Western Cape Government

Transport and Public Works

Road Network Management Branch
Road Asset Management Plan

Volume 1 and 2 2019/20 to 2028/29

Department of Transport and Public Works

Road Asset Management Plan for 2019/20 to 2028/29

Western Cape Government

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EXECUTIVE SUMMARY

This Road Asset Management Plan (RAMP) seeks to strengthen the alignment between the activities of the Roads Branch, the Strategic Goals of the Department of Transport and Public Works, and the Western Cape Government. The purpose of this RAMP is to:

- set out the elements of road infrastructure assets managed by the Branch;
- consider the required level of service to be provided by the infrastructure;
- indicate the level of service actually provided;
- assess the level of service gap and how to address this gap;
- estimate the financial resources required;
- provide details of the organisational and support plan structure;
- show how the infrastructure is managed and monitored;
- demonstrate responsible management;
- communicate and justify funding requirements;
- demonstrate compliance with regulatory requirements; and
- state the Plan's limitations.

Objectives and Policy

The asset management objectives are derived from the Branch's Strategic Objectives. These asset management objectives are to:

- maintain road assets to ensure that roads are safe and smooth for private motorists, road-based public transport, and commercial vehicles;
- optimise asset preservation over the long term;
- prioritise road asset investments that support economic growth;
- improve road asset performance to reduce agency and user costs; and
- provide new asset capacity where demand exceeds capacity.

These objectives are supported by an Asset Management Policy that is based on international standards. This policy sets the direction and framework required for sustainable, road-related asset management and commits the Branch to continual improvement in asset management practices and asset management performance.

Asset management policy is implemented through the following strategies:

- road system performance;
- capital investment;
- road infrastructure preservation; and
- road use.

Currently, the preservation and some road use strategies are implemented. The capital investment strategies have been initiated. These three strategies will form the base of the road system performance strategy.

RAMP provides an assessment of the current level of asset management in the Branch. The maturity level according to THM 22 (Committee of Transport Officials, 2013) of asset management for road assets was assessed as "reasonably advanced" with some areas needing improvement, while the structures and other road assets were generally less mature with most areas needing improvement.

Asset management approach and levels of service

The RAMP provides a detailed description of the asset management approach that includes a summary of the levels of service and standards used. The approach strives to implement international best practice in asset management as well the learnings from the practical application of asset management in other road authorities.

Situation analysis

The RAMP provides a comprehensive view of the current state of the Branch's road infrastructure assets in terms of the levels of service, network conditions, asset value, and vehicle operating costs. Relevant trends of surveillance data are presented and discussed, the performance gap is determined, and the long-term consequences of applying the current Medium Term Expenditure

Framework (MTEF) Budget and various other funding mechanisms is discussed.

The road network is described in detail in the report. In addition, the levels of service pertaining to the types of surveillance measurements and the road classifications are described. The vast majority (75%) of pavement ages are older than 25 years, and thus only 25% of the pavements are still operating within their design life. The total usage for the paved network is 26 million vehicle-km per day and 1 million vehicle-km per day for the unpaved network, totalling 27 million vehicle-km per day, or 10 billion vehicle-km annually.

A comprehensive account of the engineering and functional condition of the road network is provided in the report. The network is classified into five classes according to the Road Classification and Access Management (RCAM) Manual. Smooth Travel Exposure (based on 2015 data) indicates less than satisfactory travel conditions for RCAM classes 2, 3, 4 and 5. This is a reflection of the age of the current network and the low rate of rehabilitation. Based on low rut exposure (LRE), acceptable safety conditions were found for all RCAM classes. There is less than satisfactory High Texture Exposure for RCAM classes 2 and 3. This can be ascribed to the age of the seals on these roads.

In 2018, user cost in terms of total vehicle operating cost was R48 billion and excess vehicle operating cost was R17 million. The latter represents only 0,04% of total vehicle operating cost.

In 2018, the current replacement cost of the road network was calculated as R143 billion and the depreciated replacement cost was calculated as R116 billion. These values exclude all bridge and other structures as no valuation is currently available.

The Network Condition Number (NCN) provides a measure of the visual condition of the paved network and is weighted by length and vehicle-km. NCN weighted by length has been improved significantly over the previous 2 years and is currently 75,2%, which is now above the target of 70. NCN weighted by vehicle-km has been between 10 and 15% better than the NCN weighted by length, however this difference decreased to 2% in 2017. This reduction is a measure of how effectively the Branch maintains the network for the benefit of the users, i.e. the objective to provide a greater benefit experienced by the users.

The trend in the NCN for the unpaved network weighted by length has steadily deteriorated over the last 4 years, but gas reversed in 2017 with a NCN of 50, which is significantly below the target of 60. The unpaved network has very limited gravel-wearing course and averages 22 mm, well below the desirable average of 75 mm.

There has been a downward trend in the Reseal Condition Number (RCN) over the last 10 years. The latest data show that the RCN has increased significantly from 43,6 to 47,4. This is also reflected in the decreased need for immediate resealing.

Needs determination

Infrastructure maintenance needs were determined by means of a lifecycle benefit-cost analysis that includes optimisation of technical solutions over the lifecycle of each asset and for each project in the network. This was done for four budgets using appropriate maintenance and rehabilitation strategies. Insight was gained into the optimal means to fill the gap between the current and the desired levels of service. The four budgets analysed are:

- the Provincial MTEF Budget - the current funding level;
- an Optimised Provincial MTEF Budget – the optimised current funding level;
- a Technical Needs Budget – a theoretical funding level that achieves the required level of service immediately; and
- an Intervention Budget – a funding level that will achieve the required levels of service with a reasonable time period.

The results of these four budgets are shown below. The Provincial MTEF Budget can easily be compared with the results of the three optimised budgets for each work type.

The consequences of the four budgets in terms of the performance of the road network were analysed and the Intervention Budget was selected as the desired budget for funding the maintenance and rehabilitation of the network.

Average 5-year Provincial MTEF Budget, Rand (millions)						
Re-gravel	Upgrade to Paved	Reseal	Light Rehab.	Rehab.	Other[1]	Total
123	163	450	243	387	1965	3332
Average 5-year Optimised Provincial MTEF Budget Rand (millions)						
57	31	145	726	791	1965	3353
Average 5-year Technical Needs Budget Rand (millions)						
1092	1093	568	-	4593	1965	9311
Average 5-year Intervention Budget Rand (millions)						
790	261	89	526	2834	1965	6 465
Average annual shortfall between the MTEF and Intervention Budget, Rand (millions)						
666	98	-361	283	2 447	-	3 133

Note 1: Committed construction projects and routine maintenance activities are currently excluded from the lifecycle benefit-cost analysis.

The average Intervention Budget over the next 5 years is R6,47 billion per annum.

The current shortfall between the MTEF Budget and the Desired Budget is R2,87 billion per year over the next 10 years.

The combined Asset Sustainability Ratio for the period 2014/15 to 2017/18 is 9,64%, compared with a desirable value of 50%. This highlights inadequate expenditure on renewing the network.

Currently the Branch identifies new regional infrastructure, through multiple processes. Feasible projects are prioritised and combined into a programme input to road investment. In future, the Western Cape Transport model will supply the information required for compiling a Demand Management Plan that will be the basis for determining a comprehensive list of these priorities.

Asset management plans

Asset management plans are provided for:

- renewals and replacement of roads; and
- new facilities and upgraded roads.

The objectives of the Expanded Public Works Programme and Provincial Road Maintenance Grant are included in the asset management plans listed above.

A Forward Works Programme is provided for road projects.

Financial summary

Full details of cash flow forecasts and desired funding estimates are provided for the period 2018/19 to 2028/29. Various sources of funding are examined, but the only realistic additional source of funding remains increased allocations from Provincial Treasury.

Asset management enablers

The role of asset management systems, together with asset information management, is a key enabler for effective asset management of the road network. An effective asset information management system ensures that the right information is available to the right users at the right time to support business objectives. Details of the framework for the management of asset information systems are discussed in the RAMP as well as the current IT Steering Committee to guide and direct all systems development in the Branch. The purpose and output of all road asset management systems is described, and categorised in terms of strategic, tactical and operational context. An evaluation of information availability and analysis capability indicates a high level of performance. The Branch continues to make more effective use of this data to improve the quality and scope of management information.

To support delivery, details of the organisational and support structure are discussed in the report. These include the enablers of:

- procurement and supply chain management – a good relationship enables alignment of procurement and supply chain management with asset management objectives and strategy.
- asset management leadership – the evaluation of leadership using the asset management maturity assessment tool is a high priority to identify gaps.
- organisational structure – finalisation of the new structure is imminent and will be submitted to the Department of Public Service and Administration (DPSA) for approval.
- organisational culture – evaluation of culture using the asset management maturity assessment tool is a high priority

to identify hindrances to effective delivery.

- Competence management – improving the skills of Branch staff to achieve competence in asset management is a high priority.

Competence management is the processes of systematically developing and maintaining an adequate supply of competent and motivated people to enable the fulfilment of asset management objectives. A framework for competence management is provided by the Institute of Asset Management. It can be used to assist with:

- writing or reviewing job descriptions;
- planning recruitment;
- defining selection criteria;
- identifying individual learning and development needs;
- managing individual and team performance;
- career planning; and
- performance review.

The skills development programme for engineers, technologists and technicians has been a success over the last 8 years with 15 graduates achieving registration with the Engineering Council of South Africa.

Social responsibility

The Branch strives to enhance job creation, training and contractor development in the delivery of projects.

Strengths, weaknesses, opportunities, threats (SWOT)

A SWOT analysis revealed the following:

- Asset management has significant strengths, but weaknesses with respect to aligning projects with strategic objectives. These weaknesses are being addressed.
- Well-developed asset information systems provide high-quality information. However, additional systems are needed to address the gaps.
- The current management team and professionals are dedicated and capable, but key positions remain vacant.
- Funding remains a key weakness for delivering priority projects.
- Shortcomings in the organisational structure are addressed in the new organogram. The latter needs to be urgently finalised for the recruitment of staff to commence.

Risk analysis

A risk analysis has identified the following institutional issues that require urgent mitigation:

- under-funding of maintenance, renewals and economic projects;
- organisational sustainability in terms of:
  - difficulty in attracting and retaining professional staff;
  - barriers to succession planning;
  - the large number of vacant posts undermining the ability of the Branch to manage its assets;
  - finalising a new organogram;
  - limited new appointments due to limitations on cost of employment;
- asset information governance;
- a change in the managing authority for borrow pits to the Department of Mineral Resources, causing delays in approvals; and
- lack of internal environmental expertise.

The infrastructure-related risks affecting the future economic viability of the Western Cape are:

- suboptimal use of funds due to the exclusion of routine maintenance and new assets from the optimisation process;
- underperformance on national job creation targets;
- deteriorating condition of the road network to below acceptable levels of service;
- traffic demand on the network leading to congestion in the metropolitan area;
- impacts of climate change;
- scarcity of gravel and base aggregates;
- scarcity of water for compaction; and
- variable quality of bitumen supply.

Conclusions

- The Branch has provided a detailed analysis of the needs of the network and determined the minimum funding required for sustainability that will provide the levels of service required to support the economy of the Western Cape.
- This minimum funding is approximately R2,87 billion per year more than provided in the MTEF Budget over the next 10 years.
- Staffing of the Branch is critically low, jeopardising effective management of the road network.
- The Branch's asset management systems provide excellent support for effective management of the Branch.

Recommendations

It is recommended that the Branch should focus on the following issues to address the preservation of the network as effectively as possible for the available MTEF budget:

- expand the scope of work that is optimised in the Branch's resource allocation system;
- review level of service targets where appropriate;
- ensure the most appropriate design and delivery solutions are consistently chosen and implemented to appropriate standards;
- improve the effectiveness and efficiency of high-priority preservation and maintenance activities to reduce the rate of deterioration of the network, by:
  - waterproofing the network with reseals;
  - prioritising preventive over reactive maintenance; and
  - providing effective maintenance management to agreed levels of service and standards;
- minimise overheads;
- construct additional weighbridges to deter overloading; and
- implement measures to update information on bridges and other structures, including their asset value.

With respect to enabling the Branch, it is recommended that:

- the micro-structure of the organogram should be finalised without delay to enable sourcing of staff to minimise its negative impact on service delivery;
- Utilise the asset management maturity assessment in accordance to TMH 22 (Committee of Transport Officials, 2013), to assist the Branch in identifying gaps and creating action plans for improving asset management; and
- Systems improvements to close identified gaps are implemented.

ROAD ASSET MANAGEMENT PLAN

2019/20 TO 2028/29

VOLUME 1: THE PLAN

DEPARTMENT OF TRANSPORT & PUBLIC WORKS

ROAD NETWORK MANAGEMENT BRANCH

The **APPENDICES** can be found in **Volume 2** of the **Road Asset Management Plan**

FIGURES

TABLES

Note: This document is formatted according to the corporate branding of the Western Cape Government. The colour palette used can be found in Appendix N – Corporate Branding.

ACRONYMS

ABACUS	As built acceptance control utility system	EPWP	Expanded Public Works Programme
AADT	Annual average daily traffic	EUC	Excess user cost
AIMS	Asset Information Management System	FWD	Falling weight deflectometer
AUC	Area-under-the-condition-curve	FWP	Forward Works Programme
AAUC	Augmented-area-under-the-benefit-curve	GMFAM	Global Forum on Maintenance and Asset Management
AFR	Asset Fund Reserve	GIAMA	Government Immovable Asset Management Act
ASR	Asset sustainability ratio	GIS	Geographic information system
BAS	Basic Accounting System	GRMS	Gravel Road Management System
B&SMS	Bridge and Structures Management System	GROMAMAS	Gravel Roads Maintenance Management System
CBD	Central business district	GPSSBC	General Public Service Sector Bargaining Council
CAPEX	Capital expenditure	HSWIM	High speed weigh-in-motion
CIDB	Construction Industry Development Board	HDM III	Highway Design and Maintenance Standards Model version III
CoCT	City of Cape Town	HDM-4	Highway Development and Management system version 4
COE	Cost of employment	HTE	High texture exposure
CRC	Current replacement cost	IAM	Institute of Asset Management
CSIR	Council for Scientific and Industrial Research	IDMS	Integrated Design Management System
DSL	Decision support level	IDP	Integrated development plan/ integrated development planning
dTIMS/ dTIMS™CT	Deighton Total Infrastructure Management System	IDZ	Industrial development zone
DRC	Depreciated replacement cost	IMMS	Integrated Maintenance Management System
DSC	Design standard certificate	IPAS	Integrated Provincial Accident System
DM	District municipality	IPS	Infrastructure Preservation Strategy/ Integrated Procurement System
DCP	Dynamic cone penetrometer	IRR	Internal rate of return
DMR	Department of Mineral Resources	ITP	Integrated transport plan/ integrated transport planning
DPSA	Department of Public Service and Administration	JV	Joint venture
DRE	District Roads Engineer	KPI	Key performance indicator
ECSA	Engineering Council of South Africa	LCBCA	Life cycle benefit-cost analysis
EIA	Environmental impact assessment	LCCA	Life cycle cost analysis
EmpIA	Empowerment impact assessment	LOS	Level of service
LC	Lifecycle costing	LRE	Low rut exposure

ACRONYMS			
LSWIM	Low speed weigh-in-motion	PLTF	Provincial Land Transport Framework
LTPPMS	Long Term Pavement Performance Maintenance System	PRMG	Provincial Road Maintenance Grant
LVR	Lifecycle value realisation	PSDF	Provincial Strategic Development Framework
M&R	Maintenance & Renewal	PSG	Provincial Strategic Goal
MEDS	Micro Economic Development Strategy	RNIS	Road Network Information System
MIMS	Materials Information Management System	ROPE	Road Network Information System
MMS	Maintenance Management System	RCI	Reseal condition index
MSDF	Municipal Spatial Development Framework	RCN	Reseal condition number
MTAB	Metropolitan Transport Advisory Board	RAMP	Road Asset Management Plan
MTEF	Medium Term Expenditure Framework	RAMS	Road Asset Management System
NATMAP	National Transport Master Plan	RCAM	Road Classification and Access Management Manual
NDP	National Development Plan	RIS	Roads Investment Strategy
NCN	Network condition number	RISFSA	Road Infrastructure Strategic Framework
NDOT	National Department of Transport	RM	Routine maintenance
NLTA	National Land Transport Act	RSMS	Road System Management Strategy
NLTSF	National Land Transport Strategic Framework	RUMS	Road Use Management Strategy
NLTTA	National Land Transport Transition Act,	SANS	South African National Standard
NSDF	National Strategic Development Framework	SANRAL	South African National Roads Agency SOC Ltd.
OD	Organisation design	SITA	State Information Technology Agency
OPEX	Operational expenditure	SPADS	Seal Planning and Design System
OSD	Occupation Specific Dispensation	SR	Spot regravel
PEMS	Plant and Equipment Management System	STE	Smooth Travel Exposure
PAS	Provincial Accident System	SWOT	Strengths, weaknesses, opportunities, threats
PDI	Previously disadvantaged individual	TDA	Transport and Urban Development Authority
PFMA	Public Finance Management Act	TCS	Traffic Counting System
PM	Periodic maintenance	TMH	Technical Methods for Highways
PMS	Pavement Management System	TRH	Technical Recommendations for Highways
PQMS	Pavement Quality Management System	TTC	Total transport costs
PCI	Pavement Condition Index	VCI	Visual Condition Index
PDP	Professional Development Programme	VO	Value optimisation

ACRONYMS

VOC	Vehicle operating costs	WCG	Western Cape Government
VOCS	Vehicle Operating Cost System	WCTM	Western Cape Transport Model

GLOSSARY

ABACUS	The operations-level application for the acceptance control of layerworks
Asset Information Management System	The system that defines and manages the use of asset information
Asset Fund Reserve	A reserve of funds obtained from Provincial Treasury for funding new strategic network improvements that support economic growth
Asset sustainability ratio	A ratio that is a measure of sustainability of the road network
Bridge and Structures Management System	The strategic information system for management of bridges and large culverts (formerly referred to as the Bridge Management System – BMS)
Current replacement cost	The maximum theoretical asset value.
Deighton Total Infrastructure Management System	The term dTIMS or dTIMSTMCT, refers to Deighton Associates life cycle cost optimisation software. The software is customised with the HDM pavement performance models, calibrated for the conditions in the Western Cape. It is used to predict the future consequences of maintenance and funding policies
Depreciated replacement cost	The current asset value, depreciated according to the condition of the road, or other method
Design standard certificate	A certificate which provides the design standards to be used on a road construction project
District municipality	In the Western Cape, these are: Cape Winelands, Garden Route, Overberg, Central Karoo and West Coast. For convenience, the City of Cape Town, although a metropolitan rather than a district municipality, has been included in the charts with the district municipalities
Dynamic cone penetrometer	An instrument for determining the resistance to penetration of a steel cone
Environmental impact assessment	An assessment of environmental impact required by environmental legislation
Empowerment impact assessment	An assessment of economic empowerment impact required by labour legislation
Expanded Public Works Programme	A national programme run in the Western Cape by the Department of Transport and Public Works
Excess user cost	Incremental road user cost on paved roads that is avoidable. This cost covers delays, accidents, and VOC. In this report, only VOC is used and EUC is the incremental cost incurred where the roughness exceeds an IRI of 3,1
Forward Works Programme	The Forward Works Programme contains the list of optimised projects according to the delivery priority
Geographic information system	A system designed to capture, store, manipulate, analyse, manage, and present spatial or geographic data
Gravel Road Management System	The strategic information system for unpaved roads
Gravel Roads Maintenance Management System	Tactical and operational management information system that is integrated with ROPE to manage periodic maintenance of the unpaved road network
High speed weigh-in-motion	Technology used to measure the mass of passing vehicles

GLOSSARY	
Highway Development and Management system version 4	A software system and models that are used to investigate road transport infrastructure
High texture exposure	The percentage length of road exposed to high texture
Integrated Maintenance Management System	The tactical and operational information management system for costing of works in the Branch
Integrated Provincial Accident System	A strategic information system for analysing accidents on roads
International Roughness Index	Measurement in mm/m to indicate the riding quality of pavements
Intervention levels	The level at which it is necessary to intervene with a treatment, such as resealing, rehabilitation, re-gravelling, etc.
Lifecycle benefit-cost analysis	An analysis performed to determine the predicted performance and needs of a road network for predefined funding and policy approaches
Lifecycle costing	The analysis of cost implications for an asset or asset system over the organisation's period of responsibility
Life cycle cost analysis	An analysis that takes account of costs throughout the life cycle of the asset
Level of service	The desired level at which the service is provided
Long Term Pavement Performance Maintenance System	The system used to assist with the calibration of the HDM models
Low rut exposure	Low rut exposure is the safety efficiency of road system performance. It is the proportion of travel undertaken each year on roads with conditions above the targeted conditions for those roads
Lifecycle value realisation	The optimisation of both lifecycle costs and the value obtained from assets over the organisation's period of responsibility
Maintenance & Renewal	A roads budget that would allow for adequate maintenance and renewal
Maintenance	In this report, "maintenance" refers to the activities of re-graveling, resealing, rehabilitation and upgrading to paved standards. Routine maintenance is excluded from the maintenance activities addressed in this report. The activities to rehabilitate paved roads and upgrade unpaved roads to paved standards are not strictly maintenance activities, but are included in the term "maintenance" for the purposes of this analysis report
Materials Information Management System	A tactical and operational information system for the management of material sources
Maintenance Management System	A system to assist with routine maintenance operations
Medium Term Expenditure Framework	The budget framework used by the Provincial and National Treasuries
National Development Plan	National Development Plan 2030: Our Future: Make it Work. (National Planning Commission, Department of the Presidency)
Net present value	The difference between the present value of the future cash flows from an investment and the amount of investment. Present value of the expected cash flows is computed by discounting them at the required rate of return
Network condition number	A measure of the visual condition of the road network. See TRH 22, 1994, "Pavement Management Systems", CSRA, for further details
Occupation Specific Dispensation	Department of Public Service and Administration circular for remuneration of specified occupations including engineers, engineering technologists and technicians

GLOSSARY	
Passability	The ability of traffic to pass over the road. Where conditions prevent traffic crossing a road, it is called impassable
Paved	Refers to upgrading of unpaved roads to paved standards
Paved roads	Refers to the roads managed by the Pavement Management System of the Western Cape Government
Plant and Equipment Management System	The system that assists with the management of plant in equipment
Provincial Accident System	The system that assists with the capture of accident data
Periodic maintenance	Planned maintenance that happens at frequencies from annually up to 15 years, depending on the condition of the asset. This includes resealing, re-gravelling and may also include activities such as planned cleaning of pipe culverts and side drains
Pavement Management System	The strategic information system for management of paved roads
Pavement Quality Management System	The system used to manage the quality of pavements in the Western Cape
Pavement Condition Index	An index that measures the condition of the pavement
Professional Development Programme	The development programme for engineers and technicians to assist them in obtaining professional registration
Provincial Road Maintenance Grant	A conditional grant provided by National Treasury
Provincial Road Network Management Branch	The Branch of the Department of the Western Cape Government responsible for the management of the province's roads, excluding national roads and urban roads
Provincial Strategic Goal	Goals defined in the Western Cape Provincial Strategic Plan 2014 – 2019
Reconstruction	A renewal of the road where the vertical and/ or horizontal alignment is improved and/ or the width is increased, perhaps by the addition of shoulders. In addition, one or more pavement layers are improved and/ or an additional layer/ s is/ are added. Through reconstruction, the structural capacity of the pavement is increased
Regional Office Action Plan	Tactical and operational information system for maintenance management of routine maintenance
Re-gravel	Periodic maintenance by replacing the gravel-wearing course of an unpaved road
Rehabilitation	A renewal of a road where one or more pavement layers are improved and/ or an additional layer is added. Through rehabilitation, the structural capacity of the pavement is increased
Resealing	Periodic maintenance of a paved road by waterproofing the surface of a road. This includes chip seals and asphalt surfacing
Reseal condition index	An index that measures the condition of chip seals
Reseal condition number	An number that measures network condition of chip seals
Reset values	The value of a pavement performance measure (e.g. distress), after a treatment
Road Asset Management Plan	A strategic asset management plan for the road network
Road Asset Management System	All systems making up the road asset management system

GLOSSARY

Road Classification and Access Management Manual	TRH26: South African Road Classification and Access Management Manual – version 1.0 August 2012
Roads Investment Strategy	The Road Infrastructure Preservation Strategy translate road system performance objectives that are driven by community outcomes to priorities for managing the condition of road system assets
Road Infrastructure Strategic Framework	Road Infrastructure Strategic Framework for South Africa, Department of Transport, 2006. A framework for the classification and management of road networks in South Africa
Road length	Refers to the carriage way road length in kilometres, not the distance of the road network. The road length of a dual carriageway is therefore double the distance of the road because the pavement structures of the two carriageways are investigated separately in the Pavement Management System
Road network	Refers to all roads managed via the Pavement and Gravel Roads Management Systems of the Western Cape Government
Road Network Information System	The strategic information system for managing the location of the road network of the Branch
Routine maintenance	Routine maintenance is the day-to-day maintenance of the road surface, the drainage and the road reserve
Road System Management Strategy	Road System Management Strategy examines the community needs and expectations for the performance of all assets comprising the road system and establishes an over-arching hierarchy of performance-based levels of service and future vision of fit-for-purpose standards for the configuration, capacity, use and condition of the various road network assets
Road Use Management Strategy	Road use management strategies provide a framework for the management of road use, particularly for specific road user groups, such as freight vehicles, public transport, port access, and mining-related cartage
SealPro	The operational level application used for controlling the construction of seals
Seal Planning & Design System	A system that assists with the planning and design of chip seals
Spot regravel	Regravelling of short sections of road, also called large-scale patching
Smooth Travel Exposure	The proportion of travel undertaken each year on roads with conditions above the targeted conditions for those roads
Traffic Counting System	A strategic information system for management and storage of traffic counts
Total transport cost	The total cost of transport including vehicle operating costs and agency costs
Unpaved roads	Refers to the roads managed by the Gravel Roads Management System of the Western Cape Government
Visual Condition Index	The index for visual condition according to TMH 9: Pavement Management Systems: Standard Visual Assessment Manual for Flexible Pavements (Committee of State Road Authorities, 1992)
Value optimisation	Considers the value of the asset system in addition to asset costs
Vehicle operating costs	Costs that vary with vehicle usage, including fuel, tyres, maintenance, repairs, and mileage-dependent depreciation costs. Projects that alter vehicle distance travelled, traffic speed and delay, roadway surfaces, or roadway geometry may affect travellers' vehicle operating costs, which should be considered in a benefit-cost analysis
Vehicle Operating Cost System	A system used for determining vehicle operating costs developed by the Branch
Western Cape Government	The provincial government of the Western Cape
Western Cape Transport Model	The envisaged transport model to be created for the Branch

Chapter 1 - Introduction

The road network provides a foundation for sustaining the infrastructure of the Western Cape, thereby supporting economic and social development. The Western Cape Government Road Network Management Branch ("the Branch") is inevitably faced with the challenge of trying to balance competing demands in a constrained budget environment that does not support desired levels of service.

This Road Asset Management Plan (RAMP) seeks to strengthen the alignment between the activities of the Branch with the strategic goals of the Department of Transport and Public Works and the Western Cape Government and attempts to address some of the critical questions in managing roads infrastructure, such as:

- What is the quantum of funding required for a specified level of service?
- Is it possible to preserve the road assets to current performance standards given the available fund allocation?
- How should the available funds be split between the many needs and responsibilities of the Branch, to ensure optimal benefit for both road users and the Branch?
- What is an economic level of funding for asset preservation?

The RAMP provides the information in accordance with the draft TMH 22 template (Committee of Transport Officials, 2013), which was based on the draft of ISO 55001:2014 *Asset management - Management systems – Requirements*, which has been adopted without change as SANS 55001:2015 (International Standards Organization for Standardization, 2015). The purpose of this RAMP is to address the following issues that constitute a statement of the problem:

- set out the elements of road infrastructure assets managed by the Branch;
- consider the required level of service to be provided by the infrastructure;
- indicate the level of service actually provided;
- assess the gap in level of service and how to address this gap;
- estimate the financial resources expected;
- provide details of the organisational and support plan structure;
- show how the infrastructure is managed and monitored;
- demonstrate responsible management;
- communicate and justify funding requirements;
- comply with regulatory requirements; and
- state the Plan's limitations.

In response to this challenge, the RAMP provides a comprehensive view of the Branch's current state of the road infrastructure assets in terms of the levels of service, network conditions, asset value, vehicle operating costs and trends, the performance gap and the long-term consequences of applying the current and other funding levels to maintain the road network assets.

Paragraphs that are marked in the margin with a green bar (see left) indicate future developments or intended course of action.

1.1 Compliance statement

1.1.1 The owner of the road infrastructure and road authority

The owner of the provincial road infrastructure in the Western Cape is the Western Cape Government. The custodian is the Department of Transport and Public Works, Road Network Management Branch ("the Branch").

1.1.2 Road asset management level and scope of assets included

The current road asset management levels being practised by the Branch are listed in Table 1-1, Table 1-2 and Table 1-3. The coloured blocks indicate the approximate level of maturity. This maturity assessment is based on the framework in draft TMH 22: Road asset management manual (draft) (Committee of Transport Officials, 2013), described below:

Initiative – At this stage the people in the organisation are aware of potential asset management benefits and the need for consistent and good quality data. Certain individuals will take initiative to start applying the Road Asset Management System (RAMS) and start to make improvements to see how it can be adapted to meet the developing needs of the organisation. The sustainability of the RAMS will often rely on heroic efforts of individuals.

Proficient – at this level, the RAMS can be described as being embedded within the organisation and is a competent system with everyone having faith in the quality of the data and the related processes and outputs. The system will be able to be used to respond to most questions in respect of road asset inventory, condition, value and the probable quantum of funding required for maintaining the assets to required conditions.

Advanced – in this stage the RAMS will be used and improved regularly and all data collection and analysis systems will be regarded as routine within the organisation and among all staff. A RAMS of this stage of maturity can be used to directly influence the road authority's programme and work methods and to provide guidelines for maintenance standards, designs and procurement and specifications.

Excellence – at this stage all RAMS policies, process and procedures will routinely be improved to respond to ever more challenging questions at increasing levels of detail, to improve the outputs wherever these are inaccurate, and to ensure a high level of successful and cost-effective performance for all money that is invested in the assets.

Limitations: The survey of the road asset management maturity was prepared by an external assessor.

Table 1-1: Road asset management levels being practised by the Branch as at March 2019

Section	Initiative - Level 1	Proficient - Level 2	Advanced - Level 3	Excellence - Level 4
Policy	Expectations set in vision and mission statements	Defined policy statements for service levels and minimum conditions	Regular review of achievements and adjustment of policy statements to reflect intent together with short-term objectives and related action plans	Policy statements and strategies integrated into all business processes and regular review
Inventory	Detailed listing of all roads	Integrated GIS and road and bridge inventory together with engineering details of each link	Road asset divided into components with different expected useful life together with construction details	Inventory seamlessly integrated with planned roads, asset register, all acquisition data, and related information material to performance
Valuation	Valuations per km or m² of each road type	Valuations per m² of road type adjusted for expected useful life	Valuation per component adjusted with estimates of remaining useful life and estimates of unit costs.	Valuation per component reliably adjusted for remaining useful life and unit costs based on detailed statistics of current construction costs
Condition and usage	Visual evaluations of condition of each road. Traffic counts at selected positions	Detailed, objective visual evaluations of each road with some instrument measurements. Traffic counts cover entire road network regularly	Integrated visual and instrument evaluations taken at the minimum frequencies defined in Chapter 3. Traffic count histories to reliably project future volumes	Reliable and credible condition and usage data that is used to accurately determine excess user costs and predict future excess user costs and related risks
Decision support	Judgement of future condition and departmental priorities	Decisions based on reliable strategies and rankings based on condition and importance	Optimisation used to adapt strategies and improve returns on rehabilitation expenditure	Optimisation based on reliable performance predictions and linked to confirmation of performance based on past history
Management plans	Minimal information on planned service levels and future expenditure forecasts	Impacts of plans shown in terms of future service levels with basic information on expenditure forecasting	Plans demonstrate achievement of objectives and likely service levels subject to budget constraints	Fully integrated with customer expectations of service levels and comprehensive risk analysis and trade-offs related to budget constraints
Feedback loop	Anecdotal feedback of performance of actions	Performance of actions measured as part of ongoing condition evaluation and linked to strategy	Specifically planned activities implemented to assess performance and risk and to feed into prediction models and tactics	Regular measured performance of all actions integrated into prediction models and planned actions

Table 1-2: Structures assets: bridges, large culverts, retaining walls at March 2019				
Section	**Initiative - Level 1**	**Proficient - Level 2**	**Advanced - Level 3**	**Excellence - Level 4**
Policy	Expectations set in vision and mission statements	Defined policy statements for service levels and minimum conditions	Regular review of achievements and adjustment of policy statements to reflect intent together with short-term objectives and related action plans	Policy statements and strategies integrated into all business processes and regularly reviewed
Inventory	Detailed listing of all structures	Integrated GIS and road and bridge inventory together with engineering details of each link	Structures assets divided into components with different expected useful lives together with construction details	Inventory seamlessly integrated with planned roads, asset register, all acquisition data and related information material to performance
Valuation	Valuations per structure	Valuations structure adjusted for expected useful life	Valuation per component adjusted with estimates of remaining useful life and estimates of unit costs	Valuation per component reliably adjusted for remaining useful life and unit costs based on detailed statistics of current construction costs
Condition and usage	Visual evaluations of condition of each bridge, large culvert and retaining wall	Detailed, objective visual evaluations of each bridge, large culvert and retaining wall with some instrument measurements	Integrated visual and instrument evaluations taken at the minimum frequencies defined in Chapter 3	Reliable and credible condition and usage data to predict risks
Decision support	Judgement of future condition and departmental priorities	Decisions based on reliable strategies and rankings based on condition and importance	Optimisation used to adapt strategies and improve returns on rehabilitation expenditure	Optimisation based on reliable performance predictions and linked to confirmation of performance based on past history
Management plans	Minimal information on planned service levels and future expenditure forecasts	Impacts of plans shown in terms of future service levels with basic information on expenditure forecasting	Plans demonstrate achievement of objectives and likely service levels subject to budget constraints	Fully integrated with customer expectations of service levels and comprehensive risk analysis and trade-offs related to budget constraints
Feedback loop	Anecdotal feedback of performance of actions	Performance of actions measured as part of ongoing condition evaluation and linked to strategy	Specifically planned activities implemented to assess performance and risk and to feed into prediction models and tactics	Regular measured performance of all actions integrated into prediction models and planned actions

Table 1-3: Other road assets: pipes, guardrails, signs, gantries, fences, road markings, minor retaining structures, walking and cycle paths, lighting as at March 2019				
Section	**Initiative - Level 1**	**Proficient - Level 2**	**Advanced - Level 3**	**Excellence - Level 4**
Policy	Expectations set in vision and mission statements	Defined policy statements for service levels and minimum conditions	Regular review of achievements and adjustment of policy statements to reflect intent together with short-term objectives and related action plans	Policy statements and strategies integrated into all business processes and regularly reviewed
Inventory	Detailed listing of other road assets	Integrated GIS and road and bridge inventory together with engineering details of each link	Road asset divided into components with different expected useful life together with construction details	Inventory seamlessly integrated with planned roads, asset register, all acquisition data and related information material to performance
Valuation	Valuations of each group of road assets	Valuations of each group of road assets adjusted for expected useful life	Valuation per component adjusted with estimates of remaining useful life and estimates of unit costs	Valuation per component reliably adjusted for remaining useful life and unit costs based on detailed statistics of current construction costs
Condition and usage	Visual evaluations of condition of other road assets	Detailed, objective visual evaluations of other road assets	Integrated visual and instrument evaluations taken at the minimum frequencies defined in Chapter 3	Reliable and credible condition and usage data predict future risks
Decision support	Judgement of future condition and departmental priorities	Decisions based on reliable strategies and rankings based on condition and importance	Optimisation used to adapt strategies and improve returns on expenditure	Optimisation based on reliable performance predictions and linked to confirmation of performance based on past history
Management plans	Minimal information on planned service levels and future expenditure forecasts	Impacts of plans shown in terms of future service levels with basic information on expenditure forecasting	Plans demonstrate achievement of objectives and likely service levels subject to budget constraints	Fully integrated with customer expectations of service levels and comprehensive risk analysis and trade-offs related to budget constraints
Feedback loop	Anecdotal feedback of performance of actions	Performance of actions measured as part of ongoing condition evaluation and linked to strategy	Specifically planned activities implemented to assess performance and risk and to feed into prediction models and tactics	Regular measured performance of all actions integrated into prediction models and planned actions

1.1.3 Preparation of the Road Asset Management Plan

This RAMP was updated by a team comprising of staff and consultants:

Branch staff

- H Uys Pr. Tech. Eng. BSc (Hons) Civil Eng. (UP), BTech. Civil Eng. (CUT), NDip. Civil Eng. (CUT)
- A November Pr. Eng. BSc Eng. (Hons) (UCT)

Consultants

- **Aurecon**: M van Wyngaardt B. Eng. (Industrial) Hons (Industrial) University of Pretoria
- **DNA^2:** I Naude Pr. Eng. B. Eng. (Civil) (RAU)
- **IX Engineers:** Riaan Burger Pr. Eng. M. Eng.

The completion of this RAMP is attributed to the foundation set by the authors of the preceded RAMPs.

The following technical consultants assisted in the collection of specific data sets that were required in the compilation of the RAMP:

Table 1-4: The names of the officials and technical consultants that collected each of the data sets

Data set	Name of collecting official or technical consultant	
Visual evaluation of paved road network	EOH Consulting Engineers	Cape Winelands & CoCT
	Mott MacDonald	Overberg
	Hatch (Goba)	Garden Route
	Gibb	Central Karoo
	UWP	West Coast
	Aurecon	Quality Control
Visual evaluation of unpaved road network	AECOM	Cape Winelands
	NAKP (Iliso)	Overberg
	Royal HaskoningDHV	Garden Route
	Worley Parsons	Central Karoo
	JG Afrika	West Coast
	Mott MacDonald	Quality Control
Mechanical measurements – longitudinal and transverse profiles, surface texture	Specialised Road Technologies	
Mechanical measurements – Falling Weight Deflectometer deflection measurements	Specialised Road Technologies	
Road Inventory and Lesser and Major Culvers Data collection	EOH Consulting Engineers	Cape Winelands & CoCT
	BVi	Overberg
	SMEC	Garden Route
	Element	Central Karoo
	JG Afrika	West Coast

1.1.4 Declarations

The Branch declares:

- that the latest "Road Asset Management Policy" has been approved on 29 March 2018.
- that the completeness and the maximum age of data in each of the data sets comply with draft TMH 22 (Committee of Transport Officials, 2013) (inventory data, asset condition data (visual and surveillance), asset usage data, asset valuation data) unless otherwise indicated.
- that the Road Network Management System at https://rnis.westerncape.gov.za is the Branch's register of assets. The inventory is kept up to date as funds allow.
- that the road classification in terms of TRH 26 (Committee of Transport Officials, 2012) was completed.

HEAD: ROAD NETWORK MANAGEMENT BRANCH

DATE: 28/3/2019

1.2 Background

1.2.1 Purpose

The purpose of this RAMP is to:

- set out the elements of infrastructure assets managed by the Branch;
- consider the required level of service to be provided by the infrastructure;
- indicate the level of service actually provided;
- assess gaps in level of service and how to address these gaps;
- estimate the financial resources expected to be made available;
- demonstrate how the infrastructure is managed and monitored;
- demonstrate responsible management;
- communicate and justify funding requirements; and
- comply with regulatory requirements.

Finally, this RAMP seeks to further strengthen the alignment between the activities of the Branch and the strategic goals of the Western Cape Government.

1.2.2 Service delivery model

The service delivery model comprises the following elements:

- planning, in which needs are identified using both own resources and consulting engineers;
- design of solutions using both own resources and consulting engineers;
- preparation of a Roads Programme using own resources;
- delivery of the projects and programmes in the Roads Programme with own resources and on contract;
- management of the use of the road network using own resources; and
- measurement of performance across all phases using both internal and external resources.

1.3 Goals and objectives of the RAMP

The goals and objectives of the RAMP are to communicate the Branch strategy that supports the Department of Transport and Public Works (DTPW) vision and mission (Department of Transport and Public Works, 2015) . The DTPW strategic vision and mission are:

Vision

"To lead in the delivery of government infrastructure and related services".

Mission

"The Department of Transport and Public Works delivers infrastructure and services to promote socio-economic outcomes and safe, empowered and connected communities.".'

Strategic and departmental goals

The Strategic Objective indicators and targets are higher order indicators that are linked to the strategic objectives in the Strategic Plan (Department of Transport and Public Works, 2015). These indicators are developed into the 2017/18 Annual Performance Plan (Department of Transport and Public Works, 2018) for the Branch.

Note: The indicators are currently output-based and this drives efficiency regardless of effectiveness in moving closer to the Department's vision. The inclusion of outcome-based indicators will incentivise outcomes that are more closely aligned with the DTPW vision. This will encourage the Branch to improve the alignment between the Roads Programme and the Branch strategic objectives and, in turn, promote both effectiveness and efficiency in moving closer towards the DTPW vision.

Branch Strategic Objectives

To achieve the stated Departmental vision, two strategic objectives were adopted by the Road Network Management Branch:

- to enable an efficient road-based transport infrastructure network[1] through maintenance and repair; and
- to support economic growth and empowerment through road-based transport infrastructure investment.

Branch Asset Management Objectives

The following asset management objectives were derived from the Branch's two strategic objectives:

1. Maintain road assets to ensure that the road is safe and smooth for private motorists, road-based public transport and commercial vehicles.
2. Optimise asset preservation over the long term.
3. Prioritise road asset investments that support economic growth.
4. Improve road asset performance to reduce agency and user costs.
5. Provide new asset capacity where demand exceeds capacity.

1.3.1 Relationship with other planning documents

This plan is mainly informed by the following documents:

- Strategic Plan 2015/16 to 2019/2020, Department of Transport and Public Works, Provincial Government of the Western Cape
- Annual Performance Plan 2018/19, Department of Transport and Public Works, Provincial Government of the Western Cape

All numerical values, MTEF allocations and road condition statistics are based on the latest available data. Furthermore, the intention of the Plan is to align provincial road asset management with government-wide strategic goals, which are outlined in the National Development Plan, the Medium Term Strategic Framework, the Western Cape Provincial Strategic Plan and Spatial Development Framework, as well as the Provincial Land Transport Framework.

1.3.2 Key stakeholders of the RAMP

Good roads are essential for economic development and growth and it follows that all developmental agencies, private and public, are key stakeholders in this RAMP.

The Branch is committed to managing its road network on behalf of those who live, work and invest in the Western Cape, providing high-value services in a legally and environmentally compliant and sustainable manner, without compromising the health and safety of employees, service providers, contractors or customers. The key stakeholders in such a transactional environment would be those benefiting from a well-managed road network that meets desired standards and service levels, as well as those who would contribute to the integrity, sustainability and safe utilisation of the asset. Such stakeholders include:

[1] "Effectiveness of road-based transport infrastructure" is an omission in this objective.

- road users and commuters on the provincial road network, including private motorists, road-based public transport and commercial road users carrying freight, as well as pedestrians and cyclists;
- suppliers of essential services that have an impact on the road reserve, e.g., water, fuel lines, electricity, communications (collectively known as statutory service providers), who have equipment on and under the road that needs its own monitoring and maintenance;
- other transport suppliers, bus rapid transit, trains, buses and taxis, and non-motorised transport;
- SANRAL (South African National Roads Agency Ltd), that is responsible for most of the national roads that have an impact on the provincial road reserve;
- municipalities, including the five district municipalities which act as the agents of the Branch in the maintenance of certain roads, as well as all the other municipalities in the Western Cape and municipal structures such as the City of Cape Town transport authority Transport for Cape Town (TCT), who receive financial assistance for the maintenance and upgrading of certain roads;
- other government agencies with an interest in the employment-generating capacity of road maintenance and construction;
- Provincial Treasury which, through National Treasury, requested the compilation of this RAMP; and
- the National Department of Transport (NDOT) through its RAMP Guidelines issued under draft TMH 22: Road Asset Management Manual (Committee of Transport Officials, 2013).

1.4 RAMP framework

Introduction

The framework of this RAMP closely follows the recommendations in draft TMH 22 (Committee of Transport Officials, 2013). However, this could change once draft TMH 22 has been finalised.

Declarations

These are covered in paragraph 1.1.4.

Road network

This RAMP includes all road networks within the Western Cape that the Branch is accountable for. In addition, reference is made to SANRAL road networks that are also within the area of jurisdiction.

The road network of the Branch is represented by a GIS map (Appendix D – Maps of the road network) highlighting the roads that are under the jurisdiction of the Branch, as well as online at https://rnis.westerncape.gov.za.

Level of service

It is necessary to adopt appropriate levels of service and standards under the current budget constraints and asset conditions. These will need to be re-assessed in future with the objective of optimal management of road assets that is in alignment with the Branch's objectives and the Departmental vision.

A summary of levels of service and standards used in this RAMP is provided below. These levels of service and standards are from draft TMH 22 (Committee of Transport Officials, 2013). Where no standards are provided in draft TMH 22, the standards used are documented.

Situation analysis - current asset condition and performance

This section presents an analysis of the current situation pertaining to the Branch's road assets, comparing the actual conditions and service levels being provided against the minimum requirements documented in Chapter 3 of this RAMP.

Needs determination

Current needs

Road asset maintenance and rehabilitation needs are determined for current assets using a lifecycle benefit-cost analysis for an analysis period of 10 years, using appropriate maintenance treatments and network optimisation as required for Level 4 of the asset management maturity scale. The following budgets are covered:

- The Current Budget, providing the expected impacts on the road network of the current budget;
- An Optimised Budget that maximises the preservation of assets while minimising total transportation costs, providing the expected impacts derived from the optimum investment allocation per treatment category in comparison with the planned allocation of the current budget;
- A Technical Needs Budget determined by an analysis that has the objective of achieving immediate compliance with the levels of service as described Chapter 3; and
- An Intervention Budget determined by the desired level of service needs analysis, that provides the impacts and the optimum investment needs per treatment category to achieve the level of service as described Chapter 3 within a reasonable time period.

New assets

A Demand Management Plan (DMP) has not yet been compiled. The basis of demand determination is described given national road policies (i.e. RISFSA), as well as provincial and local strategic development plans that are likely to influence demand, such as economic and social strategies, spatial development initiatives, and land-use developments. A gap analysis that will identify backlogs in road infrastructure provision as well as accessibility to economic and social amenities will be included in future. In the interim, identified candidate new roads and upgrades, and infrastructure facilities to be planned for the next 10 years are provided here.

Asset management plans

The strategic analysis of this section supports the decision on the final budget most likely to be available for the next 10 years. The agreed multi-year optimised tactical plans based on this approved budget for the management of the road infrastructure assets are also included.

Financial summary

This section summarises the financial requirements that are discussed in Chapter 5 and Chapter 6 of the RAMP, together with the desired investment scenario.

Organisational support plan structure

Details of the Branch's capability to effectively execute the RAMP are provided in the plan.

Plan improvement and monitoring

The RAMP itself is guided by TMH 22 (Committee of Transportation Officials, 2013). The key areas identified will be monitored to determine whether there has been an improvement.

Job creation and skills development

This section provides the number of jobs created during maintenance, repair and new construction of road assets over the previous years of the RAMP. Particular emphasis is placed on the use of the Provincial Road Maintenance Grant (PRMG) for labour-intensive construction methodologies, contractor development to optimise the job creation potential of routine road maintenance, upgrading, re-gravelling, black-top patching and limited rehabilitation works. Progress made on contractor development and the number of job opportunities created is included.

Analysis of strengths, weaknesses, opportunities, threats

The record of a comprehensive SWOT analysis is provided.

References

The list of documents used as source material for the development of the RAMP is provided.

1.5 The asset management approach to planning

The Branch applies best practice in infrastructure asset management.

1.5.1 Asset management defined

Asset management is defined by SANS ISO 55001:2015 (International Standards Organization for Standardization, 2015) as the "*coordinated activity of an organisation to realise value from assets*".

At the simplest level, it means an organisation is making the best decisions it can about its assets, based on a clear understanding of its long-term objectives and purpose (mission). Asset management is the discipline that seeks to achieve this.

1.5.2 Asset Management Framework

The aim of providing an Asset Management Framework is to provide a vision and best practice guideline for how asset management should be implemented in the Branch.

The IAM Conceptual Asset Management model

The IAM (Institute of Asset Management, 2015b) scope of asset management is shown in Figure 1-1 and includes the following:

- asset information;
- organisation and people;
- asset management decision-making;
- strategy and planning;
- lifecycle delivery, which includes the processes of acquisition, operation, maintenance and disposal of assets; and
- risk and review.

The significance of "asset information" and "organisation and people" as enablers for asset management is clearly shown in the diagram. These enablers are discussed further in Chapter 8.

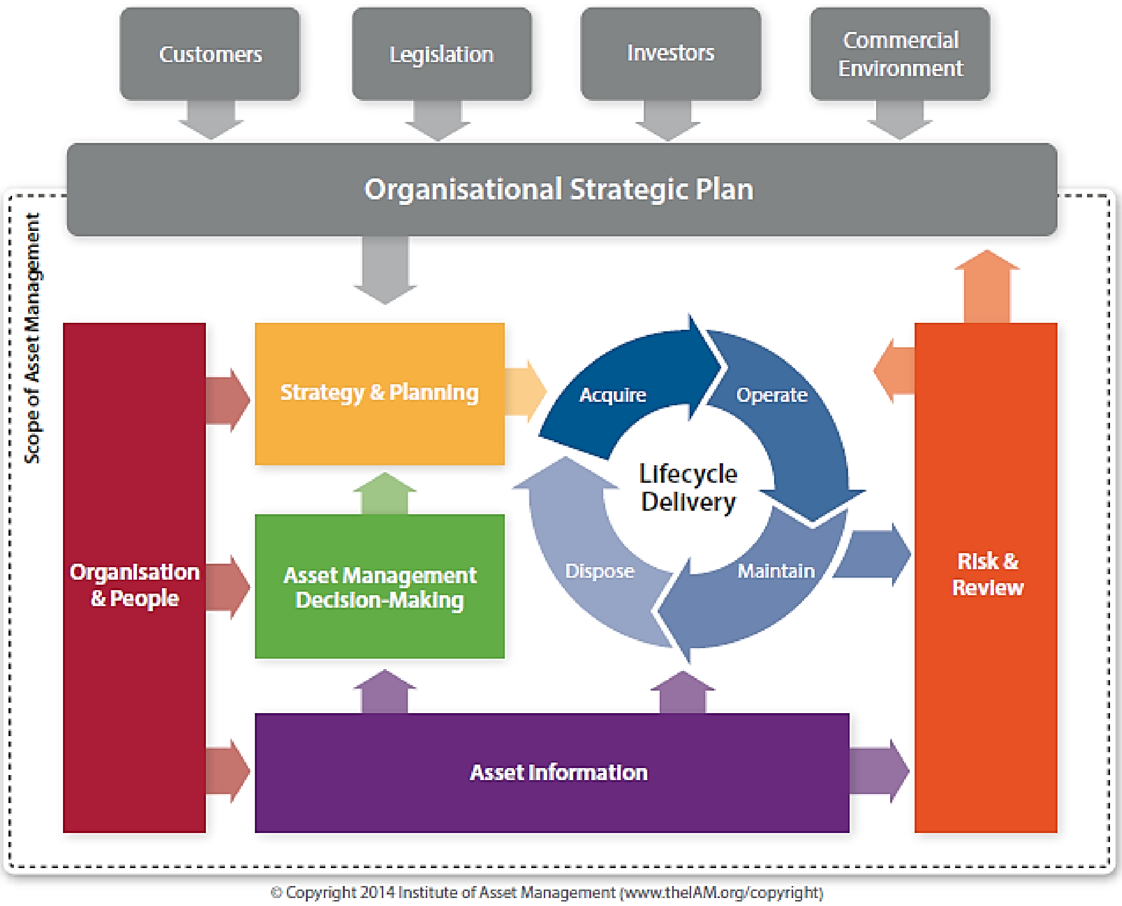


Figure 1-1: The IAM conceptual model of the scope of asset management

Guide to a Road System Manager for the Western Cape

A draft "Guide to a Road System Manager for the Western Cape" (Henderson, 2015) was written as a comprehensive guideline for best practice in asset management for provincial road networks. The guide draws on many documents and standards, including:

- Guide to Asset Management, Austroads, Australia (Austroads, 2009);
- The Interim Guide to the RSM Framework within Transport and Main Roads, Queensland Department, 2010 (TMR, 2010);
- Transportation Asset Management Guide, American Association of State Highway and Transportation Officials, 2002. (AASHTO, 2002);
- SANS 55001:2015: Asset management, International Standards Organisation, 2014 (International Standards Organization for Standardization, 2015); and
- Asset Management – an anatomy Version 2. The Institute of Asset Management, UK, 2015 (Institute of Asset Management, 2015b).

The essence of the guide is described by the business framework shown in Figure 1-2. At the heart of the business processes lie the seven phases with their feedback loops.

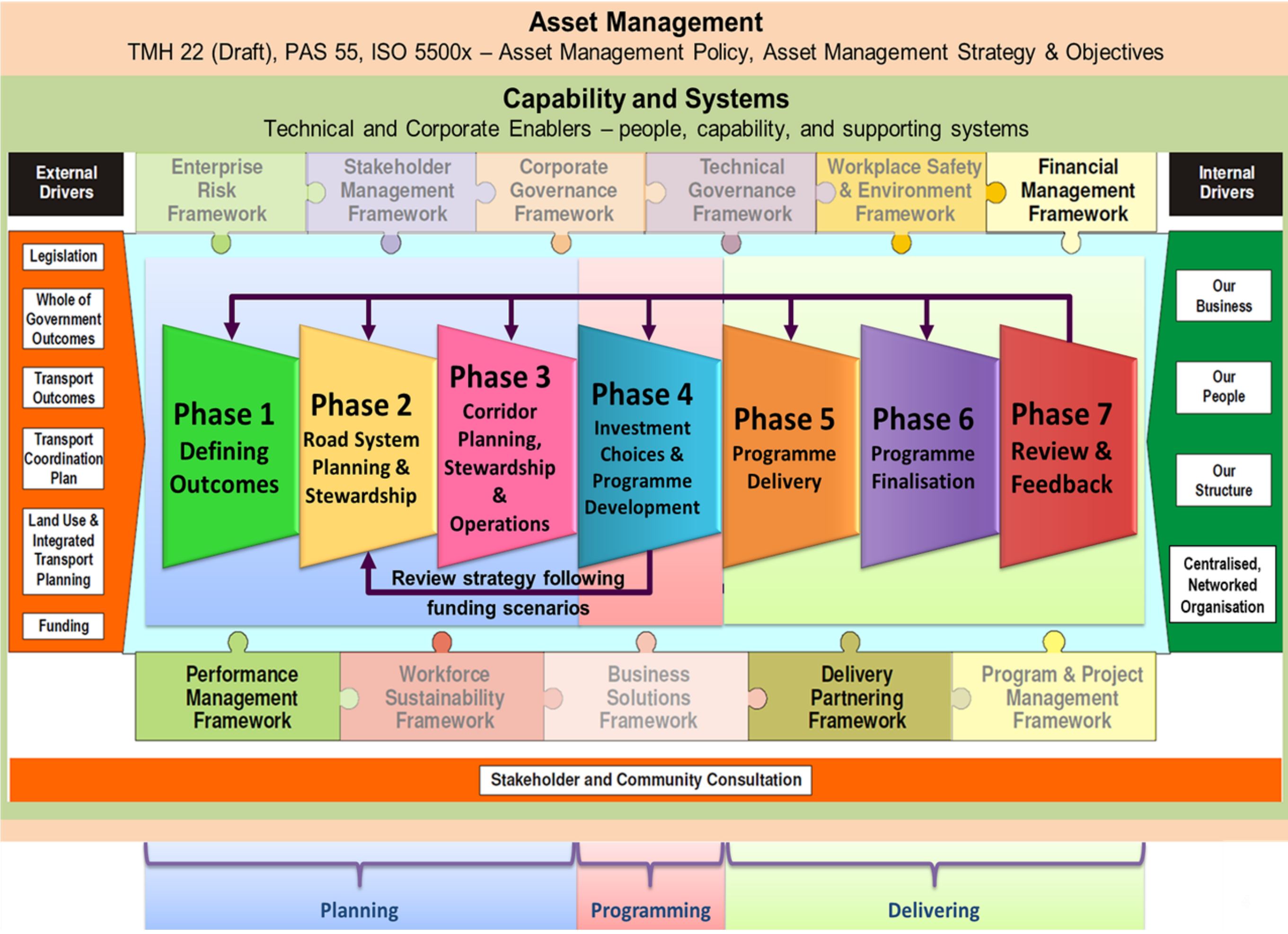


Figure 1-2: Proposed business framework for the Branch

1.5.3 Developing the Branch Asset Management Policy

The implementation of the Branch's Strategic Plan for its road assets relies on a planning approach and methodology that is grounded in asset management policy, strategies and plans. The Asset Management Policy is the link between the Organisational Plan of an organisation and its Asset Management Strategy. It is typically a set of principles or guidelines to steer asset management activity towards achieving the organisation's objectives. It specifically covers the "what" needs to be done and the "why" it needs to be done. The Branch's Asset Management Policy is included as Appendix A – Road Asset Management Policy.

1.5.4 Developing asset management strategies

Background

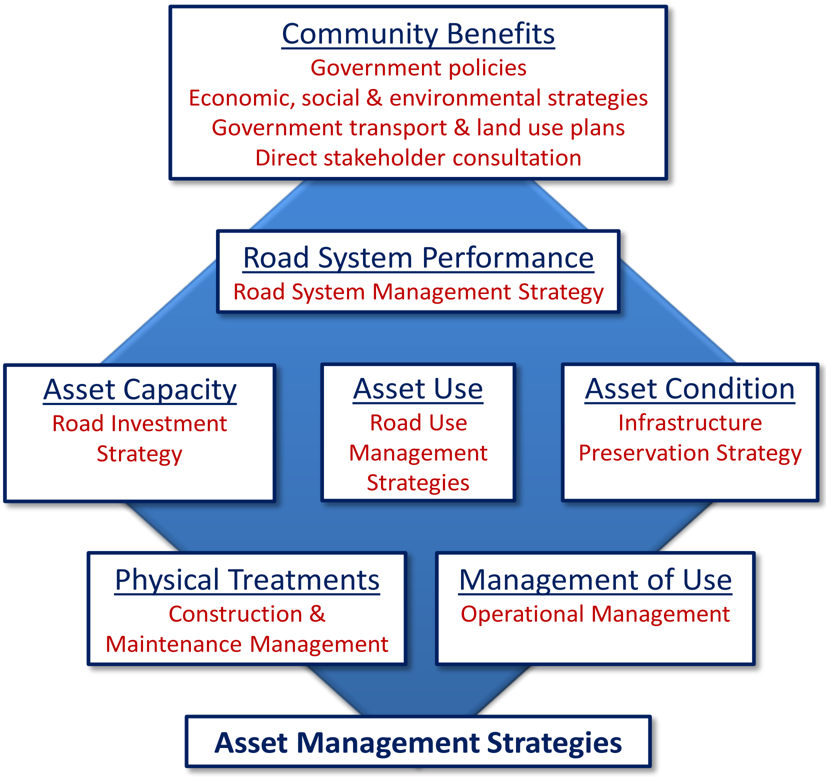
Asset management strategies direct an organisation's asset management activity. It will determine the **high-level asset management objectives** that are needed from the activity to deliver the organisation's objectives and it will define the approach to planning that will be taken.

As part of the total asset management task, it is useful to develop separate but integrated strategies (Austroads, 2009) that focus on:

- road system performance;
- capital investment;
- road infrastructure preservation; and
- Road use.

This approach is based on a hierarchy of road asset management strategies, as shown in Figure 1-3. The figure illustrates the key elements of asset management for road networks. All elements are interrelated. The blue, solid background is a representation of such relationships which, if shown, would appear as an extremely complex diagram. Although only the preservation strategy, described in this RAMP, and some road-use strategies currently exist, the synthesis of a road system management strategy and a road investment strategy is envisaged in the future. These will provide the complete framework for managing the road network. A description of these documents follows:

- Roads System Management Strategy;
- Road Investment Strategy;
- Road Use Management Strategy; and
- Infrastructure Preservation Strategy.



©Austroads (Austroads, 2009)

Figure 1-3: Hierarchy of road asset management strategies

Envisaged Road System Management Strategy

The envisaged Road System Management Strategy (RSMS) will examine the community needs and expectations for the performance of all assets comprising the road system. The focus of the RSMS is to establish an over-arching hierarchy of performance-based levels of service and future vision of fit-for-purpose standards for the configuration, capacity, use and condition of the various road network assets (Austroads, 2009). These levels of service reflect the strategic function and level of use of different routes in the road network to achieve the desired performance. The envisaged RSMS will set the direction of asset management for many decades to come. The road system management strategy is a strategic document that will demonstrate the relationship between the directions of development of the road system and the community's directions of economic development, social development and environmental management. The latter are commonly presented in government policies, strategies and plans, supplemented by direct community consultation.

The RSMS will also demonstrate to government and key stakeholders the synergies of targeted investments in the management and development of the road system together with other initiatives to achieve government policy outcomes. Furthermore, the RSMS will present the rationale behind fit-for-purpose performance targets and corresponding standards for the capacity, condition and use of various components of the road system (Austroads, 2009).

Until such time that the strategy has been compiled, reference is made to the various government Acts and policies, as well as Branch policies for the identification, planning and design of projects.

Envisaged Roads Investment Strategy

The envisaged Road Investment Strategy (RIS) translates road system performance objectives, driven by community outcomes, into priorities for investments in road system capacity. The RIS will identify and prioritise capital investments in the road system that will progressively achieve the target network configuration and capacity identified in the RSMS, while recognising forecast patterns of road use demand and funding availability. The envisaged RIS articulates the priorities and effectiveness of capital investments in improving the capacity of the road system.

The RIS will be used for the guidance of planners, project designers and developers of road investment proposals (Austroads, 2009).

Infrastructure Preservation Strategy

The Infrastructure Preservation Strategy (IPS) provides the strategic framework for managing the condition of the road network by translating road system performance objectives into preservation treatment priorities, as illustrated and outlined in Figure 1-4. This is achieved by a technique known as lifecycle value realisation (LVR) and includes:

- forecasting patterns of deterioration of asset condition;
- the effects of treatment programmes on lifecycle costs of the asset; and
- the effect of asset condition on road user costs, ride quality and safety.

It enables the development of sustainable maintenance and the renewal programmes to achieve and maintain the asset condition objectives in terms of levels of service and target standards developed in the Road Use Management Strategy (RUMS). The IPS guides the branch in terms of maintenance management for the road network.

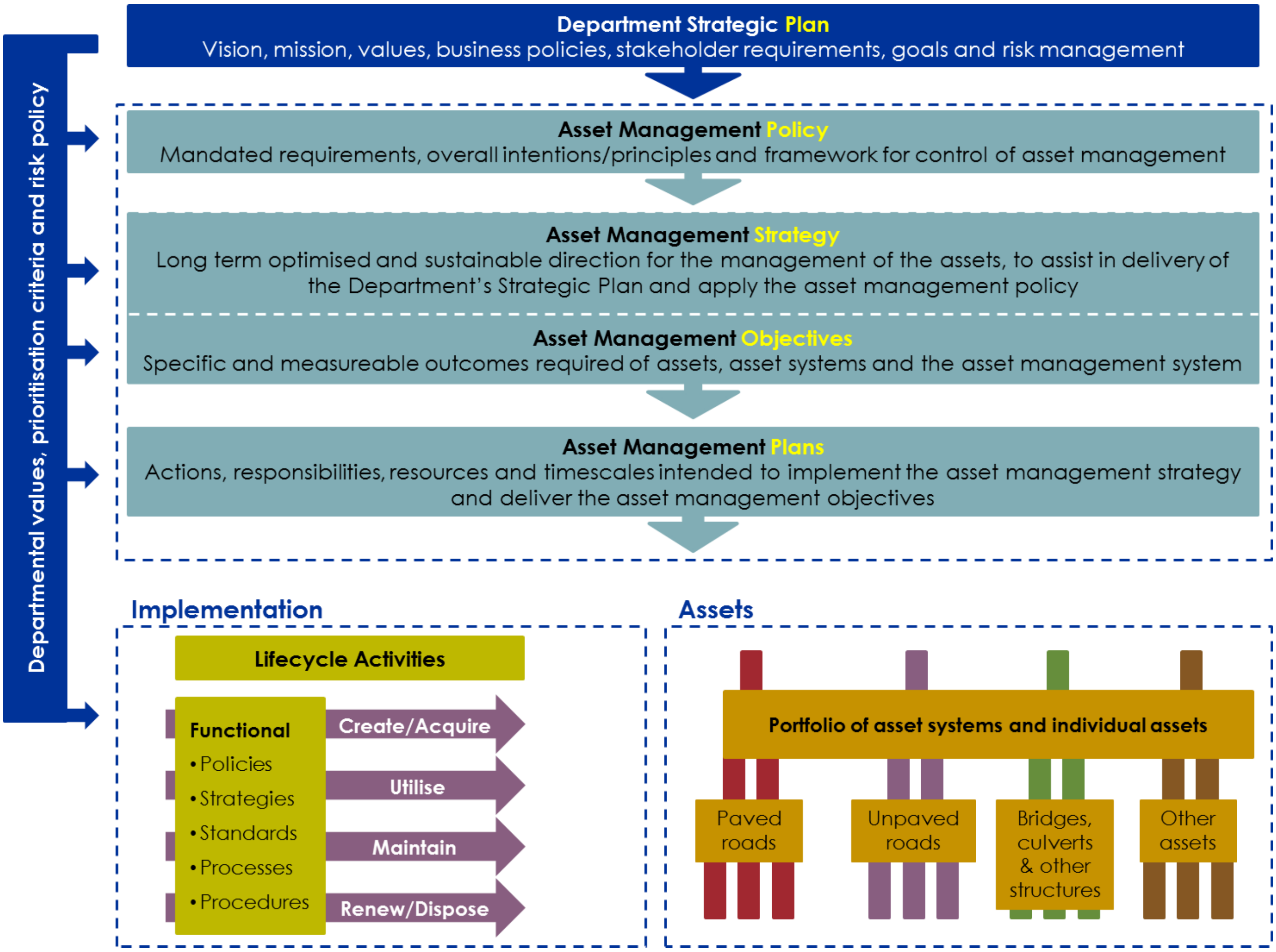
This RAMP supersedes the Road Preservation Report that previously provided the Infrastructure Preservation Strategy.

Lifecycle value realisation

LVR covers all the activities undertaken by the Branch to establish the desired balance for the costs and benefits of different interventions for the maintenance, renewal and disposal of road assets. In practice, this is a combination of capital investment decision-making and operations and maintenance decision-making techniques to optimise the value obtained from assets (Institute of Asset Management, 2015c). LVR requires the optimisation of both lifecycle costs in comparison with the value obtained from assets over the organisation's period of responsibility.

In order to achieve this outcome, it is necessary to apply both lifecycle costing (LC) and value optimisation (VO) techniques. If a required asset performance is met, then the lowest LC corresponds to the best-value method of delivering this requirement for the organisation. Sometimes LC is called "total cost of ownership". VO considers the value of the asset system in addition to the asset cost. It aims to deliver the best ratio of benefits (in terms of delivering organisational strategic goals) and LC; in other words, the best value-for-money.

The typical applications of LC and VO in the Branch at different levels of managing assets are illustrated in Figure 1-5 (Institute of Asset Management, 2015c).



©Institute of Asset Management

Figure 1-4: Planning and implementation elements of an asset management system

LC and VO are applied at three levels, namely, portfolio, system and asset, as described below.

Portfolio-level application of LC and VO

The Branch has a large portfolio of assets and asset systems within its control (i.e. paved roads, unpaved roads, bridges, culverts, retaining walls, signage, fences, weighbridges, etc.), all of which present competing demands on scarce resources. Therefore, it is essential to analyse the costs, capabilities, and risks within the entire portfolio of assets to produce a refined suite of plans and deliverables. The current implementation of this approach in the Branch is comprehensive for the paved and unpaved roads only, but is limited for other asset types, such as bridges, culverts, etc.

System-level application of LC and VO

When value is being created at the system level, i.e. the paved and unpaved road networks, it is necessary to evaluate and optimise performance, delivery, cost and risk across the assets in the system from the top down. System-wide LC, risks and performance are estimated by aggregating the impact of all assets by modelling the capability of the system as a whole. The current implementation of this approach is comprehensive for the paved and managed unpaved roads only.

Asset-level application of LC and VO

Where optimisation of capital investment decision-making and operations and maintenance decision-making for an individual asset is carried out, asset-level decisions need to take into account the asset's contribution at the system level. The current implementation of this approach in the Branch is comprehensive for the paved and managed unpaved roads, but is limited for bridges, culverts and the other assets.

The concept of the differing levels of application of LC and VO is illustrated in Figure 1-5.

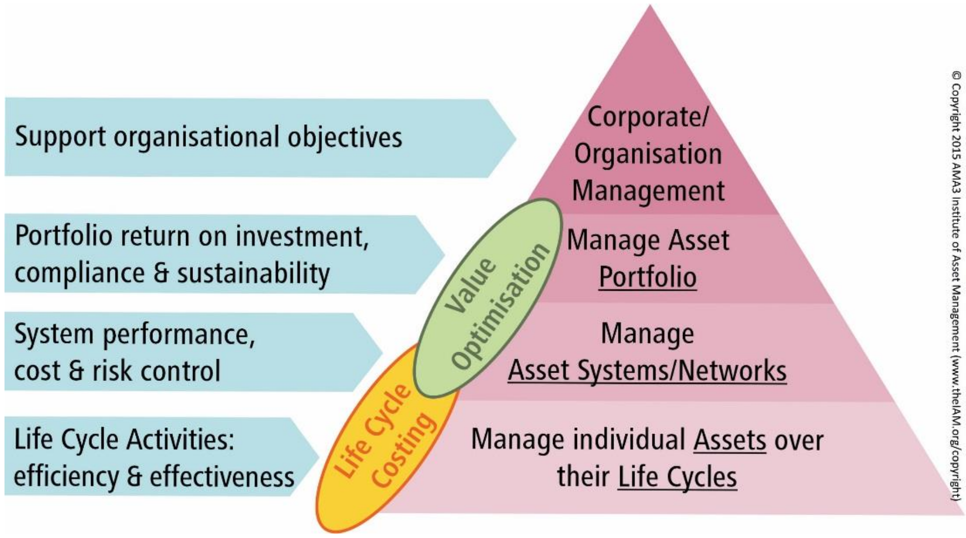


Figure 1-5: LC and VO at different levels of managing assets

LC and VO combine capital investment decision-making with operations and maintenance decision-making processes to support asset management decisions. These decisions are made in relation to costs, risks and value opportunities, taking account of both the immediate/short term impacts and any longer term consequences. The correct application of LC and VO can produce:

- increased financial and economic benefits;
- improved decision-making effectiveness;
- better communication with stakeholders; and
- improved cross-disciplinary governance and consistency.

LC and VO help to ensure that the right decisions are made about:

- what to do;
- how much to spend;
- on what assets; and
- when to do it.

Further details on the benefits of LC and VO are documented in Life Cycle Value Realisation (Institute of Asset Management, 2015c).

Preserving pavement assets

It is important to understand the implications of the two alternative strategies (maintenance strategy and renewal (rehabilitation) strategy) for preserving road pavement assets, which are based on the characteristic lifecycle of roads.

Figure 1-6 shows the effect of these two strategies represented by the blue line (renewal) and the green, broken line (maintenance). Road roughness is used as the measure of the performance of the pavement. Road roughness, or roughness, is the term used to describe the relative degree of comfort or discomfort experienced by a road user when using a road. The International Roughness Index (IRI) is a roughness parameter which is determined from the longitudinal road profile measured in a wheel path. In the IRI calculation, the measured profile is processed using a mathematical transformation which filters and cumulates the wavelengths encountered in the profile. This transformation was developed and calibrated in a manner that ensures that the output, i.e. the IRI, is closely correlated with road user perception of roughness and tyre load dynamics, which impact on vehicle control and safety (Committee of Transport Officials, 2016). Roughness is measured on a regular basis by the Branch. More details on this topic can be found in Chapter 3 – Level of Service.

When a road becomes rough to ride on, users experience a ride that is bumpy and potentially unsafe. Roughness is also an indicator of the condition of the underlying pavement structure layers.

Maintenance strategy

This strategy assumes adequate funding for routine maintenance, reseal and rehabilitation. Figure 1-6 illustrates the deterioration of roughness with time and shows the required maintenance treatments of:

- routine maintenance;
- resealing at appropriate intervals; and
- rehabilitation once the riding quality (road roughness) and condition of the road has deteriorated to the intervention level.

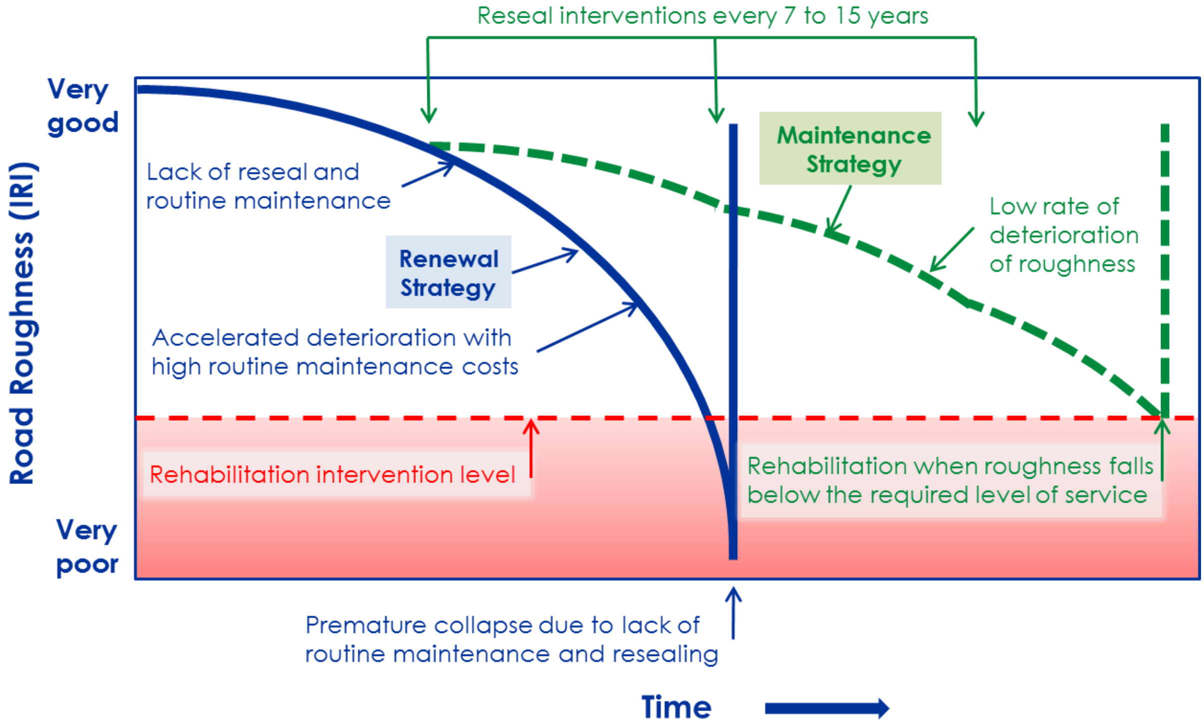


Figure 1-6: Characteristic graph of deteriorating roughness showing the effect of different strategies

The implementation of the maintenance strategy retards the deterioration of the road network by protecting the roads from ingress of water and thereby maximises the useful life of the road until it finally requires rehabilitation. The maintenance strategy results in the lowest costs to the road user and the Branch and the network is preserved in a condition that functions optimally.

The Branch has adopted the Maintenance Strategy for the Preservation of the provincial Road Network in the Western Cape

Renewal strategy

This strategy assumes insufficient funds for routine maintenance and resealing and a fix-worst-first approach is followed for the selection of maintenance options:

- there is a high demand on routine maintenance to prevent the collapse of the road surface, and the consequence is escalating routine maintenance costs;
- severely deteriorated roads require premature rehabilitation due to insufficient preventive maintenance at a cost of at least ten times more than the cost of resealing; and
- the renewal strategy leads to destruction of the road asset, which is very expensive to replace because of the premium paid for rehabilitation or reconstruction. The road user pays excessive costs due to the poor condition of the provincial road network and the Branch pays extra for the intervention.

The renewal strategy is neither desirable nor sustainable. Once the network deteriorates beyond the point where the maintenance strategy can no longer be applied because of accelerating deterioration, the renewal strategy takes over and the accelerating destruction of asset is inevitable without an injection of additional funds.

Road use management strategies

The road system cannot accommodate unconstrained use. To address this, road use management strategies (RUMS) provide a framework for the management of road use, particularly for specific road user groups, such as freight vehicles, public transport, port access, and mining-related cartage. Such operational management strategies are complementary to the Road Investment Strategy and the Infrastructure Preservation Strategy.

The RUMS also provides a strategic framework to manage the use of the road system, including vehicle registration, mass and dimension limits, operational requirements, licensing of drivers and operators, traffic management, and road space allocation (Austroads, 2009).

RUMS typically includes:

- Road Access Guideline supported by the Access Management Guidelines;
- Designated routes for heavy or oversize vehicles;
- Abnormal loads;
- Speed management; and
- Priority lanes for public transport vehicle movements.

Travel demand management (TDM) strategies that focus on managing the level of travel demand and influencing modal choice are a sub-set of road use management strategies.

1.6 Asset information systems

According to the IAM (Institute of Asset Management, 2015a), *"Organisations should establish and maintain systems that manage asset information. The systems should be designed to provide sufficient support and information to meet the organisation's asset management objectives"*. Furthermore, the IAM goes on to say that *"Unless the content of the asset information system is managed appropriately then the business decision making capability will be impaired"*.

Examples of this impairment are when:

- Maintaining assets;
- Setting investment requirements/ capital expenditure planning;
- Responding to alarms and operational incidents; and

- Managing logistics.

The IAM concludes that "*Having an effective asset information management system is a key component of asset management. Such a system ensures that the right information is available to the right users at the right time to support business objectives*" (Institute of Asset Management, 2015a).

1.6.1 Value of asset information

Cost efficiencies

The IAM (Institute of Asset Management, 2015a) quotes studies that have shown that asset information has a very significant effect on the efficiency and performance of asset-intensive businesses. Organisations operating efficient asset information processes have been found to spend around 20% of their total annual budget (OPEX and CAPEX) on asset information. In businesses with poor asset information processes, this can increase to as much as 25%. Therefore, improving the efficiency of how asset information is managed within the business therefore offers a significant opportunity for savings.

Expenditure effectiveness

The IAM (Institute of Asset Management, 2015a) advises that an even greater benefit can be realised if asset information is used effectively to inform decision making on business expenditure profiles, such as capital programmes to improve asset serviceability, or best whole-life cost decisions regarding maintenance and renewal choices, i.e., the appropriate use of asset information will **enable the right work to be done in the right place at the right time**.

1.6.2 Asset Information Management System

The IAM (Institute of Asset Management, 2015a) recommends that an Asset Information Management System (AIMS) be established to define and manage the use of asset information as a key component, and in support of, the Asset Management System. AIMS will be a core part of the operation of the Branch, will receive suitable high level input and support and will be reviewed on a periodic basis to maintain alignment with Branch objectives and the Asset Management System. The AIMS is shown in Figure 1-7 (Institute of Asset Management, 2015a). The word "governance" in this context refers to the disciplines involved in managing and controlling data and information.

As can be seen in Figure 1-7, the AIMS will consider the following:

- Asset Information Strategy;
- Standards, specifications and requirements for asset information;
- Managing information through its lifecycle;
- Monitoring, auditing and benchmarking to review performance;
- Ongoing consideration of governance, people and organisational factors;
- Management of processes and systems; and
- Effective management of change

In this context, the Branch have included a Chief Directorate in the organisational redevelopment with specific staff responsible in asset management, road programme development and business governance. This Chief Directorate will need to assess how "good practice" approaches may be relevant to the Branch objectives.

1.7 Road Asset Management Systems

Asset information is a key enabler for effective asset management (Institute of Asset Management, 2015a). The Branch relies heavily on its Road Asset Management System and supporting processes to enable effective and efficient asset management. In terms of SANS 55001:2015 (International Standards

Organization for Standardization, 2015), this includes project identification, optimisation of projects and programmes, programme and project management.

The creation and ongoing development of road information management systems has a long history in the Branch. The historical context of these developments is described below.

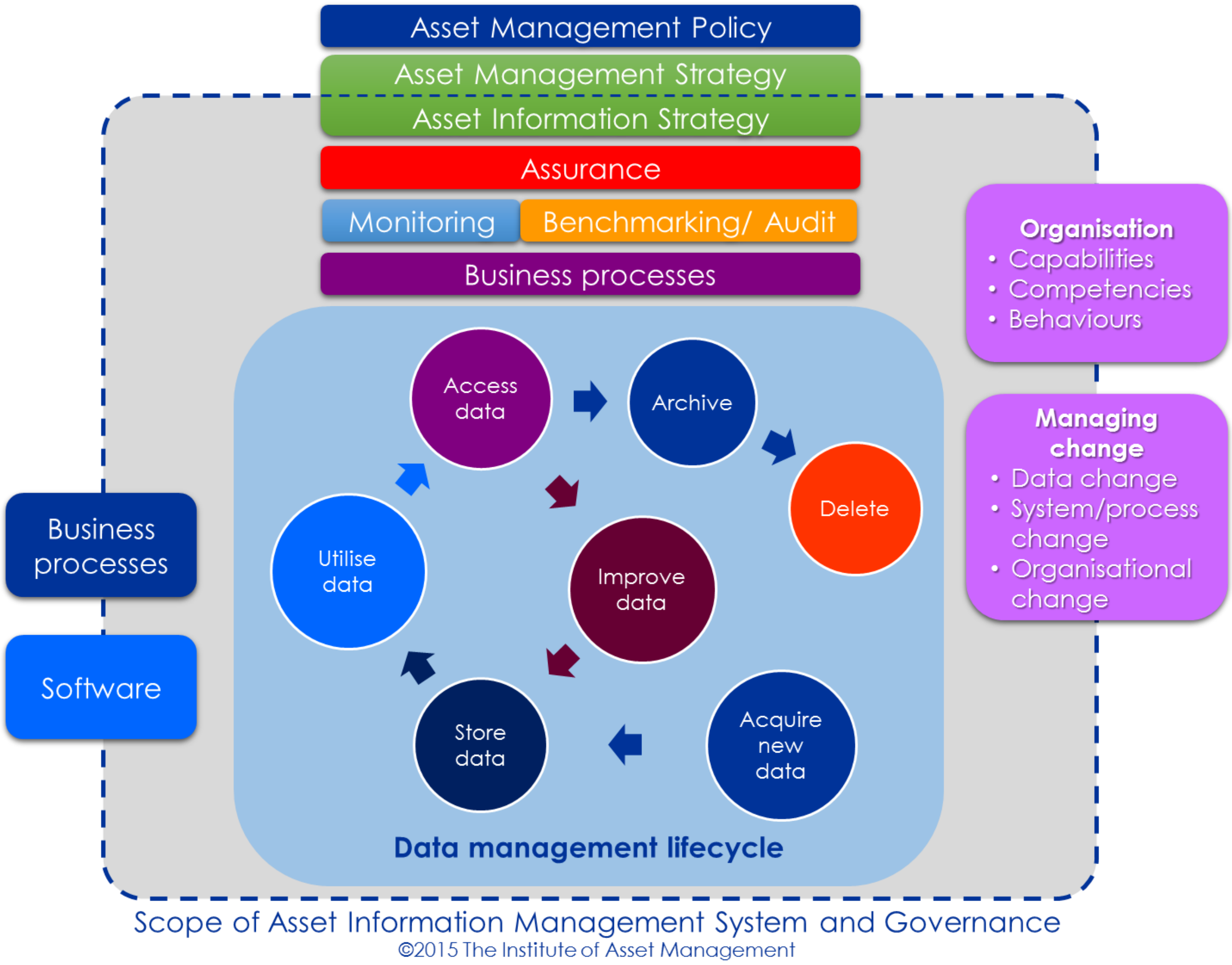


Figure 1-7: The Asset Information Management System

1.7.1 Historical development of road management systems

In 1980 what was then the Department of Roads of the Cape Provincial Administration recognised the need to develop formal procedures that use objective data on which to base maintenance strategy and policy, and to identify and prioritise rehabilitation and resealing projects. This strategic approach to asset management has been defined and refined in the preservation strategy of the Branch over approximately 30 years.

The Pavement Management System (PMS) was initiated in 1981 with the help of the Council for Scientific and Industrial Research (CSIR), and was developed and enhanced in-house with the assistance of consulting engineers. The PMS supports strategic-level decisions. It provides a repository of as-built pavement structure information. Condition reports can be obtained from the PMS that include both functional and structural condition. The system is used to identify candidate resealing projects and develop a list of resealing priorities.

The Gravel Roads Management System (GRMS) was initiated in 1989 to expand the scope of the PMS to include unpaved (gravel) roads. A panel of consulting engineers was appointed to assist with the implementation and the management of this new system. The GRMS supports strategic- and tactical-level decisions. The GRMS provides a repository of gravel-wearing course information and visual survey and dynamic core penetrometer (DCP) data. Condition reports can be obtained from the GRMS that provide functional condition. The system is used to identify and priorities candidate regravelling projects as well as special maintenance projects, such as spot regravelling.

The latest phase of the development of the PMS and GRMS was being upgraded to web-enabled systems. There are ongoing improvements to the systems and the technology used for data collection.

In 1995, the Branch contracted Aurecon to use the Deighton Total Infrastructure Management System (dTIMS) with the data from the PMS and GRMS databases to provide powerful functionality, enabling lifecycle cost-benefit analysis to be used in the optimisation process for projects under constrained budget conditions.

The priority of rehabilitation and upgrade projects is determined by means of an optimisation process using incremental benefit-cost analysis. The objective function (refer to paragraph 5.1.14, Background to the lifecycle benefit-cost analysis) initially used was to minimise total transport costs (TTC). These costs were calculated from vehicle operating costs and agency costs. This TTC objective function was subsequently modified in 2009 to allow for asset preservation on low-traffic roads by maximising road condition.

The World Bank Highway Development and Management system HDM-4 models are calibrated for the Western Cape using data from 37 monitored sections of road throughout the province captured over the last 15 years. These models predict the future deterioration of the road network, and provide information for estimating vehicle operating costs. dTIMS enables the combined analysis of both paved and unpaved roads to produce the optimum distribution of funds, thus guiding the Branch in the most effective allocation of resources.

The following kinds of potential projects are identified by dTIMS:

- Rehabilitation/ reconstruction;
- Light rehabilitation;
- Resealing;
- Regravelling; and
- Upgrading to paved standards.

dTIMS determines the technical budget needs and the optimised MTEF budgets for each project type listed above. This improves the allocation of funding sources to identified areas of need.

The Bridge and Structures Management System, known as STRUMAN, was developed by the CSIR and initiated in 1998. It provides an inventory of bridges and large culverts. Needs are determined from *ad hoc* visual inspections. Currently, no algorithms are being used to determine maintenance needs.

It is envisaged that in future dTIMS or similar approved industry software will include functionality for determining the maintenance priorities for structures.

The Traffic Counting System (TCS) was developed more than 50 years ago and continues to be refined and upgraded. The system provides reliable traffic counts for the PMS and dTIMS to support the demand analysis.

The first phase of a new system called the Gravel Roads Maintenance Management System (GROMAMAS) was implemented in 2005. GROMAMAS manages all the processes associated with the regravelling and maintenance of unpaved roads. The GROMAMAS supports tactical and operational decisions.

In 2008 the borrow pit module in the Gravel Management System was split off to create the Materials Information Management System (MIMS). This system is currently a repository of information on all borrow pits used for the maintenance of unpaved roads. MIMS will, in future, provide valuable information on the availability and spatial distribution of gravel materials. MIMS is operational, and is currently being enhanced.

The major technical systems architecture is shown diagrammatically in Figure 1-8 and places the systems with respect to their support of strategic, tactical and operational levels of decision making. Systems shown in grey are not operational, and are envisaged or under development. The acronyms used in Figure 1-8 are described in the list of acronyms at the beginning of the RAMP. The purpose and output of the Strategic Asset Management Systems is listed in Appendix B. Similarly, systems of a tactical and operational nature are listed in Appendix C.

1.7.2 Outline of the asset management information available

All surveillance data (listed in Table 3-1, Table 3-2 and Table 3-5) is available from the systems described in Annexure B and C. Comprehensive reports are prepared annually on the state of the paved and unpaved road network that cover the condition of each road.

1.7.3 Gap analysis for RAMS

All systems are reviewed periodically and their functionality updated to meet the information requirements of the Branch. Systems are also redeveloped to keep up with changes in technology. Currently, gaps in systems and processes are identified by system owners and these are attended to depending on priority and funding. The Department has an Information Technology Steering Committee to guide and direct systems developments within the department. In addition, the Branch committee member works towards a gap assessment of information management and processes in terms of best practice contained in SANS 55001:2015 (International Standards Organization for Standardization, 2015), PAS 55 (British Standards Institute, 2008), the IAM publication "Asset Information, Strategy, Standards and Data Management" (Institute of Asset Management, 2015a) and Asset Management – an anatomy (Institute of Asset Management, 2015b).

The following gaps have been identified:

- The lack of an information system to support the management of routine maintenance of the paved road network will be ameliorated by the implementation of a Maintenance Management System, call Regional Operations Planning and Execution (ROPE).
- The lack of control over how project estimates are prepared and the lack of a formal system to provide unit rates for strategic, tactical and operations planning will be ameliorated by the implementation of an Estimating and Unit Rate System (EURS).

1.7.4 Evaluation of information and analysis functions

The American Association of State Highway and Transportation Officials (AASHTO) self-assessment questionnaire (AASHTO, 2002) was used as a tool to evaluate the state of asset management in the Branch as at 10 July 2015, and reported on in the RAMP 2017/18 to 2026/27.

The Branch has initiated an independent evaluation of the efficiency of available systems and processes in September 2018. This exercise will form part of the System Support Services review of key asset management systems and the development of a new efficiency process system.

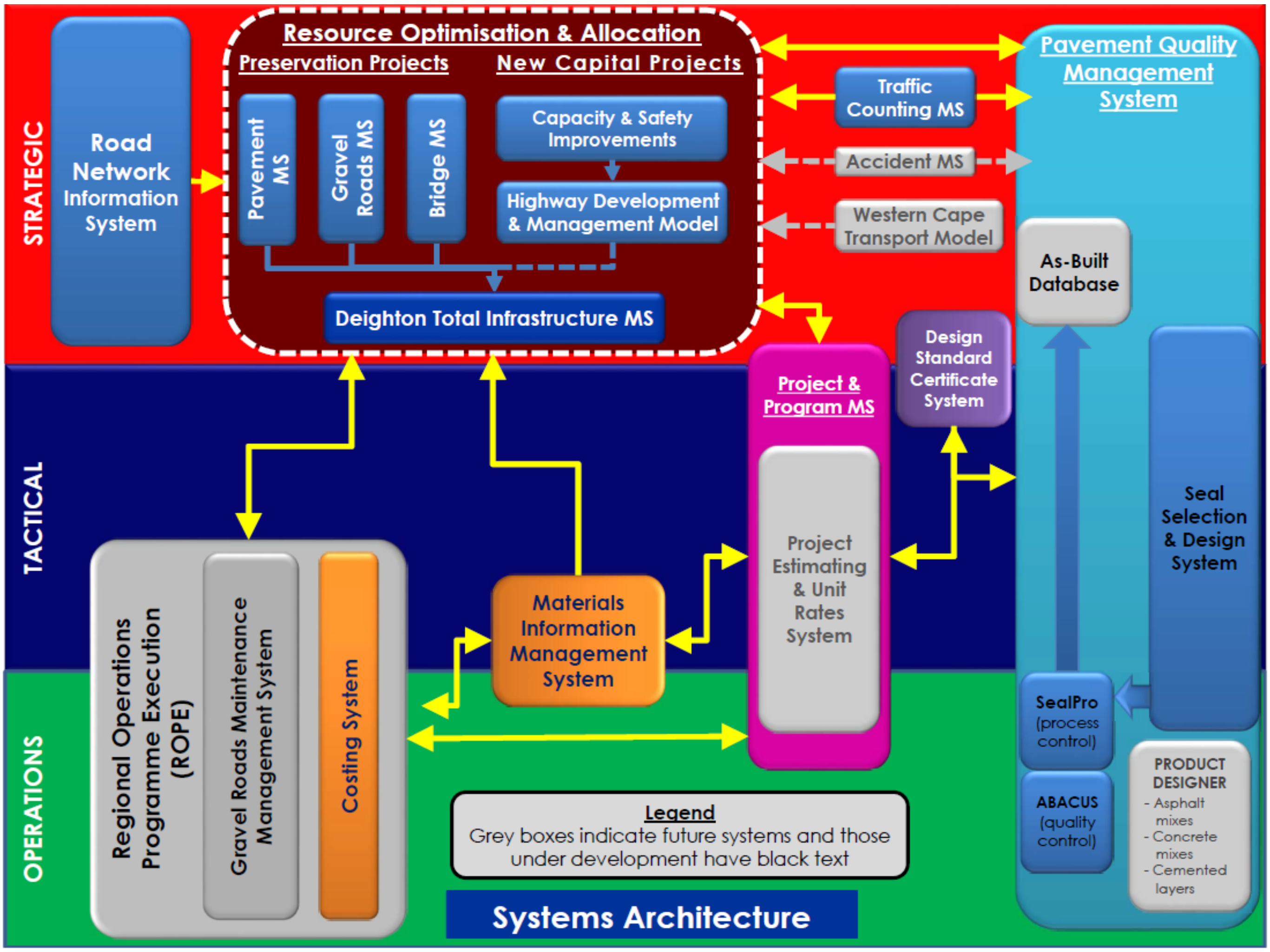


Figure 1-8: Major systems architecture

1.8 Administrative and financial management

In addition to RAMS, other support systems can be classified into the categories of administrative and financial management systems.

1.8.1 Administrative and Financial systems

The following is a list of systems in use by the Branch:

- Outlook;
- Integrated loss control system;
- Supplier Invoice Tracking Systems (SITS)
- Basic Accounting System (BAS);
- Personnel and salary administration system (PERSAL);
- Strategic planning monitoring system;
- Integrated Procurement System (IPS); and
- Electronic Content Management document management system (ECM).

1.8.2 Financial management services

Financial management services are rendered to the Branch by the Financial Management Branch of the Department. The Financial Management Branch consists of the following divisions:

- Management Accounting;
- Financial Accounting, Financial Control; and
- Supply Chain Management.

The Branch uses the transversal National Treasury financial management systems. In addition to these systems, the Department is using various debtors and management reporting systems to improve financial and budgetary controls.

The financial management of the Branch is structured on a decentralised basis and management in the various components of the Branch is financially accountable. Systems have been developed to complement this decentralised strategy. The Financial Management Branch holds regular meetings with the management of the Branch and key financial staff to ensure effective and efficient control.

The Branch regards compliance with the Public Finance Management Act (PFMA) (Act 1 of 1999) as a high priority. The Branch completes the National Treasury's normative measures report on a quarterly basis and submits the report to Provincial Treasury.

No changes in the financial management services and systems are required by this RAMP.

Chapter 2 – The Road Network

2.1 Ownership of the road infrastructure

The Constitution of the Republic of South Africa, 1996, lists provincial roads and traffic management as a Schedule 5, Part A function, which is an exclusive provincial legislative competence, but does not give a specific definition of provincial roads. Nor do the Local Government: Municipal Structures Act (Act 32 of 2000) or the Local Government: Municipal Systems Act (Act 117 of 1998) define roads and streets. The division of functions between the provincial and local spheres of government remains unstructured and guided by historic arrangements and informal agreements entered into in the spirit of co-operative governance.

Section 7(1) of the Cape Roads Ordinance requires that the "Administrator" shall undertake the construction and maintenance of every public road, other than a minor road of which the "Administrator" is the road authority. Section 7(2) requires that a "(Divisional) Council' shall, in so far as funds permit, undertake the construction and maintenance of every divisional road of which the Council is the road authority". Section 7(3) states that the road authority "may undertake the construction and maintenance of every minor road and public path of which it is the road authority".

Prior to the establishment of regional services councils during the period 1987 to 1989, the divisional councils were the road authorities for proclaimed main roads, divisional roads, minor roads and public paths in rural areas and in outer municipal areas. Divisional councils were abolished in the late 1980s. During 1992, all assets, liabilities, rights, duties and obligations of the regional services councils in respect of proclaimed main roads, divisional roads, minor roads and public paths were passed to the then Administrator of the Cape of Good Hope. This resulted in the Provincial Government of the Western Cape becoming the road authority for all provincially proclaimed roads in the province. This "road authority" function has been delegated to the Minister responsible for the Department of Transport and Public Works, with the Provincial Road Network Management Branch of the Department of Transport and Public Works being the responsible organisation. The district municipalities in the province, being the legal successors to the regional services councils, act as the agents of the provincial government for the maintenance of main roads, divisional roads and minor roads.

The Branch is therefore responsible for the proclaimed provincial road network within the Western Cape, consisting of 6 864 km of paved roads, 25 075 km of unpaved roads, and eight weighbridges. The road network of the Province is shown in Appendix D – Maps of the road network.

2.1.1 Legislative requirements

The achievement of the strategic goals of the Branch is guided primarily by the following constitutional and other legislative mandates:

- Constitution of the Republic of South Africa, (Act 108 of 1996).
- The Constitution of the Western Cape, 1998 (Act 1 of 1998).
- Public Finance Management Act, 1999 (Act 1 of 1999 as amended by Act 29 of 1999) and Regulations.
- Public Service Act, 1994 (Act 103 of 1994) and Regulations, 2001 and 2016.
- Western Cape Land Administration Act, 1998 (Act 6 of 1998). National Land Transport Act, 2009 (Act 5 of 2009) and Regulations.
- National Road Traffic Act, 1996 (Act 93 of 1996).
- Cape Roads Ordinance, 1976 (Ord, 19 of 1976).
- Advertising Along Roads and Ribbon Development Act, 1940 (Act 21 of 1940).
- Road Transportation Act, 1977 (Act 74 of 1977).

- Road Safety Act, 1972 (Act 9 of 1972).
- Road Accident Fund Act, 1972 (Act 9 of 1972)
- Road Traffic Management Corporation Act No 20 of 1999.
- Administrative Adjudication of Road Traffic Offences Act No 46 of 1998.
- Infrastructure Development Act No 23 2014.
- Provincial Infrastructure Delivery Management Framework as approved by the Provincial Executive Council.
- Occupational Health and Safety Act, 1993 (Act 85 of 1993) as amended by Acts 181 of 1993 and 66 of 1995 and Regulations.
- National Environmental Management Act, 1998 (Act 107 of 1998) and regulations.
- Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002) and regulations.
- Western Cape Road Traffic Act, 1998 (Act 12 of 1998).
- Western Cape Toll Roads Act, 1999 (Act 11 of 1999), and the Policy drawn up in terms of Section 16(1) of the Act.
- Preferential Procurement Policy Framework Act, 2000 (Act 5 of 2000) and its regulations.
- Construction Regulation R1010 of 2003 with specific reference to compliance to occupational health and safety within the construction industry.
- Construction Industry Development Board Act 2000 (Act 38 of 2000) with specific reference to the regulation of the construction industry and its 2004 Regulations with specific reference to the registering of contractors and projects.
- Building Industry Bargaining Council Legislation Act 2003 (Act No 25769 of 2003) with specific reference to the protection of employees in the construction industry.
- Local Government: Municipal Systems Act, 1999 (Act 32 of 1999).
- Local Government: Municipal Structures Act, 1998 (Act 117 of 1998).
- Division of Revenue Act, 2007 (Act 1 of 2007 and subsequent Acts).
- Government Immovable Asset Management Act, 2007 (Act 19 of 2007).
- Expropriation Act, 1975 (Act 63 of 1975).
- Western Cape Transport Infrastructure Act, 2013 (Act 1 of 2013).
- Spatial Land Use Management Act, 2013, (Act 16 of 2013) and regulations.
- The Land-use Planning Ordinance Act, 1985 (No 15 of 1985).
- The Western Cape Land-use Planning Act, 2014.
- The Mine Health and Safety Act, 1996 (No 29 of 1996).

2.2 Road network classification

Rural roads in the Western Cape are classified into three main categories:

- National roads, managed by the SA National Roads Agency (SANRAL);
- Western Cape Government provincial roads, managed by the Branch;
- Local municipal roads and streets, managed by the different local municipalities.

Provincial roads are those roads proclaimed as such by the WCG and consist of four categories:

- Trunk roads;
- Main roads;
- Divisional roads; and
- Minor roads.

There are also proclaimed municipal main roads that are subsidised by the Western Cape Government.

Other road networks within the Western Cape are the SANRAL national road network and municipal networks.

2.3 The strategic network

A study into the need for provincial strategic road networks was commissioned by the National Department of Transport during 2016. This initiative required that the Branch identify and submit its PRMG strategic road network for year-on-year performance measures based on key performance indices, measuring the outcomes supporting S'Hamba Sonke Programme.

The rationale used by the Branch for determining the strategic road network was based on the premise that the network would assist in supporting economic growth in the Western Cape. The information contained in the Growth Potential Study (Western Cape Government, 2013) (Western Cape Government, 2014) and the Provincial Spatial Development Framework (Western Cape Government, 2014) assisted with the process of selecting paved roads from the hierarchy of road classes in the Western Cape. Roads with predominantly high volumes that connect areas of economic growth potential were selected. The Strategic Provincial Road Network has a length of 3 095 km of paved roads.

2.4 Road carriageway length

Table 2-1 lists the extent of the road network in terms of length in the Western Cape as described on the Road Network Information System (RNIS) website https://rnis.westerncape.gov.za. The road network is also represented on maps on this website.

Table 2-1: Western Cape Road Network Length as of 10 July 2017

Area	Trunk Roads	Main Roads	Divisional Roads	Minor Roads	Total
PROVINCIAL PAVED ROADS					
Cape Winelands	386,05	731,95	511,28	127,11	1 756,39
Central Karoo	553,72	63,91	14,82	0,97	633,42
Garden Route	765,52	465,34	270,95	45,35	1 547,16
Overberg	351,71	387,22	189,99	55,08	984,00
West Coast	430,72	869,35	284,16	89,26	1 673,49
City of Cape Town	146,3	84,14	37,36	1,35	269,15
Provincial total	**2 634,02**	**2 601,91**	**1 308,56**	**319,12**	**6 863,61**
PROVINCIAL UNPAVED ROADS					
Cape Winelands	0	234,41	898,60	1 763,35	2 896,36
Central Karoo	68,07	616,56	1 679,17	3 846,95	6 210,75
Garden Route	63,17	455,47	2 478,55	2 327,34	5 324,53
Overberg	0	115,74	1 164,77	1 458,22	2 738,73
West Coast	0	393,71	1 600,78	5 885,42	7 879,91
City of Cape Town	0	0	9,72	14,53	24,25
Provincial total	**131,24**	**1 815,89**	**7 831,59**	**15 295,81**	**25 074,53**

Table 2-1: Western Cape Road Network Length as of 10 July 2017					
Area	Trunk Roads	Main Roads	Divisional Roads	Minor Roads	Total
All PROVINCIAL ROADS					
Cape Winelands	386,05	966,36	1 409,88	1 890,46	4 652,75
Central Karoo	621,79	680,47	1 693,99	3 847,92	6 844,17
Garden Route	828,69	920,81	2 749,50	2 372,69	6 871,69
Overberg	351,71	502,96	1 354,76	1 513,30	3 722,73
West Coast	430,72	1263,06	1 884,94	5 974,68	9 553,40
City of Cape Town	146,3	84,14	47,08	15,88	293,40
Provincial total	**2 765,26**	**4 417,80**	**9 140,15**	**15 614,93**	**31 938,14**
MANAGED ROAD NETWORK USED IN THE ANALYSIS (BASED ON VISUAL ASSESSMENT DATA IN 2017/18)					
Paved	2 636,96	2 496,86	1 251,60	263,90	6 651,32
Unpaved	131,24	1 809,16	7 816,09	582,16	10 338,65
Total managed	**2 768,20**	**4 306,02**	**9 067,69**	**846,06**	**16 989,97**

Note, the variance between the two data sources used for the provincial network and the managed network is due to:

- The RNIS is a system that is dynamically managed, while the PMS and GRMS are static for a twelve-month period.

Historical information on the condition of the individual roads, the road network and the traffic carried is available from the RNIS at https://rnis.westerncape.gov.za/rnis .

All references to the length of the WCG road network are "carriageway length", thus including the length of dual carriageways in both directions. **Note:** From this point forward, the reference to the WCG network includes only the roads maintained by the WCG Branch, being a total of 16 979,97 km of paved and unpaved roads.

Details of the national road network in the Western Cape are shown in Table 2-2.

Table 2-2: National road network in the Western Cape					
National Road No.	1	2	7	300	Total
Length, km	542,45	517,00	384,7	16,44	1 460,59

The proclaimed municipal main road network is 296,80 km. The WCG contributes subsidies to the municipalities to maintain these proclaimed main roads. Data on the full extent of the municipal road networks in the Western Cape is not available.

2.5 Paved roads versus unpaved roads

Paved roads comprise 39% of the managed road network length investigated, but the traffic data indicates 95% of vehicle-km is travelled on paved roads. It is, therefore, reasonable to say that a focus on the maintenance and rehabilitation of paved roads will influence the maximum number of road users. This policy has historically been followed and, according to the current funding scenario, between 74% and 88% of the maintenance and rehabilitation funds of the Branch has been allocated towards the preservation of the paved road network.

