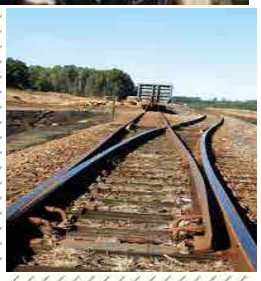


Leading. Vibrant. Global.
www.aurecongroup.com

The Determination of Forestry Transport Requirements in relation to Transport Development Plans at National, Provincial and Municipal Level

Project 107518

Submitted by:
Aurecon South Africa (Pty) Ltd
Aurecon Centre, 4 Daventry Street
Lynnwood Manor, 0081

Contact Person:
Malebo Matolong
T: +27 12 427 2011
E:malebo.matolong@aurecongroup.com

Submitted to:
The Department of Agriculture, Forestry and Fisheries
110 Hamilton Street
Pretoria
0001
Contact Person:
Nelly Mjikwa
Tel: +27 12 309 5788
E: nellymj@daff.gov.za

agriculture, forestry & fisheries
Department: Agriculture, Forestry and Fisheries
REPUBLIC OF SOUTH AFRICA

Submission date: 18 July 2012

Forestry Infrastructure Requirement Plan Final Report

Version no: 3

Quality Control Sheet

<table>
<tr><th colspan="5">Project Title</th><th>Project Number</th></tr>
<tr><td colspan="5">Determination of Forestry Transport Infrastructure Requirements in relation to the Transport Development Plans at National, Provincial and Municipal Level</td><td>107518</td></tr>
<tr><td colspan="2">Document Title</td><td colspan="4">Forestry Transport Requirement Plan</td></tr>
<tr><td colspan="2">File Reference</td><td colspan="4">P:\Projects\107518 Forestry Transp Infr Requirements\3 Delivery\6 Reports\Final Report\DAFF Transport Infrastructure Requirement Plan Final_July 2012.docx</td></tr>
<tr><td>Version</td><td>Date (dd/mm/my)</td><td>Filename</td><td colspan="3">DAFF Transport Infrastructure Requirement Plan_Draft Final_03052012_Update.docx</td></tr>
<tr><td rowspan="5">Final</td><td rowspan="5">19/07/2012</td><td>Description</td><td colspan="3">Transportation Infrastructure Requirement supporting the Forestry Industry</td></tr>
<tr><td></td><td>Prepared by</td><td>Peer Reviewed by</td><td>Approved by</td></tr>
<tr><td>Name</td><td>Adri van de Wetering
Altus Moolman
Brad Shuttle worth
Eunice Vaz
Gugulethu Hlanze
Jeff Zingel
Katlego Magoro
Lesedi Mokoma
Lynette Coetzer
Malebo Matolong</td><td>Jeff Zingel</td><td>Bernard van Biljon</td></tr>
<tr><td>Signature</td><td colspan="2"></td><td></td></tr>
<tr><td>DAFF Approved</td><td colspan="2"></td><td></td></tr>
</table>

Contents

1. INTRODUCTION 1

1.1 Background 1

1.2 Situational Analysis for the Study 1

1.3 Objectives and Needs of the Study 3

1.4 Methodology 3

1.4.1 Phase 1: Data Collection 4
1.4.2 Phase 2: Assessment of Status Quo and Future Development 4
1.4.3 Phase 3: Review of Infrastructure Programmes and Transport Plans 5
1.4.4 Phase 4: Identification of Challenges and Opportunities 5
1.4.5 Phase 5: Recommendations 5

1.5 Project Limitations 5

1.6 Structure for this Report 6

2. STATUS QUO ASSESSMENT OF FORESTRY INDUSTRY 7

2.1 Overview of the Forestry Industry 7

2.2 Economic Inter-relationships 10

2.2.1 Industry Supply and Value Chains 10
2.2.2 Forestry Plantation Ownership 11
2.2.3 Volumes by Product Type 13
2.2.4 Transport Modes 14
2.2.5 Implications for Transport Requirements 15

2.3 Key Institutional Drivers in Forestry Sector 16

2.3.1 Industry Associations 16
2.3.2 Freight Task Groups 16
2.3.3 Cluster and Corridor Working Groups 17

2.4 Location of Forestry Areas, Resources and Facilities 17

2.4.1 Forestry Areas 17
2.4.2 Facilities 18

3. STATUS QUO ASSESSMENT OF TRANSPORT INFRASTRUCTURE 20

3.1 Transport Distribution Routes 20

3.1.1 Introduction 20
3.1.2 Trip Generation Rates 20
3.1.3 Trip Attraction Rates 21
3.1.4 Forestry Transport Network 23
3.1.5 Trip Distribution 23
3.1.6 Modal Split 24
3.1.7 Routes Assignment 26
3.1.8 Forestry Related Traffic Levels (Current Situation) 26

3.2 Extent of Forestry Industry Transport Infrastructure 33

3.2.1 Introduction 33
3.2.2 Overview of the South African Road Transport Infrastructure 33
3.2.3 Overview of the South African Rail Transport Infrastructure 35

3.2.4 Extent of Transportation Infrastructure serving the Forestry Sector per Province 36
3.3 Condition of Transport Infrastructure serving the Forestry Sector per Province 47
3.3.1 Condition of Road Infrastructure serving the Forestry Sector 47
3.3.2 Condition of Rail Infrastructure serving the Forestry Sector 50
3.4 Extent and Condition of Intermodal Facilities 53
3.4.1 Road-Rail-Water Intermodal Facilities 53
3.4.2 Road-Rail Intermodal Facilities 55
3.5 Reduced Activities on Rail Facilities 61
3.6 Major Capacity Constraints 62
3.6.1 Capacity Constraints for Road Network Serving the Forestry Sector 63
3.6.2 Capacity Constraints of Rail Network serving the Forestry Sector 67
3.7 Major Operational Constraints 68
3.7.1 Operational Constraints impacting the Forestry Road Network 68
3.7.2 Operational Constraints impacting the Forestry Rail Network 68
4. FUTURE FORESTRY INDUSTRY PLANNING 69
4.1 Overview of Policy Objectives and Strategic Planning 69
4.2 Overview of Areas of Potential Identified for Future Planting and Processing and their Implications for Transport Infrastructure 70
4.2.1 Limpopo 72
4.2.2 Mpumalanga 73
4.2.3 KwaZulu Natal 74
4.2.4 Eastern Cape 75
4.2.5 Western Cape 78
4.3 Overview of Constraints and Opportunities per Industry Sub-Segment 78
4.3.1 Introduction 78
4.3.2 Growing 79
4.3.3 Processing 80
4.3.4 Transport Contracting 81
4.3.5 Sawmilling 81
4.3.6 Poles 82
4.4 Current and Future Transport Requirements for the Forestry Sector 82
4.4.1 Introduction 82
4.4.2 Modal split 82
4.4.3 Resulting Future Traffic Patterns 83
4.4.4 Capacity and Supply Constraints 98
5. SPECIFIC ISSUES IN RELATION TO FORESTRY TRANSPORT PLANNING AND THEIR IMPLICATIONS FOR FUTURE TRANSPORT INFRASTRUCTURE NEEDS 104
5.1 Policy Guidelines on Shift of Freight from Road to Rail Mode 104
5.1.1 Introduction 104
5.1.2 Deregulation of Freight Transport 104
5.1.3 White Paper on National Transport Policy 105
5.1.4 National Freight Logistics Strategy 106
5.1.5 Road Freight Strategy for South Africa 106
5.1.6 Draft Green Paper on Rail Transport 107
5.1.7 National Transport Master Plan (NATMAP) 2050 107
5.1.8 Transnet Concessioning of Branch Lines 109
5.1.9 Conclusions and Impact on Forestry Industry 111

5.2 Assessment of Climate Change and its Industry Impacts....112
5.2.1 Broad Policy and Context -Agriculture and Commercial Forestry....112
5.2.2 Relevant Policy Implementation Measures and Instruments....115
5.2.3 Forestry and Transport Infrastructure sub-sectors Response to Date....117
5.2.4 Transport and Infrastructure....118
5.2.5 Summary and Conclusions....119
5.3 Assessment of Change in Energy Source and its Impacts on Industry....119
5.3.1 Introduction....119
5.3.2 Status Quo....119
5.3.3 Challenges....121
5.3.4 Scenarios of Availability of Liquid Fuel....122
5.3.5 Bridging the Gap....124
5.3.6 Conclusions and Recommendations....126
5.3.7 Conclusions and Implications for the Forestry Industry....126
5.4 Assessment of Technology Change in Harvesting and Processing of Timber....127
5.4.1 Current Harvesting Systems....127
5.4.2 Shift to Biomass as a Key Product....128
5.4.3 Summary....129
5.5 Assessment of Progress with the Road Transport Management System....130
5.5.1 Introduction....130
5.5.2 What is RTMS?....131
5.5.3 Major Advantages of RTMS for Heavy Vehicle Transporters....132
5.5.4 Status of Implementation of RTMS....132
5.5.5 Feedback from Stakeholders....133
5.5.6 Conclusions and Implications for the Forestry Industry....133
5.6 Assessment of Progress with Performance Based Standards....134
5.6.1 Introduction....134
5.6.2 What is PBS?....134
5.6.3 Major Advantages of PBS for Heavy Vehicle Transporters....135
5.6.4 Status of Implementation of PBS....136
5.6.5 Feedback from Stakeholders....137
5.6.6 Conclusions and Implications for the Forestry Industry....137
6. REVIEW: ADEQUACY AND IMPLICATIONS OF EXISTING INFRASTRUCTURE PROGRAMMES AND TRANSPORT PLANS ON FORESTRY TRANSPORT INFRASTRUCTURE NEEDS....138
6.1 Introduction....138
6.2 Status and Adequacy of Transport Frameworks and Plans....138
6.2.1 The National Transport Master Plan (NATMAP 2050)....138
6.2.2 The Review of Provincial and District Transport Plans....139
6.3 Status, Adequacy and Implications of Transnet's Rail Plans....140
6.3.1 Budget 140
6.3.2 Planned Infrastructure Projects....142
6.3.3 Branch Line Concession Approach....143
6.3.4 Stakeholder Feedback on Transnet Current Services....143
6.3.5 Adequacy of Transnet Plans....144
6.4 Status and Adequacy of Infrastructure Programme....144
6.4.1 Extended Public Works Programme....144
6.4.2 The Comprehensive Agricultural Support Programme (CASP)....145
6.4.3 Municipal Infrastructure Grant Planning....145

