e. a primary road may have a different design life to a local road due to usage, a concrete path will have a different design life to a paved path.

The City's long term financial plan covers the first 10 years of the 20 year planning period. The total maintenance and capital renewal expenditure required over the 10 years is \$92,053,000.

This is an average expenditure of \$9,205,300. Estimated maintenance and capital renewal expenditure in year 1 is \$6,739,000. The 10 year sustainability index is 73%.

This low index represents a significant peak in road assets identified as requiring works in 2010-2019 period, with a peak of over \$40 million identified are projected renewal works in 2010. This peak highlights both the failure to adequately spend the appropriate monies on the roads assets over the past 10+ years, but also demonstrates the simplicity of the current model and limitations of our current data. It is expected that the condition audit planned for 2010/11 will help alleviate some of this, allowing a more comprehensive model to be developed based upon 'remaining useful life' assessments rather than purely on 'age profiles'. It is expected that, although this current model does appear to correlate to other models (Dtims), in identifying a required \$4-4.5 million p.a. renewal expenditure on roads, the completion of the condition audit will highlight a significant gap in road conditions, albeit not in the magnitude of the \$40m gap currently identified.

An increase in data and recording accuracy moving forward will help to produce a 'smoothing' out of peaks and troughs across the asset data and it is expected that subsequent AMP's will more accurately determine the appropriate funding levels necessary to maintain and sustain our Infrastructure Asset group.

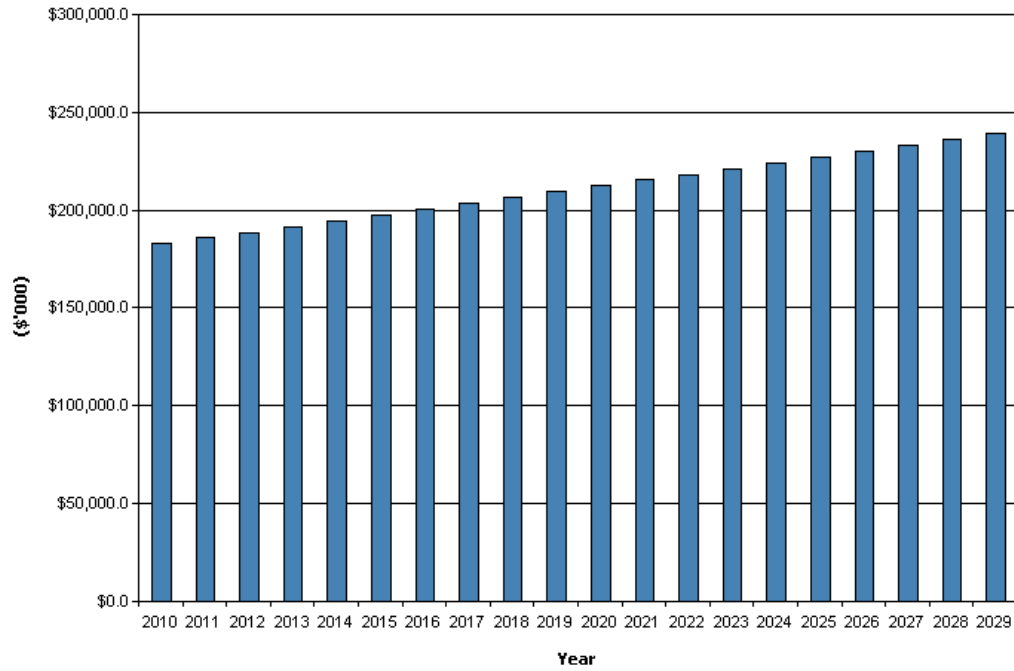
## 6.2 Funding Strategy

Projected expenditure identified in Section 6.1 is to be funded from the City's operating and capital budgets. The funding strategy is detailed in the City's 10 year long term financial plan which is currently under review for 2010-2020.

