ETHEKWINI MUNICIPALITY

eThekwini Roads Provision Department

ROADS ASSET MANAGEMENT PLAN

2015/2016

PAVED ROADS

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SECTION 1
EXECUTIVE SUMMARY

1.1 Purpose of the Plan

The purpose of the Roads Asset Management Plan is to set a path for the eThekwini Municipality to follow in setting budgetary requirements for its maintenance and rehabilitation programme over the next 30 years. This plan takes into consideration the competing interests of the level of service the community demands and the level of expenditure the Municipality is willing to provide towards maintenance and rehabilitation.

1.2 Asset Description

The paved road network within eThekwini consists of roads that belong to the Municipality, the South African National Roads Agency Limited, the KwaZulu Natal Provincial Department of Transport as well as private entities such as Transnet and private residential developments. The extent of the paved network under eThekwini's ownership is approximately 8000 km and consists of flexible, concrete and block pavements, the majority of which are flexible. The Municipality is also responsible for approximately 1300 km of gravel roads.

eThekwini's roads are classified based on a functional hierarchy. The road categories are A (freeways and arterials), B (bus and industrial routes), C (urban access collectors) and D (residential roads). The majority of the paved road network (49%) consists of Category D roads that provide mobility and access in a local residential context. Category A roads make up only 1% of the network while Category B and C roads constitute 25% and 18% of the road network respectively.

1.3 Levels of Service

Network level inspections are conducted bi-annually by trained assessors on the paved road network. The surfacing, structural and functional distresses recorded are used to calculate a Visual Condition Index (VCI) for each paved road segment. The VCI is a percentage index

ranging between 0 and 100 where 0 represents a road segment in very poor condition and 100 represents a road segment in very good condition. In order to ensure that the road network delivers an acceptable level of service, the following performance criteria have been agreed upon:

- No roads in any of the categories may deteriorate below a VCI of 30
- No category A and B roads may deteriorate below a VCI of 50
- Less than 10% of category C and D roads may deteriorate below a VCI of 50
- The average VCI of the entire network must remain greater than 70

Since 2003 the average condition of eThekwini's surfaced roads fluctuated between 76% and 80%.

1.4 Future Demand

eThekwini's Integrated Development Plan was developed to meet the challenges of managing growth effectively. It is estimated that population and employment would grow by approximately 21% and 33% respectively up to 2020. This, together with other trip attracting opportunities would place increased demands on the Municipality's road infrastructure. The eThekwini Transport Authority is tasked with long term planning to cater for any increases in future demand.

1.5 Lifecycle Management Plan

Pavement management at eThekwini is an ongoing effort spearheaded by the Roads Provision Department. The Road Management System (RMS) implemented in 2003 uses as its platform an asset management software application called dTIMS^{TM} CT. The model for the management of road pavements relates particularly to the maintenance and renewal stages of asset life. In the "Do Nothing" phase, the asset deteriorates slowly and maintenance is generally not required. In the "Maintain" phase, activities will need to be performed to minimise continued deterioration. In the "Renewal" phase, activities are undertaken that restore the asset to a condition close to that of the original. The importance of the time for intervention for renewal is paramount. If renewal activities are not undertaken in a timely manner, the condition of the asset will deteriorate rapidly to failure, and the cost of reconstruction, may be up to four times that of renewal activities.

1.6 Financial Summary

An analysis of existing pavement conditions and costs has been undertaken to determine funding implications for maintenance of the road network.

The Medium Term Expenditure Framework (MTEF) budget has been adopted. This scenario analyses the consequences in terms of future network performance if the Maintenance and Renewal portion of the MTEF budget is implemented for preventive maintenance and rehabilitation of the paved road network. The optimisation function determines the optimum allocation of funding between reseals and rehabilitation. In this instance, an annual funding level ranging between R 424 million and R 400 million per annum is required.

1.7 Asset Management Systems

The Life Cycle Cost Analysis (LCCA) of the paved road network is managed by a pavement management software called dTIMS^{TM} CT. Other support asset/financial management systems are VSmart and JD Edwards.

1.8 Monitoring and Improvement Programme

The Roads Provision Department aims to improve its management of the asset by:

- Creating a Road Asset Management Branch
- Upgrading dTIMS^{TM} CT to the latest version
- Filling vacant positions
- Introducing mechanical tests to complement the visual inspections

SECTION 2
INTRODUCTION

2.1 BACKGROUND

This Road Asset Management Plan prepared by the Roads Provision Department is based on the International Infrastructure Management Manual (IIMM) and will form part of the Municipality's Integrated Infrastructure Asset Management Plan. The Plan only includes the paved Category A, B, C and D roads.

2.2 ETHEKWINI MUNICIPAL AREA

The extent of the eThekwini Municipal Area is shown below.

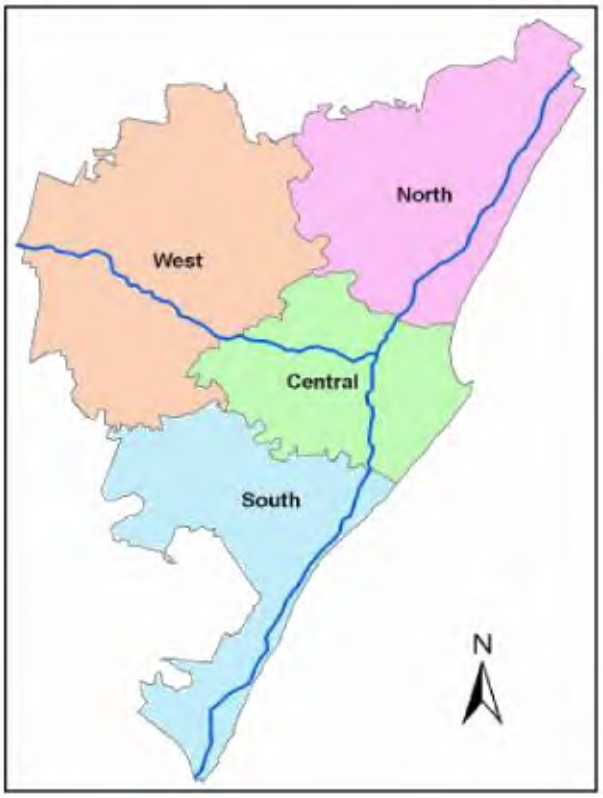


Figure 2.1: eThekwini Municipal Area

eThekwini Municipality is located on the east coast of South Africa at Latitude 30° South and Longitude 31° East. The city enjoys 98 kilometres of coastline and extends up to 58 kilometres inland and is 2300 sq km in extent. It is South Africa's second largest business hub, it has the busiest port in Africa and it is a popular international tourist destination. The climate is subtropical with an average rainfall of 1000mm per annum most of which falls in the summer months.

The city is racially and culturally diverse with an estimated population approaching 3.6 million. The African community makes up 68% of this population, followed by the Indian community (20%), White community (9%) and Coloured community (3%).

The standards of living vary from first world to third world. Within developed areas, residents enjoy good infrastructure and social amenities while settlements in the peripheral areas are generally poorly resourced, lacking infrastructure and social amenities

2.3 THE DRIVERS OF ASSET MANAGEMENT

The Constitution of the Republic of South Africa sets out a broad framework of the objectives of Local Government.

As a follow through, certain parliamentary acts have been introduced which give further definition to the role of municipalities and specific requirements for the development of asset management programmes.

The principal Acts, particularly as far as the management of infrastructure assets is concerned, include:

- Local Government: Municipal Demarcation Act, 1998
- Local Government: Municipal Structures Act, 1998
- Local Government: Municipal Systems Act, 2000
- Local Government: Municipal Finance Management Act, 2003
- Local Government: Municipal Property Rates Act, 2003
- Division of Revenue Act(s)

- Occupational Health and Safety Act, 1993
- Disaster Management Act, 2002
- Water Services Act, 1997
- National Water Act, 1998
- Electricity Act, 1987 and NRS Standards
- National Land Transport Transition Act, 2000
- Urban Transport Act, 1977
- National Health Act, 2003
- National Environmental Management Act, 1998
- Environment Conservation Act, 1989

Drivers supported by legal obligations on the municipality, that define the need and scope for improved asset management practices within eThekwini Municipality, are:

- Legislation

  National Government has recently legislated the need for local government to formulate Asset Management programmes in all sectors.

- Customer Service

  Customers require that:

  - agreed levels of service (standards of service) be delivered reliably, efficiently and effectively at the lowest sustainable cost; and
  - customers/stakeholders be consulted in determining levels of service.

- Financial Responsibility

  By law the Municipality must produce a long term financial plan linked to its Integrated Development Plan which is to be updated annually.

- Growth

  Mechanisms are to be in place to know when a new service must be provided or an existing service upgraded or extended.

- Management of Assets

The Municipality is responsible to ensure that municipal services and assets are provided in the most financially sustainable manner.

Asset Management supports all the above issues and the eThekwini Municipality have accepted the principals of asset management and are proceeding with Infrastructure Management Plans in all its various asset groups.

2.4 WHAT IS SUSTAINABLE INFRASTRUCTURE ASSET MANAGEMENT?

Sustainable Infrastructure Asset Management (SIAM) is 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 for present and future customers and stakeholders (Ref IIMM – V3 Par 1.1.3).

The following statement has been adopted for eThekwini:

"*eThekwini wishes to meet their agreed levels of service in the most cost effective manner, through the management of assets for present and future customers and stakeholders.*" (Ref. Integrated Infrastructure Asset Management – Business Plan Version 1 – July 2006).

2.5 WHAT IS AN ASSET MANAGEMENT PLAN?

An Asset Management Plan is a formalized approach to managing infrastructure assets.

It is a written document that contains a consolidation of all the information that is currently available in regard to infrastructure assets. The plan generally shows the management strategy and the related cost implications for all assets covering their entire lifecycle.