6.5 Implications of the Review Findings for Forestry Transport Requirements 146
7. CASE STUDY AND INTERVIEWS 147
7.1 Introduction 147
7.2 Perspectives on limits and strengths in existing and planned transport infrastructure147
7.2.1 Larger Organisations 147
7.2.2 Smaller Organisations and Contractors 150
7.3 Future Requirements 153
8. BARRIERS, CHALLENGES AND OPPORTUNITIES IN MEETING FORESTRY TRANSPORT NEEDS 156
8.1 Introduction 156
8.2 A Profile of Transport Infrastructure Issues and Needs 156
8.3 Barriers to Meeting the Transport Infrastructure Needs.....156
8.4 Required Infrastructure Programme for Future Years 157
9. INFRASTRUCTURE REQUIREMENTS FOR THE FORESTRY SECTOR 163
9.1 Review of Project Objectives 163
9.2 List of Recommendations to Key Departments 163
9.3 Infrastructure Requirements for the Forestry Sector 170
9.4 Major Operational Requirements for the Forestry Sector 170

Tables

Table 2-1: Forestry Supply Chain Operations 10
Table 2-2: Different Costs of each Operation on Total Production Cost..... 11
Table 2-3: Ownership and Plantation Areas per Province..... 11
Table 2-4: Total Timber Usage in Tonnes 13
Table 2-5: Distribution of Plantation Area by Zone (2008/9)..... 18
Table 2-6: Primary Roundwood Processing Plants by Size 19
Table 3-1: Roundwood Production (and therefore trip generation rate) by Zone (2008/9).... 21
Table 3-2: Modal Split Criteria Assumed for Pulp Volumes (Current Situation) 26
Table 3-3: Extent of Road Network in South Africa 35
Table 3-4: Description of the Railway Classification..... 35
Table 3-5: The Extent of Road Network serving the Forestry Industry in Eastern Cape Province..... 37
Table 3-6: The Characteristics of Road Network serving the Forestry Industry in Eastern Cape Province 38
Table 3-7: Extent of Rail Network serving the Forestry Industry in Eastern Cape Province.. 38
Table 3-8: The Extent of Road Network serving the Forestry Industry in KwaZulu Natal Province..... 39
Table 3-9: The Characteristics of Road Network serving the Forestry Industry in KwaZulu Natal Province 40
Table 3-10: Extent of Rail Network serving the Forestry Industry in KwaZulu Natal Province 41
Table 3-11: The Extent of Road Network serving the Forestry Industry in Limpopo Province 41
Table 3-12: The Characteristics of Road Network serving the Forestry Industry in Limpopo Province..... 42
Table 3-13: Extent of Rail Network serving the Forestry Industry in Limpopo Province..... 42
Table 3-14: The Extent of Road Network serving the Forestry Industry in Mpumalanga Province..... 43
Table 3-15: The Characteristics of Road Network serving the Forestry Industry in Mpumalanga Province..... 44
Table 3-16: Extent of Rail Network serving the Forestry Industry in Mpumalanga Province. 44
Table 3-17: The Extent of Road Network serving the Forestry Industry in Western Cape Province..... 45
Table 3-18: The Characteristics of Road Network serving the Forestry Industry in Western Cape 46
Table 3-19: Extent of Rail Network serving the Forestry Sector in the Western Cape Province 47
Table 3-20: Condition of Forestry Road Network per Province 48

Table 3-21: State of Rail Network serving the Forestry Sector 51
Table 3-22: Train Stations handling Forestry produce in KwaZulu Natal Province 56
Table 3-23: Forestry Road Network FONA Summary 64
Table 4-1: Possible Forestry Development Area in Limpopo 72
Table 4-2: Possible Forestry Development Area in KwaZulu Natal 74
Table 4-3: Existing and Potential Forestry Blocks in the Study Area (ha) 76
Table 4-4: Existing and Potential Forestry Blocks in the Study Area (ha) 76
Table 4-5: Existing and Potential Forestry Blocks in the Eastern Cape 77
Table 4-6: Modal Split Criteria Assumed for Pulp Volumes (Rail Scenario) 83
Table 4-7: Forestry Road Network FONA Summary 99
Table 4-8: Comparison of Required Road Upgrades for 2030 101
Table 5-1: Branch Line Clusters Carrying Wood Products 110
Table 5-2: Energy Use in Transportation 121
Table 5-3: Transport Interventions and its Perceived Impact 125
Table 5-4: Measured Benefits from the Two PBS Demonstration Projects 136
Table 6-1: Annual Expenditure on Capital and Replacement of Rail Assets 141
Table 6-2: Annual Expenditure by Asset Class 141
Table 6-3: Rail Projects in Transnet's Infrastructure Plan that impact on Forestry Transport Rail Network 142
Table 6-4: Comparison of Required Road Upgrades for 2030 146
Table 7-1: Emerging Contractors Views on District Road Conditions 151
Table 7-2: General Projects: Transport Infrastructure for New Afforestation in Northern Parts of Eastern Cape 154
Table 8-1: Summary of Infrastructure Upgrades Required to Forestry Transport Network . 158
Table 9-1: Review on Project Objectives 164

Figures

Figure 1-1: Project Methodology for the Forestry Transport Infrastructure Requirement Plan 4
Figure 2-1: Forestry Ownership in South Africa 8
Figure 2-2: Overall Plantation Ownership 12
Figure 2-3: Plantation Ownership in KwaZulu Natal 12
Figure 2-4: Plantation Ownership in Mpumalanga and Swaziland 13
Figure 2-5: Plantation Ownership in Eastern and Western Cape 13
Figure 2-6: Pulpwood Demand 2001 - 2014 14
Figure 2-7: Baseline (top) and Performance-Based Standards (below) 15
Figure 2-8: Reducing Tare Mass through Engineering Excellence 15
Figure 2-9: Number of Primary Roundwood Processing Plants by Type 18
Figure 3-1: Trip Generation Rates over the Period 2004/5 to 2008/9 21
Figure 3-2: Roundwood Production by Product Type and Zone (2008/9) 22
Figure 3-3: Average Volume Sold (and therefore trip attraction rate) per Plant (2008/9) 22
Figure 3-4: Current Forestry Volumes per Road and Rail: South Africa 27
Figure 3-5: Current Forestry Volumes per Road and Rail: Eastern Cape 28
Figure 3-6: Current Forestry Volumes per Road and Rail: KwaZulu Natal 29
Figure 3-7: Current Forestry Volumes per Road and Rail: Limpopo 30
Figure 3-8: Current Forestry Volumes per Road and Rail: Mpumalanga 31
Figure 3-9: Current Forestry Volumes per Road and Rail: Western Cape 32
Figure 3-10: Visual Condition Index 48
Figure 3-11: Condition of Forestry Road Network per Province 49
Figure 3-12: Overall Condition of Forestry Road Network 50
Figure 3-13: Usage of Stations and Loading Points for South Africa (2005) 62
Figure 3-14: Data Needs for FONA 64
Figure 3-15: Average Directional (50/50 Split) ADT per Province for Base Year 2015 65
Figure 3-16: Percentage of Forestry Road Network Operating at LOS D per Province for Base Year 2015 66
Figure 3-17: Capacity Utilisation for Rail (2010) 67
Figure 4-1: Total Plantation Area (1980 – 2009) 70
Figure 4-2: Areas Suitable for Forestry Development in Limpopo (green shades) 73
Figure 4-3: Potential Forestry Development Areas in KwaZulu Natal 75
Figure 4-4: Future Forestry Volumes per Road and Rail (Trend Scenario): South Africa 84
Figure 4-5: Future Forestry Volumes per Road and Rail (Trend Scenario): Eastern Cape 85
Figure 4-6: Future Forestry Volumes per Road and Rail (Trend Scenario): KwaZulu Natal 86

Figure 4-7: Future Forestry Volumes per Road and Rail (Trend Scenario): Limpopo 87
Figure 4-8: Future Forestry Volumes per Road and Rail (Trend Scenario): Mpumalanga 88
Figure 4-9: Future Forestry Volumes per Road and Rail (Trend Scenario): Western Cape .. 89
Figure 4-10: Future Main Forestry Corridors (Trend Scenario): South Africa 90
Figure 4-11: Future Forestry Volumes per Road and Rail (Rail Scenario): South Africa 92
Figure 4-12: Future Forestry Volumes per Road and Rail (Rail Scenario): Eastern Cape 93
Figure 4-13: Future Forestry Volumes per Road and Rail (Rail Scenario): KwaZulu Natal... 94
Figure 4-14: Future Forestry Volumes per Road and Rail (Rail Scenario): Limpopo 95
Figure 4-15: Future Forestry Volumes per Road and Rail (Rail Scenario): Mpumalanga 96
Figure 4-16: Future Forestry Volumes per Road and Rail (Rail Scenario): Western Cape ... 97
Figure 4-17: Future Main Forestry Corridors (Rail Scenario): South Africa 98
Figure 4-19: Percentage of Forestry Road Network Operating at LOS D per Province for Trend Scenario in Future Year 2020 99
Figure 4-20: Percentage of Forestry Road Network Operating at LOS D per Province for Trend Scenario in Future Year 2030 101
Figure 4-20: Expected Capacity Utilisation for Rail (2020) (assuming no investments made) 102
Figure 4-21: Expected Capacity Utilisation for Rail (2030) (assuming no investments made) 103
Figure 5-1: Energy Use in South Africa (2006) 120
Figure 5-2: Petroleum Consumption by Sector (2006) 120
Figure 5-3: Discovery of Oil Fields and Historical Production 122
Figure 5-4: Scenario 1: Well-planned journey 123
Figure 5-5: Road Transport Efficiency Measures – Passenger 124
Figure 5-6: Road Transport Efficiency Measures – Freight 125
Figure 5-7: Cut to Length Harvesting System 127
Figure 5-8: Multi-Stem Harvesting System 128
Figure 5-9: NOCS in Relation to RTMS 130
Figure 5-10: RTMS Main Standards 131
Figure 5-11: Overload Reduction in the Forestry Industry 132
Figure 5-12: Spatial Distribution of RTMS Accredited Companies within South Africa 133
Figure 5-13: Benefits of More Productive Vehicles 134
Figure 5-14: Example of the PBS Vehicles used by Sappi (overall length of 27.0m and maximum combination mass of 67.5 tonnes) 135
Figure 5-15: PBS Role Players and their Objectives 136
Figure 6-1: Total Cost per Transport Sector (2010 – 2050) 139
Figure 7-1: Thuthithali Timber Train 148
Figure 7-2: Medium Sized Transport Contractor at Roadside 151