The current asset value of paved roads is 99% of the total network's value, requiring a large input of funding to preserve the paved roads in a functional condition and minimising the road user costs for 95% of the road users. The provincial road network of the Western Cape Government carries more than 10 billion vehicle-km per annum. **Only 5% of this annual traffic, i.e. 369 million vehicle-km, is travelled on unpaved roads.**

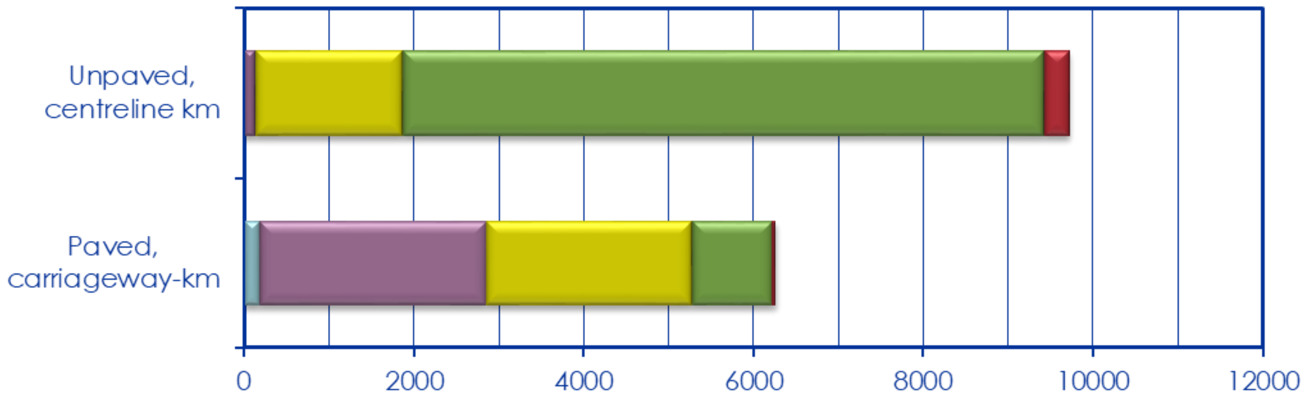
2.6 Road classification

Table 2-3 provides details of the six-class rural and urban road classification system used in TRH 26: South African Road Classification and Access Management Manual (Committee of Transport Officials, 2012).

The functional road classification for the WCG-maintained rural road network according to TRH 26 (Committee of Transport Officials, 2012) is shown in Figure 2-1. Figure 2-2 shows the subsidised municipal proclaimed main roads network. The majority of paved roads are classified as class R2 that provide mobility, and the majority of unpaved roads are classified as class R4 that provide access.

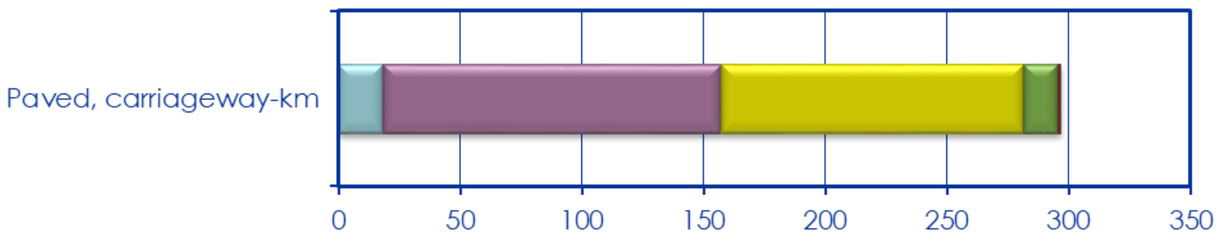
Table 2-3: Road network classification according to TRH 26 for rural and urban roads

Class	Function	Description
1	Mobility	Principal arterial
2		Major arterial
3		Minor arterial
4	Access/activity	Collector street
5		Local street
6		Walkway



	Paved, carriageway-km	Unpaved, centreline km
R1	179,06	-
R2	2 675,90	131,24
R3	2 429,80	1 735,52
R4	940,38	7 566,59
R5	42,75	296,63

Figure 2-1: The WCG maintained rural road network classification according to TRH 26



	Paved, carriageway-km
U1	18,39
U2	138,99
U3	124,38
U4	13,97
U5	1,07

Figure 2-2: The urban WCG proclaimed municipal main road network classification according to TRH 26

2.7 Overload control

Table 2-4 provides the statistics of the overloaded vehicles on the provincial road network. The percentage of vehicles overloaded on the network has followed an upward trend over the last two years, despite the efforts to combat the overloading of vehicles by the Branch, as shown from the years 2009 to 2015.

Table 2-4: Overload control statistics

Year	2009/10	2010/11	2011/12	2012/13	2014/14	2014/15	2015/16	2016/17	2017/18
Vehicles weighed	536 232	579 812	631 830	700 015	658 256	673 920	651 541	592 054	618 744
Vehicles legal	452 696	500 618	554 395	619 816	574 611	597 127	575 041	518 832	533 814
Vehicles overloaded	83 536	79 194	77 435	80 199	83 545	76 793	76 500	73 222	84 930
% Vehicles overloaded	15,60	13,70	12,30	11,50	12,70	11,40	11,70	12,40	13.70
% Overloaded within 5% limit	12,4	11,0	9,9	9,4	10,6	9,3	9,7	10,2	11.7

Figure 2-3 provides an historical view on vehicles weighed, showing the percentage of overloaded vehicles and those within the 5% warning limit.

In addition to the increase in overloading, many overloaded vehicles still escape prosecution by avoiding those sections of road with weighbridges by using and damaging other roads not designed for such heavy loads. Of further interest is the large percentage of vehicles that are overloaded within the 5% warning limit. This indicates that operators may be deliberately overloading within the warning range knowing that they will escape fines if detected. A reduction in the 5% warning limit may have to be considered to address this issue.

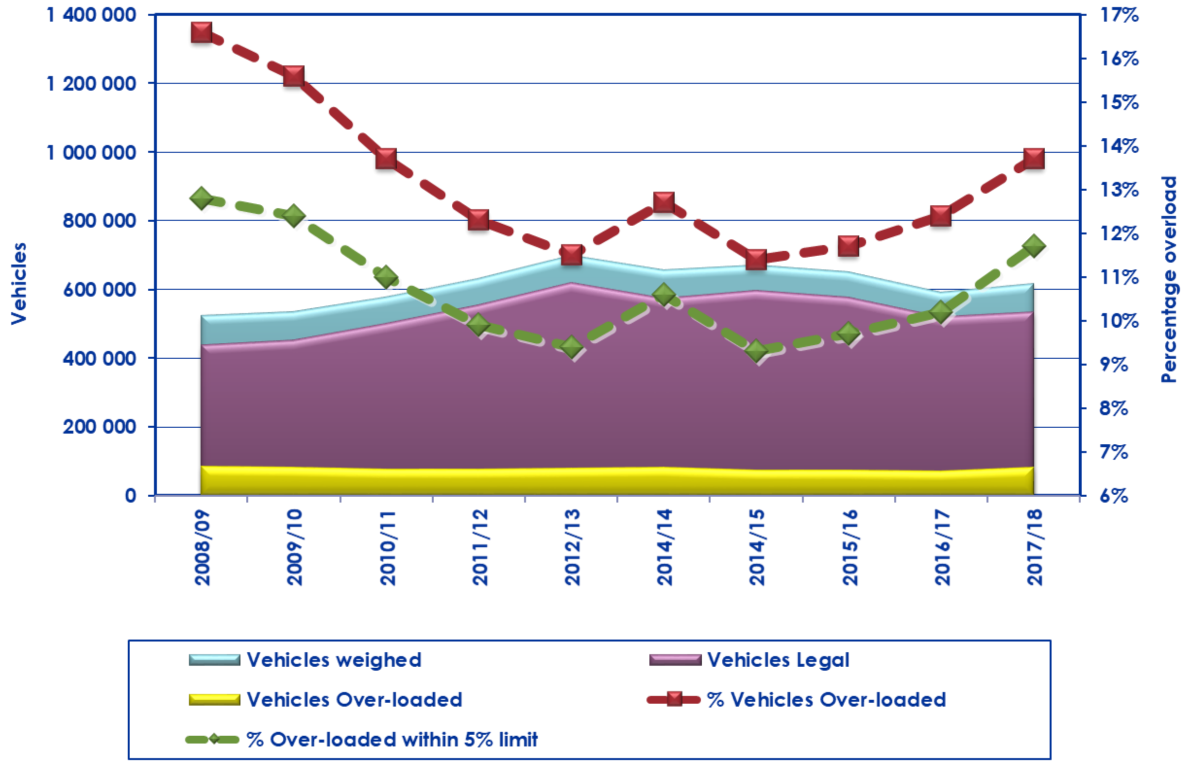


Figure 2-3: Historical trend of vehicles weighed

The introduction of Weigh-In-Motion technology to screen 100% of the traffic stream for possibly overloaded vehicles has been successfully implemented at the Beaufort West Overload Control Centre. This and other advances in technology will be monitored and implemented where applicable to improve the efficiency and effectiveness of overloading control.

Chapter 3 – Level of Service

3.1 Minimum conditions and standards

3.1.1 Road network

Through years of international and local research, the needs of the public in respect of road standards, and thus levels of service, have been established. These standards are documented in a great variety of publications, the most important of which are listed in Appendix H – Standards and specifications. A number of different surveillance measurements are done at set frequencies to determine the condition of the road network. These are shown in Table 3-1. In addition to these measurements, the traffic is counted at selected nodes on all paved and unpaved roads.

Table 3-1: List of paved network surveillance measurements and levels of service

Type of surveillance	Frequency of measurement	Compliance with TMH 22	Level of Service			Usage
			Class	TRH 26	Limit	
Visual condition (see note below) VCI (min)	Whole network[1] annually	Yes	DR/OP	4, 5	≥45,0	Functional and structural condition Seal programme Maintenance programme Condition Report
			MR	3	≥52,5	
			TR	1, 2	≥55,0	
Longitudinal profiles IRI (m/km) (max)	Whole network[1] every 2 years	Yes	DR/OP	4, 5	≤5,6	Functional condition Rehabilitation programme Condition Report
			MR	3	≤4,5	
			TR	1, 2	≤4,2	
Transverse profiles Rut depth (mm) (max)	Whole network[1] every 2 years	Yes	DR/OP	4, 5	≤20	Functional and structural condition Seal programme Condition Report
			MR	3	≤20	
			TR	1, 2	≤20	
Surface texture MPD (mm) (min.)	Whole network[1] every 2 years	Yes	DR/OP	4, 5	≥0,4	Functional condition Seal programme Condition Report
			MR	3	≥0,4	
			TR	1, 2	≥0,4	
Deflection SN	One third of the network[1] every year	Yes	N/a			Structural condition Rehabilitation programme Condition Report
Video images	Whole network[1] every 2 years	N/a	N/a			Orientation Seal programme Rehabilitation programme Maintenance programme Miscellaneous usage

Note 1: This does not include the proclaimed municipal main roads

Table 3-2: List of unpaved network surveillance measurements and levels of service				
Type of surveillance	**Frequency of measurement**	**Index and compliance with TMH 22**	**Level of Service**	**Usage**
Visual condition (see note below) VCI (max)	Annually on the maintained network	N/a	Not currently available	Functional and structural condition Regravel programme Reshape & rework programme Maintenance programme Upgrade programme Condition Report
Gravel thickness millimetres	Annually on the maintained network	N/a	Minimum of 50 mm	Structural condition Regravel programme Reshape & rework programme Maintenance programme Upgrade programme Condition Report
Dynamic Cone Penetrometer DN	Ad hoc	N/a	Gravel wearing course: Minimum CBR range: 9 – 15 depending on subgrade and traffic	Structural condition Upgrade programme Maintenance programme

The preliminary classification of the Levels of Service for unpaved roads is shown in Table 3-3.

Table 3-3: Preliminary classification of unpaved network Levels of Service				
Level of Service	**Mobility Speed (km/h)**	**Roughness Intervention Level (90th percentile) IRI**	**Accessibility (capacity of a normal car to negotiate the roads without losing traction)**	**Safety in terms of dustiness (visual assessment rating based on TRH12)**
High	80	7,5	99,5%: In service for ≥ 363 days pa	≤3
Medium	60	10	99%: In service for ≥ 361,5 days pa	≤4
Low	40	13	99%: In service for ≥ 361,5 days pa	≤4
Very low	20	15	99%: In service for ≥ 361,5 days pa	≤5

Table 3-4 provides the preliminary network targets for each Key Performance Indicator and Level of Service.

Table 3-4: Preliminary Network targets					
Key Performance Indicators	**LOS**				
	High	**Medium**	**Low**	**Very low**	**AM Objective**
Average gravel thickness (mm)	≥60	≥60	n/a	n/a	1
Target average roughness[1] (IRI)	≤4	≤5	≤6	≤6	1, 4
Network Condition Number[2]	≥60	≥50	Not set	Not set	1
Accessibility (days pa)	≥363	≥361,5	≥361,5	≥361,5	1
Average dustiness to TMH 9	≤2	≤3	≤3	≤4	1
Average Annual Gravel loss (mm)	<10	<7	n/a	n/a	2, 4
Upgrade to paved standard	As per dTIMS FWP	As per dTIMS FWP	n/a	n/a	3, 5

3.1.2 Structures

Table 4-3 shows the surveillance measurements for structures and major culverts. Currently, there is no index in use for structures. Levels of service have not yet been determined.

Table 3-5: Structures and major culverts surveillance measurements and levels of service

Type of surveillance	Frequency of measurement	Index and compliance with TMH19	Level of Service	Usage
Visual condition	5 years	N/a	Not available	Functional and structural condition Maintenance programme Condition Report

As part of the process to update the roads inventory on Trunk, Main, Divisional and Minor Roads, data on lessor culverts is also collected. An Android App was developed according to (Committee of Transport Officials, 2016) for collection of Inventory and Inspection information. The process for collection of lessor culvert information started in May 2017. The total of minor structures to be inspected is in the excess of 30 000 according to current data available. The requirement for validating information received from consultants is approximate 15% of total inspections. Inspections have also been expanded to cover major culverts, causeways and drifts, but only on network level to identify structures in a critical condition.

The collection of data on the condition of bridges has not commenced and it is envisaged to start in 2019.

3.1.3 Overload control

Ideally, the overloading of heavy vehicles on all roads should be eliminated. This is not likely and the Desired Budget for overloading control is based on the following level of service:

- Less than 10% of heavy vehicles should be overloaded
- Less than 2% of heavy vehicles should be overloaded to such an extent that they are charged for the transgression.

3.1.4 Division of Revenue Act

The Division of Revenue Act has not published any changes to the level of service for the transportation assets. However, the Provincial Roads Maintenance Grant has requested that the Branch record the number of road appraisals conducted and the number of kilometres of Road Safety Network Level Assessments performed.

Chapter 4 – Situation Analysis

4.1 Inventory Data

Detailed information on the network, the traffic it carries and its condition is available on the RNIS at https://rnis.westerncape.gov.za.

A summary of the road network under jurisdiction of the Branch, per road type and RCAM class is provided in Table 4-1. This network is maintained by the Branch, except for the Main Roads within the City of Cape Town. A summary of the structures is provided in Table 4-2.

A tabular summary of the age of the assets, per asset type, is provided in Table 4-3.

Figure 4-1 presents the distribution of the 16 804 km of Western Cape carriageway length that are being maintained. Included are Trunk, Main and Divisional roads for both paved and gravel networks, as well as some of Minor roads.

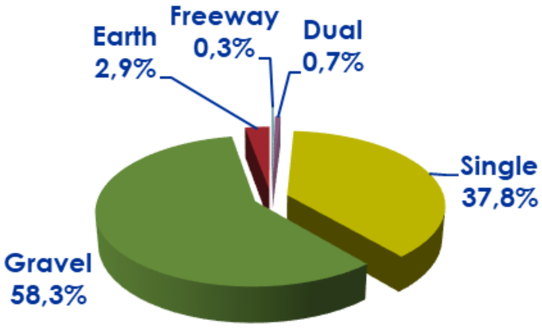


Figure 4-1 Road network distribution of carriageway length as at June 2018

Table 4-1: Summary of the roads being maintained as of June 2018

Area	RCAM Class	Paved						Unpaved		Total km	%
		Freeway		Dual carriageway		Single carriageway		Gravel km	Earth km		
		lane-km	cway-km	lane-km	cway-km	lane-km	cway-km				
Cape Winelands	1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
	2	0,00	0,00	72,51	35,52	1193,73	579,37	0,00	0,00	614,89	3,66
	3	0,00	0,00	2,58	1,29	964,42	562,37	247,08	0,00	810,74	4,82
	4	0,00	0,00	0,00	0,00	699,60	465,03	1099,93	45,90	1610,86	9,59
	5	0,00	0,00	0,00	0,00	29,34	16,00	9,86	0,00	25,86	0,15
Central Karoo	1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
	2	0,00	0,00	0,00	0,00	970,00	544,48	68,07	0,00	612,55	3,65
	3	0,00	0,00	0,00	0,00	129,80	64,90	410,75	0,00	475,65	2,83
	4	0,00	0,00	0,00	0,00	25,66	12,53	1768,67	36,71	1817,91	10,82
	5	0,00	0,00	0,00	0,00	0,00	0,00	87,66	0,00	87,66	0,52
Garden Route	1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
	2	0,00	0,00	0,00	0,00	1203,45	743,14	63,17	0,00	806,31	4,80
	3	0,00	0,00	0,00	0,00	785,08	392,02	409,15	0,00	801,17	4,77
	4	0,00	0,00	0,00	0,00	471,87	270,67	2364,45	45,98	2681,10	15,96
	5	0,00	0,00	0,00	0,00	34,39	17,15	121,61	8,41	147,17	0,88
Overberg	1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
	2	0,00	0,00	3,45	2,77	425,59	308,24	0,00	0,00	311,01	1,85
	3	0,00	0,00	0,00	0,00	892,88	446,44	189,34	0,00	635,78	3,78
	4	0,00	0,00	0,00	0,00	247,45	164,41	825,12	312,96	1302,49	7,75
	5	0,00	0,00	0,00	0,00	20,00	10,00	23,91	2,28	36,19	0,22
West Coast	1	0,00	0,00	0,00	0,00	175,23	86,78	0,00	0,00	86,78	0,52
	2	0,00	0,00	19,34	9,67	705,46	373,12	0,00	0,00	382,79	2,28
	3	0,00	0,00	0,00	0,00	1598,22	901,65	486,04	3,74	1391,43	8,28
	4	0,00	0,00	0,00	0,00	407,30	247,21	1571,42	23,46	1842,09	10,96
	5	0,00	0,00	0,00	0,00	1,86	0,93	51,66	0,00	52,59	0,31
City of Cape Town	1	213,82	40,38	34,80	16,72	72,91	33,74	0,00	0,00	90,84	0,54
	2	47,21	9,91	94,07	44,75	78,58	37,46	0,00	0,00	92,12	0,55
	3	0,00	0,00	2,54	1,27	150,50	74,82	0,00	0,00	76,09	0,45
	4	0,00	0,00	0,00	0,00	10,90	6,80	5,00	0,00	11,80	0,07
	5	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Total		261,03	50,29	229,29	111,99	11294,22	6359,26	9802,89	479,44	16803,87	-
%		0,3		0,7		37,8		58,3	2,9	100	-

Table 4-2: Summary of other assets being maintained as of June 2018								
Area	RCAM Class	Paved Roads				Unpaved Roads		
		Bridges no.	Large culverts no.	Gantries no.	Road Signs no.	Bridges no.	Large culverts no.	Road Signs no.
Cape Winelands	1	0	0	No data	0	0	0	0
	2	80	158		6 139	0	0	0
	3	51	78		2 858	6	18	381
	4	38	61		2 813	17	48	2 283
	5	2	2		66	0	0	8
Central Karoo	1	0	0		0	0	0	0
	2	68	179		5 744	2	16	195
	3	3	16		371	6	22	704
	4	0	3		67	10	67	3 129
	5	0	0		0	1	0	80
Garden Route	1	0	0		0	0	0	0
	2	93	206		8 743	1	11	119
	3	31	51		1 047	5	22	745
	4	20	22		1 277	21	126	3 498
	5	1	2		79	2	10	196
Overberg	1	0	0		0	0	0	0
	2	35	49		2 469	0	0	0
	3	26	75		1 608	12	10	332
	4	11	26		1 115	27	57	2 000
	5	1	0		18	0	0	42
West Coast	1	0	2		526	0	0	0
	2	4	31		2 900	0	0	0
	3	34	85		3 406	8	13	555
	4	46	14		1 471	26	53	2 450
	5	10	0		5	2	1	55
City of Cape Town	1	50	10		1 170	0	0	0
	2	31	7	74[1]	916	0	0	0
	3	6	9	No data	634	0	0	0
	4	0	0		55	0	0	5
	5	0	0		0	0	0	0
Total		641	1 086	-	45 497	143	474	16 777
%		1,0	1,7	-	70,4	0,2	0,7	26,0
Note 1: Estimate								

Table 4-3: Summary of the age of the assets per asset types as at June 2018		
Area	**Asset Type**	**Average Age, yr**
Cape Winelands	Roads	34
	Bridges	51
	Large culverts	44
	Gantries	No Data
	All Signs	17
Central Karoo	Roads	34
	Bridges	54
	Large culverts	54
	Gantries	No Data
	All Signs	20
Garden Route	Roads	34
	Bridges	49
	Large culverts	22
	Gantries	No Data
	All Signs	19
Overberg	Roads	34
	Bridges	54
	Large culverts	37
	Gantries	No Data
	All Signs	17
West Coast	Roads	34
	Bridges	53
	Large culverts	49
	Gantries	No Data
	All Signs	18
City of Cape Town	Roads	35
	Bridges	46
	Large culverts	26
	Gantries	No Data
	All Signs	17

4.2 Usage of the Assets

Traffic counts on all managed provincial roads are undertaken on a regular basis to establish the use of, and usage patterns on the road network.

A tabular summary of the usage of the assets, per road type and RCAM class and administrative area, in average daily vehicle-km, calculated for carriageway lengths, is shown in Table 4-4. The total for the paved network is 26 million vehicle-km per day and for the unpaved network it is 0,94 million vehicle-km per day, totalling 27 million vehicle-km per day, or 10 billion vehicle-km annually.

Table 4-4: Summary of the roads usage as at June 2018

Area	RCAM Class	Average daily vehicle-km for 2018				
		Paved roads			Unpaved roads	
		Freeway carriageway	Dual carriageway	Single Cway Bi-directional	Gravel	Earth
West Coast	1	0	0	0	0	0
	2	0	695 630	3 834 980	0	0
	3	0	12 289	921 567	20 579	0
	4	0	0	267 136	108 963	190
	5	0	0	14 200	18	0
Central Karoo	1	0	0	0	0	0
	2	0	0	234 718	3 876	0
	3	0	0	11 334	29 220	0
	4	0	0	1 877	58 882	1 537
	5	0	0	0	668	0
Garden Route	1	0	0	0	0	0
	2	0	0	1 422 249	5 082	0
	3	0	0	393 180	58 737	0
	4	0	0	158 081	245 578	1 174
	5	0	0	14 084	14 287	50
Overberg	1	0	0	0	0	0
	2	0	58 897	1 045 330	0	0
	3	0	4 422	566 349	37 065	0
	4	0	59	96 341	126 688	29 410
	5	0	0	2 654	2 094	450
West Coast	1	0	0	375 918	0	0
	2	0	116 835	1 175 458	0	0
	3	0	0	889 939	64 314	0
	4	0	0	102 993	158 311	394
	5	0	0	525	4 883	0
City of Cape Town	1	4 491 840	598 826	5 411 638	0	0
	2	541 467	962 407	1 754 417	0	0
	3	0	67 855	439 313	0	0
	4	0	0	9 275	0	0
	5	0	0	0	0	0
Total		5 033 307	2 517 220	19 143 556	939 245	33 205
%		18,2	9,1	69,2	3,4	0,1

4.3 Engineering Condition of the Assets

4.3.1 Background

The condition of the paved road network is surveyed by means of visual evaluations and instrument surveys at frequencies that are in accordance with draft TMH 22: Road Asset Management Manual (Committee of Transport Officials, 2013), unless otherwise indicated.

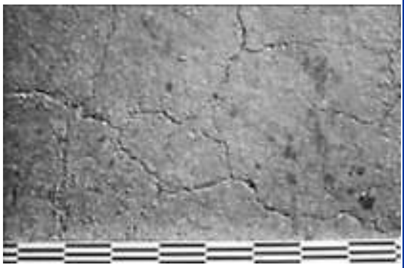
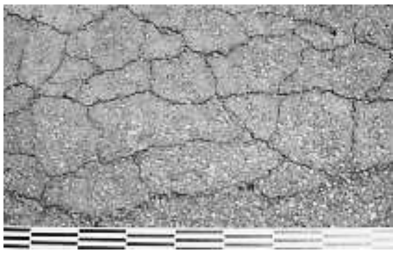
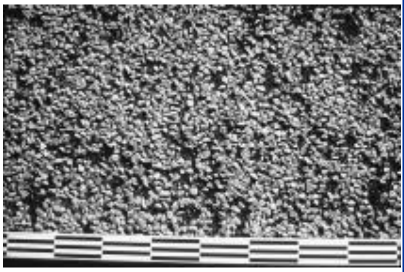
4.3.2 Visual condition of the paved road network

Visual assessment surveys are arranged annually (Table 3-1) to collect and record condition information on the paved managed road network of the WCG using TMH 9: Pavement Management Systems: Standard Visual Assessment Manual for Flexible Pavements (Committee of State Road Authorities, 1992). The surveys are completed on all surfaced roads.

Surveys are done on the roads in both directions for dual carriageways because the condition and pavement information are different.

Table 4-5 presents examples of some of the types of distress collected during the visual assessment surveys. The distresses shown here are those typically modelled in the lifecycle cost analysis to predict future pavement performance.

Table 4-5: Examples of distresses collected on the paved road network surveyed according to TMH 9

Surfacing cracks Example of degree 3 rating (distinct cracks).		Crocodile cracks Example of degree 3 rating (distinct cracks with slight deformation of cracked areas).	
Stone loss Example of degree 3 rating (distinct loss in small areas).		Rutting Example of degree 5 rating (severe, dangerous, >30 mm).	
Pothole Example of degree 3 rating (>200 mm diameter and significant depth).			

The Visual Condition Index (VCI) is based on a composite rating of all the distresses that are surveyed annually. The visual condition index is categorised as very poor (0-30%), poor (30-50%), fair (50-70%), good (70-85%), and very good (85-100%) as shown in Table 4-6.

Table 4-6: Categories of visual condition

VCI range (%)	Description	Colour used in charts & graphs
0 – 29	very poor	
30 – 49	poor	
50 – 69	fair	
70 – 84	good	
85 – 100	very good	

Table 4-7 shows examples of road visual conditions.

Table 4-7: Examples of Visual Condition Indices on paved roads in the Western Cape Province

Very Poor condition category		Poor condition category	
			
TR01608 (Murraysburg)	DR01111 (Kalbaskraal)	MR00536 (Eendekuil)	TR03303 (Oudtshoorn)
Fair condition category		**Good condition category**	
			
TR00101 (Outeniqua Pass)	TR08301 (Garcia Pass)	TR03402 (Prince Albert)	DR02181 (Marcuskraal)
Very Good condition category			
			
MR00174 (Stellenbosch)	MR00526 (Porterville)		

The following figures, showing selected aspects of the infrastructure conditions, were prepared from the information in the Road Network Information System.

The condition distribution of 6 651 carriageway-kilometres of the paved road network, which is managed by the Pavement Management System by length and vehicle-km is shown in Figure 4-2 (2017 figures). This condition distribution excludes proclaimed municipal main roads.

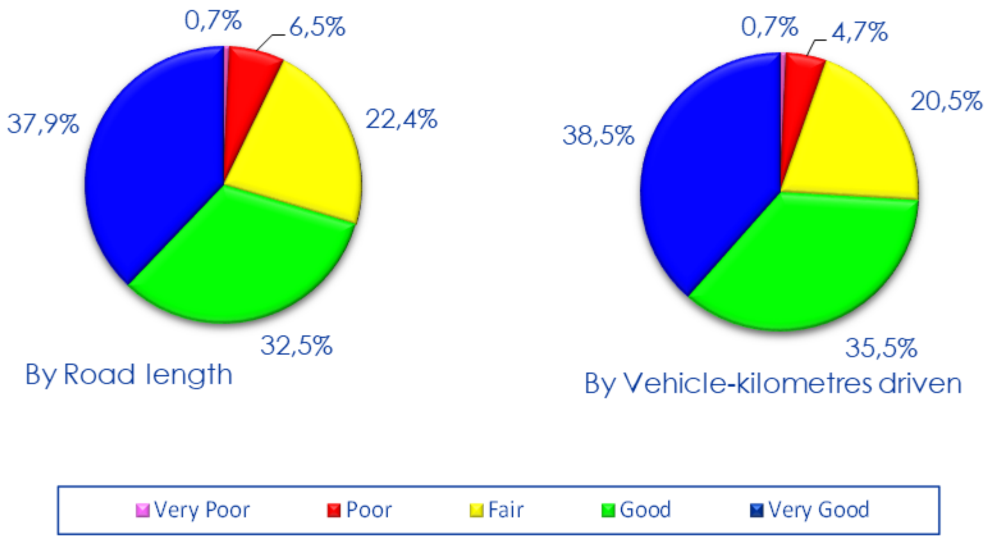


Figure 4-2 Distribution of the VCI of paved roads by road length and vehicle-km as at June 2017

Figure 4-3 presents the visual condition distribution of paved roads based on the 2017 assessment data. The comparison shows that **an effective economic maintenance policy is being followed by the Branch** because the condition distribution per vehicle-kilometre driven is superior to the condition distribution per road length. The objective of maximising the road condition for the maximum number of road users is therefore achieved.

It is noticeable that 39% of vehicles-kilometres and 40% of passengers-kilometres are driven on the 38% of roads that are in "very good" condition. By contrast, the usage of the 7% of roads in "poor to very poor" condition affects only 6% of road users. This indicates that sound pavement management principles promoting economic development through accessibility and mobility are being followed.

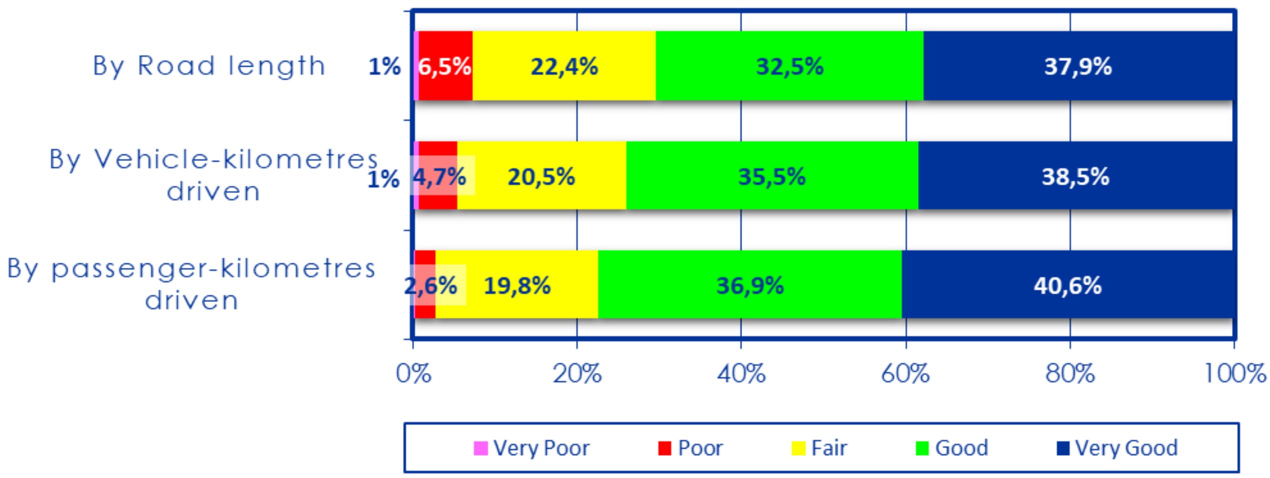


Figure 4-3: Paved roads condition distribution as at 30 June 2017

- In terms of road length, 70% of roads are in the good to very good condition category.
- In terms of vehicle usage, 74% of vehicle-km are travelled on roads in the good to very good condition category.
- In terms of passenger usage, 78% of passenger-km are travelled on roads in the good to very good condition category.

Since 2012, the overall visual condition distribution by road length has improved (refer to paragraph 4.9.1, Visual condition trends).

According to the recommendations of the Road Infrastructure Strategic Framework for South Africa (Department of Transport, 2006), it is desirable that not more than 10% of the length of a road network is in a poor to very poor condition. However, this recommendation does not take account of the distribution of traffic volumes on the network. Taking only length of paved road into account, about 8% of the paved road network is in a poor to very poor condition. Taking the traffic distribution into account, only 6% of the network is in poor to very poor condition.

Although the visual condition gives clues to the structural condition of the road network and its ability to carry traffic loading, the effect of sealing a road can mask its structural condition and present an optimistic picture of the network's load carrying capacity, which degrades continually due to the effects of traffic loading and the environment. The visual condition therefore cannot be relied upon as the definitive measure of the condition of the road network.

A detailed map showing the condition of provincial roads may be viewed on the RNIS internet site at http://rnis.westerncape.gov.za/rnis/kml_jobs_display.draw_map?p_job_id=3 . Photographic and other detail can be accessed for each road segment by clicking on the map.

4.3.3 Visual condition of paved roads per district municipality

Table 4-8 provides the statistics and Figure 4-4 illustrates the paved road visual condition distribution according to the 2017 visual assessment data, per DM. Comparing paved roads in the district municipalities, the Garden Route DM, Central Karoo DM and Cape Winelands DM show the highest proportions of poor and very poor roads, requiring expensive measures for rehabilitation.

Table 4-8: Condition distribution per DM for paved roads in the Western Cape June 2017

DM	Length (km)				
	Very Poor	Poor	Fair	Good	Very Good
City of Cape Town	17	26	54	97	161
Cape Winelands	8	108	455	657	476
Garden Route	13	115	465	437	399
Overberg	-	14	153	283	473
Central Karoo	5	116	169	228	104
West Coast	5	52	193	462	906
Western Cape Province	48	431	1 489	2 164	2 519

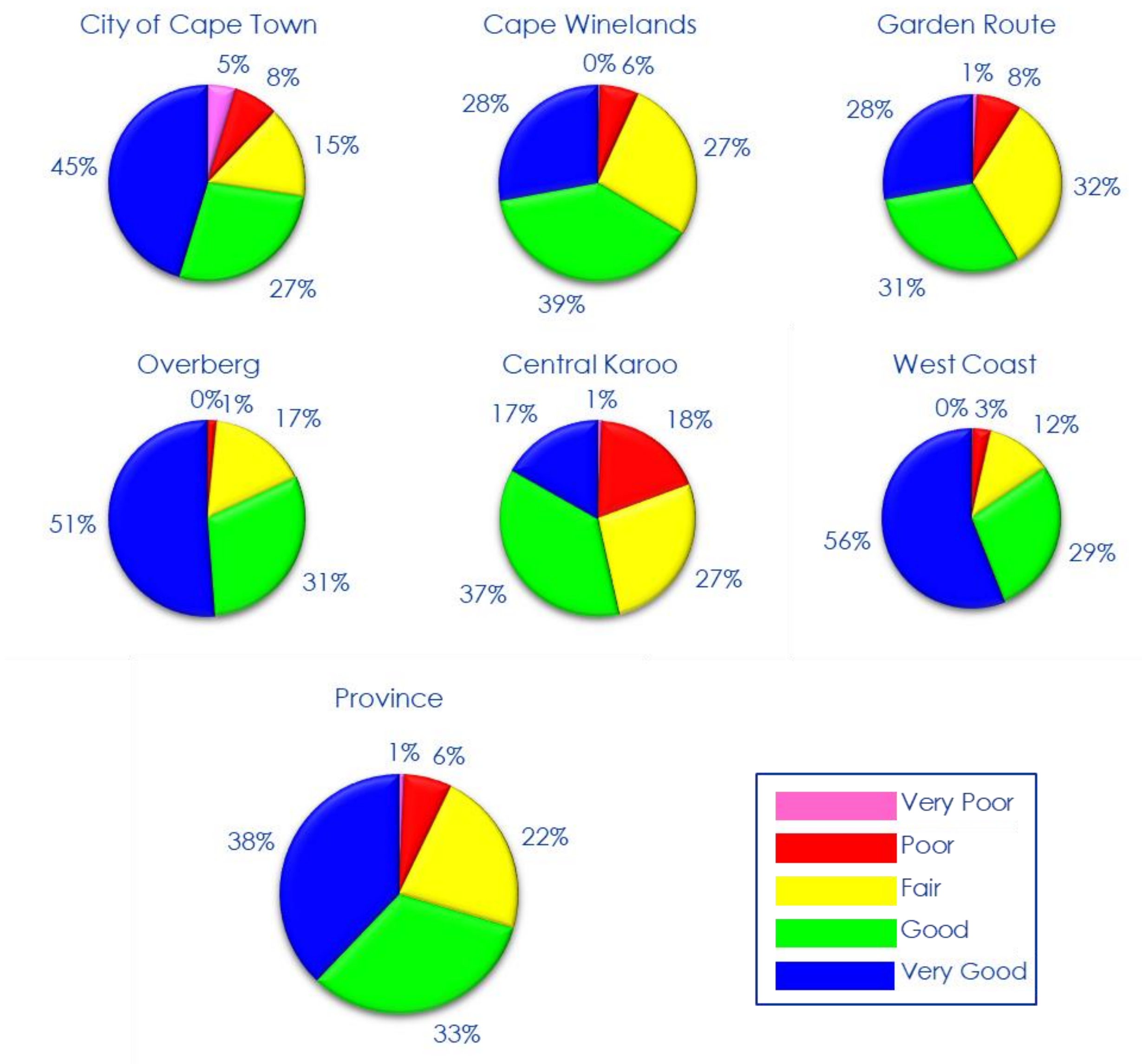


Figure 4-4: Condition distribution per kilometre by DM area for paved roads as at June 2017

4.3.4 Instrument survey condition data

Measurements are collected by a high-speed instrument survey and are used for modelling future pavement performance in the lifecycle benefit-cost analysis. These measurements include longitudinal and transverse profiles that are converted to roughness measurements, rut depths, surface texture measurements and deflection measurements. A summary of these measurements is provided in Table 3-1 and the results for the paved network are shown for the following:

- Longitudinal profile roughness – Table 4-9;
- Transverse profile rut – Table 4-10;
- Surface texture depth – Table 4-11; and
- Falling weight deflection measurements – Table 4-12.

According to draft TMH 22 (Committee of Transport Officials, 2013), the service level is determined at the 90th percentile level, which represents a considerable change from the 50th percentile used previously. Table 4-9 shows the categories of road in the Western Cape and the service level previously used that was based on TRH 4 categories A, B and C. The use of the 90 percentile level for all categories or RCAM classes does not differentiate between their different requirements for roughness. Therefore, the use of percentiles according to road category and RCAM class is proposed and shown in Table 4-9. A similar approach has been shown in Table 4-10 for transverse profile and in Table 4-11 for surface texture.

Evaluation of measurements

- In terms of roughness (longitudinal profile) trunk and main roads and RCAM Class 2 roads do not meet service level requirements.
- In terms of rutting from transverse profile measurements, all categories and classes meet service level requirements.
- In terms of surface texture measurements, all categories and classes meet service level requirements. In terms of falling weight deflectometer (FWD) measurements, there are no current service levels with which to compare the measurements.
- The condition of the road links, in terms of the various condition indices, per road link is not currently available on the RNIS.
- The condition of the structure assets (bridges, major culverts, etc.), in terms of the various condition indices, per asset type is not currently available.
- The condition of the ancillary components, in terms of the various condition indices, per component is not currently available.

Table 4-9: Longitudinal profiling measurements as at March 2015

Category or RCAM class	Level of service IRI	Actual condition (IRI m/km)			
		Average	Median	%<4,2 m/km	Percentile
DR/OP	p90<5,60	3,80	3,10	71,60	p90 = 6,40
MR	p90<4,50	3,10	2,70	82,80	p90 = 5,10
TR	p90<4,20	2,80	2,50	88,70	p90 = 4,30
1	p97,5<4,20	2,17	2,10	96,80	p97,5 = 3,79
2	p95<4,20	2,84	2,60	88,00	p95 = 4,40
3	p90<4,20	3,29	2,80	80,70	p90 = 4,10
4	p80<4,20	3,82	3,20	71,00	p80 = 3,20
5	p80<4,20	4,32	3,40	64,60	p80 = 3,40

Table 4-10: Transverse profiling rut measurements as at March 2015

Category or RCAM class	Level of service (average $\bar{x}$) mm	Actual condition (mm)			
		Average $\bar{x}$	Median	%<20 mm	Percentile
DR/OP	$\bar{x} \leq 20$	6	5	98,6	p80 = 8
MR	$\bar{x} \leq 20$	6	5	99,2	p90 = 10
TR	$\bar{x} \leq 20$	6	5	99,4	p95 = 13
1	$\bar{x} \leq 20$	6	5	99,8	p97,5 = 11

Table 4-10: Transverse profiling rut measurements as at March 2015					
Category or RCAM class	Level of service (average $\bar{x}$) mm	Actual condition (mm)			
		Average $\bar{x}$	Median	%<20 mm	Percentile
2	$\bar{x}$ ≤20	6	5	99,4	p95 = 10
3	$\bar{x}$ ≤20	6	5	99,1	p90 = 8
4	$\bar{x}$ ≤20	6	5	98,7	p80 = 5
5	$\bar{x}$ ≤20	6	5	98,1	p80 = 5

Table 4-11: Surface texture measurements as at March 2015					
Category or RCAM class	Level of service (average $\bar{x}$) mm	Actual condition (mm)			
		Average $\bar{x}$	Median	%<0,4 mm	Percentile
DR/OP	$\bar{x}$ ≥0,4	1,2	1,1	2,8	p80 = 0,8
MR	$\bar{x}$ ≥0,4	1,2	1,2	6,5	p90 = 0,4
TR	$\bar{x}$ ≥0,4	1,2	1,2	4,7	p95 = 0,3
1	$\bar{x}$ ≥0,4	1,4	1,4	6,1	p95 = 0,3
2	$\bar{x}$ ≥0,4	1,2	1,1	6,0	p90 = 0,4
3	$\bar{x}$ ≥0,4	1,3	1,3	2,8	p80 = 0,8
4	$\bar{x}$ ≥0,4	1,2	1,1	2,7	p80 = 0,8
5	$\bar{x}$ ≥0,4	1,4	1,3	0,2	p80 = 1,1

Table 4-12: FWD deflection measurements as at March 2015					
Category or RCAM class	Level of service μmm	Actual condition (μmm)			
		Average	Median	%<600 μmm	Percentile
DR/OP	Not provided	521	479	69,8	p80 = 690
MR	Not provided	472	440	74,4	p90 = 774
TR	Not provided	499	475	69,8	p95 = 934
1	Not provided	353	352	93,5	p97,5 = 630
2	Not provided	542	520	63,1	p95 = 846
3	Not provided	601	571	55,5	p90 = 767
4	Not provided	625	578	53,2	p80 = 578
5	Not provided	531	481	67,4	p80 = 481

4.3.5 The visual condition of the unpaved road network

Visual assessment surveys are conducted annually to collect and record condition information on the unpaved road network. The surveys are completed on all maintained[2] unpaved roads. The VCI is based on the visual assessment ratings of all the unpaved road characteristics that are surveyed annually.

Table 4-13 presents examples of some of the characteristics collected during the visual assessment surveys according to draft TMH 9: Manual for Visual Assessment of Road Pavements, Part E: Unpaved Roads (Committee of Transport Officials, 2015). The distresses shown here are those typically modelled in the lifecycle benefit-cost analysis to predict future performance.

Table 4-13: Examples of some results from on the unpaved network surveyed according to draft TMH 9

Gravel quantity Example of degree 3 rating (Isolated subgrade exposures, 50 – 100 mm).	
Riding quality (roughness) Example of degree 5 rating (estimated comfortable/safe speed < 40 km/h).	
Drainage on the road Example of degree 1 rating (edges of road are at least 300 mm above natural ground level).	

[2] Most of the minor road network is not managed, i.e., they are not maintained using provincial funds.

Table 4-14 shows examples of unpaved road visual conditions.

Table 4-14: Examples of Visual Condition Indices of unpaved roads	
Very Poor condition category	Poor condition category
	
MR00552 (Holrivier)	DR02171 (Aurora - Saamstaan)

The current condition of the 10 339 km of unpaved, maintained roads in the province is shown in Figure 4-5.

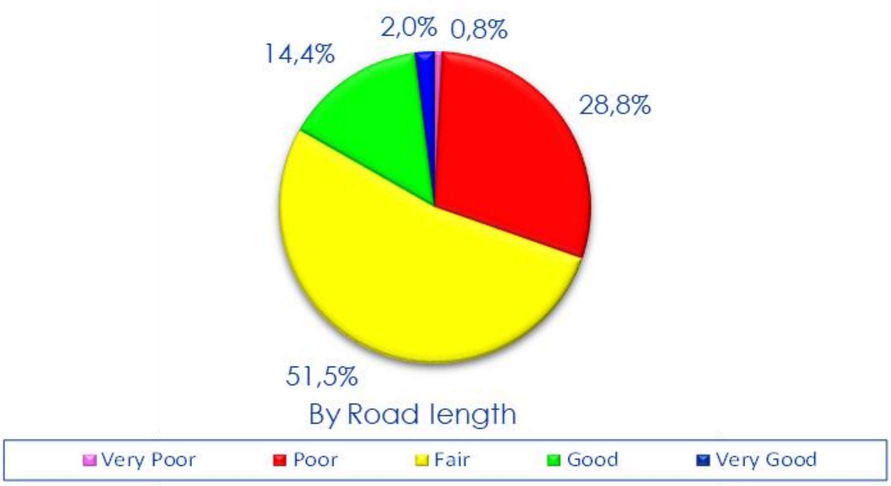


Figure 4-5: The condition of the unpaved road network as at June 2017

The condition distribution of maintained unpaved roads in 2017 is shown in Figure 4-6. The comparison shows consideration is given to the maintenance of unpaved roads carrying the most passengers. By comparison, 15% of all passengers travel on the 32% of poor to very poor roads and 24% passengers travel on the 17% good to very good roads.

The comparison in Figure 4-6 shows the condition distribution per vehicle-kilometre driven is superior to the condition distribution per road length. However, this does not apply to the poor to very poor roads where the percentage per vehicle-km is almost one and half times less compared by road length. The objective of maximising the road condition for the maximum number of road users may not have been achieved.

A detailed map showing the condition of provincial roads may be viewed at http://rnis.westerncape.gov.za/rnis/kml_jobs_display.draw_map?p_job_id=5 . Photographic and other detail can be accessed for each road segment by clicking on the map.

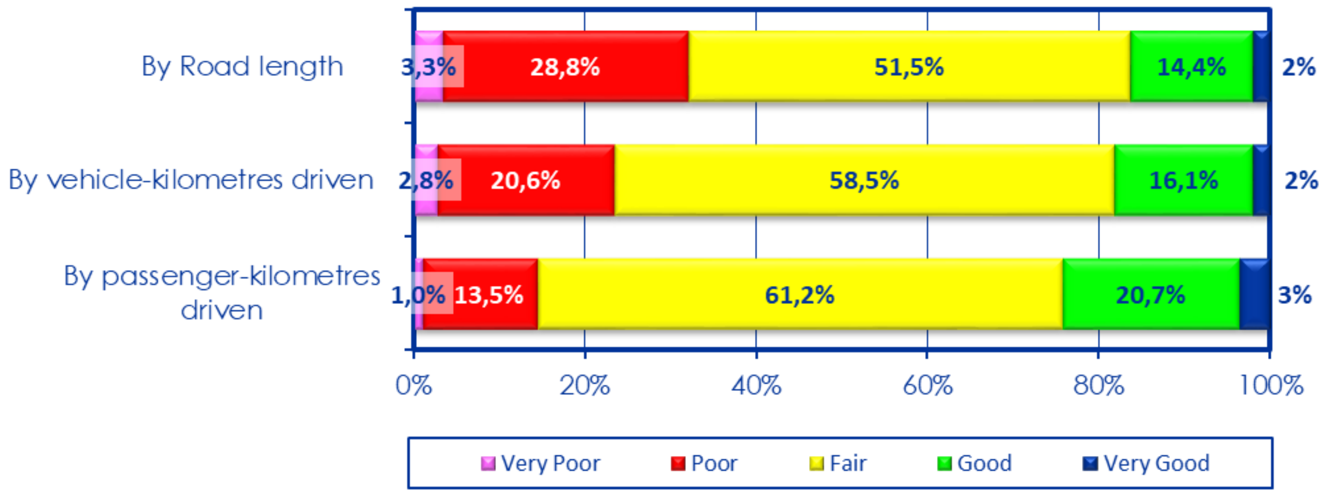


Figure 4-6: Unpaved roads condition distribution by length versus vehicle- and passenger-kilometres in June 2017

4.3.6 Visual condition of unpaved roads per district municipality

Figure 4-7 illustrates the unpaved road visual condition distribution according to the 2017 visual assessment data, per DM. The majority of all unpaved roads, irrespective of DM, are in fair to poor condition, as shown in Table 4-15.

Table 4-15: Condition distribution per DM for unpaved roads in June 2017

DM	Length (km)				
	Very Poor	Poor	Fair	Good	Very Good
City of Cape Town	-	-	-	5	-
Cape Winelands	109	493	539	168	97
Garden Route	20	849	1 643	490	14
Overberg	50	125	829	308	48
Central Karoo	132	950	1 059	194	40
West Coast	35	559	1 258	322	4
Western Cape Province	346	2 975	5 328	1 487	202

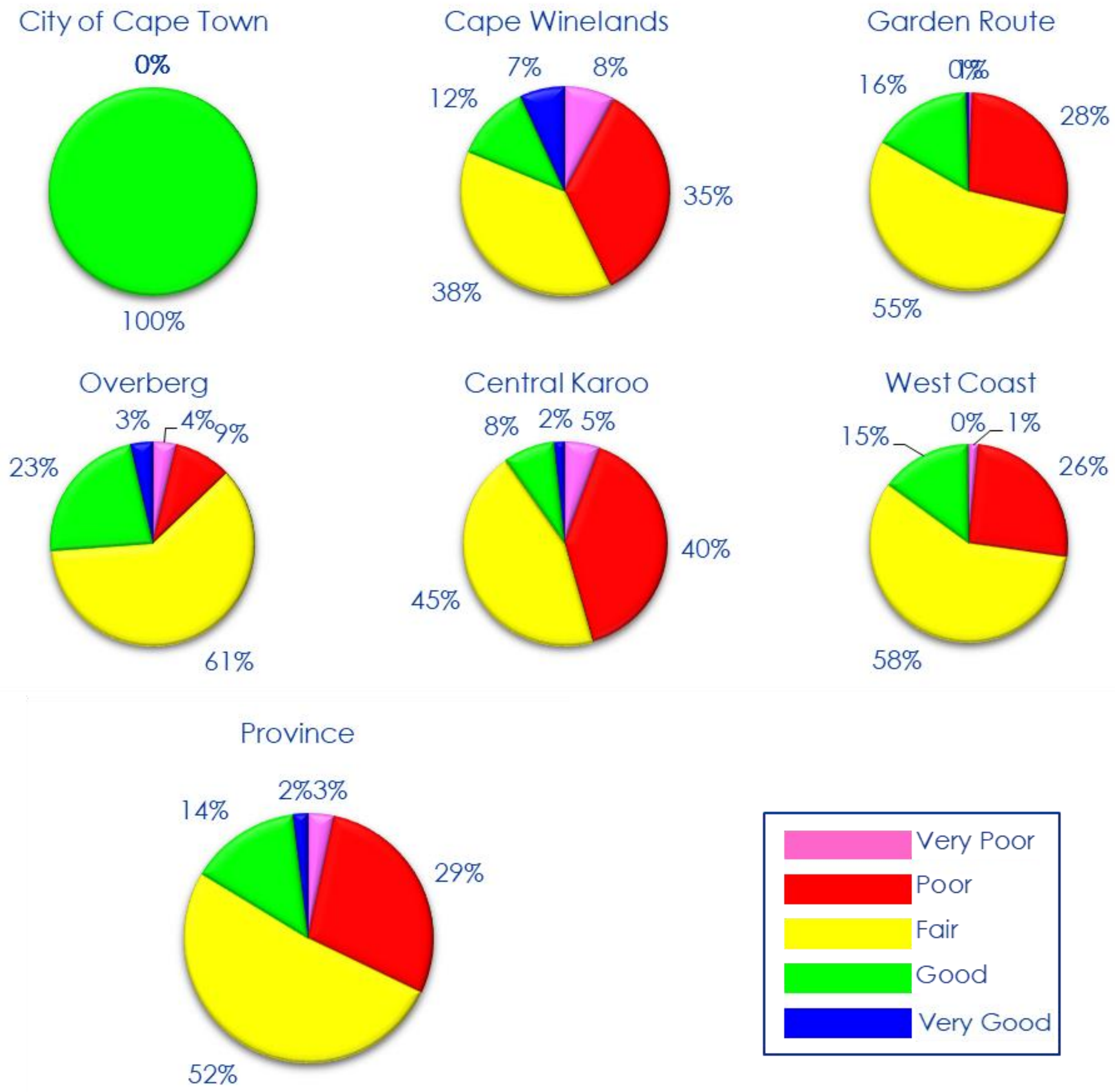
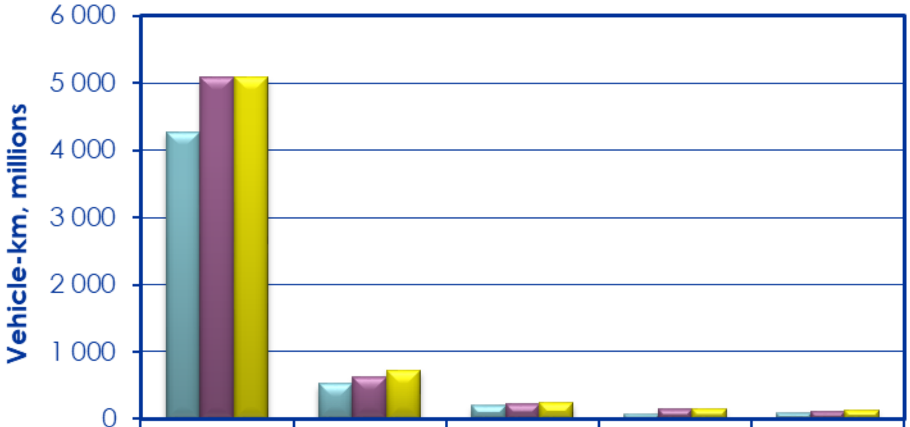


Figure 4-7: Condition distribution per kilometre by DM area for unpaved roads as at June 2017

4.4 Functional condition of the assets

4.4.1 Volume capacity

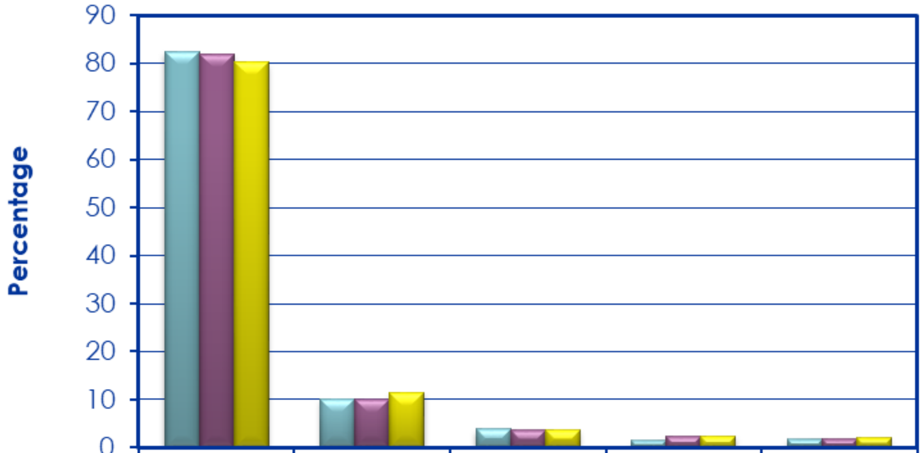
The quality of traffic flow is measured in terms of level of service (LOS). On provincial paved roads, the LOS varies from LOS A, indicating free flow conditions, to LOS E, indicating full capacity conditions with queuing being experienced. Normally the Branch strives to provide at least LOS B on rural roads and LOS D on urban roads. Figure 4-8 shows the distribution of vehicle-km travelled annually on roads under the control of the Branch currently experiencing LOS C, D or E. Figure 4-9 shows the distribution of vehicle-km as a percentage of the total in terms of LOS. Although the total of vehicle-km has grown in the last decade, the distribution remains almost constant. Only about 8% of the vehicle-km experience a LOS of C or lower.



	A	B	C	D	E
2005	4271,88	530,28	201,32	80,46	90,69
2016	5087,07	619,86	227,36	151,86	118,27
2017	5082,46	730,35	237,94	153,73	133,56

Level of Service

Figure 4-8: Vehicle-km travelled annually for each level of service category in 2005, 2016 and 2017



	A	B	C	D	E
2005	82,55	10,25	3,89	1,55	1,75
2016	81,99	9,99	3,66	2,45	1,91
2017	80,19	11,52	3,75	2,43	2,11

Level of Service

Figure 4-9: Percentage vehicle-km travelled for each level of service category in 2005, 2016 and 2017

It must, however, be stressed that LOS in terms of volume capacity is only relevant when LOS D or E is reached on a road. Roads constructed to the correct geometric design class will provide LOS A or B for many years.

Apart from paved road upgrading projects, capacity is not normally a reason for improving a road unless it can be economically justified. Unpaved roads are upgraded to paved roads mainly due to traffic volumes that are too high for economic maintenance, and/or to improve road user costs and riding quality. With the exception of the 8% of vehicle-km mentioned above, the network performs well and provides LOS B or better.

4.4.2 Roughness

Table 4-16 provides the functional index for roughness per RCAM class. Currently suitable levels of service have not been determined for the functional index for roughness.

Table 4-16: Functional index for roughness

Description	RCAM Class				
	1	2	3	4	5
Average Functional Index	88,3	80,0	74,3	67,4	63,1
Level of service	-	-	-	-	-

4.4.3 Rutting

Table 4-17 provides the functional index for rutting per RCAM class. Suitable levels of service have not been determined for the functional index for rutting.

Table 4-17: Functional index for rutting

Description	RCAM Class				
	1	2	3	4	5
Average Functional Index	93,0	92,1	91,8	91,7	91,1
Level of service	-	-	-	-	-

4.4.4 Deflection

Table 4-18 provides the functional index for deflection measured using a falling weight deflectometer per RCAM class. Suitable levels of service have not been determined for the functional index for deflection

Table 4-18: Functional index for deflection

Description	RCAM Class				
	1	2	3	4	5
Average Functional Index	74,7	50,0	44,0	41,1	51,0
Level of service	-	-	-	-	-

4.4.5 Macro-texture

A functional index for macro-texture has not been described in the draft TMH 22 (Committee of Transport Officials, 2013).

4.4.6 Personal injury accident

No information is currently available. Future black spot analysis is envisaged.

4.4.7 Smooth Travel Exposure

Smooth travel exposure (STE) measures the technical efficiency of road system performance. It is the proportion of travel undertaken each year on roads with conditions above the targeted conditions for those roads. The target condition is IRI ≤ 4,2 (South African Road Agency SOC Ltd, 2016). The purpose is to monitor whether roads are providing acceptable travel conditions. STE is calculated as follows:

$$STE = Vkt \times 100/Vk$$

Where:

Vkt = daily travel measured in vehicle-km on roads classified as above targeted conditions.

Vk = daily travel measured in vehicle-km

The smooth travel exposure statistics per RCAM class are shown in Table 4-19 and Figure 4-10.

Table 4-19: Smooth travel exposure per RCAM class for 2015					
Description	RCAM Class				
	1	2	3	4	5
Smooth travel exposure (%)	98,0	91,3	79,9	74,8	63,0
Level of service (minimum, %) (preliminary)	97,5	95,0	90,0	80,0	80,0

Examining the results in Table 4-19, RCAM classes 2, 3, 4 and 5 indicate less than satisfactory travel conditions with respect to smoothness. This is a reflection of the age of the current network and the low rate of rehabilitation of these old roads. However, the preliminary LOS may have been set too high for these RCAM classes considering the resources available and many roads that fall into RCAM classes 3, 4 and 5 may not be economically viable to rehabilitate. Further investigation into the preliminary LOS target values is therefore required.

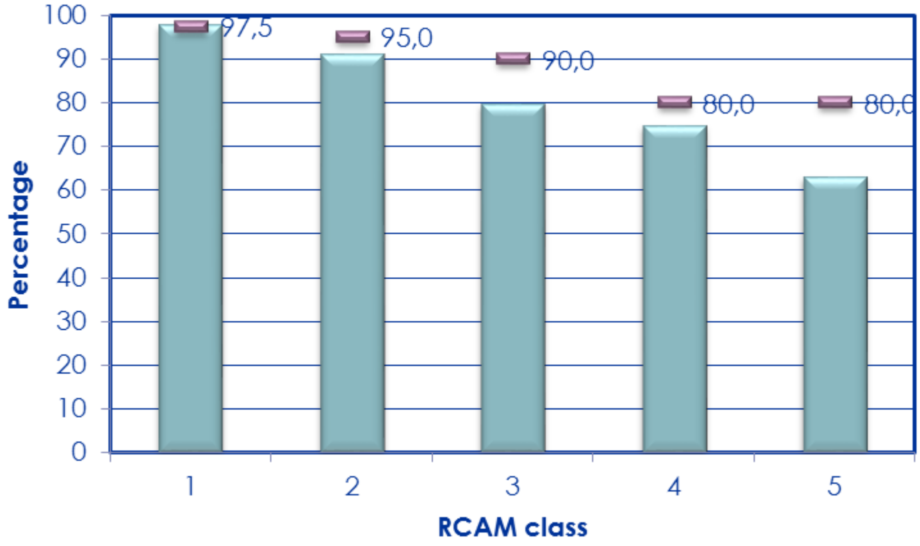


Figure 4-10: Smooth travel exposure per RCAM class compared with preliminary LOS targets for 2015

4.4.8 Low rut exposure

Low rut exposure (LRE) measures the safety efficiency of road system performance. It is the proportion of travel undertaken each year on roads with conditions above the targeted conditions for those roads. The target condition is rut depth ≤ 20 mm (Committee of Transport Officials, 2013). The purpose is to monitor whether roads are providing acceptable safety conditions. LRE is calculated as follows:

$$LRE = Vkt \times 100/Vk$$

Where:

Vkt = daily travel measured in vehicle-km on roads classified as above targeted conditions.

Vk = daily travel measured in vehicle-km

The smooth travel exposure statistics per RCAM class are shown in Table 4-20 and Figure 4-11.

Table 4-20: Low rut exposure per RCAM class for 2015					
Description	RCAM Class				
	1	2	3	4	5
Low Rut Exposure (%)	99,7	99,5	96,9	97,3	98,3
Level of service (minimum, %) (preliminary)	97,5	95,0	90,0	80,0	80,0

Examining the results in Table 4-21 indicates acceptable safety conditions for all RCAM classes with respect to pooling of water in ruts that could lead to aquaplaning of light vehicles. The preliminary LOS may be too low for RCAM classes 4 and 5 and further investigation into the preliminary LOS standards needs to be concluded.

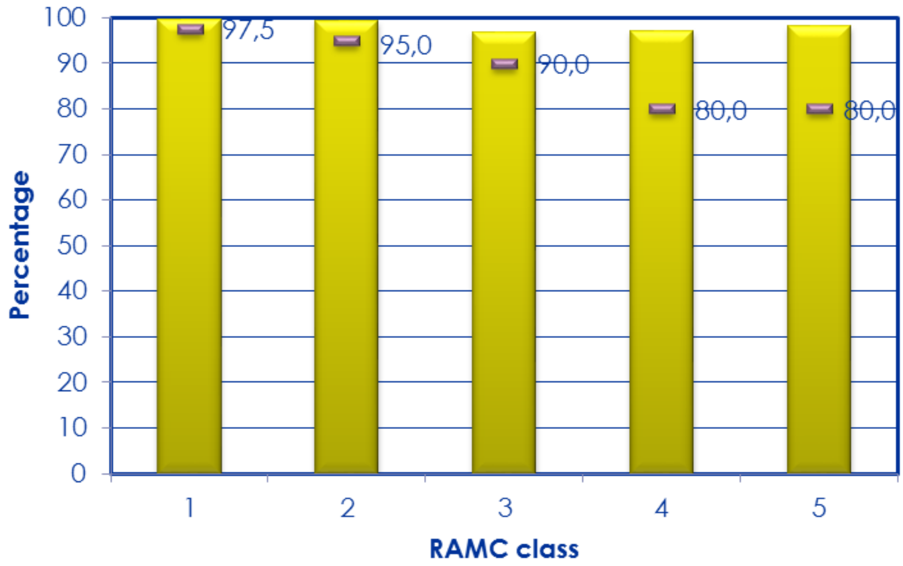


Figure 4-11: Low rut exposure per RCAM class compared with preliminary LOS targets for 2015

4.4.9 High texture exposure

High texture exposure (HTE) measures the safety efficiency of road system performance. It is the proportion of travel undertaken each year on roads with conditions above the targeted conditions for those roads. The target condition is texture depth ≥0,4 mm (Committee of Transport Officials, 2013). The purpose is to monitor whether roads are providing acceptable safety conditions. HTE is calculated as follows:

$$HTE = Vkt \times 100/Vk$$

Where:

Vkt = daily travel measured in vehicle-km on roads classified as above targeted conditions.

Vk = daily travel measured in vehicle-km

The high texture exposure statistics per RCAM class are shown in Table 4-21 and Figure 4-12.

Table 4-21: High texture exposure per RCAM class for 2015

Description	RCAM Class				
	1	2	3	4	5
High texture exposure (%)	90,0	74,8	83,4	84,8	98,1
Level of service (minimum, %) (preliminary)	97,5	95,0	90,0	80,0	80,0

Examining the results in Figure 4-12 indicates a less than satisfactory high texture exposure for RCAM classes 2 and 3. This is a reflection of the age of the seals on these roads. To date, the target macro texture condition of 0,4 mm has not been used as a reason to reseal these roads. Further investigation into the preliminary LOS standards needs to be done to validate their appropriateness.

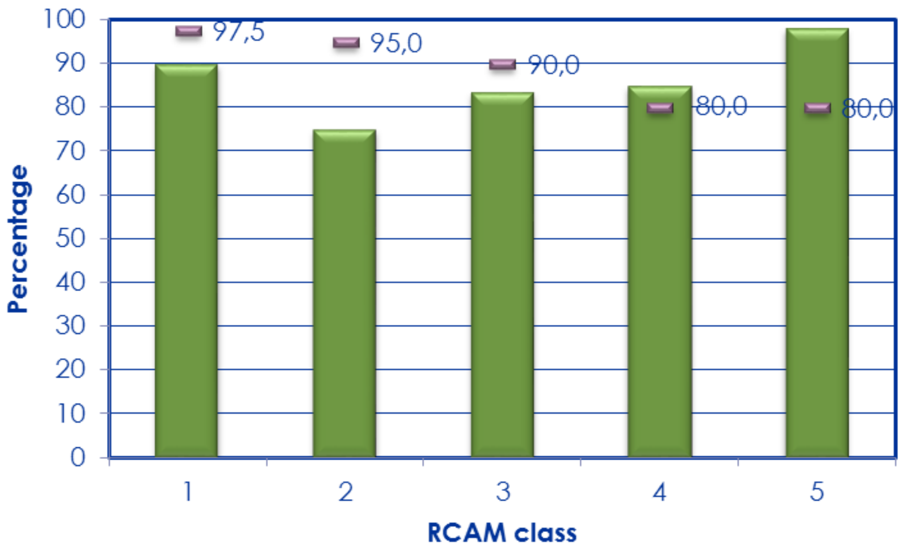


Figure 4-12: High texture exposure per RCAM class compared with preliminary LOS targets in 2015

4.4.10 Functional indices for structures

The Priority Condition Index (PCI) for bridges and major culverts was calculated by the Bridge and Structures Management System as at 21 July 2017. No function indices are currently available for retaining walls, gantries and tunnels.

4.4.11 Defects on structures

Some 2 211 structures were evaluated using the Bridge and Structures Management System. Table 4-22 and provides statistics for the defects on bridges. Figure 4-13 shows the defects on bridges and Figure 4-14 shows defects on culverts and causeways.

Table 4-22: Statistics for defects on bridges, culverts and causeways in August 2017

Inspection items for bridges	No. of bridges with a defect for the worst 100 ranked according to PCI	Total no. of bridges with a defect	Inspection items for culverts and causeways	No. of culverts and causeways with a defect for the worst 100 ranked according to PCI	Total no. of culverts and causeways with a defect
01. Approach Embankment	29	308	01. Apron Slabs & Cut Off Walls	9	193
02. Guardrail	24	287	02. Wing / Ret / Head Walls	23	760
03. Waterway	9	261	03. Scour Protection Works	4	77
04. Approach Embankment Protection Works	17	159	04. Embankment Protection Works	5	173
05. Abutment Foundations	5	31	05. Waterway	13	605
06. Abutments	33	453	06. Embankment/s	6	315
07. Wing/ Retaining Walls	26	344	07. Guardrails	2	132

Table 4-22: Statistics for defects on bridges, culverts and causeways in August 2017					
Inspection items for bridges	**No. of bridges with a defect for the worst 100 ranked according to PCI**	**Total no. of bridges with a defect**	**Inspection items for culverts and causeways**	**No. of culverts and causeways with a defect for the worst 100 ranked according to PCI**	**Total no. of culverts and causeways with a defect**
08. Surfacing	26	375	08. Parapets / Handrails	3	103
09. Superstructure Drainage	22	259	09. Approach Road Slabs	2	48
10. Kerbs / Sidewalks	13	187	10. Surfacing	2	185
11. Parapet	47	573	11. Walls	28	629
12. Pier Protection Works	3	26	12. Top Slab	25	421
13. Pier Foundations	8	39	13. Culvert Road Slabs	0	33
14. Piers & Columns	31	346	14. Invert Slab	23	162
15. Bearings	12	57	15. Movement Joints	0	27
16. Support Drainage	0	15	16. Drainage and Siltation	6	277
17. Expansion Joints	33	412	17. Cell Deformation	4	14
18. Longitudinal Members	25	116	18. Miscellaneous Items	24	593
19. Transverse Members	6	37			
20. Decks and Slabs	33	429			
21. Miscellaneous Items	31	394			

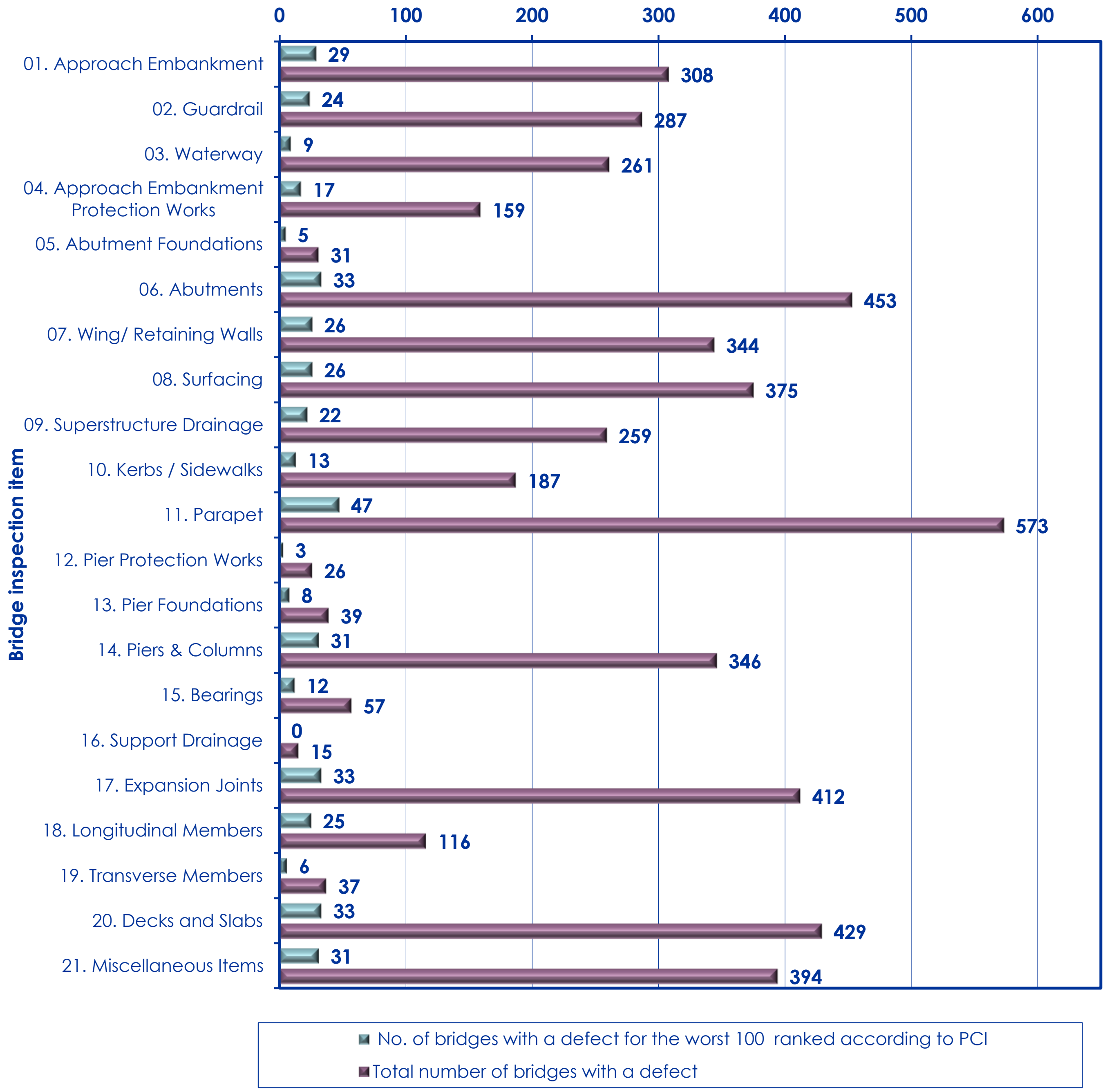


Figure 4-13: Statistics for the defects on bridges

From Figure 4-13 it can be seen that the most prevalent defects for bridges, excluding miscellaneous defects, in order of most occurrence relate to:

- Parapets;
- Abutments;
- Decks and slabs;
- Expansion joints; and
- Piers and columns.

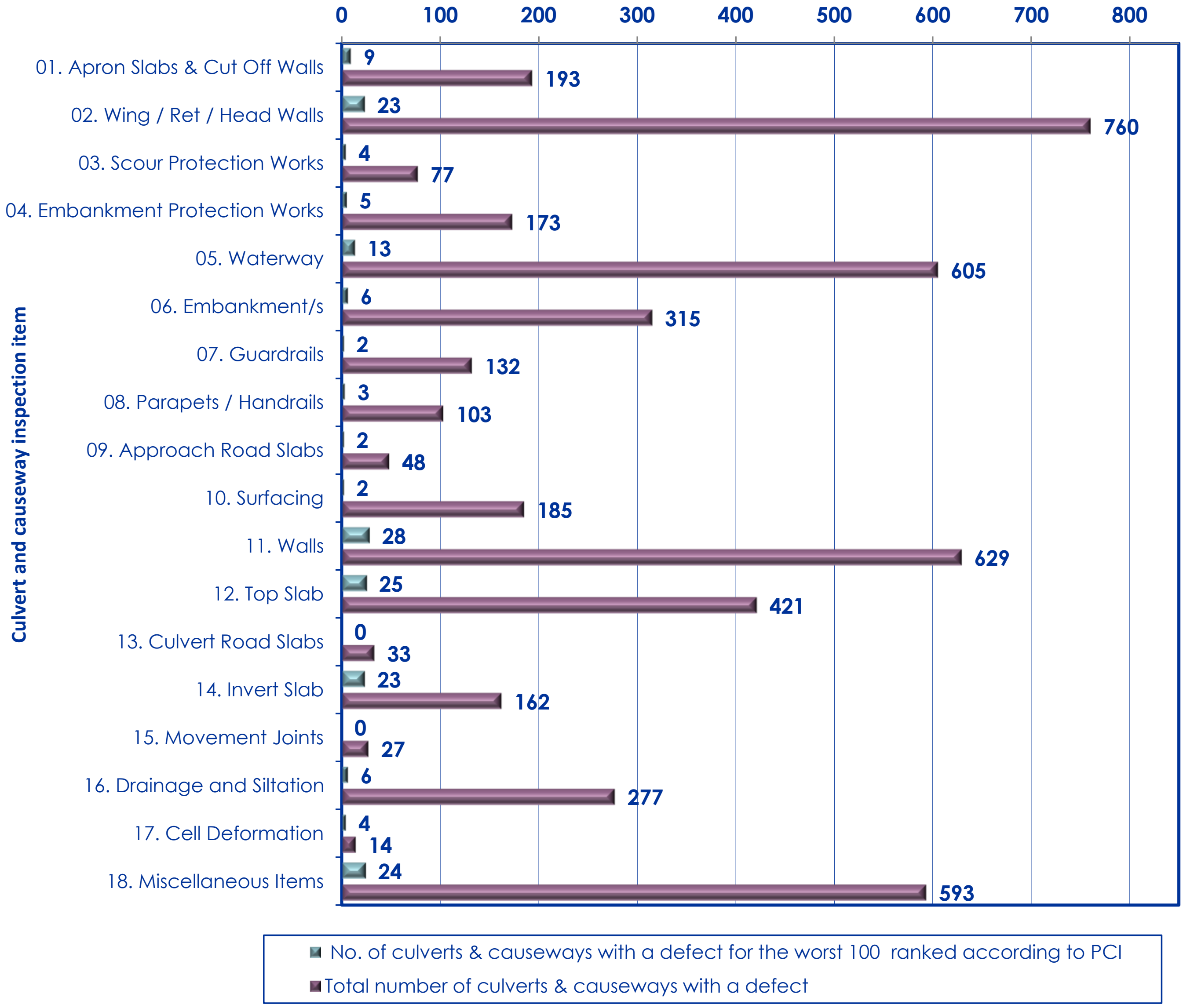


Figure 4-14: Statistics for the defects on culverts and causeways in August 2017

From Figure 4-14 it can be seen that the most prevalent defects for culverts and causeways in order of highest occurrence, excluding miscellaneous defects relate to:

- Wing, retaining and head walls;
- Walls;
- Waterways;
- Top slabs; and
- Embankments.

4.4.12 Overall bridge condition exposure

No recent data are currently available.

4.4.13 Condition of road markings

The condition of road markings is shown in Table 4-23 and Figure 4-15, which highlights the poor and very poor conditions that are found mostly on class 3 and 4 roads.

Table 4-23: Condition of road markings according to RCAM class 2017										
Condition	RCAM class									
	1		2		3		4		5	
	Km	%	Km	%	Km	%	Km	%	Km	%
Very Good	79,76	1,2	555,14	9	344,96	5	133,13	2	6,51	0,1
Good	70,92	1,1	1523,19	23	951,98	15	314,61	5	5,86	0,1
Fair	28,38	0,4	523,90	8	818,53	13	344,17	5	25,57	0,4
Poor	0,00	0,0	37,61	1	173,50	3	133,47	2	0,47	0,0
Very Poor	0,00	0,0	2,00	0	25,80	0	30,64	0	5,67	0,1
None	0,00	0,0	34,06	1	118,91	2	195,40	3	5,67	0,1

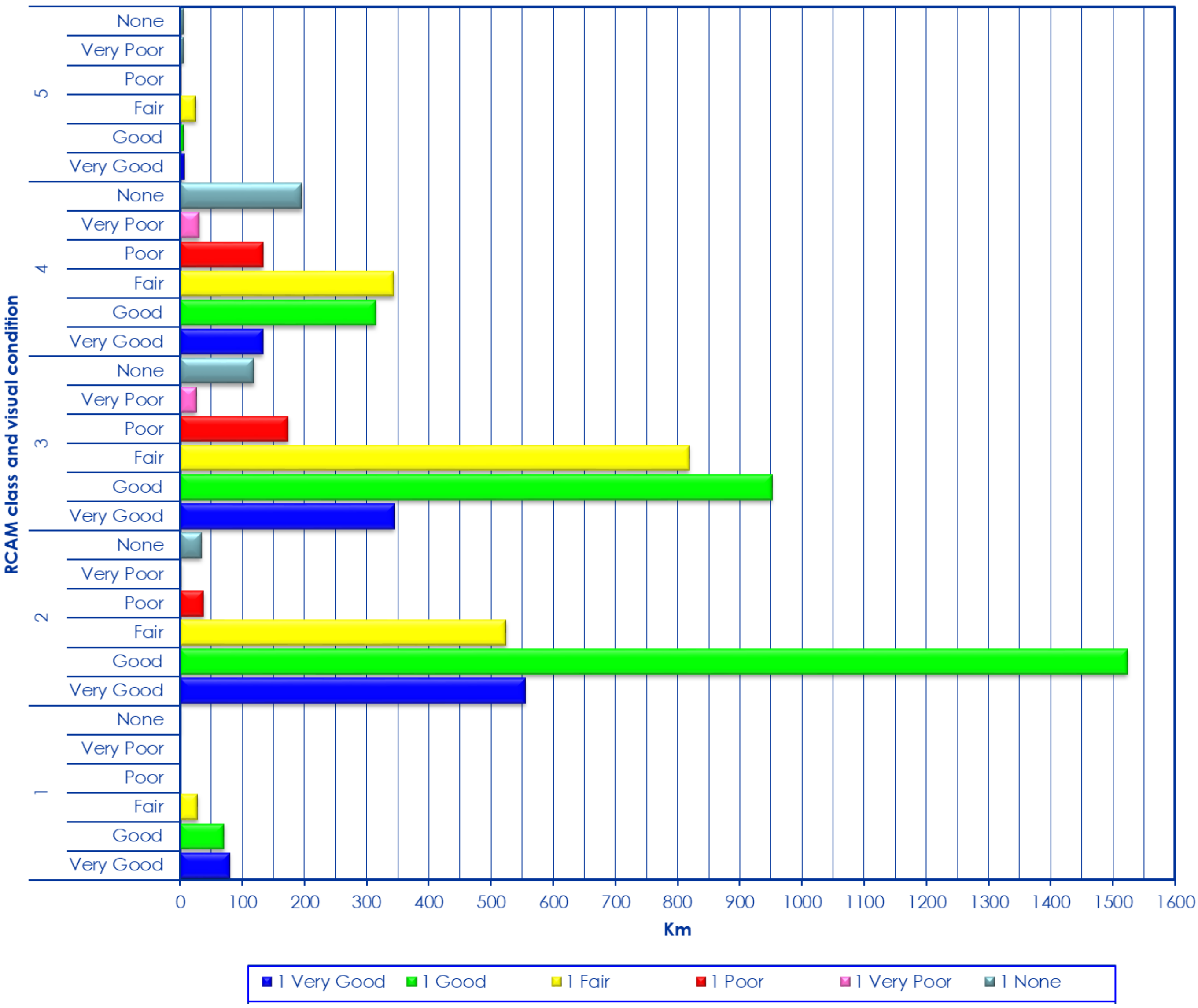


Figure 4-15: Condition of road markings according to RCAM class in 2017

4.5 Comparative conditions

Figure 4-16 provides a graphical view on the defects on the paved road network. Binder condition is the predominant defect followed by undulation edge break. These three defects are the major contributors to visual condition of the network.

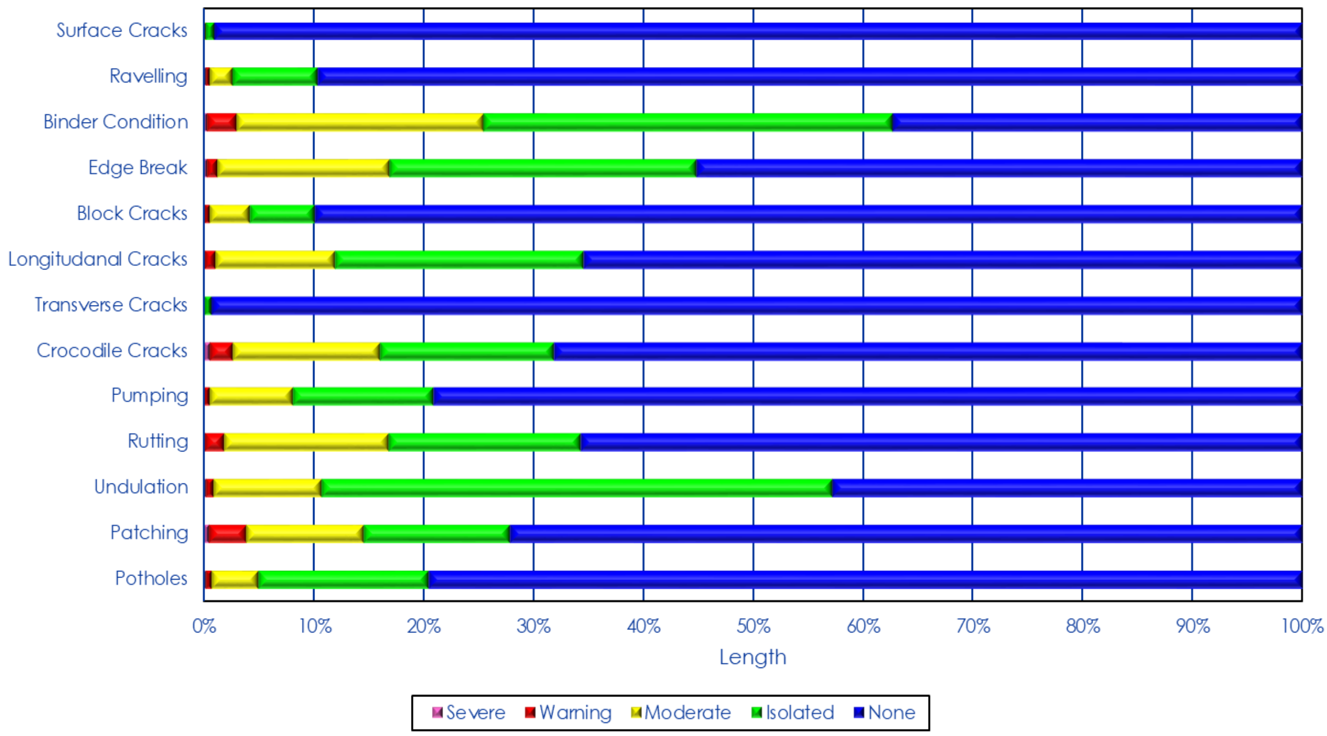


Figure 4-16: Condition distribution per distress for paved roads as at June 2017

Figure 4-17 provides a graphical view on the distresses on the unpaved network. Fixed stoniness is the predominant distresses followed by dust and corrugations. These three defects are the major contributors to roughness on the network.

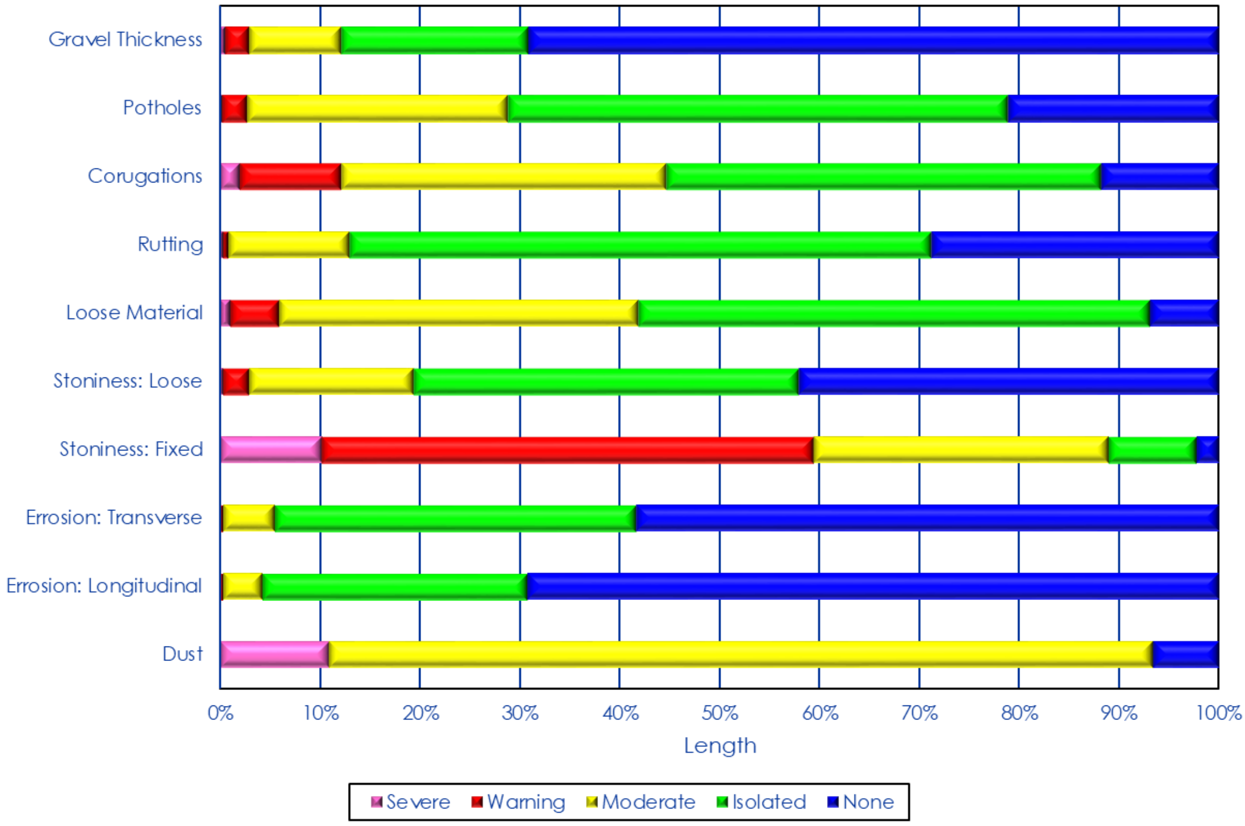


Figure 4-17: Condition distribution of the distresses on the unpaved road network as at June 2017

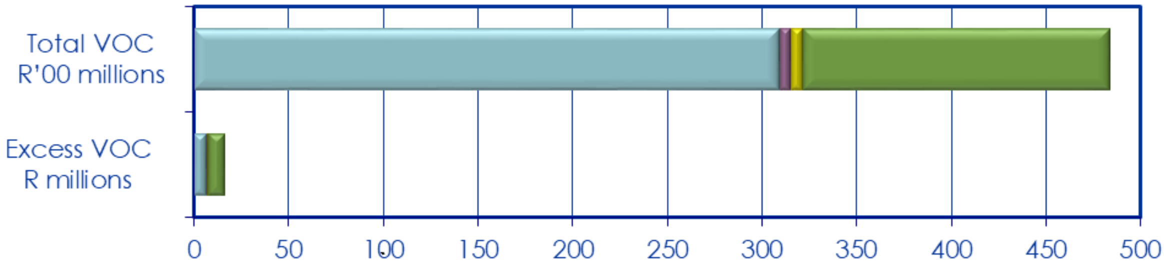
4.6 Vehicle operating costs and excess user costs

Vehicle operating costs are calculated in the Vehicle Operating Cost System (VOCS). The Branch maintains VOCS to update the vehicle operating costs and is accessed at https://rnis.westerncape.gov.za under General Reports: VOC Report. Excess (unnecessary) user costs are defined as the extra vehicle operating costs (VOC) incurred by vehicles travelling on roads rougher than an IRI of 3,1 (International Roughness Index).

Total and excess VOC are shown for the paved network in Table 4-24 and Figure 4-18. At this stage the VOC and excess VOC is not available per RCAM class and road type.

Table 4-24: Calculated vehicle operating cost for the paved road network for 2017

Vehicle operating cost	Length km	Cost per year (Rand, million)				
		Light	Taxis	Buses	Heavy	Total
Total	6651,32	30 961	576	662	16 205	48 404
Excess	2545,61	7,60	0,10	0,57	8,91	17,18
Excess as a % of Total VOC %		0,02	0,02	0,09	0,05	0,04



	Excess VOC R millions	Total VOC R'00 millions
Light	8	310
Taxis	0	6
Buses	1	7
Heavy	9	162

Figure 4-18: Total and excess vehicle operating costs on paved roads for 2017

4.7 Asset valuation

4.7.1 Current and depreciated costs of assets

The rate of change in asset value is a measure of how well the network is being preserved. The value of a new road is made up of:

- The cost of the ground preparation work; and
- The cost of the road structure (i.e., pavement layers, etc.).

The cost of acquiring land can be excluded because it is typically transferred from one owner to the next and therefore does not influence the asset value.

Figure 4-19 shows the components of the asset value of a road. Asset value is calculated as the total value of a road (foundations, preparation works and structural layers), minus the depreciation of the structural layers. The depreciation of the structural layers of a road is calculated in proportion to its remaining life and total life expectancy. This concept is similar to the generally accepted accounting practice of calculating an asset's "book value" which equates to cost minus accumulated depreciation.

Using the method for asset value calculation, the current replacement cost (maximum theoretical asset value) is calculated assuming all the unpaved roads have optimal gravel material thicknesses and all paved roads are newly built.

The asset values for 2017, excluding bridges and other structures, are shown below:

- The current replacement cost is approximately R143 872 million;
- The depreciated replacement cost is R116 170 million;
- The depreciated replacement cost is 80% of the current replacement cost, indicating asset consumption of 20%; and
- Paved roads comprise 99% of the current replacement cost.

By comparison, the depreciated replacement cost of the provincial road network, as assessed in 2014, was R75 700 million.

Limitation

The asset values for bridges and other structures have not been determined due to a lack of data.

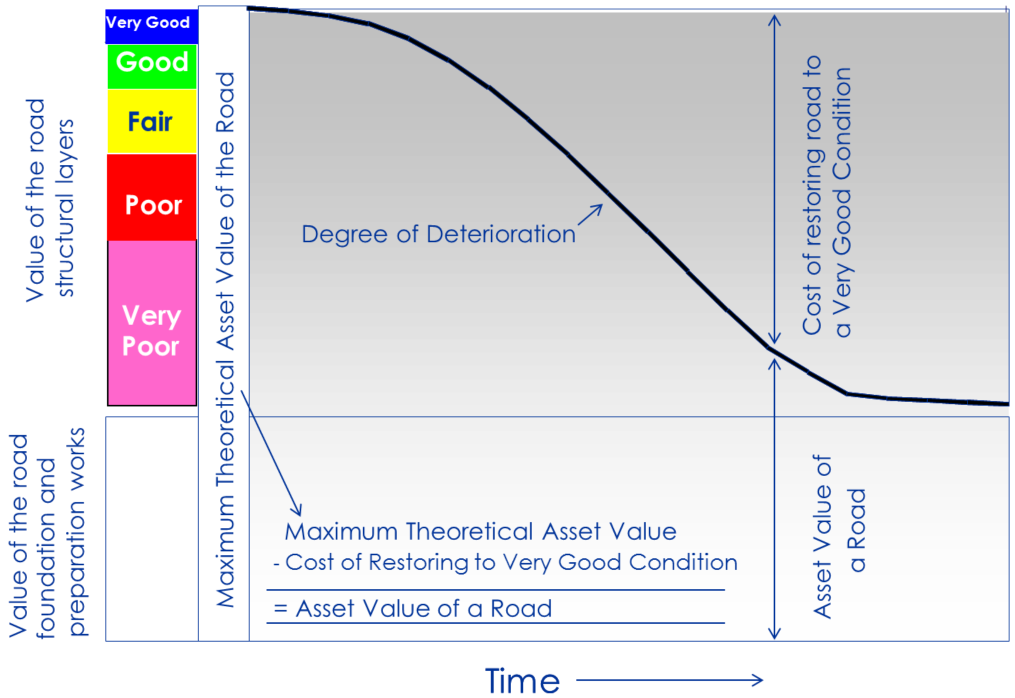


Figure 4-19: Components of the asset value of a road

The current replacement and depreciated replacement costs of the paved and unpaved road network are illustrated in Figure 4-20.

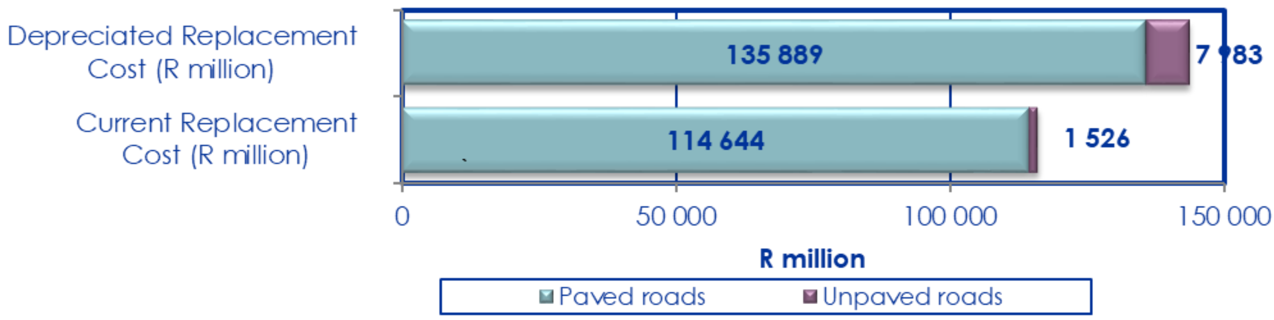


Figure 4-20: Current replacement and depreciated replacement costs of the road network in 2018

4.8 Remaining useful lives of assets

No information available at time of publication. The guidelines in Draft TMH 22 (Committee of Transport Officials, 2013) have yet to be finalised.

4.9 Trend analysis

4.9.1 Visual condition trends

The historic condition distribution of the carriageway-kilometres of the managed paved road network, per year (excludes proclaimed municipal main roads), by road length and vehicle-km travelled, is shown in Figure 4-21 and Figure 4-22 respectively. A total of 7% (approximately 480 km) of the carriageways on paved roads are in a poor or very poor condition. This is slightly down on the average of 1,5% over the last 5 years and therefore the trend is downwards for the length of road in poor or very poor condition.

The low proportion of poor and very poor roads in terms of vehicle-km distribution is noticeable, indicating the low impact of these on road users. The trend of visual condition distribution in terms of vehicle-km has remained fairly constant from 2006 to 2017.

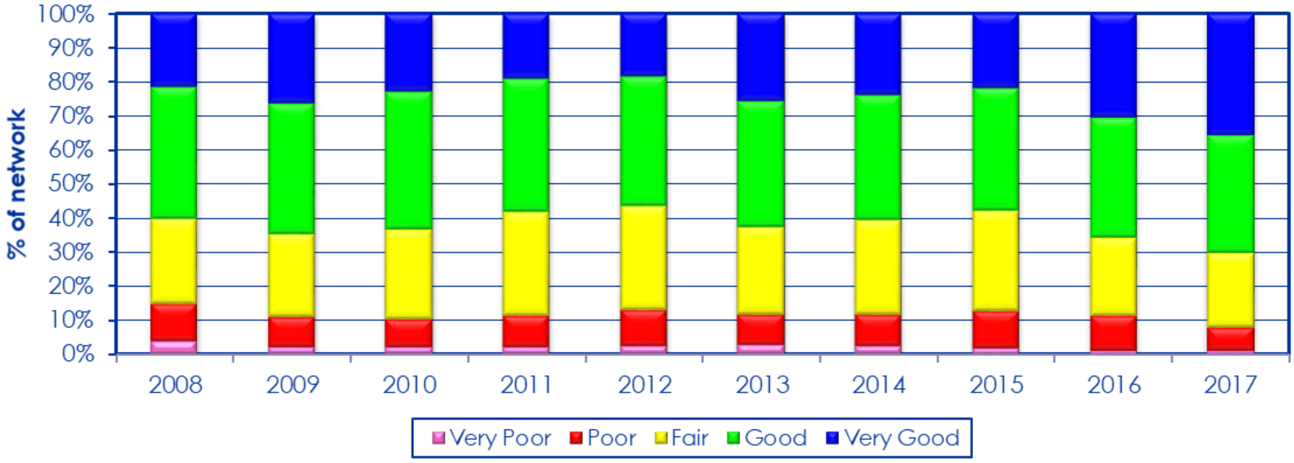


Figure 4-21: Change in the VCI by road length of the paved road network 2008 to 2017

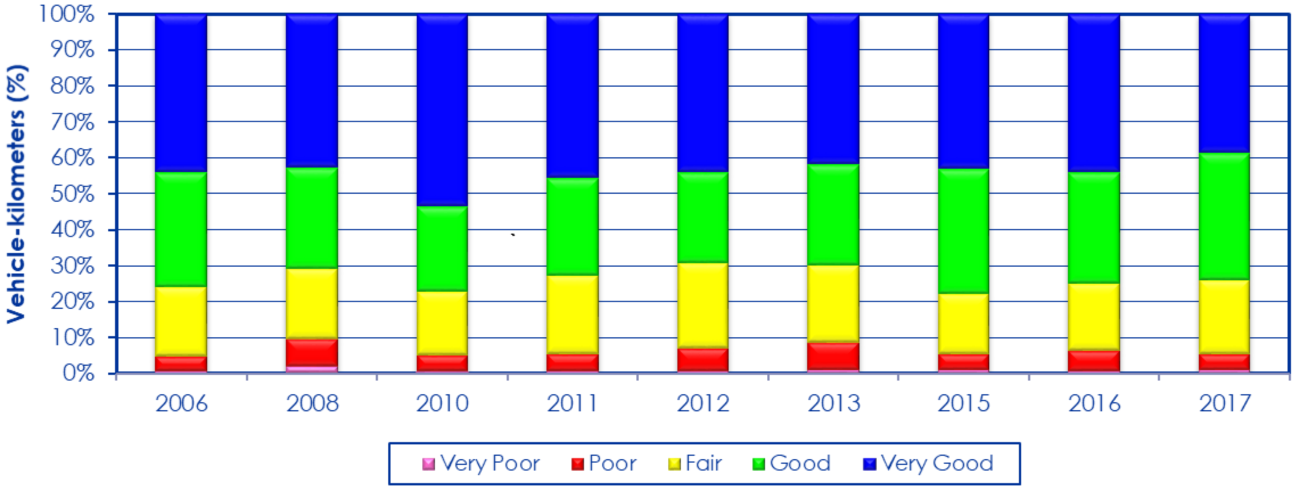


Figure 4-22: Distribution of the VCI of paved roads by annual vehicle-km travelled 2006-2017

The trend of poor and very poor visual condition is shown in Figure 4-23. The roads in poor condition and weighted by length show a cyclic trend between about 8 and 12 %. There is also a cyclical trend between 4 and 8% for roads in poor condition that are weighted by vehicle-km. Comparing these trends reveals that the condition of roads weighted by vehicle-km is up to 4% percent lower than the condition weighted by length. However, in 2017 both these trends decreased and the difference between these two trends reduced by 2%, which is attributed to the amount of reseals conducted by the Brach in recent years. Therefore, the traffic experiences fewer roads in poor condition compared with the distribution of poor roads in the network, implying that the roads carrying more traffic are in better condition.

Those roads that are in very poor condition, both weighted by length and by vehicle-km, show a flat to declining trend, with a marked decline over the last 3 years. Comparing the very poor trends reveals that the condition of roads weighted by vehicle-km is between 1 and 2% percent lower than the condition weighted by length. Therefore, over the last decade, the traffic experienced fewer roads in very poor condition compared with the distribution of very poor roads in the network. The declining trend in very poor roads in the network during the last 3 years has resulted in only a small difference in 2017 between the condition weighted by length and by vehicle-km, indicating that traffic experiences almost the same length of road in very poor condition as occurs on the network.

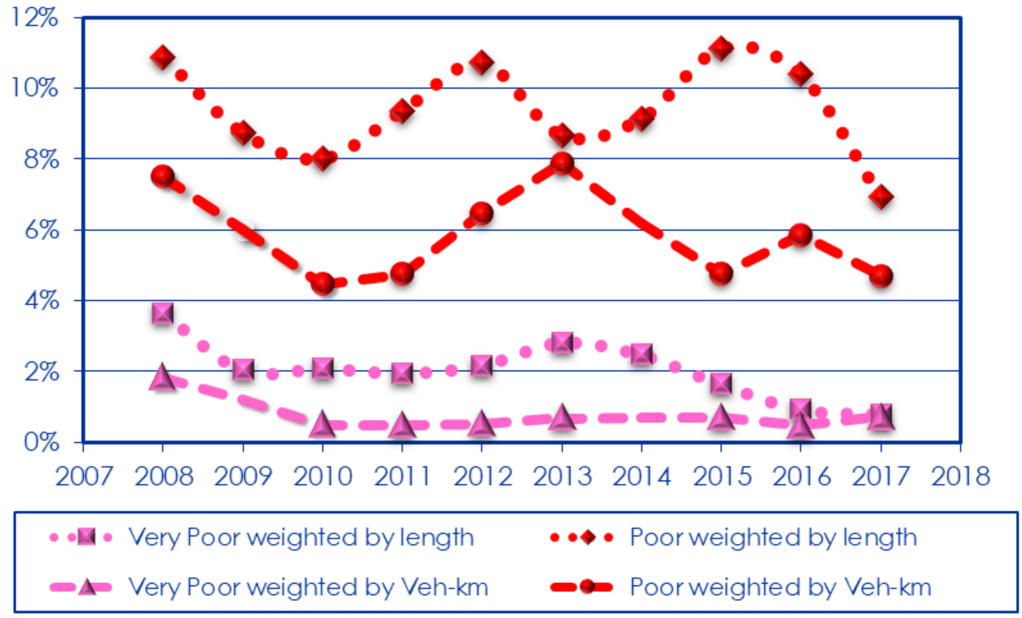


Figure 4-23: The percentage length of paved roads in a poor and very poor visual condition weighted by length and by vehicle-kilometres 2008 to 2017

The VCI of each road section is weighted for length and vehicle-km to calculate the network condition number (NCN), representing the condition of the paved road network in a single number (Committee of State Road Authorities, 1994). The NCN is used to compare overall visual condition of two or more networks and to monitor the change in condition of a network over time.

Figure 4-24 shows the historic trend in the overall condition of paved roads, as measured by the Network Condition Number (NCN) weighted by length and by vehicle-km. The trend in NCN weighted by length has been relatively flat for the period 2009 to 2015, when the NCN increased from 64 in 2015 to 76 in 2017. This can be ascribed to the increase in reseal between 2015 and 2017. The NCN is now above the desired benchmark value of 70 based when weighted by length. Refer to Appendix F – Benchmarking, for the basis of determining the benchmark.

The trend in NCN weighted by vehicle-km has been above the benchmark of 70 and relatively flat to declining over the period 2007 to 2015. The NCN kicked up over the last year to 78,4 in 2016, with a slight decrease in 2017. The NCN weighted by vehicle-km has been between 10 and 15% better than the NCN weighted by length over the period 2007 to 2015, however this difference decreased to 2% in 2017. This reduction is a measure of how effectively the Branch maintains the network for the benefit of the users, i.e. the objective to provide a greater benefit experienced by the users.