The IIMM – V3 defines an Asset Management Plan as:

"*A Plan developed for the management of one or more infrastructure assets that combines multidisciplinary techniques (including technical and financial) over the lifecycle of the asset in the most cost effective manner to provide a specified level of service. A significant component of the plan is a long term expenditure cashflow projection for all the activities related to this service delivery*".

2.6 PURPOSE OF THE ASSET MANAGEMENT PLAN

The purpose/objective of an Asset Management Plan is to provide a long range planning document which will:

- Identify the physical, functional and condition characteristics of the Municipality's assets;
- Determine acceptable levels of service based on business objectives and customer needs;
- Anticipate the time when it may be necessary to extend or upgrade existing assets or create new assets;
- Provide a systematic process of effectively maintaining, upgrading, operating and renewing Municipality's assets with sound business objectives and demands or customer needs;
- Identify the short term and long term financial commitments, for capital, maintenance and operational, necessary to maintain the assets and desired levels of service;
- Be used to determine the capital and operational budgets for future financial years;
- Identify future costs and predict future problems that may affect service delivery;
- Identify the future business risk associated with the potential failure of the assets or their products (eg water quality) to meet the expected levels of service;
- Facilitate an organized approach to the prioritisation of assets on which annual funds should be expended;
- Outline the current and proposed strategies and programs that are necessary to meet the long term provision of these services; and
- To store the information and knowledge of experienced ageing technical staff familiar with the existing infrastructure assets (storing corporate knowledge).

2.7 RELATIONSHIP WITH OTHER PLANS AND DOCUMENTS

Asset Management Plans (AMP) are key components of the Municipality's planning process and link with the following documents:

1. The eThekwini Municipality Integrated Development Plan 2010 and Beyond
   The IDP presents the Municipality's vision and focuses on translating this vision into action. It presents a workable plan that has budgets, timeframes and monitoring mechanisms, in order to achieve it's targets. The Infrastructure Asset Management Plan is aligned to and forms an integral part of the IDP as it is central to service delivery in the most cost effective manner through the lifecycle management of infrastructure assets for present and future generations.

2. Integrated Infrastructure Asset Management Business Plan – July 2006
   This document is a forerunner to the AMP and details the principles and processes for implementing asset management within eThekwini Municipality.

3. Annual Budgets
   The works identified in the Asset Management Plans should automatically become the basis on which the budgets are prepared.

4. eThekwini Municipality – Risk Management Policy and Framework – August 2009.
   The AMP is aligned to the relevant risk policies and principles set out in this document.

5. Legislation
   The AMP must comply with all relevant legislation and provide the means of meeting legislative requirements.

6. Spatial Development Plans

These plans incorporate policies and objectives for land use and infrastructure. They include proposals for future works to which the AMP must be aligned.

The above relationship is set out in Figure 2.2.

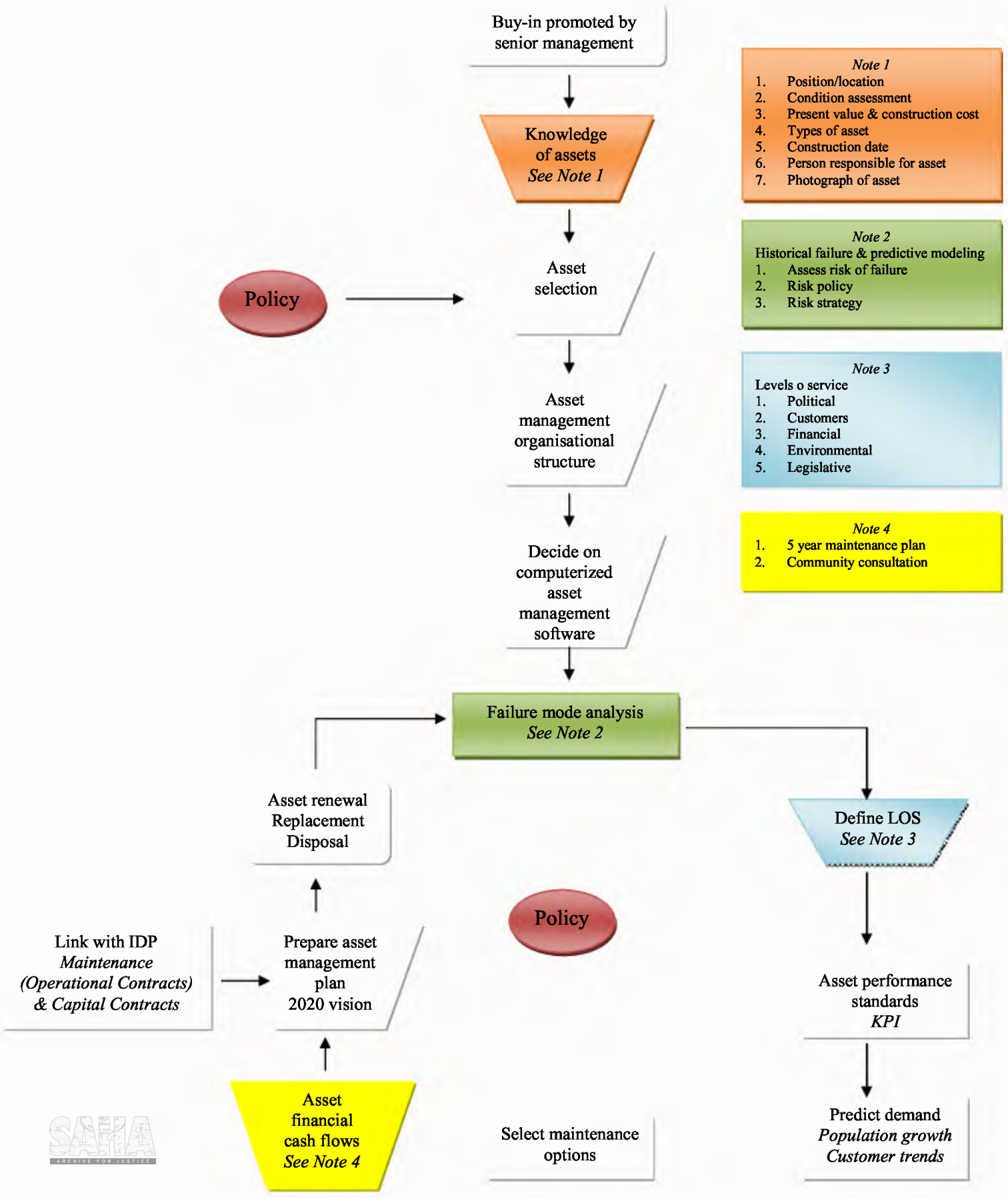


Figure 2.2 Relationship of AMP with Other Documents and Plans

2.8 INFRASTRUCTURE ASSETS INCLUDED IN THE PLAN

The Integrated Infrastructure Asset Management Plan will include the high level strategic assets of the following Asset Groups:

Electricity;
Parks, Recreation and Culture;
Water and Sanitation;
Coastal Stormwater and Catchment Management;
Roads Provision;
Cleansing and Solid Waste DSW;
Fleet;
Information Technology;
eThekwini Transport Authority;
Roads Provision (Bridges and Structures); and
Architecture.

This specific plan is related to the ROADS Asset Group.

2.9 ROADS ASSET GROUP INFRASTRUCTURE ASSETS

The road network in this Asset Management Plan refers to the paved roads of the Municipality. The life cycle cost analysis (LCCA) was conducted for the municipal roads under the ownership of eThekwini, but some roads within the municipal area under ownership of SANRAL and the KwaZulu Natal Province were also surveyed. The condition of these roads will be shown separately but they will not be included in the maintenance and rehabilitation needs calculated during the LCCA process.

Table 2.1 Road network lengths summary

Pavement Type	eThekwini (km)	KZN Province (km)	SANRAL	TOTAL LENGTH (km)
Block	111	1	0	112
Concrete	77	0	0	77
Flexible	6 574	1 003	365	7 941
TOTAL	**6 762**	**1 004**	**365**	**8130**

The eThekwini municipal roads are classified based on a functional hierarchy as described in Table 2.2.

Table 2.2: Functional Road Classification

Road Category	Description
UA	Trunk roads, primary distributors, freeways, major arterials and bypasses used for primary urban distribution and linking urban districts/sectors.
UB	District and local distributors, minor arterials and collectors, industrial and CBD roads, goods loading areas and bus routes used for district distribution and to link communities.
UC	Urban access collectors used for local distribution and to link neighbourhoods.
UD	Local access roads (residential): Loops, access ways, access courts, access strips and cul-de-sacs.
UE	Car parks, bus bays and taxi ranks.
UF	Walkways, arcades and footpaths.

The current length distribution of paved municipal roads per functional category is presented in Figure 2.3. The majority of the paved municipal road network (54%) is classified as UD roads and provides mobility and access in a local residential context.

Class UA roads are typically freeways and limited access arterials. These make up only 1% of roads in the city. UB roads constitute 28% of the road network and UC roads 17%.

Historic Urban Road Functional Classification of eThekwini	RISFSA				
	U1	U2	U3	U4	U5
UA		41	-	-	-
UB	-	-	1,915	-	-
UC	-	-	-	1,061	-
UD	-	-	-	-	3,671
UE	-	-	-	-	-

Figure 2.3 Road category distribution

The road network is also classified in terms of the Road Infrastructure Strategic Framework for South Africa (RISFSA) which was implemented in 2006 (Table 2.3). The majority of eThekwini's roads are RISFSA Class 5.