Glossary of Terms & Abbreviations

BBBEE	Broad Based Black Economic Empowerment
CASP	Community Agricultural Support Programme
CB	Caron Budgets
COCO	Committee on Forestry
CoC	Chain of Custody
CSIR	Council for Scientific and Industrial Research
CTC	Centralised Traffic Control
CTC	Central Timber Cooperative
CTL	Cut to Length
DAFF	Department of Agriculture, Forestry and Fisheries
DEA	Department of Environment Affairs
DPE	Department of Public Enterprises
DWAF	Department of Water Affairs and Forestry
EC	Eastern Cape Province
EIA	Environmental Impact Assessment
EOI	Expression of Interest
EPWP	Expanded Public Works Programme
FAO	Food and Agriculture Organisation
FSA	Forestry South Africa
FSC	Forest Stewardship Council
FTTP	Forestry, Timber, Pulp, and Paper
GSDM	Gert Sibande District Municipality
ha	Hectares
IPAP	Industrial Policy Action Plan
ITP	Integrated Transport Plan
KZN	KwaZulu Natal Province
MIDP	Mpumalanga Infrastructure Development Plan
MIG	Municipal Infrastructure Grant
MS	Multi Stem
MVR	Monitoring, Verifying and Reporting
NATMAP 2050	National Transport Master Plan
NCT	Natal Cooperative Timbers
NGP	New Growth Path
NHVAS	National Heavy Vehicle Accreditation Scheme

NIP	National Infrastructure Plan
NLTA	National Land Transport Act
NLTSF	National Land Transport Strategic Framework
NOCS	National Overload Control Strategy
NTPS	National Transport Policy Study
PBS	Performance Based Standards
PGDS	Provincial Growth and Development Strategy
PLC	Programmable Logic Controller
PLTF	Provincial Land Transport Framework
PSDP	Provincial Spatial Development plan
RMS	Road Management System
RTMS	Road Transport Management System
RTQS	Road Transport Quality System
SADC	South African Development Community
SAFCOL	South African Forestry Company Limited
SARCC	South African Rail Commuter Corporation
SDF	Spatial Development Framework
SLIMF	Small and Low Intensity Management Forests
SARCC	South African Rail Commuter Corporation
Teu	Twenty foot equivalent unit
TFR	Transnet Freight Rail
ToR	Terms of Reference
VCI	Visual Condition Index
VTS	Vessel Tracking System
WC	Western Cape Province

Executive Summary

The primary purpose and scope of this report is to assess the current status of, and future requirements for transport infrastructure across the South African forestry sector as a whole. These requirements, developed by means of extensive technical analyses, database examination, questionnaires and case study interviews, are presented as recommendations for alignment with transport development plans at national, provincial, district and municipal levels. They will be submitted by the Department of Agriculture, Forestry and Fisheries for inclusion by the Department of Transport's Technical and Financial Committee into the National Transport Master Plan 2050 Project. It will be the responsibility of the relevant Directorate in the Department of Agriculture, Forestry and Fisheries to further promote, align, coordinate and monitor -'to keep alive'- these proposed investments over time across all the relevant national, provincial, district and local agencies and authorities, as well as with private and community agencies active in the sector, to ensure their effective uptake and timely implementation and adoption.

The first two chapters establish the phased approach undertaken, the policy and industry context and structure, and the industry transport arrangements which the project addresses. Considerable work has been undertaken since 1994 in support of economic, social and environmental progression in the sector, with substantial restructuring for more inclusive growth, and with rapidly changing policy and regulatory environments at global and national levels. Much is sector specific, but many cross all of the transport, economic, energy, water, climate change, environmental and labour policy environments within forestry's key areas of activity.

Transport policy and planning has advanced considerably, with the national focus now on the promotion of modal, spatial, institutional and planning integration to allow appropriate government institutions, the private sector and consumers to be integrated in decision making processes, within a competitive, responsible and self-regulating environment. Ideally, this should promote a seamless, efficient and transparent passenger and freight logistics 'system'. The report is structured to build on these requirements and the potentials for the forestry sector to capitalise on and contribute towards achieving these policy goals.

Forestry overall occupies about 1,600,000 hectare of South Africa's land use – predominantly in private hands but also in a transforming public sector driven empowerment and ownership model progressively being devolved to community based interests with a variety of, sometimes contested, models. Some 20,000 small scale growers produce about 4% of the total tonnage. It continues to be an important component of the national economy, currently contributing over 1% of Gross Domestic Product, though this proportion has recently declined.

About 1,274,869 hectare is planted to plantation timber, predominantly in the Mpumalanga and KwaZulu-Natal provinces and also in the Western and Eastern Cape and Limpopo provinces respectively. New afforestation is occurring predominantly in the Eastern Cape – with over 50,000 hectare supported by substantial funding (currently R100 million), anticipated to increase to well over 100,000 hectare of sustainable forestry.

The report covers the sectors own challenges and requirements arising from the Forestry Transformation Charter and the recently completed Forestry 2030 Roadmap, in which forestry transport is identified as one key area requiring in depth attention. Others are in the slow rate of new afforestation, of transformation, and of changing market conditions, and potentially significant increases in the deficit of the supply of roundwood to 43% over 2025-2030, with a possible decline in rural and regional employment. Strong positive potentials lie in forest based sources of biomass for a variety of applications in renewable energy, subject to a conducive policy and regulatory environment, and in the public and industry response to climate change identified in new national policymaking.

Forestry transport costs have been estimated to comprise on average 50% of total production costs, and thus attention to its infrastructure, organisation and operation should promote far stronger industry viability than it is currently experiencing. The focus is on infrastructure for secondary transport (from roadside to processing or mill site), secondary intermediate transport (roadside to intermediate storage site or log yard) and secondary terminal transport (from an intermediate storage site to the processing site), the latter including rail. The lattice of road infrastructure largely within the compartments of the communal lands and within its larger transformation and land reform projects was determined as being beyond the scope of the report.

Approximately 17,277,481 tons of timber is transported annually on 12,175 km or 3% of the national road network and on 6,359 km or 30% of the rail network across the country. Over 67% is carried by road, and this proportion is increasing, with rail transport tonnages decreasing over 40% since 2005. This is predominantly due to a 191% increase in rail tariffs over 2001-2010, against an 81% increase in road tariffs over the same period, to the closure of timber producer dependant rural branch lines, and declining service levels from rail authorities. This dependency on road transport is recognised as unsustainable by the industry, which estimates that should conducive rail conditions exist, members will increase timber volumes on this mode by 3 million tonnes annually (about 134%), reducing timber transported by road by 2,6 million tonnes (58%), and lead to a reduction of almost 80,000 truck trips annually on the roads.

Chapter three assesses the status quo of forestry transport and infrastructure. It models a measure of the intensity of tonnage and trips generated from plantations in the forestry sector's 12 economic zones to 192 processing plants, most of which are sawmills (102) followed by pole impregnation plants (47), and the larger pulp and board plants. These vary from a low of 4 tonnes per hectare in the Maputaland zone, 9,4 in the Western Cape zone, 16,5 in the KwaZulu-Natal Midlands to a high of 22,4 in the Zululand zone. Conversely, trip attraction rates generated by processor facilities show the pulp and board plants are the major attractors, consuming on average about 650,000 tonnes per year per facility. The balance consume far less, averaging below 50,000 tonnes.

From this, the distribution of trips is calculated using a gravity distribution model, and modal split criteria, and a route assignment exercise performed, to assign the trips generated and attracted on the network. The results are mapped, with a supporting database, showing the current and **predicted forestry related traffic on the road and rail network nationally and provincially.**

Both the extent and condition of this forestry transport infrastructure is then tabulated, analysed and mapped. *Using a Visual Condition Index, of the total network used only 40% was found to be in 'good' condition, with* 33% 'fair', 15% 'poor' and 8% 'very poor'. A total of 23% of the network is in a 'poor or very poor' condition. Provincially, KwaZulu-Natal has the longest, at 1,400 km, in a poor or very poor condition. A desktop examination of the condition and extent of the intermodal facilities at the ports and the provincial road to rail facilities was undertaken and a capacity assessment of forestry road and rail infrastructure, with mapping, *provides the basis for targeting which routes and facilities require what type of improvement*.

From these assessments of the status quo, chapter four considers a range of issues impacting on future transport planning and progress. Some are general, such as uncertainties in finalisation of the land reform process for large scale producers, and the models and methods for the transfer of state assets, all of which can impact on future supplies and therefore transport demand. Others are changing market conditions, access to finance and forest development support arrangements.

The chapter specifically addresses the transport implications in the total potential of 178,000 hectare identified for new afforestation nationally, where the Eastern Cape is most advanced with planning and financing, and which can anticipate a further 130 trucks per day on the

roads over long time periods associated with tree maturation rates. It makes a general assessment of potential economic changes in key industry sub sectors, and any implications for changing demand for transport, and then moves to the *development of extensive trend scenarios for road and rail nationally and for each relevant province over differing time scales, with extensive mapping.*

Chapter five covers specific issues in relation to this transport infrastructure planning, including policies for a shift from road to rail, where there is a recognition that freight transport has decreased to levels that impact negatively on the countries overall economics. While government does not intend to dictate mode choices, to be determined by customer service criteria, the intention is to level the playing fields between modes. It draws detailed attention to Transnet's approach to the concessioning of branch lines and its specific implications for the forestry sector.

The section on forestry and climate change considers the size and importance of the forestry sector in relation to both emissions reduction and in adaptation, and the intensity of the contribution of the road transport sector to greenhouse gas emissions, second overall nationally and growing at the fastest rate, and to energy use. This and following sections show that the industry is a *leader in introducing and promoting systems for improved vehicle design and efficiencie*s and should deepen its engagement with available government flagship programmes around transport, energy efficiency, carbon sequestration, and renewable energy, among others.