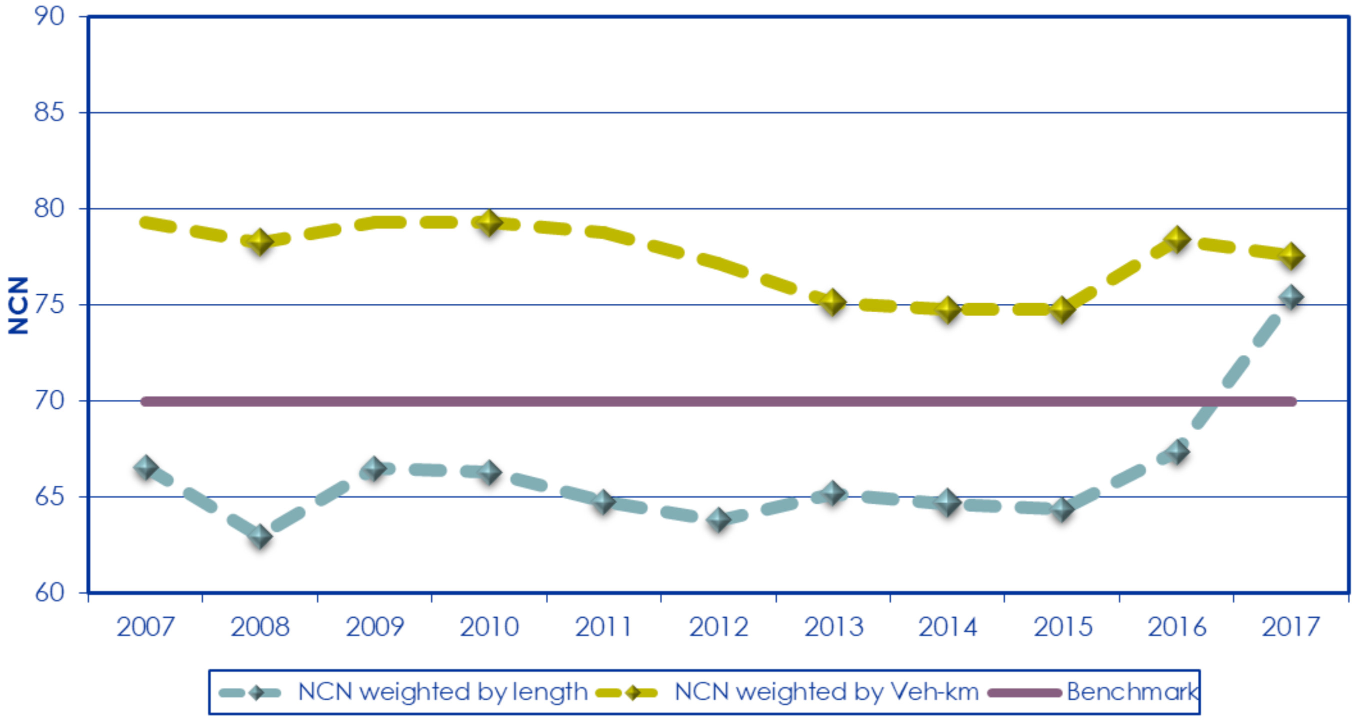


Figure 4-24: The historic trend in the overall network condition of the paved road network 2007 to 2017

The historic condition of the maintained unpaved road network by road length and vehicle-km over the last decade is shown in Figure 4-25 and Figure 5-26 respectively. The trend of visual condition by road length tended upwards in the last 3 years with a significant increase in very poor roads, however the 2017 data shown decreased in both poor and very poor roads. The trend of visual condition in terms of vehicle-km has been decreasing from 2012 to 2015, but has reversed in 2016 with a large increase in very poor and poor roads. This trend has thus significantly decreased in 2017 and is attributed to blading maintenance on the unpaved network. The percentage of very good roads has increased marginally to 1,5% of the network length. The condition distribution in terms of vehicle-km is a little less (10%) for the poor and very poor condition than the condition by road length. This indicates that the roads with the most traffic are in better condition than the lower trafficked roads. This is a significant change from 2015 where it was a lot less (17,2%).

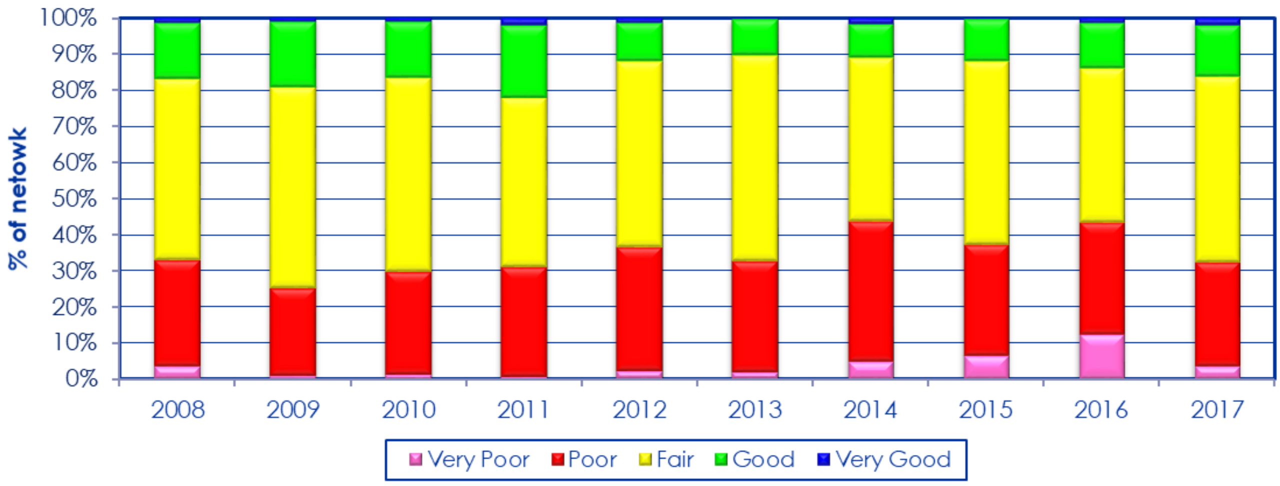


Figure 4-25: Change in the visual condition by road length of maintained unpaved road network 2008 to 2017

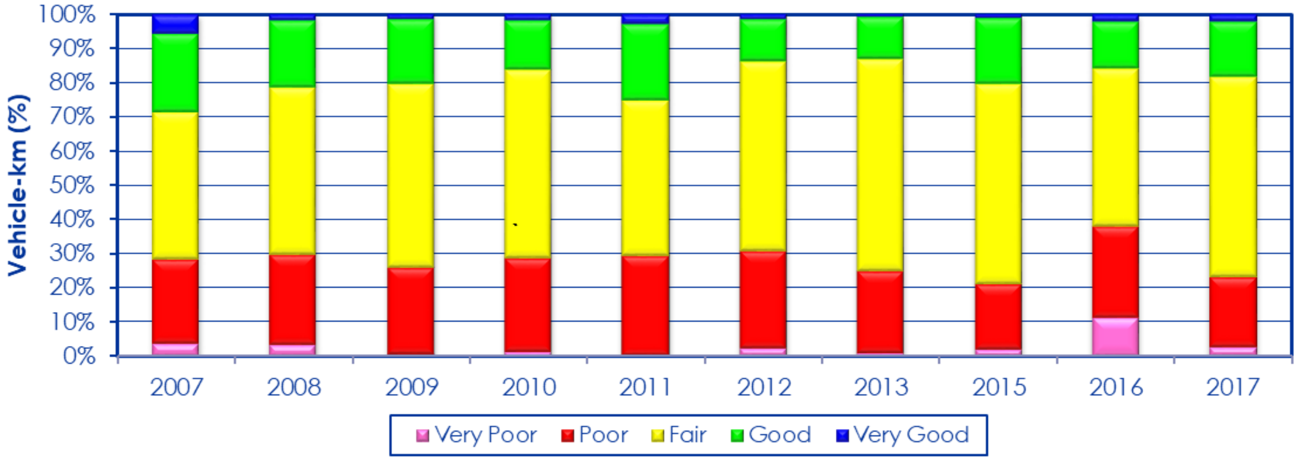


Figure 4-26: Distribution of the VCI of maintained unpaved roads by annual vehicle-km travelled 2007 to 2017

Figure 4-27 shows the historic trend in the overall condition of unpaved roads, as measured by the NCN weighted by length and by vehicle-km. Network performance is compared to the desired benchmark NCN of 60. Refer to Appendix F – Benchmarking, for the basis of determining the benchmark.

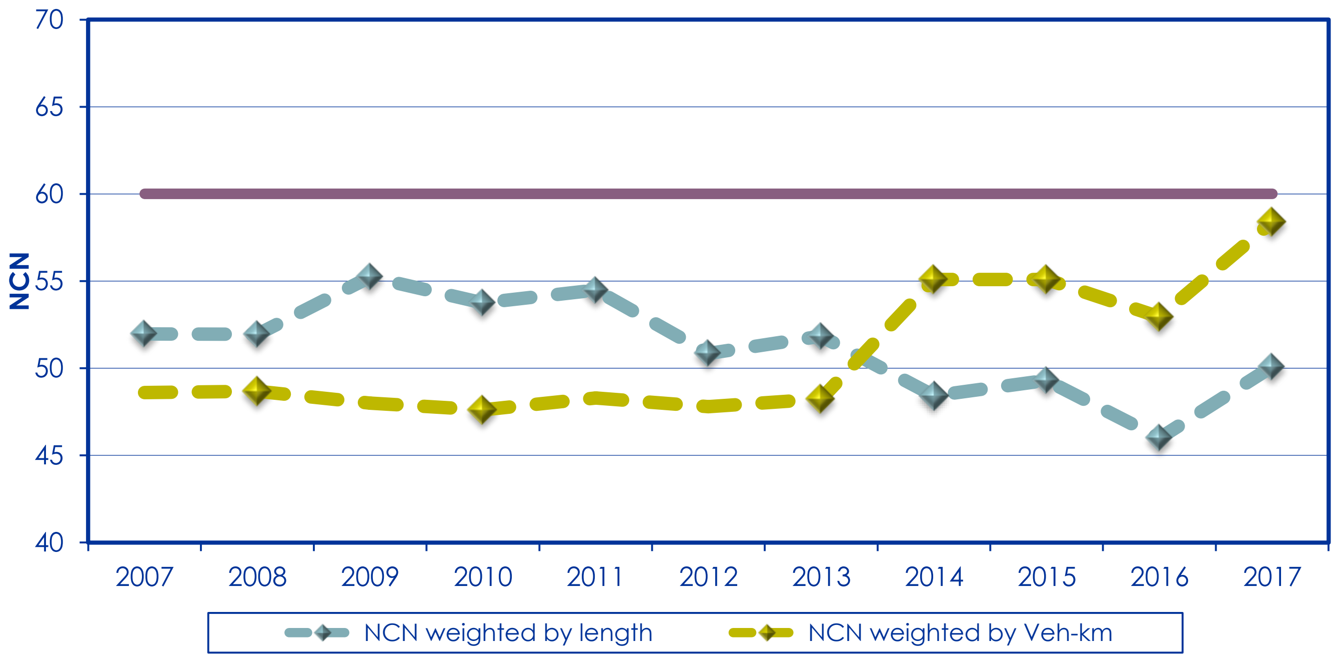


Figure 4-27: The historic trend in the overall network condition of maintained unpaved roads 2007 to 2017

The NCN weighted by length has been in the range of 46 to 55 per cent over the past ten years. There has been a steady decline in the last four years from 51,8 in 2013 to 46,0 in 2016, but has reversed in 2017 with NCN of 50. The NCN remains significantly below the desired value of 60. The NCN weighted by vehicle-km has had a flat trend with a NCN of approximately 53 from 2008 to 2013, after which it rose rapidly to a NCN of 55 and then declined to 52,9 in 2016, with a drastic increase in 2017 again to 58. The NCN has been below the benchmark of 60 over the last decade. The difference between NCN weighted by length and by vehicle-km is negative up to 2013 with an average difference of -4,7, after which the NCN becomes positive with an average difference of 6,5. This is very significant change and indicates that up to 2013 the majority of road users experienced worse roads than the average network condition, but after 2013 the majority of road users experienced better roads than the average network condition. This indicates that since 2013 that the roads with the most traffic are in better condition than the lower trafficked roads.

4.9.2 Gravel thickness trend

The change over time in the average gravel thickness on the maintained unpaved road network is shown in Figure 4-28. Over the last ten years, due to underfunding, the difficulty in obtaining environmental approvals to excavate suitable regravelling material, as well as insufficient capacity for regravelling, there has been a steady decline in average gravel thickness on the provincial unpaved roads, from about 34 mm in 2007 to about 25 mm in 2010, 27 mm in 2016 and 22 mm in 2017. There is practically no gravel left on the majority of roads. The average gravel thickness should ideally be above 75 mm, while the minimum average thickness should not drop below 60 mm to facilitate blading maintenance.

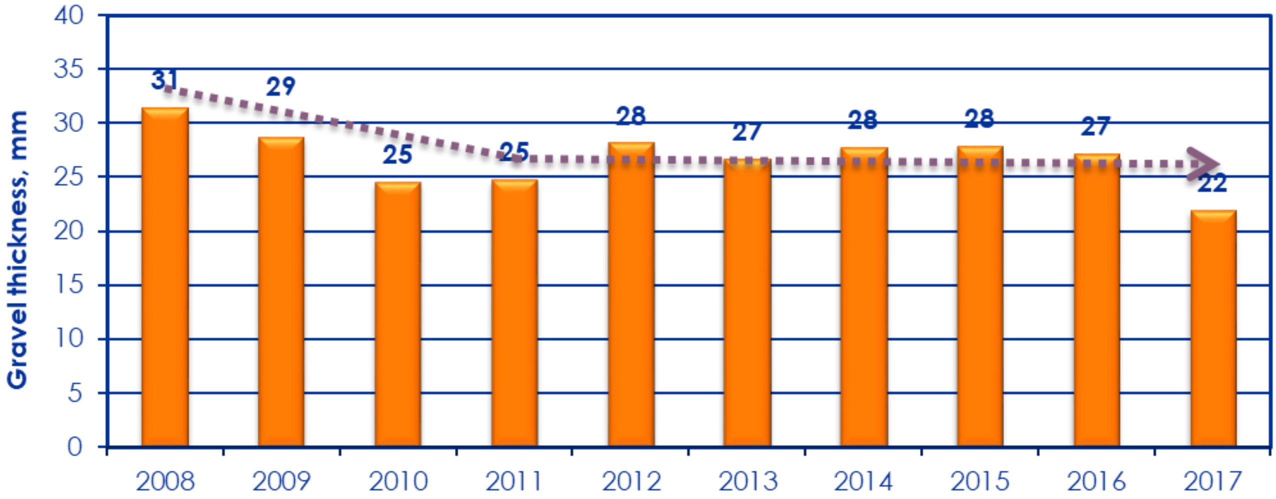


Figure 4-28: The historic trend in gravel thickness on the maintained unpaved road network from 2008 to 2017

Figure 4-29 shows how the gravel thickness distribution has changed over a decade. The last 4 years shows a static pattern of thickness distribution, with thickness between 0 to 25 mm increasing significantly in 2017.

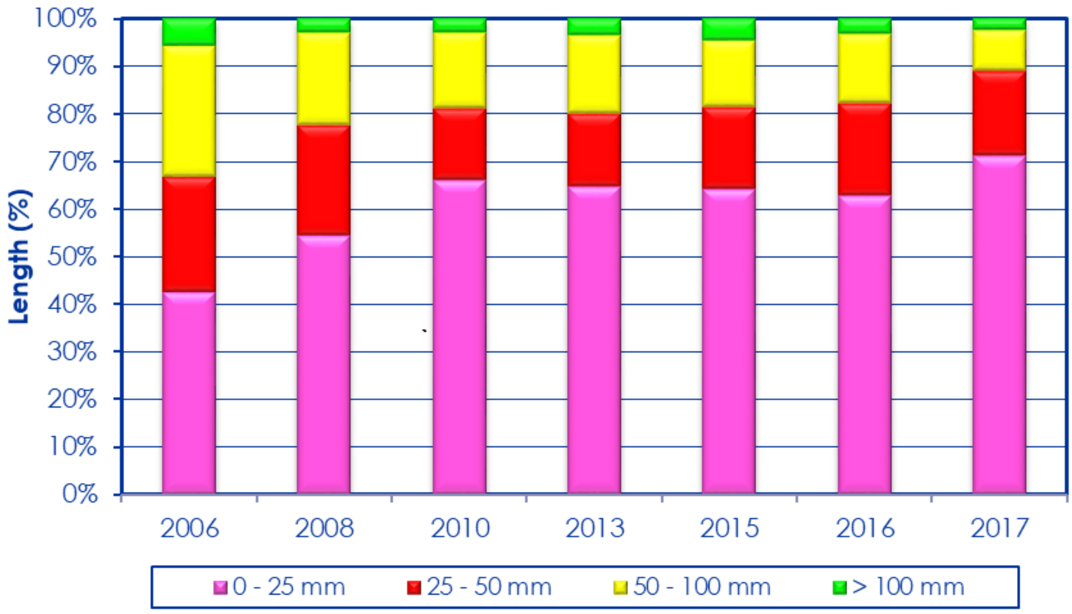


Figure 4-29: Gravel thickness distribution on unpaved roads 2006 to 2017

4.9.3 Resealing demand trend

The trend of resealing demand over the last decade is illustrated in Figure 4-30. The legend refers to the categories below:

- A = reseal now if funds are available;
- B = reseal next year;
- C = reseal in the future; and
- None = No reseal priority.

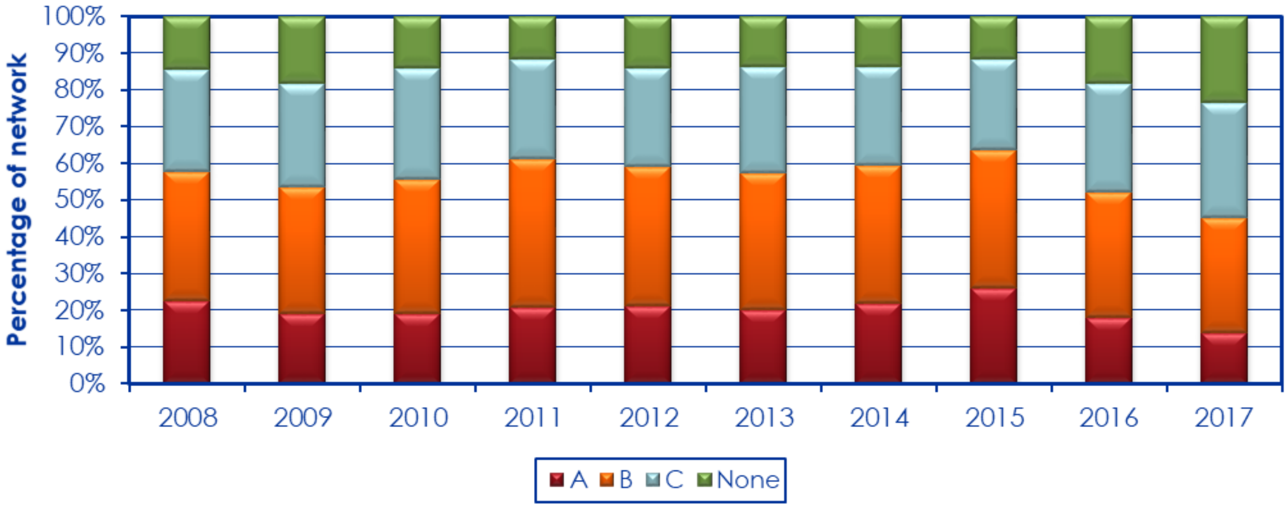


Figure 4-30: Resealing demand of paved roads according to urgency 2007 to 2017

The trend of reseal condition Number (RCN) is shown in Figure 4-31. The RCN is calculated using the same formula as for NCN [TRH 22 (Committee of State Road Authorities, 1994)], but substituting VCI for Reseal Condition Index (RCI) and using the weighting condition (W_i) values listed in Table 4-25.

Table 4-25: Condition weights for RCN calculation

Condition category classification of segment *i*	Condition weight (W*i*)
A	3,33
B	2,33
C	1,5
None	1,0

Currently no benchmark has been set for RCN. However, the following is a rough guideline:

- No more than 2% in the A category;
- No more than 8% in the B category; and
- No more than 20% in the C category.

A downward trend is apparent over the last decade, falling from 43,0 in 2007 to 38,1 in 2015. However there has been a significant improvement to 43,6% in 2016 and an additional improvement in 2017 to 47,4.%. This is also reflected in the decreasing need in the A category (reseal now). However, a limitation of this data is that the poor and very poor roads that would not normally be resealed and are candidates for rehabilitation are included in the calculation of the RCN.

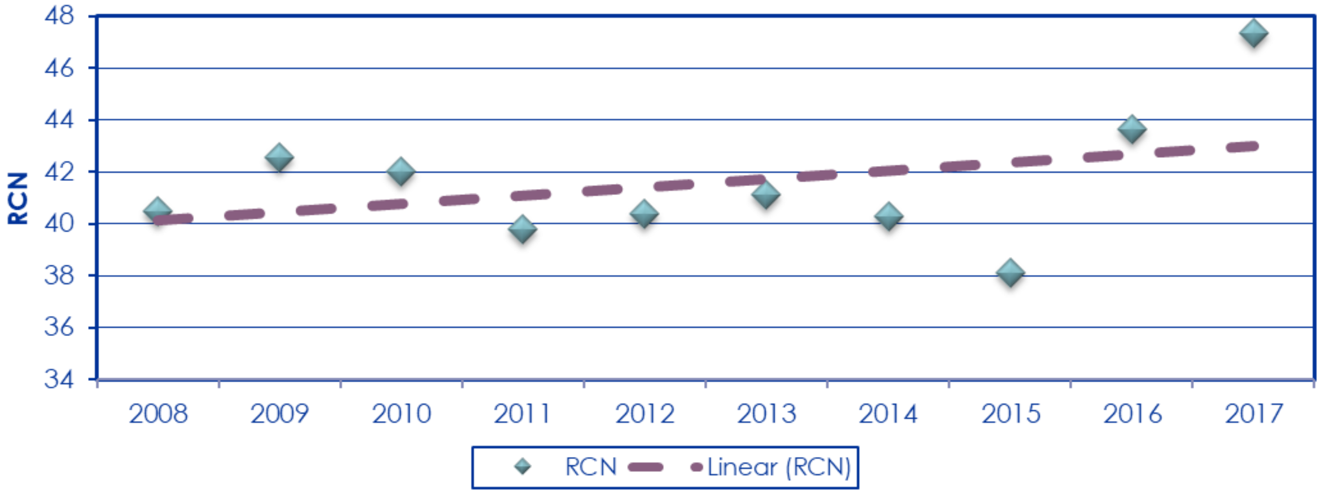


Figure 4-31: Historic trend of reseal condition number 2008 to 2017

The upward trend of RCN and decrease in the demand for reseal indicates the paved road network is progressing gradually towards a state of good repair. Roads that are not resealed in time result in a moisture accelerated distress state that leads to a growing rehabilitation demand. A tipping point is reached where the rehabilitation demand outstrips available resources. If the increase in RCN in 2016 and 2017 can be maintained in the future, it will result in a less vulnerable paved road network.

4.10 Performance gap analysis

4.10.1 Comparison of actual conditions with service levels

The comparison of actual conditions with service levels has been covered under paragraph 4.3.4 for roughness, rutting, surface texture and deflection measurements.

Table 4-26 reflects actual visual conditions compared with level of service per road category. The average visual conditions are above the required level of service.

Table 4-26: Comparison of actual visual condition and levels of service for 2017

Road class	TRH 26 class	Level of Service VCI	Average actual condition VCI
DR/OP	4, 5	45,0	67,4
MR	3	52,5	70,9
TR	1, 2	55,0	69,4

4.11 Climate change impact

The impact of climate change on the management of road network in the Western Cape has not yet been determined in any detail. Climate predictions indicate a hotter, drier climate with less rain and the likelihood of more extreme weather leading to floods and droughts (Department of Environmental Affairs, 2013). The impact of extreme weather events that often caused floods has in the past seen significant destruction to road infrastructure, with the unpaved road network and drainage structures being most affected. The influence of prolonged drought has caused water shortages and this has been a constraint on road works, particularly periodic maintenance of unpaved roads.

The predictions on climate change indicate that there is a need to enhance the resilience of critical infrastructure to cope with the effects of climate change and this will put additional demands on funding resources. In this respect, resilience is defined as follows (Climate Adaption Platform, 2017):

"The ability of systems (including infrastructure, government, business and communities) to proactively resist, absorb, recover from, or adapt to, disruption within a timeframe which is tolerable from a social, economic, cultural and environmental perspective".

4.12 Composite indices

A deduct point method has been used to produce an overall functional status of the road network. The outcomes of this method has been presented in the visual condition index graphs for both the paved and unpaved road network of the preceding sub-sections.

It is envisaged that the road network indices will be combined to summarise the condition and functional data of various assets managed by the Branch in the long term.

4.13 Road Safety Assessments

The road environment and road design has an important impact on road safety. All roads have the risk that a crash will occur, but this needs to be minimized as far as possible from an engineering perspective. A Road Safety Audit can be utilised effectively as a crash prevention measure during the preliminary and design stages of any road or transportation project. It allows the identification of potential crash-causing road elements which can be removed before implementation. It also acts as a crash reduction tool on existing facilities by reporting on the safety performance and crash potential of the facility, again identifying safety deficiencies in the face of incomplete crash information.

South Africa recognized the need for implementing this road safety tool by compiling the updated South African Road Safety Audit Manual (SARSAM). The manual aims to assist road authorities to conduct road safety audits for new road projects and road safety appraisals for existing roads in order to identify potentially hazardous locations and put remedial measures in place to minimize crashes on the road network. However, this document **has not yet been formally approved by the Committee of Transport Officials** (Department of Transport, 2017).

The SARSAM uses three terms to describe road safety investigations, namely road safety engineering assessment, road safety audit and road safety appraisals. It defined these three types of investigation as follows:

> ***Road safety engineering assessment***: *This is a screening process to establish the road safety status of sections of an existing road network. It is a network based process performed on selected sections of the road network using a set of pre-defined key indicators to determine the feasibility of safety improvement of such a section. The road safety engineering assessment process provides a list of prioritised locations that should be further investigated.*
>
> ***Road Safety Audit***: *This is a formal examination process of a new or upgrading project where interaction with road users takes place, in which an independent and qualified team identifies potential road safety problems and suggest measures to mitigate those problems. The road safety*

audit process results in a report describing potential safety concerns that should be reconsidered prior to advancing to the next stage of the design process or to physical construction or taking over completed construction works.

***Road Safety Appraisal**: This is a systematic examination process of an existing road location, in which an independent and qualified team reviews onsite conditions and available historical evidence to identify existing or potential road safety problems and suggest measures to mitigate those problems. The road safety appraisal process results in a report describing potential safety concerns on-site and suggested remedial measures.*

As mentioned in Section 3.1.4 of the RAMP, the only road safety investigation that needs to be reported on is Road Safety Appraisal and this safety investigation will be further discussed in this document.

Identification and packaging of Road Safety Appraisals

The strategies implemented in road traffic safety management can be reactive or proactive in nature:

- A reactive approach to road safety is associated with the identification of locations experiencing safety problems (screening), problem definition (diagnosis), and the identification and implementation of countermeasures (cure); and
- A proactive approach to road safety is associated with the prevention of safety problems before they manifest themselves in the form of a pattern of crash occurrences.

In both these approaches, it is necessary to identify safety deficiencies that need to be actioned to diagnose the safety problems, and then identify and implement countermeasures to remedy the deficiencies. The lack of credible crash information on the South African road network casts a shadow upon the use of this information and also any crash-based analyses. Performing rudimentary quality control on the available information often indicates that the quality and the reliability of the information would be questionable and not appropriate to be used as a basis for statistical analysis or recommendations for remedial measures. Studies has also shown that a major constraint for road safety appraisals on existing roads in the past has been the fact that the recommendations were not implemented, because it was not co-ordinated with major reseals and rehabilitation projects (Roads Traffic Management Corporation, 2012).

To overcome this, the Branch has adopted the approach of co-ordinating the road safety appraisals with reseal and rehabilitation projects. This methodology does ensure that road safety appraisals are not being done for the sake of road safety auditing, but that the opportunity is taken to make a difference in the safety performance of such a road. The fact that the appraisal process should be coordinated with the resurfacing / pavement rehabilitation process ensures the presence of the design team and the possibility to commission the appraisal as additional or specialist services through the Agreement for Consulting Engineering Services.

Professional Team Conducting the Road Safety Appraisals

Since there is no approved Technical Highway Method for conducting Road Safety Appraisal, the Branch has delegated the roles and responsibilities of the independent audit team as defined in the SARSAM to the design consultant, who is registered in terms of the Engineering Profession Act. The design consultant is therefore the competent person or team responsible for the following Road Safety Appraisal objectives on projects:

- To ensure compatibility between the safety features of a road and the functional classification of the road;
- To identify any feature that can, with time, create a safety problem; and
- To identify all features in the road environment that pose a safety hazard to any of the road users.

The following activities are followed as part of the Project Identification and Report stages objectives of a project:

- Analysing exiting data – for instance the prevalence of specific of crashes as compared with control data, if possible;
- Assessment of risks whereby the design consultants would make a judgement of the importance of remedial measures for specific concerns;
- Site inspections; and
- Identification of road safety concerns should be done for all issues, irrespective of the fact that the origin may be routine maintenance related;

Typical strategic improvements applied on Projects

The following improvements mechanisms are currently implemented on Reseals and Rehabilitation Projects within a constraint budget:

- Barrier lines - Barrier lines are corrected to prevent overtaking on road sections with inadequate sight distance, normally over crests and around horizontal curves. A general programme is implemented to ensure that barrier lines are long enough, well maintained and combined with additional signage and road markings where necessary;
- Road Marking and Signs are replaced and corrected according to the speed limit review;
- Investigations for passing opportunities to improve road safety;
- Access management, ensuring minimum spacing standards between intersections and reducing the number of intersections and accesses on a road;
- Schools - Safe areas around all schools must be developed where there is high conflict between vehicles and children walking and cycling to the school;
- Policy for Setting of Speed Limits - The Department of Transport has a draft policy for the setting of speed limits. Speed limits are often reduced as a symptomatic measure if crashes occur, but do not always address the real cause

The policy needs to be revised by National Department of Transport, incorporating the recent changes to speed limits. Speed limits on roads should be tested against the operational speeds, and changes to speed limits should involve a multi-disciplinary team of traffic law enforcement personnel, engineers and other relevant disciplines, applying the policy on the setting of speed limits.

Reporting on Road Safety Appraisal Reports on Paved Network

The Branch is not in a position to provide the actual kilometres and the number of reports that were implemented as part of a Road Safety Appraisal, as no data has been collected for this process. The Branch has however, updated the project inception report for the reseal projects in 2017, to enable the design consultants to document and identify potentially hazardous locations and put remedial measures in place to minimise crashes on the road network.

It is envisaged that a strategic safety engineering database is setup to record the number of Road Safety Appraisal reports compiled from the above project process. The existing project monitoring systems will also be utilised to determine the kilometres of remedial measures implemented in future.

Chapter 5 – Needs Determination

5.1 Current assets

5.1.1 Historical context

Historically, construction of the majority of the paved road network took place in the 1950s and 1960s. This was followed by reconstruction of parts of the trunk road network to modern standards and to upgrade their load carrying capacity in the 1970s and early 1980s. A maintenance orientated strategy of regular sealing and routine maintenance of roads was developed over this period. From the mid-1980s to the present, there was a reduction in the rehabilitation and replacement of roads with steadily rising heavy vehicle and E80 volumes, especially since the mid-1990s. This resulted in a build-up of a backlog in rehabilitation and resealing need, as well as a requirement to upgrade trunk roads with old geometric standards to current standards and to upgrade unpaved roads carrying high traffic volumes to paved standards.

5.1.2 Factors influencing demand

The increase in population as well as the expected growth in the economy of the Western Cape will translate directly into a greater demand for transport, and road transport in particular.

The main factors influencing the demand for additional funding to maintain current assets are the backlog in the following:

- Routine maintenance of all roads;
- Regravelling of unpaved roads;
- Upgrading of unpaved roads to paved roads;
- Resealing of paved roads;
- Light Rehabilitation of paved roads; and
- Rehabilitation and reconstruction of paved roads.

Anticipated changes in community expectations with regards to transport may also affect demand. However, it is difficult to estimate future changes in community needs, apart from stating that the road infrastructure of the Western Cape will not, given current budget levels, be able to support a sustained high growth rate. As the economy grows, the demand for road infrastructure will become a serious service delivery issue unless stringent transport demand management imperatives such as car-pooling, rail-readiness in terms of freight-transfer, transit-oriented-development and intelligent transport systems, etc., are put in place over the medium to long term to transform the land transport burden from being predominantly private-vehicle-based to a multi-modal shared-based system.

5.1.3 Traffic demand

The most relevant indicator of traffic growth is the number of vehicle-km travelled on the network over a given time period. The Branch conducts an ongoing vehicle counting programme and regularly updates the RNIS with the latest link-lengths. The Branch can therefore accurately report on vehicle-km on the network.

There was a steady growth of approximately 4% in vehicle-km travelled from 2002 to 2011, as illustrated in Figure 5-1, but growth has been static to negative over the last four years. This is a reflection of current economic conditions in South Africa.

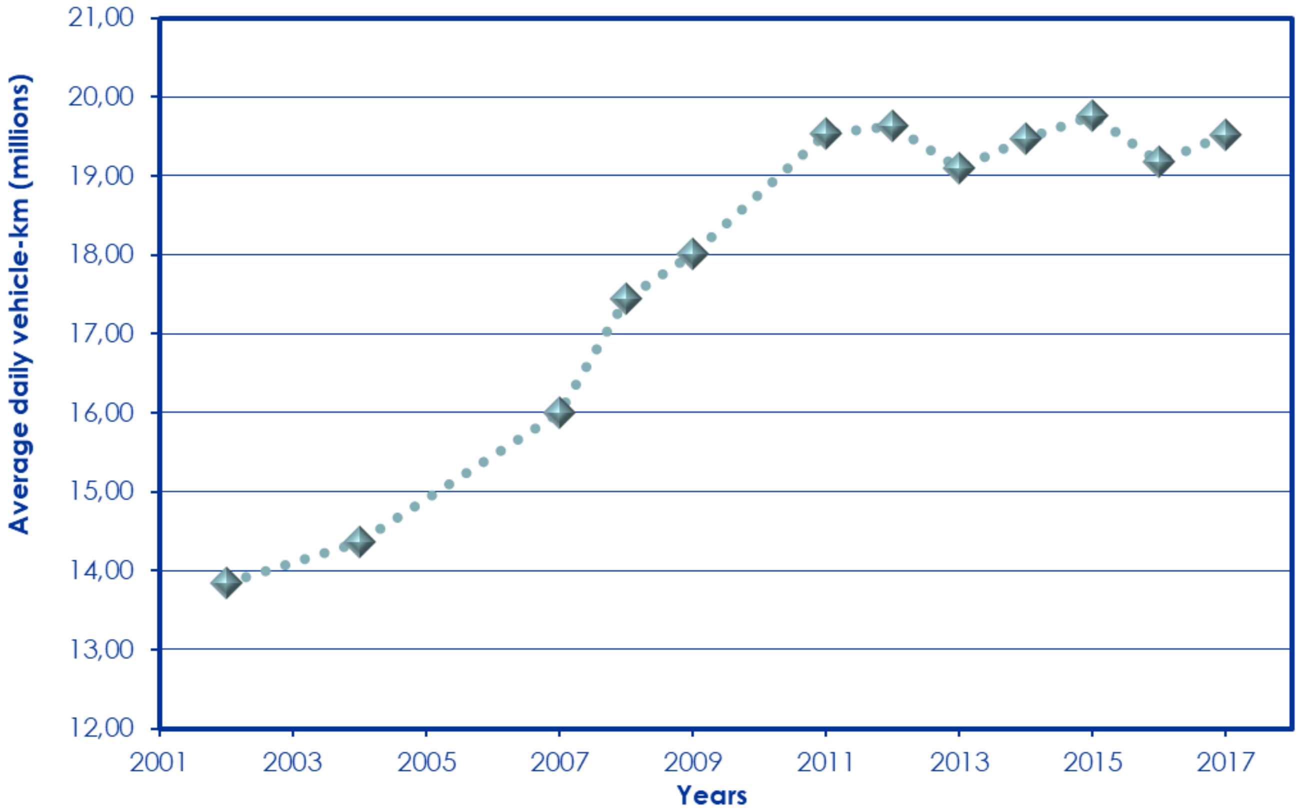


Figure 5-1: Growth in average daily vehicle-km on the WCG network 2002 to 2017

The different traffic categories and their proportion of the paved and unpaved road network, expressed as a percentage, are shown in Table 5-1 and Figure 5-2. It is evident how the majority of the network (64%) is composed of roads with traffic volumes of less than 300 vehicles per day.

Table 5-1: Traffic categories for 2017

Traffic category	AADT	Managed network length km	% of managed network
S0	<100	6 836	41,8
S1	101 – 300	3 569	21,8
T0	301 – 500	1 711	10,5
T1	501 – 1 500	2 025	12,4
T2	1 501 – 4 500	1 531	9,4
T3	4 501 – 13 500	368	2,2
T4	13 501 – 40 000	248	1,5
T5	>40 000	62	0,4
Total		16 146	16 350

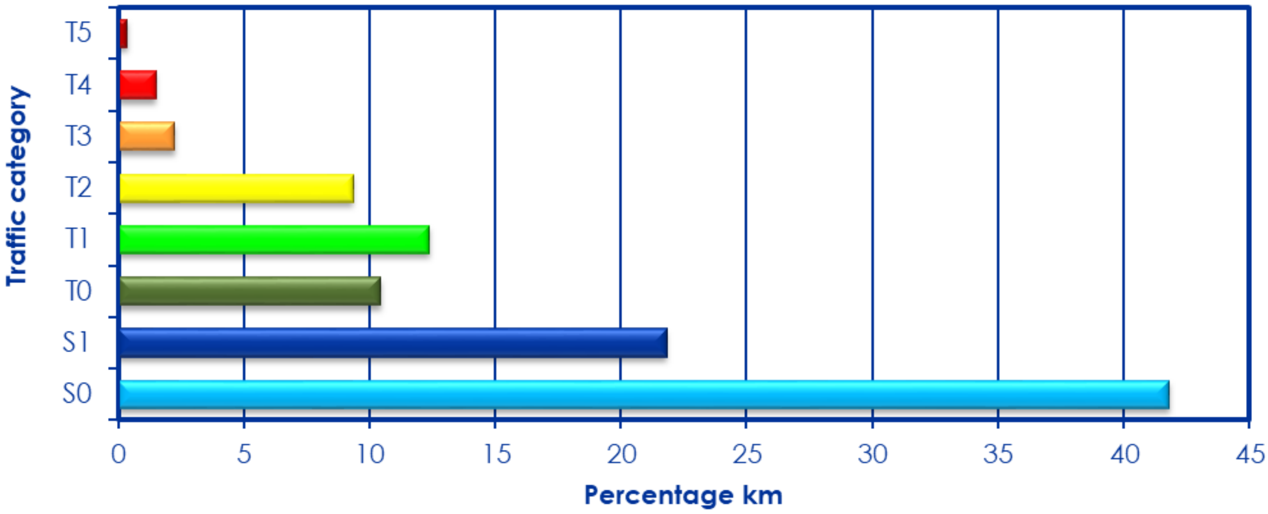


Figure 5-2: Traffic categories and their percentage of km of the network for 2017

The distribution of traffic on paved and unpaved roads is shown in Figure 5-3. The majority of vehicle-km are travelled on paved roads, carrying approximately 6 693 million vehicle-km per annum. The maintained unpaved road network carries only 5% of the total provincial traffic, approximately 369 million vehicle-km per annum.

- 42% of the road network carries less than 100 vehicles per day.
- 2% of the road network carries more than 10 000 vehicles per day.

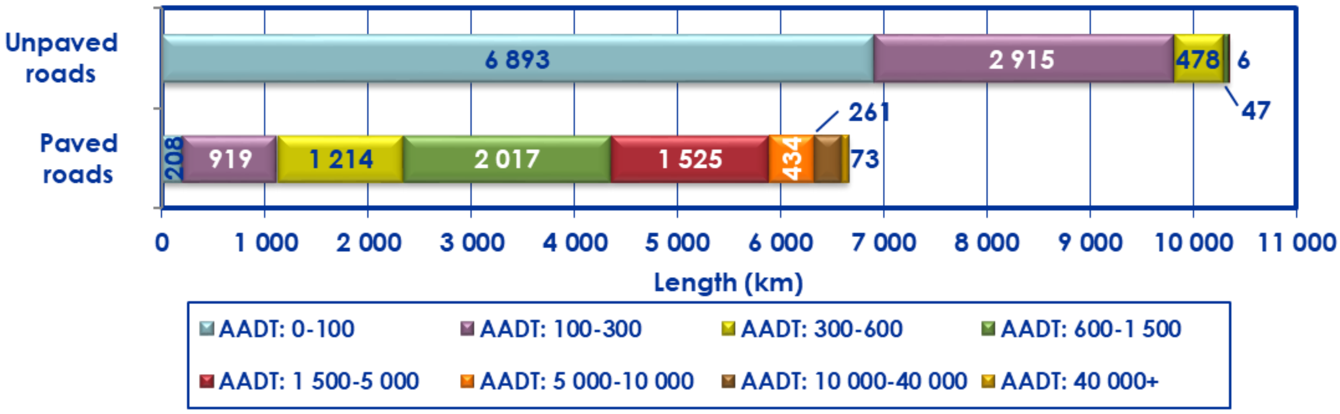


Figure 5-3: Traffic distribution on paved and unpaved roads 2017

There are 114 km of unpaved roads that carry more than 500 vehicles per day, and another 737 km that carry between 250 and 500 vehicles per day. These unpaved roads warrant upgrading to paved standards due to the economic benefits that would accrue, as well as the difficulty of maintaining these roads as a result of very high gravel loss that triggers the need for frequent regravelling.

Figure 5-4 shows the annual vehicle-km travelled on paved and unpaved roads.

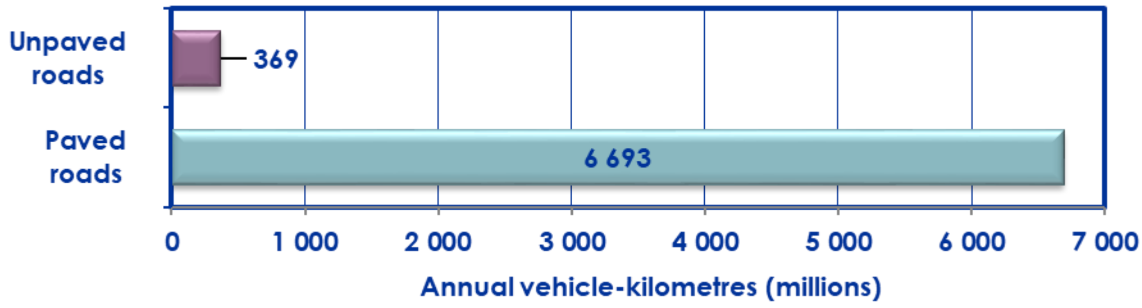


Figure 5-4: Annual vehicle-km travelled on paved and unpaved roads in 2017

5.1.4 Pavement age-related demand

Figure 5-5 shows the distribution of pavement ages for the paved road network of the WCG. A very large proportion (75%, 5 005 km) of paved roads is older than the standard design life of 25 years. As a large number of the roads have already reached the end of their design life, a rising trend of paved roads exceeding roughness standards is expected. This will result in a much greater demand for funds for rehabilitation, particularly for Trunk roads, than the current level of funding would be able to accommodate.

Figure 5-6 presents the age distribution of paved roads.

Limitation: Age data is unavailable for 20% of paved roads (1 355 km of the network). It is generally accepted that most of these pavements are at least 25 years old and therefore the average network age distribution was adopted for these roads.

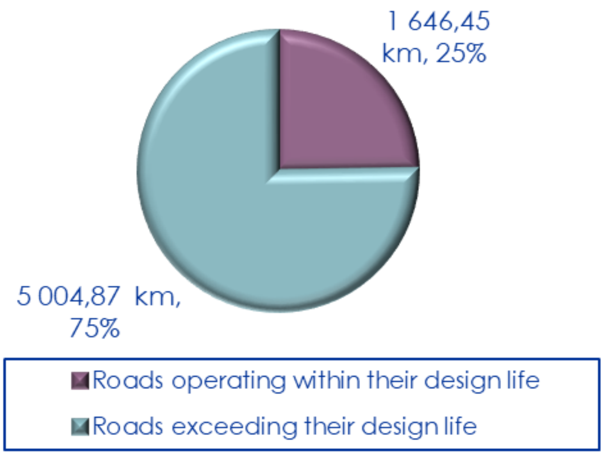


Figure 5-5: Pavement ages versus design life in 2017

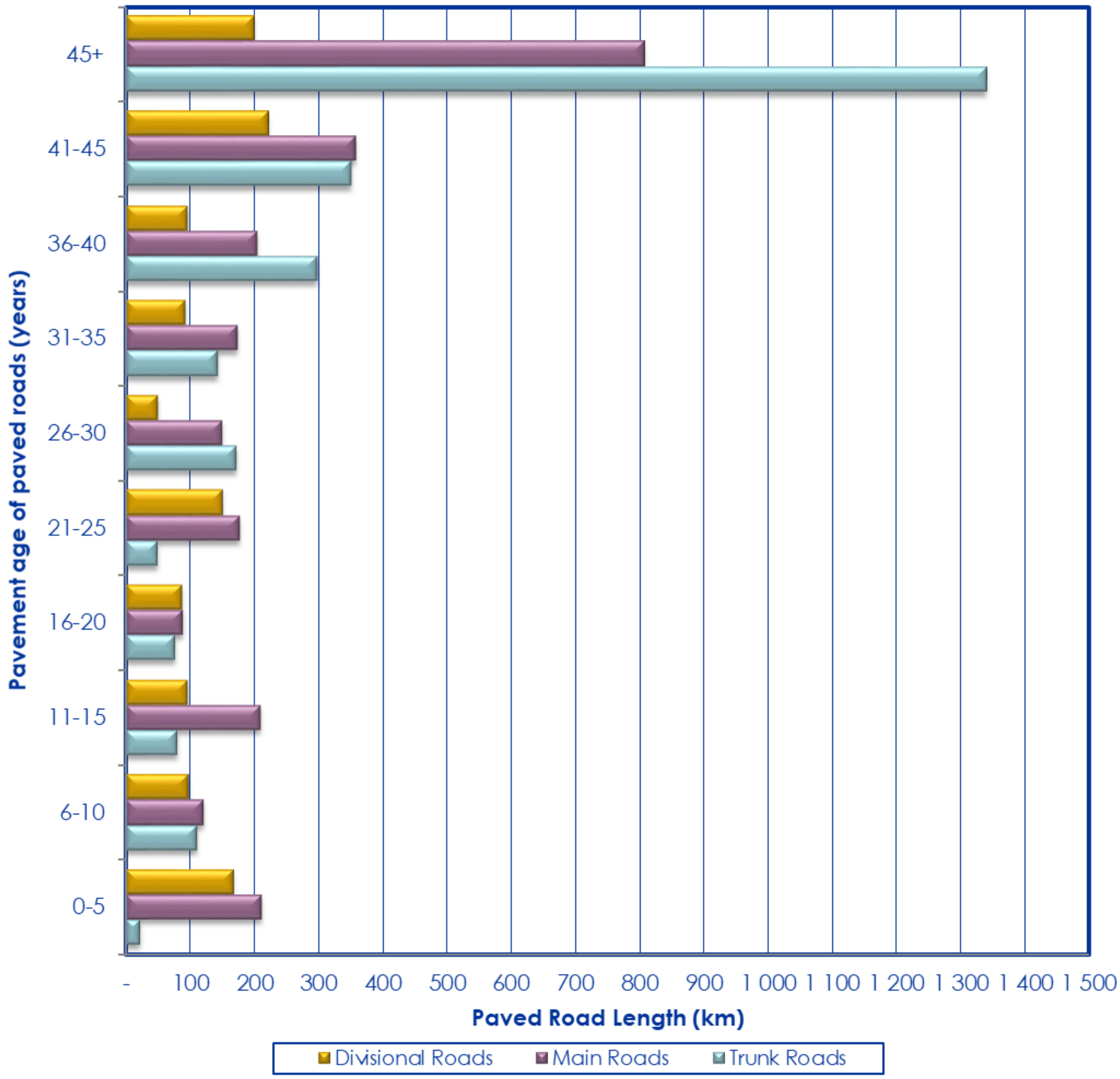


Figure 5-6: Distribution of pavement ages for paved roads 2017

For any road network, a reasonably uniform distribution of pavement ages is desirable to ensure a steady demand for future funding for reconstruction and rehabilitation. Using the available and adapted data on pavement ages, the following can be inferred:

- The vast majority (75%, 5 004 km) of pavement ages are older than 25 years, and thus only 24% of the pavements are still operating within their design life.
- The RNIS data shows the overall rate of reconstruction and rehabilitation since 1984 is generally below 100 km per year (Figure 5-7). Investigating the data, the years 2004, 2007, 2012, 2013 and 2015 are exceptions when 118 km, 139 km, 117 km, 106 km and 143 km of road were rehabilitated respectively.
- The average rate of rehabilitation of paved roads and upgrades to paved standards over the last 5 years (2012 to 2017) was approximately 84 km per year. In total, approximately 863 km of paved roads were rehabilitated over the last 10 years. The rehabilitation average is therefore roughly 1,3% per year, giving a total of 13% of the total network length over the last 10 years.

- The trend line shows the dip in rehabilitation in the mid-90s and the higher rate in the period 2005 to 2010. Extra funding prior to the Football World Cup in 2010 may have contributed to the higher rate of rehabilitation.

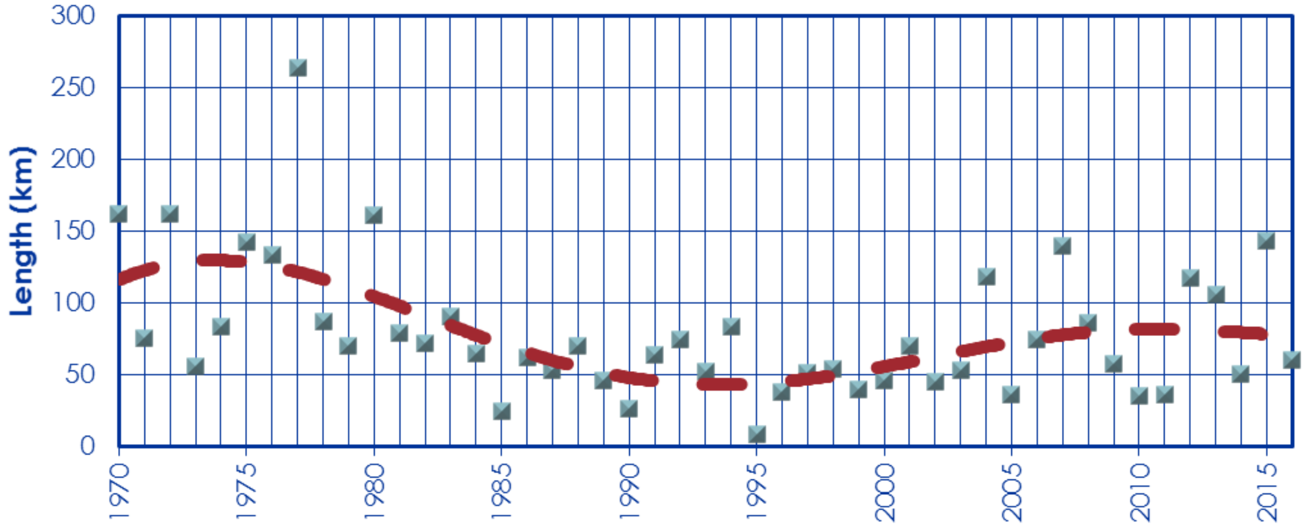


Figure 5-7: Rate of rehabilitation for paved roads 1970 to 2016

Applying cost-effective preventive maintenance actions, such as resealing, can prevent premature failure and extends the life of the road, but in the long-term, rehabilitation of the structural layers is necessary to maintain the roughness levels of service and minimise road user costs.

5.1.5 The demand for resealing

The demand for resealing is determined using the condition ratings of the visual assessments. Resealing is the process of constructing a new, waterproof surface on an existing road in order to prevent damage causing premature, moisture-induced failure and ongoing deterioration of a road, but cannot prevent the normal, direct traffic-related deterioration of the pavement layers. It should be noted that riding quality (roughness) is not affected by reseals.

Resealing is the most important preventive maintenance action for preservation of the WCG network

Figure 5-8 shows the distribution of historic resealing versus the future predicted need for resealing and the proposed resealing length of the Branch. The predicted need was calculated according to the expected seal life of the current seals on the network.

The analysis estimated 1 530 km of paved roads are at the end of their expected surface life and require resealing in 2019/2020. A further expected need of approximately 1 300 km was estimated for resealing during the period from 2020 to 2025.

The actual rate of resealing has increased slightly from 362 km for the period of 2010 to 2013 to 472 km in the period from 2014 to 2017. This additional expenditure had a positive impact on the overall visual condition of the paved road network (Figure 4-21). However, according to the MTEF Programme of the Branch for the period 2019/20 to 2023/24, approximately 492 km of road is scheduled to be resealed annually. The planned resealing levels for the next three years are therefore on par with the previous three years and improvement in road condition is therefore possible, especially in the light of the high predicted resealing need shown in Figure 5-8. The comparison of the predicted resealing need versus the proposed resealings suggests that it might be possible to ensure the network performance does not decline over the next few years.

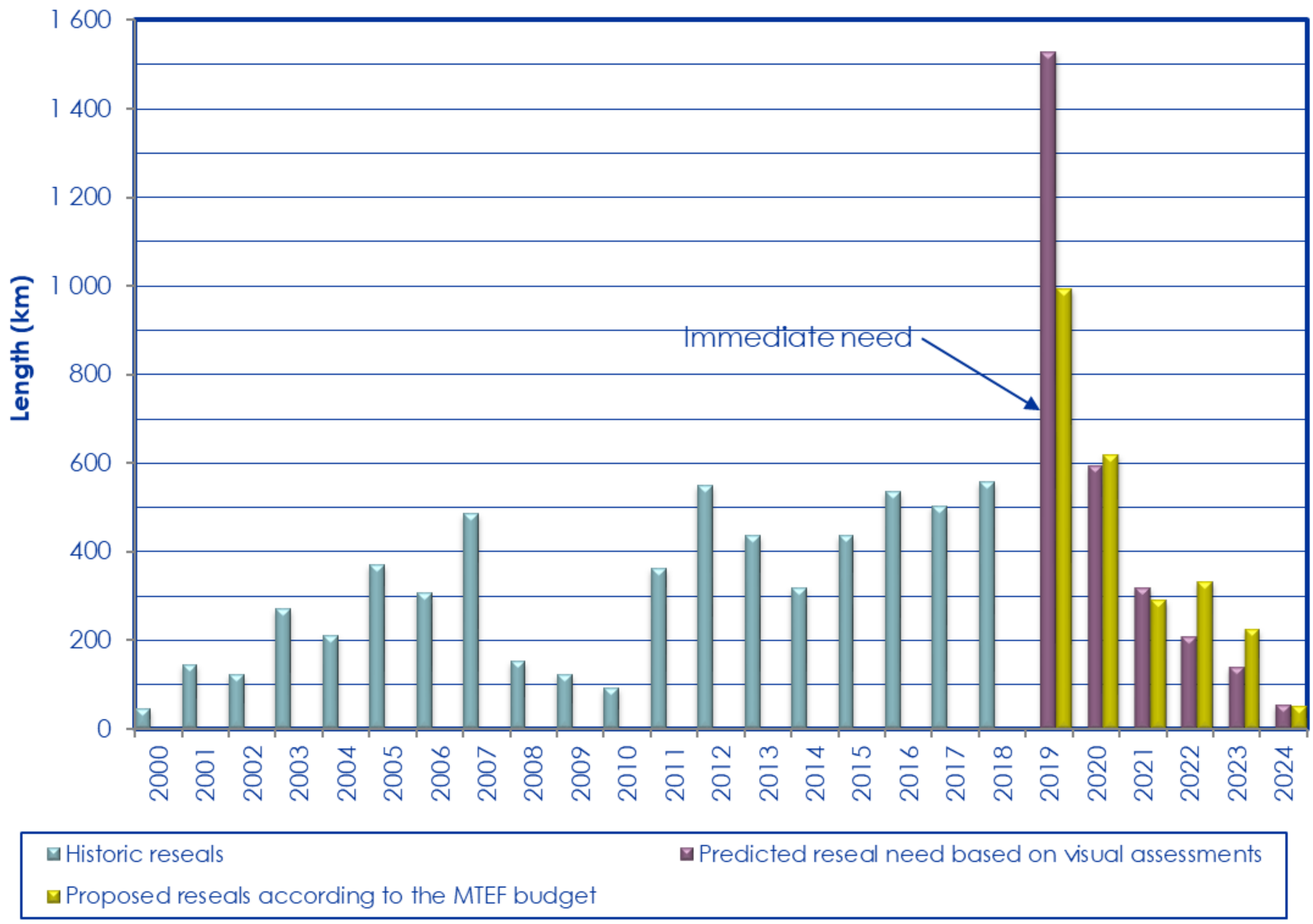


Figure 5-8: Historic resealing of paved roads versus the predicted need and proposed MTEF budget resealing programme from 2000 to 2024

The resealing need categorised according to urgency is shown in Figure 5-9. About 45% of the seals on paved roads will need to be replaced within the next two years.

Limitation: The need for resealing includes roads that need to be rehabilitated.

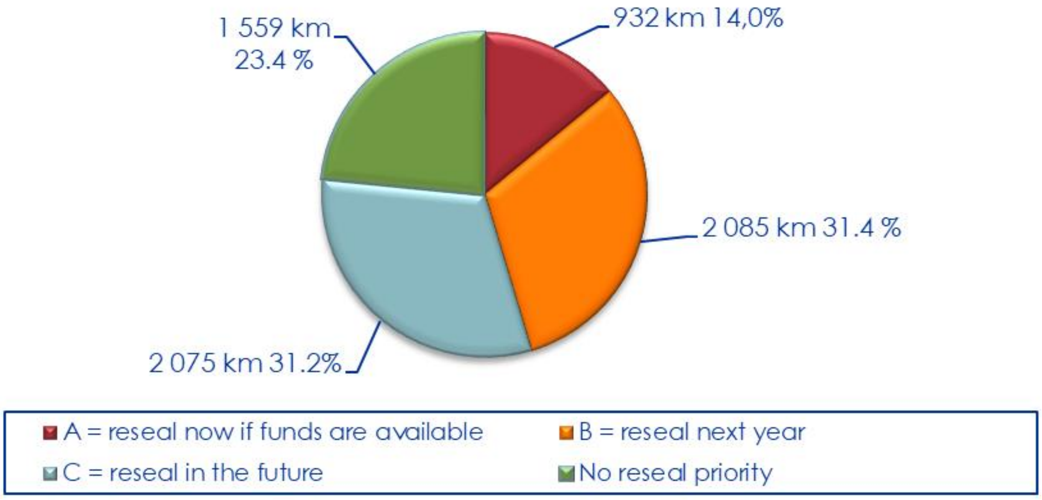


Figure 5-9: Resealing need on paved roads according to urgency as at June 2017

5.1.6 The need for drainage maintenance

In addition to keeping the paved roads waterproofed with regular resealing, the importance of adequate drainage is emphasised. Roads are designed and constructed based on the assumption of adequate drainage by means of side drains and pipe culverts so that the level of service can be maintained as long as possible. The need for increased maintenance of side drains has been quantified from the annual visual surveys. Table 5-2 provides the statistics and it is clear that there is a substantial backlog of maintenance of side drainage of paved roads.

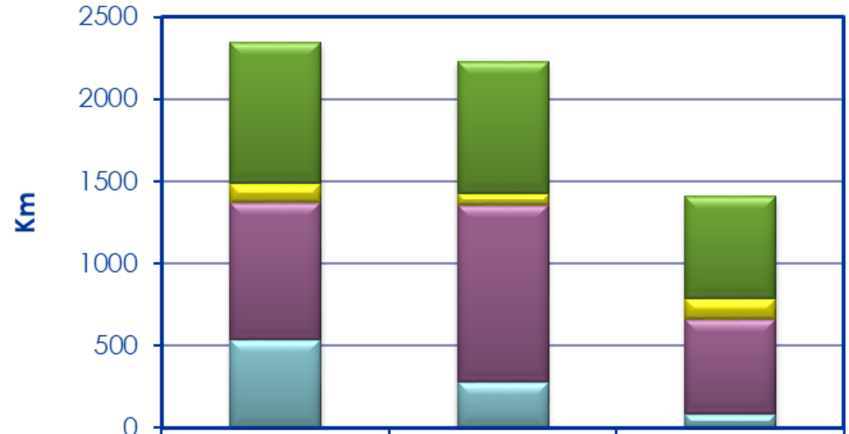
Table 5-2: Side drainage maintenance needs 2017

RCAM class	Paved roads		Unpaved roads	
	Carriageway-km	% of RCAM class of the network	Km	% of network
1	16,92	9,4	No data currently available	No data currently available
2	969,47	36,2		
3	654,53	26,6		
4	474,07	40,6		
5	11,24	25,5		

5.1.7 Maintenance demand

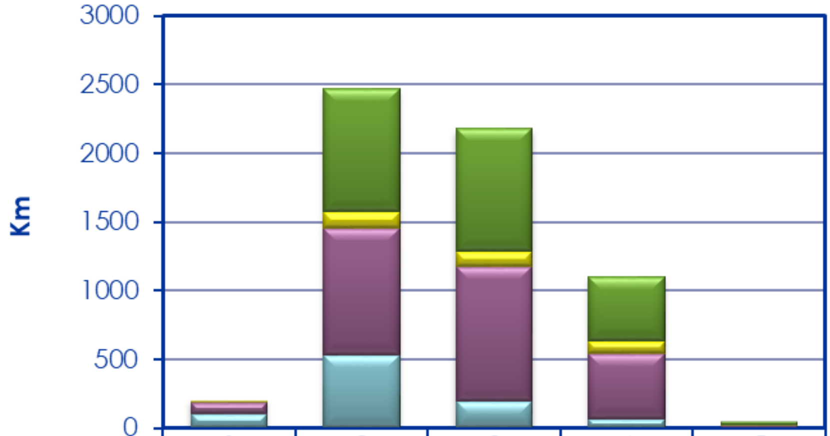
The maintenance demand in terms of crack sealing, patching, filling of ruts and shoulder defects is shown in Figure 5-10 and Figure 5-11 according to road type and RCAM classifications respectively. The length provided is the kilometres of road where the severity of the defect is ≥3.

- There is a significant backlog of maintenance with respect to shoulders, patching and crack sealing.



	Trunk	Main	Div/Minor
Shoulder defects	860,73	805,05	619,41
Rut filling	114,02	73,03	129,35
Patching	831,52	1074,06	571,99
Crack Sealing	541,45	280,29	86,66

Figure 5-10: Maintenance demand in km of road according to road category 2017

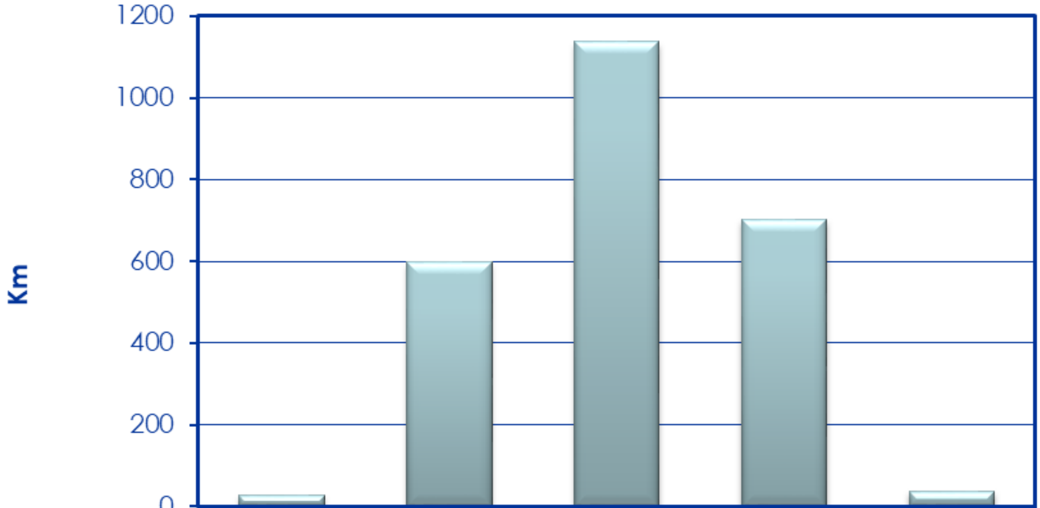


	1	2	3	4	5
Shoulder defects	0,00	896,10	894,46	471,53	22,98
Rut filling	2,00	118,70	107,25	86,59	1,86
Patching	82,58	920,83	981,20	475,74	14,66
Crack Sealing	105,52	533,14	196,58	68,91	4,25

Figure 5-11: Maintenance demand in km of road according to road category 2017

The demand for line marking has been determined in terms of the number of kilometres of those markings that are in fair condition or worse, including where there are no markings. The total demand is approximately 2 504 km. This represents 38,6% of the paved road network. Figure 5-12 provides the distribution and data for each RCAM class. Class 3 has the highest demand for line marking.

- Assuming the limit of demand is set at 20% of the network per annum, i.e. paint on average once every 5 years, the average length of road for remarking would be at least 1 350 km per annum (excluding the extra requirements for multi-lane freeways and dual carriageways). The current total demand for line marking is approximately 2 504 km, which is significantly more than the expected demand. This indicates that there is a backlog of maintenance for line marking.



	1	2	3	4	5
Demand, km	28,38	597,57	1136,74	703,68	37,38

RCAM CLASS

Figure 5-12: Demand for line marking where condition is fair or worse in 2017

5.1.8 Rehabilitation and reconstruction demand

The demand for reconstruction and rehabilitation can be estimated from the remaining life of a road pavement based on the most recent roughness measurements. This method does not take any other distress deterioration into account such as wide cracking or rutting, and therefore underestimates the need. A higher, more realistic rehabilitation need is estimated by the Intervention Budget where a desirable level of service is also taken into account. The rehabilitation need is described in paragraph 5.1.16.

The analysis is based only on roughness data, and indicates that approximately 1 807 km (27,2%) of roads require immediate rehabilitation. This need is based on the 90th percentile of roughness profile measurements. These roads have very poor riding quality conditions and generate excessive costs to road users as well as escalating routine maintenance costs to the Branch. This need was determined purely on roughness thresholds, as defined in TRH 4: Structural design for flexible pavements for interurban and rural roads (Committee of State Road Authorities, 1996), and recorded in Table 3-1. Figure 5-13 shows the lengths of roads not complying with these roughness levels of service and Figure 5-14 shows the distribution of roughness by class of paved road length in 2018.

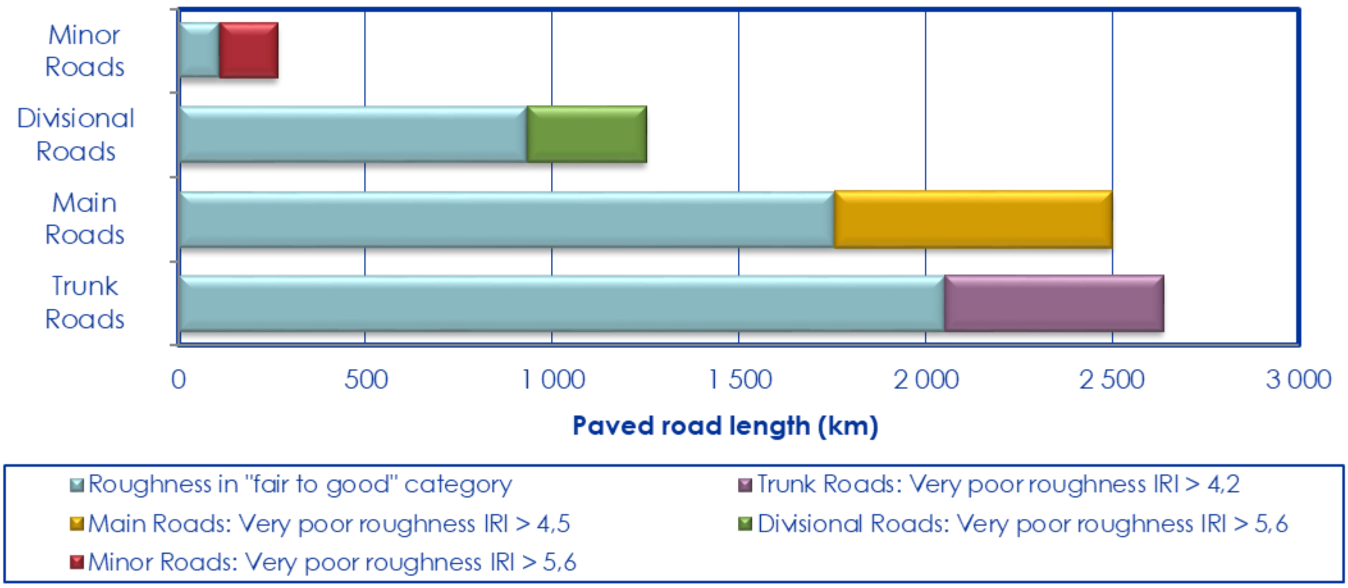


Figure 5-13: Proportion of paved roads that do not comply with minimum standards for roughness in 2016 based on the 2018 length

Figure 5-14: Distribution of very poor paved roads according to roughness values in 2016 based on the 2018 length

Figure 5-15 shows the rate of rehabilitation of paved roads and the future needs. Over the last 5 years the average rate of rehabilitation is approximately 88 km per annum, which is 1,3% of the paved network. In contrast, the immediate need based on roughness data alone is 2 488 km (These lengths include Light Rehabilitation road treatment).

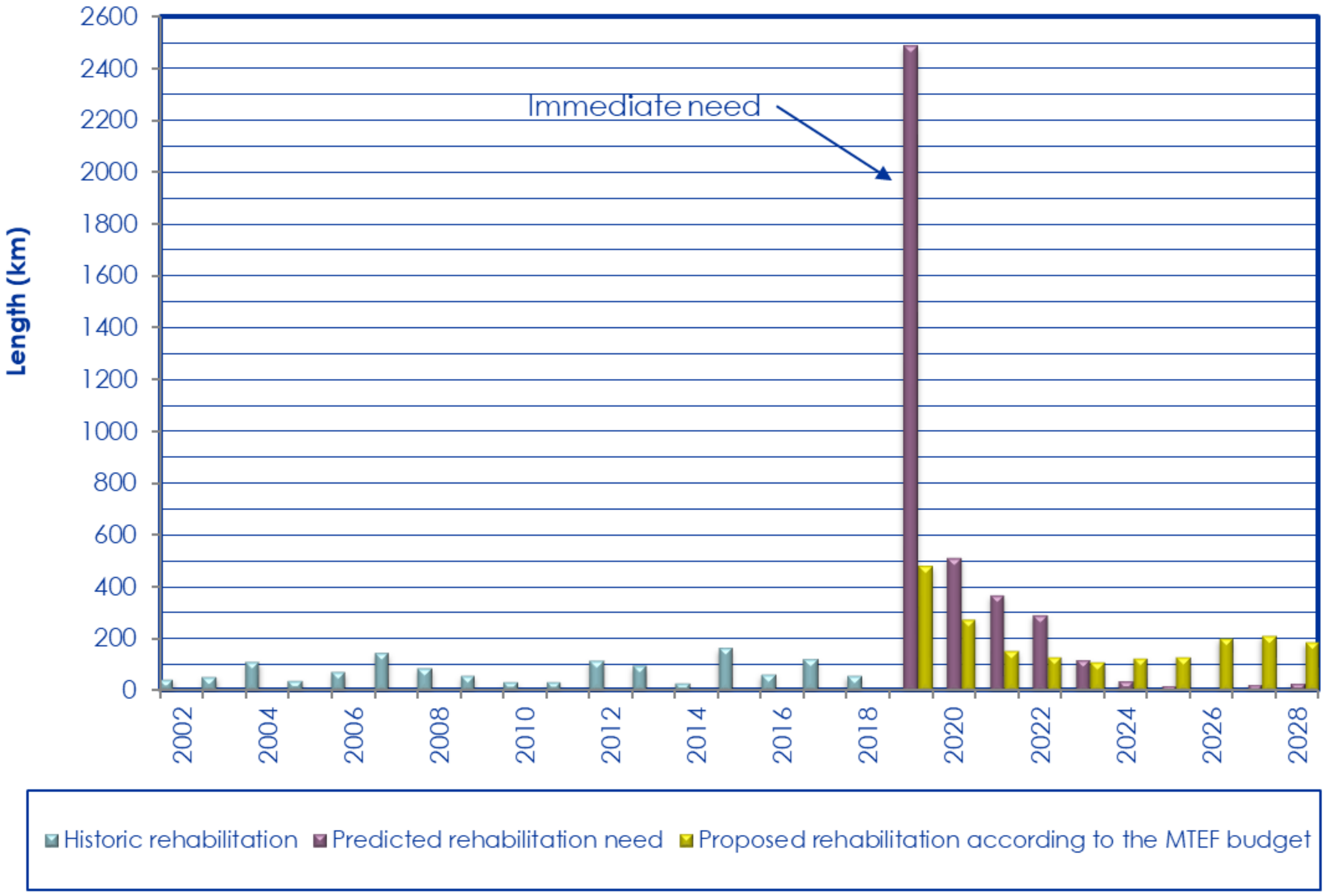


Figure 5-15: Historic rehabilitation of paved roads versus immediate rehabilitation need and proposed intervention of the MTEF budget for 2002 to 2028

5.1.9 Key constraints affecting the maintenance of paved roads

There are three key constraints that affect the maintenance of paved roads, i.e., the supply of:

- Layerworks materials, i.e. crushed stone and natural basecourse, subbase, selected and fill materials;
- Surfacing materials, i.e., crushed stone chips and bitumen; and
- Water for compaction.

Layerworks materials

Road building materials for surfaced roads layerworks have historically been obtained from so-called "borrow pits" (for gravel) and quarries (for crushed stone) that are situated adjacent to the road at optimal distances for construction. The Mineral and Petroleum Resources Development Act (Parliament of the Republic of South Africa, 2002), the National Environmental Management Act and its amendments (Parliament of the Republic of South Africa, 1998), and the regulations pertaining to these Acts severely limits the ability of the Branch to obtain and process suitable materials for layerworks used on the unpaved road network. The natural supply of suitable gravel wearing course materials is also severely limited by the geology of the Western Cape and the manner in which the rocks have been weathered. In recent times, basecourse and subbase materials have increasingly been purchased from commercial quarries, which increases construction costs.

Surfacing materials

As for basecourse materials, the establishment of quarries is very restricted and most of the stone for surfacing is purchased from commercial sources.

Bitumen

The supply of bitumen has been intermittent and there are sporadic shortages often caused by refinery maintenance. With the limited season for resealing, any shortage of bitumen for resealing and asphalt surfacing has an impact on the Branch's ability to optimally maintain the paved road network.

Water for compaction

Water for compaction of layerworks is severely restricted in some areas. The impact of climate change is causing higher temperatures and reduced rainfall that will have an increasing impact on the Branch's ability to rehabilitate and maintain the paved road network.

5.1.10 The demand for replacement of gravel wearing course

Gravel wearing course material is a scarce resource and the investment required to increase the gravel thicknesses is considered in the light of the predicted roughness after the regravelling and the expected savings in road user costs that result from the reduced roughness. If the traffic is low, the benefits may not be commensurate with the costs of regravelling. The unpaved road network has been classified according to four levels of service (Table 3-3) that assist in determining where the regravelling of a road should be a priority. Roads that are classified with low and very low levels of service are maintained by means of spot regravelling and blading, and regravelling longer lengths must be motivated. This analysis method was used for the Technical Needs (Immediate Need) analysis. However, for the MTEF budget the road network was split into economic and non-economic roads, the non-economic gravel roads were only maintained with spot regravelling and blading and the economic roads were maintained with regraveling.

Figure 5-16 shows the regravelling demand compared to the historic replacement of gravel wearing course and the proposed regravelling length of the Branch.

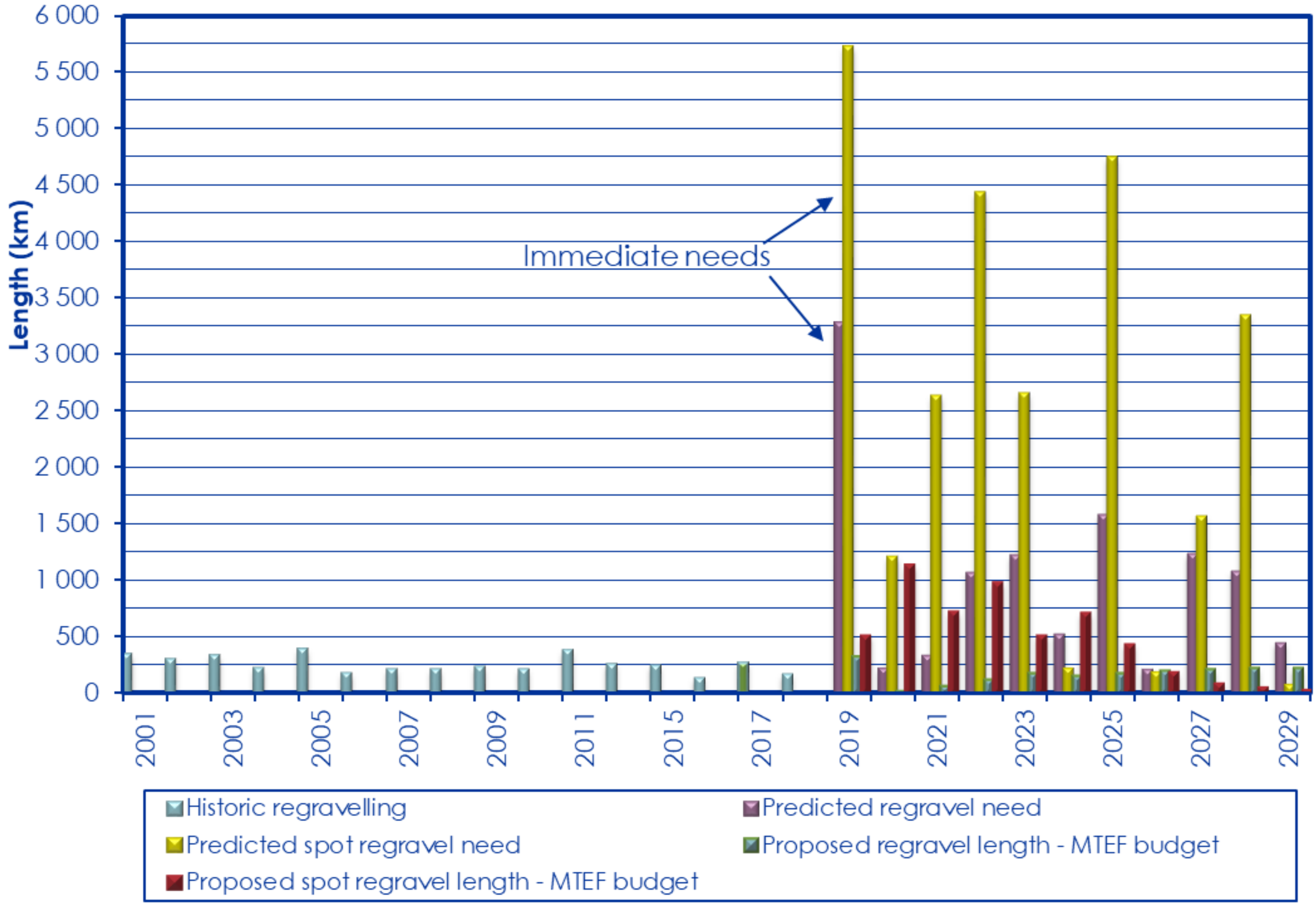


Figure 5-16: Historic regravelling of maintained unpaved roads versus immediate need and proposed intervention of the MTEF budget for 2001 to 2029

Historically, the MTEF funding levels were insufficient to satisfy the need for gravel replacement. At current MTEF budget levels, the Branch can only afford to regravel approximately 319 km and maintain approximately 510 km of roads by means of spot regravelling. Approximately 7 354 km (71%) of unpaved roads operate with minimal gravel wearing course materials (below 25 mm). As current funding is insufficient to regravel all 7 354 km of unpaved roads with a minimal gravel wearing course, the maintenance activities for the lower levels of service will consist of mainly spot regravelling. There are many roads that have outcrops of rock that prevent blading maintenance and therefore, in the absence of gravel wearing course, it is practically impossible to maintain these roads to the required level of service.

The presence of clay and sand subgrades influences a road's ability to support traffic loads and the surface smoothness. Unpaved roads having a clayey subgrade and low traffic could therefore provide an adequate level of service without regravelling. Other factors, such as when the road is below ground level and prone to flooding, may necessitate raising the vertical alignment followed by regravelling.

5.1.11 Key constraints affecting the maintenance of unpaved roads

There are two key physical constraints affecting the maintenance of unpaved roads, i.e., the supply of:

- Gravel wearing course; and
- Water for compaction.

Other constraints are the availability of:

- Skilled labour, i.e. plant operators, supervisors and technicians/ technologists; and
- Appropriate and reliable construction plant.

Supply of gravel wearing course

As previously discussed, the supply of gravel wearing course is hampered by strict environmental and mining legislation as well as the geology of the Western Cape. The majority of available gravel materials lack the plasticity required for the ideal gravel wearing course, requiring the establishment of additional sources of fine, plastic materials to mix with the substandard gravels. Again, these sources of plastic fines, often from dams or rivers, are limited, and their use is often prohibited or severely limited by legislation.

In many areas of the Western Cape, the best materials have already been used and therefore only substandard materials remain. The need to process course gravels to break them down to a suitable grading is also becoming more common. The use of grid rolling has not always been successful and it will become increasingly necessary to resort to the crushing of materials and mixing them with plastic fines. Screening of hard gravels to waste is an additional process often required. Without a full environmental impact assessment, it will not be possible to crush material in a borrow pit, adding additional uncertainty and cost to the processing of the gravel in a borrow pit.

The cost of establishing a borrow pit is typically about R500 000. In order to determine the required quantities of gravel and the spatial distribution of borrow pits, the Branch developed a Borrow Pit Strategy for each district municipality area. This strategy is based on the assumption of an average spacing of borrow pits of 30 km. This results in a network of about 350 borrow pits, which would cost a total of approximately R180 million to establish. Many of the regravelling project borrow pits will have a limited life and will need to be replaced with new pits once they have been mined out.

Water

The availability of water for compaction is expected to decline as climate change accelerates. There will consequently be a significant impact on the Branch's ability to maintain the unpaved road network. Investigations are currently under way to determine the possibilities of using sea water along the coast and mineralised water in inland areas. There will be an extra, as yet undetermined cost, in establishing the inland sources of water. These costs relate to the environmental approvals required as well as drilling, pumping and temporary storage costs.

5.1.12 Effect of climate change on demand

The need to build resilience to climate change was identified in paragraph 4.11 Climate change impact. To date there is no strategy in place to identify where additional resilience measures are justified, and the nature and cost of these measures, which will affect demand in many different ways. As noted previously, a drier climate will affect the supply of water for roadworks, perhaps increasing the cost. The incorporation of the effects of climate change on the identification and prioritisation of projects has not yet been tackled.

5.1.13 Demand prioritisation and resource allocation

The priorities for meeting the desired Branch Strategic Objectives to provide an efficient and effective road network in support of growth and development are applied to the candidate project list. The Deighton Total Infrastructure Management System is used for this purpose, which currently facilitates the trade-off analysis between rehabilitation, upgrades of unpaved roads and periodic maintenance.

The planning process for capital projects is represented diagrammatically in Figure 5-17 as a funnel through which the pool of candidate projects flow to become scheduled programmes of projects.

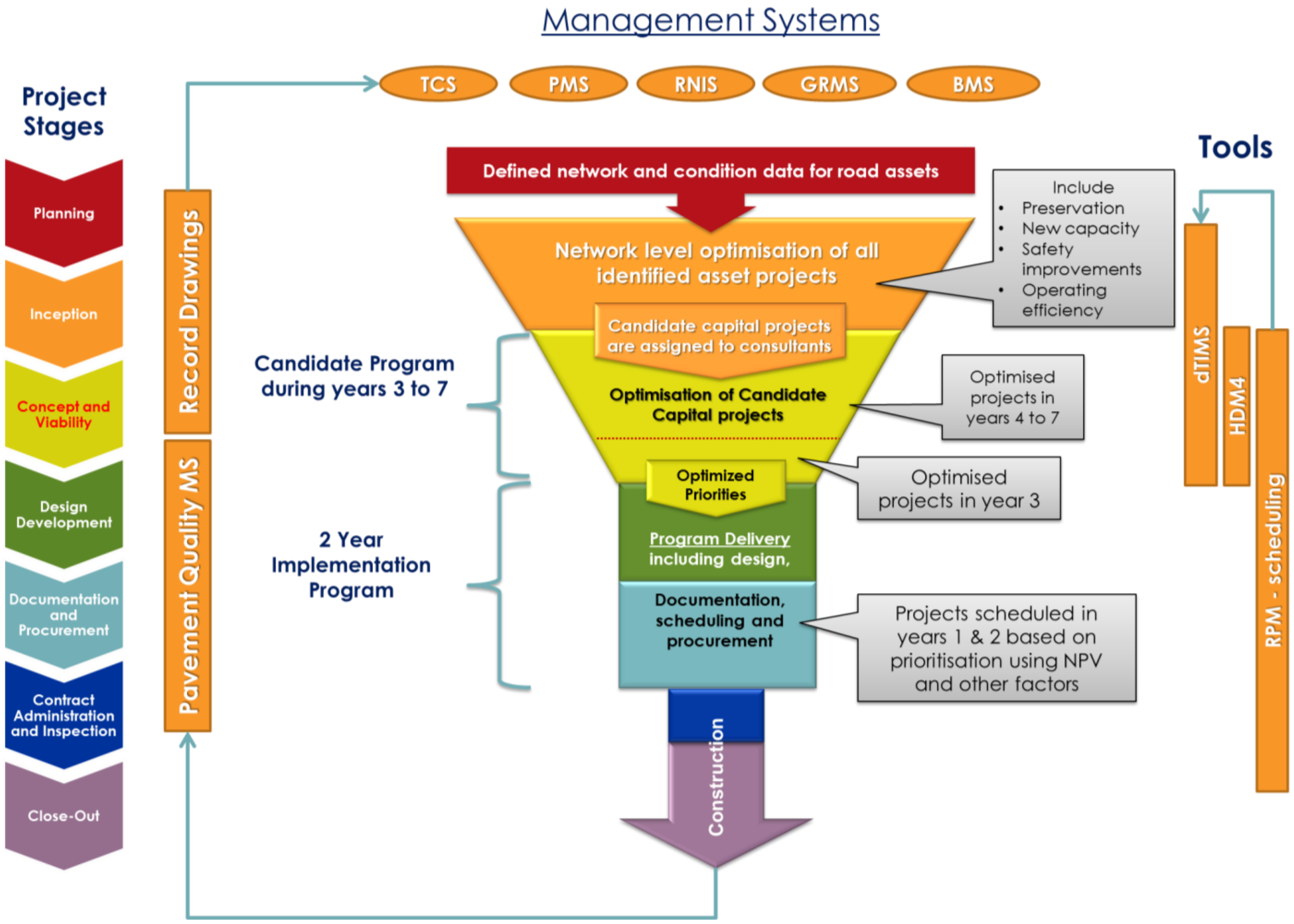


Figure 5-17: Planning process for capital projects from identification to construction

5.1.14 Background to the lifecycle benefit-cost analysis

The decision support system for optimal resource allocation, called Deighton Total Infrastructure Management System from Deighton Associates, Canada, was customised for the Branch to conduct a lifecycle benefit-cost analysis (LCBCA) on its paved and unpaved road networks. The dTIMS software was developed specifically for the management of linear infrastructure assets, adopting the heuristic optimisation methodology (also called near optimisation) to find optimal solutions under constrained resources, usually funding. This methodology is also used in HDM-4 for a more detailed project-level analysis.

According to Deighton, optimisation in dTIMS can be described as follows:

"Optimisation chooses the strategies that maximise the outcome, defined by the user, while adhering to a set of constraints such as budget or minimum level of service. It can be defined as a tool within a good Pavement Management System that provides you with quantitative feedback and suggestions, ultimately allowing you to knowingly revise a program by using your judgment to weigh political, engineering and economic factors."

Previously, the selection of intervention activities was based on pavement condition, a decision tree and engineering judgement. While this decision methodology includes other criteria such as traffic and road classification, it does not provide solutions that are optimised to a specific objective function that reflects the strategic objectives of the Branch and includes performance modelling, strategic analysis, network level consequence performance, and LCBCA. The latter forms the basis for optimisation in the dTIMS software, namely the ability to analyse the incremental benefit of alternative intervention activities, at different cost levels.

According to the draft TMH 22 (Committee of Transport Officials, 2013), "*analysis systems are used to process and analyse data in order to provide decision support to asset managers*". Robertson (Robertson, 2004) classified analysis systems into six decision support levels (DSLs) in terms of the characteristics and sophistication of the analysis process (Table 5-3). DSL1 and DSL2 are typically based only on technical parameters. DSL3 and higher are "economy based", requiring lifecycle cost analyses.

Table 5-3: Classification of decision support levels for RAMS

Decision support level	Dominant characteristic
1	Basic asset data, rule-based work allocation
2	Project and network level assessment, geographic reference
3	Life cycle cost analysis (LCCA) of authority impacts, i.e. capital and maintenance costs
4	LCCA of authority and user impacts, economic prioritisation
5	Optimum investments within constraints, sensitivity analysis
6	Economic, social, environmental multi-criteria assessment, risk analysis

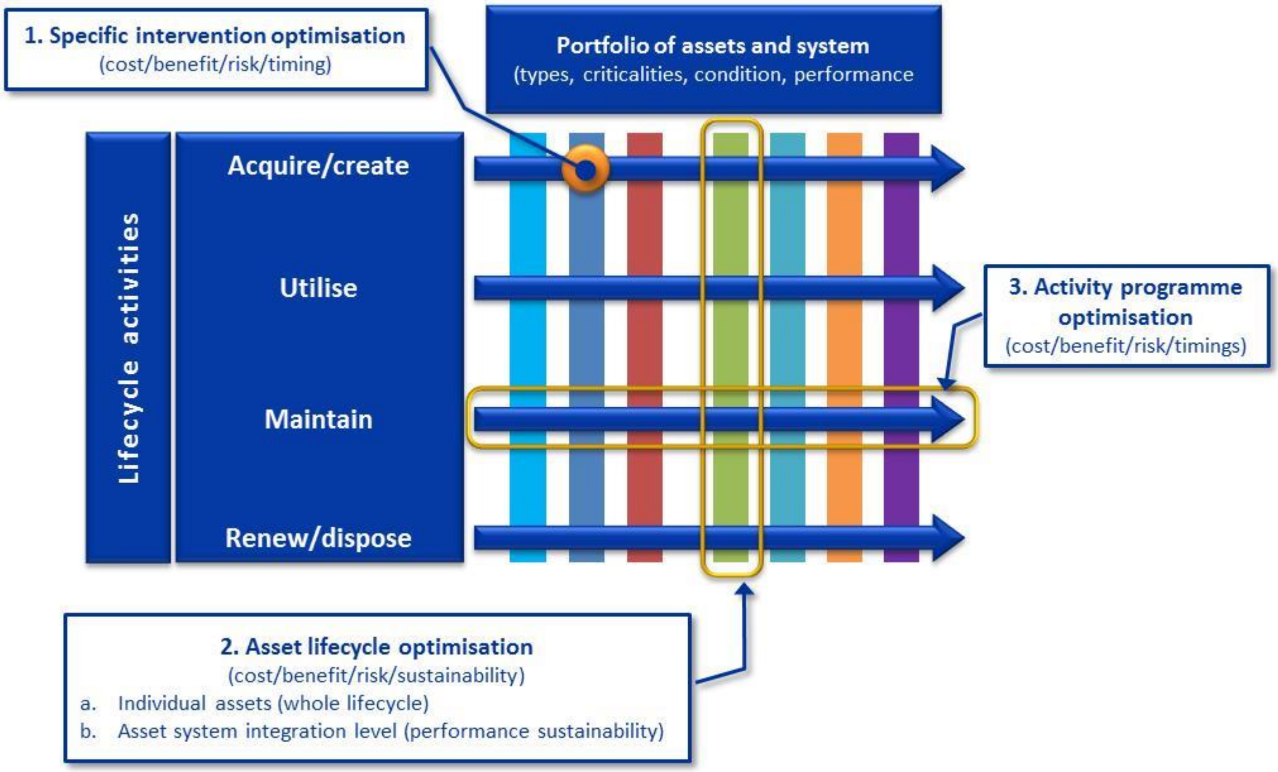
The Deighton dTIMS software was used to conduct the LCBCA to determine the long-term consequences of the current expenditure levels on the Western Cape road network. dTIMS has decision support capabilities up to DSL6 (Committee of Transport Officials, 2013), but is currently being applied at DSL5 in the Branch.

Optimisation levels and methods

Three levels of optimisation, as required by PAS 55 (Institute of Asset Management, 2004), the forerunner of SANS 55001:2015/ISO 550001 (International Standards Organization for Standardization, 2015), are included in dTIMS:

- Specific intervention – dTIMS uses the efficiency frontier method (the set of optimal treatments that offers the highest expected return for a defined capital investment. Treatments that lie below the efficient frontier are sub-optimal, because they do not provide enough return for the invested capital. Portfolios that cluster to the right of the efficient frontier are also sub-optimal, because they have a higher cost for the defined return).
- Asset lifecycle – dTIMS uses the efficiency frontier method.
- Activity programme – dTIMS identifies sections to generate an activity programme of road sections after which a stand-alone system (developed in Excel) combines these activities into larger candidate projects. Candidate projects are aggregated to ensure project length is maximised to achieve economy of scale efficiencies. The candidate projects are then re-distributed over a 5-year period based on the net present value (NPV) of the dTIMS optimised objective function and ensures that the fund allocation is consumed according to availability per year.

These levels of optimisation (British Standards Institute, 2008) are illustrated in Figure 5-18.



Asset management - whole-life management of physical asset (Lloyd, 2010)

Figure 5-18: Three levels of optimisation required in asset management decisions

The dTIMS software has been calibrated to model the deterioration and maintenance effects of roads in the Western Cape. Future paved road performance is modelled by the HDM-4 models in terms of cracking, rutting, ravelling, potholes and road roughness. Models developed by the CSIR are used for modelling gravel loss and road roughness. For any given fund allocation, the software selects maintenance, rehabilitation and upgrading alternatives to maximise the overall benefit to the network.

The activities investigated in this lifecycle benefit-cost analysis optimisation are listed below:

- regravelling;
- resealing;
- light rehabilitation - The inclusion of the Light Rehabilitation treatment adds a holding action (for constraint budgets) and roads that has passed reseal is prevented of deteriorating to rehabilitation. Light rehabilitations cost is 40% of Rehabilitation cost;
- rehabilitation (reconstruction is included with rehabilitation); and
- upgrading of unpaved roads to paved standards.

The budget portions excluded from this analysis are the budget values for the following items:

- programme support;
- access improvements;
- new facilities;
- capital improvement projects (paved road upgrading);
- transfers to municipalities;
- routine maintenance; and
- maintenance of bridges.

5.1.15 Specifications of the LCBCA

Assumptions and limitations

The LCBCA is based on a number of assumptions and limitations. These include:

- All consequences derived from analysing the MTEF funding scenarios in this report are based on the assumed funding levels.
- The prediction model for gravel loss is not very accurate as the original formulation by Dr Paige-Green was based on the road network in northern South Africa. The HDM-4 model calibrated to Western Cape conditions is envisaged for future implementation.
- The HDM-4 deterioration models have been calibrated for a rural network. However, there are four very important urban roads in the Cape Metropolitan Region, namely TR9/1, TR27, TR11/1 and TR2/1, for which the calibrations are inadequate. For these roads, other factors, such as congestion, the variable pavement structure and asphalt surfaces, have a large influence on the optimisation of periodic maintenance and upgrades, especially the timing of treatments. A detailed asset management plan for this sub-network is envisaged. Details of the projects will then be included in dTIMS.
- The reconstruction treatment is a subset of rehabilitation.

Objective function used for preservation of the uneconomic network

The area-under-the-condition curve (AUC) objective function was used for the analysis of the road network to determine the priority needs for the road network. Figure 5-19 illustrates the area-under-the-condition curve pictorially.

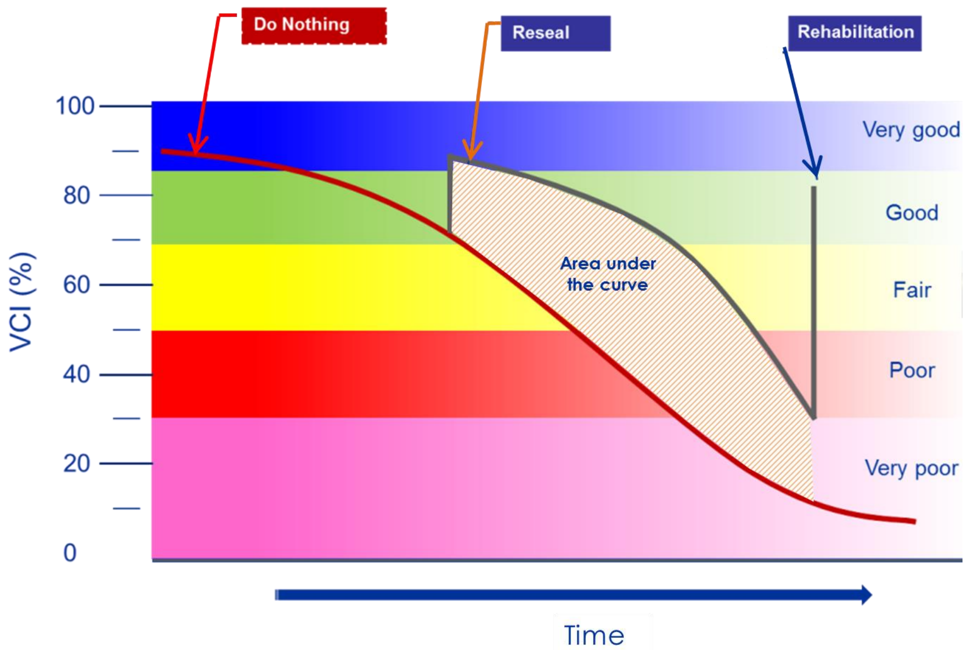


Figure 5-19: Illustration of Area-Under-the-Condition Curve

For each strategy, the benefit is calculated for each year in the analysis period, weighted by AADT and totalled for the analysis period. In theory, the 'benefit' is the area between the two curves, weighted by traffic. Any repair strategy that improves the condition of the road segment would thus result in a positive area above the 'do nothing' curve. During the optimisation analysis, the incremental benefit of alternative intervention strategies with increasing costs are measured in terms of the area-under-the-condition curve.

This method is can be applied to both high and low trafficked roads, thus complying with the objective of preservation of the Branch Road Network.

The AUC objective function is calculated by summing the present value of the difference between the condition index resulting from the intervention strategy (a combination of intervention activities over the analysis period) and the condition index for the do-nothing alternative, for each year in the analysis period. The area-under-the-condition curve benefit calculations are weighted by traffic (AADT).

The equation to calculate this benefit for an intervention strategy on a road segment is:

$$Benefit = \sum_{i=1}^{TotYears} AADT_i \,(IS\_Cond_i - DN\_Cond_i)$$

Where:
Benefit = Benefit of an Intervention Strategy for a road segment
TotYears = Total number of years in the analysis period
i = Year in the analysis period
IS_Cond_i = Condition of the road segment for the Intervention Strategy in year i
DN_Cond_i = Condition of the road segment for the Do Nothing Strategy in year i
$AADT_i$ = AADT on the road segment in year i

The Branch is currently investigating alternative methods for the LCBCA and conducting this in parallel for comparative means. Any major changes to the LCBCA will only be done upon a multiple year comparison. This investigation includes an "augmented" area-under-the-benefit-curve (AAUC) objective function developed by the Branch. Details of the development of AAUC objective function is presented in Appendix E.

Discount rate

A discount rate of 8% is used for analysis.

Financial inflation

No financial inflation was incorporated into the analysis.

Performance prediction models

The HDM-4 pavement performance prediction models are used to predict the deterioration of paved roads on the network. This paragraph explains how and where the HDM-4 models are incorporated into the Branch's dTIMS analyses.

The HDM-4 software contains seven items within its workspace. These are:

1. Vehicle fleets;
2. Road networks;
3. Work Standards;
4. Projects;
5. Programs;
6. Strategies; and
7. Configuration.

Table 5-4 presents how the HDM-4 models were incorporated within dTIMS.

Table 5-4: Incorporation of HDM-4 models into dTIMS			
Part	**Description of functionality customised in dTIMS**	**Source/ incorporation of HDM 4 models and methodology within dTIMS**	**Comments and parallel with HDM-4**
A	Database containing the road network and network information data, most recent assessment data, traffic data, committed projects and pavement structure data.	• Data necessary for the analysis and based on the HDM-4 methodology is obtained from the Branch's RNIS. • dTIMS is open-ended and any number of data attributes can be stored and used in an analysis.	• Item 2 (Road networks) of HDM-4's workspace is used to import and store the road network and its associated data attributes. • For an analysis in HDM-4, the source of data would also be the RNIS of the Branch. • dTIMS is open-ended and has no limitation on the data fields that are used in the analysis. In contrast HDM-4 has a defined set of data attributes and does not make provision for additional attributes to be used in the analysis. For example, it is simpler in dTIMS to conduct a differentiated needs analysis where intervention criteria are varied according to road class or region.
B	Calibrated pavement performance/ deterioration models for paved and unpaved roads	• The HDM-4 manuals (specifically Volume 4), contain comprehensive model descriptions of all pavement performance models and their associated input data, coefficients and calibration factors. The formulae of these models were captured in dTIMS. • The HDM-4 formulae of each pavement performance distress such as all cracking, roughness, rutting, etc. have calibration factors to adjust the predicted performance to local performance. The calibration factors determined for the Western Cape are captured and updated in the Branch's dTIMS system. • Additional models that are not part of the HDM-4 methodology are also customised in dTIMS. These are the calculation of asset values and composite condition indices.	• The pavement performance models of HDM-4 were captured within the HDM-4 software by the HDM software developers. The models cannot be viewed/ changed by the software users but they are detailed in Volume 4 of the HDM-4 manuals. • Item 7 (Configuration) of HDM-4's workspace is used to enter the calibration factors.
C	Vehicle operating cost models	• The relationship between road roughness, terrain and vehicle operating costs is obtained from HDM-4. Prior to each analysis, Aurecon obtains the updated relationship according to HDM-4 from WCG's website https://axs.pgwc.gov.za/axs/axs.main	• Item 1 (Vehicle fleets) of HDM-4's workspace is used to enter the basic characteristics and economic unit costs of the network fleet. • Similar to B above, the road user effects models

Table 5-4: Incorporation of HDM-4 models into dTIMS			
Part	**Description of functionality customised in dTIMS**	**Source/ incorporation of HDM 4 models and methodology within dTIMS**	**Comments and parallel with HDM-4**
		. This website was developed from HDM-4's Road User Effects, described in Volume 4 of the HDM-4 set of manuals. • The economic unit costs are updated via the website.	of HDM-4 were captured within the HDM-4 software by the software developers. The models cannot be viewed/ changed by the software users but they are detailed in Volume 4 of the HDM-4 manuals.
D	Aurecon's asset value model for calculating the current and future predicted asset values. Also models for the calculation of composite indices incorporating all HDM-4 models.	• This is Aurecon's methodology. HDM-4 does not make provision for calculation of asset values nor composite indices.	Not applicable
E	Intervention treatments. Their effects and unit costs.	• Customised according to Branch requirements. • dTIMS is open-ended and can accommodate any number and type of treatments. • The user has full control over the effect of intervention treatments. Note 1 has details on studies conducted for the Branch to refine the effect of treatments (reset values).	• Item 3 (Works Standards) of HDM-4's workspace is used to enter the intervention treatments, and their unit costs. • The user has limited control over the effect of intervention treatments in HDM-4.
F	Budget scenarios and maintenance policies to be investigated.	• Customised according the Branch requirements. Both dTIMS and HDM-4 can accommodate any number of budget/ policy scenarios to be optimised. • Multi-year road maintenance, rehabilitation and upgrading plans are generated with ease.	• Items 6 and 7 (Programmes and Strategies) are used to conduct network level analyses. • Multi-year road maintenance, rehabilitation and upgrading plans (Item 6 Programmes) can be generated for a sub-network of candidate projects. Experience has shown this cannot be achieved for a large road network with many road segments to be analysed.
G	Objective functions for optimisation (e.g. minimization of transport costs, or maximisation of condition thus preservation of road network as an asset)	• Customised according the Branch requirements. dTIMS can accommodate any objective function inclusive of the objective functions built into HDM-4. • For the Branch analyses, two objective functions are incorporated namely maximising condition (AUC) and minimising TTC.	• Objective functions are selected in items 6 and 7 (Programmes and Strategies). • Only three objective functions can be used: Minimise NPV, maximise IRI, minimise cost.

Note 1

The following reports and papers, pertaining to the incorporation of the HDM-4 models into the decision support system, were prepared by Aurecon (previously Africon) for the Branch:

- HDM-4 calibration study for the Western Cape Government: based on Long Term Pavement Performance Maintenance System (LTPPMS) data from 1995 to 2013.
- Study 1: Preliminary Evaluation of the HDM Road Deterioration Models for the Western Cape Road Network, May 2006. Authors: I Wolmarans and J Viktor.
- Study 2: Further Investigation of the Calibration Data and Performance Modelling of the Road Network of the Western Cape, September 2007. Authors: I Wolmarans and J Viktor. This study consisted of various tasks pertinent to the LTPPMS and its application:
    - Determine how effective the HDM-4 models (calibrated for the Western Cape) are in the prediction of the network's condition over a long period. The outcome of this analysis was the comparison of the observed condition parameters in 2006 (based on the 2006 road condition survey data) against the predicted condition parameters in 2006 (based on the calibrated HDM-4 Road Deterioration models with performance predicted from 1996 to 2006).
    - Perform calibration study to determine new calibration factors for the HDM-4 Road Deterioration models of the Western Cape based on LTPPMS.
    - Investigate the observed effects (Works Effects) of the different maintenance and rehabilitation activities to improve the treatment reset values of the HDM-4 models for Western Cape.
    - Investigate the distress types for cracking that are typically collected according to the TMH 9 visual condition assessment methodology of South Africa. Determine TMH 9-crack types to be converted to HDM-4 units and update formulae to convert the TMH 9 distress ratings to HDM-4 units for network level analyses.
    - Note 1 *continued*
    - Scrutinise the calibration data for the Western Cape on a LTPPMS by LTPPMS basis to determine the relevance of each section after more than ten years of data collection. Furthermore other influencing data such as traffic and pavement information were investigated for currency and accuracy.
- Road Deterioration Calibration study and report, based on LTPPMS data from 1995 to 2004, June 2005.
- Road Deterioration Calibration study and report, based on LTPPMS from 1995 to 2002, 2003.
- Bi-annual reports on the "Strategic analysis of the Western Cape road network with the objective to preserve the road network". These reports are based on the calibrated HDM III and HDM-4 Road Deterioration, Works Effects and Road User Effects models included in the dTIMS™ CT decision support system of the PMS and have been in use since 1999. One of these reports was also presented at the Annual Deighton Users' Conference in Canada, 1997.
- Visual assessment manual for the calibration of HDM-III / IV. 1996.