Table 2.3 RISFSA Strategic Road Classification

Road Class	Description
1	Primary Distributors, providing high mobility with limited access for rapid movement of large volumes of people, raw materials, manufactured goods and agricultural produce of national importance.
2	Regional Distributors providing relatively high mobility with lower levels of access for the movement of large volumes of people, raw materials, manufactured goods and agricultural produce of regional importance in rural and urban areas.
3	District Distributors, providing moderate mobility with controlled higher levels of access for the movement of people, raw materials, manufactured goods, agricultural produce in rural and urban areas of regional importance.
4	District Collectors, providing high levels of access and lower levels of mobility for lower traffic volumes of people, raw materials, manufactured goods and agricultural produce in rural and urban areas of local importance.
5	Access Roads, providing high access and very low mobility routes for the movement of people and goods within urban and rural areas.

2.10 KEY STAKEHOLDERS IN THE PLAN

The Plan recognizes the following persons and groups who have an interest in the services provided by the assets.

External Stakeholders	Internal Stakeholders
Citizens and Ratepayers	Asset Management Staff
Government Agencies	Internal Auditors
Customers	Municipal Council
Contractors / Consultants and Suppliers	Financial Staff
Emergency Services	Executive Management Team
Developers	Policy and Planning Staff
Utility Companies	Regulatory services
Investors	
Advisory groups – legal and consulting	
Regulators	
Community Groups	
Non-government Organisations	

The Plan is designed to transparently meet the needs, expectations and scrutiny of all its stakeholders and at the same time to comply with regulatory laws and requirements. The plan is to focus on issues to give greatest benefits to its stakeholders which in turn will lead to corporate confidence in the planning process.

2.2.1 ORGANISATION STRUCTURE

The Asset Management accountability structure is shown in Figure 2.4.

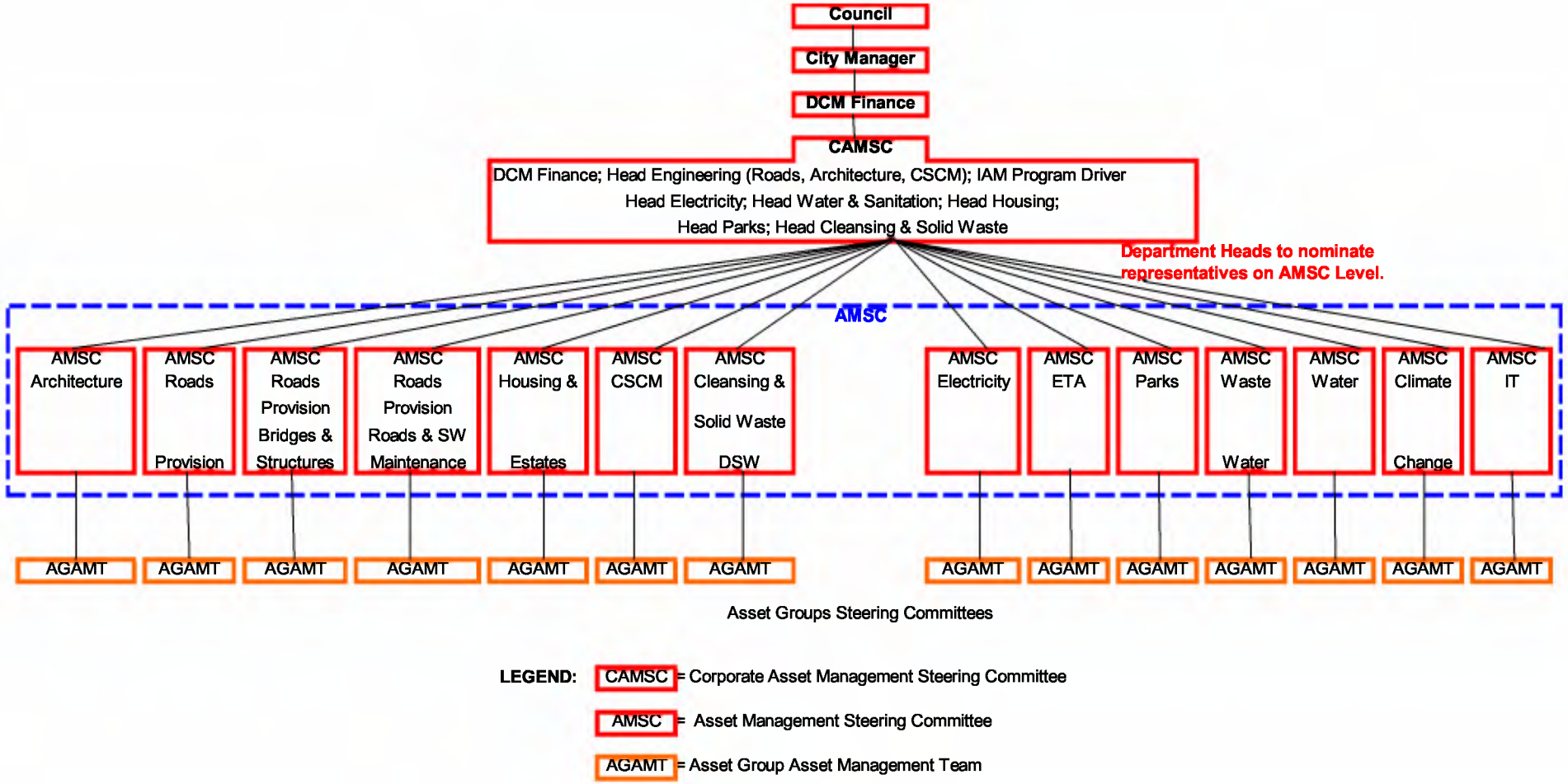


Figure 2.4 Asset Management Accountability Structure

2.11 GOALS AND OBJECTIVES OF ETHEKWINI MUNICIPALITY ASSET OWNERSHIP

The goals and objectives of ownership and maintenance of infrastructure assets by the Municipality are:

- To provide sustainable services for the community from the economic, environmental and social points of view;
- To provide a platform for economic and social development;
- To promote public health and safety;
- To safeguard long term returns for the ratepayers/citizens;
- To meet the needs and levels of service desired by the customers and stakeholders /community; and
- To facilitate good governance.

2.12 PLAN FRAMEWORK (Figure 2.5)

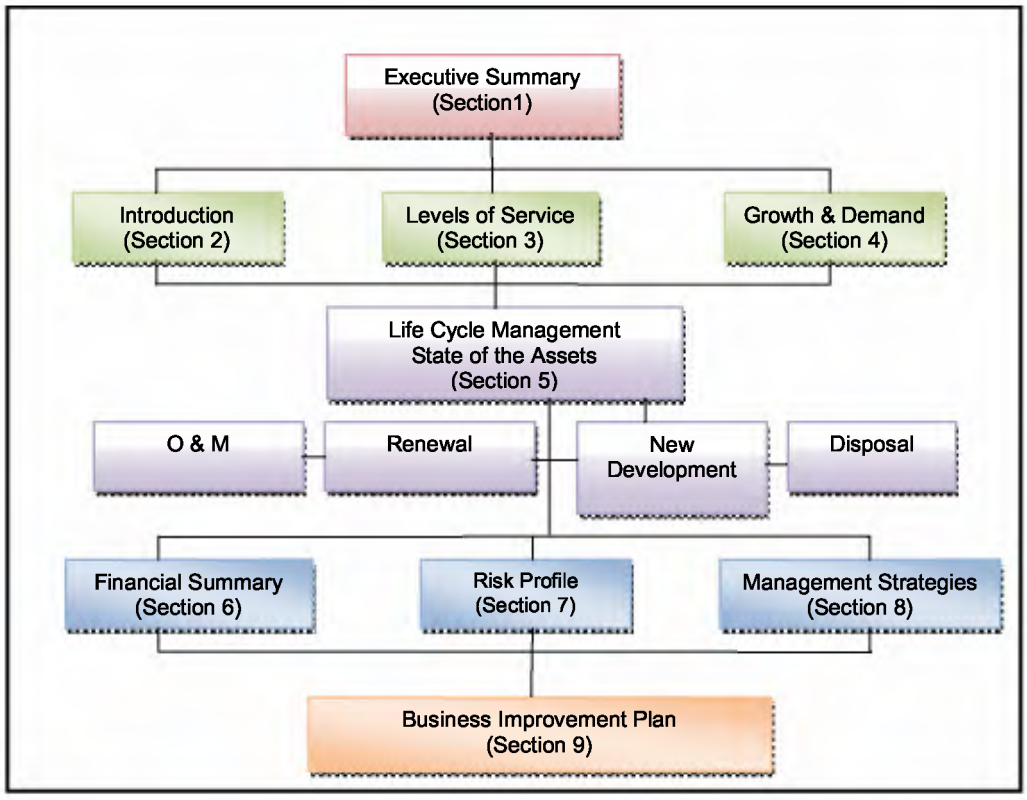


Figure 2.5: Asset Management Plan Framework

The Asset Management Plan examines the state of the infrastructure assets in each of Municipality's Asset Groups and reviews aspects of the current and future required levels of service expected from the assets which include operations and maintenance, renewal, new development and disposal of assets. Based on the levels of service and management information financial projections are made which will form the basis for the Municipality's annual and long term planning process. For the assets a risk profile, management strategies and business improvement plans are developed.

2.13 CORE AND ADVANCED ASSET MANAGEMENT

Asset Management is a process that incorporates the concept of continual improvement. Over time, it is intended that Asset Management Plans and processes will be improved with better information, better approach to the long term management of the infrastructure assets.

2.13.1 CORE (BASIC) ASSET MANAGEMENT PLAN

This level of plan will generally focus on current practices taking a life cycle approach and is based on:

- A simple risk assessment to identify critical assets;
- The use of available current information and random condition/performance sampling;
- Existing levels of service;
- Contrasting existing management strategies with opportunities for improvement;
- The use of simple ranking criteria to prioritise capital works;
- Long term cash flow predictions based on local knowledge and options for meeting current levels of service; and
- Performance measures in place to monitor implementation and improvement of the plan.