The next section expands on transport's role in energy use, presenting four different scenarios regarding the availability of petroleum globally and nationally, and the desirable responses to each. With road-based transport expected to become under severe pressure in the medium term due to decreasing fuel supplies, it promotes an immediate strategy comprising inter alia, transport demand management and a longer term focus on the modal shift from road to rail, and by implication from liquid fuel to electricity, covering three different time scales. A further section assesses the technical potentials for sourcing plantation biomass as feedstock for bio-energy, where pine species' residue can contribute 100 cubic meters per hectare. The two predominant tree felling technologies in the compartments have different implications for leaving sufficient residue at the roadside for loading and transporting. The biggest inhibitor to producing biomass at scale is in achieving economies of scale in transport, given the much lower mass but higher volumes of residue, with implications for demand on the transport infrastructure therefore likely to be small.

A final section elaborates on the industry role in the road transport management system, a voluntary self-regulation scheme encouraging collaborative participation in the road logistics value chain to implement a vehicle management system that preserves road infrastructure, improves road safety and increases the productivity of the logistics value chain. The forestry industry has been a key enabler in this and in the introduction of performance based systems, comprising 37% of the 68 companies currently registered, predominantly in KwaZulu-Natal. It details the gains achieved in the reduction of overloading, among others, and records the advantages road hauliers may realise in higher productivity and safety through more innovative vehicle design through the adoption of performance based standards. The framework promotes more productive vehicles and thus less emissions, less fuel consumption and lower uptake of road space. The recommendation is that these systems are expanded across the transport industry, with public sector support from both the Department of Agriculture Forestry and Fisheries and the Department of Transport into the forestry sector specifically, since they are not yet self-funding.

With these developments and potentials, chapter six then reviews the adequacy and implications of existing infrastructure programmes and transport plans on forestry's transport infrastructure needs. It assesses government transport planning documents at national, provincial and district levels, and Transnet's rail plans, and infrastructure planning

programmes under the custodianship of national government. At a national level, the *detailed recommendations arising from this report will be inserted into national transport planning in the NATMAP 2030 process*. Provincial growth and development planning has established priorities for forestry transport infrastructure in most relevant provinces, but district planning is generally silent on its specific requirements. The expanded public works programme has made some investment into forestry, but generally on access (lower order) roads.

The status, adequacy and implications of Transnet's planned allocation of R106,1 billion to expansion and R94,9 billion to replacement of assets over seven years to 2019 was assessed, showing a fairly equal allocation between new or upgraded infrastructure and new locomotives, and a concentration (R140 billion) on supporting general freight business, which includes forestry products. Transnet envisage a 40% increase in timber tonnages transported over the period. Its planned rollout of new investments and upgrades shows the Ermelo to Richards Bay line improvements, and those to the branch network around Pietermaritzburg will have the greatest impact on current forestry transport bottlenecks. Planning for the concessioning of branch lines, currently on hold, is considered, along with the industry response.

A regional case study across KwaZulu-Natal and the North Eastern Cape then builds on the questionnaires and it elicited individual logistics managers' responses to key transport and infrastructure issues from seven large and medium sized producer cum processors, four small scale grower organisations, one emerging sawmiller representing an association of sawmillers as well as a medium sized contractor and three small contractors. For the larger organisations, the pricing and operation of rail freight is their largest problem (acknowledged by Transnet in detail in the previous chapter), along with some inconsistent responses from provincial transport authorities. For the exporters, arbitrary annual port charge increases are a problem. Small scale grower organisations bemoan the lack of support at district level with road development, and are generally disadvantaged with transport since contractors can break arrangements to service bigger organisations. Small grower support organisations are however implementing comprehensive contractor development programmes for both short haul contracting to roadside and for secondary transport contractors to processing plants, which should be replicated nationally. Comprehensive recommendations are made for supporting and developing the small scale sector.

The penultimate chapter eight summarises the barriers, challenges and opportunities in meeting the needs identified. Key issues are the poor condition and shortfalls in capacity of specific sections of the road and rail network, and poor intermodal connectivity. Slow progress with new afforestation means long time frames for it to make significant demands on transport infrastructure (with the exception of some of the Eastern Cape). Institutional complexity in transport planning and support arrangements provincially, and at district and local levels also leads to limited responsiveness to forestry transport requirements, compounding the pressures on the performance of forestry transport due to energy price and supply insecurities.

Obstacles that hamper provision of forestry transport lie in the future ability to match capacity to demand, the elimination of operational characteristics that result in bottlenecks, the lack of network connectivity between the different modes, and the availability of funding for the required investments (currently being overcome in rail), which needs to be aligned with corridor utilisation and demand. The speedy finalisation of Transnet's branch line strategy is a serious obstacle to the industry.

The chapter sets out a table of the required programme of projects by province and route, with timescales of 2012-2015, 2015 to 2020 and 2020 to 2030, along with designated implementing authorities, generally the South African National Roads Agency, provincial road authorities, Transnet, the Department of Agriculture Forestry and Fisheries, and the Department of Transport. *This addresses the rehabilitation of specific roads and continual*

maintenance of the forestry road network, the rehabilitation of rail in poor condition, the addressing of capacity constraints on both networks, specific branch line concessioning and intermodal facilities, as well as special projects. Specific road improvement priorities for the Eastern Cape developments are listed in the case study and should be read as complimentary.

The final chapter establishes the way forward, mandating the Department of Agriculture, Forestry and Fisheries, as the custodian of the forestry sector, to take ownership of the recommendations and liaise with South African National Roads Agency, Transnet, provincial transport authorities and other relevant organisations to ensure implementation. All the findings should be communicated to these agencies, with progress on projects monitored on a frequent basis. If budget constraints at provincial and district level delay implementation of certain projects the Department of Transport is requested to consider, from a strategic importance point of view, providing financial assistance to provincial and district road authorities to ensure timely implementation of road improvement projects related to the forestry sector.

1. Introduction

1.1 Background

The South African Department of Agriculture, Forestry and Fisheries, hereafter referred to as DAFF, appointed Aurecon South Africa (Pty) Ltd in October 2011 to undertake the project "*Determination of Forestry Transport Infrastructure Requirements in relation to the Transport Development Plans at National, Provincial and Municipal Level".*

This report serves as the **Final Report** for the **Forestry Transport Infrastructure Requirements Plan**.

1.2 Situational Analysis for the Study

Forestry continues to be one of four important sectors in South Africa targeted for public support given its contribution to the economy, employment and the improvement of livelihoods. Since 1994, considerable work has been undertaken in support of economic, social and environmental progression in the forestry industry as a whole. This has comprised both a substantial restructuring of the sector in support of more inclusive growth, and rapidly changing policy and regulatory environments at global and national levels, which include the many sectors across which the industry impacts on and engages with. Economic, energy, water, climate change, environmental and labour policies are changing continually. At the same time, transport policy and planning has advanced considerably.

The White Paper on National Transport Policy (Department of Transport, 1996) has guided transport planning and transport development in the country since 1996. This paper puts strong emphasis on the promotion of integration and intermodalism. Modal, spatial, institutional and planning integration allows the appropriate government institutions, private sector and consumers to be integrated in the decision making process, enabling government regulation to be kept at a minimum and for the private sector to build and operate within a competitive, responsible and self-regulating environment. Intermodal coordination and cooperation allows the sector to optimise customer service, reduce duplication, reduce destructive competition, minimise total costs, and maximise social and economic return of investment. The focus of the transport sector currently is therefore to create a fully integrated transport and information system, which permits seamless, efficient and transparent passenger and freight logistics in the country as well as internationally.

At industry level, the White Paper on Sustainable Forest Development in South Africa (Department of Water Affairs and Forestry,1996) provided for government to deliver a wide range of support to ensure sustainable forest development of the sector, and the National Forestry Action Programme (1997) and the resulting National Forests Act of 1998 changed the role of government from active management of forests to promoting the needs, interests and participation of communities in forest management. Government's role has now been firmly established as oversight of forest management (Department of Agriculture, Forestry and Fisheries, 2009).

More recently, the Forest Sector Charter gazetted in June 2009 confirmed the scope and extent of industry restructuring to accommodate Broad Based Black Economic Empowerment (BBBEE) and resource (re)distribution, while establishing the basis for further growth in the sector, and is the major instrument for the achievement of an industry wide initiative to increase the supply of sawlogs, where the country increasingly faces a shortage. Other important industry initiatives confirmed in the Charter include integrated planning for forest sector development and transport infrastructure development in support of forestry, the latter the subject of this report (Republic of South Africa, 2009).

The Forestry 2030 Roadmap recently revisited progress with all key stakeholders and partners and identified key achievements and the challenges for the immediate future. The latter include the need to further realise the sector's potential contribution to job and wealth creation. Others remain in the inadequate supply of raw materials, biased equity distribution in the value chain and a less than optimal contribution to poverty alleviation and economic development, with slow rates of new afforestation. As the Roadmap notes, 'these challenges threaten the long term sustainability of the sector and need to be addressed as a matter of urgency' (Department of Agriculture, Forestry and Fisheries, 2009. p.2).

Within this context, considerable attention is being directed at the sector in recent national economic planning. South Africa's 2010 New Growth Path (NGP), in identifying the key drivers of its central job creation objectives, includes agriculture and forestry due to a) its potential for growth in the creation of employment in infrastructure provision, b) its labour absorbing activities in both production and processing, c) in taking advantages of new opportunities in the transition to a green economy, d) in leveraging social capital in the social economy and e) in fostering rural development and regional integration in marginalised regions of the mainstream economy (Department of Public Enterprises, 2010).

An integral part of taking the NGP forward, the 2010/11-2012/13 Industrial Policy Action Plan Two, has identified a number of forestry industry related areas as key arenas for growth and targeted public support. These are in infrastructure and transport, and in upgrading and supporting energy efficiency in manufacture and processing to enhance export performance. Bio-mass and co-generation are potential 'game changers'. A variety of interventions and support instruments are further identified in its 'scaled up and broad based interventions' for forestry, timber, paper and pulp (Department of Trade and Industries, 2011).