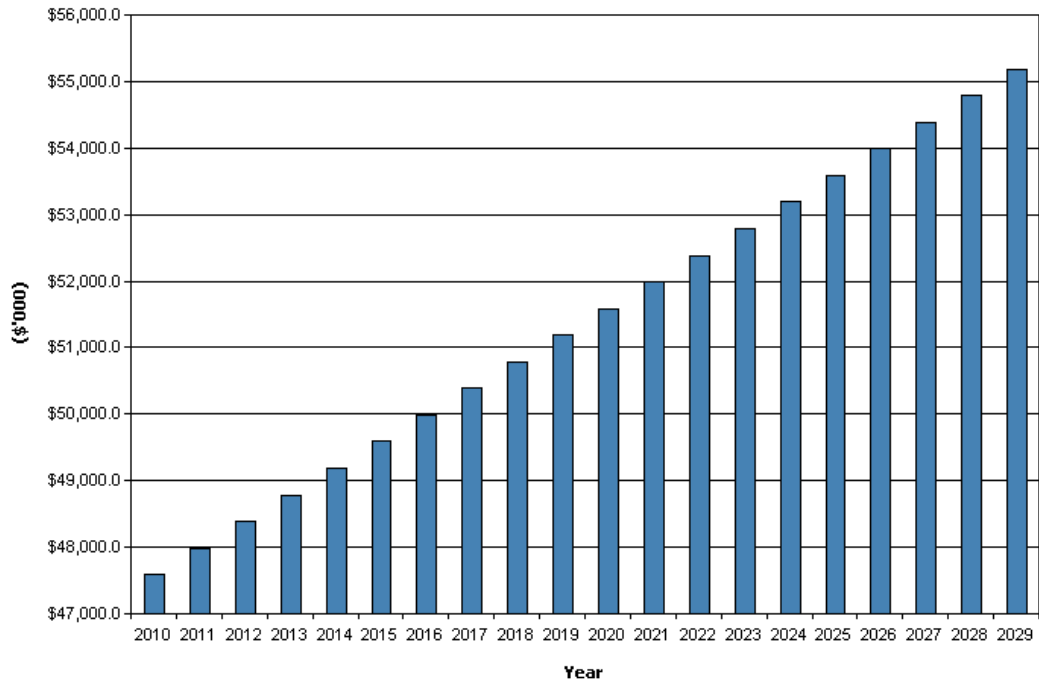
## 6.3 Valuation Forecasts

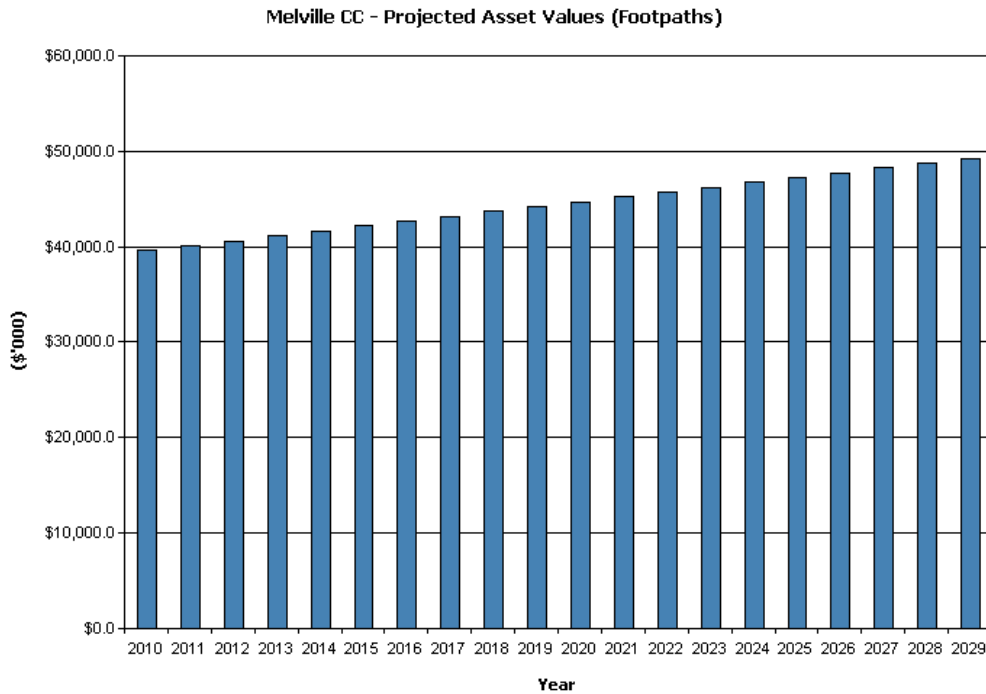
Asset values are forecast to increase as additional assets are added to the asset stock from construction and acquisition by the City and from assets constructed by land developers and others and donated to the City of Melville (i.e. Fiona Stanley Hospital road, path and drainage networks). Fig 9 shows the projected replacement cost asset values over the planning period in current 2010 dollar values.