2.13.2 ADVANCED ASSET MANAGEMENT PLAN

After the development of an initial Asset Management Plan, Asset Management will evolve in a continuous cycle of review and improvement to optimize activities and programmes to meet agreed service standards. This step by step approach will drive the Asset Management practices to a "best appropriate practice" (BAP) level using a risk based filtering technique by identifying strategies to reduce life cycle costs through improved practices and new technology.. This BAP or advanced asset management will become system focused, utilizing enhanced computerized systems and asset management processes and more detailed and accurate data on asset condition, performance and cost. This will ultimately provide a long term planning document.

The plan needs to be supported by:

- Well defined and agreed levels of service;
- Accurate and detailed asset data with minimum assumptions and high confidence levels;
- Impacts of other tactical plans on the asset management plan; and
- Reviews concerning technical, logical and appropriate implementation.

2.13.3 ASSUMPTIONS AND LIMITATIONS OF THE ASSET GROUP'S PLAN

The following assumptions have been made in compiling this Asset Management Plan.

- The asset data is considered to be reliable and fit for the purpose of developing the long term financial forecasts.
- Council will continue to fund the level of service currently set out in the plan as guided by the Department's LCCA of the road infrastructure.
- The asset and condition data is reviewed bi-annually.

SECTION 3
LEVELS OF SERVICE

3.1 Community and Customer Expectations

Although consumer expectations have not been measured scientifically, anecdotal evidence suggests that consumers expect to travel in safety on a road surface that is free from potholes, offers a good riding quality and has proper drainage.

Notwithstanding the above, there is a need to upgrade roads in rural areas as indicated in the IDP.

3.2 Strategic and Corporate Goals

The eThekweni IDP sets out the City's delivery plan which is organized into 8 separate but related plans to action the goals of the city which are summarized as follows:

- Sustaining our natural and built environment.
- Economic development and job creation.
- Quality living environments.
- Safe, healthy and secure environments.
- Empowering our citizens.
- Celebrating our cultural diversity.
- Good Governance.
- Financial viability and sustainability.

An IDP Strategic Focus Area is to meet infrastructure and household service needs and to address backlogs. This RAMP assists progress towards the achievement of these strategic goals by targeting to improve the overall condition of the Municipality's

road network from the current service level and to reduce the backlog of roads that need to be upgraded from gravel to surface standards.

3.3 Legislative Requirements

3.3.1 Legislative Framework

The South African Constitution requires that the roads authorities in the various spheres of government undertake management, financial, planning and implementation processes with regards roads provision. Furthermore the *Municipal Systems Act (MSA)* also stipulates the responsibilities of the municipal authorities in regard the management and financing of roads in the municipal context.

Municipalities are therefore responsible for the construction and maintenance of roads and streets that are proclaimed as municipal roads, within their jurisdiction. *Schedule 5B* of the Constitution assigns exclusive functions to municipalities for municipal roads, traffic and parking. Effective management of municipal infrastructure is central to the eThekwini Municipality providing an acceptable standard of service to the community. Infrastructure impacts on the quality of our living environment and opportunities to prosper. Not only is there a requirement to be effective, but the manner in which the eThekwini Municipality discharges its responsibilities as a public entity is also important. The Municipality must demonstrate good governance and customer care, and the processes adopted must be efficient and sustainable. Councillors and officials are custodians on behalf of the public of infrastructure assets, the replacement value of which, in the case of the roads at eThekwini Municipality, is well over a eighteen billion Rand.

In recent decades, concerns over poor service performance (often only highlighted during high profile failure of infrastructure) and unnecessary loss of asset value (arising from inadequate maintenance and capital renewal) has driven governments across the globe to demand improvements in infrastructure management practice in the public

sector. Key themes of the latest generation of legislation introduced (including the *Municipal Systems Act* and the *Municipal Finance Management Act – MFMA*) include:

- long-term sustainability and risk management;
- service delivery efficiency and improvement;
- performance monitoring and accountability;
- community interaction and transparent processes;
- priority development of minimum basic services for all; and
- the provision financial support from central government in addressing the needs of the poor.

Legislation has entrenched the *Integrated Development Plan (IDP)* as the principal strategic planning mechanism for the eThekwini Municipality. However, the IDP cannot be compiled in isolation – for the above objectives to be achieved, the IDP needs to be informed by robust, relevant and holistic information relating to the management of the municipality's infrastructure. There is a need to direct limited resources to address the most critical needs, to achieve a balance between maintaining and renewing the existing road infrastructure whilst also addressing the existing backlogs.

3.3.2 Road Infrastructure Strategic Framework for South Africa (RISFSA)

The Road Infrastructure Strategic Framework for South Africa (RISFSA) is the official roads policy document for the planning and development of road infrastructure in South Africa. The redefinition of the road network as per the RISFSA Classification is a fundamental component of this policy. The objectives of the reclassification process are to:

- have a nationwide road classification system, ensuring an integrated and consistent system;
- ensure the appropriate allocation of ownership and responsibility for the entire road network;
- assist in the reduction of road backlogs and unclassified roads; and

- provide a nationwide standard approach toward prioritisation and allocation of funding for roads

The basis for the reclassification is by road function, i.e. the types of roads have been grouped by the character of the service they are intended to provide, and is developed for transportation and network planning purposes. The functional classification acknowledges that roads and streets do not serve travel individually, but that travelling is characterised by movement through networks of roads and can be categorized comparative to such networks in a coherent and efficient manner. The functional classification is thus also consistent with categorisation of travel. Functional and administrative classification however has a relationship with the classification of roads by design standards. In most cases high-order roads in the design classification system will predominantly be in the administrative sphere of national and provincial government, and from a functional perspective, comprise the primary and regional networks. The lower-order roads in the design classifications are chiefly the responsibility of local authorities, and consist mainly of district and access roads. According to the RISFSA policy document, the proposed *"functional classification system is high level and does not seek to replace the administrative, technical and road safety classification systems of the road network that are implemented by the road authorities"*. The functional classification rather attempts to establish a uniform and integrated strategic classification system for the country, which will underpin and inform any other form of classification to be developed or in existence. In essence, the LOS offered by the Municipal road network will be in accordance with National standards.

3.4 Current Level of Service

3.4.1 General overview

The eThekwini Municipality's Roads Provision Department has implemented a Road Management System (eROADS - eThekwini Road Optimisation Analysis Decision Support) which uses as its platform the Deighton dTIMS CT software application

(Deighton's Total Infrastructure Management System). The objectives of this system are to:

- assist planning staff in ensuring that roads under their management are maintained in a condition acceptable to the travelling public and at the minimum life cycle cost,
- meet the requirements of the Municipal Finance Management Act (Act No. 56 of 2003) and the Generally Recognised Accounting Principles (GRAP 17).

The eROADS system incorporates the following broadly defined functions:

- The road network owned and maintained by the eThekwini Municipality (both surfaced and gravel) has been defined and the location of each road referenced on the eThekwini Geographic Information System (GIS). This GIS "stick-map" is maintained and updated by the Municipality's Corporate GIS Department as part of the Municipality's Property Management System.
- A detailed visual assessment is made of the entire surfaced network in terms of the national standard TMH 9 Visual Assessment Document every 2 years while specialised non-destructive strength testing (Falling Weight Deflectometer) is undertaken on every strategic road within network (i.e. category A and B roads) every 4 years. This enables a regular condition assessment to be quantified that illustrates the current status quo along with historic trends. This information is generally viewed within the Department via the GIS.
- Every 2 years (after completion of the visual condition assessment), a strategic needs assessment is undertaken to evaluate future network conditions, future maintenance requirements and budgetary needs. This process incorporates lifecycle costing using the World Bank's HDM III pavement performance prediction models. This assessment is the primary motivator for budgetary needs for the road network both current and in the future.
- A 2 year rehabilitation programme is compiled after the visual condition assessment which is based on a maximised benefit/cost lifecycle prioritisation across the entire surfaced network of the Municipality. The programme is thus

the outcome of an objective assessment of the technical needs of the network as a whole.

- Although the gravel road network has been identified, the informal (unengineered) nature of the gravel road network does not lend itself towards standard gravel road management practices. However, a system has been developed to prioritise and identify a gravel to surface upgrade programme that takes into account social development considerations and technical engineering constraints. This programme will be generated every 2 years.

3.4.2 Road network description

The road network within the eThekwini Municipal Boundary has been discussed extensively in Section 2. The majority of the paved municipal road network (54%) is classified as UD roads and provides mobility and access in a local residential context. Class UA roads are typically freeways and limited access arterials. These make up only 1% of roads in the city. UB roads constitute 28% of the road network and UC roads 17%. (SANRAL and KZN roads are NOT included in these statistics).

3.4.3 Level of service

The basic level of service for the provision of surfaced roads has been identified as:

- The Municipality has identified an Urban Core. All roads within the Urban Core should be all weather access surfaced roads.
- Outside of the Urban Core, roads within communities having a population density greater than 15 persons per hectare should be all weather access surfaced roads as well as all public transport routes and access roads to these higher density communities.
- The Visual Condition Index (VCI) for any road should not fall below 30.
- The overall condition category of paved roads will be “good”.
- No Category A or B road will be in a “poor” condition.

- No Category C or D road will be in a “very poor” condition.
- The backlog, i.e. roads in a “poor to very poor” condition, will not exceed 10% of the total road network length.
- The asset value of the road network will not decrease.

3.5 Future Level of Service

There is no detailed information on what customers require as a desired level of service is. Therefore, the status quo of future levels of service will remain at current levels. The gaps between current and desired levels of service are unlikely to be closed until all intervention levels have been determined and documented. Future plans include measuring the roughness of the road surface in accordance with international best practice and to report the LOS as the International Roughness Index (IRI).