New challenges for these investments in forestry and transport have emerged in the recent October 2011 National Climate Change Response White Paper. To build resilience to climate change, the White Paper priorities for agriculture and commercial forestry are to integrate agriculture and forestry into climate-resilient rural development planning to address job creation, food security and livelihoods, and for short, medium and long term adaptation scenarios to identify climate resilient land uses and any new areas and crops.

Transportation and energy used in industry contribute about 10% each of total South African greenhouse gas (GHG) emissions. Each significantly emitting economic sector or sub-sector is now required to formulate mitigation and lower-carbon development strategies. The lead government department will drive a Transport Flagship Programme, which includes an efficient vehicles programme to result in measurable improvements in the average efficiency of the South African vehicle fleet, and has the rail re-capitalisation programme as an important component, in so far as it will facilitate both passenger modal shifts and the shift of freight from road to rail. With transport costs a major component of forestry industry costs (generally estimated at up to 50 percent), future planning of transport infrastructure for the industry must therefore aim to accommodate and mitigate these negative GHG drivers (Government of the Republic of South Africa, 2011). These issues are covered in detail in relevant sections of this report.

Against this background then, the meeting of these challenges, opportunities and policy priorities will face some significant obstacles, and transport infrastructure requirements and funding need to be appropriately addressed if growth and change at the scale and rates envisaged are to be achieved. This report provides a status quo assessment of current arrangements in forestry transport and transport infrastructure, existing gaps and challenges, and based on these identifies phased priorities for meeting the future requirements for transport infrastructure across the industry.

1.3 Objectives and Needs of the Study

The Terms of Reference for the Forestry Transport Infrastructure Requirements Plan states the project goal as being "*to assess the forestry transport infrastructure requirements*" by defining the following:

- Assessment of the transport requirements for the Forestry Sector as a whole;
- Determine the status of the transport infrastructure in provinces with the potential for Forestry Development (KwaZulu Natal; Eastern Cape; Mpumalanga; Western Cape and Limpopo);
- Investigate whether afforestation plans in Eastern Cape and KwaZulu Natal are depicted in transportation plans;
- Review national, provincial and district road and rail transport plans;
- Investigate whether infrastructure programmes of governments (i.e. Expanded Public Works Programme (EPWP); Comprehensive Agricultural Support Programme; and, other road infrastructural programmes) do not address issues of forestry transport adequately;
- Profile the transport infrastructure challenges and recommendations per sub-sector;
- Ensure opportunities as identified in the forestry Transformation Charter are aligned to the transport infrastructure requirements; and;
- Investigate the barriers to the development of forestry transport infrastructure.

The aim of this report is therefore to address the items above and to provide the short, medium and long term transport requirements (target years of 2015, 2020 and 2030 respectively, in line with the timeframes proposed in the National Transport Master Plan 2050) of the key players in the forestry industries supply and value chains, and to align these with transport development plans at national, provincial and municipal levels. These requirements and the associated recommendations of this report will then be integrated with and incorporated into the National Transport Master Plan 2050 (NATMAP) project within the Department of Transport, via its Technical and Financial Committee.

1.4 Methodology

The approach that was followed with respect to the development of the **Forestry Transport Infrastructure Requirements Plan** is depicted in **Figure 1-1**.

The methodology consisted of five phases, namely:

- Phase 1: Data Collection;
- Phase 2: Assessment of Status Quo and Future Development;
- Phase 3: Review of Infrastructure Programmes and Transport Plans;
- Phase 4: Identification of Challenges and Opportunities;
- Phase 5: Formulating Recommendations.

Each of these phases will be discussed in brief in the following sections.

Figure 1-1: Project Methodology for the Forestry Transport Infrastructure Requirement Plan

1.4.1 Phase 1: Data Collection

The methodology adopted comprised an initial data collection and desktop review phase of all appropriate and available literature and data relevant to the sector and its transport requirements. Sources were a combination of industry studies, company data and perspectives made available, departmental policies, planning documentation and research reports. These informed an initial status quo assessment phase of industry structure and economic performance, its internal and external relationships and drivers and the spatial organisation of its areas, resources and facilities.

1.4.2 Phase 2: Assessment of Status Quo and Future Development

Phase 1 was expanded by a subsequent detailed assessment of the status quo in transport infrastructure, covering distribution routes within and across sub-sectors in the supply and value chain, its extent and condition and that of intermodal facilities, and major capacity, operational and supply constraints. The work was further informed by a survey questionnaire delivered to over 35 producer and processor companies, industry associations, public sector agencies and provincial departments, and with structured interviews undertaken with leadership in large, medium and small scale grower interests in a regional case study straddling KwaZulu Natal and the Eastern Cape. Data gathered was retrospectively fed into phase one, where there were information gaps, and into subsequent phases.

This phase also addressed future planning in the industry generally, covering policy objectives and strategic planning, any issues in the expansion of planting and processing, opportunities for sub-segments in the supply and value chains, anticipated future production and processing, and their implications for current and future transport infrastructure

requirements. Public sector, industry association and company data sourced in phase two was complimented with interview information.

The above provided the basis for an assessment of specific issues and challenges in forestry transport planning and their implications for future requirements, covering shifts in freight from road to rail, any climate change impacts on future transport planning, changes in energy supplies and its industry and transport impacts, and any implications of technology change in production and processing in relation to transport, as well as progress made by key industry players with the road transport management system, and with performance based standards.

1.4.3 Phase 3: Review of Infrastructure Programmes and Transport Plans

The next review phase assessed the adequacy and implications of these existing infrastructure programmes and transport plans, including Transnet's rail plans, national and provincial infrastructure programmes, and provincial, district and municipal infrastructure planning, and summarises the inadequacies in the supply of forest transport infrastructure. The case study then set out an example of the articulation of the issues in these two phases on transport infrastructure requirements in production, processing and distribution.

1.4.4 Phase 4: Identification of Challenges and Opportunities

A penultimate section then assessed the barriers, challenges and opportunities in meeting these future needs, appropriate measures to address them, and a proposed infrastructure development programme for the future.

1.4.5 Phase 5: Recommendations

Based on these, a final phase set out specific recommendations to key departments and stakeholders, setting out the actual infrastructure requirements, operational requirements and how they are being addressed by existing plans and programmes, and recommendations on addressing gaps, to be forwarded for inclusion in NATMAP 2050.

1.5 Project Limitations

Any limitations to this report can be attributed to the non-availability, age or low level of detail in any policy, planning, and programme documents and data sets sourced from all relevant agencies. Electronic questionnaire responses were varied in the depth of detail supplied. Some personal interviews did not reveal sufficient information and perspective to make sufficiently conclusive and informed conclusions and recommendations. A third limitation is that the vast network of small, possibly unmapped transport routes in the forestry sector was been confirmed as falling outside the scope of this study.

In attempting to mitigate these limitations, the team endeavoured to build a database that is as comprehensive as possible for the purpose and objectives of this report, and set up special meetings where there were inadequacies in information, and followed up on interviews and meetings to secure as much in-house industry data, planning and perspective as conceivably possible.

Aurecon extends its sincere appreciation to DAFF for their support, as well as to all who assisted in making the information available and would like to thank the various industry organisations who kindly provided assistance in responding to requests for questionnaire completion and for interviews.

1.6 Structure for this Report

The report is structured as follows:

- The Status of the Forestry Industry is captured in Chapter 2;
- Chapter 3 presents the status of Transport Infrastructure supporting the Forestry Industry;
- Chapter 4 covers many issues in future Forestry Industry Planning, and its current and future transport infrastructure requirements;
- Chapter 5 covers specific issues in relation to Forestry Transport Planning and their implications for Future Transport Infrastructure needs;
- Chapter 6 reviews the adequacy and implications of existing infrastructure programmes and transport plans on Forestry Transport Infrastructure needs;
- Chapter 7 presents a case study synopsis of perspectives and opinion on current performance and future needs in transport and transport infrastructure of large, medium and small scale producers and processors;
- Chapter 8 then presents the barriers, challenges and opportunities in meeting Forestry Transport needs, measures to address these, and a desirable infrastructure programme for the future; and
- Chapter 9 provides specific recommendations to different departments as well as stakeholders to ensure implementation of the forestry transport infrastructure plan.

2. Status Quo Assessment of Forestry Industry

2.1 Overview of the Forestry Industry

The South African Forestry, Timber, Pulp and Paper (FTPP) industry is well recognised as being among global leaders in the sector. Its competitiveness lies in strong advances achieved in improving yields through genetics, and in rainfall, soil quality and temperature conditions which can make plantation yields two to three times more productive than forests of the same species in Europe and North America, and comparable to that of other southern hemisphere countries.

The supply and value chain is constituted of the following six sub-sectors:

- Growing (plantations, nurseries and indigenous forests);
- Contracting (forestry contractors in silviculture, harvesting, fire-fighting services and other forestry contracting services);
- Sawmilling;
- The fibre sub-sector (pulp, paper, paperboard, timber board-product, woodchip and wattle bark, and manufactures);
- The poles (treatment plants); and
- The charcoal producers.

The following overview of industry structure and performance data is synopsised from a recent overview by Godsmark (2010) and DAFF (2009).

- The total land area under forestry ownership is 1,693,700 ha, with private companies utilising 1,274,869 ha, or 1% of total land in South Africa. This area has declined by 127,000 ha, or 9% over the last decade. Forestry currently follows the maize industry (2,896 million ha) as the second largest user of land.
- Over 80% of commercial forests are located in the Mpumalanga (6.4% of total land), Kwazulu-Natal (5.5%), Eastern Cape (or 0.8%) and Western Cape provinces (0.5%), where the sector contribution as a whole (both forestry and forest products) to Gross Geographic Product (GGP) is 4.8%,4.5%, 0.86% and 0.31% respectively.
- The most recent 2009 estimates indicate increasing output. Current estimates are R6,7 billion of plantation roundwood -a real increase of R4 billion or 148% over the period to 1980-2009- and predominantly in pulpwood (67%), sawlogs (27%), and mining timber (2%).
- The value of sales from the 192 primary processing plants in the country stands at R20,4 billion, primarily of pulp (52%), lumber (21%), wood chips (10%), panels (9%) and mining timber (3%), together showing a real increase of R8,9 billion or 78% over the same period. This combined output of R27,1 billion far exceeds the R12,2 billion calculated in 2003 (Genesis, 2005, p.3).
- Nevertheless, while forestry's own contribution to agricultural GDP has increased from 4.5% to 9.7% over the period 1980-2009, its total contribution to GDP has declined to about 1% over 1980-2009 (peaking at 2% in 1990), with a decrease in forestry products contribution to manufacturing GDP from 6.3% to 6.1 percent.
- In 2009 forest product exports totalled R12.5 billion, principally in paper (42.2%), pulp (34.4%) and solid wood (27.7%), with total imports at R9,6 billion comprising largely paper (74%), solid wood (22%) and pulp (4%), leaving a positive trade balance of R2,9

billion. Over the period 1992-2009 the nominal value in the increase in exports has been R10,1 billion (432%),with imports increasing by R8,1 billion (574%) and the trade balance increasing by R2 billion (214%).