Calibrated HDM-4 models

Calibration factors are used to fit the models to the conditions in the Western Cape. The most recent factors are listed in Appendix G – Calibration factors for modelling performance, and are sourced from the HDM-4 calibration study performed in 2013 (Aurecon, 2013) for the WCG Roads Branch.

Unpaved roads deterioration models

The steady state prediction models, developed by Dr P Page-Green of the CSIR (Page-Green, 1996), are used for the prediction of gravel loss and roughness on unpaved roads.

Triggers used to identify treatments

The triggers are summarised in Table 5-5 for paved roads. The triggers for unpaved roads are summarised in Table 5-6.

Table 5-5: Triggers for paved roads			
RCAM Classes 1 & 2	Weighted average area of Wide Cracks ≤10%		Wide Cracks >10%
	All Cracks ≤2,5% and Reseal Condition Index >50%	All Cracks >2,5% or Reseal Condition Index ≤50 %	
P90 Roughness ≤4,2 IRI or Condition Index ≤55%	No Maintenance	Reseal	Light Rehabilitation / Rehabilitation
P90 Roughness >4,2 IRI or Condition Index >55%	Light Rehabilitation / Rehabilitation	Light Rehabilitation / Rehabilitation	Light Rehabilitation / Rehabilitation
	Reconstruction[1]	Reconstruction[1]	Reconstruction[1]
RCAM class 3	Weighted average area of Wide Crack ≤10%		Wide Cracks >10%
	All Cracks ≤2,5 % and Reseal Condition Index >50%	All Cracks >2,5% or Reseal Condition Index ≤50 %	
P90 Roughness ≤4,5 IRI or Condition Index ≤53%	No Maintenance	Reseal	Light Rehabilitation / Rehabilitation
P90 Roughness >4,5 IRI or Condition Index >53%	Light Rehabilitation / Rehabilitation	Light Rehabilitation / Rehabilitation	Light Rehabilitation / Rehabilitation
RCAM classes 4 & 5	Weighted average area of Wide Crack ≤10%		Wide Cracks >10%
	All Cracks ≤2,5% and Reseal Condition Index >50%	All Cracks >2,5% or Reseal Condition Index ≤50 %	
P90 Roughness ≤5,6 IRI and Condition Index ≤45%	No Maintenance	Reseal	Light Rehabilitation / Rehabilitation
P90 Roughness >5,6 IRI and Condition Index >45%	Light Rehabilitation / Rehabilitation	Light Rehabilitation / Rehabilitation	Light Rehabilitation / Rehabilitation
Note 1: If Remaining Life is <5 years and Structural Number is <2,5			

Table 5-6: Triggers for unpaved roads		
Level of Service (LOS)	Gravel Thickness <50 mm	Gravel Thickness ≥50 mm
Very Low	Spot Regravel	No Maintenance
Low	Spot Regravel	No Maintenance
Medium	Regravel or Upgrade to Paved Standard[1]	No Maintenance or Upgrade to Paved Standard[1]
High	Regravel or Upgrade to Paved Standard[1]	Upgrade to Paved Standard[1]
Note 1: Depending on economic rates and budget		

Analysis period

10 years.

Analysis procedures

- Values of future predicted costs and budgets are not inflated and all rand values in this document correspond to the buying power of the rand in 2018.
- The budget components of rehabilitation, upgrades, and preventive maintenance activities are investigated in the optimisation analysis. The remainder of the budget is for items not directly associated with pavement deterioration and is not considered in this analysis. The current funding for regraveling, resealing, rehabilitation and upgrading of unpaved roads to paved roads are

combined and reallocated to minimise total transport costs and loss in asset value. The result is an optimised allocation of the MTEF funding scenario.

- The funding levels for normal maintenance, new assets, upgrade to surfaced roads and other overhead items in the MTEF budget were not investigated.
- The intervention levels used to calculate the Intervention Funding Scenario are listed in Table 5-7.

<table>
<tr><th colspan="5">Table 5-7: Intervention Levels</th></tr>
<tr><th rowspan="2">RCAM class</th><th colspan="2">Paved roads</th><th colspan="2">Unpaved roads</th></tr>
<tr><th>Riding quality Max IRI (m/km)</th><th>Condition[1] Min (%)</th><th>Level of Service[2] to regravel at 50 mm</th><th>Level of Service[2] to spot regravel at 50 mm</th></tr>
<tr><td>1</td><td>4,2</td><td>55,0</td><td></td><td rowspan="3"></td></tr>
<tr><td>2</td><td>4,2</td><td>55,0</td><td rowspan="2">Medium and High</td></tr>
<tr><td>3</td><td>4,5</td><td>52,5</td></tr>
<tr><td>4</td><td>5,6</td><td>45,0</td><td rowspan="2"></td><td rowspan="2">Low and Very Low</td></tr>
<tr><td></td><td>5,6</td><td>45,0</td></tr>
</table>

Notes
1. Condition refers to the overall visual condition index as defined in draft TRH 22.
2. Roads were classified by level of service and intervention level. The intervention level for replacement of gravel material is 50 mm.

- For this scenario, the objective of the analysis was to maintain the overall NCN of paved roads at approximately 70% while maintaining the proportion of poor to very poor roads below 10%. For unpaved roads, the objective is to maintain all roads with a minimum gravel wearing course thickness of 50 mm except for those unpaved roads in the low and very low level of service classification, which will be maintained with spot regravelling.
- For the Intervention scenario, the objective of the analysis was to maintain the majority of paved roads within the tabulated intervention levels for the next 5 years. For unpaved roads, the objective is to achieve the intervention levels within the next 10 years.
- For the rehabilitation of trunk roads, the cost of upgrading was based on the current width.

The effect of a deteriorating paved road network versus routine maintenance has also been quantified—see paragraph 5.2. Other relevant observations are:

- The quality of the traffic data meets best practice requirements in terms of collection and processing.
- Traffic levels play an important role when projects are scheduled during the optimisation process. All assumptions of future traffic levels in the Western Cape are based on historic trends extracted from the Traffic Counting System.

Unit rates used in the analysis

Unit rates are used to estimate the cost of the intervention activities, called treatments, which are investigated in this analysis. In order to determine the effective amount of work that can be accomplished for a given allocation of funds, it is necessary to determine unit rates for doing fixed portions of work. The unit rates adopted in this report were derived from the latest projects undertaken in the province. During this analysis the unit rates for rehabilitation are uniquely defined for each road segment according to its current condition. The rehabilitation costs were further adjusted to account for mountainous terrain, where the estimated rehabilitation cost is increased by 30%.

The unit rates in Table 5-8 were used in the analysis to determine the extent of work that can be achieved for each funding level.

Network

The following network was used in the analysis:

- All trunk, main and divisional roads investigated, i.e. 16 160 km. Subsidised municipal main roads are excluded from the analysis.
- The minor roads (15 615 km), except for a few exceptions (847 km) that carry high levels of traffic, are not included in the lifecycle benefit-cost analysis, because these roads are not cost-effective to maintain. Traffic volumes on the minor roads are very low, and it is estimated that less than 1% of the province's traffic use these roads.

Data

The data used in the analysis are as follows:

- The visual survey data of 2017 for both paved and unpaved roads;
- The 2017 high speed roughness and transverse profile measurements;
- Traffic information from the Traffic Counting System in 2018;
- The latest models for calculating the cost to the road user in terms of vehicle operating costs (detailed in Appendix G – Calibration factors for modelling performance); and
- The funding levels of the MTEF budget as at February 2018.

Table 5-8: Historic and current unit rates of maintenance actions modelled

Treatment Type	Rates 2009/10	Rates 2012/13	Rates 2014/15	Rate 2016/17	Rate 2017/18	Rate 2018/19
Regravelling			Rx1000/km			
Cape Winelands	230					
Overberg	200					
Central Karoo	165	300	330	345	6 m - 772	6 m - 772
Garden Route	185					
West Coast	260					
Resealing and Rehabilitation			R/m²			
Resealing	110	140	191	215	200	200
Light Rehabilitation					301	301
Rehabilitation[2]				848		
Rip, stabilise base and seal	230	320	442	442		
Rip, stabilise base as subbase, add base and seal	425	644	890	890		
Add new base and seal	412	627	865	865		
Asphalt overlay	288	422	582	582	829	829
Rip, rework and stabilise base and asphalt overlay	404	615	845	845		
Remove base, stabilise subbase, replace base, stabilise and seal	287	431	595	595		
Reconstruction	910	1 120	1 551	1 551		
Upgrading			R millions/km			
Upgrading unpaved roads to paved standards	3	4	5	6,9	10,8	10,8

Table 5-8: Historic and current unit rates of maintenance actions modelled						
Treatment Type	Rates 2009/10	Rates 2012/13	Rates 2014/15	Rate 2016/17	Rate 2017/18	Rate 2018/19
Note 1. Spot regravelling on unpaved roads classified as Low and Very Low LOS roads is done at a cost of 10% of the cost to regravel the entire road length 2. Rehabilitation cost in mountainous terrain is increased by a further 30%						

5.1.16 Historical budget context

Limited resources continue to constrain the Branch's core function of providing adequate road infrastructure. Backlogs in road infrastructure provision and maintenance continue to grow. The backlog in regravelling, resealing and rehabilitation (including reconstruction) of paved roads and the upgrading of unpaved roads to paved roads, has been estimated since 1999. The rapid increase in this backlog is evident from Table 5-9 and Figure 5-20. The decrease in the shortfall as shown in Figure 5-20 is attributed to the reseals implemented in recent years.

Table 5-9: The backlog in rehabilitation, resealing of paved roads and the regravelling and upgrading of unpaved roads to paved standards

Financial Year	Backlog (Rand million)	Backlog adjusted for 2017 rands (Rand million)	Budget shortfall as a ratio of annual budget[1]
2001/02	1 169	2 967	4,2
2003/04	2 140	5 431	6,7
2005/06	2 573	5 899	4,8
2007/08	3 535	7 351	6,8
2009/10	5 465	9 164	9,6
2012/13	7 044	9 450	6,9
2014/15	10 124	12 127	7,9
2016/17	21 724	23 027	15,8
2017/18	23 700	25 122	18,0
2019/20	24 234	24 234	16,4

Note 1: This shortfall is determined by dividing the 5-year average annual budget (Table 5-15) into the Technical Needs Budget.

Note: The steep rise in backlog from 2014/15 to 2017/18 can be attributed to:

- The change in the way that rehabilitation need is identified: up to 2014/15 the average roughness was used in identifying the need, whereas in 2016/17 onwards the 90th percentile roughness values were used as recommended in draft TMH 22 (Committee of Transport Officials, 2013); and
- Deterioration of the network leading to a greater need for rehabilitation and resealing.

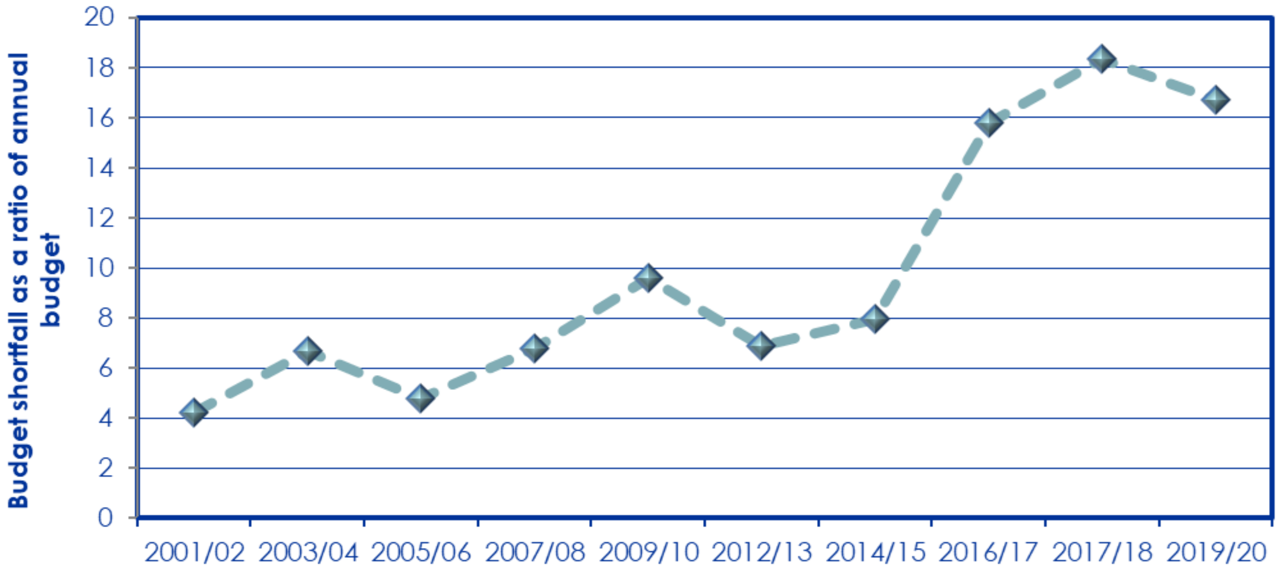


Figure 5-20: The budget shortfall in regravelling, resealing, rehabilitation and the upgrading of unpaved roads to paved roads as a ratio of the 5-year average annual budget

5.1.17 Analysis of funding levels

Table 5-10 provides a description of the funding (budgets) that have been investigated for their impact on future network conditions and costs.

Table 5-10: Funding scenarios investigated

Scenario	Description
Provincial MTEF Budget	The current funding level investigates the consequences of the MTEF Budget allocation for regravelling, resealing, light rehabilitation/rehabilitation/ reconstruction and upgrading to paved standards on the performance of the network. The allocations were calculated from the Rational Portfolio Management Project Management System deliverables and therefore do not include any treatments other than the four referred to here.
Optimised MTEF Budget	The current MTEF funding scenario with optimised fund allocation across the different intervention treatments, i.e. to gain maximum benefit from the available funding level. Using the current MTEF funding level, the fund allocations for regravelling, resealing, light rehabilitation/rehabilitation and upgrading to paved standards are optimised. The allocations were calculated from the RPM deliverables and therefore do not include any treatments other than the four referred to here.
Intervention Budget	A funding level is determined with the objective of maintaining the overall NCN of paved roads at approximately 70% whilst maintaining the proportion of poor to very poor paved roads below 10%. For unpaved roads, the objective is to regravel those roads classified with medium and high LOS and those unpaved roads classified as low and very low LOS with spot regravelling. Compliance with intervention levels is achieved immediately for paved roads and is phased-in over 10 years for unpaved roads.
Technical Needs Budget	This budget reflects the total current demand of the road network. It is a theoretical budget scenario preventing all roads from deteriorating beyond the treatment intervention thresholds. All intervention activities, i.e., preventive maintenance, rehabilitation and upgrading, are adhered to as soon as the need arises, without regard to cost, i.e., an unconstrained budget. The result of this scenario is minimised transport costs and roads that are preserved in an optimal condition. The objectives of this scenario are as follows: • The backlog of paved roads in a poor to very poor condition is removed immediately; • Paved roads are resealed timeously; • Unpaved roads with justifiable economic benefits are upgraded to paved standards immediately;

Table 5-10: Funding scenarios investigated	
Scenario	**Description**
	• Unpaved roads with insufficient gravel material are regravelled immediately; and • The road network is maintained in an optimal condition after the backlog has been cleared.

MTEF budget analysis

An objective of this analysis is to determine the consequences of the proposed Medium Term Expenditure Framework budget of the Branch on the road network. The analysis was performed in dTIMS and the results are compared to an "Ideal" scenario. In particular, the lifecycle benefit-cost analysis determines how effective this MTEF budget is in meeting the Branch road preservation needs. Thus, the objective is to answer the questions:

- Is the MTEF funding level sufficient to meet the periodic maintenance, rehabilitation and upgrading needs of the WCG roads?
- Is the allocation of the MTEF funds among periodic maintenance, rehabilitation and upgrading optimal?

For the analysis of the MTEF budget, the combination of the TTC and the AUC objective functions described in paragraph 5.1.15 was used.

The breakdown of the MTEF budget for the Branch for the financial year 2019/20 is shown in Figure 5-21 and Table 5-11 shows the breakdown from 2019/20 to 2023/24. The current funding for 2019/20 is R3 374 million, compared to R3 350 million in 2017/18. The budget for regravelling, resealing, rehabilitation and upgrading to paved standards has not increased significantly. The budget has remained at approximately R3 300 million as stated in the previous RAMP of 2018/19. Figure 5-22 shows the proportions of the 2019/20 MTEF budget analysed in this report.

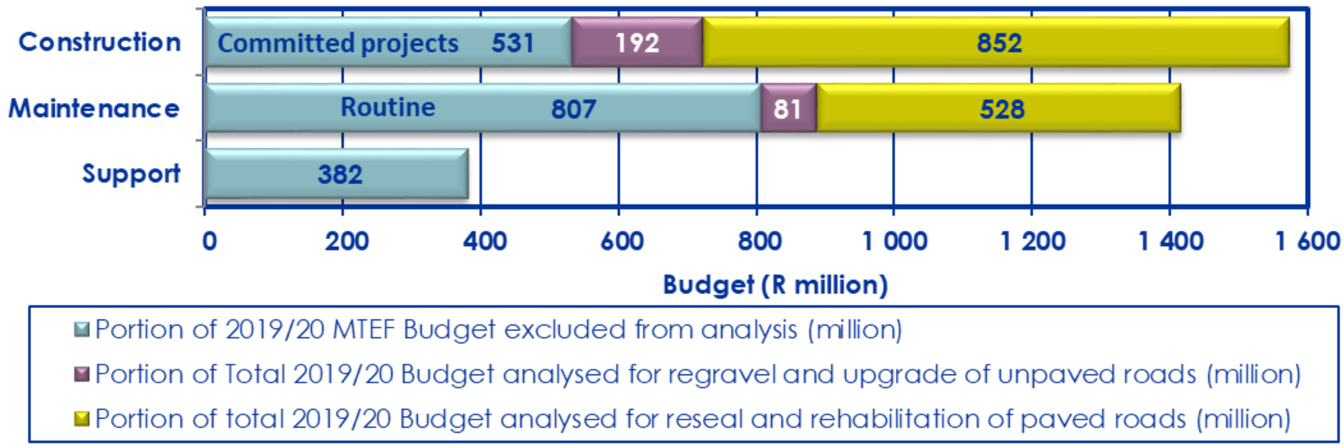


Figure 5-21: Road Network Management Branch funding for 2019/20 as at February 2018

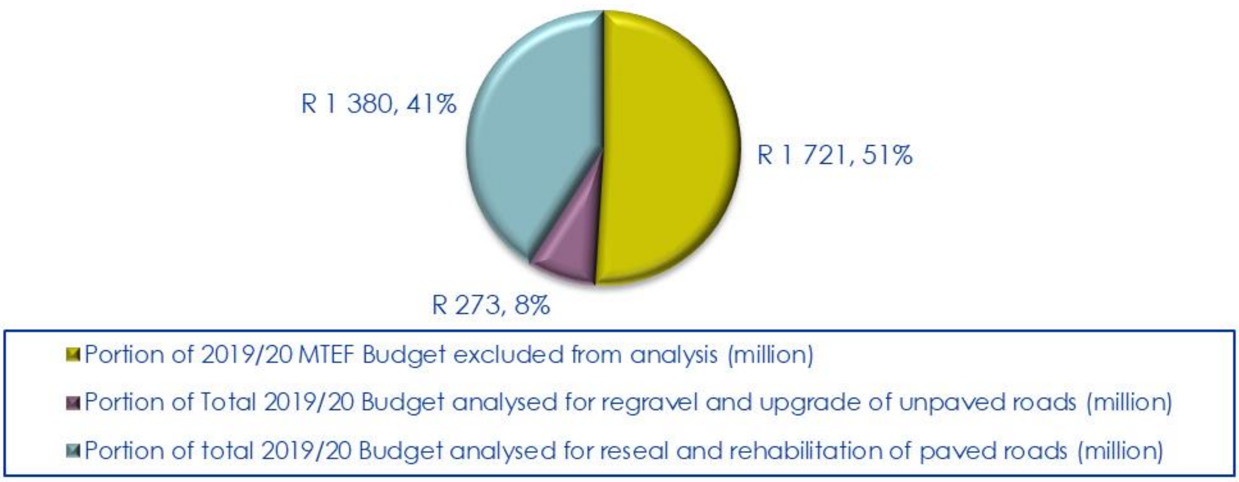


Figure 5-22: Proportions of 2019/20 MTEF budget analysed in this report

Table 5-11: Funding allocation according to the MTEF Budget as at February 2018

Budget Item	MTEF Budget				
	2019/20 (x R1000)	2020/21 (x R1000)	2021/22 (x R1000)	2022/23 (x R1000)	2023/24 (x R1000)
Programme support	40 186	42 469	45 877	48 171	50 582
Planning	89 975	95 382	99 853	104 870	109 936
Design	252 268	270 661	263 044	275 627	289 516
Total support	382 429	408 512	408 774	428 668	450 034
Rehabilitation and reconstruction of surfaced roads	917 173	789 844	495 250	536 897	690 788
Gravel road upgrading	100 000	216 000	194 000	166 000	231 000
Paved road upgrading	314 000	444 000	526 000	404 000	335 000
Access, new facilities and safety	190 400	256 000	308 000	371 000	308 000
Transfers: Cities and municipalities	53 000	75 000	36 000	18 000	19 000
Total Construction	1574 573	1780 844	1559 250	1495 897	1583 788
Reseal	576 535	440 360	458 425	552 650	571 030
Regravel	96 890	103 560	112 740	184 175	194 890
Routine maintenance	510 246	546 853	574 195	602 830	632 979
Other maintenance items (Bridges, transfers and agency fees)	233 107	256 788	287 128	308 844	321 269
Total Maintenance	1416 778	1347 561	1432 488	1648 499	1720 168
Total of the Branch	**3 373 780**	**3 536 917**	**3 400 512**	**3 573 064**	**3 753 990**
Annual increase		4,8%	-3,9%	5,1%	5,1%
Total budget optimised	1 690 598	1 549 764	1 260 415	1 439 722	1 687 708
Optimised budget as proportion of total budget	50%	44%	37%	40%	45%

For the next five years, the portion of the annual MTEF budget allocated for periodic maintenance, light rehabilitation/rehabilitation and upgrading to paved roads ranges between 37% and 50% of the total budget of the Roads Network Management Branch. It is this portion of the MTEF budget that is optimised in the analysis to find the optimal allocation for periodic maintenance, rehabilitation and the upgrading of unpaved roads to paved standards.

Table 5-12 lists the budget allocated to each of the above activities. The current and historic MTEF Budget proportions are shown in Figure 5-23. The portion of allocated funds for maintenance, rehabilitation and upgrading remains at approximately half of the funds.

Table 5-12: MTEF Budget funding allocation value (Rmillion)

Budget item	MTEF Budget based on deliverables (R million)		Estimated MTEF Budget based on deliverables (R million)		
	2019/20	2020/21	2021/22	2022/23	2023/24
Upgrading to paved	96,9	98,6	102,3	159,1	160,3
Regravelling	576,5	419,4	415,8	477,4	469,8
Light Rehabilitation / Rehabilitation	917,2	752,2	449,2	463,8	568,3
Resealing	100,0	205,7	176,0	143,4	190,0
Totals for optimisation	**1690,6**	**1476,0**	**1143,2**	**1243,7**	**1388,5**
Percentage of MTEF budget	50%	44%	37%	40%	45%
Budget excluded from optimisation analysis	1683,2	1892,5	1941,1	1842,9	1699,9

The maintenance activities investigated are those with identifiable intervention levels and reset values associated with the pavement performance prediction models (Appendix G – Calibration factors for modelling performance).

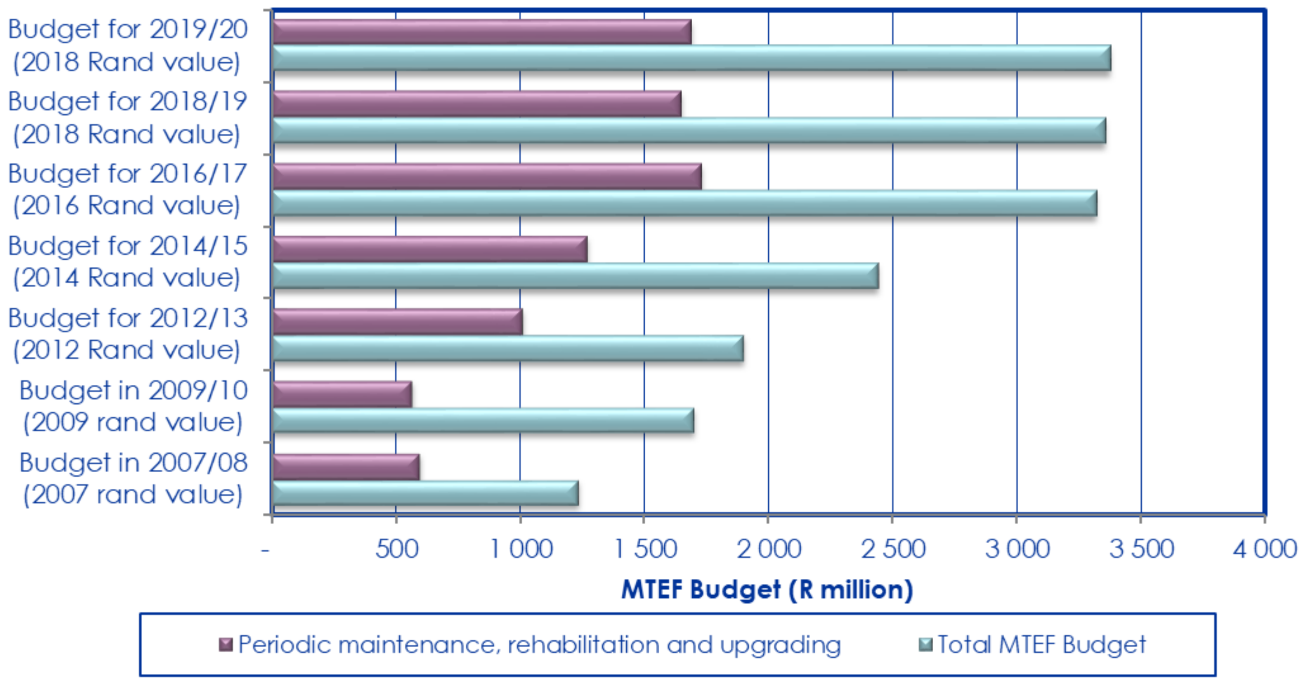


Figure 5-23: Current and historic MTEF Budgets and the proportions that are optimised

The fund allocation presented in Figure 5-24 and Table 5-12 is being implemented by the Branch. Major investments for paved roads are planned for the period 2019/20 to 2023/24. Allocation includes the treatment of light rehabilitation that is utilised in constraint economic development based on the budgets of Table 5-12.

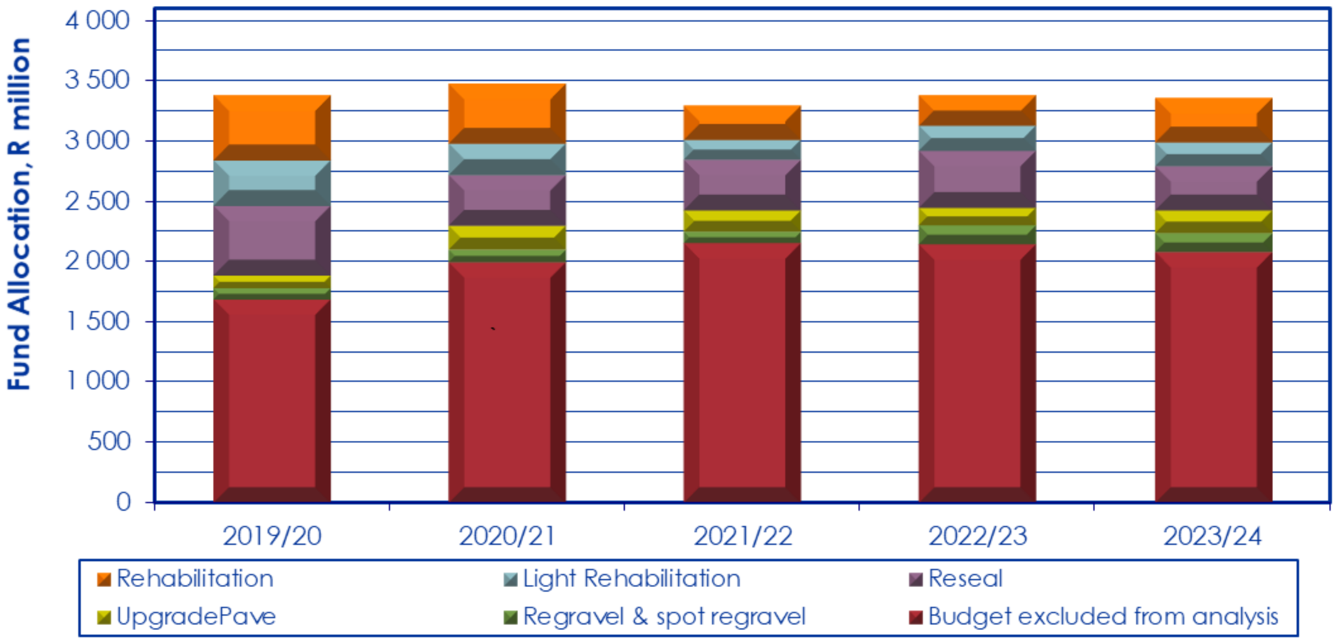


Figure 5-24: The provincial allocation of MTEF Budget, analysing the allocation for regraveling, resealing, light rehabilitation, rehabilitation and upgrading to paved standards

Comparison of actual MTEF Budget with Optimised MTEF Budget

Analysis was performed in dTIMS to investigate the consequences of the proposed provincial allocation of the MTEF budget and the results are compared to an "Ideal" scenario (Ideal split of the current MTEF budget).

Table 5-13 shows the average funds allocated to the four categories of the Provincial MTEF Budget, which is compared to the "Optimised MTEF Budget", which optimally assigns funds to the five activities. This re-allocation maximises the benefit, while minimising the loss in asset value for the province and its road users.

Figure 5-25 graphically compares the Provincial MTEF budget allocation to the Optimised MTEF budget allocation according to the results of the optimisation process.

The comparison of the Optimised MTEF Budget versus the Provincial MTEF Budget highlights the focus of the Optimised funding scenarios on paved roads. The Optimised MTEF budget is 94% funding for resealing, light rehabilitation and rehabilitation of paved roads compared to the Provincial MTEF budget of 79%. The optimal split results in the maximum investment return for the current funding level. However, there is a high need for periodic maintenance and upgrading of unpaved roads, especially roads carrying high traffic volumes. Paragraph 5.1.18 has full details on the consequences of this maintenance scenario.

Paved roads carry 95% of the vehicle-km driven on the WCG road network and the higher investment in paved roads is clearly due to the number of road users on paved roads.

Funds allocated to periodic maintenance and upgrading of unpaved roads will only increase if increased funding is available. The five activities investigated for the Optimised MTEF Budget are discussed below.

Table 5-13: Provincial versus Optimised MTEF Budget					
Budget Item		All amounts in 2017 Rand Value (millions)			
		Provincial		Optimised	
		2019/20	Average 2019/20 to 2023/24	2019/20	Average 2019/20 to 2023/24
Optimised activities	Spot regravelling	97	123	72	38
	Regraveling			77	19
	Resealing	576	450	361	145
	Light Rehabilitation	381	243	349	430
	Rehabilitation	536	387	676	726
	Upgrading to paved standards	100	163	155	31
Totals		**1 654**	**1 690**	**1 367**	**1 691**

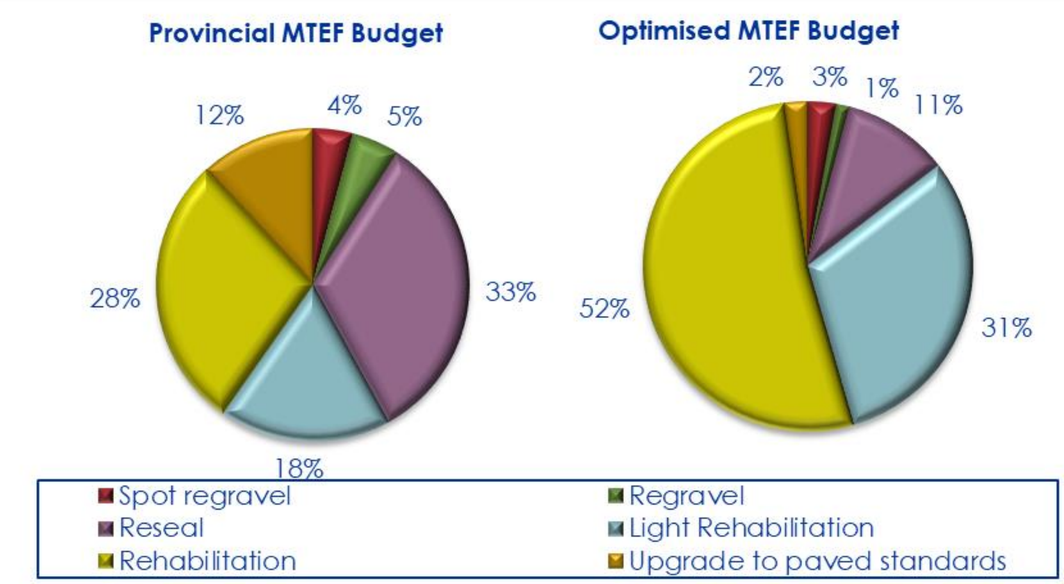


Figure 5-25: Comparison of the Provincial MTEF Budget versus the Optimised MTEF Budget, average annual expenditure for the period from 2019/20 to the end of 2023/24

Resealing

Deterioration of the roads caused by normal traffic, excluding overloaded vehicles, cannot be prevented. Should the pavement structure deteriorate beyond the point of effective resealing intervention, the only option is light rehabilitation/rehabilitation of the pavement layer(s). Resealing, in the short to medium term, prevent an explosive growth of expensive light rehabilitation/rehabilitation projects. The benefit in terms of cost savings and network condition yield the largest return if more of the available funding is allocated to resealing. The importance of road maintenance to ensure sustainability of the road network by means of **optimal timing and frequency of preventive maintenance** is emphasised. Picture 5-1 and Picture 5-2 show evidence of how a road in poor condition can deteriorate rapidly within a year due to lack of appropriate periodic maintenance.

Picture 5-1: TR22/1 on 17/6/2006

Picture 5-2: TR22/1 on 12/7/2007 showing development of potholes

The current strategy of the Branch (paragraph 1.5.7) resulted in approximately 34% (2 360 km) of the paved road network being resealed over the last 5 years. This is a little less than required for an estimated average 10 year optimum seal life.

- Since 2012/13, the unit costs for the resealing of paved roads have almost doubled. The average cost per square metre is now R200.
- The optimisation analysis increases the allocation of funding for the resealing of paved roads to ensure the preservation of paved roads by means of preventive maintenance.
- The allocation for reseals could decrease to an average of R145 million per annum over the next 5 years.

Light Rehabilitation

- The provincial fund allocation for light rehabilitation is less than the optimal funding allocation identified by the Optimised MTEF funding scenario.
- The average light rehabilitation investment should increase to approximately R 430 million per annum.

Rehabilitation

- The provincial fund allocation for rehabilitation is less than the optimal funding allocation identified by the Optimised MTEF funding scenario
- The average rehabilitation investment should increase to approximately R 726 million per annum.

Regravelling and upgrading of unpaved roads

The reallocation of investment in the Optimised MTEF Budget directly affected the available funding for the unpaved road network and the fund allocation for all unpaved roads subsequently reduced.

- The provincial fund allocation for regravel and spot regravel is more than the optimal funding allocation identified by the Optimised MTEF funding scenario
- Approximately 117 km of unpaved road are upgraded in the first 5 years with the MTEF budget, 56 km of these roads are also upgraded in the optimised analysis. These roads all have economic reasons for upgrade to paved standards.

Comparison of Provincial MTEF budget and Optimised MTEF budget over 10 years

The Provincial and Optimised MTEF Budgets for the next ten years are compared in Figure 5-26. Theoretically, according to optimisation analysis of the MTEF Budget, the network will gain maximum benefit if the funding for paved roads is increased on average by R220 million per annum. This proposed increase in expenditure on rehabilitation will only have a small effect on the overall condition of the paved road network—see paragraph 5.1.18.

Overall, the road network condition is very unlikely to improve under the current MTEF Budget and unit rates, but the optimised allocation of funding assures the best possible preservation of the roads.

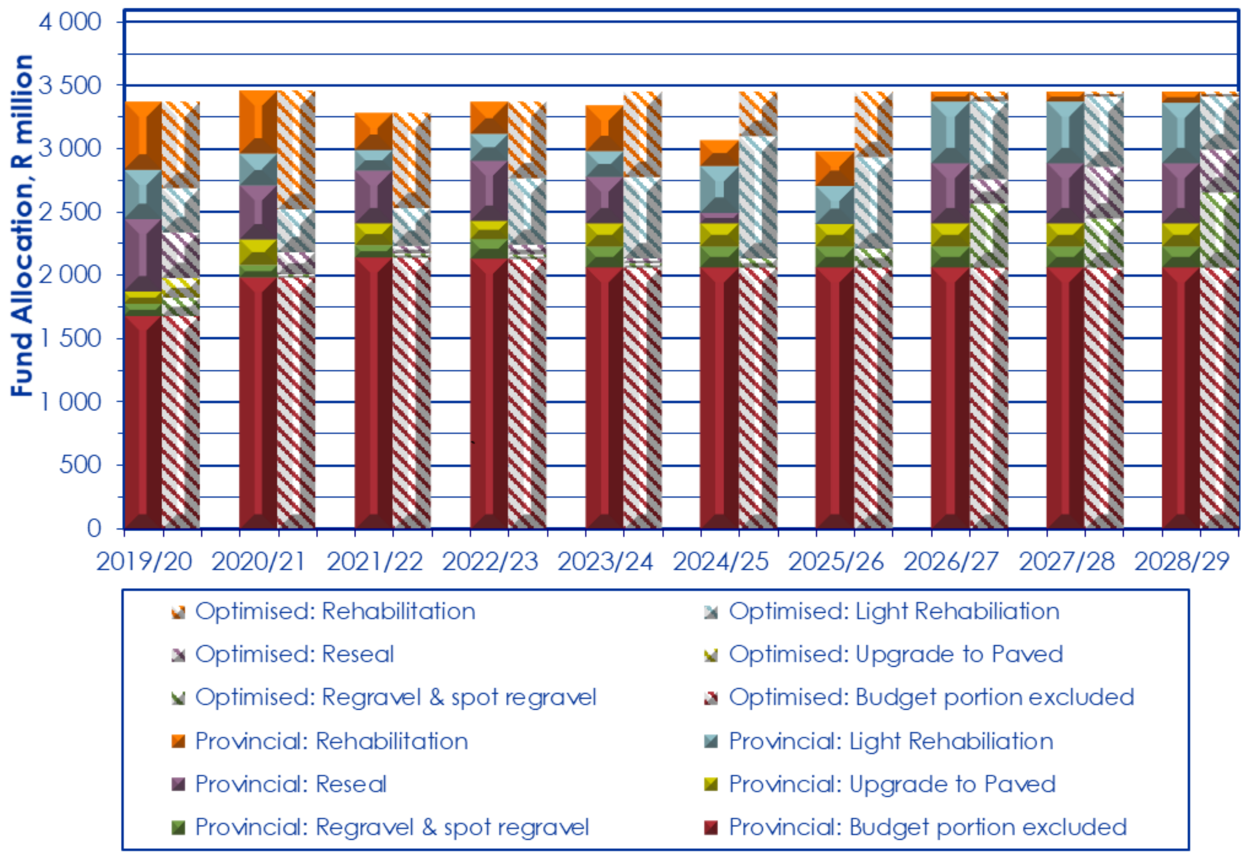


Figure 5-26: Provincial and Optimised allocations of the MTEF funds over the next 10 years

MTEF Budget compared to the Intervention Budget

The Intervention Budget analysis estimates a realistic funding level to maintain the desired levels of service of the road network. It includes roads requiring:

- Upgrading to paved standards;
- Regravelling;
- Resealing;
- Light Rehabilitation; and
- Rehabilitation due to pavement deterioration.

The Intervention Budget requires funding of approximately R6 243 million per annum over the next five years to maintain both the paved and unpaved road networks at their levels of service. The Intervention Budget will improve the performance of the road network. The extent of the improved performance levels is shown in paragraphs 5.1.18 and 5.1.19.

The Provincial MTEF Budget Allocation is compared to the Intervention Budget to determine the shortfall. It calculates the extra funds that are required for regravelling, spot regravelling, resealing, light rehabilitation, rehabilitation/ reconstruction and upgrading to paved standards to ensure the majority of roads function above the intervention levels. Table 5-14 shows the results of the analysis.

Table 5-14: Intervention Budget for 10 years							
Year	All budget amounts in 2017 Rand Value (millions)						
	Regravelling	Upgrading to Paved	Resealing	Light Rehabilitation	Rehabilitation	Other[1]	Total
2019/20	1 156	1 248	215	188	1 078	1 683	5 568
2020/21	342	6	122	556	2 880	1 987	5 892
2021/22	450	8	47	423	3 487	2 140	6 555
2022/23	785	35	24	787	2 869	2 133	6 633
2023/24	1 215	9	38	677	2 561	2 066	6 566
2024/25	641	1 078	-	537	2 243	2 066	6 566
2025/26	1 037	758	2	591	1 945	2 066	6 400
2026/27	552	1 566	496	55	1 831	2 066	6 566
2027/28	846	255	1 104	17	2 272	2 066	6 561
2028/29	815	-	1 147	20	271	2 066	4 320
5 Year Average 2019/20 to 2023/24	**790**	**261**	**89**	**526**	**2 575**	**2 002**	**6 243**
Provincial MTEF Budget							
Average for 2019/20 to 2023/24	123	163	450	243	387	2 002	3 369
Annual average shortfall	666	98	-361	283	2 188	-	2 874
Current shortfall measured against annualised need of Intervention Budget	**1 059**	**1 148**	**-361**	**-192**	**541**	**-**	**2 195**
Note 1: The budget amount "Other" refers to all expenditure that is not optimised in dTIMS							

Compared to the Intervention Budget, the MTEF budget is insufficient. The performance of the majority of roads cannot be maintained without continued deteriorating performance levels, as discussed in paragraphs 5.1.18 and 5.1.19. The outcomes from the Intervention Budget (all categories of work) are as follows:

- An annualised expenditure of approximately R6 243 million is required over the next five years for the network. Paved roads will then function within the roughness and condition threshold values given in Table 5-7, and unpaved roads will function according to the levels of service in Table 3-3.
- The required funding level of the Intervention Budget is 193% more than the MTEF funding level for preventive maintenance such as resealing, spot regravelling and regravelling and for light rehabilitation, rehabilitation and upgrades to paved standards, or approximately R3 133 million per annum over the next five years.
- This funding shortfall accumulates to a deficit of R31 330 million after 10 years.

The objectives of each of the categories of preservation and upgrading are dealt with below.

Rehabilitation, light rehabilitation and resealing

The annualised Provincial MTEF Budget is short of approximately R2 110 million for periodic maintenance and light rehabilitation/rehabilitation of paved roads.

In order to maintain the paved road network appropriate condition levels in the long term, an average expenditure of approximately R3 190 million is required for resealing, light rehabilitation and rehabilitation over the next 5 years.

Regravel

A very high, annualised need was determined, being in excess of 2 552 km for spot regravelling and more than 880 km for regravelling of the wearing surfaces. This is directly related to the 32% of unpaved roads operating in a poor to very poor condition. For unpaved roads classified as medium and high LOS, the Intervention Budget in this analysis has the objective of gradually regravelling roads with inadequate gravel thicknesses. For unpaved roads classified as low and very low LOS, the maintenance intervention of spot regravelling is used on roads with inadequate gravel thickness.

- An average annualised expenditure of approximately R790 million is required for regravelling and spot regravelling.
- There is a shortfall of approximately R666 million per annum.

Upgrade unpaved roads to paved standards

The proposed annualised funding level of the Intervention Budget for upgrades is approximately R98 million per annum less than the MTEF Budget. In the analysis of the Intervention Budget, approximately 159 km of unpaved roads were selected to be upgraded to paved standards in the first 3 years. These all carry more than 400 vehicles per day.

- An average of approximately R261 million per annum is required for upgrading to paved standards over the next five years.

Technical Needs Budget

The funding required to meet the criteria of the **Technical Needs Budget** was determined using the dTIMS optimisation software (Table 5-15).

Table 5-15: Technical Needs Budget for 10 years and the MTEF Budget shortfall

Technical Needs Budget (R million)					
Year	Regravelling	Upgrade to paved	Reseal	Rehabilitation	Total
2019/20	2 614	5 463	1 517	14 640	24 234
2020/21	249	-	336	2 861	3 447
2021/22	432	2	463	2 462	3 359
2022/23	1 089	-	290	2 146	3 524
2023/24	1 074	-	236	855	2 164
2024/25	391	72	92	319	875
2025/26	1 481	-	-	246	1 728
2026/27	164	-	4 661	-	4 825
2027/28	1 008	-	970	248	2 227
2028/29	1 021	-	1 038	223	2 282
Provincial MTEF Budget Allocation for 2019/20	68	163	243	3 101	3 575
2019/20 MTEF theoretical budget backlog[1]	2 547	5 300	1 274	11 539	20 659

Note 1:
The theoretical budget backlog is determined by comparing the 2019/20 Provincial MTEF fund allocation to the 2019/20 Technical Needs Budget

The Technical Needs Budget is a **theoretical funding level** that is used to determine the investment required to remove the backlog of roads requiring rehabilitation, periodic maintenance and upgrading to paved standards, as follows:

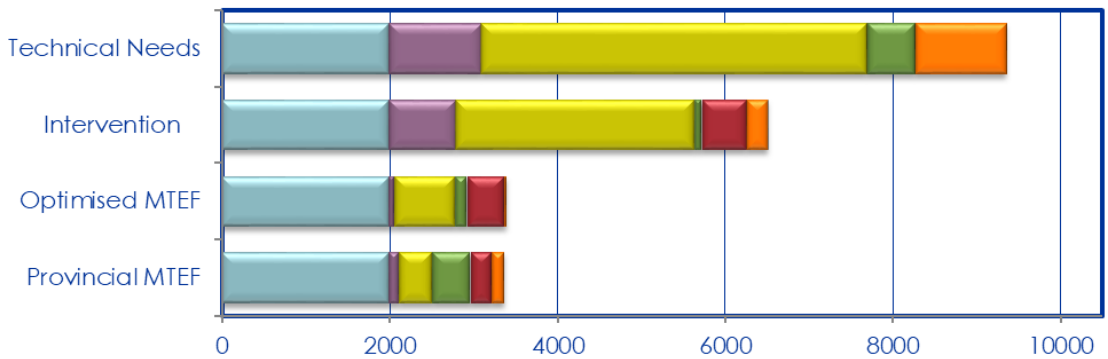
- All unpaved roads are upgraded to paved standards where it is economical to do so. The upgrading demand is approximately R5,4 billion and affects approximately 544 km of unpaved roads.
- All medium and high LOS unpaved roads are maintained with a minimum gravel thickness of 50 mm. Low and very low LOS roads are maintained by means of spot regravelling.
- Cost-effective preventive maintenance on paved roads (resealing) is applied as soon as the need arises. Roads are not permitted to deteriorate to a state where rehabilitation is necessary.
- Light rehabilitation is not a function of the Technical Need Budget as this is not a constraint circumstance.

This immediate (2019/20) investment need was calculated at R24,2 billion to eliminate the backlog, excluding the items that were not optimised, e.g., safety improvements, routine maintenance, new infrastructure, overheads, etc. For the 4-year period thereafter, 2020/21 to 2023/24, an average annual funding of approximately R3 123 million is required to maintain both paved and unpaved roads at these optimum performance levels. This funding level would result in the optimum benefit.

Comparison of the four budgets

The four budgets are compared in Figure 5-27.

- The **Intervention Budget** is approximately 193% more than the total MTEF Budget and the **Technical Needs Budget** is nearly five times the total MTEF Budget.



	Provincial MTEF	Optimised MTEF	Intervention	Technical Needs
Budget excluded from optimisation analysis	2 002	2 002	2 002	2 002
Regravel & spot regravel	123	57	790	1 092
Rehabilitation	387	726	2 834	4 593
Reseal	450	145	89	568
Light Rehabilitation	243	430	526	-
Upgrade to Paved standard	163	31	261	1 093

Average annualised fund allocation for 2019/20 to 2023/24 (R Million)

Note 1:
Based on the current MTEF budget statement, an averaged additional amount of R2 433 million will be required annually for support, access, new facilities, transfers, surfaced road upgrading, routine maintenance and maintenance of bridges.

Figure 5-27: Distribution of funding for various budgets based on a 5-year average

The cash flows in Figure 5-28 show the funding demand of the four budget scenarios over a 5-year period for regravelling, resealing, light rehabilitation/rehabilitation and upgrading to paved standards.

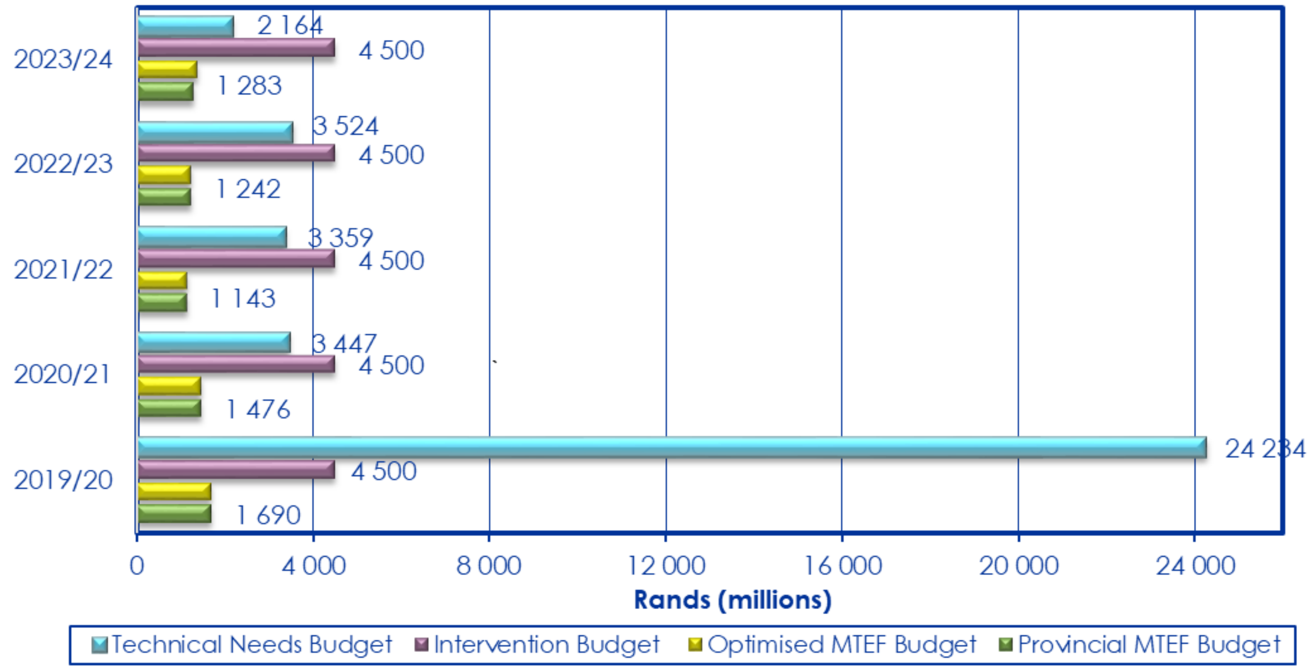
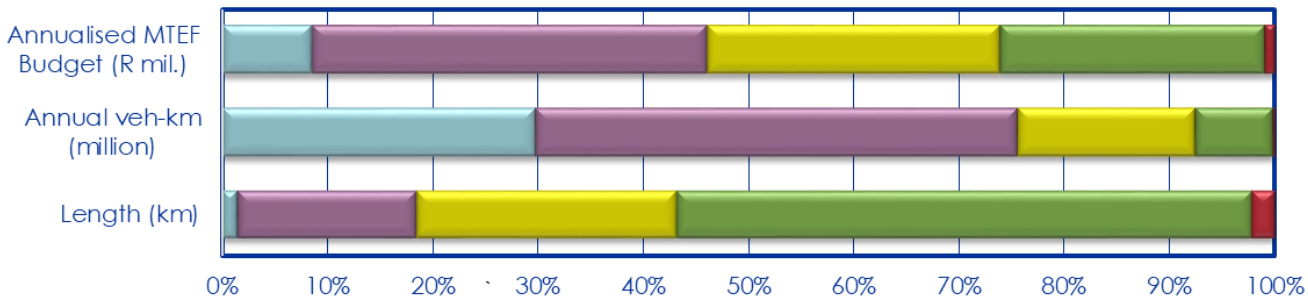


Figure 5-28: Predicted expenditure for regravelling, resealing, light rehabilitation, rehabilitation and upgrading of unpaved roads to paved standards for the four budgets

Optimised fund allocation according to RCAM classification

Figure 5-29 presents the optimised fund allocation of the MTEF budget per RCAM classification for the road network. The optimisation analysis allocated the majority of funding towards the higher RCAM class roads, thus affecting the majority of traffic and promoting mobility in those parts of the network where there is economic development and commerce.



	Length (km)	Annual veh-km (million)	Annualised MTEF Budget (R mil.)
RCAM 1	237	2 096	115
RCAM 2	2 899	3 235	511
RCAM 3	4 191	1 196	379
RCAM 4	9 290	515	342
RCAM 5	370	20	13

Figure 5-29: Road network according to RCAM classification versus the Optimised MTEF Budget allocation

5.1.18 Consequences of budgets on paved roads

The consequences likely to follow from each of the four budgets are summarised under this section to highlight the predicted performance of the paved road network.

Level of service

Figure 5-30 shows the predicted overall network condition of paved roads in terms of the NCN. For both the Provincial MTEF Budget and the Optimised MTEF Budget, it is expected that the network condition will decline considerably over the next ten years. Furthermore, the NCN benchmark of 70%, as described in paragraph 4.9.1, will not be maintained under the current MTEF budget. The MTEF Budget would need to be increased by 193% to ensure paved roads perform at the NCN benchmark of 70%, at current condition over the 10 year analysis period. The Technical Needs Budget fixes the immediate need on all paved.

Currently 44% of paved roads do not meet the minimum intervention levels as detailed in Table 5-7. Figure 5-31presents the predicted proportion of paved roads that will deteriorate beyond the intervention levels over the next 10 years.

For the MTEF Budget it is predicted that:

- The length of paved roads operating below the intervention levels will increase from 44% to more than 80% over the next 10 years.
- The proportion of unpaved roads operating above the intervention levels will increase with the implementation of the regravel programme. This regravel programme assumes spot regravelling is done on unpaved roads classified non-economical and regravelling will be confined to selected routes. The gravel thickness on most unpaved roads will still remain below 50 mm.

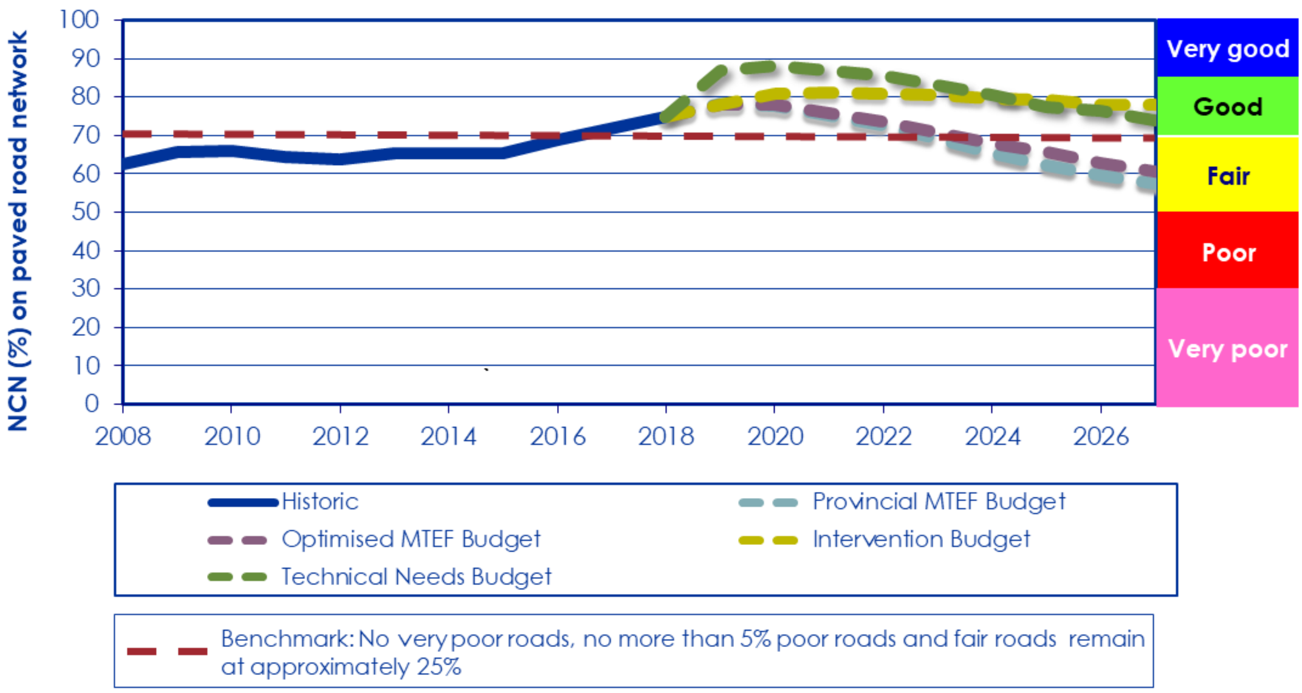


Figure 5-30: Average network condition of paved roads

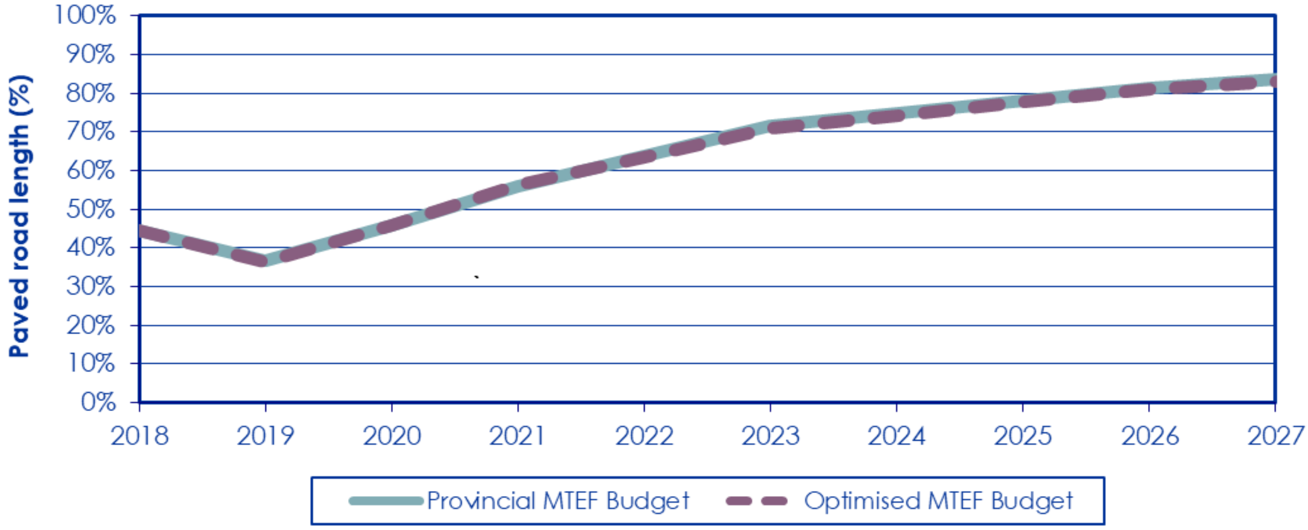


Figure 5-31: Percentage length of the paved road network not meeting the minimum intervention levels

Proportion of paved roads in a poor or very poor condition

Figure 5-32 shows the expected increase in the backlog of poor and very poor roads for the four budgets. At current MTEF funding levels, it is expected that the percentage of paved roads in a poor or very poor condition will increase to more than 30% in the next 10 years.

The MTEF Optimised Budget will reduce the rate of decline slightly. However, the paved roads in the poor or very poor categories will remain just above 20% of the network. The proportion of poor and very poor roads remains below 10% of the length of the paved network for the Intervention Budget.

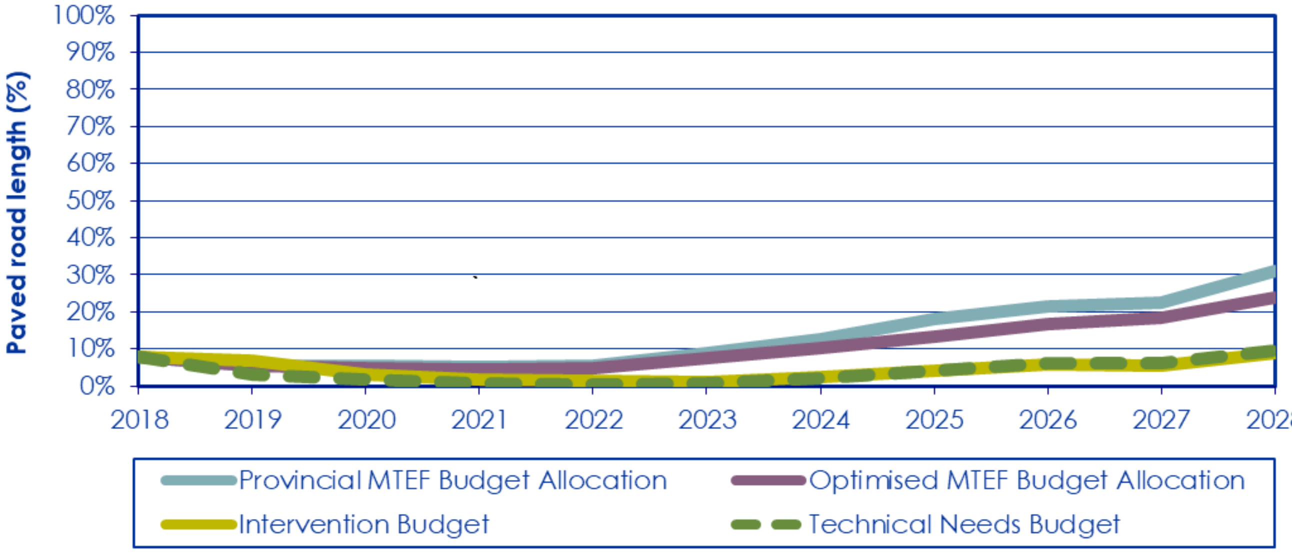


Figure 5-32: Percentage length of paved roads in poor and very poor condition

Change in asset value of paved roads

Figure 5-33 shows changes in asset value for all budgets. The current MTEF budget cannot prevent a long-term decrease in asset value. The current asset value, calculated as the depreciated replacement cost of the network, is approximately R115 billion (Table 5-17).

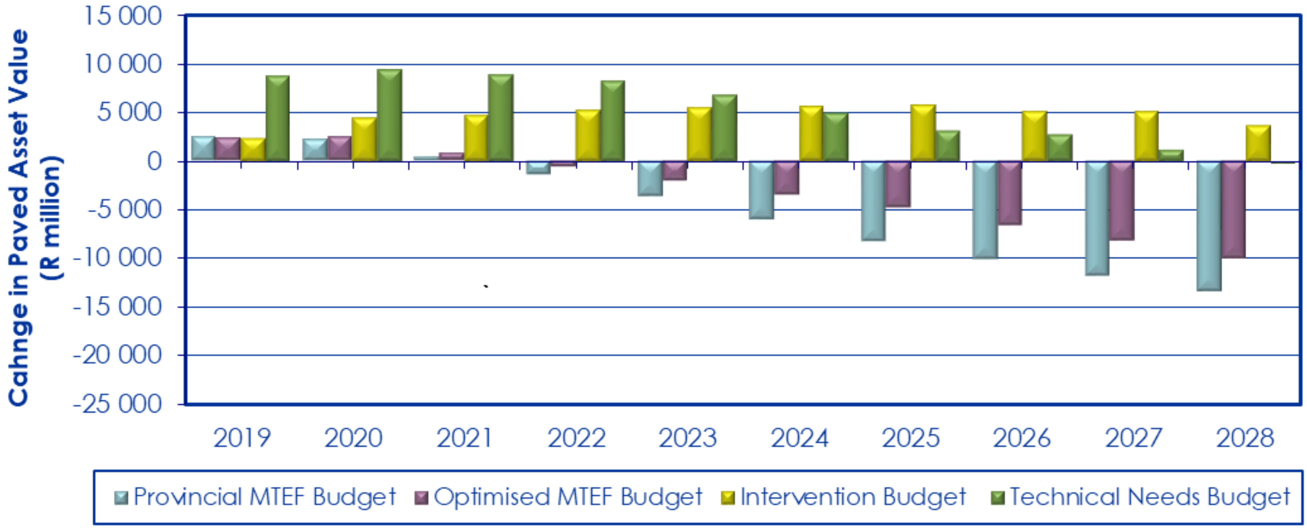


Figure 5-33: Change in asset value of paved roads compared to 2018 values

Excess vehicle operating costs on paved roads

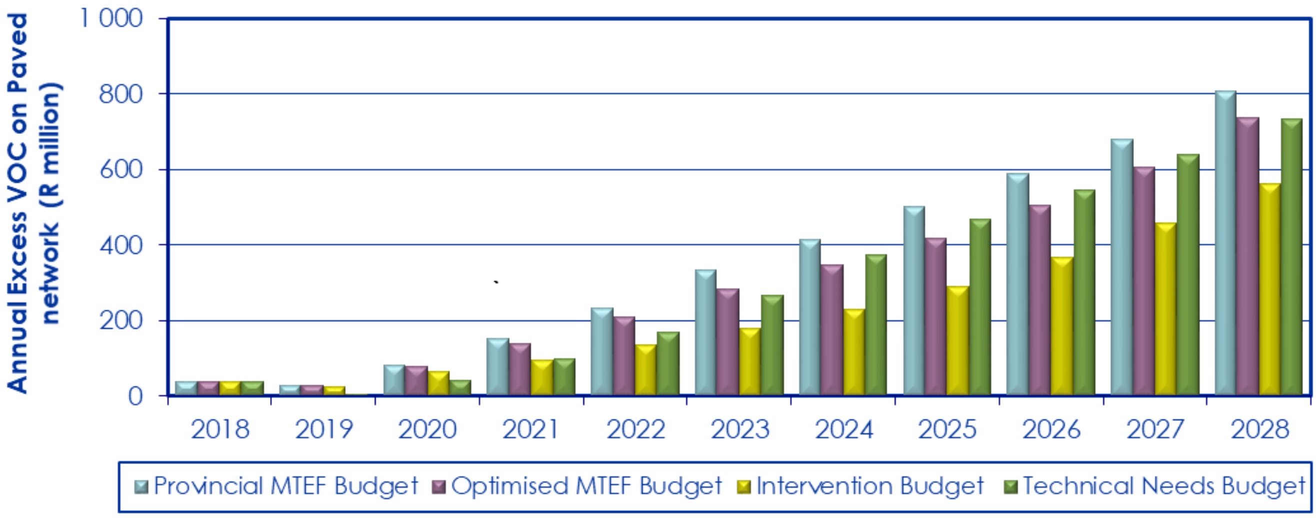
Excess user cost (EUC) is an unnecessary expense for the road user and an inevitable outcome of substandard riding quality of the roads in the network. An IRI of 3,1 was used as the upper threshold for paved roads with a good riding quality. These costs are compared to the Technical Needs Budget analysis and the results are summarised in Table 5-16.

Table 5-16: Predicted EUC on paved roads, over and above the minimum EUC achievable by the Technical Needs Budget

EUC	Provincial MTEF Budget	Optimised MTEF Budget	Intervention Budget
Additional[1] cumulative EUC after 5 year (R million)	R 790	R 741	R -179
Average EUC for next 5 years (R million)	R 326	R 316	R 132
Additional[1] length of road exceeding IRI 3,1 during the 5 year period	1 775 km	1 804 km	-245 km

Note 1:
Additional in comparison to the optimum achievable performance according to the Technical Needs Scenario.

The top graph in Figure 5-34 shows the additional EUC for the funding scenarios and the bottom graph shows the additional length of paved roads operating with these excess costs to the road users.



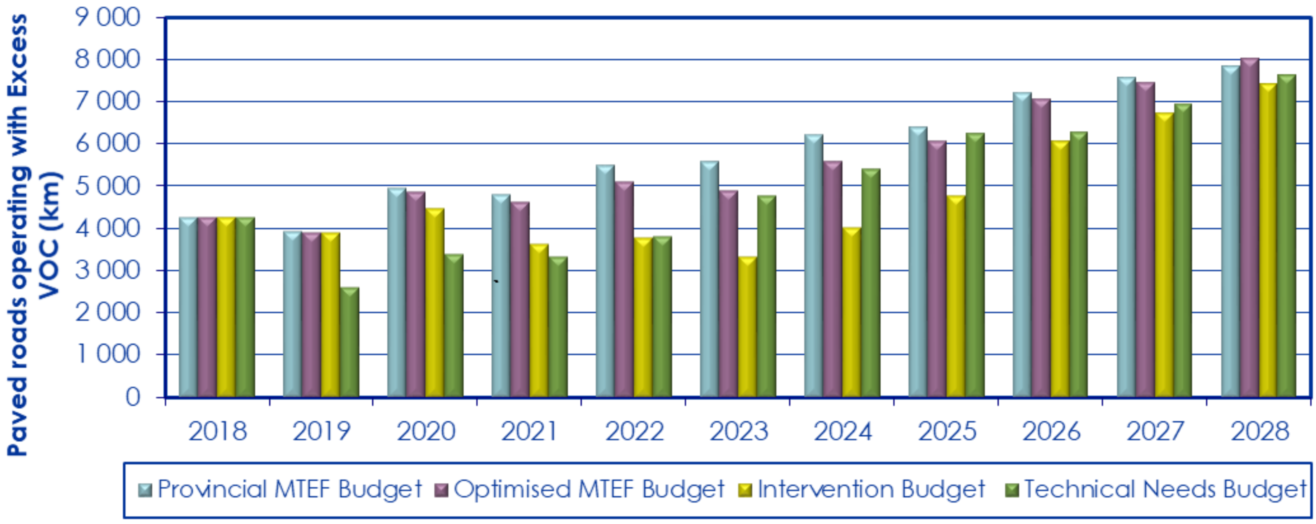


Figure 5-34: Total excess vehicle operating costs in terms of (a) annual cost and (b) km

5.1.19 Consequences of different funding scenarios on unpaved roads

The results of the different budgets analysed are summarised in this section to highlight the predicted performance of the maintained unpaved road network for each of the funding scenarios.

Average gravel thickness

The predicted network gravel thickness of maintained unpaved roads is shown in Figure 5-35. Effective blading requires a minimum thickness of gravel wearing course of at least 50 mm, depending on the particle size distribution of the gravel.

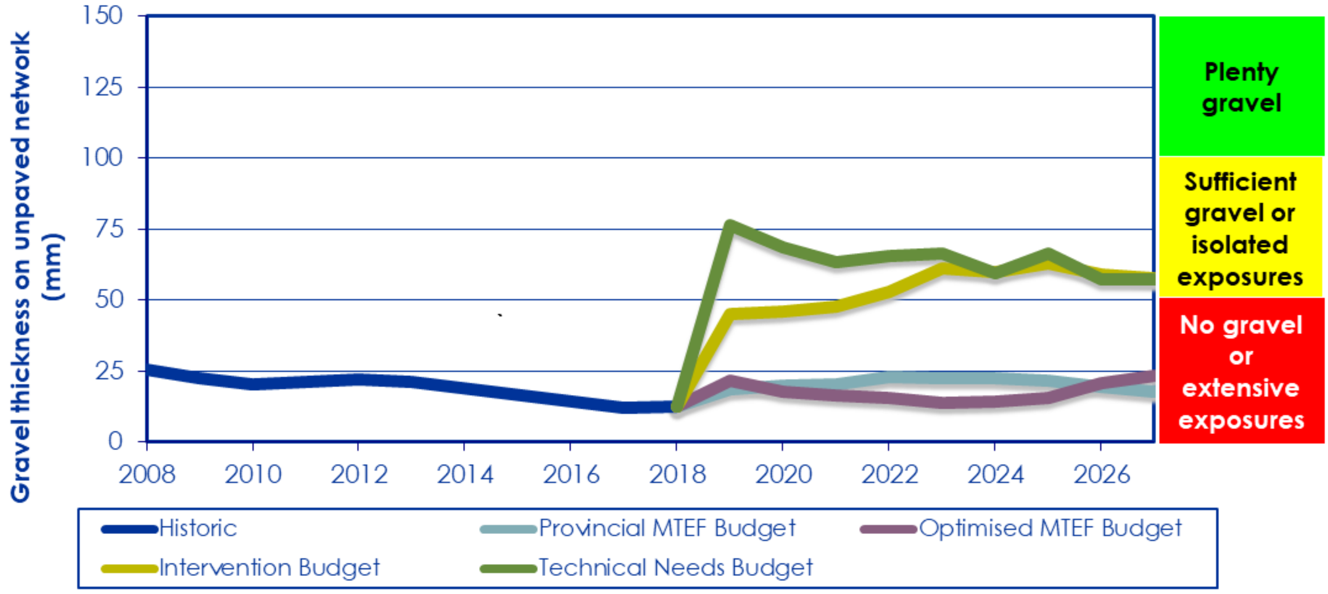


Figure 5-35: Average gravel thickness of maintained unpaved roads

The Provincial MTEF budget for regravelling is an average of R123 million over the next 5 years.

- MTEF funds allocated to regravelling are insufficient to reach this minimum target thickness of 60 mm, although gravel thickness is expected to increase slightly over the next 10 years.
- The outcome of the optimisation analysis indicates an average funding requirement of approximately R57 million per annum over the next 5 years, after which it increases to approximately R340 million per annum over the following 5 years. This funding level, however, allows the average gravel thickness to decrease even further over the next 10 years.
- The Intervention Budget improves the overall thickness of gravel wearing course and the driving conditions experienced by road users. The investment requirement is an average annual amount of R790 million for the next 5 years and increasing to R778 million towards the last 5 years of the analysis for both regravelling and spot regravelling.
- The Technical Needs Budget (Table 5-17) maintains the unpaved roads at optimum performance levels, where all unpaved roads without sufficient gravel material in the medium and high LOS category are regravelled during the first analysis year. Thereafter, all roads are either regravelled or maintained by spot regravelling as required. The immediate funding need for regravel is R2,1 billion and approximately R415 million for spot regravelling, thereafter an average R711 million is required annually to meet the minimum intervention levels.

Figure 5-36 presents the predicted proportions of unpaved roads that will deteriorate beyond the intervention levels. All roads with less than 50 mm gravel wearing course material are included, as well as roads that carry traffic in excess of 150 vehicles per day. Even though the overall condition of the unpaved road network is expected to improve, the demands of the unpaved road network for regravelling still significantly exceed the MTEF funding levels.

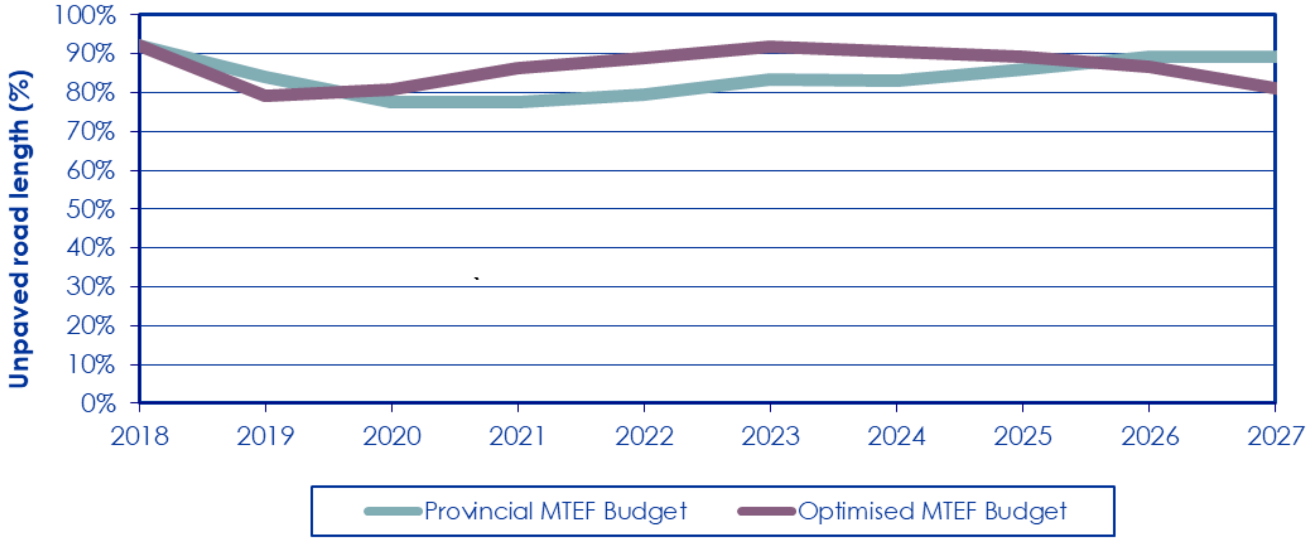


Figure 5-36: Length of the unpaved road network not meeting the minimum intervention levels

Proportion of unpaved roads with no gravel

Figure 5-37 shows the proportion of the unpaved network without any gravel. According to the Intervention Budget, an annual amount of approximately R790 million is needed to maintain unpaved roads at appropriate levels over the next 10 years. The Technical Needs Budget immediately eliminates all roads with no gravel material.

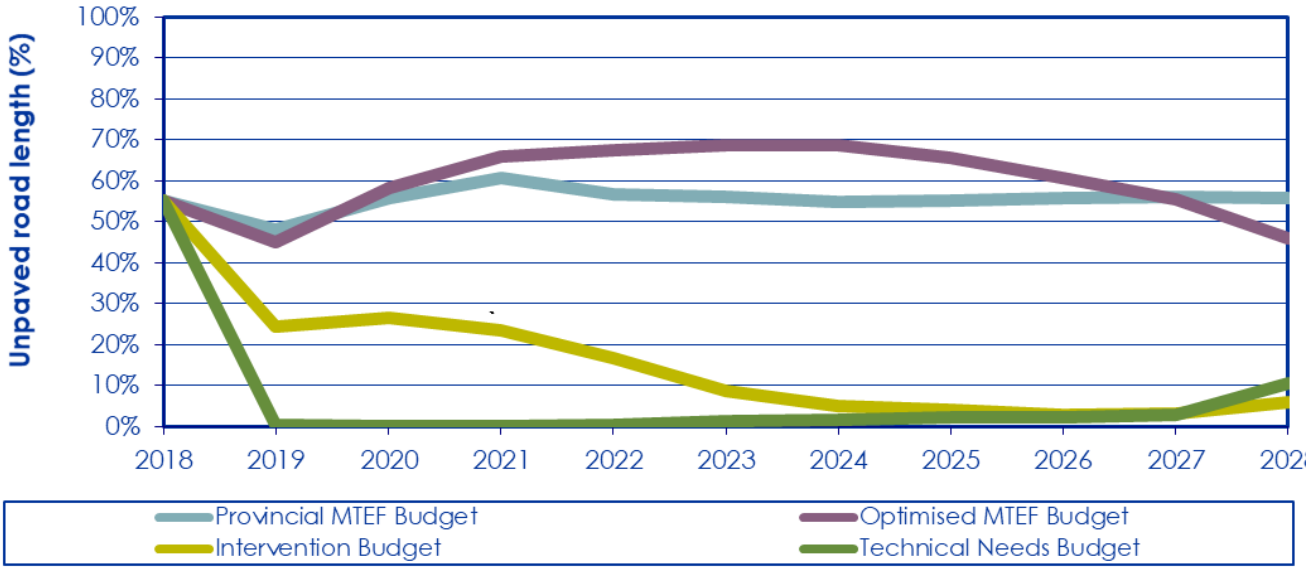


Figure 5-37: Proportion of unpaved roads without gravel, excluding earth roads

Passability of unpaved roads with no gravel

According to draft TRH 20 (Committee of State Road Authorities, 1990), passability is a function of the shear strength of the top layer of the wearing course. With insufficient quantities of coarse gravel in the gravel layer and inadequate subgrade shear strength, passability problems will occur. It is assumed that an average minimum gravel thickness of 50 mm will ensure passability and assist with the maintenance of unpaved roads.

As data on subgrade strength is available from the GRMS, it is envisaged that the strength of the subgrades will be incorporated in a future analysis in order to more accurately determine possible passability problems.

For this analysis, roads with less than 150 AADT, currently 62% (more than 6 100 km), as well as earth roads, were not included as these roads are not maintained with regravelling. Despite a lack of gravel on these roads, many operate with acceptable passability.

Figure 5-38 shows the predicted proportion of unpaved roads with possible passability problems. For both the Provincial MTEF Budget and the Optimised MTEF Budget it can be assumed the proportion of roads with possible impassability problems would not change significantly.

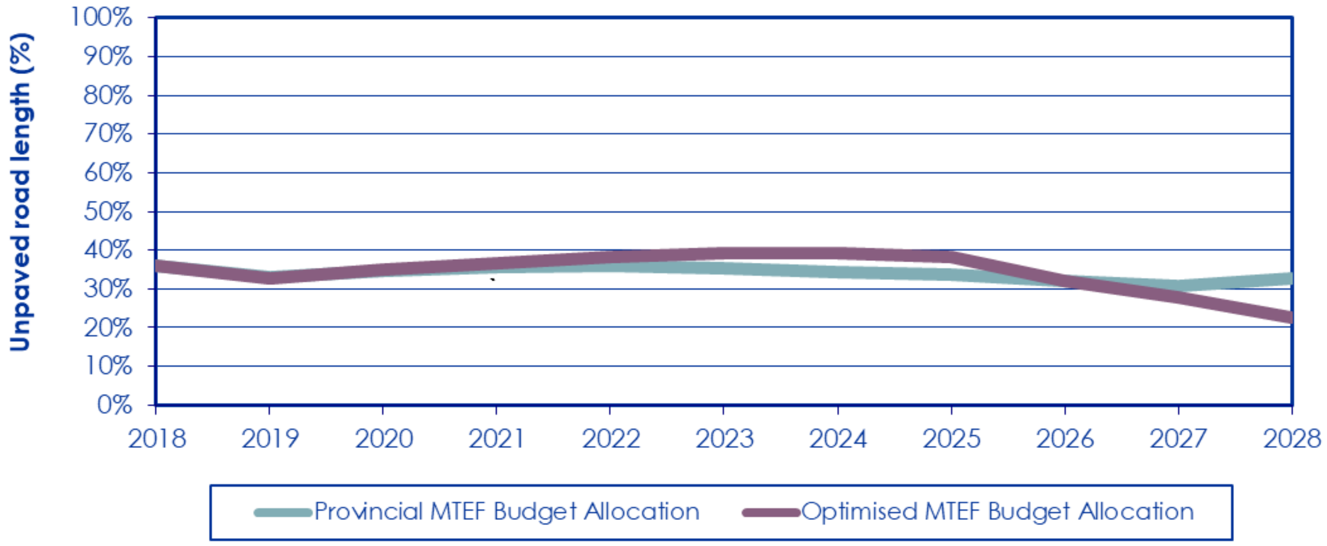


Figure 5-38: Predicted proportion of maintained unpaved roads with possible passibility problems where gravel thickness is <50 mm

Change in asset value of unpaved roads

The Intervention and Technical Needs Budget will substantially increase the asset value of the unpaved network (Figure 5-39). The Provincial MTEF Budget replaces gravel material and applies spot regravelling to a value of R123 million per annum. This level of funding has a positive influence on the asset value levels.

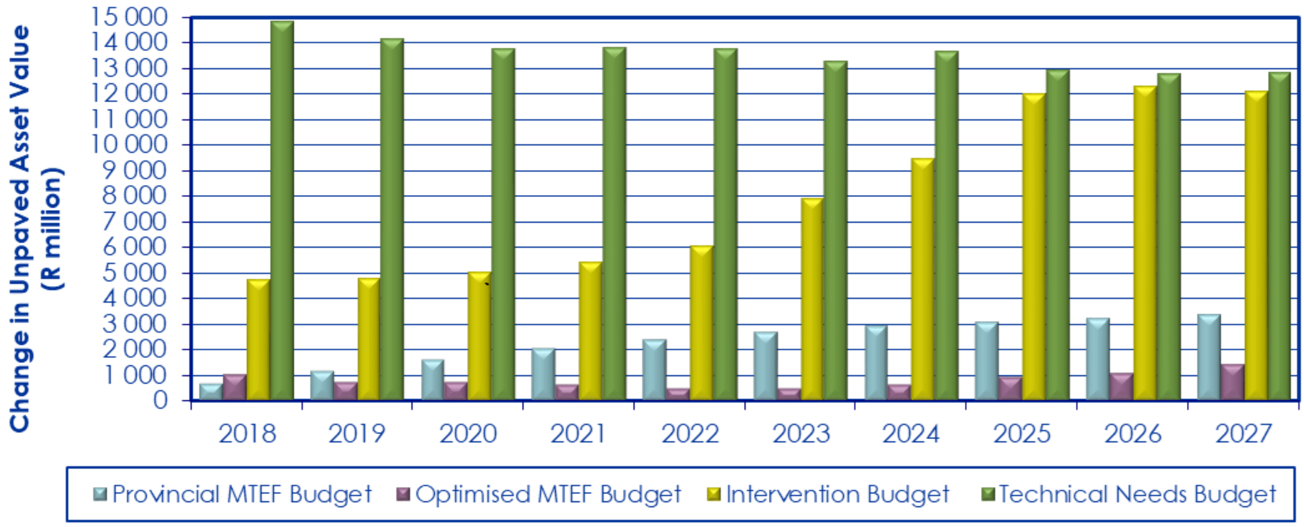


Figure 5-39: Change in asset value of maintained unpaved roads compared to 2017 values

5.1.20 Consequences of different funding scenarios on the asset value of the road network

The theoretical asset values, estimated as the current replacement cost for each of the various budgets analysed using dTIMS in 2018, are shown in Table 5-17.

Limitation: The asset values do not include the drainage structures and other inventory items such as road signs, etc.

Table 5-17: Predicted asset value comparing the Provincial MTEF budget versus the Optimised MTEF Budget

Budget Item	All values in R million (rounded to nearest R100 million)			
	Provincial Allocation		Optimised Allocation	
	Paved Roads	Unpaved Roads	Paved Roads	Unpaved Roads
Current replacement cost (CRC)	R 135 900	R 8 000	R 135 900	R 8 000
Depreciated replacement cost (DRC)	R 114 600	R 1 500	R 113 000	R 1 500
DRC as a percentage of CRC	84%	19%	83%	19%
DRC 5 years	R 104 300	R 5 100	R 106 600	R 2 600
Change in replacement cost after 5 years	R -10 300	R 3 600	R -6 400	R 1 100
Replacement cost after 5 years as a percentage of CRC	77%	64%	78%	33%
Change in replacement cost after 5 years - Total of paved and unpaved roads	-R6 700		-R5 300	

Figure 5-40 shows the change in asset value of the road network in 2018 Rands for the different budgets.

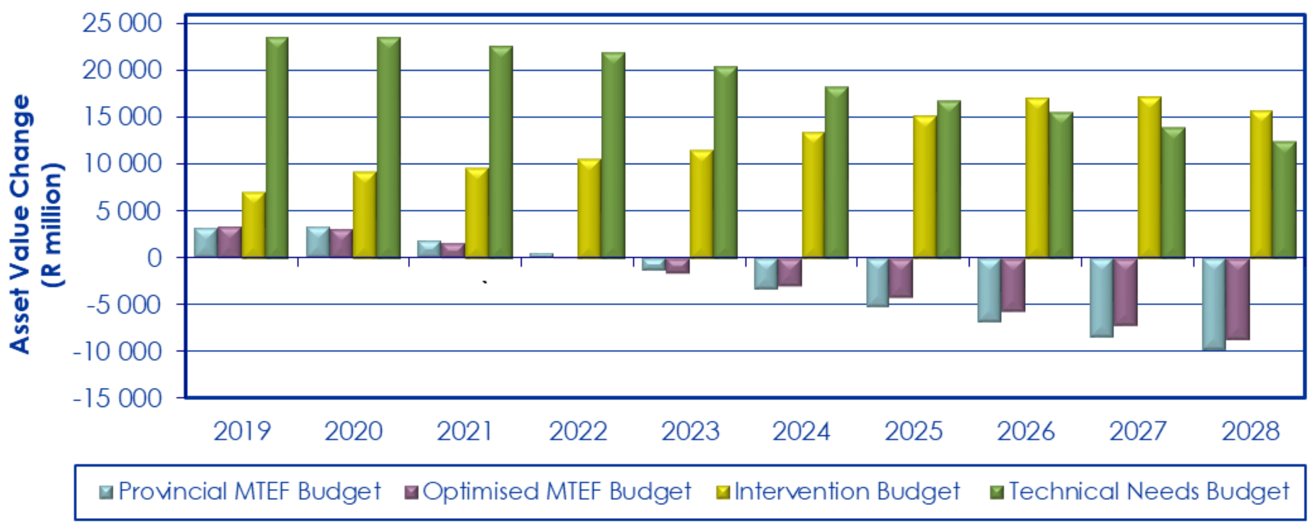


Figure 5-40: Change in asset value of the road network compared to 2018 values

- The current MTEF funding level cannot lead to an increase in asset value for both paved and unpaved road networks. This is due to the ongoing deterioration of paved roads that contributes to more than 90% of the current total network asset value.

- According to the analysis results, both the Intervention Budget and Technical Needs Budget will lead to increased asset value levels because the overall gravel thickness will increase and paved roads will be maintained at improved performance levels.

The predicted asset values in terms of depreciated replacement cost are detailed in Table 5-18. In the long-term the current funding level will result in a decrease in asset value for the road network as a whole.

Limitation: the predicted asset values do not include drainage structures and other inventory items such as road signs, etc.

Table 5-18: Asset value for 2018 versus predicted asset value after 5 years

Budget Scenario	Depreciated replacement cost (R million)								
	Current cost in 2018			Predicted in 2023			Change in asset value after 5 years		
	Paved roads	Unpaved roads	Total network	Paved roads	Upaved roads	Total network	Paved roads	Unpaved roads	Total network
Provincial MTEF Budget	R 114 600	R 1 500	R 116 100	R 100 660	R 4 161	R 104 821	R -13 940	R 2 661	R -11 279
Optimised MTEF Budget	R 114 600	R 1 500	R 116 100	R 101 936	R 2 588	R 104 524	R -12 664	R 1 088	R -11 576
Intervention Budget	R 114 600	R 1 500	R 116 100	R 114 432	R 7 128	R 121 560	R -168	R 5 628	R 5 460
Technical Needs Budget	R 114 600	R 1 500	R 116 100	R 117 838	R 6 804	R 124 642	R 3 238	R 5 304	R 8 542

The current allocation of the MTEF budget cannot prevent a future loss in asset value for paved roads. However, should funding be increased to achieve the intervention level, the asset value will increase to more than R120 billion by 2023.

The current MTEF funding level cannot improve network condition in the long-term (5+ years) and subsequently the asset value of the paved network is expected to decline (Figure 5-41), whereas the value of the unpaved network is expected to increase (Figure 5-42).

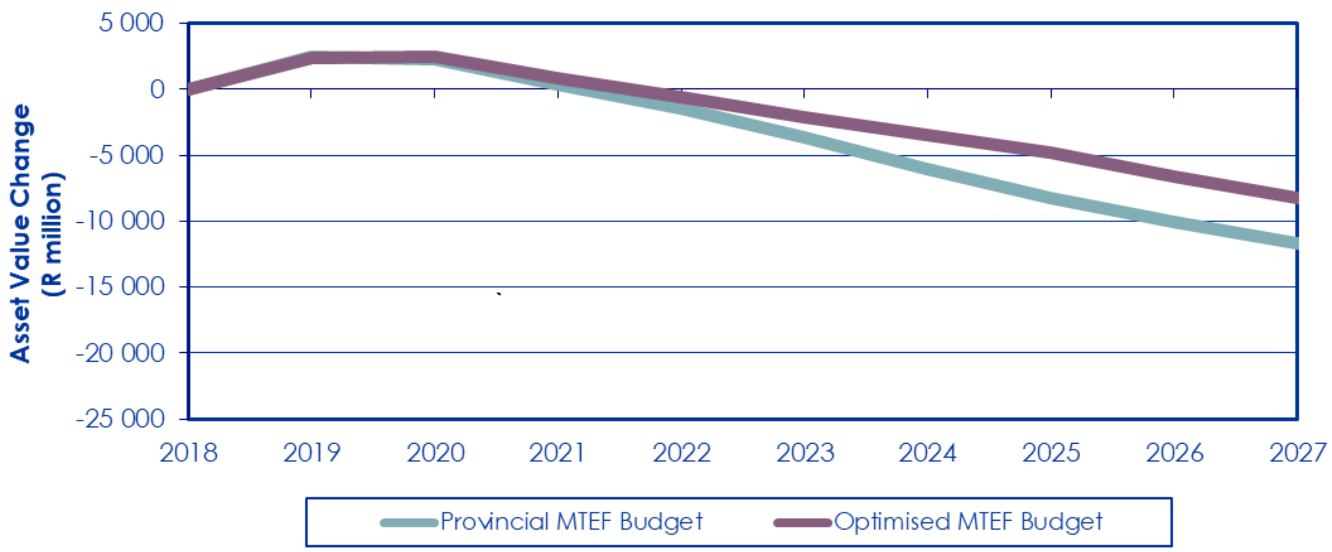


Figure 5-41: Change in asset value of paved roads

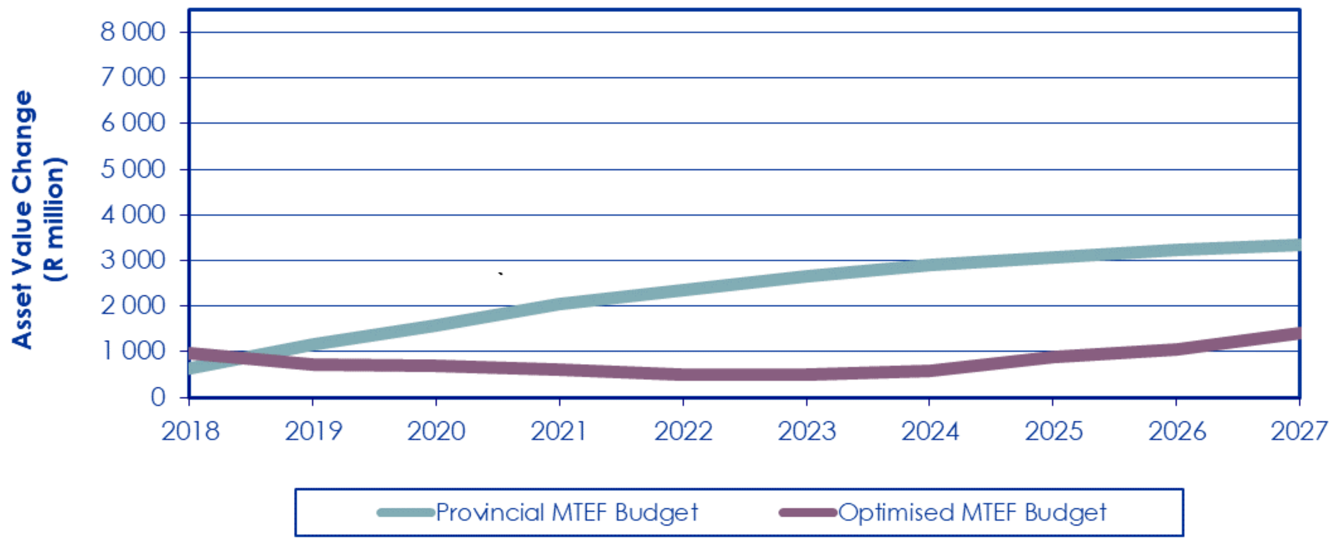


Figure 5-42: Change in asset value of unpaved roads

Consequences of different funding scenarios on excess user costs

The total predicted excess vehicle operating costs that the road users will bear after 5 and 10 years are shown in Figure 5-43. For the Provincial MTEF Budget, the cumulative excess user costs directly affecting the motorists, is expected to be almost R840million after 5 years and is expected to be just more than R4 billion after 10 years. These excess costs are a burden on the road users and the economy as a result of inadequate investment in maintaining the road network.

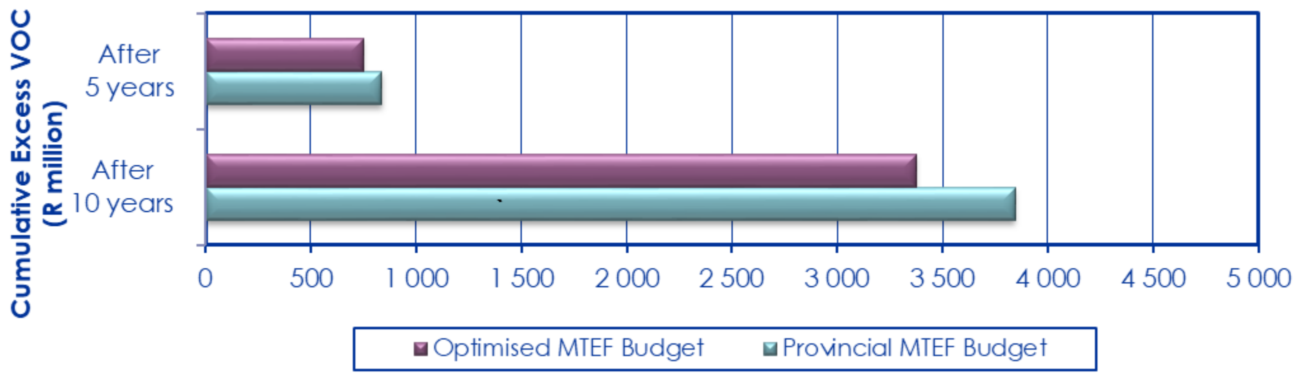


Figure 5-43: Total excess vehicle operating costs for the current funding levels on paved roads

5.1.21 Consequences of current funding level on the budget shortfall

Figure 5-44 presents the immediate need of the Branch's maintained road network, based on the 2017 visual assessment data. The budget shortfall is the difference between the current MTEF budget and the Technical Needs Budget.

The funding shortfall of the MTEF budget can therefore be calculated from the need according to the Technical Needs Budget (Table 5-15), i.e., the budget required to maximise road user benefits and to preserve the asset value.

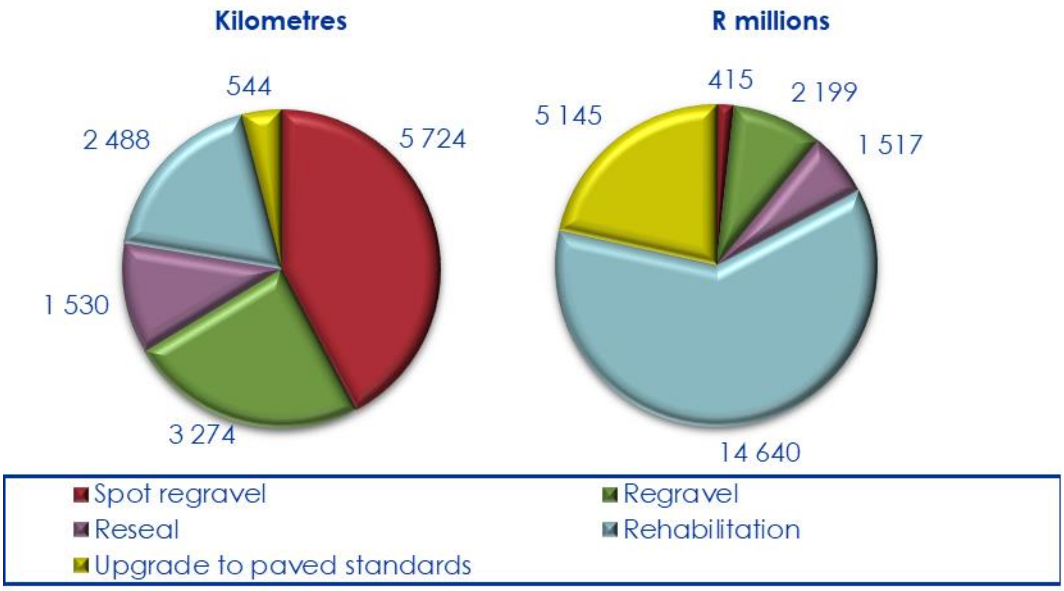


Figure 5-44: Immediate need according to the Technical Needs Budget

The budget required to eliminate the backlog in maintenance on the network is shown in Table 5-15 on page 111.

The extent of the budget backlog was calculated as the difference in the fund allocation of the Provincial MTEF Budget Allocation and the Technical Needs Budget in 2019/20

- The immediate need for gravel road maintenance is approximately R2 199 million for regravelling of 3 274 km of roads classified as medium and high LOS. An amount of R415 million is needed for spot regravelling of 5 724 km of roads classified as low and very low LOS.
- There are currently 544 km of unpaved roads where the benefit that would result from upgrading exceeds the benefit that is gained by regravelling. The funding demand of this activity is approximately R5 145 million.
- Roads experiencing structural deterioration and requiring rehabilitation account for more than 2 488 km of road and will require funding of approximately R14 billion.
- Since 2014/15, the budget backlog has increased significantly due to:
    - The change in the way that rehabilitation need is identified based on the 90th percentile roughness values;
    - Deterioration of the network leading to a greater need for rehabilitation and resealing; and
    - Increased costs.
- The immediate need for resealing is more than 1 530 km of road, requiring R1,5 billion. In comparison to the Technical Needs Budget, 100% of the need will be addressed over the next 5 years. Resealing is an important preventive measure to waterproof roads in a "fair" condition, delaying further deterioration. Once the opportunity to reseal a road has passed, the only option is expensive rehabilitation or reconstruction.

5.2 Summary of the paved and unpaved networks

Figure 5-45 shows the length of the paved and unpaved roads analysed in this RAMP versus the vehicle-km, asset value and MTEF fund allocation for the preservation of the road pavement structures and surfaces by means of regravelling, resealing, rehabilitation and upgrading of unpaved roads to paved standards.

For the current MTEF Budget, it has been found that the paved network cannot be maintained at the desired level of service and any funds used to maintain the unpaved network negatively impacts on the condition of the paved road network.

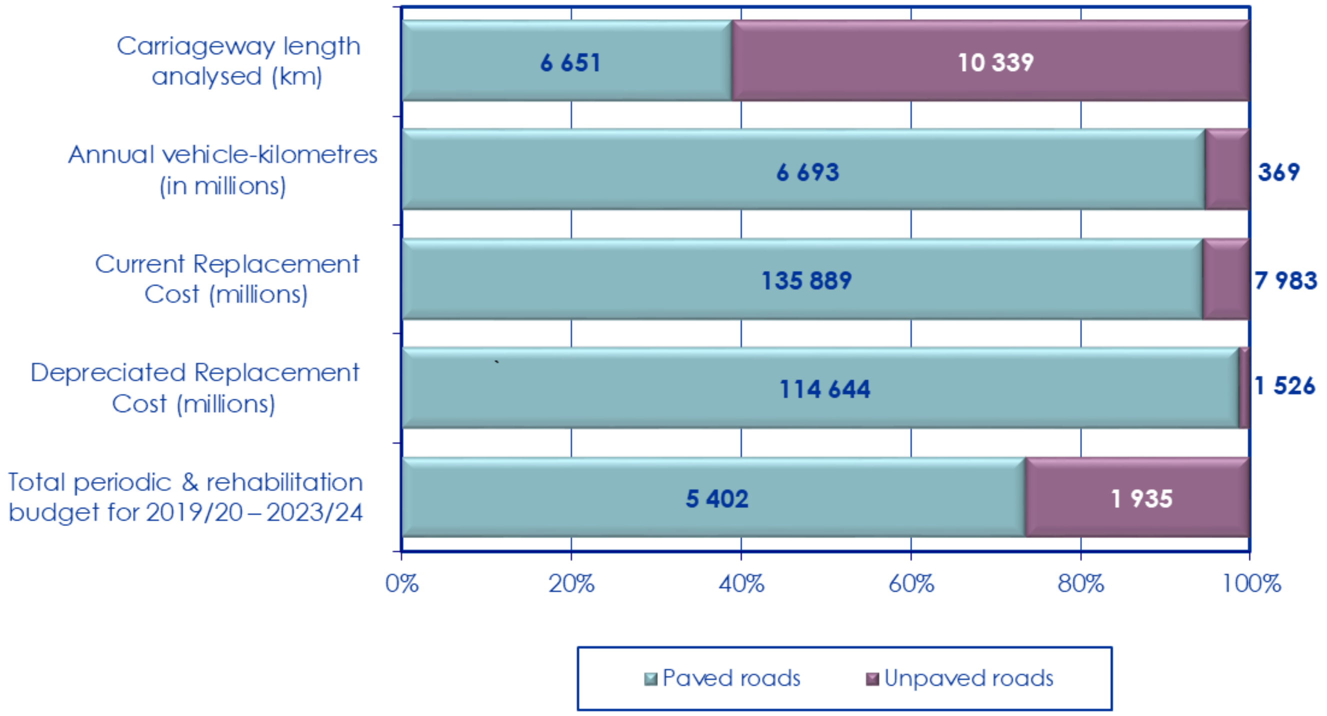


Figure 5-45: Comparison of paved and unpaved roads

5.3 Relationship of routine maintenance to condition

In this analysis, the ability of the Branch to conduct routine and emergency maintenance must also be considered. There is a direct relationship between the cost of pavement-related routine maintenance of the paved road network and road condition. For example, if the funding levels for resurfacing and rehabilitation are lower, the need for pavement related routine maintenance will increase and the following consequences are unavoidable:

- An ever-increasing need for routine maintenance will draw funds away from periodic maintenance and rehabilitation/ reconstruction.
- This will cause further deterioration of the surface condition of the road network that requires an accelerating need for additional funds.
- The future need for rehabilitation will accelerate, while the length of road that can be maintained with preventive maintenance, such as resealing, will decrease. The predicted future funding need will continue to increase.
- Teams responsible for routine maintenance will be inundated with demanding work, such as pothole repairs and patching. If these distresses are neglected the routine maintenance need will be amplified.