SECTION 4
FUTURE GROWTH AND DEMAND

4.1 Demand/Growth Forecast

4.1.1 Key nodes and corridors

The IDP supports a municipal system of development nodes and corridors that are highly accessible to public transport. The implication of achieving widespread community accessibility in this manner is the need to increase development densities along the corridors within the limits of known carrying capacity and encourage multi-purpose development at the key transport nodes in the public transport system.

Of the major routes and corridors, the north-south coastal corridor is the only major corridor. It extends from Isipingo in the south to the northern residential areas of KwaMashu, Ntuzuma, Inanda and Phoenix in the north. Bridge City is the proposed, future major transport node at the northern end of this public transport corridor. At the very centre of the corridor is the CBD and to the south of the CBD an elongated highly developed industrialised area known as the South Durban Basin (SDB). Extending north from the CBD there is also a narrow but intensely developed band of commercial/light industrial development along Umgeni-North Coast Road. This coastal corridor from south to north contains high proportion of the formal employment in the municipal area. Apart from Isipingo, Bridge City and the CBD the only other major development/ transport node in the municipal area is the Pinetown CBD. This is the hub of transport activity to the north and west.

4.1.2 Traffic Information

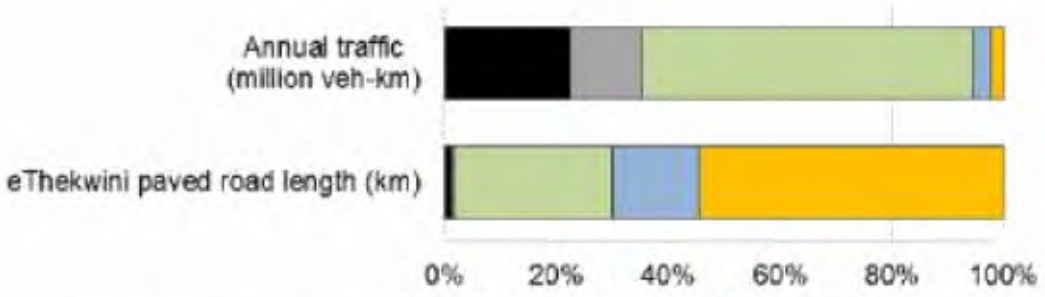
As traffic counts are mainly available for higher order routes, the traffic information used by the Department is derived from the functional classification of roads as shown in Table 4.1.

Table 4.1 Traffic figures adopted for the municipal roads of eThekwini

	URBAN			
	ROAD CATEGORY			
	A	B	C	D
Basic No. of Units per Area	100	100	100	100
Area Factor	10	10	5	1
Areas Served	500	50	5	1
No. of dwellings served	50,000	5,000	500	100
Vehicles per dwelling	1	1	1	1
AADT (2 way)	50,000	5,000	500	100
	% Vehicles			
% Cars	89	79	68	90
% Taxis	5	15	25	5
% Heavies	4	3	7	5
% Buses	2	3	0	0
	Equivalent Light Vehicle Factor			
Cars	1	1	1	1
Taxis	1	1	1	1
Heavies	40	40	40	40
Buses	40	40	40	40
	Equivalent Light Vehicles per Day			
Cars	22,250	1,975	170	45
Taxis	1,250	375	63	3
Heavies	40,000	3,000	700	100
Buses	20,000	3,000	0	0
Total ELV's per Day	83,500	8,350	933	148
	E80's/axle			
Cars	0.0002	0.0002	0.0002	0.0002
Taxis	0.018	0.018	0.018	0.018
Heavies	0.45	0.4	0.35	0.35
Buses	0.6	0.6	0.3	0.1
	Axles/vehicle			
Cars	2	2	2	2
Taxis	2	2	2	2
Heavies	3.5	3	2.5	2
Buses	2	2	2	2

	URBAN			
	ROAD CATEGORY			
	A	B	C	D
	E80's/vehicle			
Cars	0.0004	0.0004	0.0004	0.0004
Taxis	0.036	0.036	0.036	0.036
Heavies	1.575	1.2	0.875	0.7
Buses	1.2	1.2	0.6	0.2
	AAD Vehicle			
Cars	22,250	1,975	170	45
Taxis	1,250	375	63	3
Heavies	1,000	75	18	3
Buses	500	75	0	0
	AADE80			
Cars	9	1	0	0
Taxis	45	14	2	0
Heavies	1,575	90	15	2
Buses	600	90	0	0
	E80 Growth Rate			
	4	5	3	1
	Design Life (years)			
	20	20	20	20
Growth Factor	11,304	12,673	10,102	8,117
Design E80 Loading	25.19	2.46	0.18	0.02
Actual Traffic Class	ES30	ES3	ES0.3	ES0.03
Surfaced Road Traffic Class	ES30	ES3	ES0.3	ES0.03

The distribution of traffic amongst the road categories is shown in Figure 4.1. U1 through U3 roads provide mobility in the Municipality and affect the majority of road users in the municipality. These should therefore be optimally maintained to sustain a safe and economic road network for 94% of the annual vehicle traffic.



	eThekwini paved road length (km)	Annual traffic (million veh-km)
U1	73	1332
U2	41	757
U3	1915	3495
U4	1061	194
U5	3671	134

Figure 4.1 Distribution of annual traffic amongst road categories: A, B, C and D

4.1.3 Long term demographic trends

The extent and location of growth in population and employment opportunities, together with other trip attracting opportunities impacts on the transport system requirements for the municipal area. Table 4.2 shows the estimated population and employment growth over approximately twenty years for the most likely growth scenario.

Table 4.2 Population and employment (1000's)

	2001	2020	Growth
Population	3 063	3 700	+ 21%
Employment	762	1 015	+ 33%

Population projections suggest that migration may result in a 21% increase in the population, most of which will be in the very low income group.

4.1.4 Key nodes within the city

The key nodes that have a major impact on the pattern and extent of travel in the municipal area are King Shaka International Airport, the iDube Tradeport, the port expansion/upgrade and the development around Bridge City.

4.1.4 The overall planning environment

The eThekwini Municipal area consists of the urban core, the urban periphery and the rural/peri-urban area. Within the municipality there are five separate area based management (ABM) programmes which geographically cover a large part of the municipal area. These are the:

- CBD – the main commercial centre
- South Durban Basin – industrialized zone south of the CBD
- Inanda-Ntuzuma-KwaMashu (INK) residential areas
- Cato Manor residential area
- Rural areas on the City's periphery

Collectively, the programmes of these districts, respond at local level to the development imperatives expressed in eThekwini's IDP and the City's economic development framework giving input to a spatial development framework over a large part of the municipal area. Within the urban edge, densification is promoted to make best use of available infrastructure capacity and minimise the cost of bulk services.

4.1 Changes in Technology

Technological advances will increase the asset inspection efficiencies by minimising double handling of information and better managing the data. This information includes the physical parameters and condition of the asset. Previous methods of inspections requiring physical person power may be reduced with new technologies automating the information gathering process.

4.2 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.

SECTION 5
LIFE CYCLE MANAGEMENT PLAN

5.1 Introduction

A Pavement Management System provides an organizational framework for all the work activities and services necessary to provide, operate and maintain the roads in a safe and cost-effective manner throughout their life-cycle.

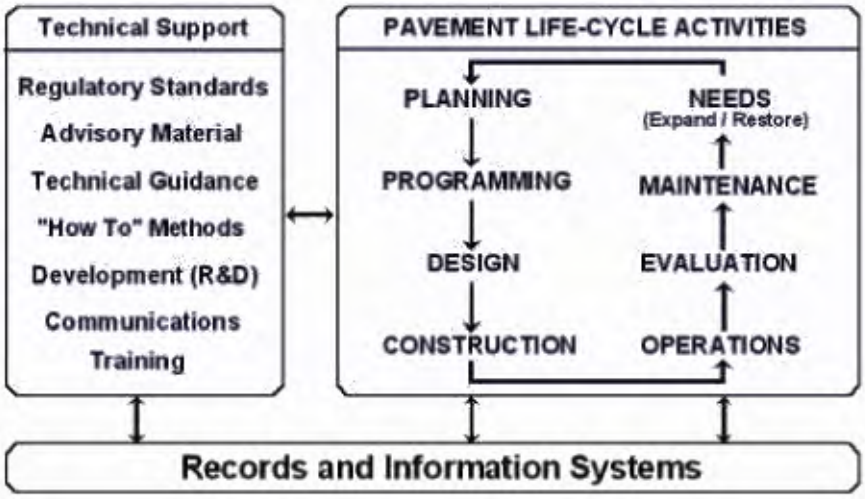


Figure 5.1 Life Cycle Management

The life-cycle begins with project planning and programming of funds, followed by pavement design and construction. Once built, the conditional characteristics of the surface must be evaluated regularly to ensure that the pavement is safe and that the condition of the pavement is being protected. Results of the pavement evaluation activity provide input to programs for pavement maintenance and rehabilitation. Once

the pavement has reached the end of it's service life, the pavement life-cycle repeats itself. A number of technical support activities are also required. Each life-cycle activity requires a set of procedures and methods relating to pavement design, construction, condition evaluation, selecting the best materials and methods for maintenance and the options and methods available for rehabilitation.

5.2 Current pavement evaluation methods

The condition of the paved road network is assessed using visual evaluation methods which are used to establish condition indices, maintenance and rehabilitation needs as well as priorities at a network level. The condition of the pavement is considered from the point of view of the road user and the road engineer. The road user regards the road as a service and hence the pavement is appraised in terms of comfort, safety and operating costs. The assessment of the condition of the pavement from an engineering perspective is based on functionality and the condition of the pavement's surfacing and structure. The condition data collected during the visual assessments is processed and a visual condition index (VCI) is used to describe the condition of the pavement based on a condition index range as shown in Table 5.1.