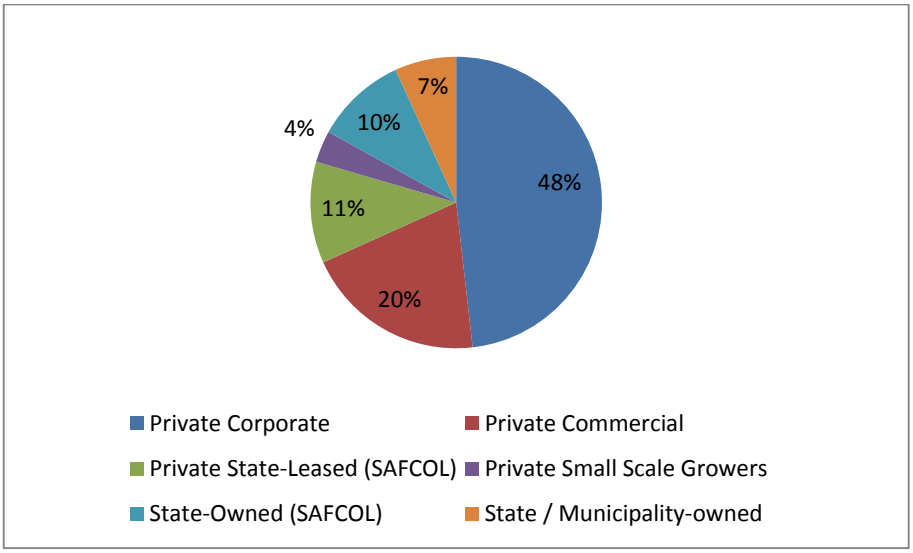
Despite these trends, the Forestry 2030 Roadmap covers significant concerns across the industry regarding evidence that the country is increasingly experiencing a shortage of timber, with implications for the national growth rate and adverse effects on the sustainability of local sawmilling, pulp and paper operations. There is thus a concomitant threat to employment opportunities and local economies. It is anticipated that South Africa will in future not be able to meet its domestic demand for timber from existing stock. An existing 2005-2009 deficit of 2,698,453 tons (-1.3%) is expected to increase to 7,706,567 tons (-41.4%) over 2025-29.

While new afforestation over 1980-2009 covered 382,619 ha at an average annual rate of 12,754 ha, this rate was last achieved in 1998. Since then the rate has declined significantly in all provinces to below 4,000 ha annually. Over 2008-09, the conversion from one tree species to another was 8,030 ha while the conversion from forestry to other agricultural uses was 3,554 ha. New afforestation amounted to only 2,169 hectares, with 80% of this in Kwazulu-Natal, and 19% in Mpumalanga.

Since 2005 about 178,000 ha have been identified as suitable for new afforestation to address these supply constraints and to stimulate poorer provinces, including over 100,000 ha in the Eastern Cape, and 40,000 ha in Kwazulu-Natal, with planning for the expansion of the small scale sector in the other provinces also underway. *The r*ate of new afforestation nationally is however slow. Key action plans have been developed which cover expediting the afforestation licensing process, confirmation of land rights holdings for land holding communities, technical and financial support to emerging small growers and improvements in transport infrastructure, the subject of this report.

The figure below shows forestry ownership in South Africa.

Figure 2-1: Forestry Ownership in South Africa



The following are observed from **Figure 2-1**:

- Private sector ownership accounts for 83% or 1,058,908 ha of the total plantation area, including investment in BBBEE ownership in the divestiture of state owned forests, further promoted in the Forest Sector Charter.
- Ownership in the plantation sector remains concentrated in the corporate sector (48%), private commercial farmers (20%), corporates owning or leasing ex South African Forestry Company Limited (SAFCOL) plantations- some of which are BBBEE companies (11.2%), while small scale growers now contribute about 3,5 to 4 percent.
- Total public ownership is 215,961 hectares (16,9%), with SAFCOL retaining 10,1% of state forests, while the state or municipalities retain 6,8%.
- The SAFCOL privatisation process has still to be finalised, and the limited extent of equity achievement and its potentials to contribute to growth are an area of considerable concern.

Capital investment remains considerable at R24,8 billion in 2009, predominantly in trees (59%) and less so in land (19%), roads (13%), fixed assets (7%) and moveable assets (3%). Its concentration provincially is predominantly in Mpumalanga (42%) and Kwazulu-Natal (37%), with the Eastern Cape attaining 12%, the Western Cape 5% and Limpopo 4 percent. The total book value of investments in the forest products sector is R15,7 billion, by far the largest in pulp and board mills (83%), and in sawmills and veneer (12%), and significantly less in pole plants (1%) and in mining timber (0.3%).

Estimates of total employment in the industry are at 169,000 in 2009, with 118,900 direct jobs and 50,800 indirect opportunities. Forestry is by far the largest direct job generator with 66,500 (30,000 indirect), with sawmilling providing 20,000 (10,000), pulp and paper 13,200 (10,800), timber board 6,000, and mining timber 2,200. The range of smaller enterprises is estimated to provide 11,000 jobs.

South Africa participates in international and regional policy making and cooperation and is signatory to numerous global conventions and treaties. Some of the most significant and binding are the Committee on Forestry (COFO) under the auspices of the United Nations Food and Agriculture Organisation (FAO) and the SADC Regional Protocol on Forestry. COFO is the highest FAO Forestry statutory body, with biennial sessions which bring together heads of forest services and other senior government officials to identify emerging policy and technical issues, to seek solutions and to advise FAO and others on appropriate action.

The industry is also both horizontally and vertically integrated into the global forestry and forest products industries, particularly the larger corporate grower cum processor companies. At the very local scale its integration is of a different order, contributing to the supply of basic needs, saving of cash resources, a safety net function at times of crises and a store of medicinal plants.

South Africa has been a world leader in terms of introducing certified plantation management with more than 90% of afforested land (the highest percentage for a single country in the world) attaining the global Forest Stewardship Council's (FSC) certification standards.

These seek to balance commercial forestry interests with those of forest ecologies and with the wellbeing of local people.Of the total land ownership of 1,572,568 ha, 92.8% are FSC certified forests. Early voluntary adoption in the late 1990's was intended as a marketing advantage, placing it in a good position to benefit from increased international demand for certified fibre, and products derived from fibre. Their introduction and subsequent formal endorsement and further refinement by the industry and government has created a change in knowledge, attitudes and practices around key environmental and bio-diversity issues challenging plantation forestry as an industrial mono crop, including those of roads and transport. A separate standard for Small and Low Intensity Management Forests (SLIMF)

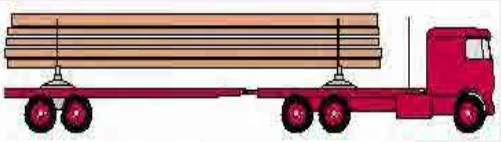
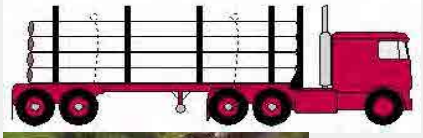
has recently been submitted to the FSC by South Africa for approval and is intended to encompass the small scale grower sector.

2.2 Economic Inter-relationships

2.2.1 Industry Supply and Value Chains

In order to understand the transport infrastructure requirements and functions it is important to understand the full supply chain operation from stump to mill and the point at which it impacts the public road system. The current operation can be divided into three distinct operations from the standing tree to the mill processing.

Table 2-1: Forestry Supply Chain Operations

Forestry Operations	Type of Vehicle Used
Harvesting The felling and processing (debranch, debark, crosscut) of the tree infield. Harvesting processes which take place on roadside after primary extraction are referred to as processing.	 
Primary transport The transport of timber from the stump to the roadside landing. **Extended primary transport** The transport from the stump to a point beyond roadside. Usually to a larger central depot or rail siding. In very few cases and only if a number of factors are favourable directly to the mill, most common in sawlog operations.	Primary transport    Extended primary transport 
Secondary transport The transport of timber from the roadside landing directly to the processing or mill site. **Secondary Intermediate transport** Transport of timber from roadside to an intermediate storage site or logyard. **Secondary terminal transport** Transport of timber from an intermediate storage site to the processing mill site.	  

Source: Forestry Solutions, 2011. Forest supply chain operations. Pretoria.

Each of the forestry operations has a cost implication and the table below outlines the different costs of each operation on total production cost.

Of significance for the industry and one focus of this report is the cost implication of the secondary transport operations. Secondary transport is impacted by the plantation location and the cost is directly related to the lead distance from the plantation to the processing plant, the condition of the road and the payload of the transport system.

Table 2-2: Different Costs of each Operation on Total Production Cost

Descriptions	Rands / Tonne	% of Total cost
Establishment	R100.00	25%
Harvesting & Primary Transport	R100.00	25%
Extended primary & secondary transport	R200.00	50%
Total Cost of Production	R400.00	100%

Source: Company consultations, 2011.

2.2.2 Forestry Plantation Ownership

Of the total land ownership ten forestry companies (including Komatiland) running commercial operations own 1,514,154ha (89.4%), DAFF 53,108ha (3.1%) and private farmers own 126,439ha (7.5%). From 2005 to 2010 a total of 98,038 ha has been lost from forestry operations to other land uses and an estimated further 60,000ha of plantation has been / will be delineated to wetlands or removed from commercial production as being uneconomical plantations. The table below details the ownership and planted areas per province.