Table 5-19 shows the routine maintenance cost versus the proportion of the paved roads in poor to very poor condition, based on the data that has been adjusted for inflation.

Table 5-19: Routine maintenance cost versus proportion of poor and very poor paved roads

% Poor and very poor paved roads	0	14	16	19
Averaged routine maintenance need per km per year (2017 rand)	6 808	12 750	14 684	15 993

The proportion of poor and very poor roads in a road network provides an indication of the overall condition of the network. A decrease of 4,5% in unit rates since 2016 was adopted according to the unit rate decrease observed in the province. As expected, the need for routine maintenance increases as the road network deteriorates. There will, however, always be a minimum need for routine maintenance even when paved roads are maintained at optimum levels. The current proportion of poor and very poor roads is 11,3% with an associated annual routine maintenance cost of approximately R12 750 per km (Figure 5-46). If the relationship is extrapolated linearly, it is expected that this cost will increase to approximately R20 000 by 2027 under the current funding policy. However, an exponential increase in routine maintenance cost is possible, implying that the linear extrapolation may under-predict the expected maintenance cost.

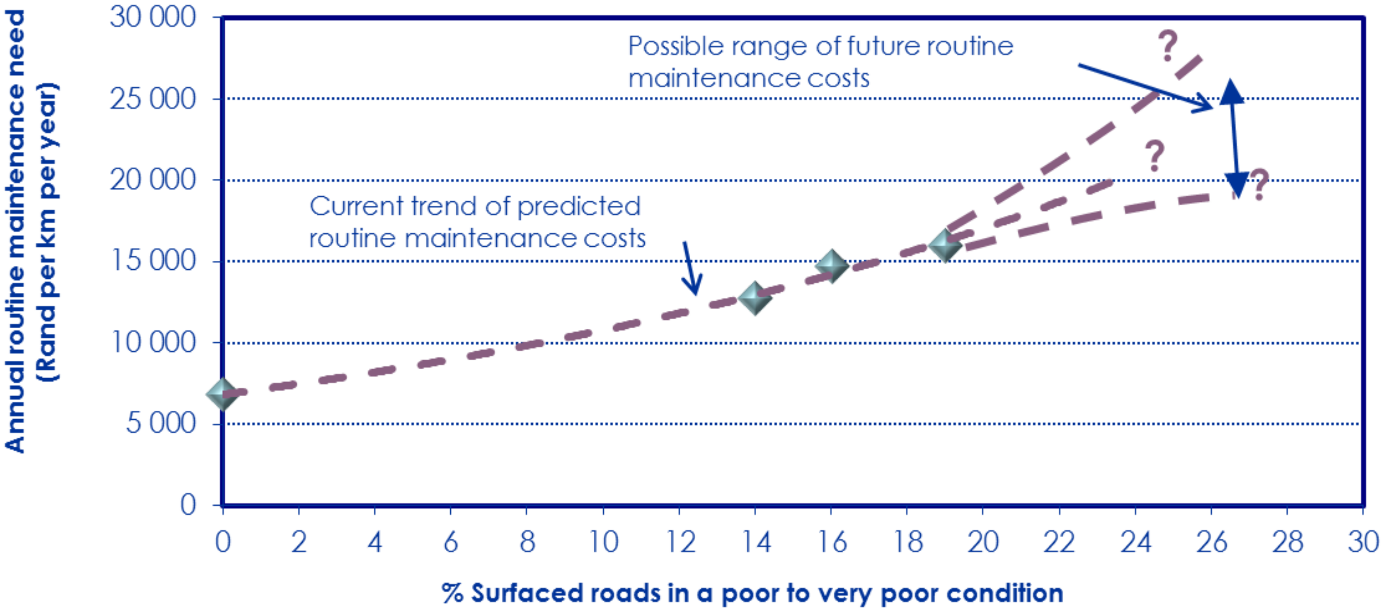


Figure 5-46: Routine maintenance cost versus condition of the paved road network

5.3.1 Recommended funding level for current assets

To remain competitive and derive the benefits from increased economic growth, the Western Cape will have to invest more in its road network than is currently the case.

In the long term, the funding level of the Intervention Budget is recommended as a "**Desired Budget"** for the resealing, regravelling, rehabilitation and upgrading activities of the Branch. The average annual funding determined for the Intervention Budget is R6 243 million (excluding the other cost). This budget is approximately 193% more than the total MTEF funding. The recommended budgets for the paved and unpaved road networks are described below.

Paved road network

Approximately R3 449 million per annum to ensure the backlog of poor and very poor roads is kept to a minimum, provided preventive maintenance is done timeously. This comprises the following five year averages:

- R89 million for resealing
- R526 million for light rehabilitation; and
- R2 834 million for rehabilitation.

Unpaved road network

To ensure gravel wearing courses are maintained, R790 million per annum is required for regravelling and spot regravelling over the next five years. An amount of R261 million per annum is required to upgrade to pavement standards.

Bridge and other structures

Due to the lack of condition data, it is only possible to estimate a recommended funding level from the cost of previous work. This is estimated to be in the region 4% of capital works per annum, i.e. approximately R103 million per annum.

Other current assets

This is not included in the analysis and therefore cannot be estimated.

5.3.2 Candidate projects and Forward Works Programme

The list of candidate projects is the start of a process that leads to the Forward Works Programme (FWP) that is scheduled in the Roads Programme. Candidate Projects are an output from dTIMS that combines the identified sections into candidate projects.

The Forward Works Programme for all categories of work is provided in Appendix I – Forward Works Programme and alignment of projects.

5.3.3 Alignment of the candidate projects and the projects in RPM

A report has been compiled to check the alignment of the Candidate Projects with the scheduled projects in RPM as well as to identify candidate projects that have no corresponding project in RPM. These lists can be found in Appendix I – Forward Works Programme and alignment of projects.

5.4 Asset sustainability

The Asset Sustainability Ratio (ASR), expressed as a percentage, is defined as the capital expenditure (capex) on the replacement of assets (renewals) divided by depreciation expense. It is an estimate of the extent to which the infrastructure assets are being replaced as they reach the end of their useful lives. The depreciation expense represents an estimate of the extent to which the infrastructure assets have been consumed. Capital expenditure on renewals (replacing assets that the WCG already has) is an estimate of the extent to which the infrastructure assets are being replaced as they reach the end of their useful life.

$$ASR = \frac{Capital\ expenditure\ on\ renewals}{Depreciation\ expense}$$

The depreciation expense (DE) is calculated from roughness measurements as these relate directly to the need for renewal of the network. The formula for DE is:

$$DE = \frac{Current\ replacement\ cost \times (Current\ yr\ average\ roughness - Previous\ yr\ average\ roughness)}{Previous\ year\ average\ roughness}$$

Using the capex and depreciation expense for 2014/15 and 2017/18, adjusted for inflation, the ASR = 9,64% for this four year period. **This value indicates that the road network is being consumed far faster than it is being renewed**. A value of 50% or more is desirable.

Limitations

- The calculation of depreciation is based solely on the roughness.
- There is a large amount spent on periodic maintenance that contributes to sustainability by reducing the deterioration in roughness of the network, but this is not included in the calculation.

5.5 Plans for overload control infrastructure

Routine maintenance

Routine maintenance of the existing weighbridge facilities at Vissershok, Joostenbergvlakte, Somerset West, Rawsonville, Swellendam, Beaufort West, Moorreesburg and Klawer is undertaken as and when necessary. This includes periodic maintenance in the form of repainting and refurbishments.

Renewal and replacement plan

Nominal amounts are provided for future maintenance, renewal and replacement of equipment that fails or becomes unreliable. The multi-deck scales are verified every 6 months. Various modules of the new CSIR software have been implemented.

Upgrading and new facilities plan

- Low speed weigh-in-motion (LSWIM) screeners have been found to be effective for screening and it would be desirable to construct these at various facilities. This would entail the construction of a separate lane for heavy traffic.
- The existing facilities at Moorreesburg and Klawer must be upgraded to provide lighting, as well as hard-stand loading area in the Vissershok holding yard.
- Further improvements at Rawsonville, Joostenbergvlakte and Somerset West have, however, been placed on hold until such a time when a decision of the future tolling of the N1 and N2 has been taken.
- A new facility is planned for Gouda.

5.6 Management of key moveable assets – Road plant

The Subdirectorate: Mechanical Services of the Transport Branch provides a mechanical support service in the Western Cape. The plant fleet consists of approximately 2 700 items with a replacement value of approximately R1,4 billion. This fleet is managed from Head Office Mechanical Services and used by the regional offices and district municipalities. A plant management and rental rate system is currently available and used to cost and measure utilisation. However, the operational costs are not currently charged back to ensure that the fleet can be renewed where and when necessary, it is envisaged that this will be reinstated.

The condition of the items in the fleet is approximately as follows:

- 65% are in good condition;
- 25% are in fair condition; and
- 10% are in poor condition.

The total operational cost of all the plant in the fleet is in the order of R108 million per year. The renewal/ replacement need has been estimated to R260 million over the next 3 years. Regional offices and district municipalities have requested new plant to the value of R85 million for the 2017/18 financial year. However, only R70 million was available for this purpose. At this rate, the fleet will , on average, only be replaced once every 20 years. The impact of the poor rate of exchange between the rand and foreign currencies on the cost of plant is significant and it will become more difficult to replace plant in the future, even at the average interval of 20 years. Heavy vehicles and road maintenance machines are purchased according to the approved preference procurement policy, and according to the approved budgets of the three regional offices. Standard items are purchased by using the National Treasury Contract RT57. The rest of the equipment will be purchased by means of ad hoc tenders and quotations.

5.7 Demand for new assets

The increase in population as well as the expected growth in the economy of the Western Cape will translate directly into a greater demand for transport, and in particular road transport. The legislation and strategic initiatives that influence the demand for new assets are provided in paragraph 5.7.3.

5.7.1 Road Investment Strategy

The demand for new assets will in future be guided by the Road Investment Strategy – refer to paragraph 1.5.7 on developing asset management strategies.

5.7.2 Gap analysis for demand determination

The demand for capital improvements on the provincial road network is assessed in the categories described below.

Paved road upgrades

- Near or at road design capacity: increase paved road width on existing alignment; and
- Pavement design inadequate: upgrade pavement structure and improve alignment.

Unpaved road upgrades

- Traffic demand exceeds design parameters: upgrade road from unpaved to paved.

Road improvements

- These are normally short to medium term interventions to improve both safety and level of service along the road or at intersections and usually include one or more of the following improvements:
  - Provision of service roads;
  - Provision of turning lanes and stop line capacity;
  - Provision of walkways;
  - Provision of cycleways;
  - Provision of bus lanes;
  - Provision of lay-bys or viewpoints on scenic roads; and
  - Upgrading of intersection control, e.g. stop street to traffic signal control, or changing ramp configurations to improve traffic flow.

New works

There are two drivers for new works, namely:

- Completing the road network, i.e., missing road links; and
- As an enabler for future growth and development.

The Branch identifies new regional infrastructure required to support growth and development through community liaison such as the municipal integrated development planning (IDP) process, which receives both community and political support. Projects such as new road links, link capacity upgrades, safety improvements, etc., are selected based on their alignment with medium- to long-term priorities such as those described in the Provincial Strategic Goals, Provincial Spatial Development Framework and the envisaged Road System Management Strategy.

To further refine the scope for each project and to verify its feasibility, specialist service providers are appointed to assist the Roads Branch with the planning process by conducting a feasibility study that examines the travel demand and benefits generated by future growth and development, in comparison to the expected costs and performance.

Various road policies and objectives, such as public transport first, improve safety, reduced congestion, improved accessibility, reduced travel time, etc., inform the road class and design standards applied. A lifecycle benefit-cost analysis is undertaken in HDM-4 to optimise the proposed alternatives. Alternatives that derive economic benefits less than the social discount rate are disregarded. The outcome is the identification of a preferred road network intervention, which is technically feasible, economically viable, and which has minimal environmental impacts.

Feasible projects are prioritised by Branch management and combined into a programme for input to the Road Investment Programme.

5.7.3 Framework for development of a Demand Management Plan

The framework for the DMP is described below.

- Legal framework
  - In terms of section 27 of the National Land Transport Transition Act, 2000, (NLTTA) (Act 22 of 2000), the integrated transport plans (ITPs) of municipalities are integrated into their IDPs.
  - Future versions of the Provincial Land Transport Framework (required by section 22 of the NLTTA), must incorporate information from the ITPs, as well as inform future ITPs.
  - Constitution, PFMA, Government Immovable Asset Management Act, 2007 (GIAMA) (Act 19 of 2007), NDP, Sustainable Development Goals, National Strategic Goals, Provincial Strategic Goals;
  - Spatial Planning and Land Use Management Act, 2013, SPLUMA (Act 16 of 2013), Local Government: Municipal Systems Act, National Land Transport Act, IDPs, ITPs, Provincial Land Transport Framework (PLTF), National Land Transport Strategic Framework (NLTSF);
  - National Environmental Management: Biodiversity Act, 2004, (Act 10 of 2004), National Environmental Management Act, 1998 (NEMA) (Act 1998), Department of Mineral Resources (DMR), Department of Water Affairs and Sanitation water licence requirements, etc.
- Strategic initiatives:
  - National Spatial Development Framework (NSDF);
  - The Provincial Strategic Infrastructure Plan;
  - The Provincial Spatial Development Framework (PSDF), developed by the Department of Environmental Affairs and Development Planning;
  - The Micro Economic Development Strategy (MEDS);
  - Provincial Strategic Objectives; and
  - National and Provincial Freight Corridor Study.
- Road Network Management Branch governance:
  - Strategic Goals, maintenance policies, capital investment policies, MTEF allocations, procurement management systems.
- Technical framework
  - Road System Management Strategy (to be developed) that contains:
    - Road network classification and associated LOS, geometric design standards, maintenance standards, Road Network Optimisation Model, project prioritisation methods, Asset Management System;

- Roads Ordinance, Expropriation Act, 1975 (Act 63 of 1975) , Road Traffic Act, Southern African Development Community road signs and marking, Road Access Guidelines, National Transport Master Plan (NATMAP), RISFSA, RCAM, draft TMH 22, TRH 22, etc.
- Integrated Design Management System (IDMS), Portfolio and Project Management System to monitor measures of effectiveness: within time, on budget and to required standards that support the coordinated and integrated planning and delivery of infrastructure projects across all sectors and spheres of government to achieve the desired NDP and PSG outcomes.
- Project procedures manual to administer, plan, design and deliver road network infrastructure and associated services.

- Institutional framework:
  - Resources to administer, plan, design and delivery road network infrastructure and associated services.

5.7.4 Demand Management Plan

Overall strategic development priorities, population trends, transport modes, and the informants of national travel surveys, will be included in the envisaged DMP. Requirements of the PSDF and Municipal Spatial Development Framework (MSDF), and the district ITP, emphasise the need for traffic modelling to be undertaken to assess the impact of spatial policies and future densification strategies along the road network corridors.

A province-wide transport model, the Western Cape Transport Model (WCTM), will be used to analyse the impact on the capacity of the existing road network to accommodate traffic demand from future growth and development. The future traffic demand requirements will be used to develop a Demand Management Plan, which will in turn inform the Branch's Investment Strategy for new assets. The WCTM will be used to test the impact of planned future land use scenarios and transport solutions and spatial policies to establish:

- Their impact on road capacity and access requirements;
- The need to expand the road network in support of the growth and development policies of the Western Cape;
- Any functional and operational system changes required;
- Projects that the local municipalities have identified to promote development as contained in their IDPs and ITPs;
- Candidate projects identified by dTIMS on the basis of traffic, average maintenance costs and vehicle operating costs
- Maintenance related upgrades identified by the DREs/DMs. These are sections of the network that incur excessive maintenance costs due lack of suitable gravel materials for maintenance or remote location; and
- Public-private partnerships, where projects are co-funded by companies, private individuals, farmer forums and special needs road-user groups, enabling the projects to become economically feasible.

Note: It is important to note that appropriate standards must be applied to each upgrade. For example, unpaved roads carrying high levels of traffic would be upgraded to normal standards, whereas maintenance-related upgrades to roads carrying little traffic would be upgraded to a much lower standard, both in terms of cross-section, alignment and pavement structure. In the latter case, it is much more important to reduce maintenance costs than to achieve a high LOS.

The identified new infrastructure is further refined into feasible projects as follows:

- The road policies and objectives, such as public transport, safety improvements, reduced congestion, improved accessibility, reduced travel time, etc., inform the road class and design standards that are required.

- Service providers are appointed to assist the Roads Branch with the planning process to produce a feasibility study to determine the travel demand generated by future growth and development as well as a cost estimate of the project.
- The outcome of the feasibility stage is a preferred road network intervention, which is technically feasible, economically viable and with minimal environmental impacts.
- Feasible new works projects are then included in the dTIMS analysis where they compete with other types of projects to maximise the total benefit to the network within the constraints of the MTEF Budget.

5.7.5 Demand prioritisation and resource allocation

In future, it is envisaged that with the implementation of the Western Cape Transport Model, the modelled outcomes from the gap analysis will determine the infrastructure needs to meet the future traffic demand, driven mainly by growth and development. These outcomes can be included in the life cycle analysis of the road network in the resource optimisation analysis in dTIMS to facilitate a more comprehensive trade-off analysis between new roads, upgrading of paved roads, safety improvements and routine maintenance in addition to rehabilitation, upgrades to unpaved roads, and periodic maintenance. The planning process for capital projects is represented diagrammatically in as a funnel through which the pool of candidate projects flow to become scheduled programs of projects.

The transport model is used to undertake a gap analysis to determine the future road network demand in support of growth and development. A gap analysis is used to systematically determine the nature, size, and timing of the "gap" between current capacity and future needs of the road network. How the road network gap is cost effectively closed is the all-important other half of the story involving rigorous investment decision-making. A good capital investment framework process will:

- systematically address the core funding questions of "Which projects? Why? At what level? When?";
- assist the Branch in striking a rational balance between capital and operating/ maintenance requirements and between renewal and expansion demands; and
- assist the Branch to motivate the road network capital investment programme to customers and elected officials with a high level of confidence in the quality of the investment decisions.

Project options analysis

Using HDM-4, conduct a comparative analysis of potential project options. Appraise and evaluate each option to determine the optimal technical solutions:

- Minimise the cost over the lifecycle of the solution;
- Maximise the benefit-cost ratio;
- Mitigate environmental impacts by undertaking an EIA; and
- Maximise social impacts such as job creation and economic growth.

Network level analysis to identify strategic priorities

The optimisation of resources among the treatments used to preserve the current assets and the new assets will be done using dTIMS to conduct a comparative review of identified improvement projects on the road network with economic lifecycle benefit-cost evaluation, including the implications of the "do nothing" option.

- Input: Road identity data (classification, length, width, surface, capacity, etc.), classified traffic counts, travel demand, vehicle operating costs, weather conditions, existing road condition, pavement deterioration models, maintenance strategies, technical road standards, levels of service.
- Output: Preferred alternative that is technically feasible, economically viable with minimal environmental impacts in compliance with the Constitution and the PFMA.

In terms of maximising the utility or the benefit derived over the life of an intervention, the expected road user costs are calculated over the lifecycle of the solution or asset using the road:

- Savings of VOC;
- Savings in time-costs; and
- Reduced accident costs.

Criteria: Net present value > 0 and benefit cost ratio > 1, mutually exclusive projects, internal rate of return (IRR) > discount rate (8%). Generally, test NPV > 0 for VOC only then do a sensitivity test VOC + Time and VOC +Time + Accidents. This gives an indication of the robustness of assumptions.

5.7.6 Current priorities

The City of Cape Town's functional area that includes the municipalities of Swartland, Drakenstein, Stellenbosch and Overstrand, plays an important role in demand management strategies as the City places a high priority on transit-oriented-development and its associate land use densification strategies to enable long-term public transport and intermodal planning. In the regional context, economic emphasis is placed on the development of the coastal economy (Phakisa) and other national initiatives such as project Khulisa, which includes the development of the Saldanha Industrial Development Zone. Regional demand is also influenced by the Growth Potential of Towns Study and the priorities outlined in district and municipal ITPs. The transport plans of municipalities are developed during joint-planning initiatives with the nine provincial departments under the facilitation of the Department of Local Government.

Currently, a gap analysis has been done on a few parts of the network, namely,

- Saldanha Bay Municipal Area;
- The Trunk Road 9 (Cape Town to Bellville) corridor;
- George Bypass; and
- Mossel Bay Municipal Area.

In the absence of the DMP, a list of known high priority improvements, i.e. possible future projects, were developed by the Planning Directorate, shown in Table 5-20. The total cost estimate is approximately R5,1 billion.

Table 5-20: Possible future capital improvements

Description	Category	Cost Estimate 2016 Rand (millions)	Desired Commence-ment Year	Funded by Province	Notes
George Western Bypass	New Asset	500	2018	100%	Identified in IDP for economic growth of George
Realignment of R27/ MR 199 Between West Coast Road and the N7	Paved Road Upgrade	200	2018	100%	Essential for the growth of the Northern corridor and evacuation from Koeberg Power Station
Upgrading of MR201 Paarl to Wemmershoek	Paved Road Upgrade	400	2018	100%	Required for economic growth and development in Paarl
Dualling of MR174 N1 to Stellenbosch	Paved Road Upgrade	300	2017	100%	Reduction of congestion during peak traffic
Extension of R300 North	New Asset	1 000	2018	100%	Essential for the growth and development of Cape Town as well as evacuation from Koeberg Power Station

Table 5-20: Possible future capital improvements

Description	Category	Cost Estimate 2016 Rand (millions)	Desired Commence-ment Year	Funded by Province	Notes
Upgrading of FW de Klerk Boulevard	Paved Road Upgrade	200	2017	40%	Reduce congestion and make the Cape Town CBD more attractive for high density development. 40% Subsidy to CoCT.
Completion of Foreshore Freeways in Cape Town	New Asset	2 000	2017	40%	Completion of the N1 corridor system, essential for rapid bus system and port access. JV between CoCT, WCG (+-40%) and private sector
Extension of Berkeley Road towards Observatory	New Asset	160	2019	40%	Essential element for the development of the Voortrekker Rd economic development corridor. 40% Subsidy to CoCT
Blaauwberg Road Extension	New Asset	150	2016	100%	Required to facilitate growth and development along the Northern Corridor and a major East-West link between the R27 and Durbanville
Dualling of Plattekloof Inter-change on the N7	Paved Road Upgrade	75	2019	100%	Reduced congestion for commuters and industrial users
New interchange on N7 near Malmesbury	New Asset	120	2019	50%	Part of the SIP 5 project for the upgrading of the Saldanha port as a strategic freight road to the N7 and beyond. JV between WCG (50%) and SANRAL

The Desired Budget is R7 918 million over the next 8 years. This budget is based on improving the level of service on roads that have congestion and/or safety issues as well as new infrastructure. The estimated cash flow for new infrastructure is shown in Table 5-21.

Table 5-21: Desired funding for new infrastructure

Category	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	Total
Not yet scheduled	1 216	1 798	1 236	713	553	159	159	5 834
Scheduled	391	451	275	80	13	438	438	2 084
Total	1 607	2 248	1 511	793	566	597	597	7 918

The estimated cost for upgrades to existing infrastructure for the next 8 years is shown in Table 5-22.

Table 5-22: Desired Budget for upgrades to existing infrastructure

Category	Budget allocations per fiscal year (millions)							
	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	Total
Not yet scheduled	297	471	264	60	-	-	-	1 092
Scheduled	711	524	519	265	135	40	116	2 310
Total	1008	994	783	325	135	40	116	3 402

5.8 Project packaging and scheduling

5.8.1 Project packaging

Prior to the finalisation of projects, consideration should be given to project packaging:

- Confirmation of treatment recommendations through panel inspections, where appropriate; or more detailed engineering investigations for more complex treatments, which might move these candidates to later years due to time required for design and contractor procurement.
- Visual inspections are undertaken by panels:
  - The panel inspection for paved roads includes personnel from Planning, Design, Program and Systems Support, as well as from the regional offices.
  - The panel inspection for unpaved roads includes personnel from the Systems Support Subdirectorate, the regional offices, the district municipalities, as agents of the WCG, as well as political representatives of the district municipalities.
- Compilation of viable projects, through merging of candidate projects across treatment types and years to achieve economy of scale.
- *Ad hoc* inclusion of identified work on structures.

5.8.2 Project scheduling

The initial scheduling of projects in the Roads Programme takes place after the final scope of each project has been approved. There are many subsequent phases of project scheduling over the full project lifecycle that covers all the stages from inception to completion of the work.

Where projects require funding in excess of the annual budget of a specific subprogramme, the budgets are adjusted (within limits) to suit the projects in question. Specific priorities identified by the Branch may also be accommodated and the funding adjusted for each subprogramme.

While the priority order in which projects should ideally be implemented is determined during the optimisation process, there are many "real-world" factors that influence the scheduling of projects within an implementation programme. The scheduling process considers all the factors exogenous to the prioritisation process that affect scheduling in the programme. The importance of each factor can vary at any time from the initial scheduling until the project has been completed:

- Availability of design and contract documentation for the project: non-performing consultants can cause delays in project design.
- Statutory processes: unexpected delays caused by, e.g., changes in legislation, expropriation, environmental and stakeholder participation processes can cause projects to be delayed. When this happens, it can cause a reprioritisation of the rest of the programme in terms of affordability, risk, etc.
- Ring-fenced budgets: Projects are prioritised in response to "use it or lose it" funding, which may not be compatible with the "real" priority of the project. The requirement is to spend the allocated budget in a specific financial year, or run the risk of losing the funding.
- Strategic importance: some projects are prioritised to support the strategic initiatives of other spheres of government, such as, e.g., the Saldanha Industrial Development Zone (IDZ).
- Affordability: Projects are slotted into a programme where they can be accommodated in terms of the expected cash flow of existing financial commitments and the available funding, which, in turn is affected by other factors, namely:
  - Differences in pre-tender cost estimates versus tendered amounts awarded to contractors;
  - Sudden increases or decreases in available funding;

- Construction delays: non-performing contractors can cause delays during construction leading to the reprioritisation of other projects;
- Risk: projects are scheduled in a manner that seeks to minimise the risks of, e.g., the following:
  - Congestion caused by construction activity;
  - Shortages of materials such as bitumen;
  - Overloading the construction capacity of the local construction industry;
  - Weather, e.g., resealing projects can only be undertaken during the summer months;
  - Not spending conditional grants; and
- Social factors: it is desirable for projects to be distributed spatially to ensure that contractor development, targeted procurement and job opportunities are, as far as possible, distributed fairly.

There are a number of possible variations of scheduling that are listed under their separate headings below.

Routine maintenance for roads

The routine maintenance of unpaved and paved roads includes the blading of unpaved roads, minor bridge repairs, grass cutting, road marking, traffic signs maintenance, etc.

Routine maintenance inspections are carried out weekly by the officials actively involved in these actions. The maintenance actions required are identified and are supplemented with actions required to address complaints received from the public. Routine maintenance actions are then prioritised as follows:

- First priority: actions required to safeguard the travelling public. These include repairs to road traffic signs, filling of potholes, the blading of unpaved roads, and other actions required to make the road prism safe for use; and
- Second priority: actions in the road reserve, such as grass cutting, opening up of drainage structures, rubbish removal, etc.

Funds are distributed according to technical norms such as traffic volume, road length and socio-economic factors, such as the use of the road by agriculture, tourism, etc.

Under current funding levels, only about 65% of the optimum level of maintenance on trunk, main and divisional roads can be accomplished. It is estimated that an increase of approximately R465 million per annum will be required to achieve the desired level.

Minor roads, which the Branch is not compelled to maintain, have, for many years, due to funding and logistical restrictions, received very little attention. The public, organised labour and tourism organisations see some these roads as essential. Complaints about their condition are received regularly. Approximately R36,54 million per annum is currently spent on maintaining minor roads and it is estimated that a further amount of approximately R81 million per annum would be required to provide the desired level of maintenance on these roads.

Bridge maintenance

Bridge inspections will be undertaken periodically by the Directorate: Design, the regional offices and consulting engineers to identify bridge maintenance requirements. The resulting information is stored in the Bridge Management and Structures Management System. Projects are identified from the B&SMS and prioritised on the basis of safety and technical requirements. Depending on the urgency of maintenance projects, funding is made available to allow the maintenance to be carried out timeously. Future developments will integrate the outputs for the B&SMS with dTIMS.

Road safety improvements

From the accidents database, high-frequency accident locations are identified. On-site inspections of these locations are periodically undertaken, where the most urgent projects will be prioritised on the basis of their potential impact on road safety. Where necessary, consulting engineers are appointed for detailed investigations and preparation of designs, specifications and cost estimates.

Road safety improvements are sometimes included in the scope of rehabilitation and upgrading projects.

Contributions to the Cape Town MTAB

In terms of the Urban Transport Act, 1977 (Act 78 of 1977), the City of Cape Town is the core city for the Cape Town Metropolitan Area. The WCG, represented by the Branch, is part of the Metropolitan Transport Advisory Board (MTAB). From time to time, planning projects, and/or joint or special, (e.g. the 2010 Soccer World Cup), projects are undertaken, requiring part funding by the Branch. Such projects and the required funding are negotiated between the two parties.

Contributions to municipal rehabilitation and periodic maintenance

Transfer payments are made to municipalities, including the City of Cape Town, for the rehabilitation and periodic maintenance of proclaimed municipal main roads within municipal areas. These are subsidies on expenditure payable to municipal councils that are road authorities for main roads in terms of the Roads Ordinance. Allocations are placed on a priority listing system and based on condition data. The municipalities usually provide 20% of the costs and the WCG subsidises the other 80%.

5.9 Changes in technology

Road-based transport is expected to remain the primary mode of transport for both passengers and freight in the Western Cape. No foreseeable changes in technology will reduce or, for that matter, increase the need for road infrastructure over the next ten years. The Branch continuously monitors new transport-related technologies that arise from time to time.

Chapter 6 – Asset management plans

6.1 Closing the gap

6.1.1 Road infrastructure

The level of service that is provided has a great influence on the level of expenditure required. In this report three scenarios were considered:

- The current trend in MTEF allocations to the Branch continues;
- An Optimised MTEF Budget is put in place, where the total transportation cost to society is minimised; and
- A desired budget, i.e. the Intervention Budget becomes possible.

Should additional funds be made available to implement the Desired Budget, it is intended to phase in the additional work over a period of 10 years. This would ensure that the capabilities and capacities of the Branch and its agents, the district municipalities, and those of private contractors are not exceeded. This phasing is reflected in the estimates of future expenditure.

Appendix I – Forward Works Programme and alignment of projects shows indicative lists of current projects for roads and for overload control.

6.1.2 Projected 10 year budget allocations

The expected budget allocations most likely to be available for the next 10 years are shown in Table 6-1.

Table 6-1: 10-year plan for various treatment categories

Treatment	Budget allocations per fiscal year (R X thousands)									
	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29
Resealing	592 535	456 860	475 425	570 150	589 030	630 262	674 380	721 588	772 100	826 147
Rehabilitation	917 173	789 844	495 250	536 897	690 788	739 143	790 883	846 245	905 482	968 866
Light Rehabilitation	-	-	-	-	-	-	-	-	-	-
Regravel	96 890	103 560	112 740	184 175	194 890	208 532	223 130	238 749	255 461	273 343
Upgrading to paved	100 000	216 000	194 000	166 000	231 000	247 170	264 472	282 985	302 794	323 989
Other	1 787 783	2 096 344	2 253 323	2 250 053	2 186 931	2 340 016	2 503 817	2 679 085	2 866 620	3 067 284
Total	3 494 381	3 662 608	3 530 738	3 707 275	3 892 639	4 165 124	4 456 682	4 768 651	5 102 457	5 459 630
AFR	300 000	300 000	-	-	-	-	-	-	-	-
PRMG	911 213	961 194	1 028 478	1 100 471	1 177 504	1 259 929	1 348 124	1 442 493	1 543 468	1 651 510
Overload control	27 839	29 231	30 692	32 227	33 838	36 207	38 741	41 453	44 355	47 460

Note: All figures after 2024/25 were estimated by using an escalation of 7% per annum

6.1.3 Plans for Expanded Public Works Programme and Provincial Road Maintenance Grant

The Branch is in the process of scaling up its capacity to create employment through the Expanded Public Works Programme (EPWP) in conjunction with the requirements of the Provincial Road Maintenance Grant (PRMG). More detail on the EPWP strategy is available in a document entitled "EPWP (Roads) Scaling Up: Business Plan for Financial Years 2009/10, 2010/11 and 2011/12" (available on request).

There are 21 priority areas identified for the PRMG. These have been designated as being "poorest of the poor" areas. These areas are given a higher priority when sourcing local labour (Table 6-2).

Table 6-2: Priority areas for allocation of EPWP funds

District municipality	Central Karoo
Local municipalities	Cederberg, Matzikama, Saldanha, Kannaland, Oudtshoorn, Drakenstein, Witzenberg, Theewaterskloof
Sub-councils (Cape Metro)	Bishop Lavis, Delft, Elsies River, Hanover Park, Gugulethu, Manenberg, Kleinvlei, Khayelitsha, Mitchells Plain, Muizenberg, Nyanga, Philippi.

Prioritised PRMG projects for the MTEF budget are shown in Appendix J – Gazetted list of projects.

6.2 Management of Road Asset Management System

Data for the RAMS is collected systematically according to the required methods and frequency (Table 3-1 and Table 3-2), verified and stored in a State Information Technology Agency (SITA)-managed database. The various systems (RNIS, PMS, GRMS, B&SMMS, TCS, PAS, etc.) access and process the data into information that is stored on the database. This process has been going on and expanding since the first system was introduced in the 1980s. The data requirements have now stabilised and this data will continue to be collected as an essential input to the management of the road network according to best practice in asset management (refer to draft TMH 22 Asset Management (Committee of Transport Officials, 2013) and ISO55001 (International Standards Organization for Standardization, 2015)). See also paragraph 1.6.

6.3 Asset transfers

No transfers of assets are currently being envisaged.

6.4 Disposal plan

Road infrastructure has a very long life, and seldom becomes obsolete in function. Whenever sections of road become obsolete due to a replacement road being built on a changed alignment, the old road is ploughed up, and bridges and culverts demolished. The costs of these disposal actions are included in the construction costs of the replacement or new facility. The road reserve of such road sections are then de-proclaimed and returned to their original owners, or their legal successors. The value of land returned is offset from the cost of any new expropriated land.

Chapter 7 – Financial summary

7.1 Financial statements and projections

7.1.1 Key assumptions

The financial requirements for road infrastructure, as set out in Table 7-3 and Table 7-4 are based on detailed optimisation procedures, which are in turn based on detailed network information. The network information is, in the end, the key to the accuracy of the resulting financial requirements. The following items of information are especially important:

- Road network information;
- Road conditions;
- Traffic volumes;
- Estimates of costs for maintenance, renewals, replacements, upgrading and new facilities; and
- The LOS to be provided.

7.1.2 Roads infrastructure

Routine maintenance, the renewal or replacement of roads, the upgrading of roads, and the provision of new facilities do not happen in isolation. To enable these actions to take place requires programme support expenditure, planning expenditure and design expenditure.

The tables below show the expected MTEF allocation at current levels, the required funding, and the additional funding required, for the following aspects of road infrastructure:

Enabling expenditure, consisting of expenditure on:

- Programme support (Table 7-3A);
- Planning (Table 7-3B); and
- Design (Table 7-3C).

Routine maintenance expenditure (Table 7-3D).

Renewal and replacements expenditure (Table 7-3N) consisting of expenditures on:

- Regravelling (Table 7-3E);
- Resealing (Table 7-3F);
- Light Rehabilitation (Table 7-3G);
- Bridge maintenance (Table 7-3H);
- Rehabilitation and reconstruction of paved roads (Table 7-3I);
- Access and development projects (Table 7-3J);
- Road safety improvements (Table 7-3K);
- Contributions to the Cape Town MTAB (Table 7-3L); and
- Contributions to municipalities for rehabilitation & reconstruction (Table 7-3M).

Upgrading and new facilities (Table 7-3R), consisting of expenditure on:

- Unpaved road upgrading (Table 7-3O);
- Paved road upgrading (Table 7-3P); and
- New facilities (Table 7-3Q).

Table 7-1 below shows a summary of the funding required to achieve the Desired Budget for roads (totals for Vote 10: Programme 3: Roads). Considerable additional funding will be needed to achieve the desired level of service. The average shortfall in funding provided for roads in the Western Cape over the next 10 years is of the order of R2,28 billion per year in 2018 Rand.

Table 7-1: Funding required to achieve the Desired Budget for roads (totals for Vote 10: Programme 3: Roads

Financial Year	MTEF budget 2018, Rands	Desired funding, Rands	Additional funds required, Rands
2019/20	3 494 381	5 568 000	2 073 619
2020/21	3 662 608	5 892 000	2 229 392
2021/22	3 530 738	6 555 000	3 024 262
2022/23	3 707 275	6 633 000	2 925 725
2023/24	3 892 639	6 566 000	2 673 361
2024/25	4 165 124	6 566 000	2 400 876
2025/26	4 456 682	6 400 000	1 943 318
2026/27	4 768 651	6 566 000	1 797 349
2027/28	5 102 457	6 561 000	1 458 543
2028/29	5 459 630	4 320 000	-1 139 630

7.2 Overload control

The tables, as indicated below, show the expected MTEF allocation at current levels, the required funding, and the additional funding required, for the following aspects of overload control:

Routine maintenance (Table 7-4A);

Renewals and replacements (Table 7-4B);

Upgrading and new facilities (Table 7-4C); and

Operational Expenditure (Table 7-4D).

Table 7-2 shows a summary of the financial resources required if the desired budget and maintenance scenario for overload control is to be achieved. It follows from the figures shown in Table 7-2 that additional funding for overloading control will have to be provided to realise the desired level of service.

Table 7-2: Funding required to achieve the Desired Budget for overload control (totals for Vote 10: Sub-programme 5.4: Overload control)

Financial Year	MTEF budget 2018, Rands	Desired funding, Rands	Additional funds required, Rands
2019/20	27 839	40 465	12 626
2020/21	29 231	42 488	13 257
2021/22	30 692	44 613	13 921
2022/23	32 227	46 933	14 706
2023/24	33 838	49 375	15 537
2024/25	36 207	51 946	15 739
2025/26	38 741	54 653	15 912
2026/27	41 453	57 932	16 479
2027/28	44 355	61 408	17 053
2028/29	47 460	65 707	18 247

It is foreseen that, in future, upgrading and new facilities for overloading control will be funded as Road Infrastructure.

The only way the additional funds required for overloading control infrastructure could be funded, would be by means of additional grants by Provincial Treasury.

7.3 Cash flow forecasts

The cash flow forecast, desired funding estimates and the additional funds required are provided in Table 7-3 for the road network and in Table 7-4 for overload control.

Table 7-3: Cash flow forecasts and desired funding estimates

Average MTEF inflation increase*	7%	All monetary values are in currency of the year shown

			2019/20 (x R1000)	2020/21 (x R1000)	2021/22 (x R1000)	2022/23 (xR1000)	2023/24 (xR1000)	2024/25 (xR1000)	2025/26 (xR1000)	2026/27 (xR1000)	2027/28 (xR1000)	2028/29 (xR1000)
Table 7-3A	Programme support (Vote 10, Prog 3, Sub-prog 1)	MTEF	40 186	42 469	45 877	48 171	50 582	54 123	57 911	61 965	66 303	70 944
		Desired Funding	44 350	46 925	50 645	53 272	55 683	59 581	63 751	68 214	72 989	78 098
		Additional funds required	**4 164**	**4 456**	**4 768**	**5 101**	**5 101**	**5 458**	**5 840**	**6 249**	**6 686**	**7 154**

			2019/20 (x R1000)	2020/21 (x R1000)	2021/22 (x R1000)	2022/23 (xR1000)	2023/24 (xR1000)	2024/25 (xR1000)	2025/26 (xR1000)	2026/27 (xR1000)	2027/28 (xR1000)	2028/29 (xR1000)
Table 7-3B	Planning (Vote 10, Prog 3, Sub-prog 2)	MTEF	89 975	95 382	99 853	104 870	109 936	117 632	125 866	134 676	144 104	154 191
		Desired Funding	91 696	97 223	101 823	106 978	112 044	119 887	128 279	137 259	146 867	157 148
		Additional funds required	**1 721**	**1 841**	**1 970**	**2 108**	**2 108**	**2 256**	**2 413**	**2 582**	**2 763**	**2 957**

			2019/20 (x R1000)	2020/21 (x R1000)	2021/22 (x R1000)	2022/23 (xR1000)	2023/24 (xR1000)	2024/25 (xR1000)	2025/26 (xR1000)	2026/27 (xR1000)	2027/28 (xR1000)	2028/29 (xR1000)
Table 7-3C	Design (Vote 10, Prog 3, Sub-prog 3)	MTEF	252 268	270 661	263 044	275 627	289 516	309 782	331 467	354 670	379 496	406 061
		Desired Funding	253 615	272 102	264 586	277 277	291 166	311 548	333 356	356 691	381 659	408 375
		Additional funds required	**1 347**	**1 441**	**1 542**	**1 650**	**1 650**	**1 766**	**1 889**	**2 021**	**2 163**	**2 314**

			2019/20 (x R1000)	2020/21 (x R1000)	2021/22 (x R1000)	2022/23 (xR1000)	2023/24 (xR1000)	2024/25 (xR1000)	2025/26 (xR1000)	2026/27 (xR1000)	2027/28 (xR1000)	2028/29 (xR1000)
Table 7-3D	Routine maintenance	MTEF	829 954	891 832	934 549	978 385	1 024 897	1 096 640	1 173 405	1 255 543	1 343 431	1 437 471
		Desired Funding	1 216 026	1 301 148	1 392 228	1 489 684	1 593 962	1 705 539	1 824 927	1 952 672	2 089 359	2 235 614
		Additional funds required	**386 072**	**409 316**	**457 679**	**511 299**	**569 065**	**608 899**	**651 522**	**697 129**	**745 928**	**798 143**

			2019/20 (x R1000)	2020/21 (x R1000)	2021/22 (x R1000)	2022/23 (xR1000)	2023/24 (xR1000)	2024/25 (xR1000)	2025/26 (xR1000)	2026/27 (xR1000)	2027/28 (xR1000)	2028/29 (xR1000)
Table 7-3E	Regravelling	MTEF	96 890	103 560	112 740	184 175	194 890	208 532	223 130	238 749	255 461	273 343
		Desired Funding	225 818	228 420	675 820	855 561	953 692	1 342 718	714 454	864 541	1 201 865	1 285 996
		Additional funds required	**128 928**	**124 860**	**563 080**	**671 386**	**758 802**	**1 134 186**	**491 324**	**625 792**	**946 404**	**1 012 652**

			2019/20 (x R1000)	2020/21 (x R1000)	2021/22 (x R1000)	2022/23 (xR1000)	2023/24 (xR1000)	2024/25 (xR1000)	2025/26 (xR1000)	2026/27 (xR1000)	2027/28 (xR1000)	2028/29 (xR1000)
Table 7-3F	Resealing	MTEF	592 535	456 860	475 425	570 150	589 030	630 262	674 380	721 588	772 100	826 147
		Desired Funding	303 952	54 811	45 420	41 675	78 941	19 121	959 643	1 694 284	1 368 868	1 464 689
		Additional funds required	**-288 583**	**-402 049**	**-430 005**	**-528 475**	**-510 089**	**-611 141**	**285 263**	**972 696**	**596 768**	**638 542**

			2019/20 (x R1000)	2020/21 (x R1000)	2021/22 (x R1000)	2022/23 (xR1000)	2023/24 (xR1000)	2024/25 (xR1000)	2025/26 (xR1000)	2026/27 (xR1000)	2027/28 (xR1000)	2028/29 (xR1000)
Table 7-3G	Light Rehabilitation	MTEF	0	0	0	0	0	0	0	0	0	0
		Desired Funding	1 072 843	609 774	537 509	626 293	759 239	724 638	548 825	106 402	134 469	143 882
		Additional funds required	**1 072 843**	**609 774**	**537 509**	**626 293**	**759 239**	**724 638**	**548 825**	**106 402**	**134 469**	**143 882**

			2019/20 (x R1000)	2020/21 (x R1000)	2021/22 (x R1000)	2022/23 (xR1000)	2023/24 (xR1000)	2024/25 (xR1000)	2025/26 (xR1000)	2026/27 (xR1000)	2027/28 (xR1000)	2028/29 (xR1000)
Table 7-3H	Bridge maintenance	MTEF	18 000	21 000	40 000	50 000	50 000	53 500	57 245	61 252	65 540	70 128
		Desired Funding	103 041	110 254	117 972	126 230	135 066	144 520	154 637	165 461	177 043	189 436
		Additional funds required	**3 200**	**72 800**	**73 041**	**70 254**	**72 972**	**76 230**	**81 566**	**87 275**	**93 385**	**99 922**

			2019/20 (x R1000)	2020/21 (x R1000)	2021/22 (x R1000)	2022/23 (xR1000)	2023/24 (xR1000)	2024/25 (xR1000)	2025/26 (xR1000)	2026/27 (xR1000)	2027/28 (xR1000)	2028/29 (xR1000)
Table 7-3I	Rehab & reconstruction of paved roads	MTEF	917 173	789 844	495 250	536 897	690 788	739 143	790 883	846 245	905 482	968 866
		Desired Funding	2 884 359	3 606 993	3 241 249	2 963 774	2 428 123	1 471 861	1 114 206	1 760 552	1 377 764	1 474 207
		Additional funds required	**1 967 186**	**2 817 149**	**2 745 999**	**2 426 877**	**1 737 335**	**732 718**	**323 323**	**914 307**	**472 282**	**505 342**

			2019/20 (x R1000)	2020/21 (x R1000)	2021/22 (x R1000)	2022/23 (xR1000)	2023/24 (xR1000)	2024/25 (xR1000)	2025/26 (xR1000)	2026/27 (xR1000)	2027/28 (xR1000)	2028/29 (xR1000)
Table 7-3J	Access & development projects (Community Based Public Works Programme)	MTEF	0	0	0	0	0	0	0	0	0	0
		Desired Funding	9 831	10 519	11 255	12 043	12 886	13 788	14 753	15 786	16 891	18 073
		Additional funds required	**9 831**	**10 519**	**11 255**	**12 043**	**12 886**	**13 788**	**14 753**	**15 786**	**16 891**	**18 073**

			2019/20 (x R1000)	2020/21 (x R1000)	2021/22 (x R1000)	2022/23 (xR1000)	2023/24 (xR1000)	2024/25 (xR1000)	2025/26 (xR1000)	2026/27 (xR1000)	2027/28 (xR1000)	2028/29 (xR1000)
Table 7-3K	Road safety improvements	MTEF	15 400	50000	110 000	116 000	13 000	13 910	14 884	15 926	17 040	18 233
		Desired Funding	11 449	12 250	13 108	14 026	15 008	16 058	17 182	18 385	19 672	21 049
		Additional funds required	**-3 951**	**-37 750**	**-96 892**	**-101 974**	**2 008**	**2 148**	**2 298**	**2 459**	**2 632**	**2 816**

			2019/20 (x R1000)	2020/21 (x R1000)	2021/22 (x R1000)	2022/23 (xR1000)	2023/24 (xR1000)	2024/25 (xR1000)	2025/26 (xR1000)	2026/27 (xR1000)	2027/28 (xR1000)	2028/29 (xR1000)
Table 7-3L	Contributions: Cape Town MTAB	MTEF	0	0	0	0	0	0	0	0	0	0
		Desired Funding	0	13 386	14 323	15 326	16 399	17 547	18 775	20 089	21 495	23 000
		Additional funds required	**0**	**13 386**	**14 323**	**15 326**	**16 399**	**17 547**	**18 775**	**20 089**	**21 495**	**23 000**

			2019/20 (x R1000)	2020/21 (x R1000)	2021/22 (x R1000)	2022/23 (xR1000)	2023/24 (xR1000)	2024/25 (xR1000)	2025/26 (xR1000)	2026/27 (xR1000)	2027/28 (xR1000)	2028/29 (xR1000)
Table 7-3M	Contributions: Municipal rehab & reconstruction (Eqt share)	MTEF	53 000	75000	36000	18 000	19 000	20 330	21 753	23 276	24 905	26 648
		Desired Funding	8 014	8 575	9 176	9 818	10 505	11 240	12 027	12 869	13 770	14 734
		Additional funds required	**-44 986**	**-66 425**	**-26 824**	**-8 182**	**-8 495**	**-9 090**	**-9 726**	**-10 407**	**-11 135**	**-11 915**

			2019/20 (x R1000)	2020/21 (x R1000)	2021/22 (x R1000)	2022/23 (xR1000)	2023/24 (xR1000)	2024/25 (xR1000)	2025/26 (xR1000)	2026/27 (xR1000)	2027/28 (xR1000)	2028/29 (xR1000)
Table 7-3N	Total Construction of renewals & replacements	MTEF	1 692 998	1 496 264	1 269 415	1 475 222	1 556 708	1 665 677	1 782 275	1 907 035	2 040 528	2 183 365
		Desired Funding	3 546 464	4 045 208	4 128 323	4 038 453	3 650 620	3 036 853	3 005 677	4 551 967	4 197 368	4 491 184
		Additional funds required	**1 771 625**	**2 532 490**	**2 853 977**	**2 557 255**	**2 081 818**	**1 356 386**	**1 207 576**	**2 627 998**	**2 138 721**	**2 288 432**

			2019/20 (x R1000)	2020/21 (x R1000)	2021/22 (x R1000)	2022/23 (xR1000)	2023/24 (xR1000)	2024/25 (xR1000)	2025/26 (xR1000)	2026/27 (xR1000)	2027/28 (xR1000)	2028/29 (xR1000)
Table 7-3O	Gravel road upgrading	MTEF	100 000	216 000	194 000	166 000	231 000	247 170	264 472	282 985	302 794	323 989
		Desired Funding	13 027	0	0	12 693	280 003	941 660	1 162 863	74 205	417 021	417 021
		Additional funds required	**-86 973**	**-216 000**	**-194 000**	**-153 307**	**49 003**	**694 490**	**898 391**	**-208 780**	**114 227**	**93 032**

			2019/20 (x R1000)	2020/21 (x R1000)	2021/22 (x R1000)	2022/23 (xR1000)	2023/24 (xR1000)	2024/25 (xR1000)	2025/26 (xR1000)	2026/27 (xR1000)	2027/28 (xR1000)	2028/29 (xR1000)
Table 7-3P	Paved road upgrading	MTEF	314 000	444 000	526 000	404 000	335 000	358 450	383 542	410 389	439 117	469 855
		Desired Funding	502 306	759 465	706 750	517 611	363 644	389 099	416 336	445 479	476 663	510 029
		Additional funds required	**188 306**	**315 465**	**180 750**	**113 611**	**28 644**	**30 649**	**32 795**	**35 090**	**37 546**	**40 175**

			2019/20 (x R1000)	2020/21 (x R1000)	2021/22 (x R1000)	2022/23 (xR1000)	2023/24 (xR1000)	2024/25 (xR1000)	2025/26 (xR1000)	2026/27 (xR1000)	2027/28 (xR1000)	2028/29 (xR1000)
Table 7-3Q	New facilities	MTEF	175 000	206 000	198 000	255 000	295 000	315 650	337 746	361 388	386 685	413 753
		Desired Funding	441 422	834 375	879 467	540 111	470 630	313 047	334 960	358 407	383 496	410 341
		Additional funds required	**266 422**	**628 375**	**681 467**	**285 111**	**175 630**	**-2 603**	**-2 786**	**-2 981**	**-3 189**	**-3 412**

			2019/20 (x R1000)	2020/21 (x R1000)	2021/22 (x R1000)	2022/23 (xR1000)	2023/24 (xR1000)	2024/25 (xR1000)	2025/26 (xR1000)	2026/27 (xR1000)	2027/28 (xR1000)	2028/29 (xR1000)
Table 7-3R	Total upgrading and new facilities	MTEF	589 000	866 000	918 000	825 000	861 000	921 270	985 759	1 054 762	1 128 595	1 207 597
		Desired Funding	956 755	1 593 840	1 586 217	1 070 415	1 114 277	1 643 806	1 914 159	878 091	1 277 180	1 337 391
		Additional funds required	**367 755**	**727 840**	**668 217**	**245 415**	**253 277**	**722 536**	**928 400**	**-176 671**	**148 585**	**129 794**

			2019/20 (x R1000)	2020/21 (x R1000)	2021/22 (x R1000)	2022/23 (xR1000)	2023/24 (xR1000)	2024/25 (xR1000)	2025/26 (xR1000)	2026/27 (xR1000)	2027/28 (xR1000)	2028/29 (xR1000)
Table 7-3S	Total Maintenance (Vote 10, Prog 3, Sub-prog 5)	MTEF	1 537 379	1 473 252	1 562 714	1 782 710	1 858 817	1 988 934	2 128 159	2 277 132	2 436 532	2 607 089
		Desired Funding	1 848 837	1 694 633	2 231 440	2 513 150	2 761 661	3 211 898	3 653 661	4 676 958	4 837 135	5 175 735
		Additional funds required	**229 617**	**204 927**	**663 795**	**724 464**	**890 750**	**1 208 174**	**1 509 676**	**2 382 892**	**2 382 485**	**2 549 259**

			2019/20 (x R1000)	2020/21 (x R1000)	2021/22 (x R1000)	2022/23 (xR1000)	2023/24 (xR1000)	2024/25 (xR1000)	2025/26 (xR1000)	2026/27 (xR1000)	2027/28 (xR1000)	2028/29 (xR1000)
Table 7-3T	Total Construction (Vote 10, Prog 3, Sub-prog 4)	MTEF	1 521 573	1 705 844	1 523 250	1 477 897	1 564 788	1 674 323	1 791 526	1 916 933	2 051 118	2 194 696
		Desired Funding	3 862 394	5 223 602	4 851 829	4 060 258	3 570 294	3 145 513	3 060 300	2 672 814	2 691 507	2 850 721
		Additional funds required	**2 340 821**	**3 517 758**	**3 328 579**	**2 582 361**	**2 005 506**	**1 471 190**	**1 268 774**	**755 881**	**640 389**	**656 025**

			2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29
			(x R1000)	(x R1000)	(x R1000)	(xR1000)	(xR1000)	(xR1000)	(xR1000)	(xR1000)	(xR1000)	(xR1000)
Table 7-3U	Total (Vote 10, Prog 3)	MTEF	3 494 381	3 662 608	3 530 738	3 707 275	3 892 639	4 165 124	4 456 682	4 768 651	5 102 457	5 459 630
		Desired Funding	6 108 906	7 356 446	7 523 822	7 036 079	6 817 752	6 877 214	7 270 150	7 944 894	8 165 422	8 707 810
		Additional funds required	**2 532 684**	**3 677 384**	**3 988 153**	**3 322 828**	**2 913 019**	**2 697 300**	**2 797 642**	**3 159 309**	**3 044 846**	**3 228 794**

Table 7-4: Cash flow forecasts and desired funding estimates for overload control

Average MTEF inflation increase*	7%	All monetary values are in currency of the year shown

			Current MTEF Period									
			2019/20	**2020/21**	**2021/22**	**2022/23**	**2023/24**	**2024/25**	**2025/26**	**2026/27**	**2027/28**	**2028/29**
			(x R1000)	(x R1000)	(x R1000)	(xR1000)	(xR1000)	(xR1000)	(xR1000)	(xR1000)	(xR1000)	(xR1000)
Table 7-4A	Routine maintenance	MTEF	0	0	0	0	0	0	0	0	0	0
		Desired funding	2 360	2 478	2 602	2 732	2 923	3 128	3 347	3 581	3 832	4 100
		Additional funds required	**2 360**	**2 478**	**2 602**	**2 732**	**2 923**	**3 128**	**3 347**	**3 581**	**3 832**	**4 100**
Table 7-4B	Renewals and replacements	MTEF	0	0	0	0	0	0	0	0	0	0
		Desired funding	879	923	970	1 018	1 089	1 166	1 247	1 334	1 427	1 527
		Additional funds required	**879**	**923**	**970**	**1 018**	**1 089**	**1 166**	**1 247**	**1 334**	**1 427**	**1 527**
Table 7-4C	Upgrading and new facilities	MTEF	0	0	0	0	0	0	0	0	0	0
		Desired funding	603	633	664	698	747	799	855	915	979	1 048
		Additional funds required	**2 086**	**574**	**574**	**603**	**633**	**664**	**698**	**733**	**769**	**769**
Table 7-4D	Operational Expenditure	MTEF	27 839	29 231	30 692	32 227	33 838	36 207	38 741	41 453	44 355	47 460
		Desired funding	42 488	44 613	46 933	49 375	51 946	54 653	57 932	61 408	65 707	65 707
		Additional funds required	**14 649**	**15 382**	**16 241**	**17 148**	**18 108**	**18 446**	**19 191**	**19 955**	**21 352**	**18 247**
Table 7-4E	Total Overload Control (Vote 10, Sub-prog 5.4	MTEF	27 839	29 231	30 692	32 227	33 838	36 207	38 741	41 453	44 355	47 460
		Desired funding	48 647	51 169	53 823	56 705	59 746	63 381	67 238	71 945	72 382	72 382
		Additional funds required	**19 974**	**19 357**	**20 387**	**21 501**	**22 753**	**23 404**	**24 483**	**25 603**	**27 380**	**24 643**

7.3.1 Expenditure trends

Expenditure trends between the 2013/14 and 2016/17 financial year are shown in Figure 7-1 for the different types of expenditure. No easily observable trends are apparent. However, there was a considerable increase in resealing expenditure in 2015/16 and a large increase in upgrading to surfaced roads in 2016/17.

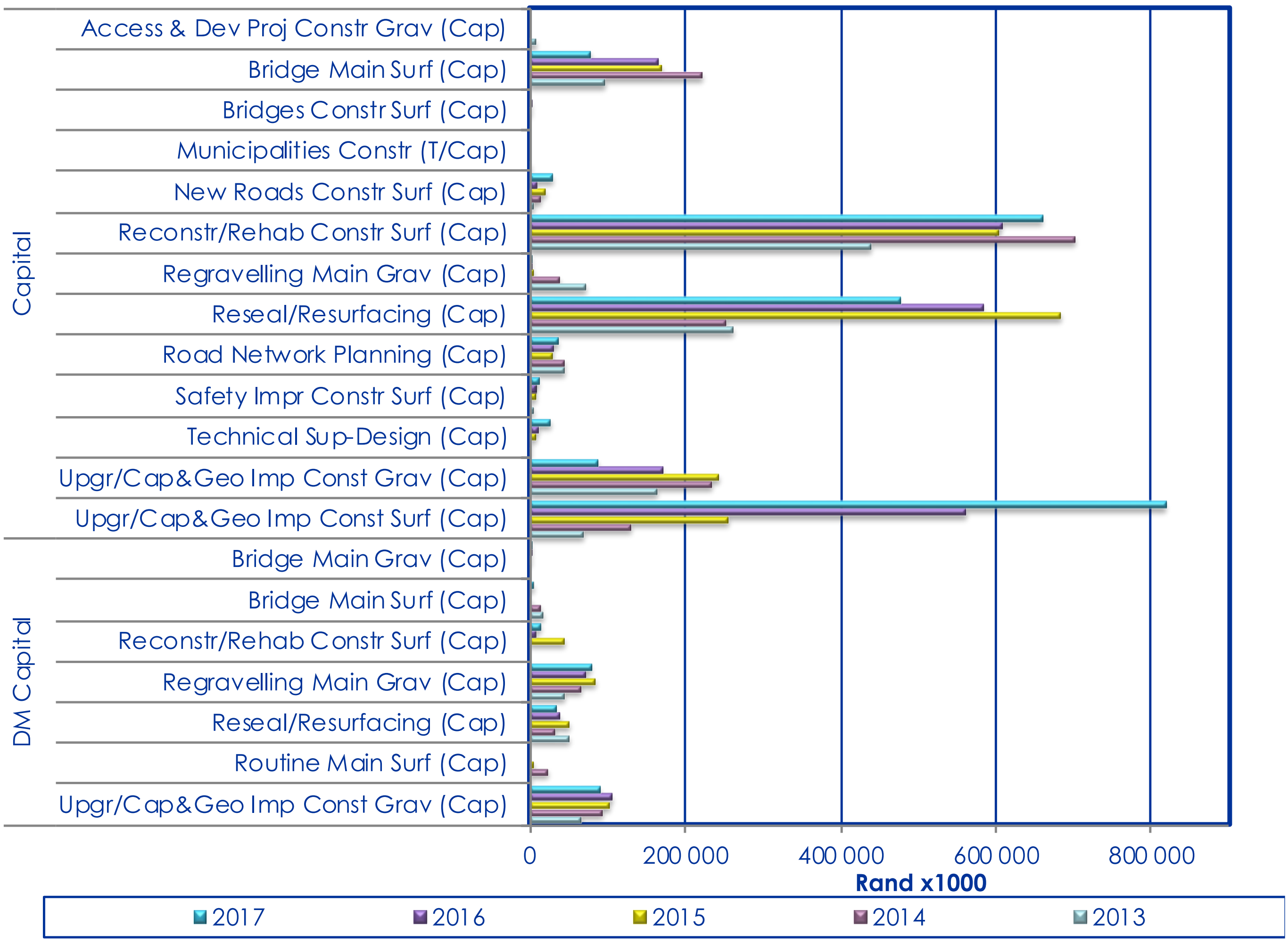


Figure 7-1: Capital and Current expenditure for 2013/14, 2014/15, 2015/16 and 2016/17

7.4 Funding strategy

The details of the financial resources required are shown in Table 7-3 and Table 7-4. These summaries of the financial resources show the amounts required for road infrastructure and overload control infrastructure, respectively.

From Table 7-1 it follows that considerable additional funding for roads will have to be provided to realise the required LOS.

From Table 7-4 it can be seen that additional funding for overloading control will have to be provided to realise the required LOS in overloading control.

Although the Department generates revenue of about R1 610 million per annum (as indicated in Vote 10: Transport and Public Works published in 2019), mainly from vehicle licensing fees, these funds are paid over to Provincial Treasury for reallocation, and not utilised directly by the Branch. The scope for increasing these revenues beyond the annual inflation rate adjustments is severely limited. The licence fees of the Western Cape are already some of the highest in South Africa and complaints about these fees are received regularly.

The only way the additional funding required could be obtained would be by means of additional grants from Provincial Treasury.

7.4.1 Proposals to supplement funding

The Branch is considering various alternate funding strategies, pending the enactment of the Western Cape Transport Infrastructure Bill. It should be noted that bringing any one of these funding strategies to fruition would require a rigorous legislative, planning and public participation process that will probably require many years to implement.

The following proposals are being considered to supplement the shortfall in funding:

- Introduction of a provincial fuel levy, km-charges, weight-distance and private/public partnership initiatives;
- The PRMG incentive and EPWP incentive grants based respectively on the year-on-year performance of the Strategic Network and job creation levels, have promise for increased funding levels, with its compulsory reporting conditions and various additional requirements such as safety assessments and condition assessment audits;
- Negotiation for a more equitable share from the nationally generated fuel levy;
- Increases in, and the standardisation of, provincial and national vehicle licensing fees;
- Increased fees for planning and way leave applications;
- Implementation of a development levy as the developer's contribution to specific infrastructure improvements concurrent with development impacts; and to "air-rights" in cases where developments overhang road reserves;
- Charging a levy on freight that should ideally be transported by rail;
- Introduction of a tax on owners in possession of undeveloped land in rural areas;
- Sharing accident environmental damage claims responsibly between road agencies and insurance companies;
- Increasing fines for overloading;
- Introducing a levy for the transportation of hazardous materials;
- Introducing provincial tolling;
- Development loans and private-public funding initiatives;
- Introducing tourism taxes on, inter alia, beds, airports and harbours; and
- Introducing a distance penalty for heavy vehicles as these users have a major detrimental impact on the road pavement.

The funding strategy thus relies on additional allocations to the Branch by Provincial Treasury.

Chapter 8 – Organisational and support plan structure

8.1 Introduction

Implementing an asset management approach is a change that leads organisations to question traditional ways of thinking and working. This can include reviews of organisational structures, roles and responsibilities, and contractual relationships. This can make the introduction of asset management thinking and practices a challenging experience for people, be it senior management roles, staff delivering asset management activities, or working in the supply chain. Effective leadership is therefore crucial for building an organisation with an appropriate culture which supports the delivery of good asset management (Institute of Asset Management, 2015b).

The subjects of organisation and people are highly interdependent and exert strong influences on an organisation's ability to adopt and embed asset management successfully. It is necessary to invest time and effort in them to produce the performance and behaviours that will support successful delivery of the asset management strategy and objectives. They are important for delivering the level of business integration that characterises more mature asset management capability (Institute of Asset Management, 2015b).

Organisation and people enablers are listed in Table 8-1 below (Institute of Asset Management, 2015b). Each enabler should be assessed and the gap determined before implementation of a plan to address shortcomings. Each enabler is discussed in more in the paragraphs that follow.

Table 8-1: Organisation and people enablers

Organisation and people enablers	Description of the enabler
Procurement and supply chain management	The processes used by an organisation to ensure that all outsourced asset management activities are aligned with the asset management objectives of the organisation and to monitor these activities against these objectives
Asset management leadership	The leadership of an organisation required to promote a whole life asset management approach to deliver the organisational and asset management objectives of the organisation
Organisational structure	The structure of an organisation in terms of its ability to deliver the organisational and asset management objectives
Organisational culture	The culture of an organisation in terms of its ability to deliver the organisational and asset management objectives
Competence management	The processes used by an organisation to systematically develop and maintain an adequate supply of competent and motivated people to fulfil its asset management objectives including arrangements by managing competence in the boardroom and the workplace

8.2 Procurement and supply chain management

Research has indicated that organisations benefit from using their supply chains strategically, and encouraging their key suppliers to participate in their whole-life value approach. Organisations with more mature asset management cultures fully align their asset management objectives and strategy and the resourcing strategy is then developed from this. The most mature organisations approach managing their supply chains as they would any other critical asset.

Procurement and supply chain management are managed in the Department, but outside the Branch. The current good relationship between the Branch and the Chief Directorate: Supply Chain Management enables the alignment of procurement and supply chain management with the Branch's asset management objectives and strategy.

8.3 Asset management leadership

Asset management leadership is crucial in an organisation aspiring to deliver effective asset management. This leadership sets the direction and priorities for the development of the asset management capabilities necessary to deliver on the organisation's overall objectives. Leaders set direction, challenge the status quo, innovate and drive the definition, development and implementation of improved procedures and systems. All leaders must excel in the following (Institute of Asset Management, 2015b):

- Give direction to of the organisation. In the context of asset management this means that leaders must promote a whole life approach to asset management so that society can realise maximum value from its assets, consistent with business risk and performance;
- Articulate their vision clearly and communicate it in a persuasive and practical way, using a variety of approaches, while being simultaneously demanding and supportive;
- Make "difficult" decisions in the face of ambiguity, where difficult decisions may be simple or complex;
- Inspire staff to contribute to achieving the organisation's goals; and
- Provide stakeholders with confidence about the direction being taken and the benefits that will be achieved.

The degree to which the current and future leadership of the Branch excels at these practices will determine how successful the Branch will be in practising good asset management and achieving its asset management objectives.

8.4 Organisational structure

8.4.1 Current structure

The current macro-organogram of the Department is shown in Figure 8-1.

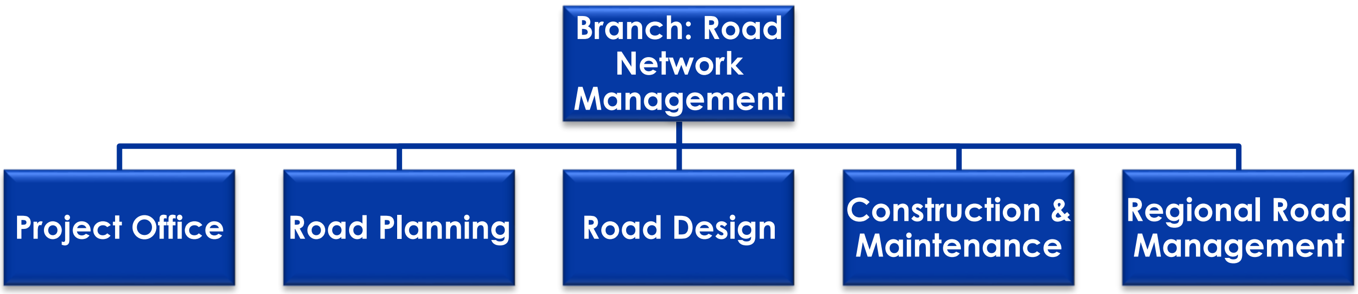


Figure 8-1: Macro-organogram of the Branch as at 31 December 2015

8.4.2 Aligning organisational structure

Aligning organisational structure with asset management objectives is a key factor in determining an appropriate structure. The revision to this old structure to meet the requirements of the Branch in terms of its organisational and asset management objectives has been thoroughly pursued during the last few years. This includes the determination of a suitable structure and adequate numbers of posts on appropriate levels. In order to achieve this, many authoritative documents were consulted, some of which are listed below:

- SANS 55001:2015 - Asset Management (International Standards Organization for Standardization, 2015);
- Asset Management – an anatomy (Institute of Asset Management, 2015b);
- The Asset Management Landscape (Global Forum on Maintenance and Asset Management, 2014);

- Organisation and people (Institute of Asset Management, 2015d);
- Asset Management – whole-life management of physical assets (Lloyd, 2010); and
- Draft Guide to the Road System Manager for the Western Cape (Henderson, 2015).

The IAM concept for an organisation implementing best practice in asset management is the basis on which the new structure is based is shown in Figure 8-2.

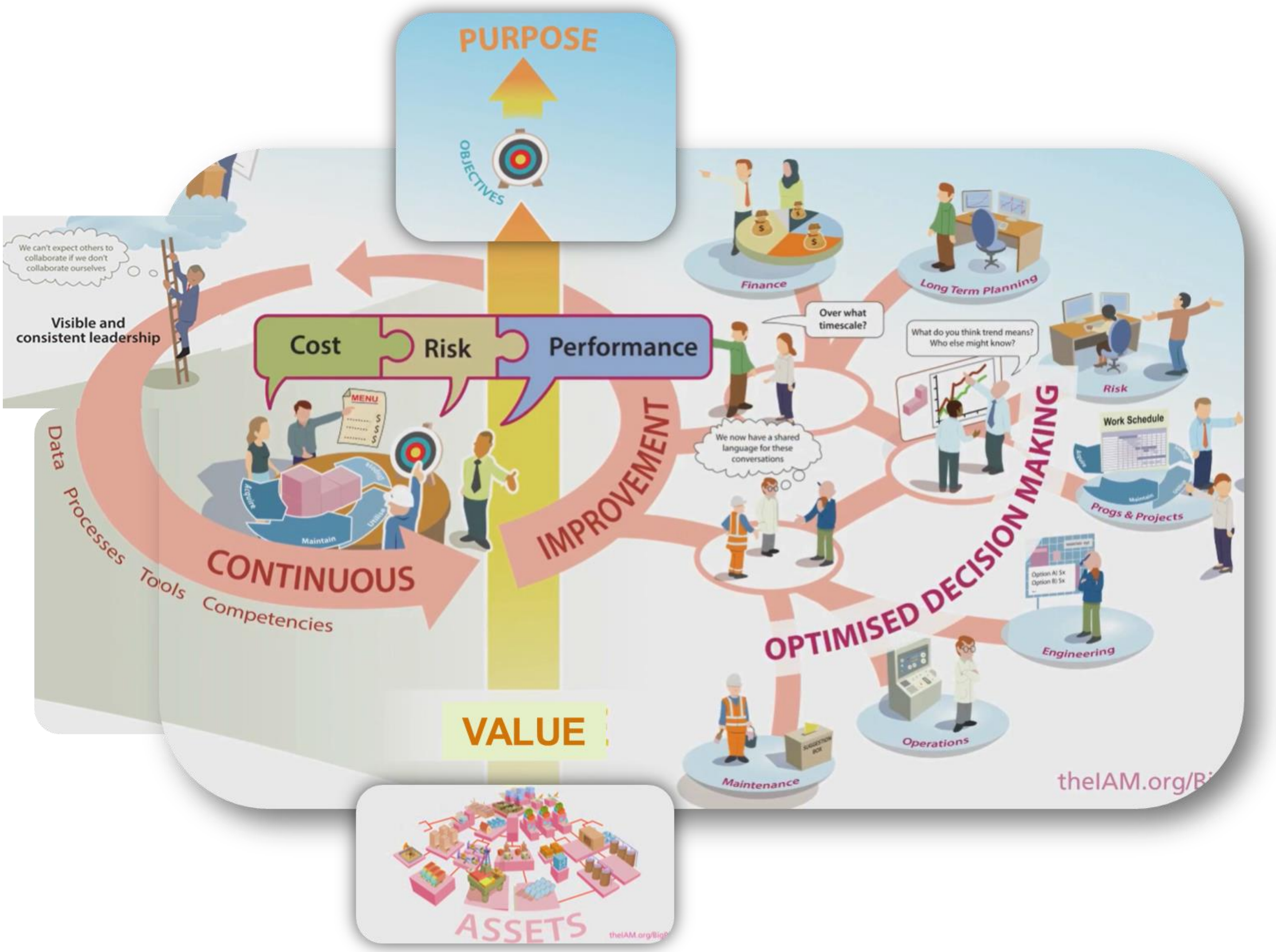


Figure 8-2: IAM concept for an organisation whose business is asset management

8.4.3 Triggers for change

There is no single organisational structure and culture that applies to all organisations, or is best suited to good asset management (Institute of Asset Management, 2015d). It follows that the Branch needs to understand it current structure and decide what needed to change for it to successfully meet its objectives. The major triggers for change are as follows:

- A high risk that the management and delivery of projects and programmes will not achieve the desired outcomes with the current structure and staffing. The current structure lacks a component that has accountability for the coordination and management of the portfolio of assets, programmes and projects from inception to final completion.
- Whether the Branch is structured to promote integrated asset management rather than silos. The current structure does not support integrated asset management very well, resulting in a culture of working in silos.

- The need to implement new business processes that support asset management. The IAM concept organisation, presented in Figure 8-2, puts the whole organisation together in a "big picture". This "big picture" presents a concept that helps the Branch understand how re-organising will facilitate phases 1 to 7 of the Road System Manager framework, i.e., all the processes that make up the full cycle of asset management (Henderson, 2015).

The concepts represented in the "big picture" organisation have been translated into a structure that will help facilitate asset management in the Branch. An organogram illustrating how the new structure relates to the "big picture" organisation is shown in Figure 8-3.

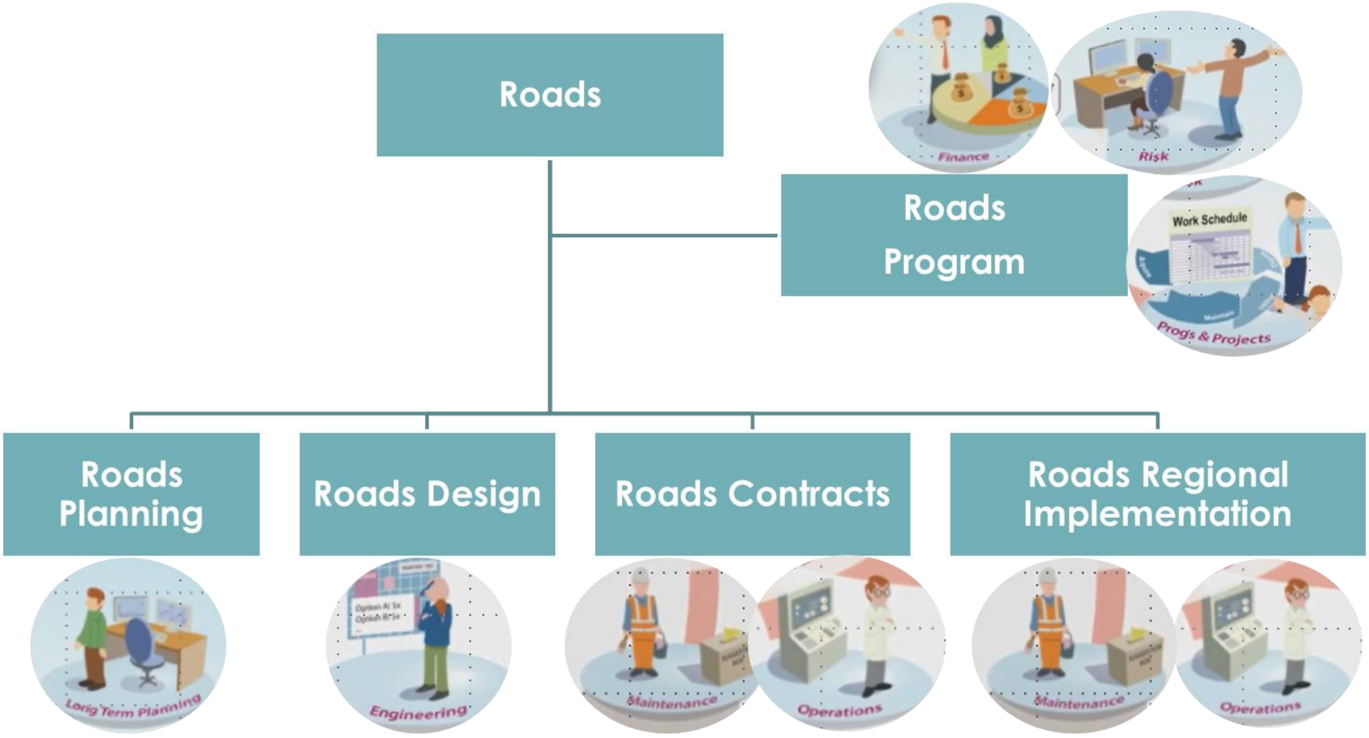


Figure 8-3: High level organogram to facilitate asset management

8.4.4 Factors influencing the design of the structure

Integrated asset management

The key requirement of the new structure is to promote integrated asset management, as opposed to silos.

Line of sight

It is important to have a clear line of sight from top management to staff working on the ground from policy and strategy, to operational plans, to work execution. This can ensure that the Branch's activities are aligned to the top level objectives with the cultural goal of understanding how everybody contributes to achieving success. Organisational structure is a key enabler of line of sight and should facilitate effective communications and feedback in all directions with internal and external staff and stakeholders. Asset management-related roles should have clear profiles or job descriptions identifying the contributions they make to the delivery of asset management objectives and how their work affects others (Institute of Asset Management, 2015d).

The value chain

The asset management value chain is a chain of activities that take place within organisational components (Porter, 2008). Products pass through all activities of the chain, in order, and in each activity the product gains some value. The chain of activities gives the product more added value than the sum of the added values of all the activities. Each of the Branch's components has a role in adding value to the products and the activities should be grouped logically together to facilitate value creation. It is the process of integrating these activities in the Branch's components that truly creates the value chain.

Decision making on strategic, tactical and operational levels

There is a need to group functions logically with respect to their level and impact on decision making in terms of asset management (Figure 8-4). There is a need to split functions that span strategic to operational level decision making.

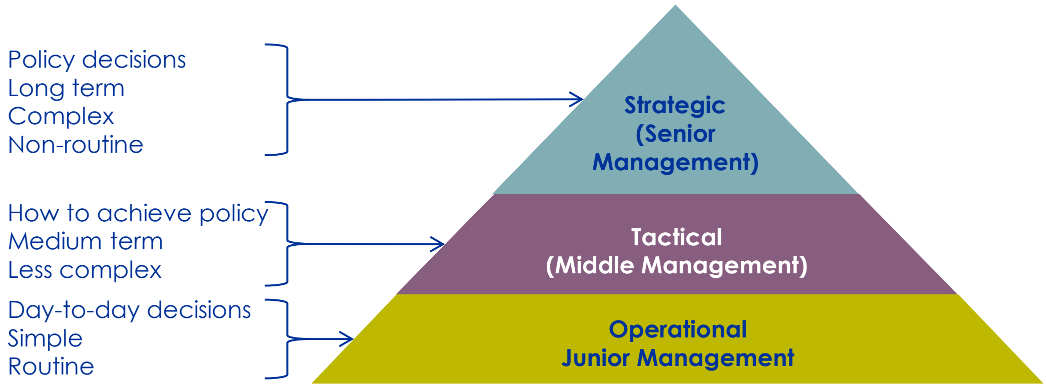


Figure 8-4: Decision making at different levels

Sustainability and continuity

There is an imperative to maintain sustainability and continuity in the Branch. A high risk of losing sustainability and continuity is neither economically nor politically acceptable as the consequences for the Western Cape road network and economy are very negative in the mid- and long-term.

The structure should facilitate the establishment of a "**critical mass**" of professional and technical people in their disciplines and asset management, especially for those disciplines that are in demand and supply is limited. For the Branch, this means all types of civil engineers and many technologists. A critical mass of professional and technical people will assist in building and retaining institutional memory for sustainability in terms of asset management. Staffing of the proposed structure is based on minimum operational requirements due to current economic conditions and the filling all positions is therefore critical. This applies especially to middle management and lower management staff in order to retain continuity, both for short term absences of top and middle management, and for long-term succession planning for top management.

The role of teams

Multi-disciplinary asset management teams are essential for unifying asset management activities across the Branch and driving progress across boundaries. They provide a way of overcoming fragmented thinking and attitudes and developing holistic approaches, decision making and practices. The effect of asset management can be seen as a wider shift into a new mode of knowledge production which is replacing or reforming established institutions, disciplines, practices and policies (Lloyd, 2010)(pp138-157).

8.4.5 New organisational structure

The new macro structure is shown in Figure 8-5 and was supported by the Head of Department in December 2018. The process for completing the micro structure is currently under way. On completion of this, the consultation process will start, after which application for the new structure will be made to the Department of Public Service and Administration.

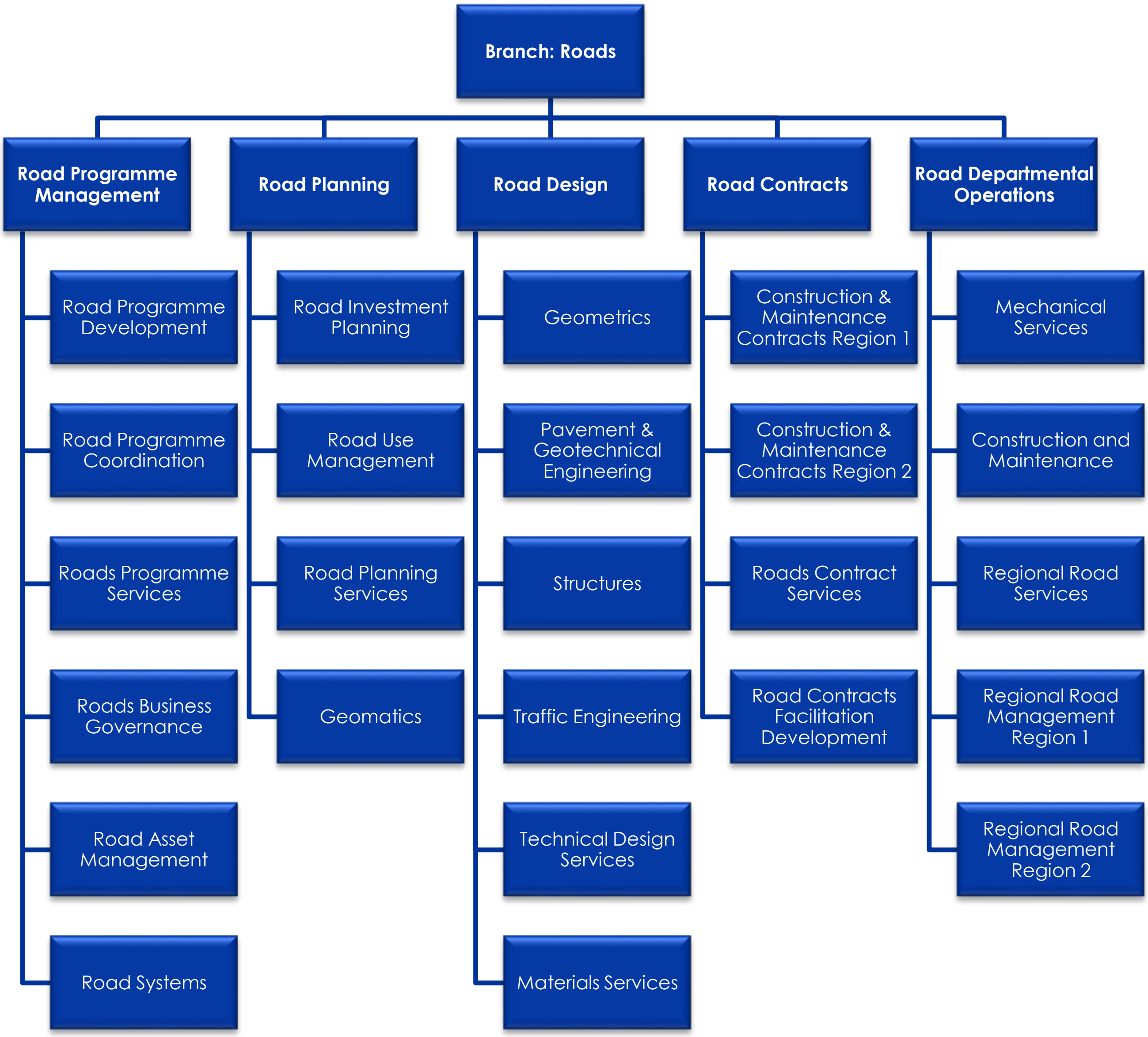


Figure 8-5: New organisational structure for the Roads Branch

8.4.6 Outsourcing and agreements with local authorities

Due to the current economic conditions and reasons of cost-effectiveness, the specialised and cyclical nature of work undertaken by the Branch will continue to operate on a co-sourced resource model in which internal capacity is augmented with contracted expertise from consulting engineers, contractors and district municipalities.

8.5 Branch culture

One of the most important elements of asset management is the role of culture. It is the foundation of good asset management, and a key ingredient of its success (Institute of Asset Management, 2015b). Culture refers to a long-lived set of values, beliefs, attitudes and assumptions which affect behaviour and performance over the longer term (Institute of Asset Management, 2015d). A simple definition is: "*the way things are done around here*".

Building an organisation with a healthy culture is a significant part of effective leadership and the organisational structure can have a major influence on the culture of the organisation and vice versa. Creating an appropriate culture is integral to achieving the level of integration between functions that good asset management requires (Institute of Asset Management, 2015b).

8.6 Competence management

Competence management is *"The processes used by an organisation to systematically develop and maintain an adequate supply of competent and motivated people to fulfil its asset management objectives including arrangements by managing competence in the boardroom and the workplace"* (Institute of Asset Management, 2015d).

People "do" asset management and therefore people, and their knowledge, competence, motivation and teamwork can make the biggest difference to good or poor asset management, otherwise known as an "asset management culture".

It is inevitable that people coming to the discipline of asset management have already demonstrated competence in other professions, such as engineering or finance, and may have significant specialist expertise in a field such as maintenance or auditing. Determining what competences are needed to complete the development of an individual is important, and can be acquired through the following avenues:

- asset management training courses developed by various organisations, including free e-learning courses;
- publications and on-line resources, some of which are available from the IAM;
- asset management conferences; and
- working on projects/ initiatives which will enable development of asset management knowledge in specific areas (Institute of Asset Management, 2015b).

Individuals can test their asset management knowledge by examination and gain an asset management qualification, such as the certificate or diploma developed by the IAM (www.theIAM.org/Quals) (Institute of Asset Management, 2015b).

8.6.1 39 subjects defining asset management

The 39 subjects describe the body of asset management knowledge as a whole, The 39 subjects are aligned with the Asset Management Landscape version 2 (Global Forum on Maintenance and Asset Management, 2014), published by the Global Forum on Maintenance and Asset Management (GMFAM), which was developed by the global asset management community to define the scope of the discipline.

The 39 asset management subjects (Figure 8-6) are linked to 6 subject groups, which in turn are reflected in the conceptual model (Figure 8-6) in a structured way.

These 39 subjects are intended to describe the complete scope of asset management. Therefore, any person who intends to become demonstrably competent or expert in this field will need to know enough of the complete breadth of all the subjects in addition to any deep and detailed expert knowledge in any one of them. Although the 39 subjects are described individually, they should be not considered as discrete subjects. There is interrelationship between the subjects and the contribution they make as a whole to an organisation's asset management capabilities (Institute of Asset Management, 2015b).

8.6.2 Competences Framework

The IAM has developed a competences framework that describes what people working in asset management should be able to do and indicates what they ought to know and understand. It is a tool that organisations, managers and individuals can use in numerous ways including in training needs analysis, recruitment and selection, career planning, continuing professional development and workforce management.

The framework contains a single set of generic competence requirements that are applicable to all organisations and sectors where business performance relies on optimising the delivery and performance of physical assets. The framework describes what people involved in the management of physical assets should be able to do and the knowledge and understanding needed to underpin this. Its structure is compatible with that of other leading competence frameworks and its contents reflect the principles and support the requirements of BSI PAS 55:2008 (British Standards Institute 2008), the precursor to ISO55000 (International Standards Organisation 2014). The Framework consists of two documents:

- Part 1 sets out asset management competence requirements and
- Part 2 contains guidance on how to use the framework.

The framework defines a key purpose for people working in asset management and the 6 roles needed to achieve this. Each role is broken down into a small number of competence units, such as "Develop the Asset Management Policy". There are 27 units in total. Each unit is then subdivided into a small set of elements of competence such as "Assess policy options using appropriate decision criteria".

To adapt the competences framework to the Branch's specific needs, a decision on which of the units are applicable to various roles within the Branch would need to be taken. In addition, the development of performance criteria is needed for each element and the knowledge and understanding requirements will also need to be tailored to the Branch's circumstances.

Figure 8-6: 6 subject groups and 39 subjects

Using the Competences Framework

The Competencies Framework assists with:

- Writing or reviewing job descriptions;
- Planning recruitment;
- Defining selection criteria;
- Identifying individual learning and development needs;
- Managing individual and team performance;

- Career planning; and
- Performance review.

Part 2 of the framework contains guidance on how the Framework can be used to combine these and other processes in a systematic approach to managing the competence of the asset management workforce in the Branch. A copy of the Framework has been obtained from the IAM and can provide a valuable resource for the Branch for managing the competence of its staff.

8.6.3 Gap analysis of asset management competences

A gap analysis of the asset management competences of current Branch staff in the subset of subjects relevant to the Branch has not yet been done. Very few of these subjects are covered at under-graduate level in civil engineering. Most subjects will require additional study to fill the gap between the current knowledge of and expertise in the relevant subjects listed in Figure 8-6 and the level required to be competent practitioners of asset management.

8.7 Human resources

8.7.1 Current status

The current staffing status within the Branch is summarised in Table 8-2.

Table 8-2: Current staffing status within the Branch as at March 2018

Sub-Programme	Senior Management Service		Engineering Professionals		Technical Professionals	
	Filled	Vacant Posts	Filled	Vacant Posts	Filled	Vacant Posts
Programme Support	1	0	0	2	0	1
Planning	1	0	5	4	1	2
Design	1	0	9	6	18	23
Operations	1	1	10	9	4	20
Totals	4	1	24	21	23	46

There is a significant shortage of staff across senior management, engineering professional and technical professionals. The situation with production engineers is illustrated in Figure 8-7. The shortage of staff continues to make it difficult for this Branch to undertake its tasks and to attain its employment equity targets.

In 2005 the Branch developed a comprehensive recruitment and training programme for engineers and technicians that facilitate the registration of professionals (refer to paragraph 10.3 for further details). However, this training programme does not address the asset management subjects.

As good as this training programme has proven to be, filling the age gap with people who have more than 10 years' experience in production engineering can only be achieved by external recruitment.

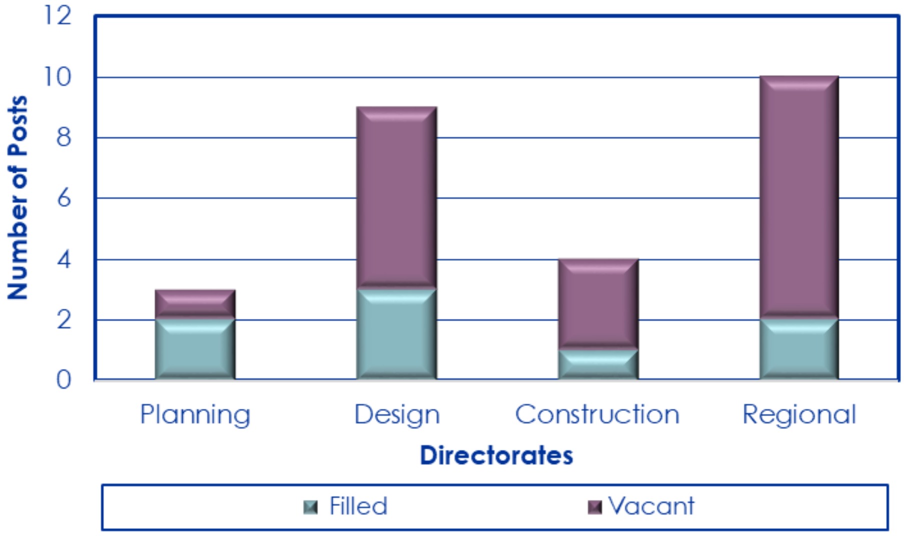


Figure 8-7: Vacancies for production engineers

Figure 8-8 shows how few people have joined the Branch from external sources and the impact of the internal training programme at all levels. The very low numbers of staff, or even no staff in the age groups 40 to 44 years, and 45 to 49 years, is clearly illustrated. The current situation is unsustainable and could lead to unfilled posts at management level when current incumbents retire. Several people have been employed post-retirement on 2-year contracts (over 65 in Figure 8-8), leaving little time to fill the vacant positions and transfer knowledge. This is a huge risk for the Branch as staff recruitment is proven to be exceptionally difficult (see Chapter 11 for further discussion on this topic).

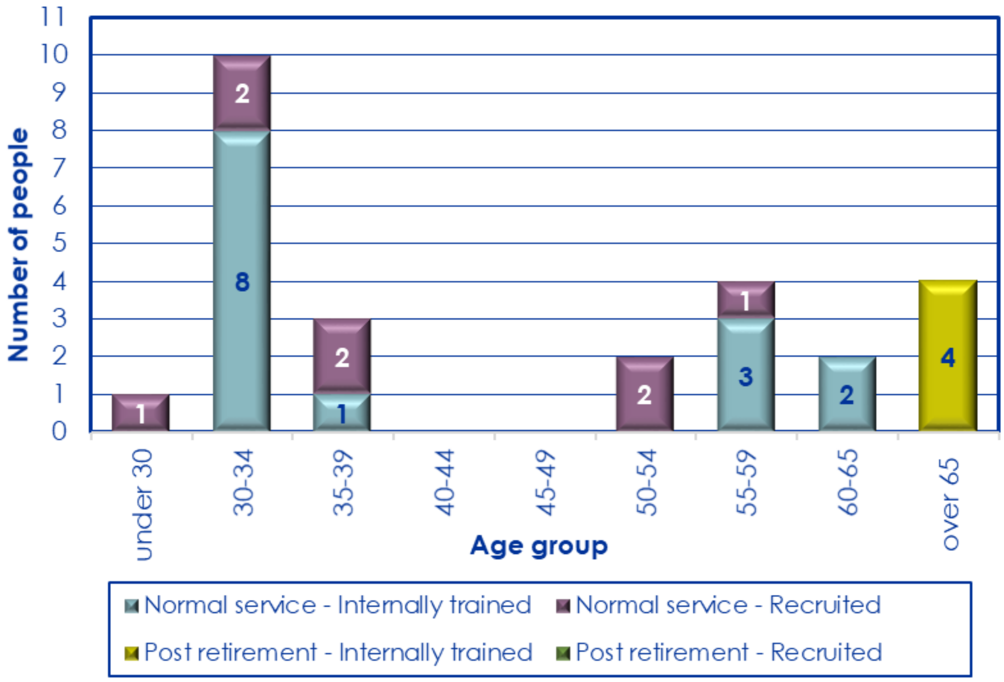


Figure 8-8: Age profile of engineering staff including management

As part of the organisational planning, the Department have initiated a strategic talent plan and people plan to maximise the effectiveness of talents within the Branch and to evaluate the processes and policies within human resource planning.

8.7.2 Public Service framework for the employment of professional staff

The following Public Service documents were referred to in connection with this paragraph and paragraphs 8.7.3, 8.7.4 and 8.7.5:

- Department of Public Service and Administration Circular 5 of 2009: Implementation of the Occupational Specific Dispensation (OSD) for engineers and related occupations;
- GPSSBC [General Public Service Sector Bargaining Council] Resolution no. 5 of 2009: Agreement on the implementation of Occupational Specific Dispensation (OSD) for Engineering Technicians, etc.;
- GPSSBC Resolution no. 9 of 2009: Agreement on the implementation of an occupational dispensation for Engineers.;
- Department of Public Service and Administration letter dated 11/3/2013: "Interpretation of GPSSBC Resolutions 3, 4, 5, 6, 8 and 9 of 2009 read together with the determination under DPSA Circular 5 of 2009: Occupational Specific Dispensation (OSD) for engineers and related occupations".; and
- Department of Public Service and Administration Public Service Regulations 2016.

8.7.3 Constraints on the employment of professional staff

A constraint is something imposed on the Branch that restricts the options it can consider. Constraints on the employment of engineers, technologists and technicians are described below.

- The limited pool of available competent engineers, technologists and technicians with experience in the planning, design and delivery of road projects and programmes. This situation has been documented by Allyson Lawless (Lawless, 2005).
- The recruitment process for new staff is extremely long, taking many months, even up to a year, by which time candidates may no longer be available or interested in taking up positions in the Branch.
- The Occupational Specific Dispensation for Engineers and Related Professions and Occupations (OSD) notch progression of 2 years is a constraint on competitive salaries for highly competent professionals.
- The reluctance of many professional engineers and technologists and technicians to work for a provincial government as a result of the track record of under-performance in many provincial departments in South Africa, including those responsible for roads, as well as a culture that can be incompatible with professional values. Although these two factors are not perceived to be major issues in the Western Cape, many competent engineers, technologists and technicians, might well view employment in a provincial government roads department to be a less attractive career.

8.7.4 Barriers preventing employment of professional staff

A barrier is something that exists in the Branch that will prevent change occurring. Barriers preventing employment of engineers in the Branch are described below.

- As professional registration is not a requirement for many potential candidates working currently in the private sector, many experienced engineers cannot be offered a competitive salary in the Branch. Consequently, there is a very limited pool of engineers to which the Branch can offer competitive salaries. This is exacerbated by the interpretation of recruitment and selection that the new DPSA Regulations do not allow matching a salary of a person being recruited from the private sector in a Chief Engineer or Control Post. Also, the OSD does not take into account pre-registration experience for engineers at production level. These barriers, in conjunction with the constraint on the number of suitable candidates, **creates a significant risk that no potential candidates will be employed**.

8.7.5 Barriers to progression (engineers)

- Professional engineers are required to manage the Branch. However, they must be employed on the administrative leg for management posts as the Engineering Management leg of OSD as described in the 2009 resolution for Engineers has not been activated. There is currently no means to place them higher on the OSD salary scale. This has the perverse result that a person's salary is reduced when, e.g., a person is promoted from an OSD position, such as Chief Engineer, to Director in order to manage an engineering component.

8.7.6 External resources

To supplement its internal capacity, the Branch is heavily dependent on the appointment of consulting engineers to investigate, design and supervise projects. The five district municipalities act as agents of the WCG for the maintenance of main, divisional and minor roads.

8.8 Financial implications

The costs associated with the RAMP can be divided into 5 components, namely:

- infrastructure management systems implementation and upgrading to maintain technical excellence and information technology standards;
- data acquisition and verification;
- data processing;
- economic analysis and reporting; and
- RAMP preparation and updating.

The costing of these components involves internal staff costs and external vendors and consultants. A cost estimate based 2018/19 RAMP is provided in Table 8-3.

Table 8-3: Estimated cost of the RAMP

Activity	Cost of external provider 2018 Rands (millions)	Cost of staff 2018 Rands (millions)	Total Cost 2018 Rands (millions)
1. Management systems operational cost	32,7	3,9	36,6
2. Data acquisition and verification	38,6		38,6
3. Data processing	Included in item 1 above	Included in item 1 above	Included in item 1 above
4. Economic analysis and reporting	0,6		0,6
5. RAMP preparation and updating	0,4	1,0	1,4
Totals	**72,3**	**4,9**	**77,3**

8.9 Overview of Asset Management Systems and Processes

As part of the asset management planning, the Branch has initiated a new efficiency system to assist the Road Network Management Branch in the planning, design and contract management of implementing efficiency systems in terms of asset portfolio and project management.

A gap analysis on the current project, asset management and information systems was initiated in September 2018. This exercise will form part of the System Support Services review of key asset management systems and the development of a new efficiency process system.

Chapter 9 – Plan improvement and monitoring

9.1 Performance measures

The network condition performance measures, discussed in paragraph 3.1, are used to monitor the performance of the Plan. The key performance indicators are:

- the condition of the paved road network (see Figure 4-2);
- the condition of the seals on paved roads (see Figure 5-31);
- the condition of the gravel road network (see Figure 4-5); and
- the thickness of gravel on the gravel road network (see Figure 4-28).

The trend in these indicators over time is indicative of the success or otherwise of the plan in respect of road infrastructure. Additional measures (key performance indicators – KPIs) are being developed for national use.

The future trend in the percentage of heavy vehicles that are legally loaded will indicate the success or otherwise of the plan in respect of overloading control.

9.2 Improvement programme

The weaknesses of the RAMP will be assessed every year and improvements will be made in future editions of the RAMP as soon as possible.

9.2.1 Improving the accuracy of the plan

The new RAMP guideline will enable the Branch to improve the accuracy of, and confidence in, the RAMP.

Systems improvements

Future new systems that will assist in improving the RAMP are:

- a new efficiency system, to assist the Road Network Management Branch in the planning, design and contract management in terms of project processes;
- a maintenance management system (ROPE) to assist with the tactical level management of routine maintenance; and
- a new estimating and unit rate system to provide improved cost estimates for Branch projects that are based on historical rates sourced from completed projects.

In addition, ongoing improvements are being made:

- Bridge Management System to assist with the collection of inventory, information data and condition of bridge and structures
- PQMS modules; and
- updates to several systems to avoid technical obsolescence.

In addition, the following initiatives are planned:

- Regularly reviewing norms and standards to ensure that best practices and innovative solutions are followed;
- the promotion of cooperative governance through forums to encourage better adherence to Western Cape design standards; and
- installing and using more electronic surveillance equipment to target real overloading transgressors, without inconveniencing law-abiding operators of heavy vehicles.

9.2.2 Monitoring and review procedures and reporting

Monitoring and review procedures and reporting

The proposed Branch Asset Management Framework described in the draft Guide to a Road System Manager for the Western Cape (Henderson, 2015) specifies a review and feedback (phase 7) that would guide the Branch in the assessment of its performance with respect to the RAMP.

Monitoring and review procedures

Performance measures are provided by the Branch's systems and monthly reports are generated. A review is done every year as part of the requirements for the Branch's Annual Performance Plan, and is reported in the Department's Annual Report.

No external audit of the data in the information data bases is planned at present, mainly because this would be a major undertaking, duplicating the current internal quality assurance that verifies all the data, with very little or no expected benefit (The current internal process makes use of internal staff and capacity consultants, to ensure accuracy.

This plan will be updated every year to reflect changes in budget allocations. Road condition information is updated continually in such a manner that sufficient new information is available to rerun the dTIMS analyses at least once every two years. Therefore, it may only be possible to base the revised Desired Funding on dTIMS analyses every second year.

Chapter 10 – Job creation and skills development

10.1 Expanded Public Works Programme

10.1.1 Approach

The revised strategy for EPWP is focused on improvements in the following areas:

- the number of work opportunities created;
- informal training;
- formal training; and
- a greater focus on maintenance to ensure sustainability of work training opportunities.

A systematic analysis of the above areas has resulted in the following recommendations:

- Communication and coordination between various authorities and Branches should be improved.
- The Branch must prioritise greater utilisation of longer (15 to 24 month) contracts in the routine road maintenance area as it is easier to implement and more sustainable.
- The selection of larger projects in the labour-intensive construction of roads is favoured, but specifically for roads where the traffic count is less than 75 vehicles per day and road-widths not greater than 6 metres.

The following approach to the expansion of the job creation has been adopted:

- A renewed focus will be put on maintenance activities to increase the number of work opportunities, the duration of employment, and the opportunities for training.
- The duration of routine road maintenance contracts will be increased to a minimum of 24 months.
- Labour-intensive contracts for the construction of low-volume, low-speed roads will be redesigned to provide employment of between 15 to 24 months long.
- Contract documentation will have specific provisions for Construction Industry Development Board (CIDB)-registered subcontractor development.
- Training will be done with officials on the methodology of labour-intensive approaches to construction and maintenance.

A refinement of PRMG requirements and the identification and prioritisation of projects based on the five S'Hamba Sonke pillars, i.e. labour intensity, improved access, asset management, safe roads and increased investment will be required.

10.1.2 Job creation commitments for 2018/19

The national benchmarks for each sector are set by the Department of Public Works, which is also the custodian of the national reporting platform. The targets below are subject to ratification by the national Department of Public Works.

- Work opportunities: 7 500; and
- Full time equivalents: 3 500.

The planned deliverables based the Branch's 2018/19 programme are shown in the job creation estimates (Appendix K – Job creation estimates).

10.1.3 EPWP/PRMG national site visits

During each delivery cycle, the national Department of Transport requests the identification of two pilot projects for a national visit. The following site were selected during the 2018/19 financial cycle for their combined contribution to meeting the PRMG (S'Hamba Sonke) principles (listed in paragraph 10.1.1).

- C0751.02: Rehabilitation of TR23/3 from Gouda to Kleinbergrivier Bridge; and
- C0914.02: Rehabilitation of MR168 between N2 and Vlaeberg Road.

10.1.4 Statistics regarding developmental training

The attached detailed spreadsheet (Appendix K – Job creation estimates) indicates that there were over 63 service opportunities to indirect contractors in the 2018/19 financial year as at March 2019. It also details the subcontractors involved in training and delivery and the type of training conducted.