Table 5.1 Condition Categories

Condition Index Range	Description of Category
85 ≤ VCI ≤ 100	Very good
70 ≤ VCI < 85	Good
50 ≤ VCI < 70	Fair
30 ≤ VCI < 50	Poor
0 ≤ VCI < 30	Very poor

Falling weight deflectometer (FWD) tests are also conducted on the Category A and B roads to evaluate the physical properties of a pavement. Inspection data is stored in a shapefile and is accessible to staff via the GIS.

5.3 Asset Condition

5.3.1 Visual Assessments

Roads are assessed visually according to nationally accepted inspection standards. The degree (seriousness) and extent (occurrence) of each distress related to the surface, structure and function of the pavement are recorded. Visual condition assessments are preceded by training, testing and calibration sessions. Quality control plans are used to monitor the quality of the data collected.

5.3.2 Flexible pavement distresses

Many roads have dry and brittle binder which leads to surface cracks. Crocodile cracks indicate structural problems and give rise to potholes. Riding quality problems are exacerbated by poor quality reinstatements as a result of service providers who dig trenches in the road reserve to install their services.

5.3.3 Block pavement distresses

The most widely spread surface distress is cracked and missing blocks. The block pavements generally have a good structure with minimal defects. There are reduced levels of functional deterioration.

5.3.4 Concrete pavement distresses

The condition of the joint seals is a problem on the concrete roads. Principal structural defects relate to cracked and shattered slabs. The surface and structural defects have invariably led to a poor riding quality.

5.4 Condition (VCI) of paved roads

5.4.1 Network VCI

The average network VCI of the paved roads in eThekwini municipality, based on the 2011 assessment data, is 77% meaning the overall condition is “good”. A three per cent decrease in overall network condition is noted since 2009. This value has fluctuated between 76% and

80% since 2003.The fluctuation in the condition of the network as indicated by the VCI may be attributable to the effect of historic investment for maintenance and rehabilitation over time. The VCI distributions are shown in Figure 5.1.

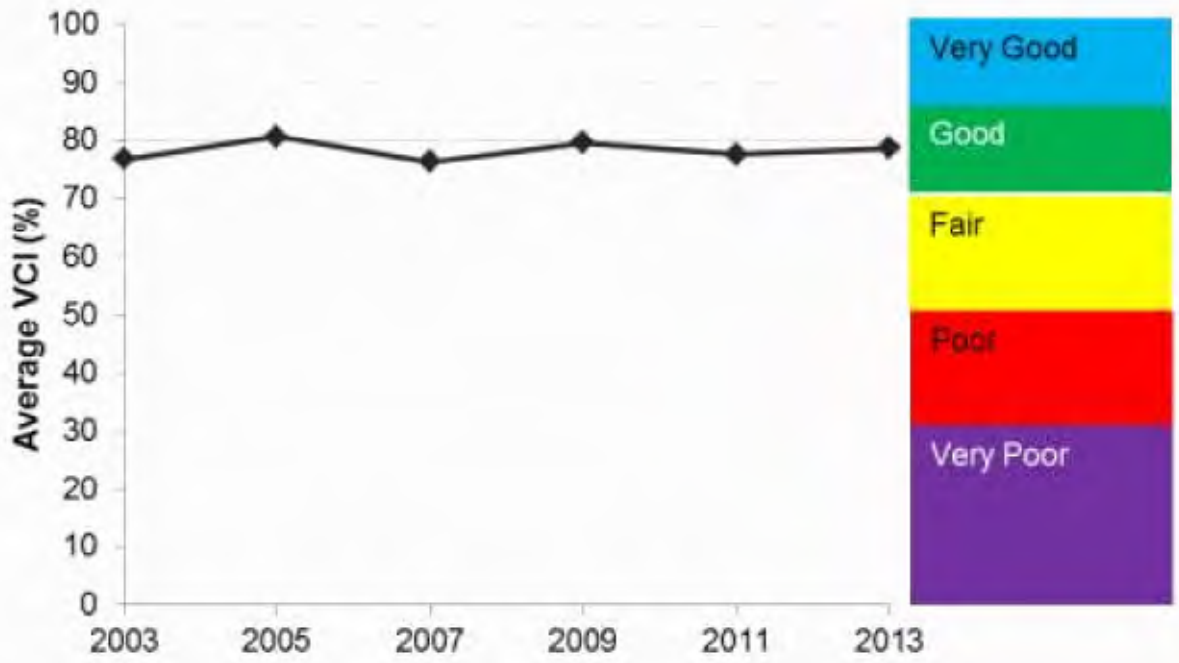


Figure 5.1: Average VCI for paved roads, 2003 to 2013

A RISFSA recommendation is that not more than ten per cent of roads should be in a "poor to very poor" condition. The level of maintenance applied by the municipality is therefore still within the RISFSA recommendation, but the increase in the "fair" to "very poor" condition categories should be addressed to prevent further deterioration of pavements.

Preventive maintenance (reseals) remains the recommended intervention to prevent "fair" roads deteriorating into the "poor" condition category. Roads in a "fair" condition have the opportunity to be preserved with cost-effective preventive intervention measures, effectively increasing the life of the pavement by many years.

5.5 Asset Valuations

The Current Replacement Cost (CRC) of the road network as calculated in VSmart is approximately R 107 billion. This is the cost to rebuild the entire network from 'scratch'. The cost of road furniture such as signs, bridges and culverts are not included in this calculation of asset value.

5.6 Routine Maintenance Plan

The Roads and Stormwater Department which falls within the Engineering Unit is responsible for the routine maintenance of the road network. Their head office is situated at Archie Gumede Place, Durban and operates from twenty three depots in six regions within the Ethekwini area. The Department is primarily responsible for the effective maintenance of roads and stormwater systems. Routine maintenance is the regular on-going work that is necessary to keep the road network operating, including instances where portions of the road network fail and need immediate repair to make the asset operational again.

Much of the work carried out by the department relates to the following activities:

- Repair / re-instatement of trenches and potholes;
- Replacement of missing manhole covers;
- Unblocking of stormwater drainage systems;
- Repairs to guardrails and roadside fencing;
- Repair / replacement of traffic lines and signs;
- Grading / regravelling of gravel roads;
- Construction of vehicle access to property (at owner's expense).

5.7 Renewals and Rehabilitation

The LCCA of pavements is a process by which preventive maintenance and rehabilitation decisions made today are quantified in terms of their effect on the road's life cycle. The full effect of today's decisions is therefore taken into account, rather than just the obvious immediate short term effects (for example, localised condition improvement). Pavement life

cycle management is a proactive business process that complements existing maintenance policies by providing strategic focus and perspective. The eROADS system is used to develop a multi-year maintenance and rehabilitation plan under constrained budget scenarios. It also has the capability of investigating the long-term effects of various maintenance policies and budget levels on the performance of the road network.

Optimisation is the systematic search for better solutions. Optimally scheduled preventive maintenance and rehabilitation strategies improve pavement reliability, time between failures, overall service delivery, pavement useful life, and ultimately reduces the total life cycle cost of road ownership.

In the analysis, sets of preventive maintenance and rehabilitation strategies (sequence of treatments) were considered for each road segment according to its current condition, predicted future condition and benefits. Table 5.3 describes the treatments considered in the paved roads strategic analysis.

Table 5.3: Treatments and unit costs for Paved roads in eThekwini Municipality

Treatment		Description	Road category
FLEXIBLE PAVEMENTS	Rejuvenate	Rejuvenation of dry and ravelled asphalt surfaces that are structurally sound	All
	Seal	Reseal using Single, Double, Modified etc Seal. Selection determined in Project Level Inspection	UA,UB UC,UD
	Light rehabilitation	Typically a 40mm overlay or Mill and replace operation. Could also be reworking the basecourse with single seal on more rural roads.	All
	Heavy rehabilitation	Ranges from Reworking at least 2 structural layers (eg asphalt and base) to full reconstruction	UA,UB UC,UD
SEGMENTED BLOCK PAVEMENTS	Rehabilitation	Asphalt Overlay (reconstruction generally uneconomical)	All

JOINTED CONCRETE PAVEMENTS	Rehabilitation	Full Reconstruction of Concrete Wearing Course	UA,UB UC,UD

The area-under-the-curve benefit function, weighted by traffic (AADT), was used for the analysis.

5.8 Funding Scenarios

The life cycle analysis is largely dependent on the funding available for preventive maintenance (rejuvenate and reseal) and rehabilitation. The maintenance and rehabilitation (M&R) portion of the Medium Term Expenditure Framework (MTEF) budget is shown in the table 5.4. The three primary budget scenarios are shown in Table 5.5.

Table 5.4 Budget for rehabilitation

YEAR	UB, UC, UD ROADS (INITIAL ALLOCATION)	UB, UC, UD ROADS (REVISED ALLOCATION)
2014/15	R386 million	
2015/16	R383 million	
2016/17	R400 million	R 285,8 million
2017/18	R400 million	R 420,5 million
2017/18 onwards	R400 million	R 279,9 million

As reflected in Table 5.4, the 2016/17 budget has been significantly reduced thus severely compromising the Department's ability to deliver on its current levels of service.