Table 2-3: Ownership and Plantation Areas per Province

Province	Ownership area (ha)	Planted areas (ha)
Limpopo	48,123	49,720
Mpumalanga	628,023	520,146
KwaZulu Natal	670,522	504,848
Eastern Cape	169,193	141,510
Western Cape	64,916	58, 645
Total	1,580,777	1,274,869

The graphs below detail the plantation areas by regions and the various land owners. The graphs also reflect changes in land ownership from 2005 to 2010.

Figure 2-2: Overall Plantation Ownership

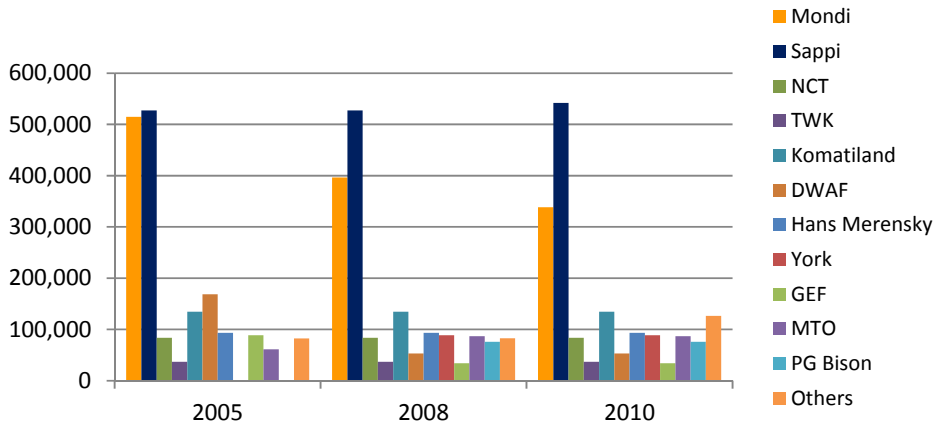


Figure 2-3: Plantation Ownership in KwaZulu Natal

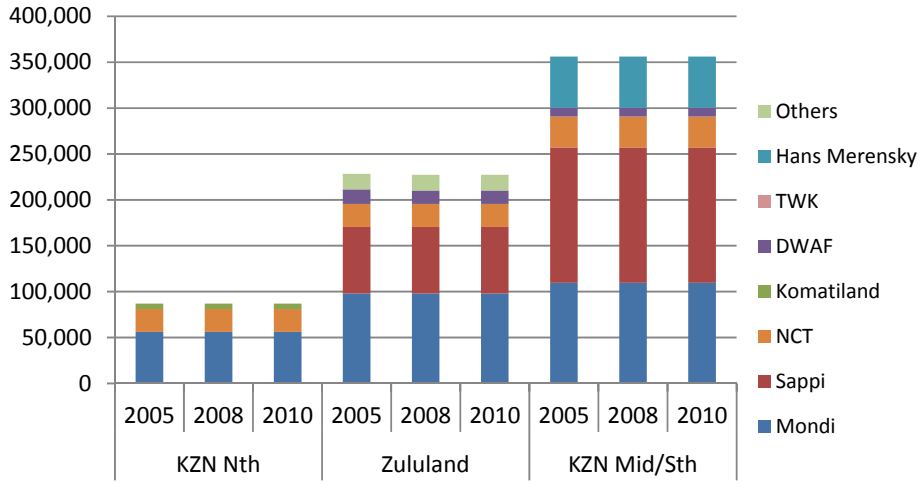


Figure 2-4: Plantation Ownership in Mpumalanga and Swaziland

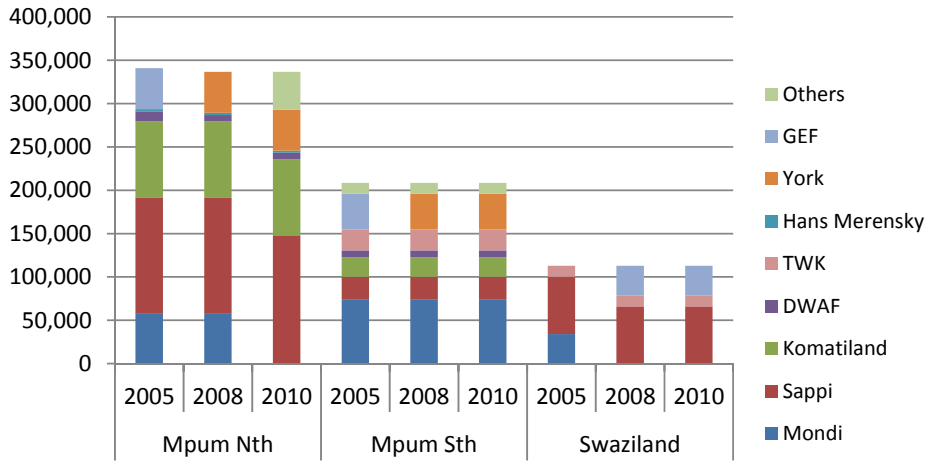
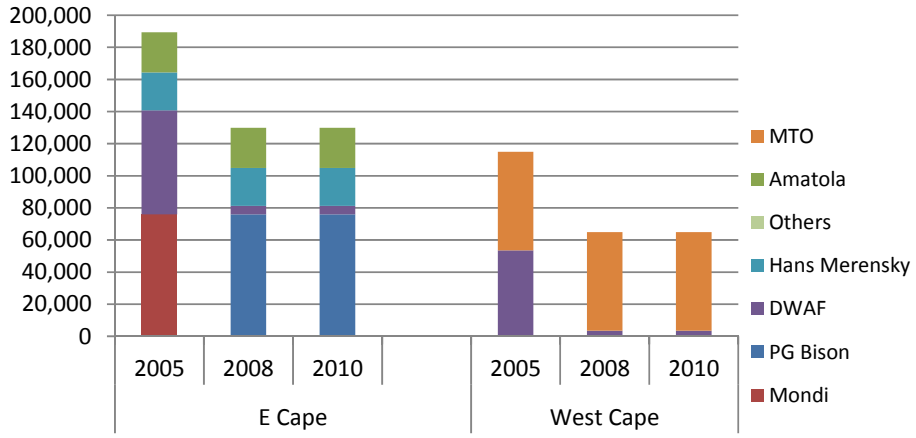


Figure 2-5: Plantation Ownership in Eastern and Western Cape



2.2.3 Volumes by Product Type

Timber plantations in South Africa are planted predominantly to hardwood (eucalyptus and acacia) and to softwood species (pinus). The two dominant markets for the timber products are pulpwood and sawn timber while the other minor products are pole, mining timber and board products.

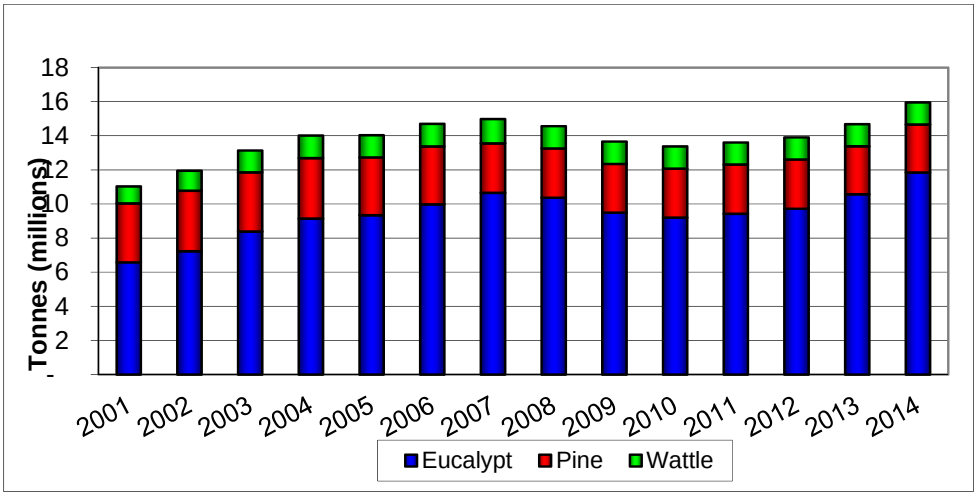
Table 2-4: Total Timber Usage in Tonnes

Usage	Eucalyptus	Acacia	Pinus	Other	Total	%
Pulp/chip	6,367,693	662,610	3,837,417	13,674	10,881,394	63.0%
Sawlogs	198,217	0	4,894, 655	515	5,093,387	29.5%
Poles	411,938	2,376	73,160	659	488,133	2.8%
Charcoal / Firewood	86,777	102, 617	28,396	0	217,790	1.2%

Usage	Eucalyptus	Acacia	Pinus	Other	Total	%
Mining	427,337	0	0	0	427,337	2.5%
Other	126,880	4,405	36,415	1,740	169,440	1.0%
Total	7,618,842	772,008	8,870,043	16,588	17,277,481	100%

Source: Godsmark, 2010. The graph below reflects the historic and expected demand for pulpwood between 2001 and 2014.

Figure 2-6: Pulpwood Demand 2001 - 2014

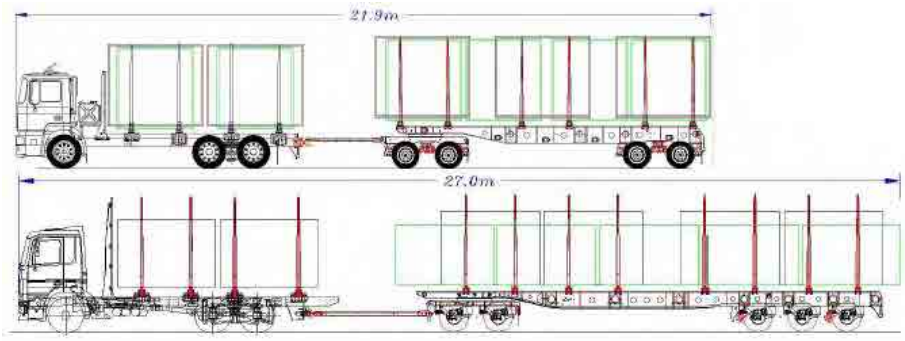


2.2.4 Transport Modes

In South Africa the only two modes of transport available to move the timber off the plantation are road or rail.