Based on project-categorisation, the summary forecasts are projected for 2019/20 and are shown in Table 10-1 and the details in Table 10-2.

Table 10-1: Summary forecast of PRMG projects March 2019

Type of Activity	No of Project	Estimated Budget 2019/20 (R x '000)
Routine Maintenance	52	R 139 800
Periodic Maintenance	19	R 422 000
Rehabilitation	9	R 450 000
Road Asset Management Systems	12	R 14 251
Safety Improvements	2	R 14 000
Grand Total	**94**	**R 1 040 051**

Table 10-2: Details of PRMG training projects

<table>
<tr><th rowspan="2">No of Projects</th><th rowspan="2">Type of Activity</th><th rowspan="2">SSP Pillars</th><th rowspan="2">Estimated Budget 2019/20 (R x '000)</th><th colspan="2">SMMEs</th></tr>
<tr><th>Value (R x '000)</th><th>No.</th></tr>
<tr><td rowspan="8">8</td><td>Periodic Maintenance - Total</td><td>SR, IA, II, LI,KYN</td><td>422 000</td><td>101 186</td><td>74</td></tr>
<tr><td>C0993.02: Reseal of TR75/01 between Holgaten & Oudtshoorn from km 0.0 to km 16.50</td><td>SR, IA, II, LI,KYN</td><td>36 000</td><td>13 470</td><td>10</td></tr>
<tr><td>C1029: Reseal of TR23/02 from km 0.00 - 17.63 between Hermon and Gouda</td><td>SR, IA, II, LI,KYN</td><td>56 000</td><td>10 376</td><td>12</td></tr>
<tr><td>C1080: Periodic Maintenance on DR1064, DR1065, DR1067, DR1069, DR1053 - Stellenbosch Area</td><td>SR, IA, II, LI,KYN</td><td>72 000</td><td>28 267</td><td>13</td></tr>
<tr><td>C1082: Periodic Maintenance on TR24/1 - Malmesbury to Hermon</td><td>SR, IA, II, LI,KYN</td><td>30 000</td><td>14 800</td><td>10</td></tr>
<tr><td>C1086: Periodic Maintenance on TR31/6 - Calitzdorp to Oudtshoorn</td><td>SR, IA, II, LI,KYN</td><td>12 000</td><td>11 492</td><td>4</td></tr>
<tr><td>C1088: Periodic Maintenance on MR267 - Stanford to Riviersonderend</td><td>SR, IA, II, LI,KYN</td><td>58 000</td><td>-</td><td>-</td></tr>
<tr><td>C1089: Periodic Maintenance on TR31/1, TR31/2 and MR287 - Worcester to Ashton and Robertson to Bonnievale</td><td>SR, IA, II, LI,KYN</td><td>106 000</td><td>5 434</td><td>12</td></tr>
</table>

Table 10-2: Details of PRMG training projects					
No of Projects	Type of Activity	SSP Pillars	Estimated Budget 2019/20 (R x '000)	SMMEs	
				Value (R x '000)	No.
	C1091: Periodic Maintenance on TR32/1 - Ashton to Swellendam and MR288 - Jan Harmansgat to Bonnievale	SR, IA, II, LI,KYN	52 000	17 345	13
5	**Rehabilitation - Total**	**SR, IA, II, LI,KYN**	**450 000**	**121 650**	**41**
	C0751.02: Rehab TR23/3 Gouda - Kleinbergrivier Bridge km 0.12 - km 12.5	SR, IA, II, LI,KYN	26 000	27 638	4
	C0822: Rehab MR344 & DR1578 - Glentana	SR, IA, II, LI,KYN	90 000	21 551	13
	C0914.02: Rehabilitation of MR168 between N2 and Vlaeberg Road	SR, IA, II, LI,KYN	104 000	36 468	13
	C0918R: Rehab TR33/3 - Oudtshoorn/De Rust	SR, IA, II, LI,KYN	80 000	35 991	11
	C1000.01: Rehab TR02802 between Hermanus & Stanford	SR, IA, II, LI,KYN	150 000	-	-
22	**Routine Maintenance - Total**	**SR, IA, II, LI,KYN**	**119 500**	**36 673**	**148**
	C1057.06: Vegetation Management on Roads in the Cape Winelands East Area	SR, IA, II, LI,KYN	3 500	1 851	14
	C1057.07:Vegetation Management on Roads in the Cape Winelands West Area	SR, IA, II, LI,KYN	2 700	834	7
	C1057.09: Vegetation Management on Roads in the Eden DM Area	SR, IA, II, LI,KYN	2 800	1 270	10
	C1057.13: Routine Road Maintenance on TR33/1, TR33/2, MR358, DR1671 and DR1680 between Oudtshoorn and Mossel Bay	SR, IA, II, LI,KYN	4 700	2 357	13
	C1057.14: Routine Road Maintenance on TR34/1, TR34/2 and MR582 from Merweville to Klaarstroom	SR, IA, II, LI,KYN	4 800	1 785	13
	C1057.16: Vegetation Management on Roads in the Overberg Area	SR, IA, II, LI,KYN	2 700	-	-
	C1057.17: Vegetation Management on Roads in the Central Karoo DM Area	SR, IA, II, LI,KYN	2 000	-	-
	C1106: Routine Road Maintenance in the Paarl DRE Area	SR, IA, II, LI,KYN	37 000	26 440	13
	C1114.01: Routine Road Maintenance on Roads in the Porterville West Area	SR, IA, II, LI,KYN	4 300	119	13
	C1114.02: Routine Road Maintenance on Roads in the Yzerfontein North Area	SR, IA, II, LI,KYN	6 200	-	-
	C1114.03: Routine Road Maintenance on Roads in the Vredendal Area	SR, IA, II, LI,KYN	3 700	-	-
	C1114.04: Routine Road Maintenance on Roads in the Yzerfontein South Area	SR, IA, II, LI,KYN	3 100	-	-
	C1114.05: Routine Road Maintenance on Roads in the Porterville East Area	SR, IA, II, LI,KYN	4 300	47	13
	C1114.06: Routine Road Maintenance on Roads in the Malmesbury North Area	SR, IA, II, LI,KYN	2 500	-	-

Table 10-2: Details of PRMG training projects					
No of Projects	**Type of Activity**	**SSP Pillars**	**Estimated Budget 2019/20 (R x '000)**	**SMMEs**	
				Value (R x '000)	**No.**
	C1114.07: Routine Road Maintenance on Roads in the Elands Bay Area	SR, IA, II, LI,KYN	5 500	127	13
	C1114.08: Routine Road Maintenance on Roads in the Malmesbury South Area	SR, IA, II, LI,KYN	4 300	-	-
	C1114.09: Routine Road Maintenance on Roads in the Cape Winelands North Area	SR, IA, II, LI,KYN	5 100	559	13
	C1114.10: Routine Road Maintenance on Roads in the Cape Winelands South Area	SR, IA, II, LI,KYN	3 400	-	-
	C1114.11: Routine Road Maintenance on Roads in the Cape Winelands West Area	SR, IA, II, LI,KYN	3 700	350	13
	C1114.12: Routine Road Maintenance on Roads in the Overberg Area	SR, IA, II, LI,KYN	4 000	930	13
	C1114.18: Routine Road Maintenance on TR16/08, TR16/09, TR16/10 and MR606 near Murraysberg	SR, IA, II, LI,KYN	3 000	-	-
	C1114.19: Routine Road Maintenance on TR33/4 and DR1723 including cleaning and maintenance of rest areas in Meiringspoort	SR, IA, II, LI,KYN	6 200	-	-
3	**Upgrades and New Infrastructure - Total**	**SR, IA, II, LI,KYN**	**24 000**	**2 893 734**	**3**
	C0733.07: New Pedestrian Bridge No. 6030 at De Beers Ave (42.1km) over TR2/1	SR, IA, II, LI,KYN	12 000	1 466 281	1
	C0749.02: Upgrade MR191 - Paarl/Franschhoek	SR, IA, II, LI,KYN	10 000	901 952	1
	C1047.02: The widening of Bridge No. 2221 over the Maalgate River at 15.1km on TR2/9	SR, IA, II, LI,KYN	2 000	525 501	1
38	**Grand Total**		**1 015 500**	**262 404**	**266**

10.2 Number of jobs created

The number of jobs created per programme since 1 April 2012 is shown in Table 10-3.

Table 10-3: Jobs created per programme since 1 April 2012							
Programme/Job Category	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19
Construction	**2 751**	**3 889**	**3 543**	**2 847**	**3 006**	**3 006**	**2 560**
Work Opportunities	2 751	3 889	3 543	2 847	3 006	3 006	2 560
Work Opportunities (Women)	755	1 114	1 026	806	852	852	659
Work Opportunities (Youth)	1 803	2 587	2 417	1 910	1 945	1 945	1 570
Maintenance	**5 211**	**6 372**	**5 490**	**5 013**	**4 742**	**4 742**	**3 374**
Work Opportunities	5 211	6 372	5 490	5 013	4 742	4 742	3 374
Work Opportunities (Women)	1 504	1 756	1 437	1 438	1 267	1 267	969
Work Opportunities (Youth)	3 422	4 230	3 664	3 339	3 071	3 071	2 227
Year Totals	**7 962**	**10 261**	**9 033**	**7 860**	**7 748**	**7 748**	**5 934**

The job creation estimates for 2018/19 are provided in Appendix K – Job creation estimates.

The types of skills gained through temporary employment on roads projects is shown in Appendix M – Skills gained.

10.3 Skills development for graduates

In response to the shortage of staff in the Branch, particularly in the professional and technical positions, the Branch is conducting a comprehensive Engineer and Technician Recruitment and Training Programme, which facilitates the training and registration of civil engineering professionals. This programme supports the Departmental Skills Development Strategy (Western Cape Government: Transport and Public Works, 2005) that was finalised in 2005.

The purpose of the candidate development programme is to provide newly graduated technicians, technologists and engineers exiting from the Masahki'Sizwe Bursary Programme with a high standard of workplace experience to allow them to register as professionals with the Engineering Council of South Africa (ECSA) in the shortest period of time, and also to retain as many of these graduates to fill vacant posts in the Branch.

The workplace experience provided is designed to incorporate exposure to all phases of the project lifecycle i.e., conception, design, construction and maintenance. The development programme therefore includes deployment to civil engineering construction companies and consulting engineering companies. Candidates are also deployed in the Design, Planning and Construction Directorates within the Branch and, in certain cases, to DRE offices.

In addition, the programme contributes to the sustainability and succession planning of the Branch. In this regard, three of the recently registered professionals have joined the Branch, all of which are classified as previously disadvantaged individuals (PDIs), which transforms the Branch demographics and emphasises the critical importance of this programme.

Table 10-4 provides a summary of the graduates taken into the programme since its inception in 2010.

Table 10-4: Summary of graduates since inception in 2010

Year	Intake				Completion			Current Number
	Category		PDI		Departures	Registration		
	Engineers	Technician/ Technologist	Male	Female		Pr Eng	Pr Techni & Pr Tech	
2010	7	2	4	5	0	0	0	9
2011	8	0	5	1	0	0	0	17
2012	5	1	3	1	0	0	0	23
2013	3	1	2	1	0	0	0	27
2014	1	1	1	0	4	0	0	25
2015	6	2	3	2	8	4	1	20
2016	3	4	2	3	2	5	0	20
2017	5	5	4	4	0	3	2	25
2018	4	6	5	4	3	-	-	32
TOTAL	42	22	29	21	17	12	3	TOTAL
	64		50			15		
					32			

The practical skills developed during the workplace training include:

- Planning and design: Investigation and problem resolution:
  - Geometric design;
  - Hydraulics and hydrology;
  - Pavement design;
  - Structural design of bridges and culverts;
  - Traffic engineering and traffic modelling;
  - Pavement engineering and materials; and
  - Procurement documentation.
- Site supervision: Acting as assistant resident engineers, the graduates gain experience in materials testing, quality control, contract documentation, measurement and payment certification.
- Routine maintenance: Where deployed to the DRE offices, participants gain experience in route inspections, unpaved and paved road assessments, and supervision of routine road maintenance and flood damage repairs.
- Construction experience:
  - Measurement and costing;
  - Site administration and contract planning and programming;
  - Site survey and setting out;
  - Quality assurance;
  - Occupational health and safety;
  - Construction methods and management of:
    - Road surfacing – asphalt and seals;
    - Road surface maintenance – milling and recycling;

- Traffic accommodation;
- Underground services;
- Earthworks – bulk and half-width construction on rehabilitation projects;
- Layer works including subbase and basecourse; and
- Concrete works – culverts, head and wing walls, as well as bridge construction.

Up to the end of 2018, 15 candidates have achieved professional registration with ECSA – 12 engineers and 3 technologists/technicians.

10.4 Contractor development

Contractor training spreadsheet containing current development initiatives are provided in Appendix L – Contractor development training.

10.4.1 Contractor Development Programme Policy Framework

The Contract Development Policy was approved on 31 March 2016 and has the following outline:

- CIDB Grade 1 – 3:
  - training based on business, management, administrative and financial capacity; and
  - focuses on dedicated works on a more local and regional level;
- CIDB Grades 3 – 5
  - based on indirect targeting (dedicated subcontracting work);
  - focuses on technical capacity and service delivery;
  - is based on a needs analysis;
  - incorporates mentorship via accredited bodies and from the main contractor; and
  - includes performance evaluation and monitoring to ensure growth and compliance.
- CIDB Grades 5 – 6:
  - based on direct targeting via routine road maintenance and other mechanisms;
  - is limited, and further training is based on a needs analysis;
  - incorporates mentorship and coaching; and
  - includes performance evaluation and monitoring to ensure growth and compliance.

Chapter 11 – Strengths-weaknesses-opportunities-threats (SWOT) and risk analysis

11.1 SWOT analysis

An analysis of the strengths, weaknesses, opportunities and threats (SWOT) relevant to the Branch is shown in Table 11-1.

Table 11-1: SWOT Analysis of the Branch

Issue	Strengths	Weaknesses	Opportunities	Threats
Asset management	Programme and project management capability, enables effective management of the organization	In many instances, project priorities are not explicitly defined, and projects are not explicitly associated with strategic objectives	• Improvements in the optimization of expenditure to achieve "value-for-money" • Improvements in the alignment between projects and strategy	Not optimising the full scope of the work undertaken by the Branch
Asset Information systems	Good systems for monitoring network performance and prioritising projects	The lack of: • Electronic maintenance management system for surfaced roads • Unit rate and estimating system • Dedicated Asset information management systems staff • The scope of assets in dTIMS is not comprehensive	• Acquire new systems • Business processes improvements	Governance of asset information is inadequate, leading to a lack of credibility in the information provided and possible poor decisions based on inaccurate information

Table 11-1: SWOT Analysis of the Branch				
Issue	**Strengths**	**Weaknesses**	**Opportunities**	**Threats**
Staffing	Dedicated, capable senior management team and professionals	Key professional and administration positions remain vacant	• Recession may make it easier to recruit and retain professional staff • New professional staff may reduce the dependence on consultants	• Uncompetitive remuneration levels at professional level makes it difficult to attract and retain professional staff • The large number of vacant posts undermines the ability of the Branch to manage its assets, thereby undermining the economy of the Western Cape
Funding		Single source of funding for reducing the backlog		Under-funding of the Branch increases the backlog causing the road network to deteriorate to a point where it cannot be economically repaired or maintained
Organisational structure	The in-house expertise available for re-organising the structure to support good asset management	Organisation has shortcomings in the support of asset management	Restructure the organisation to support asset management	The long duration of the engagement with Organisational Development to finalise the structure and the time required for the final approval by the Department of Public Service and Administration

11.2 Risk register

A condensed risk register was created that is based on the Department's Dashboard Report Q1 2017/18. The legend is shown in Table 11-2. Risk is rated according to its level shown for its impact and likelihood.

Table 11-2: Legend for impact and likelihood

Impact			
Low	**Moderate**	**High**	**Extreme**
Negative outcomes or missed opportunities that are likely to have a negligible impact on the ability to meet objectives. Event will be controlled through normal management processes.	Negative outcomes or missed opportunities that are likely to have a relatively moderate impact on the ability to meet objectives. Event resulting in breakdown of core business process activity.	Negative outcomes or missed opportunities that are likely to have a relatively substantial impact on the ability to meet objectives. Event resulting in breakdown of core business process.	Negative outcomes or missed opportunities that are of critical importance to the achievement of the objectives. Critical event resulting in breakdown of core business service.
Likelihood			
Unlikely	**Moderate**	**Likely**	**Almost Certain**
Highly unlikely that the adverse event/ opportunity will occur (0 – 20% likelihood of occurring). The adverse event/ opportunity occurs infrequently and is unlikely to occur in the next 5 years.	Unlikely but there is a slight possibility that the adverse event/ opportunity will occur (21 - 50% likelihood of occurring). There is an above average chance that the adverse event/ opportunity will occur at least once in the next 36 – 60 months.	Likely that the adverse event/ opportunity will occur (51 – 80% likelihood of occurring). History of occurrence internally or at similar institution. It is likely to occur in the next 12 – 36 months.	Adverse event/ opportunity will definitely occur (more than 80% likelihood of occurring). It is likely to occur more than once in the next 12 months.

The risk register created is show in Table 11-3.

Table 11-3: Risk register			
Risk issue	**Impact on service delivery**	**Risk likelihood**	**Mitigation measures**
Risks related to institutional issues			
Governance of asset information is inadequate	High	Almost Certain	IT Steer committee created, which will address this issue – control addresses the risk
Organisational sustainability in terms of the effect of stringent OSD requirements that creates difficulties in attracting and retaining professional staff and the extended duration of organisational development negatively affects programme performance and the ability to deliver on its objectives	High	Almost Certain	• Lobby DPSA for a review of OSD requirements • Creation of salary dispensation for engineers (OSD), which could result in more attractive packages for professionals • Annual intake of graduates • Engineer and technical practical training programme (Roads Professional Development Programe – PDP) was introduced and registered with the relevant professional associations • Establishment of a professional development committee to coordinate the Roads PDP • Exposing current staff to further professional development opportunities (e.g. conferences, seminars, workshops and forums) • Head-hunting and succession planning as well as up skilling of current graduate candidate engineers and technicians for vacant posts and as contract managers in our regions • More in-house work is undertaken in order to provide development opportunities to assist with up skilling and training of staff • Organisational Design (OD) process which will result in a new more appropriate structure • Making staff available to assist OD in developing the new structure • Providing retention and succession planning-incentives and strategies. • Retaining the services of professionals after reaching retirement age • controls partially address the risk
Organisational sustainability in terms of the limited new appointments due to cost of employment (CoE) being capped	Extreme	Almost Certain	Lobby to fund unfunded posts– controls partially addresses the risk
Continued under-funding of the Branch leads to an inability to maintain the provincial road network to an optimal standard which could lead to a gradual collapse of the provincial road network, jeopardising the safety of road users and the reliability of the road infrastructure	Extreme	Almost Certain	• Motivate for increased roads budget using details in the Road Asset Management Plan • Apply optimised budget and projects to achieve lowest cost for maintaining the network • Improve project selection by optimising maintenance strategies via multi-criteria

Table 11-3: Risk register

Risk issue	Impact on service delivery	Risk likelihood	Mitigation measures
			models (built management systems) that inform decision-making • Controls partially address the risk
Inability to complete economic projects which could result in the Programme utilising equitable share funds which could result in the increase of the maintenance backlog and limit economic infrastructure growth. Asset Finance Reserve (AFR) fund being reduced and/or terminated	Extreme	Almost Certain	• Lobbied for funding through the Asset Finance Reserve Fund. As a result of this, Treasury allocated additional funding in the 3rd year of the MTEF - This has then completely mitigated the issue Road Asset Management Plan (RAMP) of the Western Cape (issued annually) is used to motivate for increased roads budget
Opportunity to create jobs is constrained which negatively affects the government's broader objectives such as job creation, economic development and social equity	High	Almost certain	• The PRMG from National Department of Transport is a major vehicle for the Branch to address job creation • Ensure focused attention is given to the broader socio-economic objectives and include policy implementation • Routine road maintenance contracts are being restructured to make them more EPWP-compliant and expanded to enhance job opportunities. • Focus on doing more routine maintenance on contract to increase temporary work opportunities
Changes in NEMA legislation affecting borrow pits have moved the responsibilities for approval of borrow pits from the Department of Environmental Affairs & Development Planning (DEA&DP) to the Department of Mineral Resources. DMR and DEA&DP may not have sufficient resources to manage the legalisation of borrow pits and therefore the approval of borrow pits will be delayed which results in decreased Branch ability to deliver on objectives and anticipated approval delays	Extreme	Almost certain	• Facilitate a process with Departmental Finance and Provincial Treasury to develop a new business process in relation to financial guarantees. This needs urgent attention • Further discussions with DMR and DEA&DP (also through consultants) regarding changes, implementations and priorities • Reassessing the number of borrow pits required and prioritising the applications for approval • Controls partially address the risk
Lack of internal expertise in environmental assessment	Extreme	Almost certain	• Outsourcing the functions • Organisational Design to review the current organogram and establishment
Suboptimal use of funds due to the maintenance works and new assets not being fully optimised	High	Almost Certain	• Implement demand management plan for new projects based on Western Cape Transport Model predictions • Accelerate the optimisation of the full scope of works through incorporation in dTIMS • Creation and implementation of a comprehensive maintenance management system – control addresses the risk
Strategy for maintenance and upgrading of gravel roads not finalised	High	Almost Certain	Review and finalise the strategy for upgrading and maintenance of gravel roads

Table 11-3: Risk register			
Risk issue	**Impact on service delivery**	**Risk likelihood**	**Mitigation measures**
Deteriorating trend of the condition of the road network to below acceptable levels of service	High	Almost Certain	Concentrate on reducing the deterioration by addressing drainage and resealing – controls partially address the risk
Traffic demand on the network leading to congestion in the Cape Metropolitan Area	High	Almost Certain	Plan and fund increase in road space where appropriate – controls partially address the risk
Effects of climate change inducing extreme weather conditions and consequential damage through flooding and the effect of extreme heat on asphalt pavement layers	High	Almost Certain	• Concentrate on reducing the effects of extreme weather by addressing drainage and reseal – controls partially addresses the risk • Use bitumen binders that tolerate higher temperatures – controls partially address the risk
Scarcity of gravel for maintaining unpaved roads creating a high demand for upgrading to paved standards	High	Almost Certain	Reduce the demand for gravel by: • Applying best practice for regravelling and blading maintenance • Establish the optimum number of borrow pit for maintenance and regravelling and thereby reducing the demand to upgrade gravel roads • Controls partially address the risk
Scarcity of base aggregates for paved roads	Moderate	Almost Certain	Recycle base wherever possible and use of alternative technology - controls partially addresses the risk
Scarcity of water for compaction	Moderate	Almost Certain	Explore the use of sea and mineralised water – controls partially address the risk
Variable quality of bitumen available for seals and asphalt	Moderate	Moderate	Monitor the quality of bitumen – controls partially addresses the risk

11.3 Findings and conclusions

There are many high risks relating to the institutional issues, resources and infrastructure assets. The ability of the Branch to effectively mitigate many of the risks is limited and can only be partially addressed. The cumulative effects of not being able to deal with these risks effectively over the last 20 years has led to a situation where the Branch's staff and funding resources have reached a fragile state.

In conclusion, the future demands, complexity and turbulence in managing the road infrastructure assets are expected to increase and there is a high probability that situations will arise that test the Branch's ability to adequately manage the road network in its mission to effective support economic growth.

Chapter 12 – Conclusions and recommendations

12.1 Conclusions

The following was concluded:

- The Branch has provided detailed analysis of the needs of the network and determined the minimum funding required for a sustainable network that will provide the levels of service required to support the economy of the Western Cape.
- This minimum funding is approximately R2,87 billion per year over the next 10 years more than provided in the MTEF Budget.
- Staffing of the Branch is critically low, jeopardising effective management of the road network.
- The Branch's asset management systems provide excellent support for effective management.

12.2 Recommendations

The Branch should focus on the following issues to address the preservation of the network as effectively as possible for the available MTEF budget:

- Expand the scope of work that is optimised in the Branch's resource allocation system (dTIMS).
- Review the levels of service targets on the network where appropriate, bearing in mind that road users and the economy will pay the price in the form of excess user costs.
- Ensure the most appropriate design and delivery solutions incorporating proven new technologies are consistently chosen and implemented to appropriate standards.
- Improve the effectiveness and efficiency of high priority preservation and maintenance activities to reduce the rate of deterioration of the network.
- Minimise overhead costs.
- Construct additional weighbridges to deter overloading, where cost effective.
- Implement measures to update information on bridges and other structures, including their asset value.

With respect to enabling the Branch, it is recommended that:

- The organogram micro-structure be finalised without delay to enable sourcing of staff and minimise the impact on service delivery.
- Utilise the asset management maturity assessment in accordance to TMH 22 (Committee of Transport Officials, 2013), to assist the Branch in identifying gaps and creating action plans for improving asset management; and
- System improvements are implemented to close identified gaps.

Chapter 13 References

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Volume 2 of 2: Appendices

Road Asset Management Plan

2019/20 to 2028/29

Volume 2: Appendices

Department of Transport & Public Works

Road Network Management Branch

C O N T E N T S

Note: This document is formatted according to the corporate branding of the Western Cape Government. The colour palette used can be found in Appendix N – Corporate Branding.

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Appendices

Appendices Appendix A – Road Asset Management Policy to Appendix N – Corporate Branding are contained in this section.

Appendix A – Road Asset Management Policy

Road Asset Management Policy

1. Background

Asset management is defined as the systematic and coordinated activities and practices through which the Branch optimally and sustainably manages its assets and asset systems, their associated performance, risks and expenditures over their life for the purpose of achieving corporate objectives.

1.1 International Asset Management Standard

International asset management specifications highlight the importance of corporate asset management policies as part of an integrated suite within an Asset Management System. The contents of this policy should conform to the direction and intent of the SANS 55000 Asset Management. SANS 55001:2015 specifies that an organisation shall establish an asset management policy that:

'a) is appropriate to the purpose of the organisation;

b) provides a framework for setting asset management objectives;

c) includes a commitment to satisfy applicable requirements;

d) includes a commitment to continual improvement of the asset management systems.

The asset management policy shall:

- be consistent with the organisation plans;
- be consistent with other relevant organisational policies;
- be appropriate to the nature and scale of the organisation's assets and operations;
- be available as documents information;
- be communicated within the organisation;
- be available to stakeholders;
- be implemented and be periodically reviewed and, if required, updated.'

1.2 Legislative requirements

This policy will align the Branch with international best practice and conform to the requirements of the following Acts:

- Constitution of the Republic of South Africa, (Act 108 of 1996).
- The Constitution of the Western Cape, 1998 (Act 1 of 1998).
- Public Finance Management Act, 1999 (Act 1 of 1999 as amended by Act 29 of 1999) and Regulations.
- Public Service Act, 1994 (Act 103 of 1994) and Regulations, 2001 and 2016.
- Western Cape Land Administration Act, 1998 (Act 6 of 1998). National Land Transport Act, 2009 (Act 5 of 2009) and Regulations.
- National Road Traffic Act, 1996 (Act 93 of 1996).
- Cape Roads Ordinance, 1976 (Ord, 19 of 1976).
- Advertising Along Roads and Ribbon Development Act, 1940 (Act 21 of 1940).
- Road Transportation Act, 1977 (Act 74 of 1977).
- Road Safety Act, 1972 (Act 9 of 1972).
- Road Accident Fund Act, 1972 (Act 9 of 1972).
- Road Traffic Management Corporation Act No 20 of 1999.
- Administrative Adjudication of Road Traffic Offences Act No 46 of 1998.

- Infrastructure Development Act No 23 2014.
- Provincial Infrastructure Delivery Management Framework as approved by the Provincial Executive Council.
- Occupational Health and Safety Act, 1993 (Act 85 of 1993) as amended by Acts 181 of 1993 and 66 of 1995 and Regulations.
- National Environmental Management Act, 1998 (Act 107 of 1998) and regulations.
- Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002) and regulations.
- Western Cape Road Traffic Act, 1998 (Act 12 of 1998).
- Western Cape Toll Roads Act, 1999 (Act 11 of 1999), and the Policy drawn up in terms of Section 16(1) of the Act.
- Preferential Procurement Policy Framework Act, 2000 (Act 5 of 2000) and its regulations.
- Construction Regulation R1010 of 2003 with specific reference to compliance to occupational health and safety within the construction industry.
- Construction Industry Development Board Act 2000 (Act 38 of 2000) with specific reference to the regulation of the construction industry and its 2004 Regulations with specific reference to the registering of contractors and projects.
- Building Industry Bargaining Council Legislation Act 2003 (Act No 25769 of 2003) with specific reference to the protection of employees in the construction industry.
- Local Government: Municipal Systems Act, 1999 (Act 32 of 1999).
- Local Government: Municipal Structures Act, 1998 (Act 117 of 1998).
- Division of Revenue Act, 2007 (Act 1 of 2007 and subsequent Acts).
- Government Immovable Asset Management Act, 2007 (Act 19 of 2007).
- Expropriation Act, 1975 (Act 63 of 1975).
- Western Cape Transport Infrastructure Act, 2013 (Act 1 of 2013).
- Spatial Land Use Management Act, 2013, (Act 16 of 2013) and regulations.
- The Land-use Planning Ordinance Act, 1985 (No 15 of 1985).
- The Western Cape Land-use Planning Act, 2014.
- The Mine Health and Safety Act, 1996 (No 29 of 1996).

2. Scope

This policy covers the physical assets that comprise the WCG-owned transport infrastructure network and the asset information assets including data, processes and information systems.

The Branch's asset classes covered by this policy include:

- Roads – including earthworks, pavements and surfaces
- Road structures – including bridges (concrete, timber, steel; deck unit, girder/beam, box girder), tunnels, major culverts (box culvert, arch, slab deck, pipe) minor culverts, gantries and tunnels
- Road reserve assets – guard rails, signage, fences, kilometre markers, traffic signals and their controls, intelligent transport systems, etc.
- Non-motorised transport infrastructure – foot paths, etc.
- Information assets that are enablers of asset management.

Asset classes not covered by this policy include:

- Buildings, plant and current assets
- Human resources
- Financial resources

Although human factors such as leadership, motivation and culture are not directly addressed within the scope of this policy, they are critical enablers to successfully achieving optimised and sustainable asset management and require due consideration.

3. Objectives

The objectives of this policy are to set the direction and framework required for road-related asset sustainability, including:

- Meeting legislative requirements for asset management; and
- Ensuring effective resourcing to support asset management.

4. Policy Statement

The Road Network Management Branch (the Branch) of the Department of Transport and Public Works, WCG, will manage the WCG roads assets sustainably over the long term.

The Branch has a strategic role in leading a safe and accessible road transport system that contributes to economic development and enhances the quality of life for all people of the Western Cape. Long-term sustainable asset management is essential to fulfilling this role and delivering cost-effective transport infrastructure and services.

This policy outlines the Branch's approach to asset management and demonstrates how transport investments will be maximised to ensure Western Cape residents receive value-for-money. It will support the Western Cape Government's strategic goals for creating opportunities for growth and jobs, enable a resilient, sustainable, quality and inclusive living environment and embed good governance and integrated service delivery through partnerships and spatial alignment by prioritising investments that facilitate growth and improved productivity. It will foster opportunities for regional development through stakeholder collaboration.

5. Policy Implementation Plan

The Branch aims to meet its policy objectives in terms of:

- Legislative requirements for asset management by
    - Striving to meet excellence in accordance with the draft TMH 22 template (Committee of Transport Officials 2013), which was based on the draft of ISO 55001:2014 Asset management - Management systems – Requirements, which has been adopted without change as SANS 55001:2015 (South African National Standard 2015).
    - Ensure that the WCG road-related assets are managed in a sustainable manner, with appropriate Levels of Service that balance the needs of customers and the environment within available funding and consistent with the Department's risk framework.
    - Safeguard the WCG road-related assets and employees by implementing effective asset management strategies and providing the necessary financial resources for those assets
    - Maximise value-for-money, taking into account the full costs of providing, holding, using, maintaining and disposing of assets throughout their lifecycle
    - Optimise the solutions through improved management and economies of scale

- Demonstrate transparent and responsible asset management processes that align with established best practice.

- To ensure effective resourcing by
  - Ensure resources required and operational capabilities are identified and responsibility for asset management is allocated.
  - Assign clear responsibilities and accountabilities for the stewardship and control of the Branch's road-related assets and the associated reporting responsibilities.

5. Approval

This policy has been approved by Head of Branch.

DATE: 29/3/2018

6. References

References include, but are not limited to:

- Asset Management, SANS 55001:2015: 2014 Edition 1 – Asset Management, SABS, Pretoria, 2014
- Draft TMH 22: Road Asset Management Manual, COTO, SANRAL, Pretoria, 2013
- Roads Ordinance 19 of 1976, Western Cape Government
- Public Finance Management Act, 1 of 2009
- Government Immovable Asset Management Act, 2007 (Act No. 19 of 2007)

Appendix B – Strategic asset management systems

The following major monitoring and reporting information technology systems as shown diagrammatically in Figure 1-8, in Book 1 of the RAMP is described below:

Road Network Information System

RNIS purpose: to manage the road network information of the WCG and to make this information available to the various subsystems within the Branch. The information in the database is updated by periodic surveys of roadside element data as well as various other sources. This system is designed to eliminate the need for the duplication of data, and forms the core of the ongoing effort to achieve integration between the various systems of the Branch.

Output: it provides all the reference data required by other systems.

Traffic Counting System

TCS purpose: to provide a repository of traffic counts, analyse the data and provide reports.

Output: The PMS, GRMS, DSC and other systems access the traffic counts in the TCS. It also provides reports on traffic information to other stakeholders.

Pavement Management System

Purpose:

- Keep an in-depth inventory of pavement structures, etc.
- Keep track of how the network is performing through regular surveillance of:
  - Visual condition;
  - Roughness and rutting;
  - Structural capacity; and
  - Surface texture.

Output: the data for the economic analysis. Reports on the condition of each road on the network and information regarding the state of roads for the compilation of the annual report.

Deighton Total Infrastructure Management System

Purpose: dTIMS optimises the overall performance of the road network over time in accordance with policy objectives and within budgetary constraints by:

- A lifecycle benefit cost economic analysis to optimise the treatments over the lifecycle of the roads for the combined paved and unpaved networks including:
  - Upgrades to paved roads;
  - Rehabilitation of paved roads;
  - Resealing of paved roads;
  - Regravelling of unpaved roads;
  - Upgrades of unpaved roads to paved standards;
  - Bridges and major culverts;
  - Safety upgrades; and

Output: information on the optimal resource allocation, i.e. the optimal split of funds between treatments, such as rehabilitation, resealing, upgrading to paved standards, unpaved road maintenance. An optimised list of rehabilitation and resealing projects for the paved road network.

Highway Development and Management Model

HDM-4 purpose: detailed analysis of the economic feasibility of projects in accordance with policy objectives including:

- New roads;
- Upgrading of paved roads;
- Upgrading of unpaved roads to paved standards;
- Safety projects; and
- Rehabilitation options.

It is envisaged that the benefits and costs of these projects will be input to dTIMS for network optimisation of all projects.

Gravel Road Management System

GRMS purpose: to:

- Keep an inventory of gravel wearing course and subgrade properties
- Keep track of how the network is performing through regular surveillance of visual condition
- Identify and prioritise unpaved roads maintenance projects.

Output: reports on the condition of each unpaved road on the network; information regarding the state of roads for the compilation of the annual report.

Bridge and Structures Management System (B&SMS)

B&SMS purpose: to record the information on the condition and required maintenance on the about all bridges and major culverts on provincial roads.

Output: A prioritised list of bridges and major culverts needing maintenance, rehabilitation or replacement.

Integrated Provincial Accident System (IPAS)

IPAS purpose:

- To capture accident information from the accident report forms;
- To transfer accident information into a provincial accident database that will contain all accident information for the urban and rural networks of the Western Cape.

Output: Provide various reports on accidents and the spatial representation of accidents

Geographical Information System (GIS)

GIS purpose: to provide the Branch with a tool for creating maps from queries of all Roads Infrastructure databases, and provide spatial analysis capability.

Outputs: projects in relation to dTIMS priorities; intervention types; routine maintenance activities; distribution of materials sources; overlapping activities.

Appendix C – Tactical and Operational systems

The following major tactical and operational systems as shown diagrammatically in Figure 1-8, in Book 1 of the RAMP is described below:

Integrated Maintenance Management System (IMMS)

IMMS purpose: to keep track of the expenditure at the Regional Offices, the Central Workshop in Bellville and the district municipalities (DMs) which act as agents for the WCG. This information is reconciled with the Basic Accounting System, BAS. This system provides a central database of the information contained in the Maintenance Management Systems as operated by the Regional Offices, District Municipalities and the Bellville Central Workshop.

Output: a database of unit costs and project costs for various maintenance and construction activities.

Gravel Roads Maintenance Management System – under development

GROMAMAS purpose: to support the scheduling, scoping, materials selection and design, risk register, process and acceptance control and project review for regravelling and to optimise the blading maintenance of the unpaved roads network.

Output: project progress, project scope, specifications and design plans, material sources and mix designs, risks and mitigation measures, quality information, actual costs, and blading programmes.

Plant and Equipment Management System

PEMS purpose: to keep and process information relevant to the road construction plant and equipment owned by the Branch for maintenance purposes.

Output: Maintenance and repair costs, utilisation and other logged data are currently transferred from the Maintenance Management System (MMS).

Regional Operations Activity Plan (ROAP) – under development

The current system of local maintenance planning situated in the districts, which is manual and not integrated with the Branch's electronic information systems, will be enhanced by the implementation of ROAP, an electronic tactical and operations level maintenance management system for the Branch. This new system will assist with the operations and maintenance decision making for individual assets that are not currently covered by the strategic-level systems, e.g., RNIS, PMS, and GRMS. It will also provide vital feedback of information to the strategic-level systems that will enhance decision making on the scope of rehabilitation and periodic maintenance projects.

ROAP purpose: to provide a comprehensive view of all operational work (including routine, periodic and rehabilitation and upgrading) and support the management of operations by the identification of defects, scheduling and packaging of routine maintenance activities across District Roads Engineer (DRE), DM and contract maintenance for current expenditure and the scoping of work, work packaging, and scheduling of capital projects, including borrow pits.

Output:

- Operational (including maintenance) works programme and work instructions; and
- History of all routine maintenance, including pavement-related routine maintenance for consideration during the decision making process for the scoping of rehabilitation and periodic maintenance projects at both strategic and tactical levels.

Portfolio, Program and Project Management System (Rational Portfolio Management – RPM)

RPM purpose: to assist in the management of the Branch's portfolio of projects and programmes.

Output:

- MTEF implementation plans for the planning, design and construction of projects in the project portfolio;
- Measurement of actual performance/estimation of future performance for each indicator in the Annual Performance Plan for each financial year;
- Actual cash flow/ estimated future cash flow per project, programme and financial year;
- Management and operational reports;
- Inputs to financial statements; and
- Framework for the governance of projects in terms of the Project Procedures Manual.

Materials Information Management System

MIMS purpose: provide the repository for all information relevant to material sources and support the process of application for legalisation of these sources from the Department of Mineral Resources, and the reporting done by the Environmental Control Officer during the mining phase.

Output: information on available sources of gravel; reports on the management of borrow pits.

Pavement Quality Management System (PQMS)

PQMS purpose: Quality assurance during all road construction processes, such as:

- Managing the testing of road building materials in the laboratory and storage of the results;
- Planning and design of seals;
- Pavement design;
- Design of asphalt and cemented layers;
- Acceptance control for all layerworks on construction sites (ABACUS);
- Control during the construction of seals (SealPro); and
- As-built database for all for decision-making on future paved road maintenance projects.

Output:

- Quality data;
- As-built data;
- Information for strategic analysis of performance of the network in terms of the quality of construction and the materials used; and
- Data for analysis by the PMS.

Seal Planning and Design System (SPADS) – In development

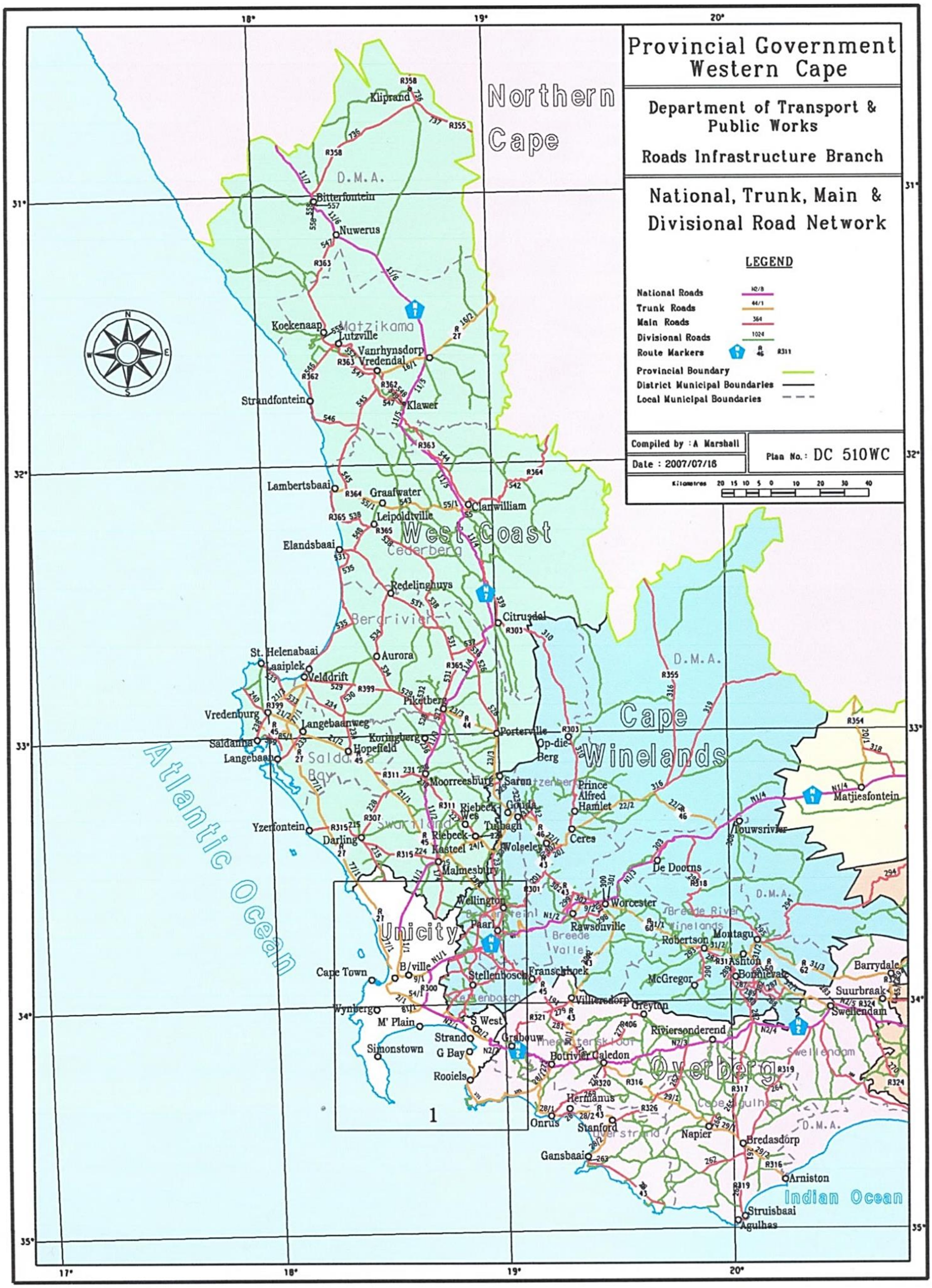
This is a module of the PQMS.

SPADS purpose: to provide the software platform for managing the planning and design of seals in the Western Cape in order to achieve predictable and consistent planning and seal design outputs, both within the Branch and from consulting engineers, while allowing future improvements and innovations.

Output:

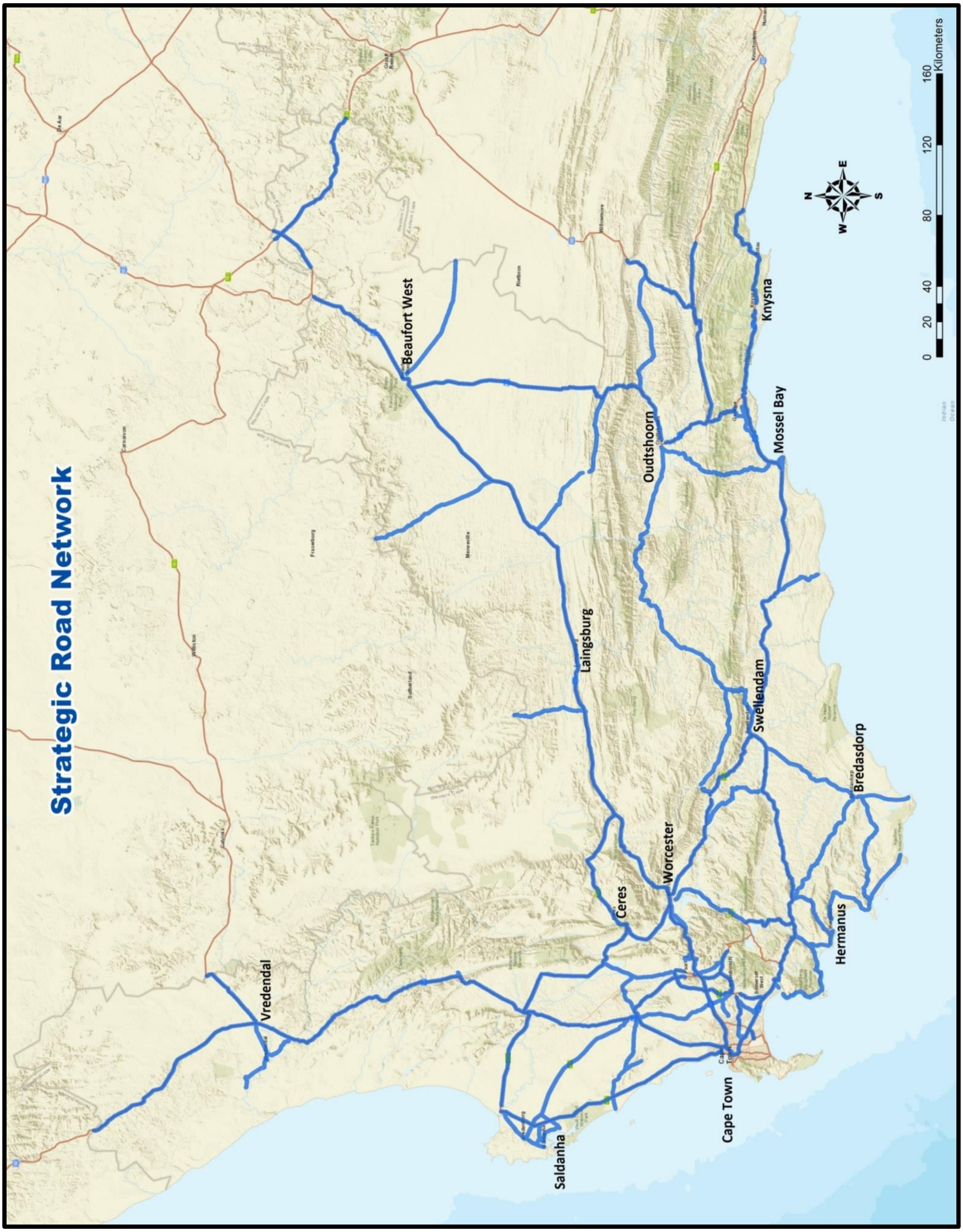
- Planned seal types and where they will be applied;
- Report for tender documentation;
- Uniform sections for the seal design; and
- A design report.

Appendix D – Maps of the road network




Provincial Government - Western Cape
Department of Transport & Public Works
Roads Infrastructure Branch
National, Trunk, Main & Divisional Road Network
LEGEND
National Roads
Trunk Roads
Main Roads
Divisional Roads
Route Markers
Provincial Boundary
District Municipal Boundaries
Local Municipal Boundaries
Compiled by : A Marshall
Date : 2007/07/16
Kilometres
Plan No. :
DC 510WC
Northern Cape
Eastern Cape
Central Karoo
Eden
Beaufort West
Laingsburg
Prince Albert
Oudtshoorn
Kannaland
George
Mossel Bay
Knysna
Bitou
Hessequa
D.M.A.
Merweville
Leeuw Gamka
Bitter Water
Prince Albert Road
Murraysburg
Klaarstroom
Cango Caves
De Rust
Ladismith
Calitzdorp
Uniondale
Van Wyksdorp
Brandrivier
Heidelberg
Riversdale
Herbertsdale
Albertinia
Gouritsmond
Witsand
Cape Infanta
Stilbaai
Sedgefield
Plettenbergbaai
Groot Brakrivier
Klein Brakrivier
Indian Ocean
INSET 2

The Strategic Road Network



Appendix E – Development of a new objective function

The Branch is currently developing an "augmented" area-under-the-benefit-curve (AAUC) objective function, to support the current Life-Cycle-Benefit-Cost-Analysis (LCBCA) in addressing the Brach's two strategic objectives:

1. Sustainable asset preservation.
2. Economic growth through road-based transport infrastructure investment.

The area-under-the-condition-curve (AUC) approach has a shortcoming with respect to the Branch's second strategic objective of supporting sustainable economic growth (Western Cape Government 2015). The AUC objective function considers the economic benefits relative to costs incurred for each treatment alternative per road section, but does not consider the broader economic context of where the road segment is located relative to other competing road segments. Refer to Figure E-1that illustrates the AUC pictorially.

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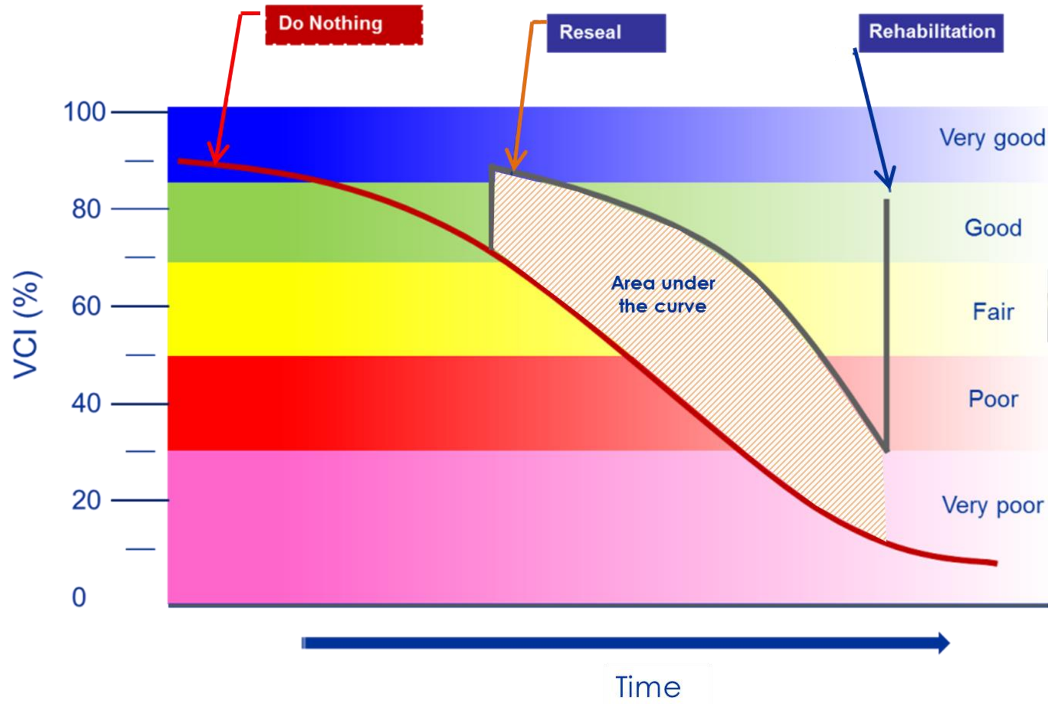


Figure E-1: Illustration of area-under-the-condition curve

The Branch further requires that resource allocation with respect to the road network should be aligned and responsive to the WCG planning themes that are captured in the Provincial Spatial Development Framework (Western Cape Government 2014) and related Growth Potential Study (Western Cape Government 2013). The Branch plans to introduce consideration with respect to the economically equitable allocation of resources during the resource optimisation of the network management process.

Economic consideration can be introduced through augmenting the weighting parameter of the AUC objective function. The premise of this approach is that the road network, in conjunction with other sets of public and private infrastructure, serves to "host" economic activity in a region.

Following on from this assumption, the specific economic weight that each road, road section, or road segment hosts, can be calculated. The economic weight of a road in a specific area is proportioned according to its contribution in terms of vehicle-kilometre (annual average daily traffic [AADT]-km) of the segment in question to that of the total network in the region. The implicit assumption is that a truck and a passenger vehicle carry equivalent economic weight.

Such economic weight per road segment reflects the underlying distribution of activity in an area and between areas. Within the Western Cape, the economic weight could be determined at either local or district municipality level. The premise of the approach introduces equity consideration in the resource allocation process (Porras, Han and Zhang 2014). The proposed approach further shares similarities with the Economic Network Plan approach which matches the economic need, from land use, to the economic flows resulting on the road network (Maughan 2013).

Augmenting the objective function introduces two sources of variation:

- Introduction of vehicle-kilometres enables competition between road links of different lengths and traffic volumes. A short segment with high traffic is competing for investment on the same basis of comparison with a longer segment which hosts lower traffic volumes. The effect is that road sections are weighted by the extent that they perform in hosting the economy. Introducing this step is required as road segment lengths vary considerably.
- Introduction of economic weight of different sub-areas that constitute the area under consideration allows for the reflection of the underlying distribution of actual economic activity. It allows for the equitable allocation of resources according to the quantum of economy hosted.

The nature of the objective function does not change. It remains the sum over the analysis period of changes in the condition, multiplied by a weighting parameter. The weighting parameter itself is augmented to better reflect the underlying economic characteristics. The basis of this weighting parameter remains the level of traffic on the road segment.

The effect of the change of weighting parameter is the re-ranking of priority, irrespective of the benefit part of the function. Given the changes in condition, the benefit part of the equation remains constant.

The approach allows for the alignment and responsiveness of pavement network management with respect to the social and economic development policy. Differential economic growth rates could be assigned to sub-areas where development and growth are anticipated or encouraged in the planning and evaluation timeframe. Such integrated planning would serve to unlock network constraints in timely fashion and support economic growth and development.

Procedure

For each intervention strategy (treatment), the benefit calculated for each year in the analysis period, is weighted by the economic number based on the gross domestic product and not only traffic (AADT). This benefit is then totalled for the analysis period. The "benefit" is the area between the two curves, weighted by the "economic weight". Any repair strategy (consisting of one or more successive treatments) that improves the condition of the road segment would thus result in a positive area above the "do-nothing" curve. During the optimisation analysis, the incremental benefit of alternative intervention strategies with increasing costs is measured in terms of the AUC curve.

The AAUC objective function is calculated by summing the present value of the difference between the condition index resulting from the intervention strategy (a combination of intervention activities over the analysis period) and the condition index for the do-nothing alternative, for each year in the analysis period. The AAUC curve benefit calculations are weighted by the "economic weight".

The equation to calculate this benefit for an intervention strategy on a road segment is:

$$Benefit = \sum\nolimits_{\forall j,i} \left\{ \left(\frac{AADT_j \ \times km_j}{\sum_{\forall\, j} AADT_j \ \times km_j} \right) Econ_j \right\} (IS_{Cond} - \ DN_{Cond})$$

Where:

Benefit = Benefit of an Intervention Strategy for a road segment
AADTj = AADT on the road segment j

km_j	= Length of road segment j
$Econ_i$	= Size of economy in terms of the gross domestic product in sub-area i
j	= Road segment
i	= Sub-area in the evaluation area
IS_{Cond}	= Condition of the road segment for the Intervention Strategy in year n
DN_{Cond}	= Condition of the road segment for the Do Nothing Strategy in year n

Limitation: the degree of granularity achieved is at the level of a local municipality and not at road level.

This aspect needs further investigation to determine if the granularity can be improved to road level.

Assumption: a heavy vehicle and a passenger vehicle carry equivalent economic weight.

This aspect needs to be researched further to find out whether it is possible to determine the economic value of heavy vehicles and passenger vehicles on any road in order to refine the quantifiable economic value hosted by every road in the network. The economic value of the light vehicle traffic is not expected to have a large variation, but the economic value of the heavy vehicles could vary considerably, depending on the value of the goods being transported.

The approach could also be expanded to allow for vehicle-passenger-kilometres, introducing social consideration through average occupancy levels. This would introduce more variation only in the event that occupancy levels differ significantly between the sub-areas constituting the area under evaluation.

Evaluation

The Branch plans to review the effect of the AAUC objective function by comparing results with those yielded by the objective function used in the 2019/20 analysis. Any major changes to the LCBCA will only be done upon a multiple year comparison which is documented in a report and presented to the Branch for approval.

Appendix F - Benchmarking

Benchmarking is a valuable tool to measure the current performance of assets, to provide an effective mechanism to predict the impact of investments on these assets and to provide the custodians of assets with goals to pursue, thereby ensuring continuous performance of such assets.

Two performance indicators are currently used in South Africa to describe the overall condition of a road network. These are:

- Average visual condition index (VCI) weighted for the length of each road segment, and
- Network condition number (NCN) weighted for both the length and the condition of each road segment.

For benchmarking, the averaged network VCI is not suitable because the effect of poorer roads could be concealed by a similar proportion of good to very good roads. On the other hand, the NCN has a high sensitivity for changes and occurrence of roads in the poor to very poor condition categories, thus making it a suitable performance indicator (PI) for use when determining benchmarking for road networks.

Benchmarking for surfaced and unsurfaced road networks will also differ because the level of functionality, such as roughness, that is expected and achievable is different. Traffic on the road network, and therefore road users that are affected by road condition also plays a role in determining realistic goals. No guidelines are currently adopted for South Africa, but an observation of the Department of Transport in the document *Road Infrastructure Strategic Framework for South Africa*, July 2005 reads as follows:

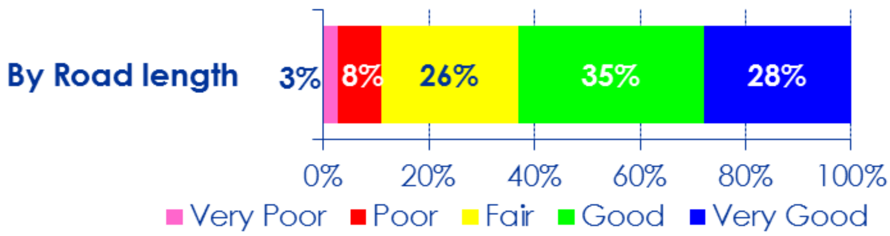
"Internationally the benchmark of road quality is that no more than 5 to 10 per cent of the road networks be in a poor to very poor state (according to the VCI key performance indicator) for a limited period before remedial action is executed. It is recommended that this benchmark be interrogated in the South African context and a decision be made on an appropriate benchmark for the road network."

A further benchmark to pursue is to ensure the need for preventive maintenance can be accomplished. Preventive maintenance, such as the resealing of surfaced roads, is a cost-effective intervention measure with considerable long-term preservation effects. The opportunity for such preventive measures exists typically with surfaced roads in the fair condition category before they deteriorate to a state where expensive rehabilitation intervention remains the only alternative. This benchmarking measure is therefore to limit the proportion of fair roads and thereby retarding their deterioration to a poor condition. Note that this does not mean that roads in good and very good condition do not qualify for preventive maintenance treatments.

In order to choose suitable benchmarking values for the Branch, the 2013 condition data of the surfaced and unsurfaced road networks were investigated and compared to international standards for poor and very poor roads, and other opinions in the industry.

The current condition of the surfaced road network

The 2013 VCI for WCG's surfaced roads is 72% and the 2013 NCN is 66%. The proportions of the surfaced road network in the five condition categories are shown in the graph below.

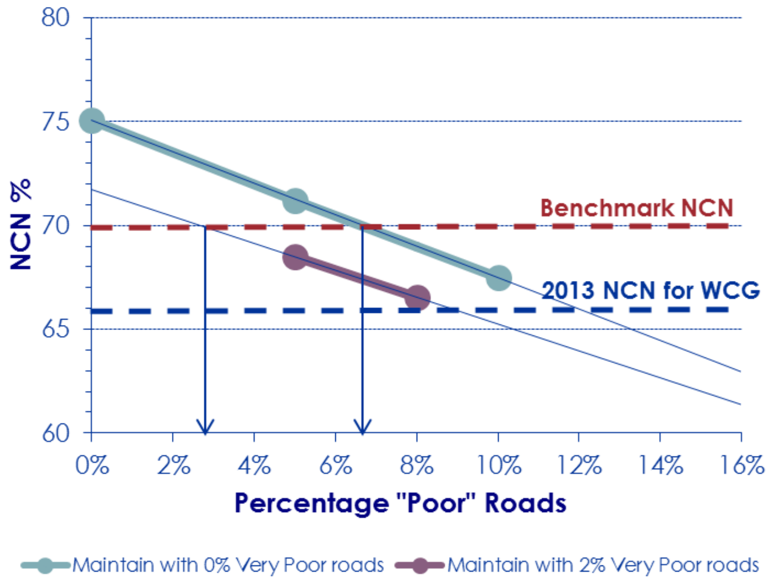


Benchmarking of the surfaced road network

The 2013 condition data of the WCG was used to determine benchmarks for surfaced roads. A combination of condition distribution scenarios was investigated to derive at a benchmark NCN and distribution ceiling values for VCI. These are as follows:

- Very Poor roads - two scenarios were investigated:
  - No very poor roads, and
  - 2% very poor roads.
- Poor roads – A variety of proportions ranging between 0% and 10% of surfaced roads in this condition category.
- The above proportions are therefore adhering to the international benchmarking for road condition keeping no more than 5 to 10 per cent of roads in the poor to very poor category.
- Fair roads – this proportion was kept at 26% thus adhering to a benchmark where approximately 25% of surfaced roads should be in a fair condition and ensuring the need for resealing does not escalate beyond an achievable/realistic level.

The figure below shows the condition impact graphs generated from the 2013 condition data and for the combination of condition scenarios described above.



Condition impact graphs for paved roads

Reading from the graph, a benchmark NCN of 70% was selected as a sensible PI, thus ensuring the condition of surfaced roads remains between the following threshold scenarios:

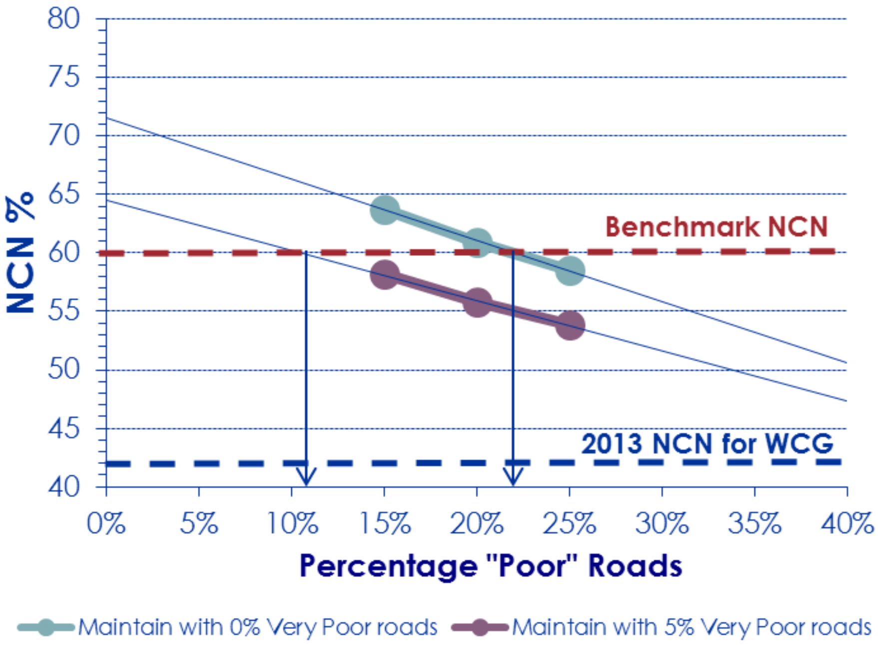
Scenario with no very poor roads
• Less than 7% Poor roads and • Less than 25% Fair roads
Scenario allowing a maximum of 2% very poor roads
• Less than 3% Poor roads and • Less than 25% Fair roads

Benchmarking of the unsurfaced road network

As for surfaced roads, the most recent condition data of unsurfaced roads was used for benchmarking the condition of unsurfaced roads. A combination of condition distribution scenarios was investigated to derive at a benchmark NCN and distribution ceilings for VCI. These are as follows:

- Very Poor roads - two scenarios were investigated:
  - No very poor roads, and
  - 5% very poor roads.
- Poor roads – proportions ranging between 15% and 25% of unsurfaced roads in this condition category.
- The above proportions are much higher than the international benchmarking of 5 to 10 per cent, but due to the current state of unsurfaced roads in the Western Cape and South Africa, a realistic benchmark is proposed in the short-term. The benchmark was investigated for a proportion of poor to very poor roads of no more than 20 to 30 per cent. This benchmark could be revised once guidelines are provided for the maintenance of unsurfaced roads according to functional class and for the environmental difficulties in finding appropriate burrow pits for supply of gravel wearing course material.
- The higher ceiling for poor /very poor roads is also a result of the trade-off between maintenance funding and the magnitude of road users affected by the investment. The traffic on unsurfaced roads constitutes only 4% of all vehicle-km driven on the Western Cape's provincial roads.
- Fair roads – this proportion was kept at 32% thus assuming plus-minus one third of the unsurfaced road network would remain in a fair condition.

The figure below shows the condition impact graphs generated from the most recent condition data and for the combination of condition scenarios described above.



Condition impact graphs for unpaved roads

Condition impact graphs for unsurfaced roads

Reading from the graph, a benchmark NCN of 60% was selected as a sensible PI, thus ensuring the condition of unsurfaced roads remains between the following threshold scenarios:

Scenario with no very poor roads

- Less than 22% Poor roads and
- Maintain the proportion of Fair roads at one-third of the unsurfaced road length

Scenario allowing a maximum of 5% very poor roads

- Less than 10% Poor roads and
- Maintain the proportion of Fair roads at one-third of the unsurfaced road length

Appendix G – Calibration factors for modelling performance

Table A.1 shows the calibration factors for HDM-4 models (HDM-4 Calibration study for Western Cape Government, 02 July 2013) compared to the factors from previous years. These factors are derived from the continuous monitoring of specific pavement performance monitoring sections in the Western Cape Province.

The calibration factors influence the performance models as follows:

- Crack initiation: The period starting at the most recent re/surfacing up to the time when the first signs of cracks are visible.
- Crack progression: The rate at which cracks progress from the time of crack initiation and onwards.
- Ravelling initiation: The period starting at the most recent re/surfacing up to the time when the first signs of ravelling (aggregate loss) are visible.
- Ravelling progression: The rate at which ravelling progress from the time of ravelling initiation and onwards.
- Pothole progression: The rate at which potholes progress from the time of pothole initiation and onwards.
- Roughness progression: The rate at which roughness progresses (deteriorates).
- Rut depth progression: The rate at which rut depth progresses (deteriorates).

Table A.1: Pavement performance calibration factors for paved roads for HDM-4 models

Distress parameter		Seal type	Recommended calibration factor
Time to all crack initiation (ICA)	K_{cia}	Sand seals (SS) and Diluted emulsions (DE)	0,7
		Cape seals (S19)	0,7
		Latex modified seals (L13G)	0,7
		Conventional seals and all other seals not mentioned above	1,2
		Asphalt surfaces	2,5
Time to wide crack initiation (ICW)	K_{ciw}	All types	1,0
All crack progression (ACA)	K_{cpa}	All types, but Cape Seals	0,12
		Cape Seals	An alternative model is recommended where all cracking develop to 20% in the first year after crack initiation, thereafter a 10% increase in all cracking annually.
Wide crack progression (ACW)	K_{cpw}	All types	0,14
Time to ravelling initiation (IRV)	K_{vi}	Diluted emulsions	0,7
		Cape seals	1,3
		Conventional seals and all other seals not mentioned above	1,0
		Asphalt surfaces	1,7
Ravelling progression (ARV)	K_{vp}	All types	1,0
Pothole initiation (IPT)	K_{pi}	All types	1,0

Table A.1: Pavement performance calibration factors for paved roads for HDM-4 models			
Distress parameter		Seal type	Recommended calibration factor
Pothole progression (NPT)	K_{pp}	All types	1,0
Rutting initial densification (RDO)	K_{rid}	All types	1,0
Rutting progression (RDST)	K_{rst}	All types	3,1
Roughness progression (RI)	K_{gs}	All types	1,0
Roughness progression (RI)	K_{gm}	All types	2,8

Appendix H – Standards and Specifications

- The Geometric Design Manual of the Provincial Administration: Western Cape
- TRH 17: Geometric Design of Rural Roads, 1984.
- South African Road Safety Manual
- Road Access Guidelines, Transport Infrastructure Branch, as amended from time to time.
- 'Handleiding vir padboumetodes', PGWC, as amended from time to time.
- Materials Manual: Provincial Administration of the Western Cape, as amended from time to time.
- Maintenance Manual – Provincial Administration of the Cape of Good Hope, July 1986.
- TRH 14: Guidelines for road construction materials
- Draft TRH3: Surfacing seals for rural and urban roads
- TMH1: Standard methods of testing road construction materials
- TMH5: Sampling methods for road construction materials
- TRH9: Construction of road embankments
- TRH10: The design of road embankments
- Draft TRH15: Sub-surface drainage for roads
- Draft TRH18: The investigation, design, construction and maintenance of road cuttings.
- SADC Road Traffic Signs Manual
- TMH7: Code of practice for the design of highway bridges, and culverts in South Africa, parts 1 to 3.
- Bridge Design Manual : Provincial Administration Western Cape
- TRH25: Guidelines for the Hydraulic design and maintenance of river crossings
- General conditions of contract for State Road Authorities (CSAICE) 2004.
- Standard specifications: COLTO (1998)
- Project procedures manual, Volumes 1 to 3. PGWC As amended.
- K21 (revised) Identification and improvement of hazardous locations. CSIR. 1991.
- TRH20: The structural design, construction and maintenance of unpaved roads. 1990.
- Guidelines for the provision and maintenance of unpaved roads in the Western Cape, 2005.
- Draft TRH 4: Structural design of flexible pavements for interurban and rural roads. 1996
- TRH 12: Flexible pavement rehabilitation investigation and design. 1997.
- Draft TRH 3: Surfacing seals for rural and urban roads. 1998.

Appendix I – Forward Works Program and alignment of projects

Optimised delivery schedule per financial year

The report shows the correlation between dTIMS Candidate Projects and the current project schedule in terms of delivering on the identified dTIMS priorities per financial year.

Key:

Not scheduled | Late delivery | Early delivery

Optimum Delivery Year	Recommended treatment	Road number	Start km	End km	Scheduled delivery year	Scheduled treatment	Schedule start km	Schedule end km	Total dTIMS length km
2019	Reseal	DR01095	0	1,95	(blank)	None	0	0	1,95
		DR01102	0	14,9	(blank)	None	0	0	14,9
		DR01123	1,18	10	(blank)	None	0	0	8,82
		DR01123	22	22,15	(blank)	None	0	0	0,15
		DR01123	22,15	23,48	(blank)	None	0	0	1,33
		DR01123	23,48	23,57	(blank)	None	0	0	0,09
		DR01146	4,4	5,83	(blank)	None	0	0	1,43
		DR01154	3,85	3,91	2021	Upgrade,Road, Gravel	0,79	4,32	0,06
		DR01175	17,09	17,87	(blank)	None	0	0	0,78
		DR01214	4	6,48	(blank)	None	0	0	2,48
		DR01238	2	4,61	(blank)	None	0	0	2,61
		DR01285	0	2	(blank)	None	0	0	2
		DR01355	0	2	(blank)	None	0	0	2
		DR01365	0	2,8	(blank)	None	0	0	2,8
		DR01394	10	11,37	(blank)	None	0	0	1,37
		DR01398	0	1,29	(blank)	None	0	0	1,29
		DR01398	12	14	(blank)	None	0	0	2
		DR01409	0	0,49	(blank)	None	0	0	0,49

Optimum Delivery Year	Recommended treatment	Road number	Start km	End km	Scheduled delivery year	Scheduled treatment	Schedule start km	Schedule end km	Total dTIMS length km
		DR01416	4	5,63	(blank)	None	0	0	1,63
		DR01458	8	10,92	(blank)	None	0	0	2,92
		DR01471	0	5,43	(blank)	None	0	0	5,43
		DR01487	105,93	118	(blank)	None	0	0	12,07
		DR01525	20	22	2025	Reseal,Road, Surfaced	20	24,28	2
		DR01525	22	24,28	2025	Reseal,Road, Surfaced	20	24,28	2,28
		DR01529	12,74	14,86	(blank)	None	0	0	2,12
		DR01596	1,65	3,26	(blank)	None	0	0	1,61
		DR01599	9,06	11,43	(blank)	None	0	0	2,37
		DR01621	0	1,87	(blank)	None	0	0	1,87
		DR01627	0	2	(blank)	None	0	0	2
		DR01627	2	4	(blank)	None	0	0	2
		DR02161	0	16,9	(blank)	None	0	0	16,9
		DR02176	0,56	30,42	(blank)	None	0	0	29,86
		DR02185	0	1,36	(blank)	None	0	0	1,36
		DR02203	17,05	20,65	2025	Upgrade,Road, Gravel	15	22	3,6
		MR00027	18,26	20	2022	Reseal,Road, Surfaced	18,26	20,68	3,48
		MR00027	36,2	37,5	(blank)	None	0	0	1,3
		MR00201	0	8,9	(blank)	None	0	0	8,9
		MR00215	47,85	69,34	(blank)	None	0	0	21,49
		MR00217	9,77	19,87	(blank)	None	0	0	10,1
		MR00228	0	0,16	(blank)	None	0	0	0,16
		MR00230	0,04	1,18	(blank)	None	0	0	1,14
		MR00231	0,03	0,46	(blank)	None	0	0	0,43
		MR00233	0	6,61	(blank)	None	0	0	6,61
		MR00240	6,1	13	2019	Rehabilitate,Road, Surfaced	2,14	14,92	6,9

Optimum Delivery Year	Recommended treatment	Road number	Start km	End km	Scheduled delivery year	Scheduled treatment	Schedule start km	Schedule end km	Total dTIMS length km
		MR00264	12	18	(blank)	None	0	0	6
		MR00265	0	49,86	(blank)	None	0	0	49,86
		MR00271	0	10	(blank)	None	0	0	10
		MR00278	0	0,8	(blank)	None	0	0	0,8
		MR00278	2,76	3,96	(blank)	None	0	0	1,2
		MR00286	26	27,94	(blank)	None	0	0	1,94
		MR00289	12	14	(blank)	None	0	0	2
		MR00298	4,35	14,55	(blank)	None	0	0	10,2
		MR00298	19,04	20,2	(blank)	None	0	0	1,16
		MR00305	3,53	6,96	(blank)	None	0	0	3,43
		MR00310	58	62	2025	Reseal,Road, Surfaced	57,75	76	4
		MR00312	2	4,7	(blank)	None	0	0	2,7
		MR00337	0,6	2	2025	Reseal,Road, Surfaced	0,6	15,65	1,4
		MR00337	4	6	2025	Reseal,Road, Surfaced	0,6	15,65	2
		MR00337	8	12	2025	Reseal,Road, Surfaced	0,6	15,65	4
		MR00337	42	44	2025	Reseal,Road, Surfaced	33,21	48,95	2
		MR00337	46	48,95	2025	Reseal,Road, Surfaced	33,21	48,95	2,95
		MR00348	12	14,45	(blank)	None	0	0	2,45
		MR00355	43,09	43,23	(blank)	None	0	0	0,14
		MR00363	38	41,14	(blank)	None	0	0	3,14
		MR00382	2,12	4,96	(blank)	None	0	0	2,84
		MR00531	33	38,7	(blank)	None	0	0	5,7
		MR00531	40	42	(blank)	None	0	0	2
		MR00531	42	48	(blank)	None	0	0	6
		MR00531	48	50	(blank)	None	0	0	2
		MR00534	0	17,44	(blank)	None	0	0	17,44

Optimum Delivery Year	Recommended treatment	Road number	Start km	End km	Scheduled delivery year	Scheduled treatment	Schedule start km	Schedule end km	Total dTIMS length km
		MR00534	43,56	45,4	(blank)	None	0	0	1,84
		MR00536	4,27	5,81	(blank)	None	0	0	1,54
		MR00537	0	15,82	(blank)	None	0	0	15,82
		MR00538	24	43,56	(blank)	None	0	0	19,56
		OP04979	0	0,64	(blank)	None	0	0	0,64
		OP05364	0	3,5	(blank)	None	0	0	3,5
		OP05676	0	0,79	(blank)	None	0	0	0,79
		OP05677	2	5,49	(blank)	None	0	0	3,49
		OP05718	0	1,74	(blank)	None	0	0	1,74
		OP07628	1	1,43	(blank)	None	0	0	0,43
		OP07643	0	5,54	(blank)	None	0	0	5,54
		OP07664	14	16,04	(blank)	None	0	0	2,04
		TR00102	56	62	2022	Reseal,Road, Surfaced	40	85,04	6
		TR00102	64	66	2022	Reseal,Road, Surfaced	40	85,04	2
		TR00102	70	76	2022	Reseal,Road, Surfaced	40	85,04	6
		TR00102	76	78	2022	Reseal,Road, Surfaced	40	85,04	2
		TR00102	78	82	2022	Reseal,Road, Surfaced	40	85,04	4
		TR00103	0	2	2022	Reseal,Road, Surfaced	0	16,6	2
		TR00103	2	4	2022	Reseal,Road, Surfaced	0	16,6	2
		TR00103	4	6	2022	Reseal,Road, Surfaced	0	16,6	2
		TR00103	6	8	2022	Reseal,Road, Surfaced	0	16,6	2
		TR00103	8	12	2022	Reseal,Road, Surfaced	0	16,6	4
		TR00103	12	14	2022	Reseal,Road, Surfaced	0	16,6	2

Optimum Delivery Year	Recommended treatment	Road number	Start km	End km	Scheduled delivery year	Scheduled treatment	Schedule start km	Schedule end km	Total dTIMS length km
		TR00201	32	42,79	2022	Reseal,Road, Surfaced	30,92	42,79	10,79
		TR00202	6	8,54	(blank)	None	0	0	2,54
		TR00209	18	21,5	(blank)	None	0	0	3,5
		TR00209	22	24,06	(blank)	None	0	0	2,06
		TR01602	34	36	(blank)	None	0	0	2
		TR01609	28	30	(blank)	None	0	0	2
		TR01610	18	22	(blank)	None	0	0	4
		TR01610	24	30	(blank)	None	0	0	6
		TR02101	29,35	53,9	(blank)	None	0	0	24,55
		TR02501	17,88	37	(blank)	None	0	0	19,12
		TR03002	26	38	(blank)	None	0	0	12
		TR03104	58	60	(blank)	None	0	0	2
		TR03301	0,52	6	2026	Upgrade,Road, Surfaced	0	16,08	5,48
		TR03301	14	16,08	2026	Upgrade,Road, Surfaced	0	16,08	2,08
		TR03302	64	66	(blank)	None	0	0	2
		TR03305	22	24	2021	Reseal,Road, Surfaced	0	55	2
		TR03402	43,34	43,9	2022	Reseal,Road, Surfaced	39,3	47,4	0,56
		TR04401	0	12	2022	Reseal,Road, Surfaced	0	14	12
		TR05501	4	6	(blank)	None	0	0	2
		TR05501	18	28	(blank)	None	0	0	10
		TR05501	28	38	(blank)	None	0	0	10
		TR07701	8,24	13,88	(blank)	None	0	0	5,64
		TR07701	8,24	24,59	(blank)	None	0	0	16,35
	Light Rehabilitation	DR01103	1,65	1,86	2020	Upgrade,Road, Gravel	0	3,88	0,21
		DR01154	11,86	13,4	2025	Rehabilitate,Road, Surfaced	11,65	13,4	1,54

Optimum Delivery Year	Recommended treatment	Road number	Start km	End km	Scheduled delivery year	Scheduled treatment	Schedule start km	Schedule end km	Total dTIMS length km
		DR01167	0	1,73	(blank)	None	0	0	1,73
		DR01277	0	2,7	(blank)	None	0	0	2,7
		DR01398	22	23,63	(blank)	None	0	0	1,63
		DR01423	0	0,32	(blank)	None	0	0	0,32
		DR01618	1,12	2,59	2020	Upgrade,Road, Gravel	0	4,44	1,47
		MR00108	0	3,17	2021	Upgrade,Road, Surfaced	0	4,63	3,17
		MR00240	13	14	2019	Rehabilitate,Road, Surfaced	2,14	14,92	1
		MR00266	0,2	4	(blank)	None	0	0	3,8
		MR00276	0	0,49	2020	Upgrade,Road, Gravel	0	6,72	0,49
		MR00348	3,02	6	(blank)	None	0	0	2,98
		MR00355	56,98	68	(blank)	None	0	0	11,02
		MR00395	4,88	7,24	2024	Rehabilitate,Road, Surfaced	4,88	7,24	2,36
		OP05615	0	0,69	(blank)	None	0	0	0,69
		OP07219	0	1,43	(blank)	None	0	0	1,43
		OP07224	0	0,54	(blank)	None	0	0	0,54
		TR00102	44	48	2022	Reseal,Road, Surfaced	40	85,04	4
		TR02202	4	6	2025	Reseal,Road, Surfaced	0,85	54	2
		TR03002	16	22	(blank)	None	0	0	6
		TR03104	38	44	(blank)	None	0	0	6
		TR03304	8	10	2022	Reseal,Road, Surfaced	2	19,3	2
		TR03304	10	12	2022	Reseal,Road, Surfaced	2	19,3	2
		TR03305	0	2	2021	Reseal,Road, Surfaced	0	55	2
		TR03305	2	14	2021	Reseal,Road, Surfaced	0	55	12

Optimum Delivery Year	Recommended treatment	Road number	Start km	End km	Scheduled delivery year	Scheduled treatment	Schedule start km	Schedule end km	Total dTIMS length km
		TR03305	14	16	2021	Reseal,Road, Surfaced	0	55	2
		TR03402	43,9	47,4	2022	Reseal,Road, Surfaced	39,3	47,4	3,5
		TR04401	20	26	(blank)	None	0	0	6
		TR04401	30	36,76	(blank)	None	0	0	6,76
	Upgrade to Paved	DR01770	0	8,3	2024	Upgrade,Road, Surfaced	0	8,51	8,3
	Rehabilitate	DR01050	6	7,34	2019	Upgrade,Road, Surfaced	5,5	7,34	1,34
		DR01056	0	1,32	(blank)	None	0	0	1,32
		DR01085	0	3,47	2021	Reseal,Road, Surfaced	0	3,47	3,47
		DR01108	0	6,82	(blank)	None	0	0	6,82
		DR01395	0	2,31	(blank)	None	0	0	2,31
		DR01622	0,45	2	(blank)	None	0	0	1,55
		DR01888	2,55	2,6	(blank)	None	0	0	0,05
		MR00177	28	30,15	(blank)	None	0	0	2,15
		MR00189	12,34	16,63	(blank)	None	0	0	4,29
		MR00189	26	32,53	(blank)	None	0	0	6,53
		MR00189	31,24	32,53	(blank)	None	0	0	1,29
		MR00201	68	74,59	2022	Upgrade,Road, Surfaced	59,02	74,59	6,59
		MR00215	34,07	46,53	(blank)	None	0	0	12,46
		MR00222	1,41	1,58	(blank)	None	0	0	0,17
		MR00230	0,04	1,18	(blank)	None	0	0	1,14
		MR00231	0,46	19,35	(blank)	None	0	0	18,89
		MR00233	6,61	12,84	(blank)	None	0	0	6,23
		MR00240	2,14	6	2019	Rehabilitate,Road, Surfaced	2,14	14,92	3,86
		MR00264	0,84	8	(blank)	None	0	0	7,16
		MR00298	0	4,35	(blank)	None	0	0	4,35

Optimum Delivery Year	Recommended treatment	Road number	Start km	End km	Scheduled delivery year	Scheduled treatment	Schedule start km	Schedule end km	Total dTIMS length km
		MR00298	4,35	14,55	(blank)	None	0	0	10,2
		MR00298	20,2	20,7	(blank)	None	0	0	0,5
		MR00302	0	24,59	(blank)	None	0	0	24,59
		MR00307	0	1,23	(blank)	None	0	0	1,23
		MR00344	6,81	10	2020	Upgrade,Road, Surfaced	6,76	14,84	3,19
		MR00344	10	11,34	2020	Upgrade,Road, Surfaced	6,76	14,84	1,34
		MR00347	8	10	(blank)	None	0	0	2
		MR00529	0	55,77	(blank)	None	0	0	55,77
		MR00533	13,13	23,08	2019	Rehabilitate,Road, Surfaced	13,13	23,08	9,95
		MR00536	0	4,27	(blank)	None	0	0	4,27
		OP04236	0	2,67	(blank)	None	0	0	2,67
		OP07628	0	1	(blank)	None	0	0	1
		TR00201	13,8	17,48	(blank)	None	0	0	3,68
		TR00209	21,5	22	(blank)	None	0	0	0,5
		TR02101	9	16	(blank)	None	0	0	7
		TR02501	6	8	(blank)	None	0	0	2
		TR05901	0	2	(blank)	None	0	0	2
2020	Reseal	DR01113	0,29	1,75	(blank)	None	0	0	1,46
		DR01211	9,61	11,88	(blank)	None	0	0	2,27
		DR01214	0	2	(blank)	None	0	0	2
		DR01358	0	4,05	(blank)	None	0	0	4,05
		DR01389	0	4,03	(blank)	None	0	0	4,03
		DR01411	55,4	56,14	(blank)	None	0	0	0,74
		DR01577	0	1,04	(blank)	None	0	0	1,04
		DR01775	0	1,9	(blank)	None	0	0	1,9
		MR00023	2,62	23,09	2019	Reseal,Road, Surfaced	2,62	23,09	20,47

Optimum Delivery Year	Recommended treatment	Road number	Start km	End km	Scheduled delivery year	Scheduled treatment	Schedule start km	Schedule end km	Total dTIMS length km
		MR00027	22	26	2022	Reseal,Road, Surfaced	20,68	26,37	4
		MR00027	22	26	2022			26,58	4
		MR00133	8,76	10,03	(blank)	None	0	0	1,27
		MR00174	3,82	17,64	2019	Reseal,Road, Surfaced	3,82	17,64	13,82
		MR00174	20	28	(blank)	None	0	0	8
		MR00174	28	30,28	(blank)	None	0	0	2,28
		MR00174	47,15	50	(blank)	None	0	0	2,85
		MR00176	0	3	2019	Asphalt Overlay,Road, Surfaced	0	3,13	3
		MR00176	0	3	2023	Asphalt Overlay,Road, Surfaced	0	3,13	3
		MR00176	0	3	2023			3	3
		MR00176	0	3	(blank)	None	0	0	3
		MR00176	0	3,13	2019	Asphalt Overlay,Road, Surfaced	0	3,13	3,13
		MR00176	0	3,13	2023	Asphalt Overlay,Road, Surfaced	0	3,13	3,13
		MR00176	0	3,13	(blank)	None	0	0	3,13
		MR00177	8,17	16,74	(blank)	None	0	0	8,57
		MR00177	20	22	(blank)	None	0	0	2
		MR00177	27,59	30,15	(blank)	None	0	0	2,56
		MR00187	4,72	8	(blank)	None	0	0	3,28
		MR00188	16	18	(blank)	None	0	0	2
		MR00188	24	26,8	(blank)	None	0	0	2,8
		MR00201	56,92	58,34	(blank)	None	0	0	1,42
		MR00213	5,32	10,79	(blank)	None	0	0	5,47

Optimum Delivery Year	Recommended treatment	Road number	Start km	End km	Scheduled delivery year	Scheduled treatment	Schedule start km	Schedule end km	Total dTIMS length km
		MR00226	0	0,3	2019	Reseal,Road, Surfaced	0	0,3	0,3
		MR00238	1,29	4	2020	Reseal,Road, Surfaced	1,29	10,48	2,71
		MR00238	4	10,48	2020	Reseal,Road, Surfaced	1,29	10,48	6,48
		MR00267	0	31,8	2020	Reseal,Road, Surfaced	0	31,8	31,8
		MR00287	2,69	14,5	2019	Reseal,Road, Surfaced	2,69	14,5	11,81
		MR00287	32	45,31	2019	Reseal,Road, Surfaced	32	45,31	13,31
		MR00310	62	68	2025	Reseal,Road, Surfaced	57,75	76	6
		MR00552	18	22	(blank)	None	0	0	4
		TR00101	14	18	(blank)	None	0	0	4
		TR00101	18	20	(blank)	None	0	0	2
		TR00102	52	56	2022	Reseal,Road, Surfaced	40	85,04	4
		TR00201	30,97	40	2022	Reseal,Road, Surfaced	30,92	42,79	9,03
		TR00202	6	7,69	(blank)	None	0	0	1,69
		TR00901	10,81	18,93	2019	Reseal,Road, Surfaced	10,81	18,93	8,12
		TR00901	10,834	18,93	2019	Reseal,Road, Surfaced	10,81	18,93	8,096
		TR00901	10,834	18,93	2019		10,834	18,93	8,096
		TR02201	34	36,05	(blank)	None	0	0	2,05
		TR02302	0	17,63	2019	Reseal,Road, Surfaced	0	17,63	17,63
		TR02303	0	0,06	2019	Reseal,Road, Surfaced	0	0,06	0,06
		TR03002	40	47,39	(blank)	None	0	0	7,39
		TR03102	1,9	2,16	2019	Reseal,Road, Surfaced	1,9	2,16	0,26

Optimum Delivery Year	Recommended treatment	Road number	Start km	End km	Scheduled delivery year	Scheduled treatment	Schedule start km	Schedule end km	Total dTIMS length km
		TR03106	23,2	47,8	2019	Reseal,Road, Surfaced	23,2	47,8	24,6
		TR03301	6	14	2026	Upgrade,Road, Surfaced	0	16,08	8
		TR03302	0	4	(blank)	None	0	0	4
		TR03501	58	74,22	2019	Reseal,Road, Surfaced	58	74,22	16,22
		TR05401	0	1,71	2019	Asphalt Overlay,Road, Surfaced	0	1,71	1,71
		TR05401	0	1,71	2023	Reseal,Road, Surfaced	0	1,71	1,71
		TR05401	0,33	1,71	2019	Asphalt Overlay,Road, Surfaced	0	1,71	1,38
		TR05401	0,33	1,71	2019		0,33	1,71	1,38
		TR05401	0,33	1,71	2023	Reseal,Road, Surfaced	0	1,71	1,38
		TR05501	0,83	2	(blank)	None	0	0	1,17
		TR05501	56	60,5	(blank)	None	0	0	4,5
		TR07501	0	16,5	2019	Reseal,Road, Surfaced	0	16,5	16,5
		TR07701	54	56	(blank)	None	0	0	2
		TR07701	56	62	(blank)	None	0	0	6
		TR07701	62	64	(blank)	None	0	0	2
		TR08501	0	12,09	(blank)	None	0	0	12,09
	Light Rehabilitation	DR01079	0	0,24	(blank)	None	0	0	0,24
		DR01114	0	1,7	(blank)	None	0	0	1,7
		DR01326	0	3,92	(blank)	None	0	0	3,92
		DR01725	0,26	0,62	(blank)	None	0	0	0,36
		MR00027	70	71,65	2021	Reseal,Road, Surfaced	66,95	71,65	1,65
		MR00027	70	71,65	2021		67,22	75,2	1,65

Optimum Delivery Year	Recommended treatment	Road number	Start km	End km	Scheduled delivery year	Scheduled treatment	Schedule start km	Schedule end km	Total dTIMS length km
		MR00191	10	21,88	(blank)	None	0	0	11,88
		MR00201	66	68	2022	Upgrade,Road, Surfaced	59,02	74,59	2
		MR00230	0	0,04	(blank)	None	0	0	0,04
		MR00230	4,2	4,79	(blank)	None	0	0	0,59
		MR00269	0	2	2021	Reseal,Road, Surfaced	0	2,5	2
		MR00272	1,81	2,99	(blank)	None	0	0	1,18
		MR00290	16	18,5	(blank)	None	0	0	2,5
		MR00295	72	75,49	(blank)	None	0	0	3,49
		MR00310	44	50	2025	Rehabilitate,Road, Surfaced	38,8	50,5	6
		MR00310	112,02	114,29	(blank)	None	0	0	2,27
		MR00348	6	8	(blank)	None	0	0	2
		MR00361	0,8	1,07	(blank)	None	0	0	0,27
		MR00552	22	24,28	(blank)	None	0	0	2,28
		OP04018	0	1,32	(blank)	None	0	0	1,32
		OP04094	0	1,27	(blank)	None	0	0	1,27
		OP04492	0	0,46	(blank)	None	0	0	0,46
		OP05247	0	0,94	(blank)	None	0	0	0,94
		OP07659	0	1,39	(blank)	None	0	0	1,39
		TR00209	2	4	(blank)	None	0	0	2
		TR00902	20	21,25	2022	Reseal,Road, Surfaced	0,21	21,25	1,25
		TR00902	50	52,03	(blank)	None	0	0	2,03
		TR02102	34	36,65	(blank)	None	0	0	2,65
		TR02202	6	12	2025	Reseal,Road, Surfaced	0,85	54	6
		TR02802	24	26	2023	Upgrade,Road, Surfaced	23	26,5	2
		TR02802	24	26	2025	Upgrade,Road, Surfaced	24	43,88	2

Optimum Delivery Year	Recommended treatment	Road number	Start km	End km	Scheduled delivery year	Scheduled treatment	Schedule start km	Schedule end km	Total dTIMS length km
		TR03001	24	26	(blank)	None	0	0	2
		TR03001	30	32,11	(blank)	None	0	0	2,11
		TR03102	24	25,99	2019	Upgrade,Road, Surfaced	19,7	26,5	1,99
		TR03104	46	50	(blank)	None	0	0	4
		TR03105	26	28	(blank)	None	0	0	2
		TR03302	34	38	(blank)	None	0	0	4
		TR03305	16	22	2021	Reseal,Road, Surfaced	0	55	6
		TR07501	28	31,22	2025	Reseal,Road, Surfaced	16,5	31,22	3,22
	Rehabilitate	MR00025	3,67	3,98	(blank)	None	0	0	0,31
		MR00027	70	74	2021	Reseal,Road, Surfaced	67,22	75,2	4
		MR00027	74	75,2	2021	Reseal,Road, Surfaced	67,22	75,2	1,2
		MR00027	74	75,2	(blank)	None	0	0	1,2
		MR00165	8,47	8,99	(blank)	None	0	0	0,52
		MR00189	24	26	(blank)	None	0	0	2
		MR00191	0	2	2022	Upgrade,Road, Surfaced	0	9,57	2
		MR00191	2	8	2022	Upgrade,Road, Surfaced	0	9,57	6
		MR00199	13,9	18	(blank)	None	0	0	4,1
		MR00207	1,4	2,7	(blank)	None	0	0	1,3
		MR00238	1,29	4	2020	Reseal,Road, Surfaced	1,29	10,48	2,71
		MR00278	2,72	2,76	(blank)	None	0	0	0,04
		MR00288	0	6	2019	Rehabilitate,Road, Surfaced	0	6	6
		MR00288	0	6	2019	Reseal,Road, Surfaced	0	6	6
		MR00310	8	10	2025	Reseal,Road, Surfaced	1,91	10	2

Optimum Delivery Year	Recommended treatment	Road number	Start km	End km	Scheduled delivery year	Scheduled treatment	Schedule start km	Schedule end km	Total dTIMS length km
		TR00101	20	24,55	2021	Reconstruct,Road, Surfaced	19,36	24,55	4,55
		TR00101	20	24,55	(blank)	None	0	0	4,55
		TR00201	0	2	(blank)	None	0	0	2
		TR00201	40	42,79	2022	Reseal,Road, Surfaced	30,92	42,79	2,79
		TR00209	16	18	(blank)	None	0	0	2
		TR02303	0,12	12,9	2019	Rehabilitate,Road, Surfaced	0,12	12,9	12,78
		TR03103	1,22	1,285	2019	Rehabilitate,Road, Surfaced	0	1,285	0,065
		TR03303	2,8	23	2020	Rehabilitate,Road, Surfaced	1,9	23	20,2
		TR07501	16,5	18	2025	Reseal,Road, Surfaced	16,5	31,22	1,5
		TR07501	20	28	2025	Reseal,Road, Surfaced	16,5	31,22	8
	Reconstruct	TR02202	0,85	2	2025	Reseal,Road, Surfaced	0,85	54	1,15
2021	Reseal	DR01064	1,72	5,86	2019	Reseal,Road, Surfaced	1,72	5,86	4,14
		DR01065	0	0,9	2019	Reseal,Road, Surfaced	0	0,9	0,9
		DR01067	0	3,25	2019	Reseal,Road, Surfaced	0	3,25	3,25
		DR01069	0,84	5,76	2019	Reseal,Road, Surfaced	0,84	5,76	4,92
		DR01119	2,76	3,64	(blank)	None	0	0	0,88
		DR01126	2	4	(blank)	None	0	0	2
		DR01214	2	4	(blank)	None	0	0	2
		DR01366	0	3,42	(blank)	None	0	0	3,42
		DR01369	0	3,13	(blank)	None	0	0	3,13
		DR01385	0,88	2,44	(blank)	None	0	0	1,56
		DR01394	0	6	(blank)	None	0	0	6
		DR01434	0	5,69	(blank)	None	0	0	5,69

Optimum Delivery Year	Recommended treatment	Road number	Start km	End km	Scheduled delivery year	Scheduled treatment	Schedule start km	Schedule end km	Total dTIMS length km
		DR01452	0	2	(blank)	None	0	0	2
		DR01487	118	120	(blank)	None	0	0	2
		DR01524	0	2,69	(blank)	None	0	0	2,69
		DR01532	2	6	(blank)	None	0	0	4
		DR01532	6	8	(blank)	None	0	0	2
		DR01532	10	12	(blank)	None	0	0	2
		DR01532	12	14	(blank)	None	0	0	2
		DR01599	19,64	20,62	(blank)	None	0	0	0,98
		DR01626	0,71	1,52	(blank)	None	0	0	0,81
		DR01673	0,6	6	(blank)	None	0	0	5,4
		MR00177	22	28	(blank)	None	0	0	6
		MR00187	10	14,71	(blank)	None	0	0	4,71
		MR00188	18	22	(blank)	None	0	0	4
		MR00213	10,79	20,88	(blank)	None	0	0	10,09
		MR00224	6	20	(blank)	None	0	0	14
		MR00227	8	30	(blank)	None	0	0	22
		MR00264	24	28	(blank)	None	0	0	4
		MR00337	6	8	2025	Reseal,Road, Surfaced	0,6	15,65	2
		MR00337	12	15,65	2025	Reseal,Road, Surfaced	0,6	15,65	3,65
		MR00531	76	88,4	2020	Rehabilitate,Road, Surfaced	76	92,33	12,4
		MR00531	92,55	95,82	(blank)	None	0	0	3,27
		MR00540	0	12,4	2020	Reseal,Road, Surfaced	0	12,4	12,4
		MR00546	38	40	(blank)	None	0	0	2
		MR00552	12	18	(blank)	None	0	0	6
		MR00559	12	14	(blank)	None	0	0	2
		OP04234	0	1,16	(blank)	None	0	0	1,16
		OP05361	0	5,53	(blank)	None	0	0	5,53

Optimum Delivery Year	Recommended treatment	Road number	Start km	End km	Scheduled delivery year	Scheduled treatment	Schedule start km	Schedule end km	Total dTIMS length km
		OP07645	0	2,64	(blank)	None	0	0	2,64
		TR00101	2,97	4	(blank)	None	0	0	1,03
		TR00102	84	85,04	2022	Reseal,Road, Surfaced	40	85,04	1,04
		TR02201	22	24	(blank)	None	0	0	2
		TR02201	26	34	(blank)	None	0	0	8
		TR03101	1,37	8	(blank)	None	0	0	6,63
		TR03103	14	16	(blank)	None	0	0	2
		TR03103	16	28	(blank)	None	0	0	12
		TR03103	48	58	(blank)	None	0	0	10
		TR03304	12	14	2022	Reseal,Road, Surfaced	2	19,3	2
		TR05501	6	16	(blank)	None	0	0	10
		TR05501	16	18	(blank)	None	0	0	2
		TR07701	64	82	(blank)	None	0	0	18
	Light Rehabilitation	DR01001	12	13,76	(blank)	None	0	0	1,76
		DR01052	0	4,81	(blank)	None	0	0	4,81
		DR01298	0	0,13	(blank)	None	0	0	0,13
		DR01318	0	0,19	(blank)	None	0	0	0,19
		MR00191	26,02	38	(blank)	None	0	0	11,98
		MR00201	40	42,7	2021	Reseal,Road, Surfaced	38,64	42,7	2,7
		MR00265	49,86	49,87	(blank)	None	0	0	0,01
		MR00312	0	2	(blank)	None	0	0	2
		MR00350	0	2,43	(blank)	None	0	0	2,43
		MR00539	26	27,52	(blank)	None	0	0	1,52
		MR00547	0	0,63	(blank)	None	0	0	0,63
		MR00548	14	15,61	(blank)	None	0	0	1,61
		TR00102	62	64	2022	Reseal,Road, Surfaced	40	85,04	2

Optimum Delivery Year	Recommended treatment	Road number	Start km	End km	Scheduled delivery year	Scheduled treatment	Schedule start km	Schedule end km	Total dTIMS length km
		TR00102	82	84	2022	Reseal,Road, Surfaced	40	85,04	2
		TR00902	0,21	6	2022	Reseal,Road, Surfaced	0,21	21,25	5,79
		TR02802	28	40	2025	Upgrade,Road, Surfaced	24	43,88	12
		TR03001	26	30	(blank)	None	0	0	4
		TR03102	20	24	2019	Upgrade,Road, Surfaced	19,7	26,5	4
		TR03104	44	46	(blank)	None	0	0	2
		TR07501	18	20	2025	Reseal,Road, Surfaced	16,5	31,22	2
		TR07701	13,88	14,48	(blank)	None	0	0	0,6
	Rehabilitate	DR01021	1,55	3,55	(blank)	None	0	0	2
		DR01578	34,22	34,99	2020	Rehabilitate,Road, Surfaced	34,22	34,99	0,77
		MR00027	18,26	20	2022	Reseal,Road, Surfaced	18,26	20,68	3,48
		MR00027	22	26	2022	Reseal,Road, Surfaced	20,68	26,37	4
		MR00027	22	26	2022			26,58	4
		MR00168	0	3,12	2020	Rehabilitate,Road, Surfaced	0	3,12	6,24
		MR00191	22,69	23,71	(blank)	None	0	0	1,02
		MR00205	6	8,62	(blank)	None	0	0	2,62
		MR00344	1,71	5,19	2020	Upgrade,Road, Surfaced	1,71	5,2	3,48
		MR00344	11,34	14,84	2020	Upgrade,Road, Surfaced	6,76	14,84	3,5
		MR00535	24	49,5	2020	Rehabilitate,Road, Surfaced	24	49,5	25,5
		TR00201	2	13,8	(blank)	None	0	0	11,8
		TR00201	8	13,8	(blank)	None	0	0	5,8
		TR00201	13,8	17,48	(blank)	None	0	0	3,68
		TR02501	3,98	6	(blank)	None	0	0	2,02

Optimum Delivery Year	Recommended treatment	Road number	Start km	End km	Scheduled delivery year	Scheduled treatment	Schedule start km	Schedule end km	Total dTIMS length km
		TR02802	40	43,22	2025	Upgrade,Road, Surfaced	24	43,88	3,22
2022	Reseal	DR01119	4,66	7,27	(blank)	None	0	0	2,61
		DR01254	0	12,29	(blank)	None	0	0	12,29
		DR01342	14	18	(blank)	None	0	0	4
		DR01359	0	3	(blank)	None	0	0	3
		DR01363	0	2,84	(blank)	None	0	0	2,84
		DR01368	0	2	(blank)	None	0	0	2
		DR01368	2	3,35	(blank)	None	0	0	1,35
		DR01386	0	4	(blank)	None	0	0	4
		DR01390	0	4	(blank)	None	0	0	4
		DR01390	4	6,93	(blank)	None	0	0	2,93
		DR01398	14	22	(blank)	None	0	0	8
		DR01400	0	6	(blank)	None	0	0	6
		DR01408	1,44	6,37	(blank)	None	0	0	4,93
		DR01429	0	0,25	(blank)	None	0	0	0,25
		DR01441	0	1,93	(blank)	None	0	0	1,93
		DR01452	4	10	(blank)	None	0	0	6
		DR01453	0	2,38	(blank)	None	0	0	2,38
		DR01461	0,72	2	(blank)	None	0	0	1,28
		DR01532	0	2	(blank)	None	0	0	2
		DR01532	8	10	(blank)	None	0	0	2
		DR01532	14	17,16	(blank)	None	0	0	3,16
		DR01631	0	4,15	(blank)	None	0	0	4,15
		DR01645	0	2	(blank)	None	0	0	2
		DR01671	0	2	(blank)	None	0	0	2
		DR01671	2	7,27	(blank)	None	0	0	5,27
		DR01673	6	7,29	(blank)	None	0	0	1,29
		DR01680	0	5,15	(blank)	None	0	0	5,15

Optimum Delivery Year	Recommended treatment	Road number	Start km	End km	Scheduled delivery year	Scheduled treatment	Schedule start km	Schedule end km	Total dTIMS length km
		DR01709	2	6,74	(blank)	None	0	0	4,74
		DR01770	10	12,33	(blank)	None	0	0	2,33
		DR01834	4	7,41	(blank)	None	0	0	3,41
		DR02175	0	12	(blank)	None	0	0	12
		DR02178	0	6	(blank)	None	0	0	6
		DR02180	19,9	24	(blank)	None	0	0	4,1
		DR02184	14	16,3	(blank)	None	0	0	2,3
		DR02220	0	3,57	(blank)	None	0	0	3,57
		DR02221	0	2,39	(blank)	None	0	0	2,39
		MR00028	0,54	24	(blank)	None	0	0	23,46
		MR00174	44	46,15	(blank)	None	0	0	2,15
		MR00188	22	24	(blank)	None	0	0	2
		MR00229	0	1,88	(blank)	None	0	0	1,88
		MR00262	0	2	(blank)	None	0	0	2
		MR00271	10	34	(blank)	None	0	0	24
		MR00286	22,72	26	(blank)	None	0	0	3,28
		MR00310	72	76	2025	Reseal,Road, Surfaced	57,75	76	4
		MR00331	1,43	10,54	(blank)	None	0	0	9,11
		MR00334	2	6	2025	Reseal,Road, Surfaced	0	26,49	4
		MR00334	6	8	2025	Reseal,Road, Surfaced	0	26,49	2
		MR00334	8	14	2025	Reseal,Road, Surfaced	0	26,49	6
		MR00337	2	4	2025	Reseal,Road, Surfaced	0,6	15,65	2
		MR00532	0	5,53	(blank)	None	0	0	5,53
		MR00546	46	50	(blank)	None	0	0	4
		MR00547	66	70	(blank)	None	0	0	4
		MR00552	10	12	(blank)	None	0	0	2