Table 5.5 Budget scenarios

FUNDING SCENARIO NAME	DESCRIPTION	ANNUAL FUNDING LEVEL
MTEF Budget	This scenario analyses the consequences in terms of future network performance if the M&R portion of the MTEF budget is implemented for preventive maintenance and rehabilitation of the paved road network. The optimisation function determines the optimum allocation of funding between reseals and rehabilitation.	Ranging between R386 million and R400 million per annum
Status Quo Budget	The objective of this funding level is to maintain the paved road network in its current condition. It is thus the minimum funding level that is required to ensure no further deterioration in the overall condition is allowed.	Funding level calculated by the analysis: R250 – 280 million pa
Technical Needs Budget	This scenario selects the first and earliest treatment that is triggered for each road segment, according to the intervention measures adopted for eThekwini's Municipal Roads. This scenario is used to determine the funding level that is currently required to remove all backlog with regards to preventive maintenance and rehabilitation. Thereafter the paved road network is maintained at optimum levels.	Approximately R1.6 billion for 2014/15 to 2015/16 Thereafter R290 million pa.

5.9 Predicted condition

Reseal expenditure from 2014 onwards should increase drastically to prevent deterioration of the overall road network condition. The current level of funding is adequate to maintain the

paved road network at the target levels of condition set by the Municipality. The following conditions will then be met:

- The overall condition category of paved roads will be "good".
- No Category A or B road will be in a "poor" condition.
- No Category C or D road will be in a "very poor" condition.
- The backlog, i.e. roads in a "poor to very poor" condition, will not exceed 10% of the total road network length.
- The asset value of the road network will not decrease.

5.10 Development/New Works Plan

The creation of new roads and related assets is effected in several ways:

- Assets being vested in Council through subdivision/developments.
- Construction of roads by the Housing Department.
- New works and expansions in terms of the eThekwini Transport Authority's plans.

5.11 Disposal Plan

The Municipality disposes of unused sections of road reserve when requested by adjoining property owners providing the road does not provide legal access to other property owners. It is however unlikely that any constructed road would be disposed of while it is still serving residents. Although it is expected that some cost may be involved with disposal at the end of their useful lives, it is not expected that these costs will be incurred within the current financial forecast period. Therefore no funding allocation has been made in the forward work programme at this time for disposal costs. It is however recommended that this situation be reviewed with each future update of the Asset Management Plan.

SECTION 6
FINANCIAL SUMMARY

6.1 Financial Statement and Projections

6.1.1 Renewal / Rehabilitation Demands

The renewal/rehabilitation demands are based on the analysis of the data collected during the bi-annual visual condition inspection surveys. These are detailed in the document entitled “Strategic Road Maintenance Needs Report” which is available from the Roads Provision Department upon request.

6.1.2 New Works

Details of new works are available from the eThekwini Transport Authority.

6.1.3 Maintenance Costs

Maintenance costs are available from the Roads and Stormwater Maintenance Department.

6.1.4 Operating Costs

Operating costs are based on the budgetary allocation made to the Roads Provision Department by Treasury.

6.2 Funding Strategy

The expected performance of the paved road network, for various funding levels, is presented in Figure 6.1 and Figure 6.2

- The current funding level is close to the optimum for preventive maintenance and rehabilitation. According to the analysis the average condition of the paved road network will improve if the current funding level is implemented under the assumption that the optimised fund allocations are obeyed.
- A Status Quo scenario was investigated to determine the required funding where the paved road network will be maintained in its current condition. This scenario does not allow the overall condition of the network to improve nor deteriorate. The analysis determined an annualised funding between R250 million and R280 million is required to prevent further deterioration. These calculations are based on the assumptions that the allocation of funding is optimised, e.g. for the R250 million per annum funding scenario 48% of the expenditure should be used for reseals. In the case of a reduced expenditure for reseal projects, an increased level of funding will be required to achieve the same level of condition.

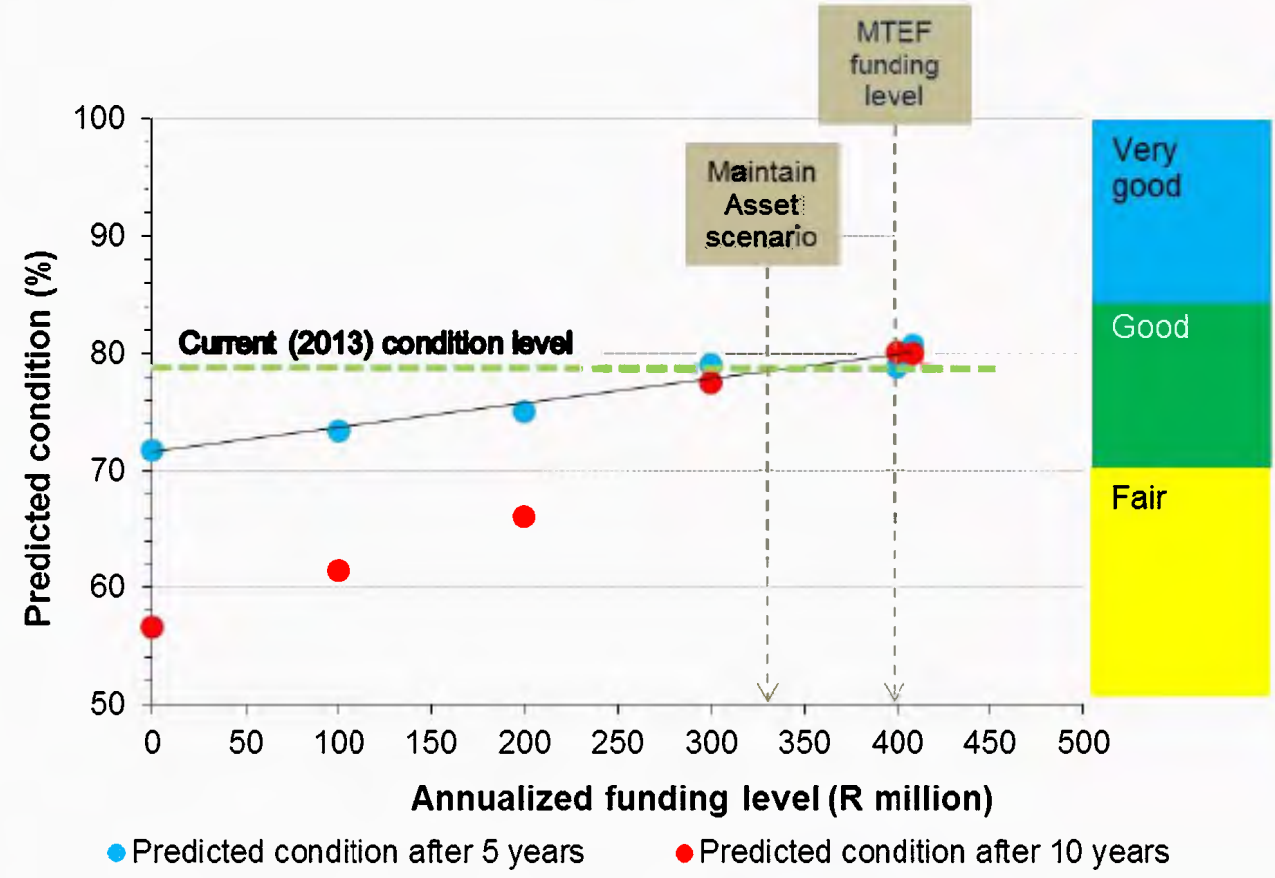


Figure 6.1: Predicted condition versus annual funding level for paved roads

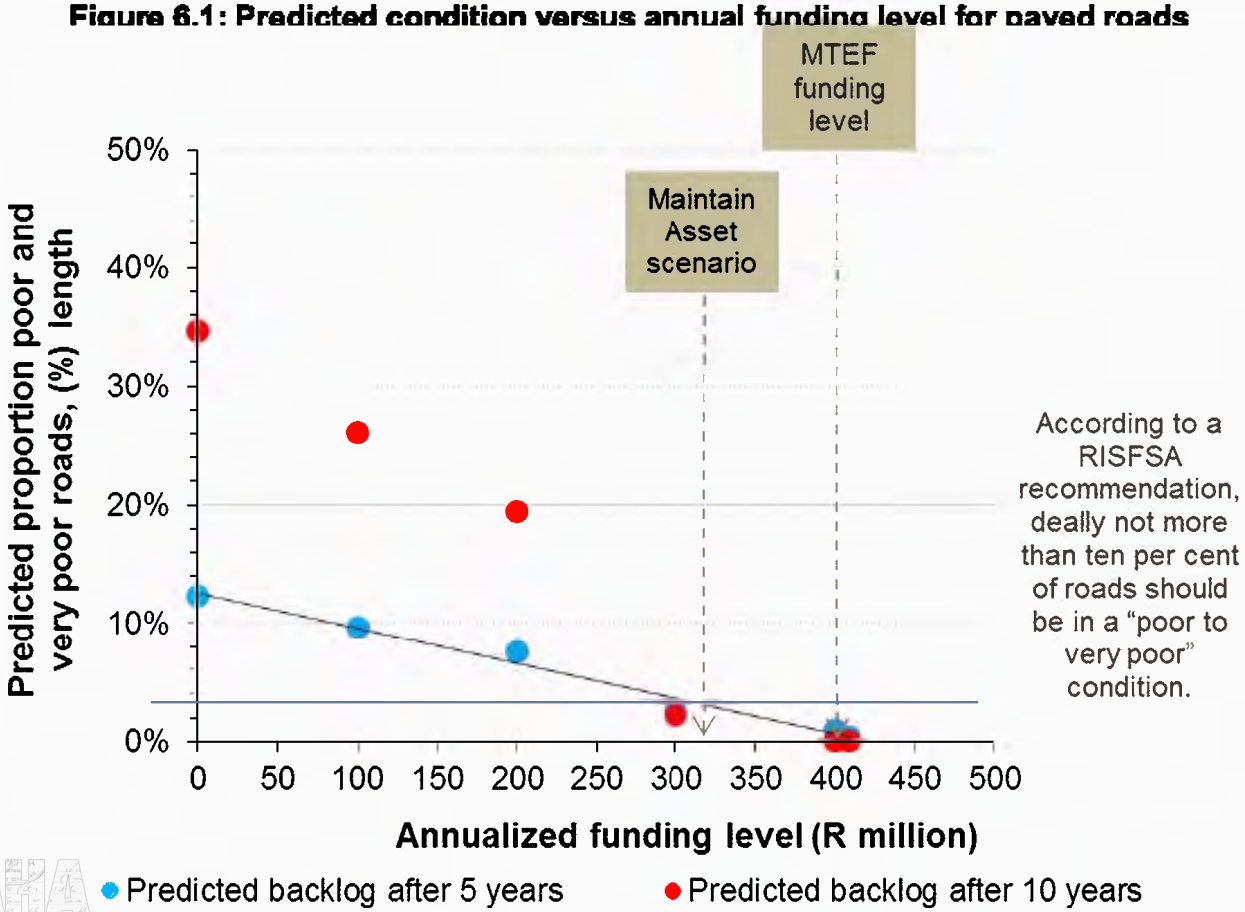


Figure 6.2: Predicted backlog of poor to very poor versus annual funding level for paved roads