Melville CC - Projected Asset Values (Roads V5)



Melville CC - Projected Asset Values (Drainage Version 2 )





**Fig 9: Projected Asset Values**

Depreciation expense values are forecast in line with asset values as shown in Fig 10.

#### 6.4 Key Assumptions made in Financial Forecasts

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

Key assumptions made in this IAMP are:

- Financial data has been allocated to the correct works category
- Information is based on current knowledge only. The anticipated results of current surveys, reviews or their impact on future projections have not been considered.
- All Stormwater Drainage is assumed as being constructed when the 'City of Melville' was established in 1968.
- The design life of the footpaths has been placed at 40 years for all paths.
- The formation age of roads has been based upon their pavement date.

Improvements which will increase the accuracy of future financial forecasts are included the Improvement Plan in section 8.2

## 7. ASSET MANAGEMENT PRACTICES

### 7.1 Accounting/Financial Systems

The current financial package is 'Finance One'

Accountabilities for the finance system reside with the Finance Manager

Australian Accounting Standards must be complied with.

City of Melville Financial Sustainability – Forward Financial Planning and Funding Allocation Policy (Policy No. 13-PL-001).

City of Melville Borrowings and Asset Financial Policy (Policy No. 13-006).

City of Melville Accounting Policy (Policy No. 13-PL-007).

Changes to the accounting/financial system resulting from this IAMP are included in section 8.2 Improvement Plan

### 7.2 Asset Management Systems

The asset management system, (Archibus) is the central source for asset information for the sub categories Footpaths and Drainage, with ROMAN I/II being the asset management system for Roads. The Roman I/II system have the capability to manage all of the planned and reactive maintenance of the Infrastructure assets and produce reports on demand to provide the City of Melville with the management information required to make informed decisions for the life cycle of the assets. The Archibus system has not been developed to this level as yet and substantial resource is required to update and keep current the database information to provide meaningful information and reports.

The ROMAN system is specifically designed for roads and is required to be used by State Government.

All planned and reactive maintenance work issued through the asset management system is captured in the finance system. The planned and reactive maintenance work not issued through the asset management system is issued through and captured by the finance system. In summary, all financial transactions are captured by the finance system but not in the asset management system. The link between the financial and asset management systems is one way at present which means that the financial information stored in Archibus is neither complete nor accurate.

Accountabilities for the asset management system reside with the Manager Asset Management.

Changes to the asset management system resulting from this asset management plan are included in section 8.2 Improvement Plan

### 7.3 Information Flow Requirements and Processes

The key information flows *into* this asset management plan are:

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

The key information flows *from* this asset management plan are:

- The planned works program

- The resulting budget, valuation and depreciation projections;
- The useful life analysis;
  
- Tasks for inclusion in the Improvement Plan.

These will impact the Long Term Financial Plan, Strategic Business Plan, annual budget and departmental business plans and budgets.

The key information flows *from* the asset management to the financial systems are:

- Work order details and costs.