Optimum Delivery Year	Recommended treatment	Road number	Start km	End km	Scheduled delivery year	Scheduled treatment	Schedule start km	Schedule end km	Total dTIMS length km
		MR00557	0	1,36	(blank)	None	0	0	1,36
		OP04019	0	2	(blank)	None	0	0	2
		OP04068	0	4,09	(blank)	None	0	0	4,09
		OP05223	0	1,44	(blank)	None	0	0	1,44
		OP05255	0	1,41	(blank)	None	0	0	1,41
		OP05362	0	1,83	(blank)	None	0	0	1,83
		OP06456	0	0,65	(blank)	None	0	0	0,65
		TR00101	4	14	(blank)	None	0	0	10
		TR01609	30	32	(blank)	None	0	0	2
		TR02201	24	26	(blank)	None	0	0	2
		TR02901	40	42	(blank)	None	0	0	2
		TR03101	8	12	(blank)	None	0	0	4
	Light Rehabilitation	DR01098	8,79	14,24	2021	Rehabilitate,Road, Surfaced	8,79	14,24	5,45
		DR01118	1,05	6,31	(blank)	None	0	0	5,26
		DR01300	1,37	4,36	(blank)	None	0	0	2,99
		DR01788	0	1,46	(blank)	None	0	0	1,46
		MR00199	20	22,46	(blank)	None	0	0	2,46
		MR00210	0,06	0,87	(blank)	None	0	0	0,81
		MR00224	2,35	6	(blank)	None	0	0	3,65
		MR00276	1,66	1,77	2020	Upgrade,Road, Gravel	0	6,72	0,11
		MR00306	0,36	0,72	(blank)	None	0	0	0,36
		MR00310	20	22	2025	Reseal,Road, Surfaced	14	22,02	2
		MR00365	8	10	2025	Reseal,Road, Surfaced	0	14,12	2
		MR00547	14	21,55	(blank)	None	0	0	7,55
		MR00547	23,1	26	(blank)	None	0	0	2,9
		MR00547	26	30	(blank)	None	0	0	4
		MR00547	30	34	(blank)	None	0	0	4

Optimum Delivery Year	Recommended treatment	Road number	Start km	End km	Scheduled delivery year	Scheduled treatment	Schedule start km	Schedule end km	Total dTIMS length km
		OP05742	0	2	(blank)	None	0	0	2
		TR00102	66	70	2022	Reseal,Road, Surfaced	40	85,04	4
		TR00202	2	6	(blank)	None	0	0	4
		TR00210	54,76	59,15	(blank)	None	0	0	4,39
		TR00902	6	10	2022	Reseal,Road, Surfaced	0,21	21,25	4
		TR02303	20	24	(blank)	None	0	0	4
		TR02501	8	10	(blank)	None	0	0	2
		TR02801	10	12	(blank)	None	0	0	2
		TR02901	32	34	(blank)	None	0	0	2
		TR03002	14	16	(blank)	None	0	0	2
		TR03106	18	20	(blank)	None	0	0	2
		TR03201	44	45,15	(blank)	None	0	0	1,15
		TR03305	24	26	2021	Reseal,Road, Surfaced	0	55	2
		TR03305	108	110,05	2023	Reseal,Road, Surfaced	55	110,05	2,05
	Rehabilitate	MR00199	18	20	(blank)	None	0	0	2
		MR00205	0	6	(blank)	None	0	0	6
		MR00310	1,91	8	2025	Reseal,Road, Surfaced	1,91	10	6,09
		TR00201	2	8	(blank)	None	0	0	6
		TR03106	14	18	(blank)	None	0	0	4
2023	Reseal	DR01119	3,74	4,59	(blank)	None	0	0	0,85
		DR01161	0	4	(blank)	None	0	0	4
		DR01161	4	8	(blank)	None	0	0	4
		DR01162	21,5	22,43	(blank)	None	0	0	0,93
		DR01170	0	3,58	(blank)	None	0	0	3,58
		DR01342	18	20,15	(blank)	None	0	0	2,15
		DR01372	0	6	(blank)	None	0	0	6

Optimum Delivery Year	Recommended treatment	Road number	Start km	End km	Scheduled delivery year	Scheduled treatment	Schedule start km	Schedule end km	Total dTIMS length km
		DR01420	0	0,56	(blank)	None	0	0	0,56
		DR01440	2	4	(blank)	None	0	0	2
		DR01452	2	4	(blank)	None	0	0	2
		DR01487	120	123,32	(blank)	None	0	0	3,32
		DR01549	0	1,03	(blank)	None	0	0	1,03
		DR01568	43,46	50	(blank)	None	0	0	6,54
		DR01573	7,93	9,06	(blank)	None	0	0	1,13
		DR01645	2	4	(blank)	None	0	0	2
		DR01645	4	5,4	(blank)	None	0	0	1,4
		DR01709	0	2	(blank)	None	0	0	2
		DR02151	3,02	4,19	(blank)	None	0	0	1,17
		DR02180	24	35,68	(blank)	None	0	0	11,68
		DR02191	0	0,4	(blank)	None	0	0	0,4
		DR02227	0	2,82	(blank)	None	0	0	2,82
		DR02232	0	8	(blank)	None	0	0	8
		DR02232	10	12	(blank)	None	0	0	2
		DR02232	12	18	(blank)	None	0	0	6
		DR02232	18	20	(blank)	None	0	0	2
		DR02232	20	22	(blank)	None	0	0	2
		DR02232	22	24	(blank)	None	0	0	2
		MR00028	24	28	(blank)	None	0	0	4
		MR00174	32	42	(blank)	None	0	0	10
		MR00174	42	44	(blank)	None	0	0	2
		MR00177	22	24,36	(blank)	None	0	0	2,36
		MR00187	8	10	(blank)	None	0	0	2
		MR00262	2	19,65	(blank)	None	0	0	17,65
		MR00295	4	6	(blank)	None	0	0	2
		MR00310	68	72	2025	Reseal,Road, Surfaced	57,75	76	4

Optimum Delivery Year	Recommended treatment	Road number	Start km	End km	Scheduled delivery year	Scheduled treatment	Schedule start km	Schedule end km	Total dTIMS length km
		MR00334	16	26,49	2025	Reseal,Road, Surfaced	0	26,49	10,49
		MR00337	33,21	36	2025	Reseal,Road, Surfaced	33,21	48,95	2,79
		MR00337	36	38	2025	Reseal,Road, Surfaced	33,21	48,95	2
		MR00337	38	40	2025	Reseal,Road, Surfaced	33,21	48,95	2
		MR00337	40	42	2025	Reseal,Road, Surfaced	33,21	48,95	2
		MR00337	44	46	2025	Reseal,Road, Surfaced	33,21	48,95	2
		MR00403	4	8	(blank)	None	0	0	4
		MR00403	12	13,03	(blank)	None	0	0	1,03
		MR00531	66	70	(blank)	None	0	0	4
		MR00547	56	66	(blank)	None	0	0	10
		MR00547	70	72,81	(blank)	None	0	0	2,81
		MR00559	14	16,31	(blank)	None	0	0	2,31
		MR00559	15,83	16,31	(blank)	None	0	0	0,48
		MR00582	40	44	(blank)	None	0	0	4
		MR00582	44	52	(blank)	None	0	0	8
		MR00582	52	54	(blank)	None	0	0	2
		MR00582	54	68	(blank)	None	0	0	14
		MR00582	68	74	(blank)	None	0	0	6
		OP05543	0	2	(blank)	None	0	0	2
		OP06887	1,41	2,41	(blank)	None	0	0	1
		OP08081	0	0,29	(blank)	None	0	0	0,29
		OP08081	1,28	2,82	(blank)	None	0	0	1,54
		TR08801	68	70,2	2022	Reseal,Road, Surfaced	60,34	70,2	2,2
	Light Rehabilitation	DR01343	0,44	3,1	(blank)	None	0	0	2,66

Optimum Delivery Year	Recommended treatment	Road number	Start km	End km	Scheduled delivery year	Scheduled treatment	Schedule start km	Schedule end km	Total dTIMS length km
		DR01373	0	0,74	2019	Upgrade,Road, Surfaced	0	0,741	0,74
		DR01412	0	1,71	(blank)	None	0	0	1,71
		DR01416	1,8	4	(blank)	None	0	0	2,2
		DR01418	0	3,68	(blank)	None	0	0	3,68
		DR01592	0	0,32	(blank)	None	0	0	0,32
		DR02183	27,01	27,32	(blank)	None	0	0	0,31
		MR00172	8	15,76	(blank)	None	0	0	7,76
		MR00174	0	0,6	(blank)	None	0	0	0,6
		MR00174	30,28	32	(blank)	None	0	0	1,72
		MR00189	16,63	24	(blank)	None	0	0	7,37
		MR00201	46,1	50,23	(blank)	None	0	0	4,13
		MR00231	0	0,03	(blank)	None	0	0	0,03
		MR00261	0,8	2	(blank)	None	0	0	1,2
		MR00290	0,25	2	(blank)	None	0	0	1,75
		MR00305	0	1,3	(blank)	None	0	0	1,3
		MR00332	0	0,04	(blank)	None	0	0	0,04
		MR00347	3,24	6	(blank)	None	0	0	2,76
		MR00347	12,45	16	(blank)	None	0	0	3,55
		MR00547	34	42	(blank)	None	0	0	8
		MR00547	42	46	(blank)	None	0	0	4
		OP04232	0	0,55	(blank)	None	0	0	0,55
		TR00209	0	2	(blank)	None	0	0	2
		TR02801	2	4	(blank)	None	0	0	2
		TR02801	28	29,46	(blank)	None	0	0	1,46
		TR03104	56	58	(blank)	None	0	0	2
		TR03105	36	38	(blank)	None	0	0	2
		TR03305	26	28	2021	Reseal,Road, Surfaced	0	55	2
		TR07701	24,59	26	(blank)	None	0	0	1,41

Optimum Delivery Year	Recommended treatment	Road number	Start km	End km	Scheduled delivery year	Scheduled treatment	Schedule start km	Schedule end km	Total dTIMS length km
		TR07701	50	54	(blank)	None	0	0	4
	Rehabilitate	MR00303	0	0,34	(blank)	None	0	0	0,34
		TR01601	0,53	6	(blank)	None	0	0	5,47
		TR02802	26	28	2025	Upgrade,Road, Surfaced	24	43,88	2
		TR08101	8,69	14,02	(blank)	None	0	0	5,33
2024	Reseal	DR01440	0	2	(blank)	None	0	0	2
		DR01440	4	9,48	(blank)	None	0	0	5,48
		DR01459	0	2,85	(blank)	None	0	0	2,85
		DR02157	0	1,03	(blank)	None	0	0	1,03
		MR00028	28	37,71	(blank)	None	0	0	9,71
		MR00177	18	20	(blank)	None	0	0	2
		MR00218	0	5,56	(blank)	None	0	0	5,56
		MR00531	62	66	(blank)	None	0	0	4
		OP05873	0	2,03	(blank)	None	0	0	2,03
		TR02701	12	14	(blank)	None	0	0	2
		TR02701	36	38	(blank)	None	0	0	2
	Light Rehabilitation	DR01388	0	3,12	(blank)	None	0	0	3,12
		DR01636	0	0,27	(blank)	None	0	0	0,27
		DR01668	15,22	16,68	(blank)	None	0	0	1,46
		DR01888	2,6	2,64	(blank)	None	0	0	0,04
		MR00027	51,94	54	(blank)	None	0	0	2,06
		MR00027	54	56	(blank)	None	0	0	2
		MR00027	56	58	(blank)	None	0	0	2
		MR00027	58	62	(blank)	None	0	0	4
		MR00027	62	64	(blank)	None	0	0	2
		MR00027	64	66	(blank)	None	0	0	2
		MR00166	0,11	4,71	(blank)	None	0	0	4,6
		MR00172	0,05	1,25	(blank)	None	0	0	1,2

Optimum Delivery Year	Recommended treatment	Road number	Start km	End km	Scheduled delivery year	Scheduled treatment	Schedule start km	Schedule end km	Total dTIMS length km
		MR00172	2,49	8	(blank)	None	0	0	5,51
		MR00177	8,17	18	(blank)	None	0	0	9,83
		MR00177	20	22	(blank)	None	0	0	2
		MR00201	8,9	12	(blank)	None	0	0	3,1
		MR00240	6	6,1	2019	Rehabilitate,Road, Surfaced	2,14	14,92	0,1
		MR00310	34	36	(blank)	None	0	0	2
		MR00355	54,54	54,68	(blank)	None	0	0	0,14
		MR00402	0	1,21	(blank)	None	0	0	1,21
		MR00546	52	54,54	(blank)	None	0	0	2,54
		TR01601	8	10	(blank)	None	0	0	2
		TR02103	0,82	6	(blank)	None	0	0	5,18
		TR02103	6	8	(blank)	None	0	0	2
		TR02103	8	10	(blank)	None	0	0	2
		TR02501	37	42,21	(blank)	None	0	0	5,21
		TR02801	4	10	(blank)	None	0	0	6
		TR02801	12	16	(blank)	None	0	0	4
		TR02801	26,69	29,46	(blank)	None	0	0	2,77
		TR07701	26	48,22	(blank)	None	0	0	22,22
	Rehabilitate	MR00174	50	58,49	(blank)	None	0	0	8,49
		TR08101	8,69	14,02	(blank)	None	0	0	5,33
2025	Light Rehabilitation	DR01110	0,78	4,8	(blank)	None	0	0	4,02
		DR01130	0	0,03	(blank)	None	0	0	0,03
		DR01210	26,66	27,01	(blank)	None	0	0	0,35
		MR00177	17,3	20	(blank)	None	0	0	2,7
		MR00220	0	8,24	(blank)	None	0	0	8,24
		MR00289	0	12	(blank)	None	0	0	12
		MR00347	6	8	(blank)	None	0	0	2
		MR00548	2	12	(blank)	None	0	0	10

Optimum Delivery Year	Recommended treatment	Road number	Start km	End km	Scheduled delivery year	Scheduled treatment	Schedule start km	Schedule end km	Total dTIMS length km
		MR00548	12	14	(blank)	None	0	0	2
		OP07644	0	3,75	(blank)	None	0	0	3,75
		TR00209	12	14	(blank)	None	0	0	2
		TR00209	14	16	(blank)	None	0	0	2
		TR02102	24,6	34	(blank)	None	0	0	9,4
		TR02202	32	34	2025	Reseal,Road, Surfaced	0,85	54	2
		TR02303	34	35,12	(blank)	None	0	0	1,12
		TR02701	0	4	(blank)	None	0	0	4
		TR02701	4	12	(blank)	None	0	0	8
		TR02701	14	18	(blank)	None	0	0	4
		TR03201	42	44	(blank)	None	0	0	2
		TR07701	48,22	50	(blank)	None	0	0	1,78
	Rehabilitate	MR00133	8,76	10,03	(blank)	None	0	0	1,27
		MR00188	11,13	16	(blank)	None	0	0	4,87
		TR02801	16	28	(blank)	None	0	0	12
2026	Light Rehabilitation	DR01126	12	18,82	(blank)	None	0	0	6,82
		DR01134	0	1,58	(blank)	None	0	0	1,58
		DR01146	5,91	6,41	(blank)	None	0	0	0,5
		DR01394	6	10	(blank)	None	0	0	4
		DR01438	0,5	2	(blank)	None	0	0	1,5
		DR01489	0	1,03	(blank)	None	0	0	1,03
		DR01590	0	2,88	(blank)	None	0	0	2,88
		DR01600	0	6,89	(blank)	None	0	0	6,89
		MR00224	20	26	(blank)	None	0	0	6
		MR00224	26	28	(blank)	None	0	0	2
		MR00228	21,22	22,64	(blank)	None	0	0	1,42
		MR00261	2	29,03	(blank)	None	0	0	27,03
		MR00270	0	0,08	(blank)	None	0	0	0,08

Optimum Delivery Year	Recommended treatment	Road number	Start km	End km	Scheduled delivery year	Scheduled treatment	Schedule start km	Schedule end km	Total dTIMS length km
		MR00277	28	30,9	(blank)	None	0	0	2,9
		MR00348	10	12	(blank)	None	0	0	2
		MR00351	0	2	(blank)	None	0	0	2
		MR00548	0	2	(blank)	None	0	0	2
		TR00209	4	6	(blank)	None	0	0	2
		TR00209	6	12	(blank)	None	0	0	6
		TR00902	34,28	50	(blank)	None	0	0	15,72
		TR02202	40	48	2025	Reseal,Road, Surfaced	0,85	54	8
		TR02303	18	20	(blank)	None	0	0	2
		TR02701	18	26	(blank)	None	0	0	8
		TR02701	26	30	(blank)	None	0	0	4
		TR02701	30	36	(blank)	None	0	0	6
		TR02901	36	40	(blank)	None	0	0	4
		TR03002	38	40	(blank)	None	0	0	2
		TR03104	60	62	(blank)	None	0	0	2
		TR03105	0,42	26	(blank)	None	0	0	25,58
		TR03105	28	30	(blank)	None	0	0	2
		TR03105	42	47,63	(blank)	None	0	0	5,63
		TR03106	1,1	4	(blank)	None	0	0	2,9
		TR03106	4	14	(blank)	None	0	0	10
		TR03201	38	42	(blank)	None	0	0	4
		TR07701	82	86	(blank)	None	0	0	4
		TR07701	88	90	(blank)	None	0	0	2
2027	Light Rehabilitation	DR01090	0	4	(blank)	None	0	0	4
		DR01373	2,06	3,27	(blank)	None	0	0	1,21
		DR01398	1,29	4	(blank)	None	0	0	2,71
		DR01398	4	12	(blank)	None	0	0	8

Optimum Delivery Year	Recommended treatment	Road number	Start km	End km	Scheduled delivery year	Scheduled treatment	Schedule start km	Schedule end km	Total dTIMS length km
		DR01693	11,1	11,42	(blank)	None	0	0	0,32
		MR00224	28	32,53	(blank)	None	0	0	4,53
		MR00227	0	8	(blank)	None	0	0	8
		MR00291	0	8,99	(blank)	None	0	0	8,99
		MR00390	0	4	(blank)	None	0	0	4
		MR00394	0	2	(blank)	None	0	0	2
		MR00547	1,66	14	(blank)	None	0	0	12,34
		MR00547	46	56	(blank)	None	0	0	10
		TR01601	6	8	(blank)	None	0	0	2
		TR02103	10	20,49	(blank)	None	0	0	10,49
		TR02202	30	32	2025	Reseal,Road, Surfaced	0,85	54	2
		TR02202	34	40	2025	Reseal,Road, Surfaced	0,85	54	6
		TR02303	32	34	(blank)	None	0	0	2
		TR02901	1,49	22	(blank)	None	0	0	20,51
		TR02901	34	36	(blank)	None	0	0	2
		TR02901	58,32	71,73	(blank)	None	0	0	13,41
		TR03104	30,89	38	(blank)	None	0	0	7,11
		TR03104	62	76,06	(blank)	None	0	0	14,06
		TR07701	86	88	(blank)	None	0	0	2
		TR07701	90	94	(blank)	None	0	0	4
		TR07701	94	100	(blank)	None	0	0	6
	Rehabilitate	MR00538	0,44	8,5	(blank)	None	0	0	8,06
2028	Light Rehabilitation	DR01090	4	6,73	(blank)	None	0	0	2,73
		DR01129	0	2,82	(blank)	None	0	0	2,82
		DR01413	3,79	6,59	(blank)	None	0	0	2,8
		DR02188	0	9,75	(blank)	None	0	0	9,75
		MR00289	14	16	(blank)	None	0	0	2

Optimum Delivery Year	Recommended treatment	Road number	Start km	End km	Scheduled delivery year	Scheduled treatment	Schedule start km	Schedule end km	Total dTIMS length km
		MR00335	0	3,12	(blank)	None	0	0	3,12
		MR00348	8	10	(blank)	None	0	0	2
		MR00351	2	4	(blank)	None	0	0	2
		MR00365	4	8	2025	Reseal,Road, Surfaced	0	14,12	4
		MR00526	0	2	(blank)	None	0	0	2
		MR00531	0	0,66	(blank)	None	0	0	0,66
		MR00531	2,68	8	(blank)	None	0	0	5,32
		MR00531	10	14	(blank)	None	0	0	4
		MR00531	14	20	(blank)	None	0	0	6
		MR00531	20	22	(blank)	None	0	0	2
		MR00543	0	0,58	(blank)	None	0	0	0,58
		MR00546	40	46	(blank)	None	0	0	6
		OP04087	0	3,92	(blank)	None	0	0	3,92
		TR02101	0	9	(blank)	None	0	0	9
		TR02101	16	28	(blank)	None	0	0	12
		TR02202	18	20	2025	Reseal,Road, Surfaced	0,85	54	2
		TR02303	24	32	(blank)	None	0	0	8
		TR02501	10	16	(blank)	None	0	0	6
		TR02501	16	17,88	(blank)	None	0	0	1,88
		TR02801	0	2	(blank)	None	0	0	2
		TR02901	42	56,13	(blank)	None	0	0	14,13
		TR03104	50	56	(blank)	None	0	0	6
		TR03105	30	36	(blank)	None	0	0	6
		TR03304	2	8	2022	Reseal,Road, Surfaced	2	19,3	6
		TR03402	14	16	(blank)	None	0	0	2
		TR06501	0	6	(blank)	None	0	0	6

Optimum Delivery Year	Recommended treatment	Road number	Start km	End km	Scheduled delivery year	Scheduled treatment	Schedule start km	Schedule end km	Total dTIMS length km
		TR07701	100	126	(blank)	None	0	0	26
		TR08301	1,85	6	(blank)	None	0	0	4,15
	Reconstruct	TR02202	2	4	2025	Reseal,Road, Surfaced	0,85	54	2
2029	Light Rehabilitation	DR01125	0	2	(blank)	None	0	0	2
		DR01125	4	6	(blank)	None	0	0	2
		DR01126	0	2	(blank)	None	0	0	2
		DR01126	9,16	12	(blank)	None	0	0	2,84
		DR01138	0	2,47	(blank)	None	0	0	2,47
		DR01205	0	2	(blank)	None	0	0	2
		DR01205	2	4	(blank)	None	0	0	2
		DR01205	4	8	(blank)	None	0	0	4
		DR01205	12	16	(blank)	None	0	0	4
		DR01205	16	18	(blank)	None	0	0	2
		DR01241	0	0,4	(blank)	None	0	0	0,4
		DR01379	6	7,41	(blank)	None	0	0	1,41
		DR01437	0	0,1	(blank)	None	0	0	0,1
		DR01439	0	0,2	(blank)	None	0	0	0,2
		DR01609	0	0,38	2021	Upgrade,Road, Gravel	0	6,43	0,38
		DR01620	2,11	3,55	(blank)	None	0	0	1,44
		MR00201	14	16	2021	Reseal,Road, Surfaced	13,85	30	2
		MR00264	46	58,52	(blank)	None	0	0	12,52
		MR00269	14	16	(blank)	None	0	0	2
		MR00269	22	24	(blank)	None	0	0	2
		MR00282	18	19,03	(blank)	None	0	0	1,03
		MR00283	3,8	5,04	(blank)	None	0	0	1,24
		MR00289	16	18,54	(blank)	None	0	0	2,54

Optimum Delivery Year	Recommended treatment	Road number	Start km	End km	Scheduled delivery year	Scheduled treatment	Schedule start km	Schedule end km	Total dTIMS length km
		MR00290	2	4	(blank)	None	0	0	2
		MR00290	6	16	(blank)	None	0	0	10
		MR00303	3,66	8	(blank)	None	0	0	4,34
		MR00312	6,8	10,22	(blank)	None	0	0	3,42
		MR00346	0	2	(blank)	None	0	0	2
		MR00347	16	19,19	(blank)	None	0	0	3,19
		MR00348	14,96	17,03	(blank)	None	0	0	2,07
		MR00355	68	70,83	(blank)	None	0	0	2,83
		MR00365	10	12	2025	Reseal,Road, Surfaced	0	14,12	2
		MR00394	2	4,5	(blank)	None	0	0	2,5
		MR00531	8	10	(blank)	None	0	0	2
		MR00531	22	30	(blank)	None	0	0	8
		MR00546	32	34	(blank)	None	0	0	2
		MR00546	34	38	(blank)	None	0	0	4
		MR00546	50	52	(blank)	None	0	0	2
		OP05601	0	2,57	(blank)	None	0	0	2,57
		OP05657	0	0,67	(blank)	None	0	0	0,67
		OP07647	0	4	(blank)	None	0	0	4
		OP07664	12,56	14	(blank)	None	0	0	1,44
		OP08055	0	0,78	(blank)	None	0	0	0,78
		TR01602	22	24	(blank)	None	0	0	2
		TR02202	20	24	2025	Reseal,Road, Surfaced	0,85	54	4
		TR02901	24	32	(blank)	None	0	0	8
		TR02902	1,63	8	(blank)	None	0	0	6,37
		TR03002	22	26	(blank)	None	0	0	4
		TR03103	58	61,49	(blank)	None	0	0	3,49
		TR03104	8	10	(blank)	None	0	0	2

Optimum Delivery Year	Recommended treatment	Road number	Start km	End km	Scheduled delivery year	Scheduled treatment	Schedule start km	Schedule end km	Total dTIMS length km
		TR03104	14	16	(blank)	None	0	0	2
		TR03105	38	40	(blank)	None	0	0	2
		TR03105	40	42	(blank)	None	0	0	2
		TR03302	14	28	(blank)	None	0	0	14
		TR03304	20	22	2022	Reseal,Road, Surfaced	19,3	28,45	2
		TR03304	22	26	2022	Reseal,Road, Surfaced	19,3	28,45	4
		TR04401	12	14	2022	Reseal,Road, Surfaced	0	14	2
		TR05501	2	4	(blank)	None	0	0	2
		TR05901	68,32	68,75	(blank)	None	0	0	0,43
		TR06501	6	8	(blank)	None	0	0	2
		TR07701	134	140,71	(blank)	None	0	0	6,71

Unscheduled priorities

This is a list of dTIMS identified Candidate Projects that are not associated with any Rehabilitation, Reseal, Reconstruct or Upgrade deliverable scheduled on RPM. This list is useful for identifying next project priorities/consultant appointments.

Delivery year	Recommended treatment	Road number	Start km	End km	Length
2019	Light Rehabilitation	DR01167	0	1,73	1,73
		DR01277	0	2,7	2,7
		DR01398	22	23,63	1,63
		DR01423	0	0,32	0,32
		MR00266	0,2	4	3,8
		MR00348	3,02	6	2,98
		MR00355	56,98	68	11,02
		OP05615	0	0,69	0,69
		OP07219	0	1,43	1,43
		OP07224	0	0,54	0,54
		TR03002	16	22	6
		TR03104	38	44	6
		TR04401	20	26	6
		TR04401	30	36,76	6,76
	Light Rehabilitation Total				**51,6**
	Rehabilitate	DR01056	0	1,32	1,32
		DR01108	0	6,82	6,82
		DR01395	0	2,31	2,31
		DR01622	0,45	2	1,55
		DR01888	2,55	2,6	0,05
		MR00177	28	30,15	2,15
		MR00189	12,34	16,63	4,29
		MR00189	26	32,53	6,53
		MR00189	31,24	32,53	1,29
		MR00215	34,07	46,53	12,46
		MR00222	1,41	1,58	0,17
		MR00230	0,04	1,18	1,14
		MR00231	0,46	19,35	18,89
		MR00233	6,61	12,84	6,23
		MR00264	0,84	8	7,16
		MR00298	0	4,35	4,35
		MR00298	4,35	14,55	10,2
		MR00298	20,2	20,7	0,5
		MR00302	0	24,59	24,59
		MR00307	0	1,23	1,23
		MR00347	8	10	2
		MR00529	0	55,77	55,77
		MR00536	0	4,27	4,27
		OP04236	0	2,67	2,67
		OP07628	0	1	1
		TR00201	13,8	17,48	3,68

Delivery year	Recommended treatment	Road number	Start km	End km	Length
		TR00209	21,5	22	0,5
		TR02101	9	16	7
		TR02501	6	8	2
		TR05901	0	2	2
	Rehabilitate Total				**194,12**
	Reseal	DR01095	0	1,95	1,95
		DR01102	0	14,9	14,9
		DR01123	1,18	10	8,82
		DR01123	22	22,15	0,15
		DR01123	22,15	23,48	1,33
		DR01123	23,48	23,57	0,09
		DR01146	4,4	5,83	1,43
		DR01175	17,09	17,87	0,78
		DR01214	4	6,48	2,48
		DR01238	2	4,61	2,61
		DR01285	0	2	2
		DR01355	0	2	2
		DR01365	0	2,8	2,8
		DR01394	10	11,37	1,37
		DR01398	0	1,29	1,29
		DR01398	12	14	2
		DR01409	0	0,49	0,49
		DR01416	4	5,63	1,63
		DR01458	8	10,92	2,92
		DR01471	0	5,43	5,43
		DR01487	105,93	118	12,07
		DR01529	12,74	14,86	2,12
		DR01596	1,65	3,26	1,61
		DR01599	9,06	11,43	2,37
		DR01621	0	1,87	1,87
		DR01627	0	2	2
		DR01627	2	4	2
		DR02161	0	16,9	16,9
		DR02176	0,56	30,42	29,86
		DR02185	0	1,36	1,36
		MR00027	36,2	37,5	1,3
		MR00201	0	8,9	8,9
		MR00215	47,85	69,34	21,49
		MR00217	9,77	19,87	10,1
		MR00228	0	0,16	0,16
		MR00230	0,04	1,18	1,14
		MR00231	0,03	0,46	0,43
		MR00233	0	6,61	6,61
		MR00264	12	18	6
		MR00265	0	49,86	49,86

Delivery year	Recommended treatment	Road number	Start km	End km	Length
		MR00271	0	10	10
		MR00278	0	0,8	0,8
		MR00278	2,76	3,96	1,2
		MR00286	26	27,94	1,94
		MR00289	12	14	2
		MR00298	4,35	14,55	10,2
		MR00298	19,04	20,2	1,16
		MR00305	3,53	6,96	3,43
		MR00312	2	4,7	2,7
		MR00348	12	14,45	2,45
		MR00355	43,09	43,23	0,14
		MR00363	38	41,14	3,14
		MR00382	2,12	4,96	2,84
		MR00531	33	38,7	5,7
		MR00531	40	42	2
		MR00531	42	48	6
		MR00531	48	50	2
		MR00534	0	17,44	17,44
		MR00534	43,56	45,4	1,84
		MR00536	4,27	5,81	1,54
		MR00537	0	15,82	15,82
		MR00538	24	43,56	19,56
		OP04979	0	0,64	0,64
		OP05364	0	3,5	3,5
		OP05676	0	0,79	0,79
		OP05677	2	5,49	3,49
		OP05718	0	1,74	1,74
		OP07628	1	1,43	0,43
		OP07643	0	5,54	5,54
		OP07664	14	16,04	2,04
		TR00202	6	8,54	2,54
		TR00209	18	21,5	3,5
		TR00209	22	24,06	2,06
		TR01602	34	36	2
		TR01609	28	30	2
		TR01610	18	22	4
		TR01610	24	30	6
		TR02101	29,35	53,9	24,55
		TR02501	17,88	37	19,12
		TR03002	26	38	12
		TR03104	58	60	2
		TR03302	64	66	2
		TR05501	4	6	2
		TR05501	18	28	10
		TR05501	28	38	10

Delivery year	Recommended treatment	Road number	Start km	End km	Length
		TR07701	8,24	24,59	16,35
		TR07701		13,88	5,64
	Reseal Total				**492,45**
2020	Light Rehabilitation	DR01079	0	0,24	0,24
		DR01114	0	1,7	1,7
		DR01326	0	3,92	3,92
		DR01725	0,26	0,62	0,36
		MR00191	10	21,88	11,88
		MR00230	0	0,04	0,04
		MR00230	4,2	4,79	0,59
		MR00272	1,81	2,99	1,18
		MR00290	16	18,5	2,5
		MR00295	72	75,49	3,49
		MR00310	112,02	114,29	2,27
		MR00348	6	8	2
		MR00361	0,8	1,07	0,27
		MR00552	22	24,28	2,28
		OP04018	0	1,32	1,32
		OP04094	0	1,27	1,27
		OP04492	0	0,46	0,46
		OP05247	0	0,94	0,94
		OP07659	0	1,39	1,39
		TR00209	2	4	2
		TR00902	50	52,03	2,03
		TR02102	34	36,65	2,65
		TR03001	24	26	2
		TR03001	30	32,11	2,11
		TR03104	46	50	4
		TR03105	26	28	2
		TR03302	34	38	4
	Light Rehabilitation Total				**58,89**
	Rehabilitate	MR00025	3,67	3,98	0,31
		MR00027	74	75,2	1,2
		MR00165	8,47	8,99	0,52
		MR00189	24	26	2
		MR00199	13,9	18	4,1
		MR00207	1,4	2,7	1,3
		MR00278	2,72	2,76	0,04
		TR00101	20	24,55	4,55
		TR00201	0	2	2
		TR00209	16	18	2
	Rehabilitate Total				**18,02**
	Reseal	DR01113	0,29	1,75	1,46
		DR01211	9,61	11,88	2,27
		DR01214	0	2	2

Delivery year	Recommended treatment	Road number	Start km	End km	Length
		DR01358	0	4,05	4,05
		DR01389	0	4,03	4,03
		DR01411	55,4	56,14	0,74
		DR01577	0	1,04	1,04
		DR01775	0	1,9	1,9
		MR00133	8,76	10,03	1,27
		MR00174	20	28	8
		MR00174	28	30,28	2,28
		MR00174	47,15	50	2,85
		MR00176	0	3	3
		MR00176	3	3,13	0,13
		MR00177	8,17	16,74	8,57
		MR00177	20	22	2
		MR00177	27,59	30,15	2,56
		MR00187	4,72	8	3,28
		MR00188	16	18	2
		MR00188	24	26,8	2,8
		MR00201	56,92	58,34	1,42
		MR00213	5,32	10,79	5,47
		MR00552	18	22	4
		TR00101	14	18	4
		TR00101	18	20	2
		TR00202	6	7,69	1,69
		TR02201	34	36,05	2,05
		TR03002	40	47,39	7,39
		TR03302	0	4	4
		TR05501	0,83	2	1,17
		TR05501	56	60,5	4,5
		TR07701	54	56	2
		TR07701	56	62	6
		TR07701	62	64	2
		TR08501	0	12,09	12,09
	Reseal Total				**119,01**
2021	Light Rehabilitation	DR01001	12	13,76	1,76
		DR01052	0	4,81	4,81
		DR01298	0	0,13	0,13
		DR01318	0	0,19	0,19
		MR00191	26,02	38	11,98
		MR00265	49,86	49,87	0,01
		MR00312	0	2	2
		MR00350	0	2,43	2,43
		MR00539	26	27,52	1,52
		MR00547	0	0,63	0,63
		MR00548	14	15,61	1,61
		TR03001	26	30	4

Delivery year	Recommended treatment	Road number	Start km	End km	Length
		TR03104	44	46	2
		TR07701	13,88	14,48	0,6
	Light Rehabilitation Total				**33,67**
	Rehabilitate	DR01021	1,55	3,55	2
		MR00191	22,69	23,71	1,02
		MR00205	6	8,62	2,62
		TR00201	2	13,8	11,8
		TR00201	8	13,8	5,8
		TR00201	13,8	17,48	3,68
		TR02501	3,98	6	2,02
	Rehabilitate Total				**28,94**
	Reseal	DR01119	2,76	3,64	0,88
		DR01126	2	4	2
		DR01214	2	4	2
		DR01366	0	3,42	3,42
		DR01369	0	3,13	3,13
		DR01385	0,88	2,44	1,56
		DR01394	0	6	6
		DR01434	0	5,69	5,69
		DR01452	0	2	2
		DR01487	118	120	2
		DR01524	0	2,69	2,69
		DR01532	2	6	4
		DR01532	6	8	2
		DR01532	10	12	2
		DR01532	12	14	2
		DR01599	19,64	20,62	0,98
		DR01626	0,71	1,52	0,81
		DR01673	0,6	6	5,4
		MR00177	22	28	6
		MR00187	10	14,71	4,71
		MR00188	18	22	4
		MR00213	10,79	20,88	10,09
		MR00224	6	20	14
		MR00227	8	30	22
		MR00264	24	28	4
		MR00531	92,55	95,82	3,27
		MR00546	38	40	2
		MR00552	12	18	6
		MR00559	12	14	2
		OP04234	0	1,16	1,16
		OP05361	0	5,53	5,53
		OP07645	0	2,64	2,64
		TR00101	2,97	4	1,03
		TR02201	22	24	2

Delivery year	Recommended treatment	Road number	Start km	End km	Length
		TR02201	26	34	8
		TR03101	1,37	8	6,63
		TR03103	14	16	2
		TR03103	16	28	12
		TR03103	48	58	10
		TR05501	6	16	10
		TR05501	16	18	2
		TR07701	64	82	18
	Reseal Total				**207,62**
2022	Light Rehabilitation	DR01118	1,05	6,31	5,26
		DR01300	1,37	4,36	2,99
		DR01788	0	1,46	1,46
		MR00199	20	22,46	2,46
		MR00210	0,06	0,87	0,81
		MR00224	2,35	6	3,65
		MR00306	0,36	0,72	0,36
		MR00547	14	21,55	7,55
		MR00547	23,1	26	2,9
		MR00547	26	30	4
		MR00547	30	34	4
		OP05742	0	2	2
		TR00202	2	6	4
		TR00210	54,76	59,15	4,39
		TR02303	20	24	4
		TR02501	8	10	2
		TR02801	10	12	2
		TR02901	32	34	2
		TR03002	14	16	2
		TR03106	18	20	2
		TR03201	44	45,15	1,15
	Light Rehabilitation Total				**60,98**
	Rehabilitate	MR00199	18	20	2
		MR00205	0	6	6
		TR00201	2	8	6
		TR03106	14	18	4
	Rehabilitate Total				**18**
	Reseal	DR01119	4,66	7,27	2,61
		DR01254	0	12,29	12,29
		DR01342	14	18	4
		DR01359	0	3	3
		DR01363	0	2,84	2,84
		DR01368	0	2	2
		DR01368	2	3,35	1,35
		DR01386	0	4	4
		DR01390	0	4	4

Delivery year	Recommended treatment	Road number	Start km	End km	Length
		DR01390	4	6,93	2,93
		DR01398	14	22	8
		DR01400	0	6	6
		DR01408	1,44	6,37	4,93
		DR01429	0	0,25	0,25
		DR01441	0	1,93	1,93
		DR01452	4	10	6
		DR01453	0	2,38	2,38
		DR01461	0,72	2	1,28
		DR01532	0	2	2
		DR01532	8	10	2
		DR01532	14	17,16	3,16
		DR01631	0	4,15	4,15
		DR01645	0	2	2
		DR01671	0	2	2
		DR01671	2	7,27	5,27
		DR01673	6	7,29	1,29
		DR01680	0	5,15	5,15
		DR01709	2	6,74	4,74
		DR01770	10	12,33	2,33
		DR01834	4	7,41	3,41
		DR02175	0	12	12
		DR02178	0	6	6
		DR02180	19,9	24	4,1
		DR02184	14	16,3	2,3
		DR02220	0	3,57	3,57
		DR02221	0	2,39	2,39
		MR00028	0,54	24	23,46
		MR00174	44	46,15	2,15
		MR00188	22	24	2
		MR00229	0	1,88	1,88
		MR00262	0	2	2
		MR00271	10	34	24
		MR00286	22,72	26	3,28
		MR00331	1,43	10,54	9,11
		MR00532	0	5,53	5,53
		MR00546	46	50	4
		MR00547	66	70	4
		MR00552	10	12	2
		MR00557	0	1,36	1,36
		OP04019	0	2	2
		OP04068	0	4,09	4,09
		OP05223	0	1,44	1,44
		OP05255	0	1,41	1,41
		OP05362	0	1,83	1,83

Delivery year	Recommended treatment	Road number	Start km	End km	Length
		OP06456	0	0,65	0,65
		TR00101	4	14	10
		TR01609	30	32	2
		TR02201	24	26	2
		TR02901	40	42	2
		TR03101	8	12	4
	Reseal Total				**253,84**
2023	Light Rehabilitation	DR01343	0,44	3,1	2,66
		DR01412	0	1,71	1,71
		DR01416	1,8	4	2,2
		DR01418	0	3,68	3,68
		DR01592	0	0,32	0,32
		DR02183	27,01	27,32	0,31
		MR00172	8	15,76	7,76
		MR00174	0	0,6	0,6
		MR00174	30,28	32	1,72
		MR00189	16,63	24	7,37
		MR00201	46,1	50,23	4,13
		MR00231	0	0,03	0,03
		MR00261	0,8	2	1,2
		MR00290	0,25	2	1,75
		MR00305	0	1,3	1,3
		MR00332	0	0,04	0,04
		MR00347	3,24	6	2,76
		MR00347	12,45	16	3,55
		MR00547	34	42	8
		MR00547	42	46	4
		OP04232	0	0,55	0,55
		TR00209	0	2	2
		TR02801	2	4	2
		TR02801	28	29,46	1,46
		TR03104	56	58	2
		TR03105	36	38	2
		TR07701	24,59	26	1,41
		TR07701	50	54	4
	Light Rehabilitation Total				**70,51**
	Rehabilitate	MR00303	0	0,34	0,34
		TR01601	0,53	6	5,47
		TR08101	8,69	14,02	5,33
	Rehabilitate Total				**11,14**
	Reseal	DR01119	3,74	4,59	0,85
		DR01161	0	4	4
		DR01161	4	8	4
		DR01162	21,5	22,43	0,93
		DR01170	0	3,58	3,58

Delivery year	Recommended treatment	Road number	Start km	End km	Length
		DR01342	18	20,15	2,15
		DR01372	0	6	6
		DR01420	0	0,56	0,56
		DR01440	2	4	2
		DR01452	2	4	2
		DR01487	120	123,32	3,32
		DR01549	0	1,03	1,03
		DR01568	43,46	50	6,54
		DR01573	7,93	9,06	1,13
		DR01645	2	4	2
		DR01645	4	5,4	1,4
		DR01709	0	2	2
		DR02151	3,02	4,19	1,17
		DR02180	24	35,68	11,68
		DR02191	0	0,4	0,4
		DR02227	0	2,82	2,82
		DR02232	0	8	8
		DR02232	10	12	2
		DR02232	12	18	6
		DR02232	18	20	2
		DR02232	20	22	2
		DR02232	22	24	2
		MR00028	24	28	4
		MR00174	32	42	10
		MR00174	42	44	2
		MR00177	22	24,36	2,36
		MR00187	8	10	2
		MR00262	2	19,65	17,65
		MR00295	4	6	2
		MR00403	4	8	4
		MR00403	12	13,03	1,03
		MR00531	66	70	4
		MR00547	56	66	10
		MR00547	70	72,81	2,81
		MR00559	14	16,31	2,31
		MR00559	15,83	16,31	0,48
		MR00582	40	44	4
		MR00582	44	52	8
		MR00582	52	54	2
		MR00582	54	68	14
		MR00582	68	74	6
		OP05543	0	2	2
		OP06887	1,41	2,41	1
		OP08081	0	0,29	0,29
		OP08081	1,28	2,82	1,54

Delivery year	Recommended treatment	Road number	Start km	End km	Length
	Reseal Total				**185,03**
2024	Light Rehabilitation	DR01388	0	3,12	3,12
		DR01636	0	0,27	0,27
		DR01668	15,22	16,68	1,46
		DR01888	2,6	2,64	0,04
		MR00027	51,94	54	2,06
		MR00027	54	56	2
		MR00027	56	58	2
		MR00027	58	62	4
		MR00027	62	64	2
		MR00027	64	66	2
		MR00166	0,11	4,71	4,6
		MR00172	0,05	1,25	1,2
		MR00172	2,49	8	5,51
		MR00177	8,17	18	9,83
		MR00177	20	22	2
		MR00201	8,9	12	3,1
		MR00310	34	36	2
		MR00355	54,54	54,68	0,14
		MR00402	0	1,21	1,21
		MR00546	52	54,54	2,54
		TR01601	8	10	2
		TR02103	0,82	6	5,18
		TR02103	6	8	2
		TR02103	8	10	2
		TR02501	37	42,21	5,21
		TR02801	4	10	6
		TR02801	12	16	4
		TR02801	26,69	29,46	2,77
		TR07701	26	48,22	22,22
	Light Rehabilitation Total				**102,46**
	Rehabilitate	MR00174	50	58,49	8,49
		TR08101	8,69	14,02	5,33
	Rehabilitate Total				**13,82**
	Reseal	DR01440	0	2	2
		DR01440	4	9,48	5,48
		DR01459	0	2,85	2,85
		DR02157	0	1,03	1,03
		MR00028	28	37,71	9,71
		MR00177	18	20	2
		MR00218	0	5,56	5,56
		MR00531	62	66	4
		OP05873	0	2,03	2,03
		TR02701	12	14	2
		TR02701	36	38	2

Delivery year	Recommended treatment	Road number	Start km	End km	Length
	Reseal Total				**38,66**
2025	Light Rehabilitation	DR01110	0,78	4,8	4,02
		DR01130	0	0,03	0,03
		DR01210	26,66	27,01	0,35
		MR00177	17,3	20	2,7
		MR00220	0	8,24	8,24
		MR00289	0	12	12
		MR00347	6	8	2
		MR00548	2	12	10
		MR00548	12	14	2
		OP07644	0	3,75	3,75
		TR00209	12	14	2
		TR00209	14	16	2
		TR02102	24,6	34	9,4
		TR02303	34	35,12	1,12
		TR02701	0	4	4
		TR02701	4	12	8
		TR02701	14	18	4
		TR03201	42	44	2
		TR07701	48,22	50	1,78
	Light Rehabilitation Total				**79,39**
	Rehabilitate	MR00133	8,76	10,03	1,27
		MR00188	11,13	16	4,87
		TR02801	16	28	12
	Rehabilitate Total				**18,14**
2026	Light Rehabilitation	DR01126	12	18,82	6,82
		DR01134	0	1,58	1,58
		DR01146	5,91	6,41	0,5
		DR01394	6	10	4
		DR01438	0,5	2	1,5
		DR01489	0	1,03	1,03
		DR01590	0	2,88	2,88
		DR01600	0	6,89	6,89
		MR00224	20	26	6
		MR00224	26	28	2
		MR00228	21,22	22,64	1,42
		MR00261	2	29,03	27,03
		MR00270	0	0,08	0,08
		MR00277	28	30,9	2,9
		MR00348	10	12	2
		MR00351	0	2	2
		MR00548	0	2	2
		TR00209	4	6	2
		TR00209	6	12	6
		TR00902	34,28	50	15,72

Delivery year	Recommended treatment	Road number	Start km	End km	Length
		TR02303	18	20	2
		TR02701	18	26	8
		TR02701	26	30	4
		TR02701	30	36	6
		TR02901	36	40	4
		TR03002	38	40	2
		TR03104	60	62	2
		TR03105	0,42	26	25,58
		TR03105	28	30	2
		TR03105	42	47,63	5,63
		TR03106	1,1	4	2,9
		TR03106	4	14	10
		TR03201	38	42	4
		TR07701	82	86	4
		TR07701	88	90	2
	Light Rehabilitation Total				**178,46**
2027	Light Rehabilitation	DR01090	0	4	4
		DR01373	2,06	3,27	1,21
		DR01398	1,29	4	2,71
		DR01398	4	12	8
		DR01693	11,1	11,42	0,32
		MR00224	28	32,53	4,53
		MR00227	0	8	8
		MR00291	0	8,99	8,99
		MR00390	0	4	4
		MR00394	0	2	2
		MR00547	1,66	14	12,34
		MR00547	46	56	10
		TR01601	6	8	2
		TR02103	10	20,49	10,49
		TR02303	32	34	2
		TR02901	1,49	22	20,51
		TR02901	34	36	2
		TR02901	58,32	71,73	13,41
		TR03104	30,89	38	7,11
		TR03104	62	76,06	14,06
		TR07701	86	88	2
		TR07701	90	94	4
		TR07701	94	100	6
	Light Rehabilitation Total				**149,68**
	Rehabilitate	MR00538	0,44	8,5	8,06
	Rehabilitate Total				**8,06**
2028	Light Rehabilitation	DR01090	4	6,73	2,73
		DR01129	0	2,82	2,82
		DR01413	3,79	6,59	2,8

Delivery year	Recommended treatment	Road number	Start km	End km	Length
		DR02188	0	9,75	9,75
		MR00289	14	16	2
		MR00335	0	3,12	3,12
		MR00348	8	10	2
		MR00351	2	4	2
		MR00526	0	2	2
		MR00531	0	0,66	0,66
		TR07701	2,68	8	5,32
		TR07701	10	14	4
		TR07701	14	20	6
		TR07701	20	22	2
		MR00543	0	0,58	0,58
		MR00546	40	46	6
		OP04087	0	3,92	3,92
		TR02101	0	9	9
		TR02101	16	28	12
		TR02303	24	32	8
		TR02501	10	16	6
		TR02501	16	17,88	1,88
		TR02801	0	2	2
		TR02901	42	56,13	14,13
		TR03104	50	56	6
		TR03105	30	36	6
		TR03402	14	16	2
		TR06501	0	6	6
		TR07701	100	126	26
		TR08301	1,85	6	4,15
	Light Rehabilitation Total				**160,86**
2029	Light Rehabilitation	DR01125	0	2	2
		DR01125	4	6	2
		DR01126	0	2	2
		DR01126	9,16	12	2,84
		DR01138	0	2,47	2,47
		DR01205	0	2	2
		DR01205	2	4	2
		DR01205	4	8	4
		DR01205	12	16	4
		DR01205	16	18	2
		DR01241	0	0,4	0,4
		DR01379	6	7,41	1,41
		DR01437	0	0,1	0,1
		DR01439	0	0,2	0,2
		DR01620	2,11	3,55	1,44
		MR00264	46	58,52	12,52
		MR00269	14	16	2

Delivery year	Recommended treatment	Road number	Start km	End km	Length
		MR00269	22	24	2
		MR00282	18	19,03	1,03
		MR00283	3,8	5,04	1,24
		MR00289	16	18,54	2,54
		MR00290	2	4	2
		MR00290	6	16	10
		MR00303	3,66	8	4,34
		MR00312	6,8	10,22	3,42
		MR00346	0	2	2
		MR00347	16	19,19	3,19
		MR00348	14,96	17,03	2,07
		MR00355	68	70,83	2,83
		MR00394	2	4,5	2,5
		MR00531	8	10	2
		MR00531	22	30	8
		MR00546	32	34	2
		MR00546	34	38	4
		MR00546	50	52	2
		OP05601	0	2,57	2,57
		OP05657	0	0,67	0,67
		OP07647	0	4	4
		OP07664	12,56	14	1,44
		OP08055	0	0,78	0,78
		TR01602	22	24	2
		TR02901	24	32	8
		TR02902	1,63	8	6,37
		TR03002	22	26	4
		TR03103	58	61,49	3,49
		TR03104	8	10	2
		TR03104	14	16	2
		TR03105	38	40	2
		TR03105	40	42	2
		TR03302	14	28	14
		TR05501	2	4	2
		TR05901	68,32	68,75	0,43
		TR06501	6	8	2
		TR07701	134	140,71	6,71
	Light Rehabilitation Total				**167**

Appendix J – Gazetted list of projects

Key to table headings

Type of infrastructure: Paved; gravel (include earth and access roads); public transport; bridges; drainage structures etc.

Economic classification: (Buildings and other fixed structures, Goods and services, Plant, Machinery and equipment, COE)

Delivery Mechanism (Individual project or Packaged program)

Total Expenditure (until 31 March 2019)

Note 1: Site handover/commencement of construction - date of letter of acceptance

Note 2: Construction completion date (take over date) - practical completion date

Summary of details of expenditure for infrastructure by category - Programme 3 Transport Infrastructure															
No.	Project name	Project status	District /Local Municipality	Economic Classification	Type of infrastructure	Project duration		Source of funding	Budget programme name	Delivery Mechanism	Total project cost	Total Expenditure	Medium-term estimate		
						Date: Start Note 1	Date: Finish Note 2						2019/20	2020/21	2021/22
											R'000	R'000	R'000	R'000	R'000
1. NEW AND REPLACEMENT ASSETS															
Own Funds															
1	FMS on N1	Works	City of Cape Town	Other fixed structures	Paved Roads	2013/04/01	2020/03/31	Equitable share	Transport Infrastructure	Individual project	25 413	16 413	9 000	-	-
2	C975.1 AFR Saldanha Bay IDZ	Design development	Saldanha Bay Municipality	Other fixed structures	Paved Roads	2015/06/09	2021/03/31	Equitable share	Transport Infrastructure	Individual project	302 805	179 805	118 000	5 000	-
3	Design Fees New	Works	Across districts	Other fixed structures	Paved Roads	2016/04/01	2022/03/31	Equitable share	Transport Infrastructure	Packaged program	59 239	41 239	6 000	6 000	6 000
4	C415.2 AFR Saldanha TR77	Infrastructure planning	Saldanha Bay Municipality	Other fixed structures	Paved Roads	2017/04/01	2020/03/31	Equitable share	Transport Infrastructure	Individual project	220 619	216 619	4 000	-	-
5	C377.1 George West Bypass	Infrastructure planning	George Municipality	Other fixed structures	Paved Roads	2019/07/05	2022/03/31	Equitable share	Transport Infrastructure	Individual project	30 000	-	-	-	30 000
6	Extend R300 Freeway: N1-north	Design documentation	City of Cape Town	Other fixed structures	Paved Roads	2020/02/04	2022/03/31	Equitable share	Transport Infrastructure	Individual project	308 385	-	-	90 000	218 385
Sub-total: Own Funds											**946 461**	**454 076**	**137 000**	**101 000**	**254 385**
TOTAL: NEW AND REPLACEMENT ASSETS											**946 461**	**454 076**	**137 000**	**101 000**	**254 385**

Summary of details of expenditure for infrastructure by category - Programme 3 Transport Infrastructure														
No.	Project name	Project status	District /Local Municipality	Economic Classification	Type of infrastructure	Project duration		Source of funding	Budget programme name	Delivery Mechanism	Total project cost	Total Expenditure	Medium-term estimate		
						Date: Start Note 1	Date: Finish Note 2						2019/20	2020/21	2021/22
											R'000	R'000	R'000	R'000	R'000
2. UPGRADES AND ADDITIONS															
Own Funds															
1	C850.1 Simonsvlei	Design documentation	Design documentation	Stellenbosch Municipality	Paved Roads	2016/08/02	2022/03/31	Equitable share	Transport Infrastructure	Individual project	56 526	2 526	-	20 000	34 000
2	C1046 AFR N1 Durban Road i/c	Works	Works	City of Cape Town	Paved Roads	2015/11/26	2021/09/15	Equitable share	Transport Infrastructure	Individual project	644 482	615 482	25 000	4 000	-
3	C1038 N7 Bosmansdam & Melkbos i/c	Works	Close out	City of Cape Town	Access Roads	2017/11/17	2022/03/31	Equitable share	Transport Infrastructure	Individual project	158 986	18 986	-	40 000	100 000
4	C733.5 Mariner's Way	Infrastructure planning	Design documentation	City of Cape Town	Paved Roads	2018/10/03	2022/03/31	Equitable share	Transport Infrastructure	Individual project	112 950	12 950	-	20 000	80 000
5	C974 Somerset West-Stellenbosch safety improvements	Design documentation	Infrastructure planning	Stellenbosch Municipality	Bridges	2020/06/01	2022/03/31	Equitable share	Transport Infrastructure	Individual project	39 223	9 223	-	-	30 000
6	Expropriation	Infrastructure planning	Works	Across districts	Expropriation of Land	2015/04/01	2022/03/31	Equitable share	Transport Infrastructure	Packaged program	36 854	12 204	7 800	8 200	8 650
7	Friemersheim Road DM	Works	Design documentation	Garden Route district	Gravel roads	2017/01/15	2020/03/31	Equitable share	Transport Infrastructure	Individual project	14 006	4 006	10 000	-	-
8	C1039 AFR Realign Borcherds Quarry phase 2	Design documentation	Infrastructure planning	City of Cape Town	Paved Roads	2016/01/07	2022/03/31	Equitable share	Transport Infrastructure	Individual project	286 676	25 676	15 000	140 000	106 000
9	Citrusdal DM	Design documentation	Infrastructure planning	West Coast District	Gravel roads	2014/04/01	2020/03/31	Equitable share	Transport Infrastructure	Individual project	37 406	22 406	15 000	-	-
10	C1025 AFR Wingfield i/c	Infrastructure planning	Design development	City of Cape Town	Paved Roads	2016/05/18	2022/03/31	Equitable share	Transport Infrastructure	Individual project	323 441	53 441	90 000	90 000	90 000
11	Haasekraal DM	Infrastructure planning	Works	Cape Winelands District	Gravel roads	2017/04/01	2020/03/31	Equitable share	Transport Infrastructure	Individual project	20 817	2 317	18 500	-	-
12	Hangklip DM	Works	Works	Overberg District	Gravel roads	2017/04/01	2020/03/31	Equitable share	Transport Infrastructure	Individual project	7 619	619	7 000	-	-

Summary of details of expenditure for infrastructure by category - Programme 3 Transport Infrastructure															
No.	Project name	Project status	District /Local Municipality	Economic Classification	Type of infrastructure	Project duration		Source of funding	Budget programme name	Delivery Mechanism	Total project cost	Total Expenditure	Medium-term estimate		
						Date: Start Note 1	Date: Finish Note 2				R'000	R'000	2019/20 R'000	2020/21 R'000	2021/22 R'000
13	Fancourt DM	Design documentation	Works	Garden Route district	Gravel roads	2016/04/01	2022/03/31	Equitable share	Transport Infrastructure	Individual project	69 330	5 330	-	29 000	35 000
14	C964.2 Mossel Bay-Hartenbos phase 2	Works	Design development	Mossel Bay Municipality	Paved Roads	2017/04/01	2022/03/31	Equitable share	Transport Infrastructure	Individual project	261 964	156 964	-	55 000	50 000
15	C964.3 Mossel Bay-Hartenbos phase 3	Works	Infrastructure planning	Mossel Bay Municipality	Paved Roads	2018/04/01	2022/03/31	Equitable share	Transport Infrastructure	Individual project	25 076	5 076	-	-	20 000
16	Design Fees Upgrading	Works	Works	Across districts	Paved Roads	2016/04/01	2022/03/31	Equitable share	Transport Infrastructure	Packaged program	365 755	152 628	63 361	73 546	76 220
17	C733.6 N2-Mariner's Way	Works	Design development	City of Cape Town	Gravel roads	2016/04/01	2020/03/31	Equitable share	Transport Infrastructure	Individual project	15 718	15 318	400	-	-
18	C975.2 AFR Upgrade of Saldanha Bay	Works	Design development	Saldanha Bay Municipality	Paved Roads	2017/04/01	2022/03/31	Equitable share	Transport Infrastructure	Individual project	61 226	2 226	-	39 000	20 000
19	Rawsonville DM	Infrastructure planning	Handover	Cape Winelands District	Gravel roads	2016/04/01	2021/03/31	Equitable share	Transport Infrastructure	Individual project	8 195	4 195	-	4 000	-
20	Wansbek DM	Infrastructure planning	Infrastructure planning	Cape Winelands District	Gravel roads	2018/04/01	2022/03/31	Equitable share	Transport Infrastructure	Individual project	25 634	634	-	-	25 000
21	Algeria Road DM	Works	Infrastructure planning	West Coast District	Gravel roads	2017/04/01	2020/03/31	Equitable share	Transport Infrastructure	Individual project	12 779	2 779	10 000	-	-
22	Slangrivier DM	Design development	Infrastructure planning	Garden Route district	Gravel roads	2017/04/01	2021/03/31	Equitable share	Transport Infrastructure	Individual project	30 195	4 195	21 000	5 000	-
23	Klipheuwel DM	Infrastructure planning	Infrastructure planning	Overberg District	Gravel roads	2019/04/01	2021/03/31	Equitable share	Transport Infrastructure	Individual project	13 619	619	6 000	7 000	-
24	C733 S-West-Sir Lowrey's Pass-Debeers-Hazelden	Infrastructure planning	Design development	City of Cape Town	Paved Roads	2020/05/14	2022/03/31	Equitable share	Transport Infrastructure	Individual project	48 263	28 263	-	-	20 000
25	C851 Rondevlei	Infrastructure planning	Design documentation	George Municipality	Gravel Road	2020/04/01	2022/03/31	Equitable share	Transport Infrastructure	Individual project	13 554	3 554	-	-	10 000
26	C1011 Draaiberg road	Infrastructure planning	Design development	Theewaterskloof Municipality	Gravel Road	2020/04/01	2022/03/31	Equitable share	Transport Infrastructure	Individual project	102 508	2 508	-	20 000	80 000

Summary of details of expenditure for infrastructure by category - Programme 3 Transport Infrastructure															
No.	Project name	Project status	District /Local Municipality	Economic Classification	Type of infrastructure	Project duration		Source of funding	Budget programme name	Delivery Mechanism	Total project cost	Total Expenditure	Medium-term estimate		
						Date: Start Note 1	Date: Finish Note 2				R'000	R'000	2019/20 R'000	2020/21 R'000	2021/22 R'000
27	C1120 Pearl Valley	Works	Infrastructure planning	City of Cape Town	Paved Roads	2020/04/01	2022/03/31	Equitable share	Transport Infrastructure	Individual project	150 000	-	-	60 000	90 000
28	C852.1 Road over Rail Boontjies Kraal	Infrastructure planning	Design development	Overberg District	Paved Roads	2020/04/01	2022/03/31	Equitable share	Transport Infrastructure	Individual project	22 087	2 087	-	-	20 000
29	Nuy Station DM	Infrastructure planning	Design documentation	Cape Winelands District	Gravel Road	2019/04/02	2021/03/31	Equitable share	Transport Infrastructure	Individual project	10 000	-	-	10 000	-
30	Robertson-Lange Valley DM	Design documentation	Design development	Cape Winelands District	Gravel Road	2019/04/02	2021/03/31	Equitable share	Transport Infrastructure	Individual project	9 195	4 195	-	5 000	-
31	Drakenstein DM	Design development	Infrastructure planning	Cape Winelands District	Gravel Road	2019/05/24	2022/03/31	Equitable share	Transport Infrastructure	Individual project	14 403	7 403	-	5 000	2 000
32	Koppiesveld surface DM	Infrastructure planning	Infrastructure planning	West Coast District	Gravel Road	2018/04/02	2020/03/31	Equitable share	Transport Infrastructure	Individual project	919	619	300	-	-
33	Vredenburg - Stompneusbaai upgrade	Design development	Infrastructure planning	West Coast District	Gravel Road	2019/06/04	2022/03/31	Equitable share	Transport Infrastructure	Individual project	62 634	634	-	30 000	32 000
34	Boontjieskraal DM	Design documentation	Infrastructure planning	Overberg District	Gravel Road	2019/06/10	2022/03/31	Equitable share	Transport Infrastructure	Individual project	43 087	2 087	-	10 000	31 000
35	C1025.1 AFR Wingfield i/c	Design development	Design development	City of Cape Town	Paved Roads	2018/10/01	2022/03/31	Equitable share	Transport Infrastructure	Individual project	76 508	2 508	-	-	74 000
36	Karoovlak-Vredendal DM	Infrastructure planning	Works	West Coast District	Gravel Road	2018/08/01	2020/03/31	Equitable share	Transport Infrastructure	Individual project	9 064	619	8 445	-	-
37	Buffeljagsbaai DM	Infrastructure planning	Works	Overberg District	Gravel roads	2015/04/01	2021/03/31	Equitable share	Transport Infrastructure	Individual project	19 162	1 162	8 000	10 000	-
Sub-total: Own Funds											**3 209 861**	**1 185 439**	**305 806**	**684 746**	**1 033 870**
Provincial Roads Maintenance Funds															
38	C1047.2 PRMG Maalgaten River	Infrastructure planning	City of Cape Town	Other fixed structures	Access Roads	2020/04/01	2021/03/31	Provincial Roads Maintenance Grant	Transport Infrastructure	Individual project	8 000	2 000	2 000	4 000	-

Summary of details of expenditure for infrastructure by category - Programme 3 Transport Infrastructure															
No.	Project name	Project status	District /Local Municipality	Economic Classification	Type of infrastructure	Project duration Date: Start Note 1	Project duration Date: Finish Note 2	Source of funding	Budget programme name	Delivery Mechanism	Total project cost R'000	Total Expenditure R'000	Medium-term estimate 2019/20 R'000	2020/21 R'000	2021/22 R'000
39	C733.7 PRMG De Beers pedestrian Bridge	Works	City of Cape Town	Other fixed structures	Bridges	2018/04/02	2020/03/31	Provincial Roads Maintenance Grant	Transport Infrastructure	Individual project	16 000	4 000	12 000	-	-
Sub-total: Provincial Roads Maintenance Funds											**24 000**	**6 000**	**14 000**	**4 000**	**-**
TOTAL: UPGRADES AND ADDITIONS											**3 233 861**	**1 191 439**	**319 806**	**688 746**	**1 033 870**
3. REHABILITATION, RENOVATIONS AND REFURBISHMENTS															
Own Funds															
1	C820 Roberston-Bonnievale	Works	Langeberg Municipality	Other fixed structures	Paved Roads	2015/08/20	2020/03/31	Equitable share	Transport Infrastructure	Individual project	305 667	302 667	3 000	-	-
2	C921 Annandale Road	Works	Stellenbosch Municipality	Other fixed structures	Paved Roads	2016/02/04	2020/03/31	Equitable share	Transport Infrastructure	Individual project	107 000	105 000	2 000	-	-
3	C1009.1 Kalbaskraal	Works	City of Cape Town	Other fixed structures	Paved Roads	2015/09/08	2020/03/31	Equitable share	Transport Infrastructure	Individual project	147 977	146 426	1 551	-	-
4	C998 Oudtshoorn-Cango Caves reseal	Design documentation	Oudtshoorn Municipality	Other fixed structures	Resealing	2017/08/31	2020/03/31	Equitable share	Transport Infrastructure	Individual project	39 983	39 483	500	-	-
5	CW DM regravel	Works	Cape Winelands District	Other fixed structures	Gravel roads	2016/04/01	2022/03/31	Equitable share	Transport Infrastructure	Packaged program	97 874	28 749	23 500	22 050	23 575
6	OB DM regravel	Works	Overberg District	Other fixed structures	Gravel roads	2016/04/01	2022/03/31	Equitable share	Transport Infrastructure	Packaged program	94 494	21 269	26 340	24 355	22 530
7	WC DM regravel	Works	West Coast District	Other fixed structures	Gravel roads	2016/04/01	2022/03/31	Equitable share	Transport Infrastructure	Packaged program	84 564	24 559	16 000	21 505	22 500
8	ED DM regravel	Works	Garden Route district	Other fixed structures	Gravel roads	2016/04/01	2022/03/31	Equitable share	Transport Infrastructure	Packaged program	85 075	29 530	17 035	18 740	19 770
9	CK DM regravel	Works	Central Karoo District	Other fixed structures	Gravel roads	2016/04/01	2022/03/31	Equitable share	Transport Infrastructure	Packaged program	114 004	37 659	23 100	25 910	27 335

Summary of details of expenditure for infrastructure by category - Programme 3 Transport Infrastructure															
No.	Project name	Project status	District /Local Municipality	Economic Classification	Type of infrastructure	Project duration		Source of funding	Budget programme name	Delivery Mechanism	Total project cost	Total Expenditure	Medium-term estimate		
						Date: Start Note 1	Date: Finish Note 2						2019/20	2020/21	2021/22
											R'000	R'000	R'000	R'000	R'000
10	C821 Porterville-Piketberg	Works	Bergrivier Municipality	Other fixed structures	Paved Roads	2017/01/18	2020/03/31	Equitable share	Transport Infrastructure	Individual project	203 538	200 538	3 000	-	-
11	C749.2 Paarl-Franschoek	Design documentation	Drakenstein Municipality	Other fixed structures	Paved Roads	2017/08/01	2021/03/31	Equitable share	Transport Infrastructure	Individual project	131 809	21 809	10 000	100 000	-
12	C1036 Vredenburg-Paternoster	Works	Saldanha Bay Municipality	Other fixed structures	Paved Roads	2017/02/07	2021/03/31	Equitable share	Transport Infrastructure	Individual project	123 766	46 766	75 000	2 000	-
13	C1037 Prince Albert Road reseal	Design documentation	Prince Albert Municipality	Other fixed structures	Resealing	2017/07/26	2020/03/31	Equitable share	Transport Infrastructure	Individual project	70 404	69 404	1 000	-	-
14	OB DM reseal	Works	Overberg District	Other fixed structures	Resealing	2016/04/01	2022/03/31	Equitable share	Transport Infrastructure	Packaged program	60 450	8 540	18 000	16 500	17 410
15	CW DM reseal	Works	Cape Winelands District	Other fixed structures	Resealing	2017/04/01	2022/03/31	Equitable share	Transport Infrastructure	Packaged program	65 870	21 890	16 000	13 615	14 365
16	WC DM reseal	Works	West Coast District	Other fixed structures	Resealing	2018/04/01	2022/03/31	Equitable share	Transport Infrastructure	Packaged program	66 904	23 404	10 000	16 300	17 200
17	ED DM reseal	Works	Garden Route district	Other fixed structures	Resealing	2019/04/01	2022/03/31	Equitable share	Transport Infrastructure	Packaged program	89 323	35 653	23 000	14 925	15 745
18	C914 Spier Road phase 3	Design development	Stellenbosch Municipality	Other fixed structures	Paved Roads	2017/11/28	2022/03/31	Equitable share	Transport Infrastructure	Individual project	52 245	20 245	-	-	32 000
19	C822 Hartenbos-Groot Brak River	Handover	Mossel Bay Municipality	Other fixed structures	Paved Roads	2018/01/18	2022/03/31	Equitable share	Transport Infrastructure	Individual project	117 965	114 965	-	-	3 000
20	C993.2 Holgaten-Oudtshoorn reseal	Infrastructure planning	George Municipality	Other fixed structures	Resealing	2017/09/15	2021/03/31	Equitable share	Transport Infrastructure	Individual project	31 000	30 000	-	1 000	-
21	C845.1 Ceres regravel	Infrastructure planning	Witzenberg Municipality	Other fixed structures	Gravel Road	2018/04/30	2022/03/31	Equitable share	Transport Infrastructure	Individual project	5 830	1 830	-	-	4 000
22	Design Fees Rehabilitation	Works	Across districts	Other fixed structures	Paved Roads	2016/04/01	2022/03/31	Equitable share	Transport Infrastructure	Packaged program	552 441	355 441	62 000	70 000	65 000

Summary of details of expenditure for infrastructure by category - Programme 3 Transport Infrastructure															
No.	Project name	Project status	District /Local Municipality	Economic Classification	Type of infrastructure	Project duration		Source of funding	Budget programme name	Delivery Mechanism	Total project cost	Total Expenditure	Medium-term estimate		
						Date: Start Note 1	Date: Finish Note 2						2019/20	2020/21	2021/22
											R'000	R'000	R'000	R'000	R'000
23	C751.2 TR23/3 Gouda-Kleinbergrivier	Works	Witzenberg Municipality	Other fixed structures	Paved Roads	2017/03/15	2021/03/31	Equitable share	Transport Infrastructure	Individual project	184 365	180 365	-	4 000	-
24	C818 Ashton-Montagu	Works	Langeberg Municipality	Other fixed structures	Paved Roads	2015/06/25	2022/03/31	Equitable share	Transport Infrastructure	Individual project	821 908	443 908	185 000	185 000	8 000
25	C918 Oudtshoorn-De Rust	Works	Oudtshoorn Municipality	Other fixed structures	Paved Roads	2016/10/19	2022/03/31	Equitable share	Transport Infrastructure	Individual project	59 666	55 666	-	-	4 000
26	C1090 N7 Wingfield-Melkbos	Works	City of Cape Town	Other fixed structures	Paved Roads	2017/04/01	2022/03/31	Equitable share	Transport Infrastructure	Individual project	134 243	20 243	100 000	11 000	3 000
27	C1081 Gordon's Bay reseal	Infrastructure planning	City of Cape Town	Other fixed structures	Resealing	2016/08/18	2020/03/31	Equitable share	Transport Infrastructure	Individual project	49 869	48 869	1 000	-	-
28	C1083 De Rust-Uniondale reseal	Infrastructure planning	George Municipality	Other fixed structures	Resealing	2017/04/01	2020/03/31	Equitable share	Transport Infrastructure	Individual project	37 564	36 564	1 000	-	-
29	C1085 Beaufort West-Willowmore reseal	Infrastructure planning	Beaufort West Municipality	Other fixed structures	Resealing	2018/04/01	2021/03/31	Equitable share	Transport Infrastructure	Individual project	27 875	19 875	7 000	1 000	-
30	C1086 Calitzdorp-Oudtshoorn reseal	Infrastructure planning	Kannaland Municipality	Other fixed structures	Resealing	2018/04/01	2021/03/31	Equitable share	Transport Infrastructure	Individual project	32 211	31 211	-	1 000	-
31	C1053.6 Seweweekspoort regravel	Design documentation	Laingsburg Municipality	Other fixed structures	Gravel roads	2017/04/01	2022/03/31	Equitable share	Transport Infrastructure	Individual project	34 797	3 797	21 000	8 000	2 000
32	C823.1 Hoekwil-Saasveld Road	Design development	George Municipality	Other fixed structures	Paved Roads	2019/02/08	2021/03/31	Equitable share	Transport Infrastructure	Individual project	95 000	85 000	8 000	2 000	-
33	C914.2 Spier Road	Infrastructure planning	Stellenbosch Municipality	Other fixed structures	Paved Roads	2019/04/27	2021/03/31	Equitable share	Transport Infrastructure	Individual project	174 957	134 957	-	40 000	-
34	C1090.1 N7 Bosmansdam - Potsdam	Works	City of Cape Town	Other fixed structures	Paved Roads	2017/04/01	2022/03/31	Equitable share	Transport Infrastructure	Individual project	201 408	40 408	115 000	43 000	3 000

Summary of details of expenditure for infrastructure by category - Programme 3 Transport Infrastructure															
No.	Project name	Project status	District /Local Municipality	Economic Classification	Type of infrastructure	Project duration		Source of funding	Budget programme name	Delivery Mechanism	Total project cost	Total Expenditure	Medium-term estimate		
						Date: Start Note 1	Date: Finish Note 2						2019/20	2020/21	2021/22
											R'000	R'000	R'000	R'000	R'000
35	C1094 Redelinghuys-Elandsbaai	Infrastructure planning	Bergrivier Municipality	Other fixed structures	Resealing	2019/04/01	2022/03/31	Equitable share	Transport Infrastructure	Individual project	85 092	4 092	55 000	25 000	1 000
36	C1096 Nuwekloof reseal	Infrastructure planning	Cape Winelands District	Other fixed structures	Resealing	2019/04/01	2020/03/31	Equitable share	Transport Infrastructure	Individual project	27 963	26 963	1 000	-	-
37	C1008.1 Calitzdorp-Oudtshoorn rehabilitation (Spa Road)	Design development	Oudtshoorn Municipality	Other fixed structures	Paved Roads	2020/03/17	2021/03/31	Equitable share	Transport Infrastructure	Individual project	80 543	3 543	75 000	2 000	-
38	C1009 Kalbaskraal Road rehabilitation	Design development	City of Cape Town	Other fixed structures	Paved Roads	2018/09/25	2022/03/31	Equitable share	Transport Infrastructure	Individual project	83 556	10 556	40 000	32 000	1 000
39	C1029 Hermon-Gouda reseal & rehabilitation	Design development	Drakenstein Municipality	Other fixed structures	Resealing	2020/05/15	2021/03/31	Equitable share	Transport Infrastructure	Individual project	29 510	27 510	-	2 000	-
40	C984 Grabouw-Villiersdorp reseal	Design documentation	Theewaterskloof Municipality	Other fixed structures	Resealing	2017/09/12	2020/03/31	Equitable share	Transport Infrastructure	Individual project	124 364	122 364	2 000	-	-
41	C1089 Worcester-Roberston	Infrastructure planning	Breede Valley Municipality	Other fixed structures	Resealing	2019/04/01	2021/03/31	Equitable share	Transport Infrastructure	Individual project	43 408	40 408	-	3 000	-
42	C1098 Klipheuwel Reseal	Design development	Swartland Municipality	Other fixed structures	Resealing	2019/04/01	2021/03/31	Equitable share	Transport Infrastructure	Individual project	91 000	80 000	10 000	1 000	-
43	C1095 Vredenburg - Saldanha	Infrastructure planning	Saldanha Bay Municipality	Other fixed structures	Resealing	2020/05/14	2022/03/31	Equitable share	Transport Infrastructure	Individual project	56 021	1 021	-	45 000	10 000
44	C1082 Malmesbury-Hermon	Infrastructure planning	Swartland Municipality	Other fixed structures	Resealing	2019/04/01	2021/03/31	Equitable share	Transport Infrastructure	Individual project	12 955	11 955	-	1 000	-
45	C1097 Dwarskersbos Elandsbaai	Infrastructure planning	Bergrivier Municipality	Other fixed structures	Paved Roads	2021/04/01	2022/03/31	Equitable share	Transport Infrastructure	Individual project	183 362	27 362	100 000	53 000	3 000

Summary of details of expenditure for infrastructure by category - Programme 3 Transport Infrastructure															
No.	Project name	Project status	District /Local Municipality	Economic Classification	Type of infrastructure	Project duration		Source of funding	Budget programme name	Delivery Mechanism	Total project cost	Total Expenditure	Medium-term estimate		
						Date: Start Note 1	Date: Finish Note 2						2019/20	2020/21	2021/22
											R'000	R'000	R'000	R'000	R'000
46	C1025.2 Borcherds Quarry	Works	City of Cape Town	Other fixed structures	Resealing	2018/04/02	2021/03/31	Equitable share	Transport Infrastructure	Individual project	37 508	2 508	33 000	2 000	-
47	C1104 Reseal of Meirings Poort	Procurement planning	Garden Route district	Other fixed structures	Resealing	2020/04/01	2021/03/31	Equitable share	Transport Infrastructure	Individual project	74 898	33 898	-	41 000	-
48	C1119 Tesselaarsdal area bridges	Design development	Theewaterskloof Municipality	Other fixed structures	Bridges	2020/04/01	2022/03/31	Equitable share	Transport Infrastructure	Individual project	53 898	33 898	-	10 000	10 000
49	C1087 Stellenbosch-Klapmuts reseal	Infrastructure planning	Stellenbosch Municipality	Other fixed structures	Resealing	2019/04/01	2020/03/31	Equitable share	Transport Infrastructure	Individual project	77 661	76 661	1 000	-	-
50	C1093 N2-Villiersdorp	Infrastructure planning	Theewaterskloof Municipality	Other fixed structures	Resealing	2019/03/15	2021/03/31	Equitable share	Transport Infrastructure	Individual project	36 858	15 858	20 000	1 000	-
51	C1080 Stellenbosch reseal	Infrastructure planning	Stellenbosch Municipality	Other fixed structures	Resealing	2019/04/01	2021/03/31	Equitable share	Transport Infrastructure	Individual project	19 187	17 187	-	2 000	-
52	C1004 Riebeek Kasteel	Design development	Across districts	Other fixed structures	Paved Roads	2021/04/01	2022/03/31	Equitable share	Transport Infrastructure	Individual project	24 000	-	-	-	24 000
53	C1008 Rehab Calitzdorp - Oudtshoorn	Design development	Oudtshoorn Municipality	Other fixed structures	Paved Roads	2021/04/01	2022/03/31	Equitable share	Transport Infrastructure	Individual project	54 543	3 543	-	-	51 000
54	C1088 Stanford-Riviersonderend reseal	Infrastructure planning	Theewaterskloof Municipality	Other fixed structures	Resealing	2019/04/01	2021/03/31	Equitable share	Transport Infrastructure	Individual project	6 052	4 052	-	2 000	-
55	C1092 Somerset West-Stellenbosch	Infrastructure planning	Stellenbosch Municipality	Other fixed structures	Resealing	2019/04/15	2020/03/31	Equitable share	Transport Infrastructure	Individual project	20 153	2 153	18 000	-	-
56	C1100 Reseal Holgaten	Infrastructure planning	Garden Route district	Other fixed structures	Resealing	2020/04/01	2020/03/31	Equitable share	Transport Infrastructure	Individual project	61 477	9 477	52 000	-	-
57	C1102 Reseal Windmeul	Design development	Drakenstein Municipality	Other fixed structures	Resealing	2020/04/01	2020/03/31	Equitable share	Transport Infrastructure	Individual project	16 945	6 945	10 000	-	-

Summary of details of expenditure for infrastructure by category - Programme 3 Transport Infrastructure															
No.	Project name	Project status	District /Local Municipality	Economic Classification	Type of infrastructure	Project duration		Source of funding	Budget programme name	Delivery Mechanism	Total project cost	Total Expenditure	Medium-term estimate		
						Date: Start Note 1	Date: Finish Note 2						2019/20	2020/21	2021/22
											R'000	R'000	R'000	R'000	R'000
58	C1103 Reseal Grootriver and Bloukrans	Design development	Garden Route district	Other fixed structures	Resealing	2020/04/01	2020/03/31	Equitable share	Transport Infrastructure	Individual project	43 898	33 898	10 000	-	-
59	C1124 Reseal Herbertsdale Albertinia Gouritz Mond	Design development	Garden Route district	Other fixed structures	Resealing	2020/04/01	2020/03/31	Equitable share	Transport Infrastructure	Individual project	9 180	3 180	6 000	-	-
60	C838.6 Caledon-Sandbaai	Design documentation	Overberg District	Other fixed structures	Paved Roads	2020/04/01	2022/03/31	Equitable share	Transport Infrastructure	Individual project	54 139	4 139	5 000	-	45 000
61	C1128 Worcester-Wolseley	Infrastructure planning	Breede Valley Municipality	Other fixed structures	Resealing	2020/04/01	2020/03/31	Equitable share	Transport Infrastructure	Individual project	60 000	-	60 000	-	-
62	C1091 Ashton-Swellendam	Infrastructure planning	Swellendam Municipality	Other fixed structures	Resealing	2019/04/08	2021/03/31	Equitable share	Transport Infrastructure	Individual project	37 000	35 000	-	2 000	-
Sub-total: Own Funds											**6 007 217**	**3 424 861**	**1 267 026**	**865 900**	**449 430**
Provincial Roads Maintenance Grant															
63	C749.2 PRMG Paarl-Franschoek	Design documentation	Drakenstein Municipality	Other fixed structures	Paved Roads	2020/04/13	2022/03/31	Provincial Roads Maintenance Grant	Transport Infrastructure	Individual project	161 809	21 809	-	-	140 000
64	C822 PRMG Hartenbos-Groot Brak River	Design documentation	Mossel Bay Municipality	Other fixed structures	Paved Roads	2019/03/18	2021/03/31	Provincial Roads Maintenance Grant	Transport Infrastructure	Individual project	187 000	87 000	90 000	10 000	-
65	C1049 PRMG Kromme Rhee Road-Protea-Waarburgh Road reseal	Design documentation	City of Cape Town	Other fixed structures	Resealing	2018/09/04	2022/03/31	Provincial Roads Maintenance Grant	Transport Infrastructure	Individual project	117 218	6 124	-	10 798	100 296
66	C751.2 PRMG TR23/3 Gouda-Kleinbergrivier	Works	Witzenberg Municipality	Other fixed structures	Paved Roads	2017/03/15	2020/03/31	Provincial Roads Maintenance Grant	Transport Infrastructure	Individual project	206 000	180 000	26 000	-	-

Summary of details of expenditure for infrastructure by category - Programme 3 Transport Infrastructure															
No.	Project name	Project status	District /Local Municipality	Economic Classification	Type of infrastructure	Project duration		Source of funding	Budget programme name	Delivery Mechanism	Total project cost	Total Expenditure	Medium-term estimate		
						Date: Start Note 1	Date: Finish Note 2						2019/20	2020/21	2021/22
											R'000	R'000	R'000	R'000	R'000
67	C1000.1 PRMG Hermanus-Gansbaai	Design documentation	Overstrand Municipality	Other fixed structures	Paved Roads	2017/02/14	2022/03/31	Provincial Roads Maintenance Grant	Transport Infrastructure	Individual project	344 543	3 543	150 000	150 000	41 000
68	C918 PRMG Oudtshoorn-De Rust	Works	Oudtshoorn Municipality	Other fixed structures	Paved Roads	2016/10/19	2021/03/31	Provincial Roads Maintenance Grant	Transport Infrastructure	Individual project	334 000	191 000	80 000	63 000	-
69	C838.6 PRMG Caledon-Sandbaai	Design documentation	Overberg District	Other fixed structures	Paved Roads	2020/04/01	2021/03/31	Provincial Roads Maintenance Grant	Transport Infrastructure	Individual project	74 139	4 139	-	70 000	-
70	C914.2 PRMG Spier Road	Infrastructure planning	Stellenbosch Municipality	Other fixed structures	Paved Roads	2019/04/27	2022/03/31	Provincial Roads Maintenance Grant	Transport Infrastructure	Individual project	209 000	100 000	104 000	-	5 000
71	C1089 PRMG Worcester-Roberston	Infrastructure planning	Breede Valley Municipality	Other fixed structures	Resealing	2019/04/01	2020/03/31	Provincial Roads Maintenance Grant	Transport Infrastructure	Individual project	176 000	70 000	106 000	-	-
72	C1091 PRMG Ashton-Swellendam	Infrastructure planning	Swellendam Municipality	Other fixed structures	Resealing	2019/04/08	2020/03/31	Provincial Roads Maintenance Grant	Transport Infrastructure	Individual project	63 374	11 374	52 000	-	-
73	C1092 PRMG Somerset West-Stellenbosch	Infrastructure planning	Stellenbosch Municipality	Other fixed structures	Resealing	2019/04/15	2022/03/31	Provincial Roads Maintenance Grant	Transport Infrastructure	Individual project	84 153	2 153	-	80 000	2 000
74	C1088 PRMG Stanford-Riviersonderend reseal	Infrastructure planning	Theewaterskloof Municipality	Other fixed structures	Resealing	2019/04/01	2020/03/31	Provincial Roads Maintenance Grant	Transport Infrastructure	Individual project	84 000	26 000	58 000	-	-

Summary of details of expenditure for infrastructure by category - Programme 3 Transport Infrastructure															
No.	Project name	Project status	District /Local Municipality	Economic Classification	Type of infrastructure	Project duration		Source of funding	Budget programme name	Delivery Mechanism	Total project cost	Total Expenditure	Medium-term estimate		
						Date: Start Note 1	Date: Finish Note 2						2019/20	2020/21	2021/22
											R'000	R'000	R'000	R'000	R'000
75	C1082 PRMG Malmesbury-Hermon 24,76km reseal & rehabilitation	Infrastructure planning	Swartland Municipality	Other fixed structures	Resealing	2019/04/01	2020/03/31	Provincial Roads Maintenance Grant	Transport Infrastructure	Individual project	41 955	11 955	30 000	-	-
76	C1080 PRMG Stellenbosch reseal	Infrastructure planning	Stellenbosch Municipality	Other fixed structures	Resealing	2019/04/01	2020/03/31	Provincial Roads Maintenance Grant	Transport Infrastructure	Individual project	89 187	17 187	72 000	-	-
77	C1029 PRMG Hermon-Gouda reseal & rehabilitation	Design development	Drakenstein Municipality	Other fixed structures	Resealing	2020/05/15	2020/03/31	Provincial Roads Maintenance Grant	Transport Infrastructure	Individual project	83 510	27 510	56 000	-	-
78	C1100 PRMG Reseal Holgaten	Infrastructure planning	Garden Route district	Other fixed structures	Resealing	2020/04/01	2022/03/31	Provincial Roads Maintenance Grant	Transport Infrastructure	Individual project	144 898	33 898	-	108 000	3 000
79	C1102 PRMG Reseal Windmeul	Design development	Drakenstein Municipality	Other fixed structures	Resealing	2020/04/01	2022/03/31	Provincial Roads Maintenance Grant	Transport Infrastructure	Individual project	140 898	33 898	-	57 000	50 000
80	C1103 PRMG Reseal Grootriver and Bloukrans	Design development	Garden Route district	Other fixed structures	Resealing	2020/04/01	2022/03/31	Provincial Roads Maintenance Grant	Transport Infrastructure	Individual project	78 716	1 716	-	75 000	2 000
81	C1124 PRMG Reseal Herbertsdale Albertinia Gouritz Mond	Design development	Garden Route district	Other fixed structures	Resealing	2020/04/01	2022/03/31	Provincial Roads Maintenance Grant	Transport Infrastructure	Individual project	136 898	33 898	-	90 000	13 000
82	C1086 PRMG Calitzdorp-Oudtshoorn reseal	Infrastructure planning	Kannaland Municipality	Other fixed structures	Resealing	2018/04/01	2020/03/31	Provincial Roads Maintenance Grant	Transport Infrastructure	Individual project	43 211	31 211	12 000	-	-

Summary of details of expenditure for infrastructure by category - Programme 3 Transport Infrastructure															
No.	Project name	Project status	District /Local Municipality	Economic Classification	Type of infrastructure	Project duration		Source of funding	Budget programme name	Delivery Mechanism	Total project cost	Total Expenditure	Medium-term estimate		
						Date: Start Note 1	Date: Finish Note 2				R'000	R'000	2019/20 R'000	2020/21 R'000	2021/22 R'000
83	C1101 PRMG Reconstruct Waboomskraal - Holgaten	Infrastructure planning	George Municipality	Other fixed structures	Paved Roads	2021/04/01	2022/03/31	Provincial Roads Maintenance Grant	Transport Infrastructure	Individual project	93 898	33 898	-	-	60 000
84	C1105 PRMG Du Toit's Kloof Pass	Infrastructure planning	Cape Winelands District	Other fixed structures	Resealing	2021/04/01	2022/03/31	Provincial Roads Maintenance Grant	Transport Infrastructure	Individual project	53 851	851	-	-	53 000
85	C1115 PRMG Somerset West	Infrastructure planning	City of Cape Town	Other fixed structures	Resealing	2021/04/01	2022/03/31	Provincial Roads Maintenance Grant	Transport Infrastructure	Individual project	93 898	33 898	-	-	60 000
86	C1116 PRMG Ceres - Touwsrivier	Infrastructure planning	Witzenberg Municipality	Other fixed structures	Resealing	2021/04/01	2022/03/31	Provincial Roads Maintenance Grant	Transport Infrastructure	Individual project	118 898	33 898	-	-	85 000
87	C809 PRMG Klaarstroom - Beaufort	Close out	Prince Albert Municipality	Other fixed structures	Paved Roads	2005/11/16	2023/01/07	Provincial Roads Maintenance Grant	Transport Infrastructure	Individual project	226 404	2 404	-	75 000	149 000
88	"C1123 PRMG Reseal Beaufort West - Willowmore 38 km	Infrastructure planning	Beaufort West Municipality	Other fixed structures	Resealing	2018/04/01	2022/03/31	Provincial Roads Maintenance Grant	Transport Infrastructure	Individual project	83 898	33 898	-	-	50 000
89	C993.2 PRMG Holgaten-Oudtshoorn reseal	Infrastructure planning	George Municipality	Other fixed structures	Resealing	2017/09/15	2020/03/31	Provincial Roads Maintenance Grant	Transport Infrastructure	Individual project	66 000	30 000	36 000	-	-

Summary of details of expenditure for infrastructure by category - Programme 3 Transport Infrastructure															
No.	Project name	Project status	District /Local Municipality	Economic Classification	Type of infrastructure	Project duration		Source of funding	Budget programme name	Delivery Mechanism	Total project cost	Total Expenditure	Medium-term estimate		
						Date: Start Note 1	Date: Finish Note 2						2019/20	2020/21	2021/22
											R'000	R'000	R'000	R'000	R'000
90	C1104 PRMG Reseal of Meirings Poort	Procurement planning	Garden Route district	Other fixed structures	Resealing	2020/04/01	2022/03/31	Provincial Roads Maintenance Grant	Transport Infrastructure	Individual project	78 898	33 898	-	-	45 000
Sub-total: Provincial Roads Maintenance Grant											**3 616 254**	**1 097 160**	**872 000**	**788 798**	**858 296**
TOTAL: REHABILITATION, RENOVATIONS AND REFURBISHMENTS											**9 623 471**	**4 522 021**	**2 139 026**	**1 654 698**	**1 307 726**
4. MAINTENANCE AND REPAIRS															
Own Funds															
1	Maintenance Cape Town	Works	City of Cape Town		Paved Roads	2015/04/01	2022/03/31	Equitable share	Transport Infrastructure	Packaged program	338 882	619	105 461	113 499	119 303
2	Maintenance Cape Winelands	Works	Cape Winelands District		Paved Roads	2015/04/01	2022/03/31	Equitable share	Transport Infrastructure	Packaged program	292 327	619	90 115	98 428	103 165
3	Maintenance West Coast	Works	West Coast District		Paved Roads	2015/04/01	2022/03/31	Equitable share	Transport Infrastructure	Packaged program	102 015	1 542	30 996	33 926	35 551
4	Maintenance Eden	Works	Garden Route district		Paved Roads	2015/04/01	2022/03/31	Equitable share	Transport Infrastructure	Packaged program	222 453	619	68 525	74 849	78 460
5	Maintenance OB DM	Works	Overberg District		Routine Maintenance	2017/04/01	2022/03/31	Equitable share	Transport Infrastructure	Packaged program	124 673	3 943	37 500	40 500	42 730
6	Maintenance CW DM	Works	Cape Winelands District		Routine Maintenance	42826	44651	Equitable share	Transport Infrastructure	Packaged program	188 134	619	59 480	62 455	65 580
7	Maintenance WC DM	Works	West Coast District		Routine Maintenance	2017/04/01	2022/03/31	Equitable share	Transport Infrastructure	Packaged program	216 447	1 062	68 500	71 900	74 985
8	Maintenance ED DM	Works	Garden Route district		Routine Maintenance	2017/04/01	2022/03/31	Equitable share	Transport Infrastructure	Packaged program	287 624	619	89 150	96 280	101 575

Summary of details of expenditure for infrastructure by category - Programme 3 Transport Infrastructure															
No.	Project name	Project status	District /Local Municipality	Economic Classification	Type of infrastructure	Project duration		Source of funding	Budget programme name	Delivery Mechanism	Total project cost	Total Expenditure	Medium-term estimate		
						Date: Start Note 1	Date: Finish Note 2				R'000	R'000	2019/20 R'000	2020/21 R'000	2021/22 R'000
9	Maintenance CK DM	Works	Central Karoo District		Routine Maintenance	2017/04/01	2022/03/31	Equitable share	Transport Infrastructure	Packaged program	75 139	619	24 675	24 255	25 590
Sub-total: Own Funds											**1 847 694**	**10 261**	**574 402**	**616 092**	**646 939**
Provincial Roads Maintenance Grant															
10	Maintenance Cape Town PRMG	Works	City of Cape Town		Paved Roads	2015/04/01	2022/03/31	Provincial Roads Maintenance Grant	Transport Infrastructure	Packaged program	462 019	619	139 800	157 000	164 600
11	Data Collection for Asset Management (CUR)	Works	City of Cape Town		Routine Maintenance	2018/04/02	2022/03/31	Provincial Roads Maintenance Grant	Transport Infrastructure	Packaged program	41 892	7 403	14 251	9 850	10 388
Sub-total: Provincial Roads Maintenance Grant											**503 911**	**8 022**	**154 051**	**166 850**	**174 988**
TOTAL: MAINTENANCE AND REPAIRS											**2 351 605**	**18 283**	**728 453**	**782 942**	**821 927**
5. INFRASTRUCTURE TRANSFERS – CURRENT															
Own Funds															
1	Financial assistance to municipalities for maintenance of Transport Infrastructure (CUR)	Works	Across districts		Paved Roads	2015/04/01	2022/03/31	Equitable share	Transport Infrastructure	Packaged program	11 919	419	3 500	4 000	4 000
TOTAL: INFRASTRUCTURE TRANSFERS - CURRENT											**11 919**	**419**	**3 500**	**4 000**	**4 000**
6. INFRASTRUCTURE TRANSFERS – CAPITAL															
Own Funds															
1	Financial assistance to municipalities for construction of Transport Infrastructure (CAP)	Infrastructure planning	Across districts		Paved Road	2015/04/01	2022/03/31	Equitable share	Transport Infrastructure	Packaged program	307 728	96 818	37 410	90 500	83 000

Summary of details of expenditure for infrastructure by category - Programme 3 Transport Infrastructure															
No.	Project name	Project status	District /Local Municipality	Economic Classification	Type of infrastructure	Project duration		Source of funding	Budget programme name	Delivery Mechanism	Total project cost	Total Expenditure	Medium-term estimate		
						Date: Start Note 1	Date: Finish Note 2						2019/20	2020/21	2021/22
											R'000	R'000	R'000	R'000	R'000
TOTAL: INFRASTRUCTURE TRANSFERS - CAPITAL											307 728	96 818	37 410	90 500	83 000
TOTAL: INFRASTRUCTURE TRANSFERS											319 647	97 237	40 910	94 500	87 000
TOTAL INFRASTRUCTURE											16475045	6 283 056	3 365 195	3 321 886	3 504 908

Note 1 Site handover/commencement of construction - DATE OF LETTER OF ACCEPTANCE.

Note 2 Construction completion date (take over date) - PRACTICAL COMPLETION DATE.

Appendix K – Job creation estimates

The job creation estimates are for the Maintenance Programme. The beneficiaries are not unknown.

No.	Project Name	Project Reference Number	Project Date		Total Project Budget	Project Work Opportunity	Projected FTE	Project Output Description (No. of kms, of household units, square km, metres etc.)
			Start	End				
1	C0733.07: New Pedestrian Bridge No. 6030 at De Beers Ave (42.1km) over TR2/1	651829	2019/04/28	2020/07/30	12 000	53	28	Road safety project by constructing new pedestrian bridge no. 6030 at De Beers Avenue, over Trunk road 2 section 1 at km42.1.
2	C0749.02: Upgrade MR191 - Paarl/Franschhoek	22412	2020/01/14	2022/07/25	10 000	23	11	The upgrade of 10km of MR191 between Paarl and Franschhoek.
3	C0751.02: Rehab TR23/3 Gouda - Kleinbergrivier Bridge km 0.12 - km 12.5	22441	2017/07/28	2019/05/29	26 000	161	26	The rehabilitation of 13km of TR23/3 between Gouda and Saron
4	C0818: Rehab TR31/2 - Ashton/Montagu	113551	2015/08/06	2021/02/01	185 000	42	27	The rehabilitation of TR31/2 between Ashton and Montagu.
5	C0822: Rehab MR344 & DR1578 - Glentana	114520	2018/01/15	2020/04/13	90 000	344	118	The rehabilitation of MR344 from Hartenbos (km 1.71) to Groot Brak (km14.84) and a portion of DR1578
6	C0823.01: Rehab MR352 & MR355 & Reseal MR355 - Wilderness to Hoogekraal	143987	2017/11/28	2019/05/19	8 000	155	27	The rehabilitation of MR352 and MR355 near George. Reseal & drainage improvements of MR355 km 2.0 - km 10.50. Roundabout on MR352
7	C0914.02: Rehabilitation of MR168 between N2 and Vlaeberg Road	293866	2018/04/12	2020/04/29	104 000	155	101	Rehabilitation and improvements to MR168 between MR159 and MR177 in the Stellenbosch Area
8	C0918R: Rehab TR33/3 - Oudtshoorn/De Rust	651788	2018/06/15	2020/02/15	80 000	251	218	Continuation of traffic accommodation on TR33/3 between Oudtshoorn and De Rust.
9	C0921: Rehab DR1050 - Annandale Road	293844	2016/11/11	2019/05/23	2 000	57	23	Rehabilitation of DR1050, from Annandale Road (km0.00) at MR168 in Lynedoch to Groene Rivier (km7.34) in the Stellenbosch area.
10	C0965.03: N2 Streetlighting Maintenance	597011	2015/05/01	2019/04/30	12 000	15	10	Streetlighting Maintenance & various installations on TR2/1, TR2/2, TR54/1
11	C0965.04: N1 Streetlighting Maintenance on TR00901	603321	2015/11/01	2019/10/31	7 000	8	5	Maintenance of street lighting on the N1 between the Koeberg interchange and the Old Oak Interchange

No.	Project Name	Project Reference Number	Project Date		Total Project Budget	Project Work Opportunity	Projected FTE	Project Output Description (No. of kms, of household units, square km, metres etc.)
			Start	End				
12	C0975.01: Extension of TR85/1 from TR77/1 to TR21/2 (Greenfields link)	613068	2017/12/01	2019/10/31	118 000	150	98	Extend TR08501 from TR77/1 to TR21/1 Greenfields Link (between TR77/1 and Langebaan Airforce Base)
13	C0993.02: Reseal of TR75/01 between Holgaten & Oudtshoorn from km 0.0 to km 16.50	564956	2018/11/15	2019/11/18	36 000	98	50	Reseal of TR75/01 between Holgaten & Oudtshoorn from km 0.0 to km 16.50
14	C1000.01: Rehab TR02802 between Hermanus & Stanford	494471	2019/02/07	2021/07/26	150 000	175	113,75	Rehabilitation of TR02802 between Hermanus and Stanford.
15	C1008.01: Rehab of DR01688 from Calitzdorp to Spa & Upgrade DR01699	561209	2019/01/28	2020/04/08	75 000	69	45	Rehabilitation of DR01688 from Calitzdorp to the Catitzdorp Spa turn-off and Upgrade of DR01699.
16	C1009: Rehab DR01111 km 12.31 to km 23.5 from Philadelphia to Malmesbury	494561	2019/01/08	2020/09/07	40 000	91	72	Rehabilitation of DR01111 Abbotsdale to Van Schoorsdrift.
17	C1025.02: Periodic Maintenance of TR9/1, TR54/1 and MR176	651808	2019/02/28	2019/08/15	33 000	153	78	Periodic maintenance of NACA, airport approach road and Borcherds Quarry Road. Resurfacing of roads and maintenance of auxiliaries.
18	C1029: Reseal of TR23/02 from km 0.00 - 17.63 between Hermon and Gouda	551063	2018/10/15	2020/02/15	56 000	105	63	Reseal of TR02302 from km 0.00 to km 17.63 between Hermon and Gouda. Reseal of TR02303 from km 0.00 to km 0.12.
19	C1036: Rehabilitation of MR240 between Vredenburg and Paternoster	550952	2019/01/10	2020/01/19	75 000	215	142	Rehabilitation of MR00240 from km2.40 to km6.0 & km13.0 to km14.92 between Vredenburg and Paternoster. Reseal of MR00240 from km6.0 to km13.0.
20	C1039: Constructing I/C on the Borcherds Quarry Road & extend 3rd lane on TR2/1 to NR0201	549105	2019/12/10	2021/12/21	15 000	56	29	Construct new I/C on re-aligned B. Quarry Road and extend 3rd lane from west of the Borcherds Quarry I/C to the NR201 and rehab/reseal/overlay existing.
21	C1046: Extend the 3rd Lane on TR09/1 west of Durban Road I/C to the NR0101	548877	2016/02/19	2019/06/15	25 000	92	60	Extend the 3rd lane from West of the Durbanville I/C to the NR0101 and reseal/overlay existing.
22	C1047.02: The widening of Bridge No. 2221 over the Maalgate River at 15.1km on TR2/9	651832	2019/07/25	2021/01/26	2 000	19	10	Road safety improvement project by widening existing bridge No. 2221 over the Maalgate River at 15.1km on Trunk Road 2 Section 9.