This analysis, based on the current condition of the paved road network, has showed roads are maintained at elevated performance levels. The analysis also concluded that the current and future funding levels of the MTEF Budget are adequate to maintain the roads at a level where the overall condition of the paved road network remains "good" and the overall performance of the network is not expected to deteriorate. However; these predictions are based on the assumption that the preventive maintenance and rehabilitation allocations, described in this report and presented in the M&R Plans, are followed by the Municipality in future. A continuous maintenance policy to reseal roads as a preventive measure should be followed to effectively delay the deterioration of roads thereby extending the useful lives by many years.

6.3 Valuation Forecasts

Fair value asset accounting requires the Municipality to value (and consequently depreciate) its assets using a method that accurately reflects the consumption of the asset. As such, historical straight line depreciation is not considered an appropriate method. The valuation forecasts are therefore based on visual condition inspection data and the VCI Deterioration Models.

Asset values are forecast to increase as additional assets are added to the asset register from construction and acquisition by Council and from assets constructed by land developers and others and donated to Council. The depreciated replacement cost (current replacement cost less accumulated depreciation) will vary over the forecast period depending on the rates of addition of new assets, disposal of old assets and the rehabilitation of existing assets.

6.4 Key Assumptions

Key assumptions made in this infrastructure and asset management plan are:

- The existing pavements will achieve their assumed useful life in accordance with the design criteria of the different road categories.
- Pavements have been constructed using sound engineering practice and are fit for the purpose of carrying the anticipated traffic volumes and loads.
- Future rehabilitation treatments will be selected and undertaken in accordance with appropriate Standards and Specifications.
- The unit rates for the rehabilitation of pavements are realistic market related rates.
- The visual inspection data is accurate to a 90% confidence level.

SECTION 7
RISK MANAGEMENT

7.1 Overview

Risk management is the systematic application of management policies, procedures and practices to the tasks of identifying, evaluating, treating and monitoring those risks that could prevent the municipality from achieving its strategic or operational objectives in terms of the IDP.

In view of the aforementioned, detailed condition inspections of every road within the municipality are conducted bi-annually with the technical information being captured into our Road Management System (eROADS). The eROADS system optimizes this information taking into account pavement condition, predicted deterioration, and

treatment costs to produce a prioritized list of rehabilitation and seal projects across the entire municipal network such that the most ecomomically viable treatment is undertaken given the budgetary constraints for road rehabilitation. The optimisation process is therefore not a simple worst first scenario, but evaluates the merits of a range of possible treatments each time taking into account the predicted future deterioration of the road in accordance with World Bank models. This iterative process is undertaken for every road in the Municipal network to produce a list of Candidate Projects.

However, the following issues need to be addressed from a risk management perspective:

- available funding within a particular financial year
- clearances being obtained from the various service providers with under-road services such as Telkom, Water and Electricity
- technical personnel to manage projects

SECTION 8

ASSET MANAGEMENT PROCESSES & PRACTICES

8.1 Accounting/Financial Systems

The Municipal Accounting and Procedures Manual sets out a framework of the accounting standards that need to be applied by municipalities in South Africa when they prepare annual financial statements (AFS). The accounting principles, concepts and disclosure requirements are included in the standards of Generally Recognised Accounting Practice (GRAP), also referred to as the accounting standards. In terms of paragraph 63 of the *Framework for the Preparation and Presentation of Annual*

Financial Statements the application of GRAP normally results in financial statements that convey what is generally understood as a **fair presentation** of such information.

8.2 Asset Management Systems

Project selection occurs through the pavement management system (PMS). PMS refers to a systematic method of information collection and decision making support to permit the optimisation of resources for the maintenance, rehabilitation and the construction of new pavements, generating a programme of works and corresponding budget which match a defined level of service. The pavement management decision support system is a computerised sub-system of the overall Road Network Management System that:

- access a centralised road network database for inventory, condition and utilisation data;
- then utilising the data for life cycle predictions of road deterioration, maintenance needs, agency costs and user costs, and
- combining the above according to the selected objective function to produce an optimised budget.

While in general terms there are undoubtedly budget programming strategies that are more appropriate than others, given specific conditions, the factors that influence the selection process are varied and complex.

The Pavement Management System is a well-established, documented procedure for the execution of the pavement management activities in a schematic and co-ordinated manner with the objective of identifying the optimum strategies for providing and maintaining pavements at an adequate level of service for the funding available. To achieve the above mentioned an intimate knowledge of the condition of the network is required. This intimate knowledge is obtained through bi-annual visual condition inspection surveys of the network. One of the main objectives during these surveys is to capture the information in as short a time span as possible, thus eliminating any adverse environmental and traffic loading influences.

The Deighton Software (dTIMS CT) is used to store the data. It analyses the data based on a variety of maintenance and rehabilitation treatment alternatives over a period of time. dTIMS CT is a combination of dROAD (featuring Concurrent Transformation) and dTIMS featuring Deighton's approach to Infrastructure Management.

8.3 Information Flow Requirements and Processes

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

- The asset register data on size, age, value, remaining life of the network;
- The unit rates for rehabilitation;
- 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 infrastructure and asset management plan are:

- A 2 year rehabilitation programme;
- The resulting budget, valuation and depreciation projections;
- A life cycle cost analysis.

The flow of data and information in and from the life cycle costs analysis (LCCA) is presented below.

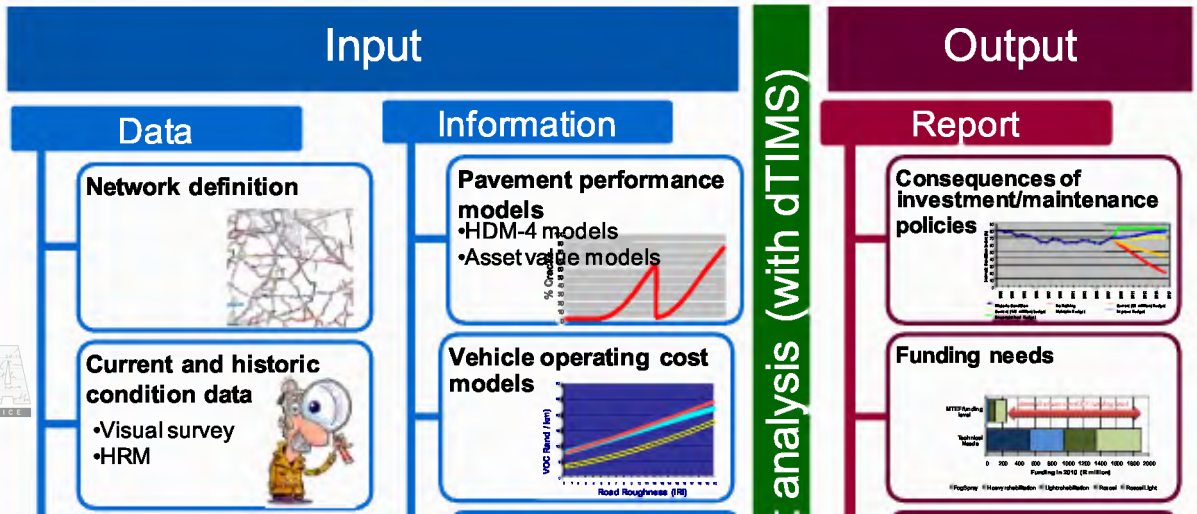


Figure 8.1 Schematic representation of the needs analysis

8.4 Standards and Guidelines

All asset management activities conform to the requirements of GRAP 17.

SECTION 9
ASSET MANAGEMENT IMPROVEMENT & MONITORING

9.1 Monitoring and Review Procedures

This infrastructure and 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 2 years and is due for revision and updating after each bi-annual visual condition inspection survey of the road network.

The following will be addressed in terms of asset management improvement and monitoring:

- It is intended to improve the asset management system by implementing a dTIMS™ CT training programme and recruiting technical personnel.
- Mechanical tests will be carried out to supplement the visual inspection process.
- The PMU and dTIMS™ CT risk and cash flow models need to be streamlined. A concern with the PMU risk model is that low order roads are considered less of a risk when compared with higher order roads. The implication is that the rehabilitation of Category D roads for example, may be neglected when funds are allocated to high risk assets.

9.2 Asset Management Improvement Programme

9.2.1 Asset Hierarchy / Componentisation

Sidewalks and kerbs have been included as additional components.

9.2.2 Missing Data

- Road markings are recorded during the condition assessments.
- Signage is recorded by the ETA.
- Formal footpaths are inspected as part of the formal road network.

9.2.3 As-built plans

There is a good record of as-built data for rehabilitation projects. However, the Design Branches and Departments such as Housing and Development Engineering need to become actively involved in the submission of as-built data.

9.2.4 AM Training Programmes

Staff have been on AM training programmes.