#### 7.4 Standards and Guidelines

IPWEA, 2006, 'International Infrastructure Management Manual', Institute of Public Works Engineering Australia, Sydney, [www.ipwea.org.au](http://www.ipwea.org.au)

IPWEA NAMS.PLUS Asset Management 2009

City of Melville Asset Management Policy (Policy No. 13-PL-008)

City of Melville Asset Management Deployment Strategy

City of Melville Corporate Plan 2008-2012

City of Melville Financial Sustainability – Forward Financial Planning and Funding Allocation Policy (Policy No. 13-PL-001)

City of Melville Borrowings and Asset Financial Policy (Policy No. 13-PL-006)

City of Melville Accounting Policy (Policy No. 13-PL-007)

City of Melville Strategic Financial Plan – The City's long term Financial Plan which outlines all aspects of the key financial strategy objectives and commitments and how future expenditure needs will be funded.

## 8. PLAN IMPROVEMENT AND MONITORING

### 8.1 Performance Measures

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

- The degree to which the required cashflows identified in this asset management plan are incorporated into council's long term financial plan and Strategic Management Plan;
- The degree to which 1-5 year detailed works programs, budgets, business plans and organisational structures take into account the 'global' works program trends provided by the asset management plan;

### 8.2 Improvement Plan

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

**Table 8.2 Improvement Plan**

Task No	Task	Responsibility	Resources Required	Timeline
1.	Establish an Asset Management Working Group to ensure a corporate approach to asset management	Manager Asset Management	Staff	April 2010
2.	Investigate integrating the finance and asset management systems	Manager Asset Management	Staff	July 2010
3.	Update and maintain all data in the AM system	Coordinator Facilities and Assets	Staff	Ongoing
4.	Review financial data and processes, particularly those relating to asset valuations and depreciation	Manager Finance/Manager Asset Management	Staff	December 2010
5.	Ensure the financial (Finance 1) asset register is updated on an annual basis.	Manager Asset Manager	Staff	Ongoing
6.	Set performance targets and implement recording processes for levels of service.	Manager Operations	Staff	July 2010
7.	Quantify desired levels of service.	Manager Operations	Staff	July 2011
8.	Investigate the establishment of asset recording within the financial system allowing all capital and maintenance costs to be attributed to each individual asset	Manager Operations	Staff	July 2011
9.	Develop infrastructure budgets to clearly identify, operational costs, maintenance, renewal and new works	Manager Operations	Staff	July 2010
10.	Audit all stormwater drainage infrastructure to determine year of construction.	Executive Engineer	Staff	July 2011

11	Segregate road and path assets into sub classes and allocate costs across these classes.	Manager Operations/Manager Finance	Budget	July 2011
12	Undertake a condition audit of all roads inclusive of car parks and kerbs	Manager Manager	Asset	July 2011
13	Continue to develop the Long Term Financial Plan for roads to reflect creations, acquisitions, renewals and upgrades	Manager Manager/Manager Operations	Asset	July 2011
14	Increase renewal spending on roads to \$4.5 million per annum, with transfers to reserve of any unexpended funds	Council		June 2010
15	Maintain current renewal spending on paths and review once all slab paths have been replaced	Council		June 2010
16	Review the consumption rate of drainage and transfer this amount to reserve on an annual basis	Manager Management	Asset	June 2010

### 8.3 Monitoring and Review Procedures

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

The Plan has a life of 4 years and is due for revision and updating within 2 years of each Council election.

## REFERENCES

City of Melville, 'Corporate Plan 2008 – 2012,

City of Melville Asset Management Deployment Strategy,

City of Melville, 'Budget,

City of Melville, 'Community Plan,

City of Melville, Community Wellbeing Survey,

City of Melville, 'Long Term Financial Plan,

City of Melville, 'Policies;

- 04-PL-002 Property Retention and Disposal,
- 13-PL-001 Financial Sustainability- Forward Financial Planning and Funding Allocation,
- 13-PL-006 Borrowings and Asset Financial Policy
- 13-PI-007 Accounting Policy,
- 13-PL-008 Asset Management,
- 26-PL-001 Risk Management,
- 26-PL-002 Occupational Safety and Health,
- 28-PL-005 Community Concept Plan,

Asset Management – The City Of Melville Approach

IPWEA, NAMS.PLUS Asset Management- A Guided Pathway

IPWEA, 2006, 'International Infrastructure Management Manual', Institute of Public Works Engineering Australia, Sydney, [www.ipwea.org.au](http://www.ipwea.org.au)