No.	Project Name	Project Reference Number	Project Date		Total Project Budget	Project Work Opportunity	Projected FTE	Project Output Description (No. of kms, of household units, square km, metres etc.)
			Start	End				
23	C1053.06: Flood Damage Repairs on MR309 in Seweweekspoort - Central Karoo/Lainsburg - (Hatch)	631696	2019/01/28	2020/11/14	21 000	50	33	Flood Damage repairs to structures on MR309 in Seweweekspoort - Central Karoo/Laingsberg
24	C1057.06: Vegetation Management on Roads in the Cape Winelands East Area	635590	2017/10/23	2020/10/22	3 500	70	23	Vegetation Management on Roads in the Cape Winelands East Area
25	C1057.07:Vegetation Management on Roads in the Cape Winelands West Area	635600	2017/10/23	2020/10/22	2 700	115	16	Vegetation Management on Roads in the Cape Winelands East Area
26	C1057.09: Vegetation Management on Roads in the Eden DM Area	645583	2017/11/14	2020/10/23	2 800	99	17	Vegetation control along 2103km of surfaced roads in the Eden DM area, as a replacement contract for RMT322.
27	C1057.13: Routine Road Maintenance on TR33/1, TR33/2, MR358, DR1671 and DR1680 between Oudtshoorn and Mossel Bay	643009	2017/05/22	2020/05/02	4 700	45	38	Routine Road Maintenance on TR33/1, TR33/2, MR358, DR1671 and DR1680 between Oudtshoorn and Mossel Bay
28	C1057.14: Routine Road Maintenance on TR34/1, TR34/2 and MR582 from Merweville to Klaarstroom	643012	2017/05/22	2020/05/02	4 800	53	28	Routine Road Maintenance on TR34/1, TR34/2 and MR582 from Merweville to Klaarstroom
29	C1057.16: Vegetation Management on Roads in the Overberg Area	636791	2018/08/01	2020/11/28	2 700	48	26	Vegetation Management on Roads in the Overberg Area
30	C1057.17: Vegetation Management on Roads in the Central Karoo DM Area	645586	2018/09/24	2020/12/14	2 000	15	10	Vegetation control along 3094km of surfaced roads in the Central Karoo DM area, as a replacement contract for RMT323.
31	C1080: Periodic Maintenance on DR1064, DR1065, DR1067, DR1069, DR1053 - Stellenbosch Area	637569	2018/11/20	2020/02/21	72 000	142	92	The reseal of DR01064, km 1.72 to km 5.85, DR01067 km 0.00 to km 0.90, DR01067 km 0.00 to km 5.76. Reseal and Geometric Improvements on DR1069 km 0.84 to km 5.76. Stellenbosch Area.
32	C1082: Periodic Maintenance on TR24/1 - Malmesbury to Hermon	638402	2018/11/22	2019/11/15	30 000	135	54	The reseal of TR02401 from km 0.00 to km 24.76 - Malmesbury to Hermon.
33	C1083: Periodic Maintenance on TR88/1 - De Rust to Uniondale	637731	2018/08/06	2019/03/18	1 000	152	1	The reseal of TR08801 from km 0.00 to km 22.00 - De Rust to Uniondale.
34	C1085: Periodic Maintenance on TR35/1 - Beaufort West to Aberdeen	637713	2018/09/04	2019/04/22	7 000	63	3	The reseal of TR03501 from km 58.00 to km 74.22 - Beaufort West to Aberdeen. Pull-off bay for Policing

No.	Project Name	Project Reference Number	Project Date		Total Project Budget	Project Work Opportunity	Projected FTE	Project Output Description (No. of kms, of household units, square km, metres etc.)
			Start	End				
35	C1086: Periodic Maintenance on TR31/6 - Calitzdorp to Oudtshoorn	637821	2018/08/22	2019/04/17	12 000	149	18	The reseal of TR03106 from km 23.20 to km 47.80 - Calitzdorp to Oudtshoorn.
36	C1088: Periodic Maintenance on MR267 - Stanford to Riviersonderend	637605	2019/04/08	2020/06/08	58 000	120	78	The reseal of MR00267 from km 0.00 to km 31.80 - Stanford to Riviersonderend.
37	C1089: Periodic Maintenance on TR31/1, TR31/2 and MR287 - Worcester to Ashton and Robertson to Bonnievale	637641	2018/10/17	2020/01/28	106 000	196	155	The reseal of TR031/01 (km13.58 to km45.02), TR31/02 (km1.46 to km15.68) and km1.90 to km2.16 (LHS & RHS) Worcester to Ashton. Climbing lanes to be added on TR31/01 between km 13.58 and km 45.02. Reseal of MR287 (km2.69 to km14.50) - Robertson to Bonnievale.
38	C1090.01: The periodic maintenance of TR11/1 (Route N7) between Bosmansdam (km 2.00) and Potsdam (km 9.50)	652771	2019/02/14	2021/04/09	115 000	12	8	The periodic maintenance of TR11/1 (Route N7) between Bosmansdam (km 2.00) and Potsdam (km 9.50)
39	C1090: Periodic Maintenance on TR11/1 - Wingfield i/c to Melkbos	638022	2019/01/28	2020/07/13	100 000	132	94	The reseal of TR01101 km 2.00 to km 18.00 - Wingfield i/c to Melkbos. Rehabilitation of TR01101 from km 2.00 to km 18.00 - Wingfield to Melkbos.
40	C1091: Periodic Maintenance on TR32/1 - Ashton to Swellendam and MR288 - Jan Harmansgat to Bonnievale	637767	2018/11/22	2020/03/20	52 000	192	69	The reseal of TR03201 from km 0.00 to km 31.20 - Ashton to Swellendam. The reseal and rehabilitation of MR00288 from km 0.00 to km 6.00 - Jan Harmansgat to Bonnievale.
41	C1092: Periodic Maintenance on MR27 - Somerset West to Stellenbosch	638498	2019/12/03	2020/10/27	18 000	44	22	Still no feedback from design office regarding email 31/08/2018 (Joey Note) v0.49: Booysen, Brandon 2018-09-26 07:54:32.000000 The reseal of MR00027 from km 18.26 to km 31.20 (LHS & RHS) - Somerset West to Stellenbosch.
42	C1093: Periodic Maintenance on TR30/1 - Langhoogte to Villiersdorp	638466	2018/10/26	2019/07/11	20 000	79	35	The reseal of TR03001 from km 0.00 to km 22.43 - Langhoogte to Villiersdorp.

No.	Project Name	Project Reference Number	Project Date		Total Project Budget	Project Work Opportunity	Projected FTE	Project Output Description (No. of kms, of household units, square km, metres etc.)
			Start	End				
43	C1094: Rehabilitation of MR531 km 76.0 to km 92.6 Elandsbaai and Periodic Maintenance of MR540 km 0.0 to km 12.4 Leipoldtville	638450	2019/01/09	2020/07/08	55 000	166	58	The reseal of MR00531 from km 76.00 to km 88.40 and km 92.55 to km 95.84. Rehabilitation of MR00531 from km 88.40 to km 92.55 - Piketberg to Elandsbay. The reseal of MR00540 from km 0.00 to km 12.40 - Bonteheuwel to Leipoldtville.
44	C1097: Periodic Maintenance on MR535 - Laaiplek to Elandsbaai	638482	2019/02/19	2020/10/19	100 000	263	144	The reseal of MR00535 from km 49.50 to km 56.82 and km 56.82 to km 65.37. The rehabilitation of MR00535 from km 24.00 to km 49.50 - Laaiplek to Elandsbaai.
45	C1098: Periodic Maintenance on MR174 - Malmesbury to Muishondrivier	637929	2018/09/11	2019/07/14	10 000	161	17	The reseal of MR00174 from km 3.82 to km 17.64. Malmesbury to Stellenbosch.
46	C1100: Periodic Maintenance on TR1/2, TR1/3, TR88/1, TR44/1 and MR401 - Uniondale Area	650628	2019/07/30	2021/08/05	52 000	85	44	The reseal of MR00401 km 0.0 to km 12.90. Reseal of TR00102 from km 40.0 to km 85.04. Reseal of TR00103 from km 0.0 to km 16.60. Reseal of TR04401 from km 0.0 to km 14.0. Reseal of TR08801 from km 60.34 to km 70.2.
47	C1103: Periodic Maintenance on TR2/12 km 14.14 to km 37.25 from Kurland to Eastern Cape Border (Bloukrans Pass)	650824	2020/01/07	2020/11/09	10 000	20	10	The reseal of TR00212 from km 14.14 to km 37.25 between Kurland and Eastern Cape Border (Bloukrans Pass).
48	C1106: Routine Road Maintenance in the Paarl DRE Area	635594	2017/02/23	2021/02/24	37 000	156	101	Routine Road Maintenance in the Paarl DRE Area
49	C1114.01: Routine Road Maintenance on Roads in the Porterville West Area	650004	2018/06/18	2021/05/14	4 300	31	20	Routine Road Maintenance on Roads in the Porterville West Area.
50	C1114.02: Routine Road Maintenance on Roads in the Yzerfontein North Area	650022	2018/06/07	2021/05/17	6 200	56	36	Routine Road Maintenance on Roads in the Yzerfontein North Area
51	C1114.03: Routine Road Maintenance on Roads in the Vredendal Area	650034	2018/06/29	2021/05/17	3 700	30	20	Routine Road Maintenance on Roads in the Vredendal Area
52	C1114.04: Routine Road Maintenance on Roads in the Yzerfontein South Area	650016	2018/06/18	2021/05/15	3 100	20	13	Routine Road Maintenance on Roads in the Yzerfontein South Area
53	C1114.05: Routine Road Maintenance on Roads in the Porterville East Area	650040	2018/06/18	2021/05/14	4 300	29	19	Routine Road Maintenance on Roads in the Porterville East Area

No.	Project Name	Project Reference Number	Project Date		Total Project Budget	Project Work Opportunity	Projected FTE	Project Output Description (No. of kms, of household units, square km, metres etc.)
			Start	End				
54	C1114.06: Routine Road Maintenance on Roads in the Malmesbury North Area	650010	2018/05/18	2021/05/17	2 500	30	20	Routine Road Maintenance on Roads in the Malmesbury North Area
55	C1114.07: Routine Road Maintenance on Roads in the Elands Bay Area	650046	2018/06/18	2021/05/14	5 500	47	31	Routine Road Maintenance on Roads in the Elands Bay Area.
56	C1114.08: Routine Road Maintenance on Roads in the Malmesbury South Area	650028	2018/05/18	2021/05/17	4 300	26	17	Routine Road Maintenance on Roads in the Malmesbury South Area
57	C1114.09: Routine Road Maintenance on Roads in the Cape Winelands North Area	652188	2019/02/01	2022/01/31	5 100	18	12	Routine Road Maintenance on Roads in the Cape Winelands North Area
58	C1114.10: Routine Road Maintenance on Roads in the Cape Winelands South Area	652200	2019/02/01	2022/01/31	3 400	56	30	Routine Road Maintenance on Roads in the Cape Winelands South Area
59	C1114.11: Routine Road Maintenance on Roads in the Cape Winelands West Area	652194	2019/02/01	2022/01/31	3 700	32	18	Routine Road Maintenance on Roads in the Cape Winelands West Area
60	C1114.12: Routine Road Maintenance on Roads in the Overberg Area	652206	2019/02/01	2022/01/31	4 000	37	28	Routine Road Maintenance on Roads in the Overberg Area
61	C1114.18: Routine Road Maintenance on TR16/08, TR16/09, TR16/10 and MR606 near Murraysberg	652212	2019/05/01	2022/03/01	3 000	42	21	Routine Road Maintenance on TR16/08, TR16/09, TR16/10 and MR606 near Murraysberg
62	C1114.19: Routine Road Maintenance on TR33/4 and DR1723 including cleaning and maintenance of rest areas in Meiringspoort	652218	2019/05/01	2022/04/28	6 200	59	31	Routine Road Maintenance on TR33/4 and DR1723 including cleaning and maintenance of rest areas in Meiringspoort.
63	C1124: Periodic Maintenance on MR334, MR337 and DR1525 - Herbertsdale/Gouritsmond Area	651016	2019/11/12	2021/05/18	6 000	25	13	The reseal of MR00334 from km 0.0 to km 26.49, MR00337 from km 0.6 to km 15.65 & km 33.31 to 48.95, Reseal of DR01525 from km 20.0 to km 24.28. – Herbertsdale /Gouritsmond area.
TOTALS					**2 125 500**	**5 787**	**2 878**	

Appendix L – Contractor development training

Status for the entries is off-site.

Contractor	Contractor CIDB	Subcontractor Name	CIDB Grading	SITE	Equity Indicator	Description of Service	C Group	Tender Amount (Rands)	Training Provided to Employees	Estimated Contract Amount (Rands)	Total Payments (Rands)
Actophambili Roads	9CE	Nikkiys Cartage (Pty) Ltd	1CE PE	Eden: Mossel Bay Local Municipality: MR00342;	Black Owned	Concrete Works	Subcontractor	44 572 273,58	(blank)	8 000 000,00	328 271,69
		Sithemba Construction (Pty) Ltd	2CE	Eden: Mossel Bay Local Municipality: MR00342;	Women Owned	Patching, Slurry Ect.	Subcontractor	44 572 273,58	(blank)	8 000 000,00	1 246 858,18
		Pdi-Industrial Services Cc T/A Vibrant Construction	6CE PE	Eden: Mossel Bay Local Municipality: MR00342;	Women Owned	Traffic Accommodati on	Subcontractor	44 572 273,58	Traffic accommodatio n; Concrete steel-fixing;	5 600 000,00	2 491 505,44
	8CE	Kleinhans Construction Pty Ltd	1CE	Cape Winelands: Witzenberg Local Municipality: TR02201;	Black Owned	Traffic Control	Subcontractor	20 077 000,00	(blank)	1 277 400,00	3 832 200,00
		Kc Traffic Services	1CE PE	Eden: Oudtshoorn Local Municipality: TR03106;	Women Owned	Traffic Control	Subcontractor	42 545 977,48	(blank)	2 448 000,00	3 063 400,00
		Hei Way	1CE	Cape Winelands: Witzenberg Local Municipality: TR02201;	Black Owned	Guardrails	Subcontractor	20 077 000,00	(blank)	497 402,58	1 492 207,74
		Wiltun Construction	1CE	Cape Winelands: Witzenberg Local Municipality: TR02201;	Black Owned	Ancillary Works	Subcontractor	20 077 000,00	(blank)	395 176,42	1 185 529,26
		Kearahn Enterprise	1CE	Eden: Oudtshoorn Local Municipality: TR03106;	Black Owned	Ancillary Works	Subcontractor	42 545 977,48	(blank)	50 000,00	44 400,00
		Njikelela Construction	2CE	Eden: Oudtshoorn Local Municipality: TR03106;	Women Owned	Ancillary Works	Subcontractor	42 545 977,48	(blank)	50 000,00	40 020,00
		Bridgton Garage	N/A	Eden: Oudtshoorn Local Municipality: TR03106;	Women Owned	Diesel Supplier	Subcontractor	42 545 977,48	(blank)	500 000,00	491 450,04
		Cango Cargo	N/A	Eden: Oudtshoorn Local Municipality: TR03106;	Black Owned	Transport Asphalt	Subcontractor	42 545 977,48	(blank)	350 000,00	266 094,50

Contractor	Contractor CIDB	Subcontractor Name	CIDB Grading	SITE	Equity Indicator	Description of Service	C Group	Tender Amount (Rands)	Training Provided to Employees	Estimated Contract Amount (Rands)	Total Payments (Rands)
		Enkosi Kakhulu Trading	1CE	Eden: Oudtshoorn Local Municipality: TR03106;	Women Owned	Ancillary Works	Subcontractor	42 545 977,48	(blank)	50 000,00	34 660,00
		Jc Fredericks	1GB PE	Eden: Oudtshoorn Local Municipality: TR03106;	Black Owned	Shoulder Reconstruction And Ancillary Works	Subcontractor	42 545 977,48	(blank)	11 000 000,00	5 662 301,92
		Nichela Construction	1CE	Eden: Oudtshoorn Local Municipality: TR03106;	Women Owned	Ancillary Works	Subcontractor	42 545 977,48	(blank)	50 000,00	35 480,00
		Pnb Civils	2CE PE	Eden: Oudtshoorn Local Municipality: TR03106;	Black Owned	Transport Asphalt	Subcontractor	42 545 977,48	(blank)	1 500 000,00	2 218 802,84
		Swartberg Plant Hire	N/A	Eden: Oudtshoorn Local Municipality: TR03106;	Black Owned	Plant Hire	Subcontractor	42 545 977,48	(blank)	150 000,00	191 675,00
		Tjeka Training Matters	N/A	Eden: Oudtshoorn Local Municipality: TR03106;	Black Owned	Training	Subcontractor	42 545 977,48	(blank)	200 000,00	45 960,00
		Khans Transport	N/A	Cape Winelands: Witzenberg Local Municipality: TR02201;	Black Owned	Asphalt Supply/ Transport	Materials Supplier	20 077 000,00	(blank)	3 037 890,18	9 113 670,54
		Umasa Roadmarkings	1CE	Cape Winelands: Witzenberg Local Municipality: TR02201;	Black Owned	Roadmarkings	Subcontractor	20 077 000,00	(blank)	209 266,83	627 800,49
Actophambili Roads Total										**43 365 136,01**	**32 412 287,64**
Amandla GCF JV Umzali Civil	9CE	Applied Paving Systems	N/A	Overberg: Theewaterskloof Local Municipality: MR00279; MR00191; MR00277;	Black Owned	Asphalt Surfacing	Subcontractor	104 166 361,43	(blank)	1 599 987,54	9 432 766,26
		Ikapa Quarries	N/A	Overberg: Theewaterskloof Local Municipality: MR00279; MR00191; MR00277;	Black Owned	Supplier And Transport Materials	Materials Supplier	104 166 361,43	(blank)	21 535 439,40	18 916 643,94
		Western Cape Signs Cc	3SK PE	Overberg: Theewaterskloof Local Municipality: MR00279; MR00191; MR00277;	Black Owned	Road Markings Adn All Signage	Subcontractor	104 166 361,43	(blank)	278 800,00	778 434,00

Contractor	Contractor CIDB	Subcontractor Name	CIDB Grading	SITE	Equity Indicator	Description of Service	C Group	Tender Amount (Rands)	Training Provided to Employees	Estimated Contract Amount (Rands)	Total Payments (Rands)
		Silver Solutions 3392 Cc	4CE	Overberg: Theewaterskloof Local Municipality: MR00279; MR00191; MR00277;	Black Owned	Traffic Management	Subcontractor	104 166 361,43	First Aid Training; Flagman Stop/Go training; Fire Fighting;	14 298 188,74	9 439 354,20
		Chba Construction	N/A	Overberg: Theewaterskloof Local Municipality: MR00279; MR00191; MR00277;	Women Owned	Site Cleaning	Subcontractor	104 166 361,43	(blank)	782 406,10	294 774,15
		Cleophas Construction	3CE PE	Overberg: Theewaterskloof Local Municipality: MR00279; MR00191; MR00277;	Black Owned	Guardrails And Gabions	Subcontractor	104 166 361,43	(blank)	588 229,96	481 087,11
	8CE	Advanced Paving Systems	4CE	Cape Winelands: Stellenbosch Local Municipality: MR00027;	Black Owned	Asphalt Works	Subcontractor	81 000 000,00	(blank)	5 000 000,00	2 843 771,28
		Du Toit Bouers	1GB	Eden: Hessequa Local Municipality: DR01283; DR01328; DR01593; OP04540; OP06402; OP06082; DR01316;	Women Owned	Labour Broker And Construction Services	Subcontractor	18 517 142,95	Concrete handling, placing and finishing; First Aid Training; Shuttering; Install gabions on a construction site; Traffic accommodation;	2 200 000,00	972 638,31
		Du Toit Bouers							First Aid Training; Concrete handling, placing and finishing; Shuttering; Install gabions on a construction site; Traffic accommodation;	2 200 000,00	3 207 334,75

Contractor	Contractor CIDB	Subcontractor Name	CIDB Grading	SITE	Equity Indicator	Description of Service	C Group	Tender Amount (Rands)	Training Provided to Employees	Estimated Contract Amount (Rands)	Total Payments (Rands)
		Ikapa Quarries	N/A	Cape Winelands: Stellenbosch Local Municipality: MR00027;	Black Owned	Road Stone	Materials Supplier	81 000 000,00	(blank)	2 600 000,00	4 362 422,76
		S R Civil Contractors (Pty) Ltd	4CE PE	Cape Winelands: Stellenbosch Local Municipality: MR00027;	Women Owned	Concrete Works	Subcontractor	81 000 000,00	(blank)	4 665 060,60	8 740 147,95
		Western Cape Signs Cc	3SK PE	Cape Winelands: Stellenbosch Local Municipality: MR00027;	Black Owned	Road Signs	Materials Supplier	81 000 000,00	(blank)	700 000,00	2 590 620,21
		Gdebe Security Solutions	N/A	Eden: Hessequa Local Municipality: DR01283; DR01328; DR01593; OP04540; OP06402; OP06082; DR01316;	Black Owned	Security	Subcontractor	18 517 142,95	(blank)	120 000,00	42 873,20
		Graig Geldenhuys	N/A	Eden: Hessequa Local Municipality: DR01283; DR01328; DR01593; OP04540; OP06402; OP06082; DR01316;	Black Owned	Gabion Contractor	Subcontractor	18 517 142,95	(blank)	100 000,00	77 885,11
		Heidelberg Verenigende Gereformeerde Kerk	N/A	Eden: Hessequa Local Municipality: DR01283; DR01328; DR01593; OP04540; OP06402; OP06082; DR01316;	Black Owned	Accommodation And Land Rental	Other Procurement	18 517 142,95	(blank)	85 000,00	6 500,00
		Lourens Roadmarking Cc	6SK	Cape Winelands: Stellenbosch Local Municipality: MR00027;	Black Owned	Road Marking	Subcontractor	81 000 000,00	(blank)	2 500 000,00	639 857,70
		Tip Trans Logistix	N/A	Cape Winelands: Stellenbosch Local Municipality: MR00027;	Black Owned	Transportr Materials	Subcontractor	81 000 000,00	(blank)	1 600 000,00	2 313 436,20
		Cleophas Construction	3CE	Cape Winelands: Stellenbosch Local Municipality: MR00027;	Black Owned	Guardrail Works	Subcontractor	81 000 000,00	Concrete handling, placing and finishing;	3 255 779,00	6 331 934,73
		Amandla Asphalt / Zelpy	6CE PE	Cape Winelands: Stellenbosch Local Municipality: MR00027;	Black Owned	Asphaly Works	Subcontractor	81 000 000,00	(blank)	5 000 000,00	3 652 840,14
Amandla GCF JV Umzali Civil Total										**69 108 891,34**	**75 125 322,00**

Contractor	Contractor CIDB	Subcontractor Name	CIDB Grading	SITE	Equity Indicator	Description of Service	C Group	Tender Amount (Rands)	Training Provided to Employees	Estimated Contract Amount (Rands)	Total Payments (Rands)
Baseline Civil Contractors	9CE	Britlow Construction	4CE	West Coast: Swartland Local Municipality: DR01111;	Black Owned	Construction Of Stormwater Structures	Subcontractor	104 711 830,85	(blank)	12 549 994,38	7 986 118,08
		Britlow Construction	4CE PE	Cape Winelands: Stellenbosch Local Municipality: DR01050;	Black Owned	Concrete Side Drains	Subcontractor	122 242 981,50	(blank)	3 043 245,00	2 911 157,02
		Imvusa Trading	4CE	Cape Winelands: Witzenberg Local Municipality: TR02303;	Women Owned	Concrete Lined Drains	Subcontractor	190 701 636,57	(blank)	6 429 247,50	7 092 214,40
		Johnny'S Landbou Kontrakteurs	N/A	West Coast: Swartland Local Municipality: DR01111;	Black Owned	Fencing	Subcontractor	104 711 830,85	Traffic accommodatio n;	2 200 000,00	1 036 957,95
		Kleinhans Construction Pty Ltd	4CE	Cape Winelands: Stellenbosch Local Municipality: DR01050;	Women Owned	Traffic Accommodati on	Subcontractor	122 242 981,50	Flagman Stop/Go training;	64 800 000,00	25 325 633,64
		Kleinhans Construction Pty Ltd		West Coast: Swartland Local Municipality: DR01111;	Black Owned	Traffic Control	Subcontractor	104 711 830,85	Flagman Stop/Go training; Occupational health and safety training; Traffic accommodatio n;	10 800 000,00	30 113 703,36
		Kolossie General Trading Cc	4CE PE	Cape Winelands: Witzenberg Local Municipality: TR02303;	Women Owned	Fencing	Subcontractor	190 701 636,57	(blank)	1 001 917,50	952 836,70
		Qjm2 Construction (Pty) Ltd	4CE	Cape Winelands: Stellenbosch Local Municipality: DR01050;	Black Owned	Concrete Lined Site Drains	Subcontractor	122 242 981,50	(blank)	2 819 232,70	1 721 871,02
		Siyabonwa Resources	2CE PE	Cape Winelands: Witzenberg Local Municipality: TR02303;	Women Owned	Material Supplier	Materials Supplier	190 701 636,57	(blank)	31 800 000,00	32 175 675,08
		Simandie Civils	4CE PE	West Coast: Swartland Local Municipality: DR01111;	Women Owned	Roadworks	Subcontractor	104 711 830,85	(blank)	4 341 548,64	3 461 748,06

Contractor	Contractor CIDB	Subcontractor Name	CIDB Grading	SITE	Equity Indicator	Description of Service	C Group	Tender Amount (Rands)	Training Provided to Employees	Estimated Contract Amount (Rands)	Total Payments (Rands)
		Ludify Suppliers	1CE PE	West Coast: Swartland Local Municipality: DR01111;	Black Owned	Labour Only - Sidewalk	Subcontractor	104 711 830,85	(blank)	560 000,00	713 739,63
		Kfa Security	N/A	Cape Winelands: Witzenberg Local Municipality: TR02303;	Women Owned	Security	Subcontractor	190 701 636,57	(blank)	1 200 000,00	1 237 120,00
		Pila Khyiya Trading	N/A	Cape Winelands: Witzenberg Local Municipality: TR02303;	Women Owned	Office Setup	Subcontractor	190 701 636,57	(blank)	160 000,00	151 507,00
		Jrk Civil Services	N/A	Cape Winelands: Witzenberg Local Municipality: TR02303;	Women Owned	Concrete Head And Wingwalls	Subcontractor	190 701 636,57	(blank)	250 000,00	286 543,74
		Thompson Khusela	4CE PE	Cape Winelands: Witzenberg Local Municipality: TR02303;	Women Owned	Traffic Control	Subcontractor	190 701 636,57	Flagman Stop/Go training; Radio Control; Traffic accommodatio n;	26 000 000,00	23 796 509,44
		Funda Civils Cc	4CE PE	Cape Winelands: Stellenbosch Local Municipality: DR01050;	Black Owned	Storm Water Structures	Subcontractor	122 242 981,50	(blank)	3 157 953,90	3 573 948,18
		Zimele Plant Hire	1CE PE	Cape Winelands: Stellenbosch Local Municipality: DR01050;	Black Owned	Side Walk & Kerbs	Subcontractor	122 242 981,50	(blank)	5 286 682,72	9 487 603,88
Baseline Civil Contractors Total										**176 399 822,34**	**152 024 887,18**
Civils 2000	9CE	Ikapa Quarries	N/A	Cape Metro: Helderberg Administration: TR00202;	Women Owned	G5 & G2	Materials Supplier	14 633 217,27	(blank)	666 757,87	2 921 823,00
		Jkt Rocks (Pty) Ltd	N/A	Cape Metro: Helderberg Administration: TR00202;	Black Owned	Earthworks	Subcontractor	14 633 217,27	(blank)	1 268 905,06	3 042 044,64

Contractor	Contractor CIDB	Subcontractor Name	CIDB Grading	SITE	Equity Indicator	Description of Service	C Group	Tender Amount (Rands)	Training Provided to Employees	Estimated Contract Amount (Rands)	Total Payments (Rands)
		Masingdanga	N/A	Cape Metro: Helderberg Administration: TR00202;	Black Owned	Concrete	Subcontractor	14 633 217,27	(blank)	171 982,00	327 804,66
		Western Cape Signs Cc	3SK PE	Cape Metro: Helderberg Administration: TR00202;	Women Owned	Signage	Materials Supplier	14 633 217,27	(blank)	86 273,07	325 503,45
Civils 2000 Total										**2 193 918,00**	**6 617 175,75**
Entsha Henra CC	8CE	Kc Traffic Services	1CE	Eden: George Local Municipality: MR00352; MR00355;	Women Owned	Traffic Control	Subcontractor	102 252 200,25	Plan and implement management at a roadworks construction site; Traffic accommodation;	16 887 050,00	27 689 555,61
		Andris Contractors	1CE PE	Eden: George Local Municipality: MR00352; MR00355;	Black Owned	Gabions, Kerbs, V-Drains	Subcontractor	102 252 200,25	(blank)	600 000,00	1 984 210,41
		Ezamaqhinebe T/A Bahlaseli Project Development	4CE	Eden: George Local Municipality: MR00352; MR00355;	Black Owned	Subcontractor	Subcontractor	102 252 200,25	(blank)	1 277 589,60	547 659,75
		Mdc Arendse Construction Cc	4CE PE	Eden: George Local Municipality: MR00352; MR00355;	Women Owned	Subsoil Drains	Subcontractor	102 252 200,25	(blank)	1 825 578,00	6 480 129,78
		Vuko Maintenance	4CE PE	Eden: George Local Municipality: MR00352; MR00355;	Black Owned	Guardrails	Subcontractor	102 252 200,25	(blank)	1 036 900,00	2 595 582,72
Entsha Henra CC Total										**21 627 117,60**	**39 297 138,27**
Hydro Cape Turf Services CC	4CE	Osei (Pty) Ltd	N/A	West Coast: Matzikama Local Municipality: TR01601; MR00547; DR02227; DR02232; DR02233; MR00546; DR02220; DR02224; MR00548; MR00552; TR01602; DR02222; DR02216; DR02221;	Black Owned	Vegetation Management	Subcontractor	7 235 980,01	(blank)	917 840,78	809 849,53

Contractor	Contractor CIDB	Subcontractor Name	CIDB Grading	SITE	Equity Indicator	Description of Service	C Group	Tender Amount (Rands)	Training Provided to Employees	Estimated Contract Amount (Rands)	Total Payments (Rands)
		Bercor Construction	1CE PE	Cape Winelands: Cape Winelands District Municipality: TR03101; DR01356; DR01418; DR01426; TR03102; DR01386; DR01347; MR00287; MR00294; DR01400; OP05705; DR01339; DR01435; MR00282; TR00902; DR01383; MR00291; DR01394; DR01425; TR03201; MR00299; MR00288; DR01364; MR00290; TR03002; DR01368; DR01342;	Women Owned	Vegetation Management	Subcontractor	10 198 355,41	Fire Fighting;	1 124 471,70	181 127,99
		Wf Construction T/A Imvusa Trading 1037cc	5CE PE	Cape Winelands: Cape Winelands District Municipality: TR03101; DR01356; DR01418; DR01426; TR03102; DR01386; DR01347; MR00287; MR00294; DR01400; OP05705; DR01339; DR01435; MR00282; TR00902; DR01383; MR00291; DR01394; DR01425; TR03201; MR00299; MR00288; DR01364; MR00290; TR03002; DR01368; DR01342;	Women Owned	Vegetation Management	Subcontractor	10 198 355,41	First Aid Training; Flagman Stop/Go training; Fire Fighting; Occupational health and safety training;	1 124 471,70	240 731,34
Hydro Cape Turf Services CC Total										**3 166 784,18**	**1 231 708,86**
Lusasa Construction	9CE	Umnathi Projects & Trading	N/A	Overberg: Overberg District Municipality: MR00267; TR02701; TR03103; TR02801; TR02802; MR00272; MR00028; DR01336; MR00283; TR03001; TR02901; DR01215; MR00261; MR00278; TR02902; TR06501; MR00286; MR00264; MR00262; DR01311;	Black Owned	Litter Picking, Grass Cutting & Eradication	Subcontractor	6 131 061,72	(blank)	145 000,00	22 575,00
	4CE	Bercor Construction	1CE PE	West Coast: Swartland Local Municipality: DR02151; MR00529; MR00535; TR07701; MR00559; OP07644; MR00234; MR00238; TR02103; MR00533; TR08501; TR02102; MR00233; MR00240; OP07645; OP07664; OP07628;	Women Owned	Vegetation Management	Subcontractor	8 238 077,62	(blank)	1 000 000,00	193 242,30
		Wesco Vegetation	1SH	West Coast: Swartland Local Municipality: DR02151; MR00529; MR00535; TR07701; MR00559; OP07644; MR00234; MR00238; TR02103; MR00533; TR08501; TR02102; MR00233; MR00240; OP07645; OP07664; OP07628;	Black Owned	Vegetation Management And Services	Subcontractor	8 238 077,62	(blank)	122 700,48	245 400,96

Contractor	Contractor CIDB	Subcontractor Name	CIDB Grading	SITE	Equity Indicator	Description of Service	C Group	Tender Amount (Rands)	Training Provided to Employees	Estimated Contract Amount (Rands)	Total Payments (Rands)
		Wesco Vegetation	1SH	Overberg: Overberg District Municipality: TR02701; TR02801; TR02802; MR00028; MR00272; MR00283; TR03001; DR01254; TR02901; DR01215; MR00261; TR02902; TR06501; MR00286; MR00264; DR01311;	Black Owned	Vegetation Management	Subcontractor	7 719 806,40	(blank)	2 315 941,92	120 538,06
Lusasa Construction Total										**3 583 642,40**	**581 756,32**
Martin & East	9CE	Afrisam (Pty) Ltd	N/A	Cape Metro: Cape Town Administration: TR00901; NR00101;	Black Owned	Concrete Supply	Materials Supplier	486 900 000,00	(blank)	88 000 000,00	22 421 901,00
		Ams Civils Pty (Ltd)	3CE PE	Cape Metro: Cape Town Administration: TR00901; NR00101;	Black Owned	Emerging Contractor Development - Gabions And Guardrails	Subcontractor	486 900 000,00	(blank)	5 131 655,28	3 630 379,66
		Current Affairs Electrical Cc	1CE	Cape Metro: Cape Town Administration: TR00901; NR00101;	Women Owned	Electrical	Subcontractor	486 900 000,00	(blank)	150 000,00	228 695,76
		Ec Traffic Services Western Region	5CE PE	Eden: Hessequa Local Municipality: MR00332;	Women Owned	Roadsigns, Guardrails, Asphalt Berms	Subcontractor	156 960 000,00	Erect and maintain guard rails;	4 016 346,76	8 639 358,30
		Jetvac Sa (Pty) Ltd	6CE	Cape Metro: Cape Town Administration: TR00901; NR00101;	Black Owned	Plumbing	Subcontractor	486 900 000,00	(blank)	450 000,00	852 720,00
		Kleinhans Construction Pty Ltd	4CE	Eden: Hessequa Local Municipality: MR00332;	Black Owned	Traffic Accommodation	Subcontractor	156 960 000,00	(blank)	207 468,00	27 740 994,27
		Legend Road Marking Cc	1SK PE	Cape Metro: Cape Town Administration: TR00901; NR00101;	Black Owned	Road Marking	Subcontractor	486 900 000,00	(blank)	4 000 000,00	1 255 414,96
		Mambamba Trading Cc	4CE PE	Cape Metro: Cape Town Administration: TR00901; NR00101;	Women Owned	Emerging Contractor Development - Concrete Small Structures	Subcontractor	486 900 000,00	(blank)	1 944 099,00	166 589,22

Contractor	Contractor CIDB	Subcontractor Name	CIDB Grading	SITE	Equity Indicator	Description of Service	C Group	Tender Amount (Rands)	Training Provided to Employees	Estimated Contract Amount (Rands)	Total Payments (Rands)
		Ow General Workers	1CE PE	Eden: Hessequa Local Municipality: MR00332;	Black Owned	Gabions	Subcontractor	156 960 000,00	(blank)	336 000,00	2 062 441,02
		Professional Construction & Building Suppliers Cc	N/A	Cape Metro: Cape Town Administration: TR00901; NR00101;	Women Owned	Pipes And Fittings	Materials Supplier	486 900 000,00	(blank)	3 000 000,00	1 931 325,90
		Qjm2 Construction (Pty) Ltd	3CE PE	Cape Metro: Cape Town Administration: TR00901; NR00101;	Black Owned	Emerging Contractor Development - Kerbs, Concrete Lined Drains	Subcontractor	486 900 000,00	(blank)	20 320 631,10	17 763 871,10
		Suid Kaap Omheinings Bk	N/A	Eden: Hessequa Local Municipality: MR00332;	Black Owned	Fencing	Subcontractor	156 960 000,00	(blank)	2 223 729,62	3 589 205,16
		Western Cape Signs Cc	4SK PE	Cape Metro: Cape Town Administration: TR00901; NR00101;	Women Owned	Signs	Materials Supplier	486 900 000,00	(blank)	3 000 000,00	1 662 813,60
		Willoughby Projects Pty Ltd	3CE	Cape Metro: Cape Town Administration: TR00901; NR00101;	Black Owned	Emerging Contractor Development - Erra Force And Landscaping	Subcontractor	486 900 000,00	(blank)	11 346 566,82	1 770 633,98
		Zyfcon (Pty)Ltd	4CE PE	Eden: Hessequa Local Municipality: MR00332;	Women Owned	Concrete Lined Drains	Subcontractor	156 960 000,00	(blank)	9 116 846,28	13 236 797,52
		Hlumantombazana Civil & Construction	4CE PE	Eden: Hessequa Local Municipality: MR00332;	Women Owned	Slurry	Subcontractor	156 960 000,00	(blank)	6 643 356,80	7 659 959,67
		Lawula Systems (Pty) Ltd	1CE	Cape Metro: Cape Town Administration: TR00901; NR00101;	Black Owned	Traffic Signals	Subcontractor	486 900 000,00	(blank)	40 000,00	169 271,14
		Calz Trading	1SQ PE	Eden: Hessequa Local Municipality: MR00332;	Black Owned	Tree Felling	Subcontractor	156 960 000,00	(blank)	27 000,00	81 000,00

Contractor	Contractor CIDB	Subcontractor Name	CIDB Grading	SITE	Equity Indicator	Description of Service	C Group	Tender Amount (Rands)	Training Provided to Employees	Estimated Contract Amount (Rands)	Total Payments (Rands)
		Yebo Sales Wild Coast Cc	N/A	Eden: Hessequa Local Municipality: MR00332;	Black Owned	Supply Of Pipes	Subcontractor	156 960 000,00	(blank)	310 128,00	930 384,00
		Triple C Maintenance & Services	5CE	Cape Metro: Cape Town Administration: TR00901; NR00101;	Women Owned	Fencing	Subcontractor	486 900 000,00	(blank)	428 051,61	1 020 989,36
		Romps Projects	2CE PE	Eden: Hessequa Local Municipality: MR00332;	Black Owned	Gabions	Subcontractor	156 960 000,00	(blank)	844 728,00	4 115 410,80
		Trident Jute & Hessian Products	N/A	Eden: Hessequa Local Municipality: MR00332;	Black Owned	Hessian Supplier	Materials Supplier	156 960 000,00	(blank)	33 200,00	99 600,00
		Azimo Trading	4CE PE	Cape Metro: Cape Town Administration: TR00901; NR00101;	Black Owned	Emerging Contractor Development - Inlet And Outlet Structures	Subcontractor	486 900 000,00	(blank)	4 245 658,94	930 427,84
		Chs Transport Cc	N/A	Cape Metro: Cape Town Administration: TR00901; NR00101;	Women Owned	Concrete Products	Materials Supplier	486 900 000,00	(blank)	15 000 000,00	12 662 600,38
Martin & East Total										**180 815 466,21**	**134 622 784,64**
N1 Construction Pty Ltd	6CE	Share-A-Deal	1CE PE	Central Karoo: Beaufort West Local Municipality: TR01610; MR00606; TR01608; TR01609;	Women Owned	Subcontractor	Subcontractor	8 860 584,34	(blank)	5 700 000,00	2 182 461,60
N1 Construction Pty Ltd Total										**5 700 000,00**	**2 182 461,60**
Power Construction Pty Ltd	9CE	Adenco Construction (Pty) Ltd	7CE	West Coast: Saldanha Bay Local Municipality: DR02151; MR00559; MR00238;	Black Owned	Provision Street Lighting And Electrical Reticulation Services	Subcontractor	161 600 624,58	(blank)	5 295 249,89	14 892 449,73
		Alroda Trading Cc	1CE	Eden: Mossel Bay Local Municipality: TR00209; DR01578; MR00348; MR00344;	Black Owned	Bricklayer	Subcontractor	182 420 000,00	(blank)	1 000 000,00	1 016 993,58
		Aveng (Africa) Pty Ltd	9CE	West Coast: Saldanha Bay Local Municipality: DR02151; MR00559; MR00238;	Black Owned	Supplier Of Pipe Materials	Materials Supplier	161 600 624,58	(blank)	56 254,93	178 371,18

Contractor	Contractor CIDB	Subcontractor Name	CIDB Grading	SITE	Equity Indicator	Description of Service	C Group	Tender Amount (Rands)	Training Provided to Employees	Estimated Contract Amount (Rands)	Total Payments (Rands)
		Ithuba Industries (Pty) Ltd	N/A	West Coast: Saldanha Bay Local Municipality: DR02151; MR00559; MR00238;	Black Owned	Supply Of Pipe Materials	Materials Supplier	161 600 624,58	(blank)	1 500 000,00	3 300 129,72
		Keystar Trading	3CE PE	West Coast: Saldanha Bay Local Municipality: DR02151; MR00559; MR00238;	Black Owned	Supply And Laying Of Rectangular Pavers	Subcontractor	161 600 624,58	(blank)	25 200,00	75 600,00
		Sea Breeze Community Development Cc	1EP PE	West Coast: Saldanha Bay Local Municipality: DR02151; MR00559; MR00238;	Women Owned	Construction Of Headwalls To Stormwater Structures	Subcontractor	161 600 624,58	(blank)	450 000,00	190 608,84
		Shc Civils And Maintenance	3CE PE	West Coast: Saldanha Bay Local Municipality: DR02151; MR00559; MR00238;	Black Owned	Construction Of Pedestrian Sidewalk	Subcontractor	161 600 624,58	(blank)	2 714 523,00	3 671 498,94
		Smart Civils Construction (Pty) Ltd	7CE	West Coast: Saldanha Bay Local Municipality: DR02151; MR00559; MR00238;	Black Owned	Bridge Remedial Works	Subcontractor	161 600 624,58	(blank)	1 537 525,00	7 469 502,24
		Western Cape Signs Cc	3SK PE	West Coast: Saldanha Bay Local Municipality: DR02151; MR00559; MR00238;	Women Owned	Supplying And Installing Of Contract Name Boards On Site	Subcontractor	161 600 624,58	(blank)	63 804,00	218 562,00
		Casswan Trading Cc	2CE PE	West Coast: Saldanha Bay Local Municipality: DR02151; MR00559; MR00238;	Women Owned	Traffic Accommodati on Subcontractors	Subcontractor	161 600 624,58	(blank)	647 140,00	5 460 815,79
		Aquaduct Trading	N/A	West Coast: Saldanha Bay Local Municipality: DR02151; MR00559; MR00238;	Black Owned	Supplier Of Pipe Materials	Materials Supplier	161 600 624,58	(blank)	151 200,00	524 079,00
		Secruitem (Pty) Ltd	N/A	West Coast: Saldanha Bay Local Municipality: DR02151; MR00559; MR00238;	Black Owned	Supply And Installing Of All Fencing On Site	Other Procurement	161 600 624,58	(blank)	1 426 312,50	2 255 897,19
		Sheldon Civils	N/A	West Coast: Saldanha Bay Local Municipality: DR02151; MR00559; MR00238;	Black Owned	Transportation Of Materials`	Materials Supplier	161 600 624,58	(blank)	4 539 722,00	7 765 047,48

Contractor	Contractor CIDB	Subcontractor Name	CIDB Grading	SITE	Equity Indicator	Description of Service	C Group	Tender Amount (Rands)	Training Provided to Employees	Estimated Contract Amount (Rands)	Total Payments (Rands)
		Sylmou Logistics	N/A	West Coast: Saldanha Bay Local Municipality: DR02151; MR00559; MR00238;	Black Owned	Transportation Of Material	Materials Supplier	161 600 624,58	(blank)	1 034 290,00	813 494,52
		Tigrafield (Pty) Ltd	N/A	West Coast: Saldanha Bay Local Municipality: DR02151; MR00559; MR00238;	Women Owned	Supply Of Reinforcing Steel	Materials Supplier	161 600 624,58	(blank)	6 596 760,00	10 491 753,12
		Chavro Projects (Pty) Ltd	1CE PE	West Coast: Saldanha Bay Local Municipality: DR02151; MR00559; MR00238;	Women Owned	Laying Of Bk4 Kerbs And C1 Channels	Materials Supplier	161 600 624,58	(blank)	72 000,00	414 379,95
		G6 Group	N/A	West Coast: Saldanha Bay Local Municipality: DR02151; MR00559; MR00238;	Black Owned	Fixing & Reinforcing Including The Supply Of Binding Wire	Subcontractor	161 600 624,58	(blank)	300 000,00	1 308 831,42
		Lourens Roadmarking Cc	6SK	West Coast: Saldanha Bay Local Municipality: DR02151; MR00559; MR00238;	Black Owned	Roadmarking Subcontractor	Subcontractor	161 600 624,58	(blank)	944 894,34	1 879 703,10
		Nokholo Trading (Pty) Ltd	N/A	West Coast: Saldanha Bay Local Municipality: DR02151; MR00559; MR00238;	Black Owned	Transportation Of Commercial Fill Material	Materials Supplier	161 600 624,58	(blank)	750 000,00	296 928,78
		Shig Suppliers	N/A	West Coast: Saldanha Bay Local Municipality: DR02151; MR00559; MR00238;	Women Owned	Transportation Of Material	Materials Supplier	161 600 624,58	(blank)	249 996,00	106 518,72
		Tip Trans Logistix	8CE PE	West Coast: Saldanha Bay Local Municipality: DR02151; MR00559; MR00238;	Women Owned	Supplier Of Commercial Fill Material On Site	Materials Supplier	161 600 624,58	(blank)	8 568 000,00	8 217 293,16
		Artcon Construction	5CE	Eden: Mossel Bay Local Municipality: TR00209; DR01578; MR00348; MR00344;	Women Owned	Construct Conrete Side Drains	Subcontractor	182 420 000,00	(blank)	8 852 441,94	1 801 745,80
		Edh Enterprises	1CE PE	West Coast: Saldanha Bay Local Municipality: DR02151; MR00559; MR00238;	Women Owned	Mascellaneous Site Works	Subcontractor	161 600 624,58	(blank)	100 000,00	158 414,43

Contractor	Contractor CIDB	Subcontractor Name	CIDB Grading	SITE	Equity Indicator	Description of Service	C Group	Tender Amount (Rands)	Training Provided to Employees	Estimated Contract Amount (Rands)	Total Payments (Rands)
		Hei Way Supply (Pty) Ltd	4CE	West Coast: Saldanha Bay Local Municipality: DR02151; MR00559; MR00238;	Black Owned	Guardrails	Subcontractor	161 600 624,58	(blank)	450 000,00	1 403 508,96
		Stormers Construction And Projects	N/A	West Coast: Saldanha Bay Local Municipality: DR02151; MR00559; MR00238;	Women Owned	Structures	Subcontractor	161 600 624,58	(blank)	120 000,00	295 064,64
		Lukhenyise General Trading (Pty)Ltd	1CE PE	Eden: Mossel Bay Local Municipality: TR00209; DR01578; MR00348; MR00344;	Women Owned	Site Security	Subcontractor	182 420 000,00	(blank)	896 688,00	1 622 749,82
		Otto Signs	1SK	Eden: Mossel Bay Local Municipality: TR00209; DR01578; MR00348; MR00344;	Women Owned	Roadsign/Manufacture/Supplier	Manufacturer	182 420 000,00	(blank)	100 000,00	21 948,00
		Ve Management Services	1EP PE	Eden: Mossel Bay Local Municipality: TR00209; DR01578; MR00348; MR00344;	Women Owned	Electrical Works	Subcontractor	182 420 000,00	(blank)	1 720 794,00	1 162 074,76
Power Construction Pty Ltd Total										**50 162 795,60**	**77 013 964,87**
Roadmac Surfacing pta Road Mac Cape	9CE	Alroda Trading Cc	1CE PE	West Coast: Bergrivier Local Municipality: TR02303;	Black Owned	Drainage	Subcontractor	169 725 206,56	(blank)	500 000,00	1 134 149,78
		Ec Traffic Services Western Region	5CE	Cape Metro: Cape Metro: TR01101;	Black Owned	Traffic Control	Subcontractor	181 992 290,00	(blank)	29 000 000,00	175 000,00
		Sunglide 160cc	4CE PE	West Coast: Bergrivier Local Municipality: TR02303;	Women Owned	Gabion Construction	Subcontractor	169 725 206,56	(blank)	125 000,00	564 208,54
		Kc Traffic Services	1CE	Eden: Oudtshoorn Local Municipality: TR03303;	Women Owned	Traffic Accommodation	Subcontractor	234 009 868,42	Flagman Stop/Go training;	10 348 865,00	11 214 857,18
		Casswan Trading Cc	2CE PE	West Coast: Bergrivier Local Municipality: TR02303;	Women Owned	Traffic Accommodation	Subcontractor	169 725 206,56	Flagman Stop/Go training;	21 000 000,00	23 514 499,18
		Casswan Trading Cc	3CE	West Coast: Swartland Local Municipality: TR02102; MR00174;	Women Owned	Traffic Accommodation	Subcontractor	47 745 000,00	Flagman Stop/Go training;	1 890 607,50	3 060 432,94

Contractor	Contractor CIDB	Subcontractor Name	CIDB Grading	SITE	Equity Indicator	Description of Service	C Group	Tender Amount (Rands)	Training Provided to Employees	Estimated Contract Amount (Rands)	Total Payments (Rands)
		Keyona Civils And Cleaning	1CE PE	West Coast: Bergrivier Local Municipality: TR02303;	Women Owned	Drainage	Subcontractor	169 725 206,56	(blank)	650 000,00	592 032,78
		Sephila Construction	1CE PE	West Coast: Bergrivier Local Municipality: TR02303;	Black Owned	Drainage	Subcontractor	169 725 206,56	(blank)	1 950 000,00	2 726 745,82
		Oshakati Security Services	1CE PE	West Coast: Bergrivier Local Municipality: TR02303;	Women Owned	Security Service	Subcontractor	169 725 206,56	(blank)	1 700 000,00	1 443 750,50
		Oshakati Security Services	6CE PE	West Coast: Swartland Local Municipality: TR02102; MR00174;	Women Owned	Security	Subcontractor	47 745 000,00	(blank)	252 828,00	605 028,30
		Wiltun Construction	1GB	West Coast: Bergrivier Local Municipality: TR02303;	Black Owned	Drainage	Subcontractor	169 725 206,56	(blank)	1 000 000,00	855 718,68
		Inntsibi Construction	1CE PE	West Coast: Bergrivier Local Municipality: TR02303;	Black Owned	Survey	Subcontractor	169 725 206,56	(blank)	3 240 000,00	2 285 118,44
		Dual Civils	4CE	Cape Metro: Cape Metro: TR01101;	Black Owned	Truck Hire	Subcontractor	181 992 290,00	(blank)	21 630,00	5 150,00
		Ec Traffic Services	6CE	West Coast: Swartland Local Municipality: TR02102; MR00174;	Women Owned	Subcontractor	Subcontractor	47 745 000,00	(blank)	739 941,08	1 362 417,42
		Ssb Logistics	N/A	West Coast: Bergrivier Local Municipality: TR02303;	Women Owned	Materials Transporter	Subcontractor	169 725 206,56	(blank)	17 000 000,00	30 965 852,94
	8CE	Sihlange Projects	N/A	Cape Metro: Cape Town Administration: TR02701;	Women Owned	Asphalt Berms	Subcontractor	59 130 000,00	Flagman Stop/Go training;	200 000,00	577 859,34
		Dual Civils	2CE	Cape Metro: Cape Town Administration: TR02701;	Women Owned	Traffic Control	Subcontractor	59 130 000,00	Flagman Stop/Go training;	5 200 000,00	4 488 778,59
		Fendi Trading	N/A	Cape Metro: Cape Town Administration: TR02701;	Black Owned	Milling Truck	Subcontractor	59 130 000,00	(blank)	24 000,00	251 704,20
		Scott Projects And Civil (Pty) Ltd	N/A	Cape Metro: Cape Town Administration: TR02701;	Black Owned	Asphalt And Labour	Subcontractor	59 130 000,00	(blank)	1 100 000,00	1 403 631,78
Roadmac Surfacing pta Road Mac Cape Total										**95 942 871,58**	**87 226 936,41**

Contractor	Contractor CIDB	Subcontractor Name	CIDB Grading	SITE	Equity Indicator	Description of Service	C Group	Tender Amount (Rands)	Training Provided to Employees	Estimated Contract Amount (Rands)	Total Payments (Rands)
Seclawa Enterprises	4CE	Redrin Rail Services	4CE	Cape Winelands: Cape Winelands District Municipality: MR00025; MR00213; TR02202; MR00172; MR00205; MR00201; DR01470; MR00191; DR01452; DR01473; DR01468; MR00310; MR00218; MR00220;	Black Owned	Road Maintenance	Subcontractor	13 543 551,52	First Aid Training; Fire Fighting; Flagman Stop/Go training; Occupational health and safety training;	8 700 000,00	1 645 563,48
Seclawa Enterprises Total										**8 700 000,00**	**1 645 563,48**
Samaai Construction	6CE	Bright Idea Projects 2642 Cc	1CE	Overberg: Theewaterskloof Local Municipality: MR00269; MR00267; MR00279; DR01295; DR01285; DR01336; MR00277; DR01287; OP04058; MR00278; DR01264; OP05601;	Women Owned	Routine Road Maintenance	Subcontractor	11 545 529,63	(blank)	1 100 000,00	66 029,00
		Guenantin Construction	3CE PE	Overberg: Theewaterskloof Local Municipality: MR00269; MR00267; MR00279; DR01295; DR01285; DR01336; MR00277; DR01287; OP04058; MR00278; DR01264; OP05601;	Women Owned	Routine Road Maintenance	Subcontractor	11 545 529,63	(blank)	10 390 976,58	1 132 218,13
Samaai Construction Total										**11 490 976,58**	**1 198 247,13**
Golden Rewards 1981 CC	2CE	Wesco Vegetation	1SH	Cape Winelands: Cape Winelands District Municipality: DR01129; DR01067; MR00023; DR01385; MR00027; OP04236; DR01126; DR01085; DR01064; MR00187; DR01408; MR00189; DR01069; MR00174; TR02501;	Black Owned	Vegetation Management	Subcontractor	6 930 916,71	(blank)	645 000,00	175 101,50
		Connies Enterprises	N/A	Cape Winelands: Cape Winelands District Municipality: DR01129; DR01067; MR00023; DR01385; MR00027; OP04236; DR01126; DR01085; DR01064; MR00187; DR01408; MR00189; DR01069; MR00174; TR02501;	Women Owned	Vegetation Maintenance	Subcontractor	6 930 916,71	(blank)	1 279 408,33	100 164,92

Contractor	Contractor CIDB	Subcontractor Name	CIDB Grading	SITE	Equity Indicator	Description of Service	C Group	Tender Amount (Rands)	Training Provided to Employees	Estimated Contract Amount (Rands)	Total Payments (Rands)
		Bercor Construction	1CE PE	West Coast: Bergrivier Local Municipality: MR00529; TR02303; DR02242; DR02176; MR00531; MR00532; MR00538; DR01175; DR02171; MR00528; DR02163; DR02175; MR00536; MR00236; DR02161; DR02166; DR02159; DR02215; MR00310; MR00537; MR00539; MR00527; DR02178; MR00526; MR00534; DR02157;	Women Owned	Vegetation Management	Subcontractor	6 110 808,78	(blank)	884 612,50	298 327,50
Golden Rewards 1981 CC Total										**2 809 020,83**	**573 593,92**
Kew Maintenance cc	9CE	Mambamba Trading Cc	5CE PE	Cape Metro: Cape Metro: MR00176; DR01052; MR00166; DR01050; TR02701; TR07701; TR08101; MR00165; DR01021; OP05205; TR05401; MR00108; MR00168; MR00027; MR00133; TR00202; MR00188; OP05204; TR00901; MR00199; TR01101; TR00201; TR08801; DR01065; MR00177; MR00174;	Women Owned	Road Maintenance, Civil Works	Subcontractor	114 103 534,80	Handle, transport, store and utilize hazardous materials on a construction site; First Aid Training; TSO; Construction of pre-cast kerbs and channels; Flagman Stop/Go training; Fire Fighting; Occupational health and safety training; Basic knowledge of statistics and probability; Traffic accommodation;	3 536 880,78	6 870 722,85
		Mambamba Trading Cc		Cape Metro: Cape Metro: MR00176; DR01052; TR02701; MR00166; DR01050; TR07701; TR08101; MR00165; DR01021; OP05205; TR05401; MR00108; MR00168; MR00027; MR00133; TR00202; MR00188; OP05204; TR00901; MR00199; TR01101; TR00201; TR08801; DR01065; MR00177; MR00174;	Women Owned	Road Maintenance, Civil Works	Subcontractor	114 103 534,80	First Aid Training; Handle, transport, store and utilize hazardous materials on a construction site; TSO;	3 536 880,78	18 459 216,00

Contractor	Contractor CIDB	Subcontractor Name	CIDB Grading	SITE	Equity Indicator	Description of Service	C Group	Tender Amount (Rands)	Training Provided to Employees	Estimated Contract Amount (Rands)	Total Payments (Rands)
									Construction of pre-cast kerbs and channels; Flagman Stop/Go training; Fire Fighting; Occupational health and safety training; Basic knowledge of statistics and probability; Traffic accommodation;		
		Sisonke Civils	4CE	Cape Metro: Cape Metro: MR00176; DR01052; MR00166; DR01050; TR02701; TR07701; TR08101; MR00165; DR01021; OP05205; TR05401; MR00108; MR00168; MR00027; MR00133; TR00202; MR00188; OP05204; TR00901; MR00199; TR01101; TR00201; TR08801; DR01065; MR00177; MR00174;	Black Owned	Road Maintenance Civil Works	Subcontractor	114 103 534,80	Construction of pre-cast kerbs and channels; Flagman Stop/Go training; Occupational health and safety training;	8 503 499,40	17 606 417,97
		Mambamba Trading Cc	5CE PE	Cape Metro: Cape Metro: MR00176; DR01052; MR00166; DR01050; TR02701; TR07701; TR08101; MR00165; DR01021; OP05205; TR05401; MR00108; MR00168; MR00027; MR00133; TR00202; MR00188; OP05204; TR00901; MR00199; TR01101; TR00201; TR08801; DR01065; MR00177; MR00174;	Women Owned	Road Maintenance, Civil Works	Subcontractor	114 103 534,80	(blank)	8 551 965,11	385 224,18
Kew Maintenance cc Total										**24 129 226,07**	**43 321 581,00**
Basil ReadHaw & Inglis	9CE	Ams Civils Pty (Ltd)	3CE PE	Cape Winelands: Langeberg Local Municipality: TR03103; DR01373; TR03102;	Black Owned	Emerging Contractor Development Programme	Subcontractor	583 279 179,46	(blank)	3 222 289,32	4 507 234,05

Contractor	Contractor CIDB	Subcontractor Name	CIDB Grading	SITE	Equity Indicator	Description of Service	C Group	Tender Amount (Rands)	Training Provided to Employees	Estimated Contract Amount (Rands)	Total Payments (Rands)
		Atn Group (Pty) Ltd	4CE PE	Cape Winelands: Langeberg Local Municipality: TR03103; DR01373; TR03102;	Women Owned	Stormwater & Concrete Block Paving	Subcontractor	583 279 179,46	(blank)	2 067 668,00	1 951 513,80
		Autumn Skies Trading 187	3CE PE	Cape Winelands: Langeberg Local Municipality: TR03103; DR01373; TR03102;	Women Owned	Emerging Contractor Development - Stormwater	Subcontractor	583 279 179,46	Fire Fighting;	3 758 657,96	19 309 706,70
		Aveng (Africa) Pty Ltd	9CE	Cape Winelands: Langeberg Local Municipality: TR03103; DR01373; TR03102;	Black Owned	Supply, Cut Bend, Deliver And Fix Reinforcing	Subcontractor	583 279 179,46	(blank)	48 240 468,12	214 282 921,95
		Cn Blanket Linen Cc	1GB PE	Cape Winelands: Langeberg Local Municipality: TR03103; DR01373; TR03102;	Black Owned	Construction Of Manholes	Subcontractor	583 279 179,46	(blank)	50 000,00	3 026 878,20
		Ec Traffic Services Western Region	5CE PE	Cape Winelands: Langeberg Local Municipality: TR03103; DR01373; TR03102;	Women Owned	Traffic Accommodati on	Subcontractor	583 279 179,46	(blank)	29 451 102,00	107 287 959,15
		Ect Road Signs	N/A	Cape Winelands: Langeberg Local Municipality: TR03103; DR01373; TR03102;	Black Owned	Road Signage	Materials Supplier	583 279 179,46	(blank)	595 031,00	38 247 985,35
		Herandien Contractos	N/A	Cape Winelands: Langeberg Local Municipality: TR03103; DR01373; TR03102;	Black Owned	Fencing Materials	Materials Supplier	583 279 179,46	(blank)	1 066 080,00	3 627 393,30
		Julius Maintenance Projects And Services (Pty) Ltd	2CE PE	Cape Winelands: Langeberg Local Municipality: TR03103; DR01373; TR03102;	Women Owned	Labour Only Stormwater	Subcontractor	583 279 179,46	(blank)	216 743,40	1 860 232,05
		Junuku Traffic Control	1CE PE	Cape Winelands: Langeberg Local Municipality: TR03103; DR01373; TR03102;	Black Owned	Telecommunic ation Ducts	Subcontractor	583 279 179,46	(blank)	242 320,03	629 947,65
		Kolossie General Trading Cc	3CE PE	Cape Winelands: Langeberg Local Municipality: TR03103; DR01373; TR03102;	Women Owned	Emerging Contractor Development - Kerbing And Concrete	Subcontractor	583 279 179,46	(blank)	3 614 608,31	5 129 350,35

Contractor	Contractor CIDB	Subcontractor Name	CIDB Grading	SITE	Equity Indicator	Description of Service	C Group	Tender Amount (Rands)	Training Provided to Employees	Estimated Contract Amount (Rands)	Total Payments (Rands)
		Lawson Tool Distributors	N/A	Cape Winelands: Langeberg Local Municipality: TR03103; DR01373; TR03102;	Black Owned	Materials	Materials Supplier	583 279 179,46	(blank)	2 000 000,00	9 025 009,50
		Monticap	1CE PE	Cape Winelands: Langeberg Local Municipality: TR03103; DR01373; TR03102;	Black Owned	Medicals	Materials Supplier	583 279 179,46	(blank)	300 000,00	1 782 000,00
		Ohlson Civils	2CE PE	Cape Winelands: Langeberg Local Municipality: TR03103; DR01373; TR03102;	Black Owned	Paving And Gabions	Subcontractor	583 279 179,46	(blank)	811 487,50	4 032 131,55
		Phakamizani Plant Hire	N/A	Cape Winelands: Langeberg Local Municipality: TR03103; DR01373; TR03102;	Black Owned	Plant Hire	Materials Supplier	583 279 179,46	(blank)	3 000 000,00	90 715 740,45
		Spine Road Civil Engineering Works Cc	5CE PE	Cape Winelands: Langeberg Local Municipality: TR03103; DR01373; TR03102;	Women Owned	Subcontractor Mentoring	Subcontractor	583 279 179,46	(blank)	200 000,00	707 563,20
		Sunglide 160cc	4CE PE	Cape Winelands: Langeberg Local Municipality: TR03103; DR01373; TR03102;	Women Owned	Stormwater Pipes, Inlets And Outlets	Subcontractor	583 279 179,46	(blank)	5 937 858,24	10 194 662,85
		Zyfcon (Pty)Ltd	1CE PE	Cape Winelands: Langeberg Local Municipality: TR03103; DR01373; TR03102;	Women Owned	Head And Wing Walls	Subcontractor	583 279 179,46	(blank)	2 272 859,14	5 909 949,30
		Pdi-Industrial Services Cc T/A Vibrant Construction	6CE PE	Cape Winelands: Langeberg Local Municipality: TR03103; DR01373; TR03102;	Women Owned	Accommodation Of Traffic	Subcontractor	583 279 179,46	First Aid Training; Flagman Stop/Go training; Fire Fighting; Occupational health and safety training;	29 917 735,20	77 273 533,05
		Blanket Corporation (Pty) Ltd	N/A	Cape Winelands: Langeberg Local Municipality: TR03103; DR01373; TR03102;	Women Owned	Labour Only Fencing	Other Procurement	583 279 179,46	(blank)	367 644,68	9 159 599,10
		Mega Bouers (Pty) Ltd	1CE	Cape Winelands: Langeberg Local Municipality: TR03103; DR01373; TR03102;	Black Owned	Kerbs And Channels,	Subcontractor	583 279 179,46	(blank)	4 409 790,00	63 855 507,60

Contractor	Contractor CIDB	Subcontractor Name	CIDB Grading	SITE	Equity Indicator	Description of Service	C Group	Tender Amount (Rands)	Training Provided to Employees	Estimated Contract Amount (Rands)	Total Payments (Rands)
						Sidewalks And Riprap					
		Ludify Suppliers	1CE PE	Cape Winelands: Langeberg Local Municipality: TR03103; DR01373; TR03102;	Women Owned	Tree Felling	Subcontractor	583 279 179,46	(blank)	14 000,00	8 085,00
		Artcon Construction	4CE	Cape Winelands: Langeberg Local Municipality: TR03103; DR01373; TR03102;	Women Owned	Paving And Related Works	Subcontractor	583 279 179,46	(blank)	6 602 170,58	23 216 954,40
		Imvusa Trading 1581	4CE PE	Cape Winelands: Langeberg Local Municipality: TR03103; DR01373; TR03102;	Women Owned	Kerbing And Side Drains	Subcontractor	583 279 179,46	(blank)	2 513 992,47	4 820 289,15
Basil ReadHaw & Inglis Total										**150 872 505,95**	**700 562 147,70**
Triamic Construction Pty Ltd	9CE	Easy Mix	N/A	Cape Winelands: Langeberg Local Municipality: MR00287;	Black Owned	Establishment Of Lab Area/Ancillary Works	Subcontractor	205 000 000,00	(blank)	2 000 000,00	6 886 633,98
		Julius Maintenance Projects And Services (Pty) Ltd	2CE PE	Cape Winelands: Langeberg Local Municipality: MR00287;	Women Owned	Ancillary Works	Subcontractor	205 000 000,00	(blank)	1 800 000,00	4 961 162,66
		Phakamizani Plant Hire	5CE PE	Cape Winelands: Langeberg Local Municipality: MR00287;	Black Owned	Plant Hire	Other Procurement	205 000 000,00	(blank)	3 000 000,00	17 102 893,92
		Shine The Way 481 Cc	4CE PE	Cape Winelands: Langeberg Local Municipality: MR00287;	Black Owned	Concrete Works - Casting New Jersey Barriers And Structured Works	Subcontractor	205 000 000,00	(blank)	4 000 000,00	11 153 734,78
		Cad Civils	1CE	Cape Winelands: Langeberg Local Municipality: MR00287;	Black Owned	Institute Concrete Structures	Subcontractor	205 000 000,00	(blank)	2 600 000,00	7 505 764,72
		Conradie Cleaning Services	N/A	Cape Winelands: Langeberg Local Municipality: MR00287;	Women Owned	Cleaning Services	Subcontractor	205 000 000,00	(blank)	1 200 000,00	2 253 790,00

Contractor	Contractor CIDB	Subcontractor Name	CIDB Grading	SITE	Equity Indicator	Description of Service	C Group	Tender Amount (Rands)	Training Provided to Employees	Estimated Contract Amount (Rands)	Total Payments (Rands)
		Ec Traffic Services	5CE PE	Cape Winelands: Langeberg Local Municipality: MR00287;	Women Owned	Crs No: 10052189	Subcontractor	205 000 000,00	(blank)	10 000 000,00	61 023 785,34
		Fairbrother Geotechnical Engineering Cc	4CE	Cape Winelands: Langeberg Local Municipality: MR00287;	Black Owned	Rotary Core, Drilling, Grouting At Bridge	Materials Supplier	205 000 000,00	(blank)	1 084 711,20	2 394 455,58
		Greenfem	1CE PE	Cape Winelands: Langeberg Local Municipality: MR00287;	Women Owned	Concrete V-Drains	Subcontractor	205 000 000,00	(blank)	1 100 000,00	2 115 129,58
		Groeneveld Civil Engineering Construction Pty Ltd	5CE	Cape Winelands: Langeberg Local Municipality: MR00287;	Black Owned	Walkways, Pavings	Subcontractor	205 000 000,00	(blank)	4 500 000,00	8 055 982,72
		J Bothman	2GB	Cape Winelands: Langeberg Local Municipality: MR00287;	Black Owned	Ancillary Works	Subcontractor	205 000 000,00	(blank)	1 400 000,00	2 692 869,86
		Moula Construction	1GB	Cape Winelands: Langeberg Local Municipality: MR00287;	Women Owned	Ancillary Works	Subcontractor	205 000 000,00	(blank)	1 000 000,00	1 967 195,24
		Shaloti General Trading	1CE PE	Cape Winelands: Langeberg Local Municipality: MR00287;	Women Owned	Security Services. Crs No: 1005218	Subcontractor	205 000 000,00	(blank)	3 000 000,00	8 743 429,44
Triamic Construction Pty Ltd Total										**36 684 711,20**	**136 856 827,82**
EskomCivils 2000	9CE	Zyfcon (Pty)Ltd	5CE PE	Cape Winelands: Stellenbosch Local Municipality: MR00168; TR00201;	Women Owned	Subcontractor	Subcontractor	281 000 000,00	Erection of scaffolding; Flagman Stop/Go training; Working at Heights;	14 961 055,40	11 017 131,98
		Silver Solutions 3392 Cc	3CE	Cape Winelands: Stellenbosch Local Municipality: MR00168; TR00201;	Women Owned	Traffic Accommodation	Subcontractor	281 000 000,00	Erection of scaffolding; Life skills training; Flagman Stop/Go training; Working at Heights;	5 131 600,00	2 856 949,62

Contractor	Contractor CIDB	Subcontractor Name	CIDB Grading	SITE	Equity Indicator	Description of Service	C Group	Tender Amount (Rands)	Training Provided to Employees	Estimated Contract Amount (Rands)	Total Payments (Rands)
		Cleophas Construction	3CE	Cape Winelands: Stellenbosch Local Municipality: MR00168; TR00201;	Black Owned	Subcontractor	Subcontractor	281 000 000,00	(blank)	50 000,00	47 098,84
		Abupix	N/A	Cape Winelands: Stellenbosch Local Municipality: MR00168; TR00201;	Black Owned	Subcontractor	Subcontractor	281 000 000,00	(blank)	100 000,00	133 483,02
		B&Z Construction	N/A	Cape Winelands: Stellenbosch Local Municipality: MR00168; TR00201;	Black Owned	Subcontractor	Subcontractor	281 000 000,00	(blank)	600 000,00	594 544,34
		Benjivert Plant Hire	7CE	Cape Winelands: Stellenbosch Local Municipality: MR00168; TR00201;	Black Owned	Plant Hire	Subcontractor	281 000 000,00	(blank)	166 324,50	1 823 073,00
		Cash-Cade	1CE PE	Cape Winelands: Stellenbosch Local Municipality: MR00168; TR00201;	Black Owned	Plant Hire	Subcontractor	281 000 000,00	(blank)	80 000,00	738 864,92
		Cpg	2CE	Cape Winelands: Stellenbosch Local Municipality: MR00168; TR00201;	Black Owned	Subcontractor	Subcontractor	281 000 000,00	Erection of scaffolding; Life skills training;	100 000,00	659 944,80
		Directional Moling Services	5CE	Cape Winelands: Stellenbosch Local Municipality: MR00168; TR00201;	Black Owned	Subcontractor	Subcontractor	281 000 000,00	(blank)	200 000,00	239 580,00
		Ehad Construction And Civils	1CE	Cape Winelands: Stellenbosch Local Municipality: MR00168; TR00201;	Black Owned	Laying Of Stormwater Pipes	Subcontractor	281 000 000,00	Erection of scaffolding; Life skills training;	161 970,00	1 057 858,00
		Jaca Development Enterprise	1CE	Cape Winelands: Stellenbosch Local Municipality: MR00168; TR00201;	Black Owned	Prefabricated Culverts	Subcontractor	281 000 000,00	(blank)	150 000,00	329 276,42
		Junhicho Trading & Projects	1CE	Cape Winelands: Stellenbosch Local Municipality: MR00168; TR00201;	Black Owned	Subcontractor	Subcontractor	281 000 000,00	(blank)	100 000,00	199 468,66
		Letaba Logistics	N/A	Cape Winelands: Stellenbosch Local Municipality: MR00168; TR00201;	Black Owned	Crane Truck Transportation	Subcontractor	281 000 000,00	(blank)	250 000,00	40 704,00
		Lj And Matt Fencing Pty Ltd	1CE PE	Cape Winelands: Stellenbosch Local Municipality: MR00168; TR00201;	Black Owned	Construction Of New Fence	Subcontractor	281 000 000,00	(blank)	770 410,00	732 874,70
		Milanimaqhawe	5CE	Cape Winelands: Stellenbosch Local Municipality: MR00168; TR00201;	Women Owned	Prefabricated Culverts	Subcontractor	281 000 000,00	(blank)	350 000,00	49 270,00
		Mpeke Plant Hire	1CE PE	Cape Winelands: Stellenbosch Local Municipality: MR00168; TR00201;	Black Owned	Plant Hire	Subcontractor	281 000 000,00	(blank)	462 286,60	5 224 830,82

Contractor	Contractor CIDB	Subcontractor Name	CIDB Grading	SITE	Equity Indicator	Description of Service	C Group	Tender Amount (Rands)	Training Provided to Employees	Estimated Contract Amount (Rands)	Total Payments (Rands)
		Ngova Security Services	N/A	Cape Winelands: Stellenbosch Local Municipality: MR00168; TR00201;	Black Owned	Security Service	Subcontractor	281 000 000,00	(blank)	200 000,00	104 460,00
		Popeye Trucking	N/A	Cape Winelands: Stellenbosch Local Municipality: MR00168; TR00201;	Women Owned	Plant Hire	Subcontractor	281 000 000,00	(blank)	254 176,00	658 860,80
		Robotech Traffic Systems	5CE PE	Cape Winelands: Stellenbosch Local Municipality: MR00168; TR00201;	Black Owned	Subcontractor	Subcontractor	281 000 000,00	(blank)	5 704 947,50	4 377 790,00
		Salfred'S Coach Tours	N/A	Cape Winelands: Stellenbosch Local Municipality: MR00168; TR00201;	Black Owned	Transportation	Materials Supplier	281 000 000,00	(blank)	109 500,00	218 000,00
EskomCivils 2000 Total										**29 902 270,00**	**31 104 063,92**
WBHO Construction	9CE	5p'S Trading	2CE PE	Cape Winelands: Langeberg Local Municipality: TR03101; TR03102; MR00287;	Women Owned	Maintenance And Security	Subcontractor	150 377 188,95	(blank)	686 560,00	402 271,46
		Phakamizani Plant Hire	EXP	Cape Winelands: Langeberg Local Municipality: TR03101; TR03102; MR00287;	Black Owned	Plant Hire	Subcontractor	150 377 188,95	(blank)	250 000,00	154 801,50
		Sea Breeze Community Development Cc	1CE PE	West Coast: Saldanha Bay Local Municipality: NEWSAL2; TR08501; TR02102; MR00233;	Women Owned	Fencing	Subcontractor	282 637 209,24	(blank)	14 145 150,00	1 208 491,98
		Kc Traffic Services	1CE	Cape Winelands: Langeberg Local Municipality: TR03101; TR03102; MR00287;	Women Owned	Traffic Accomodation	Subcontractor	150 377 188,95	Flagman Stop/Go training;	5 946 250,00	3 848 700,52
		Silver Solutions 3392 Cc	3CE PE	West Coast: Saldanha Bay Local Municipality: NEWSAL2; TR08501; TR02102; MR00233;	Black Owned	Traffic Accommodation	Other Procurement	282 637 209,24	(blank)	1 455 124,08	1 149 794,84
		Wiltun Construction	1GB	West Coast: Saldanha Bay Local Municipality: NEWSAL2; TR08501; TR02102; MR00233;	Black Owned	Civil Works	Subcontractor	282 637 209,24	(blank)	86 314,67	72 309,64

Contractor	Contractor CIDB	Subcontractor Name	CIDB Grading	SITE	Equity Indicator	Description of Service	C Group	Tender Amount (Rands)	Training Provided to Employees	Estimated Contract Amount (Rands)	Total Payments (Rands)
		Thompson Khusela	4CE PE	Cape Winelands: Langeberg Local Municipality: TR03101; TR03102; MR00287;	Black Owned	Vms Trailers Supplier	Manufacturer	150 377 188,95	(blank)	350 000,00	88 000,00
		Shaloti General Trading	1CE PE	Cape Winelands: Langeberg Local Municipality: TR03101; TR03102; MR00287;	Women Owned	Supplier Of Ablution Units	Materials Supplier	150 377 188,95	(blank)	200 000,00	236 603,56
		Advent Oil	N/A	West Coast: Saldanha Bay Local Municipality: NEWSAL2; TR08501; TR02102; MR00233;	Women Owned	Diesel	Raw Material supplier (based on BBBEE scorecard rating)	282 637 209,24	(blank)	8 764 346,40	2 808 249,74
		Anako Transport	N/A	West Coast: Saldanha Bay Local Municipality: NEWSAL2; TR08501; TR02102; MR00233;	Black Owned	Transport	Other Procurement	282 637 209,24	(blank)	240 000,00	417 800,00
		Booi Transport	N/A	West Coast: Saldanha Bay Local Municipality: NEWSAL2; TR08501; TR02102; MR00233;	Black Owned	Transport	Other Procurement	282 637 209,24	(blank)	240 000,00	460 000,00
		Busayi Transport	N/A	West Coast: Saldanha Bay Local Municipality: NEWSAL2; TR08501; TR02102; MR00233;	Black Owned	Transport	Other Procurement	282 637 209,24	(blank)	240 000,00	431 660,00
		Construction Project Solutions	2CE	West Coast: Saldanha Bay Local Municipality: NEWSAL2; TR08501; TR02102; MR00233;	Women Owned	Subcontractor	Subcontractor	282 637 209,24	(blank)	1 329 956,00	1 629 658,14
		Fatuse Transport	N/A	West Coast: Saldanha Bay Local Municipality: NEWSAL2; TR08501; TR02102; MR00233;	Black Owned	Transport	Other Procurement	282 637 209,24	(blank)	240 000,00	602 240,00

Contractor	Contractor CIDB	Subcontractor Name	CIDB Grading	SITE	Equity Indicator	Description of Service	C Group	Tender Amount (Rands)	Training Provided to Employees	Estimated Contract Amount (Rands)	Total Payments (Rands)
		Hyman Masterfence Pty Ltd	4CE	West Coast: Saldanha Bay Local Municipality: NEWSAL2; TR08501; TR02102; MR00233;	Women Owned	Fencing	Subcontractor	282 637 209,24	(blank)	643 627,50	846 550,32
		Kaba Transport	N/A	West Coast: Saldanha Bay Local Municipality: NEWSAL2; TR08501; TR02102; MR00233;	Black Owned	Transport	Other Procurement	282 637 209,24	(blank)	240 000,00	401 100,00
		Kinex Power Projects	6CE PE	West Coast: Saldanha Bay Local Municipality: NEWSAL2; TR08501; TR02102; MR00233;	Black Owned	Subcontractor	Subcontractor	282 637 209,24	(blank)	2 163 552,50	2 219 396,56
		Lezora Trading/Window Wide	1CE PE	West Coast: Saldanha Bay Local Municipality: NEWSAL2; TR08501; TR02102; MR00233;	Women Owned	Removal Of Paving	Subcontractor	282 637 209,24	(blank)	371 070,00	1 110 755,00
		Lourens Roadmarking	6SK	West Coast: Saldanha Bay Local Municipality: NEWSAL2; TR08501; TR02102; MR00233;	Black Owned	Roadmarking	Subcontractor	282 637 209,24	(blank)	399 050,50	216 622,80
		Magadeni Tours	N/A	West Coast: Saldanha Bay Local Municipality: NEWSAL2; TR08501; TR02102; MR00233;	Black Owned	Transport	Other Procurement	282 637 209,24	(blank)	240 000,00	347 400,00
		Mletshe Transport	N/A	West Coast: Saldanha Bay Local Municipality: NEWSAL2; TR08501; TR02102; MR00233;	Black Owned	Transport	Other Procurement	282 637 209,24	(blank)	240 000,00	76 000,00
		Ntsulumbane Transport	N/A	West Coast: Saldanha Bay Local Municipality: NEWSAL2; TR08501; TR02102; MR00233;	Black Owned	Transport	Other Procurement	282 637 209,24	(blank)	240 000,00	731 400,00

Contractor	Contractor CIDB	Subcontractor Name	CIDB Grading	SITE	Equity Indicator	Description of Service	C Group	Tender Amount (Rands)	Training Provided to Employees	Estimated Contract Amount (Rands)	Total Payments (Rands)
		Platinum Loss Control	N/A	West Coast: Saldanha Bay Local Municipality: NEWSAL2; TR08501; TR02102; MR00233;	Black Owned	Security	Other Procurement	282 637 209,24	(blank)	1 080 000,00	1 387 584,00
		Subrostar	1SL PE	West Coast: Saldanha Bay Local Municipality: NEWSAL2; TR08501; TR02102; MR00233;	Black Owned	Steel Fixer	Subcontractor	282 637 209,24	(blank)	73 762,00	1 560 683,12
		T.O Tours	N/A	West Coast: Saldanha Bay Local Municipality: NEWSAL2; TR08501; TR02102; MR00233;	Black Owned	Transport	Other Procurement	282 637 209,24	(blank)	240 000,00	303 600,00
		Zgqibs Transport	N/A	West Coast: Saldanha Bay Local Municipality: NEWSAL2; TR08501; TR02102; MR00233;	Black Owned	Transport	Other Procurement	282 637 209,24	(blank)	240 000,00	293 800,00
		Saclec	N/A	Cape Winelands: Langeberg Local Municipality: TR03101; TR03102; MR00287;	Black Owned	Clo Payment / Consulting	Subcontractor	150 377 188,95	(blank)	120 000,00	48 602,00
		Afrimat Aggregates (Pty) Ltd	N/A	Cape Winelands: Langeberg Local Municipality: TR03101; TR03102; MR00287;	Black Owned	Road Stone Supplier	Materials Supplier	150 377 188,95	(blank)	25 338 525,76	13 296 488,16
		Cyrilla Trading And Projects T/A Sher-Con	EXP	Cape Winelands: Langeberg Local Municipality: TR03101; TR03102; MR00287;	Women Owned	Road Signs Supplier	Manufacturer	150 377 188,95	(blank)	114 290,00	457 160,00
		Farm Genote T/A Trusr Patrols	N/A	Cape Winelands: Langeberg Local Municipality: TR03101; TR03102; MR00287;	Black Owned	Security	Subcontractor	150 377 188,95	(blank)	100 000,00	1 540,00

Contractor	Contractor CIDB	Subcontractor Name	CIDB Grading	SITE	Equity Indicator	Description of Service	C Group	Tender Amount (Rands)	Training Provided to Employees	Estimated Contract Amount (Rands)	Total Payments (Rands)
		Fibresky	N/A	Cape Winelands: Langeberg Local Municipality: TR03101; TR03102; MR00287;	Black Owned	Internet Connection	Materials Supplier	150 377 188,95	(blank)	17 000,00	26 506,20
		Pick 'N Pay	N/A	Cape Winelands: Langeberg Local Municipality: TR03101; TR03102; MR00287;	Black Owned	Stationary Supplier	Materials Supplier	150 377 188,95	(blank)	150 000,00	40 000,00
		Robertson Shell	N/A	Cape Winelands: Langeberg Local Municipality: TR03101; TR03102; MR00287;	Black Owned	Fuel Supplier	Materials Supplier	150 377 188,95	(blank)	100 000,00	584 849,12
		Stz Corporation	1CE PE	Cape Winelands: Langeberg Local Municipality: TR03101; TR03102; MR00287;	Black Owned	Patching And Repairing Of Edge Breaks	Subcontractor	150 377 188,95	(blank)	1 895 506,00	493 467,80
WBHO Construction Total										**68 180 085,41**	**37 954 086,46**
Imvula Roads and Civils Pty Ltd	8CE	Autumn Skies Trading 187	1CE PE	Eden: Oudtshoorn Local Municipality: TR07502;	Women Owned	Earthworks, Pipe Culverts, Hydraulic Structure	Subcontractor	34 948 925,27	(blank)	3 000 000,00	696 823,71
		Kc Traffic Services	1CE	Eden: Oudtshoorn Local Municipality: TR07502;	Women Owned	Road Marking - Permanent Road Signs	Subcontractor	34 948 925,27	(blank)	660 000,00	2 767 621,50
		Kc Traffic Services		Central Karoo: Prince Albert Local Municipality: DR01725; MR00582; TR03401; TR03402;	Black Owned	Traffic Control Services	Subcontractor	73 388 925,34	(blank)	3 295 200,00	8 795 716,23
		Hei Way	N/A	Eden: Oudtshoorn Local Municipality: TR07502;	Black Owned	Supply And Installation Of Guardrails	Other Procurement	34 948 925,27	(blank)	2 190 000,00	3 990 560,10
		Imvusa Trading 1581	2CE PE	Eden: Oudtshoorn Local Municipality: TR07502;	Women Owned	Construction Plant Hire	Other Procurement	34 948 925,27	(blank)	300 000,00	193 527,00

Contractor	Contractor CIDB	Subcontractor Name	CIDB Grading	SITE	Equity Indicator	Description of Service	C Group	Tender Amount (Rands)	Training Provided to Employees	Estimated Contract Amount (Rands)	Total Payments (Rands)
		Alfa And Omega	N/A	Eden: Oudtshoorn Local Municipality: TR07502;	Black Owned	Small Earthworks, Clearing Grubbing	Subcontractor	34 948 925,27	Life skills training; Occupational health and safety training; Estimating and Tendering ;	400 000,00	483 669,57
		Colyns Transport	N/A	Eden: Oudtshoorn Local Municipality: TR07502;	Women Owned	Hire Of Site Office And Laboratory	Other Procurement	34 948 925,27	(blank)	322 000,00	290 360,64
		Deon Donson/Masisebe nzisane	1GB	Eden: Oudtshoorn Local Municipality: TR07502;	Black Owned	Small Earthworks, Clearing Rubbing	Subcontractor	34 948 925,27	(blank)	400 000,00	911 388,48
		Es Delport	1CE PE	Eden: Oudtshoorn Local Municipality: TR07502;	Women Owned	Small Earthworks, Clearing Grubbing	Subcontractor	34 948 925,27	(blank)	200 000,00	371 139,87
		Gjc Enterprise	N/A	Eden: Oudtshoorn Local Municipality: TR07502;	Black Owned	Small Earthworks, Clearing Grubbing	Subcontractor	34 948 925,27	Life skills training; Occupational health and safety training; Estimating and Tendering ;	200 000,00	291 410,97
		Isizwe Civils/Fj Delport	2CE PE	Eden: Oudtshoorn Local Municipality: TR07502;	Black Owned	Small Earthworks, Clearing Grubbing	Subcontractor	34 948 925,27	(blank)	400 000,00	1 155 538,83
		Kearahn Enterprise	1CE PE	Eden: Oudtshoorn Local Municipality: TR07502;	Black Owned	Small Earthworks, Clearing Grubbing	Subcontractor	34 948 925,27	(blank)	400 000,00	745 015,80
		Njikelela Construction	1CE PE	Eden: Oudtshoorn Local Municipality: TR07502;	Women Owned	Small Earthworks, Clearing Grubbing	Subcontractor	34 948 925,27	Life skills training; Estimating and Tendering ;	400 000,00	887 132,88

Contractor	Contractor CIDB	Subcontractor Name	CIDB Grading	SITE	Equity Indicator	Description of Service	C Group	Tender Amount (Rands)	Training Provided to Employees	Estimated Contract Amount (Rands)	Total Payments (Rands)
		Saclec	N/A	Eden: Oudtshoorn Local Municipality: TR07502;	Black Owned	Clo And Labour Management	Other Procurement	34 948 925,27	(blank)	162 000,00	96 288,00
		Sanitech Enterprises	1GB PE	Eden: Oudtshoorn Local Municipality: TR07502;	Women Owned	Toilet Hire	Other Procurement	34 948 925,27	(blank)	45 600,00	80 335,80
		Sizisa Ukhanyo Trading 792	3CE PE	Eden: Oudtshoorn Local Municipality: TR07502;	Women Owned	Small Concrete And Earthworks	Subcontractor	34 948 925,27	Concrete handling, placing and finishing;	1 880 000,00	2 184 892,08
		Ss Harmse	N/A	Eden: Oudtshoorn Local Municipality: TR07502;	Women Owned	Small Earthworks, Clearing Grubbing	Subcontractor	34 948 925,27	(blank)	400 000,00	788 395,35
		Duneco Bk	4CE PE	Central Karoo: Prince Albert Local Municipality: DR01725; MR00582; TR03401; TR03402;	Black Owned	Earthworks And Plant Hire	Subcontractor	73 388 925,34	(blank)	1 987 500,40	14 981 961,75
		Kgota Holdings	1CE PE	Central Karoo: Prince Albert Local Municipality: DR01725; MR00582; TR03401; TR03402;	Black Owned	Kerbing, Edge Beams, And Related Works	Subcontractor	73 388 925,34	(blank)	975 200,58	1 835 154,99
Imvula Roads and Civils Pty Ltd Total										**17 617 500,98**	**41 546 933,55**
Amandla Umzali JV	8CE	8CE	Ikapa Quarries	N/A	West Coast: Saldanha Bay Local Municipality: MR00240;	Black Owned	Sales And Transport Of Aggregates	93 813 378,08	(blank)	21 500 000,00	120 864,88
Amandla Umzali JV Total										**21 500 000,00**	**120 864,88**
Amandla JV	8CE	Ayslie Enterprises	1CE	Eden: Kannaland Local Municipality: MR00309;	Women Owned	Labour	Subcontractor	32 514 975,82	(blank)	2 100 000,00	38 890,00

Contractor	Contractor CIDB	Subcontractor Name	CIDB Grading	SITE	Equity Indicator	Description of Service	C Group	Tender Amount (Rands)	Training Provided to Employees	Estimated Contract Amount (Rands)	Total Payments (Rands)
		Golden Awards Construction	N/A	Eden: Kannaland Local Municipality: MR00309;	Women Owned	Office Services And Labour	Subcontractor	32 514 975,82	(blank)	1 600 000,00	252 916,18
		Western Cape Signs Cc	N/A	Eden: Kannaland Local Municipality: MR00309;	Women Owned	Road Signs Manufacturer/Supplier	Manufacturer	32 514 975,82	(blank)	50 000,00	84 281,20
		Afriserv (Pty) Ltd	4SK PE	Eden: Kannaland Local Municipality: MR00309;	Black Owned	Landscaping	Subcontractor	32 514 975,82	(blank)	1 351 957,50	81 044,00
Amandla JV Total										**5 101 957,50**	**457 131,38**
Egon Civils	6CEPE	Anna Ruiters	1CE	Eden: Oudtshoorn Local Municipality: DR01671; TR03301; TR03302; DR01680; MR00358;	Women Owned	Maintenance	Other Procurement	14 048 645,30	(blank)	1 106 870,35	93 626,10
		Anna Ruiters				Maintenance	Subcontractor	14 048 645,30	First Aid Training; Handle, transport, store and utilize hazardous materials on a construction site; Life skills training; Fire Fighting; Flagman Stop/Go training; Safe Use of Chainsaws; Operating Lawnmowers and Weedeaters;	1 106 870,35	986 267,81
Egon Civils Total										**2 213 740,70**	**1 079 893,91**

Contractor	Contractor CIDB	Subcontractor Name	CIDB Grading	SITE	Equity Indicator	Description of Service	C Group	Tender Amount (Rands)	Training Provided to Employees	Estimated Contract Amount (Rands)	Total Payments (Rands)
Shar Civils cc	8CEPE	Nikkiys Cartage (Pty) Ltd	1CE	Cape Winelands: Stellenbosch Local Municipality: DR01067; MR00027; DR01065; DR01064; DR01053; DR01069;	Black Owned	Traffic Accomodation	Subcontractor	99 252 674,39	Flagman Stop/Go training;	3 500 000,00	588 719,24
		Otto Signs	1CE	Cape Winelands: Stellenbosch Local Municipality: DR01067; MR00027; DR01065; DR01064; DR01053; DR01069;	Women Owned	Road Signs	Materials Supplier	99 252 674,39	(blank)	1 200 000,00	31 812,00
		Colas	N/A	Cape Winelands: Stellenbosch Local Municipality: DR01067; MR00027; DR01065; DR01064; DR01053; DR01069;	Women Owned	Bitumen Suppliers	Materials Supplier	99 252 674,39	(blank)	4 147 200,00	54 981,32
		Mokwena Brink Asphalting	1CE	Cape Winelands: Stellenbosch Local Municipality: DR01067; MR00027; DR01065; DR01064; DR01053; DR01069;	Black Owned	Asphalting Subcontractor	Subcontractor	99 252 674,39	(blank)	1 900 000,00	171 775,00
Shar Civils cc Total										**10 747 200,00**	**847 287,56**
WTW Civil Pty Ltd	8CE	5p'S Trading	2CE PE	Overberg: Theewaterskloof Local Municipality: TR03001; TR03002;	Women Owned	Texture Slurry	Subcontractor	47 563 098,27	(blank)	350 000,00	110 647,26
		Kleinhans Construction Pty Ltd	4CE	Eden: Oudtshoorn Local Municipality: TR08801;	Women Owned	Concrete Culverts, Drains, Guard Rails	Subcontractor	29 479 249,03	(blank)	2 305 344,21	27 230,12

Contractor	Contractor CIDB	Subcontractor Name	CIDB Grading	SITE	Equity Indicator	Description of Service	C Group	Tender Amount (Rands)	Training Provided to Employees	Estimated Contract Amount (Rands)	Total Payments (Rands)
		Kc Traffic Services	1CE	Eden: Oudtshoorn Local Municipality: TR08801;	Women Owned	Traffic Accommodation	Subcontractor	29 479 249,03	Flagman Stop/Go training;	2 804 100,00	5 608 804,76
		Kc Traffic Services	1CE PE	Central Karoo: Beaufort West Local Municipality: TR03501;	Women Owned	Traffic Accomodation	Subcontractor	20 588 853,85	Traffic accommodation;	2 263 607,00	3 214 590,50
		Mega Bouers (Pty) Ltd	4CE	Overberg: Theewaterskloof Local Municipality: TR03001; TR03002;	Black Owned	Traffic Accomodation	Subcontractor	47 563 098,27	Flagman Stop/Go training;	5 400 000,00	1 908 948,20
		Duneco Bk	4CE PE	Central Karoo: Beaufort West Local Municipality: TR03501;	Black Owned	Texture Slurry	Subcontractor	20 588 853,85	(blank)	980 000,00	1 867 643,58
		Kgota Holdings	1CE PE	Central Karoo: Beaufort West Local Municipality: TR03501;	Women Owned	Mowing And Clearing Road Reserve	Subcontractor	20 588 853,85	(blank)	240 000,00	255 588,00
		Lcm Construction (Pty)Ltd	5GB PE	Eden: Oudtshoorn Local Municipality: TR08801;	Black Owned	Clear And Grub	Subcontractor	29 479 249,03	(blank)	2 489 806,90	1 181 181,50
		Oakridge Rading 135 Cc	N/A	Eden: Oudtshoorn Local Municipality: TR08801;	Women Owned	Diesel Supplier	Materials Supplier	29 479 249,03	(blank)	1 200 000,00	1 988 601,40
WTW Civil Pty Ltd Total										**18 032 858,11**	**16 163 235,32**
Talon Construction	7CE	Kolossie General Trading Cc	4CE PE	West Coast: Bergrivier Local Municipality: DR02176; MR00536; DR02175; DR02159; MR00539; MR00537; MR00310; DR02215; DR02178; MR00526;	Women Owned	Rrm	Subcontractor	9 673 049,34	(blank)	2 300 000,00	47 873,34

Contractor	Contractor CIDB	Subcontractor Name	CIDB Grading	SITE	Equity Indicator	Description of Service	C Group	Tender Amount (Rands)	Training Provided to Employees	Estimated Contract Amount (Rands)	Total Payments (Rands)
		Kolossie General Trading Cc		West Coast: Cederberg Local Municipality: MR00535; DR02188; DR02181; MR00543; MR00540; MR00538; MR00531; DR02184; DR01487; DR02189; DR02178; MR00544; MR00542; DR02196;	Women Owned	Rrm	Subcontractor	22 120 912,26	(blank)	2 303 378,70	127 309,10
		Saclawa Enterprises	4CE PE	West Coast: Bergrivier Local Municipality: MR00529; OP05520; DR02242; MR00538; MR00532; MR00531; MR00528; DR02171; DR01175; DR02163; MR00236; DR02161; DR02166; MR00527; MR00534; DR02157;	Black Owned	Rrm	Subcontractor	15 497 647,35	(blank)	1 500 000,00	119 334,27
Talon Construction Total										**6 103 378,70**	**294 516,71**

Appendix M – Skills gained

Programme/Type of Training Provided	Number of persons trained/Financial Year								Grand Total
	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	
Construction	**618**	**284**	**770**	**724**	**979**	**699**	**547**	**510**	**5 131**
Application of fog spray and texture slurry	5	9	-	-	-	11	10	-	**35**
Basic concrete skills	27	-	11	15	-	10	14	-	**77**
Batch and mix concrete by volume	13	-	-	5	-	-	-	-	**18**
Brick laying	6	-	-	-	6	15	-	-	**27**
Brick paving			6				7		**13**
Calculate Construction quantities to develop a work plan	10	-	-	-	-	-	-	-	**10**
Chef	-	9	-	-	-	-	-	-	**9**
Concrete handling, placing and finishing	-	-	15	12	5		18	9	**59**
Concrete lined open drains	11	-	8	-	7	19	10		**55**
Concrete steel-fixing	-	-	12	-	-	26	43	12	**93**
Conduct a bituminous seal operation	-	9	-	6	-	-	-	-	**15**
Construction of headwalls and wing walls	-	-	-	-	9	14	-	-	**23**
Construction of layer works	-	-	-	6	-	-	-	-	**6**
Construction of pre-cast kerbs and channels	21	-	-	15	24	7	-	-	**67**
Drivers licences/professional driver permits	-	9	-	-	-	-	-	-	**9**
Environmental awareness induction	-	-	-	54	16	25	-	11	**106**
Erect and maintain guard rails	-	-	-	-	-	-	9	-	**9**
Erect and maintain wire fencing	-	-	-	-	1	17	-	-	**18**

Programme/Type of Training Provided	Number of persons trained/Financial Year								Grand Total
	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	
Erection of scaffolding	3	-	-	7	-	9	42	12	**73**
Establish and prepare a work area	10	-	-	-	-	-	-	5	**15**
Excavate, backfill and compact a trench	-	-	-	-	-	-	-	-	**-**
Financial Management	-	-	-	-	-	-	-	-	**-**
Fire Fighting	-	9	3	-	6	-	12	15	**45**
First Aid Training	42	9	24	6	11	5	25	10	**132**
Flagman Stop/Go training	182	129	457	227	435	165	141	269	**2 005**
Handle, transport, store and utilize hazardous materials on a construction site	10	-	-	-	4	-	-	2	**16**
Identify, describe and use materials in civil engineering construction	10	-	-	-	-	-	-	-	**10**
Install gabion baskets on a construction site	-	-	12	-	6	12	-	-	**30**
Install gabions on a construction site	8	11	-	7	-	-	17	-	**43**
Install precast concrete pipes on a construction site	10	-	-	11	-	-	-	-	**21**
Labour Intensive Construction and Task Based Systems	-	-	-	20	-	-	-	-	**20**
Laying of Sub-Surface Drains	-	-	-		-	-	-	-	**-**
Life skills training		18	34	109	56	129		56	**402**
Maintain and repair bituminous road surfaces	9	9	-	-	16	-	-	-	**34**
Maintain and repair unsurfaced road shoulders	10	-	-	-	-	-	-	-	**10**

Programme/Type of Training Provided	Number of persons trained/Financial Year								Grand Total
	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	
Monitor cost/Maintain records on a construction site	10	-	-	-	-	-	-	-	**10**
Occupational health and safety training	120	26	171	178	242	150	3	71	**961**
Operator training	-	2	-	-	-	12	3	-	**17**
Placing and compaction of hot mix asphalt	12	-	-	-	-	-	-	-	**12**
Plan and implement management at a roadworks construction site	-	-	-	-	-	-	71	-	**71**
Productivity/quality control on a construction site	10	-	-	-	-	11	-	-	**21**
Radio Control	-	-	-	-	-	-	22	-	**22**
Read and interpret construction drawings and specifications	10	-	-	-	-	-	-	-	**10**
Read/write texts for a range of communicative contexts	-	-	-	6	-	-	-	-	**6**
Repair/replace minor structures	10	-	-	-	-	-	-	10	**20**
Roadworks learnership	-	-	-	5	-	-	-	-	**5**
Role-players	7	-	-	-	-	-	-	-	**7**
Rope access	-	-	-	-	-	15	-	-	**15**
Setting out control points for centre line and edge line road marks	-	-	-	-	-	-	6	-	**6**
Shuttering	-	-	-	-	9	-	30	22	**61**
Stone pitching	-	-	14	-	-	12	-	-	**26**
Supervision and leadership on a construction site	-	-	-	12	-	-	7	6	**25**
Traffic accommodation	52	17	3	23	100	23	47	-	**265**

Programme/Type of Training Provided	Number of persons trained/Financial Year								Grand Total
	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	
Use and maintain hand tools on a construction site	-	9	-	-	2	12	10	-	**33**
Use and maintain small plant and equipment on a construction site	-	9	-	-	24	-	-	-	**33**
Maintenance	**1 248**	**451**	**1 067**	**1 039**	**1 676**	**1 382**	**840**	**1 516**	**9 219**
Application of fog spray and texture slurry	52	10	-	36	8	-	2	-	**108**
Basic Business Principles	-	3	-	4	-	-	-	-	**7**
Basic concrete skills	14	24	96	-	-	5	-	1	**140**
Basic knowledge of statistics and probability	-	-	-	33	-	9	-	1	**43**
Basic survey techniques	-	-	-	-	-	-	-	-	**-**
Batch and mix concrete by volume	-	-	18	-	-	-	-	-	**18**
Brick laying	11	-	-	-	-	-	-	-	**11**
Brick paving	-	11	-	-	4	-	-	-	**15**
Bulk Earthworks	-	-	-	-	-	-	-	-	**-**
Computer course	-	-	1	1	-	-	-	-	**2**
Concrete construction technology	-	-	-	16	-	-	-	-	**16**
Concrete handling, placing and finishing	-	-	-	12	12	5	10	11	**50**
Concrete steel-fixing	-	10	13	22	13	13	13	-	**84**
Conduct a bituminous seal operation	7	-	-	-	-	-	-	-	**7**
Construction of headwalls and wing walls	20	-	44	4	2	-	2	-	**72**
Construction of layer works	-	-	-	-	-	-	-	-	**-**
Construction of pre-cast kerbs and channels	-	12	-	-	-	8	-	5	**25**
Contract documentation	-	-	7	-	-	-	-	-	**7**

Programme/Type of Training Provided	Number of persons trained/Financial Year								Grand Total
	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	
Crack sealing	-	-	10	-	-	-	2	-	**12**
Drivers licences/professional driver permits	-	-	-	-	-	-	-	-	**-**
Environmental awareness induction	104	-	35	54	38	51	10	-	**292**
Environmental Weed Control	-	-	-	-	5	17	-	-	**22**
Erect and maintain guard rails	-	-	6	-	14	8	-	-	**28**
Erect and maintain wire fencing	17	6	-	9	-	12	-	-	**44**
Establish and prepare a work area	9	-	-	-	-	-	-	-	**9**
ETB Patches	9	-	-	23	-	-	2	-	**34**
Financial Management	11	-	-	12	-	-	-	-	**23**
Fire Fighting	11	35	13	9	10	104	66	117	**365**
First Aid Training	64	86	87	110	61	151	46	67	**672**
Flagman Stop/Go training	244	58	211	121	733	219	347	588	**2 521**
Garden Maintenance	-	-	-	6	-	-	-	-	**6**
Handle, transport, store and utilize hazardous materials on a construction site	-	-	-	13	-	-	2	3	**18**
Identify, describe and use materials in civil engineering construction	-	-	-	-	-	-	-	-	**-**
Install gabion baskets on a construction site	16	14	22	31	33	34	4	-	**154**
Install gabions on a construction site	-	-	-	12		12	2	-	**26**
Install precast concrete pipes on a construction site	-	-	18	-	-	-	-	-	**18**

Programme/Type of Training Provided	Number of persons trained/Financial Year								Grand Total
	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	
Install reno mattresses on a construction site	-	-	16	-	-	-	-	-	**16**
Interpret the composition construction sequence and processes of the construction industry	-	-	-	-	-	9	-	-	**9**
Labour Intensive Construction and Task Based Systems	1	-	15	5	55	33	-	-	**109**
Life skills training	251	44	146	130	89	81	67	135	**943**
Maintain and adapt oral communication	-	-	-	-	-	-	10	-	**10**
Maintain and repair bituminous road surfaces	23	-	12	-	-	-	-	-	**35**
Maintain vegetation and monitor structures within the road reserve	-	-	-	-	16	4	-	-	**20**
Maths literacy	-	-	-	-	-	5	-	-	**5**
Monitor cost/Maintain records on a construction site	-	-	-	-	-	-	-	-	**-**
Occupational health and safety training	228	60	167	249	226	514	195	512	**2 151**
Operator training	12	22	-	53	15	2	-	4	**108**
Placing and compaction of hot mix asphalt	-	-	-	-	-	-	-	-	**-**
Plan and implement management at a roadworks construction site	35	-	-	-	-	-	-	-	**35**
Productivity/quality control on a construction site	-	-	-	-	-	-	-	-	**-**
Radio Control	-	-	-	-	17	-	-	-	**17**
Read and interpret construction	-	-	-	-	-	-	-	-	**-**

Programme/Type of Training Provided	Number of persons trained/Financial Year								Grand Total
	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	
drawings and specifications									
Read/write texts for a range of communicative contexts	-	-	-	-	-	-	-	-	**-**
Roadworks learnership	20	10	-	12	4	-	-	-	**46**
Role-players	-	-	-	-	-	-	-	-	**-**
Rope access	5	-	-	23	8	-	-	-	**36**
Rubble/Stone masonry	15	-	-	-	-	-	-	-	**15**
Self management and personal finance	15	-	-	-	-	-	-	-	**15**
Setting out control points for centre line and edge line road marks	-	-	-	-	-	-	-	-	**-**
Shuttering	-	8	-	-	18	22	14	-	**62**
Steel reinforcement	14	10	41	-	-	-	-	-	**65**
Stone pitching	-	-	43	14	3	-	-	-	**60**
Supervision and leadership on a construction site	-	-	-	-	-	-	-	-	**-**
Traffic accommodation	40	21	21	4	289	57	44	50	**526**
Use and maintain hand tools on a construction site	-	7	25	21	3	7	-	18	**81**
Use and maintain small plant and equipment on a construction site	-	-	-	-	-	-	2	4	**6**
Grand Total	**1 866**	**735**	**1 837**	**1 763**	**2 655**	**2 081**	**1 387**	**2 026**	**14 350**

Appendix N – Corporate Branding

Background

The Corporate Identity Guidelines of the Western Cape Province were used for this report. The alternative Typeface prescribed by this document namely; Century Gothic are used in either black or the PMS 280 colour specification.

Colour coding: Condition Graphs

The colour coding prescriptions of the TMH 22 for condition and functional categories were adopted for condition related graphs. These colours are shown below.

Colour palette for condition data		
Condition category	**RGB Colour Code**	**Colour**
Very Poor	255, 102, 204	
Poor	255,0,0	
Fair	255, 255, 0	
Good	0, 255, 0	
Very Good	0, 0, 255	

Colour coding: Other Graphs

The Tertiary Colour palette of the WCG Corporate Identity Guidelines was adopted for all graphs and visual presentations not related to condition. The colours are always used in the sequence as listed in the table below:

Tertiary Colour Palette for non-condition data		
Condition category	**RGB Colour Code**	**Colour**
5493	129, 173, 181	
5135	136, 94, 128	
397	190, 184, 0	
576	102, 142, 60	
1807	161, 40, 48	
151	255, 115, 0	
464	133, 87, 35	
1245	198, 146, 0	

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The Department of Transport and Public Works delivers infrastructure and services to promote socio-economic outcomes and safe, empowered and connected communities.

Afrikaasn and isiXhosa versions of this document are available on request.

Western Cape
Government

Transport and Public Works