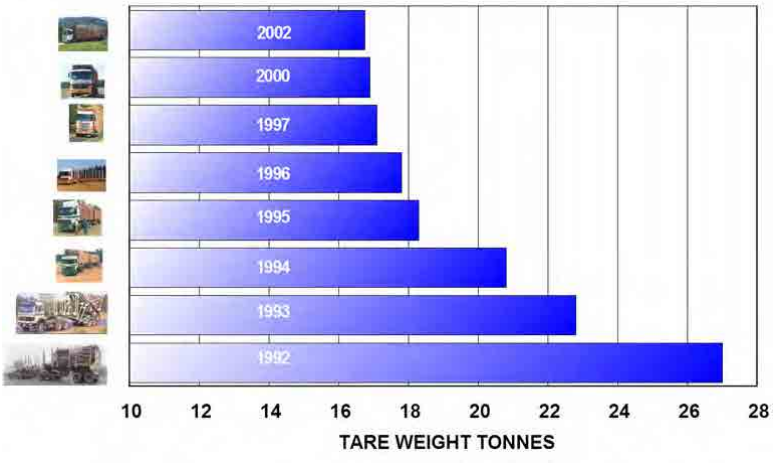
Road transport is done predominately by transport contractors and with a number of years' research and development by both forestry companies and the truck trailer manufacturers, advancements in truck and trailer design have significantly increased payloads and the number of points of timber collection. The philosophy of developing a suitable transport rig which would optimise payload but still collect the timber as close to the point of origin as possible is applied. The ideal operation strived for is that of harvesting, primary transport to roadside and then secondary transport from roadside to mill. The multi-staging and double handling of timber is avoided unless it is not possible for the larger rigs to access the harvesting compartment due to either slope or plantation road conditions, in which case secondary intermediate transport is used. The introduction of Performance Based Standards (PBS) trucks into the forest industry can result in an average payload increase of 38 tonnes per load to a total average payload of 47 tonnes (Nordengen, 2010). The increased payloads of PBS trucks will effectively save 50,385 truck trips per year based on 10,000,000 tonnes of timber moved.

Figure 2-7: Baseline (top) and Performance-Based Standards (below)



Source: Nordengen, P,, et al., 2008. Baseline and performance based standard vehicles. Proclamation of Sugar Technology Association, Durban

Figure 2-8: Reducing Tare Mass through Engineering Excellence



Source: Armstrong, D. 2003. Reducing tare mass through engineering. Figure supplied by Mondi Forests, Ltd. Pietermaritzburg.

In the case of rail transport, timber is moved from the harvesting compartment to rail sidings, in either an extended primary or secondary intermediate transport mode and then loaded to rail and transported to the processing mill.

2.2.5 Implications for Transport Requirements

The annual production of timber requires the movement of 17,277,481 tonnes of timber products from their harvesting compartment through to the processing mill. Based on an average truck load of 37 tonnes, this would equate to 466,959 truck-loads per year or 1,279 trucks moving a load every day of the year.

The proximity of the plantation site to the processing mill site influences both the product types produced by the plantations and the transport modes selected. All saw logs being produced for sawn timber are transported by road. Sawmills generally have small intake volumes and are generally located within the growing area. In the case of softwoods the timber being sawn is ideally processed within two to four days of harvesting, and this is not suited to the “slower” rail scenario. The same rule can also be applied to the timber volumes used in poles, mining, charcoal and firewood production.

In the case of pulp timber the option for either road or rail is available to the 10,881,394 tonnes which are required to be moved annually. As a rule of thumb, timber within a 150–300km from the mill site would be moved via road and timber outside of this could also be transported via rail. There are mitigating factors which need to be considered on a case by case basis.

All timber moved on the rail system is done under the commercial wing of Transnet Freight Rail (TFR). In a recent study done by Forestry South Africa (FSA) on the potential to increase rail timber volumes the following was found (Godsmark, 2011).

- That of the current 10,881,394 tonnes of pulp moved annually only 2, 259,000 tonnes (20.8%) was moved by rail and the remainder was transported by road.
- However should the conditions be conducive then the rail volumes could be increase to 5,284,000 tonnes. This is a move of 3,025,000 tonnes (27.8%) of timber off roads and onto rail.
- Put in perspective, this would reduce the truck loads on the roads by 81,757 trucks per annum or 224 truck-loads per day off the road network.

2.3 Key Institutional Drivers in Forestry Sector

2.3.1 Industry Associations

Forestry South Africa is South Africa's premier and largest forestry organisation representing growers of timber in South Africa. The Association's membership includes all 11 corporate forestry companies active in the industry, approximately 1,300 commercial timber farmers and some 20,000 emergent small scale growers who between them own or control no less than 93% of the total plantation area in the country. Given these credentials FSA is regarded by government and the private sector alike as being the industry's "representative body". The Association's structure mirrors its membership with three separate and distinct entities under the umbrella of an overall Executive Committee:

- Large Growers Group (corporate timber growers)
- Medium Growers Group (commercial timber farmers)
- Small Growers Group (emergent timber growers)

2.3.2 Freight Task Groups

The following freight task groups are noted:

FSA Transport Committee – The committee has been set-up with industry representation and other role players to address transport issues to the benefit of the industry. Included into the committee are representatives of the KwaZulu Natal. Transport department as well as transport specialists to assist in developing a cost effective transport strategy.

Road Transport Management System (RTMS) – An industry-led, voluntary self-regulation scheme that encourages timber owners, processors and transport contractors engaged in the road logistics value chain, to implement a vehicle management system that promotes the preservation of the road infrastructure, improvement of road safety and an increase in the productivity of the logistics value chain.

2.3.3 Cluster and Corridor Working Groups

Clusters and Corridor Working groups addressing transport considerations include the Pietermaritzburg Branch Line Cluster. The cluster consists of 723km of rail around the Pietermaritzburg, KwaZulu Natal area which currently only handles 11, 000 tonnes of timber per annum. However if conditions were met and agreements put in place then the volumes could be increased tenfold to 1,347,000 tonnes per annum. This would take approximately 33,000 truck trips per annum or 91 truck trips per day off the N2 into Durban.

2.4 Location of Forestry Areas, Resources and Facilities

2.4.1 Forestry Areas

2.4.1.1 General Resources

Forest resources in South Africa can be divided into three main categories (DAFF 2011), namely:

- Commercial plantations (this includes commercial plantations owned by DAFF as well as privately owned commercial plantations);
- Woodlands/savannas; and,
- Natural/indigenous forests.

Commercial plantations are made up of compartments, where each compartment is usually planted with the same plant species of the same age. The trees in commercial compartments are mostly exotic, and are harvested by felling a whole compartment at the same time.

Woodlands/savannas can be seen as vegetation formations dominated by trees but not to the extent that the canopies are continuous or overlapping, and cover between 29 to 46 million ha of the country. The Council for Scientific and Industrial Research (CSIR, 2003) defines woodlands according to the average height in metres (more than 1 metre) and the plant canopy cover (5% to 75%). Thickets (average height of 1.0 to 2.5 metres and plant canopy cover of 75% to 100%) are however also included in the definition of woodlands.

A **natural forest** is a multi-layered vegetation unit which has a high occurrence of evergreen or semi-deciduous trees whose crown cover is 75% or more. Indigenous forests cover about 500,000 ha of the country. The average national occurrence of species per ha is the highest for indigenous forests compared to the Fynbos. The protection of forests therefore has a large impact on the conservation of biodiversity in the country.

Map 1 shows the respective forestry areas in South Africa graphically. Note that commercial plantations owned by DAFF and by private organisations are shown separately in this map. Albany thickets are also shown separately. (Albany thickets are a type of thicket found in the Albany region in the Eastern Cape).

2.4.1.2 Commercial Plantations

Given that South Africa's demand for wood is met predominantly from commercial forest plantations, the impact of woodlands and natural forests on transport infrastructure and its requirements are negligible and will therefore not be considered further in this report.

Commercial plantations in South Africa are divided into 12 forestry economic zones, based on political (provincial and district), physical (climate, rainfall, soil), silviculture (timber

Forestry Base Map: Eastern Cape

Legend

Mills Facilities

Towns
- Main
- Other

Road - Rail Intermodal Facilities

Road - Rail Water Intermodal Facilities

Train Station

Railway

Roads
- National
- Main
- Secondary
- Other

Provincial Boundary

Forestry Areas
- Private Owned Plantation
- DAFF Owned Commercial Plantation
- Savanna Woodlands
- Albany Thickets
- NFI Indigenous Forests

International Border

Forestry Zones
- Zone 1 Limpopo Province
- Zone 2 Mpumalanga North
- Zone 3 Central Districts
- Zone 4 Mpumalanga South
- Zone 5 Maputaland
- Zone 6 Zululand
- Zone 7 KwaZulu Natal Midlands
- Zone 8 KwaZulu Natal North
- Zone 9 KwaZulu Natal South
- Zone 11 Eastern Cape
- Zone 12 Southern Cape
- Zone 13 Western Cape

Free State

Lesotho

Zone 7

Zone 9
KwaZulu-Natal

Western Cape

Zone 11

Zone 12

INDIAN OCEAN

Middelburg
Queenstown
Bisho
EastLondon
Port Alfred
Port Elizabeth
Port St. Johns

Ref:\\G:\PROJECTS\107518\Projects\05 Forestry Base Map_Eastern Cape_A3.mxd

Forestry Base Map: KwaZulu-Natal

Legend

Mills Facilities

Towns
- Main
- Other

Road - Rail Intermodal Facilities

Road - Rail Water Intermodal Facilities

Train Station

Railway

Roads
- National
- Main
- Secondary
- Other

Provincial Boundary

Forestry Areas
- Private Owned Plantation
- DAFF Owned Commercial Plantation
- Savanna Woodlands
- Albany Thickets
- NFI Indigenous Forests

International Border

Forestry Zones
- Zone 1 Limpopo Province
- Zone 2 Mpumalanga North
- Zone 3 Central Districts
- Zone 4 Mpumalanga South
- Zone 5 Maputaland
- Zone 6 Zululand
- Zone 7 KwaZulu Natal Midlands
- Zone 8 KwaZulu Natal North
- Zone 9 KwaZulu Natal South
- Zone 11 Eastern Cape
- Zone 12 Southern Cape
- Zone 13 Western Cape

Mozambique

Swaziland

Mpumalanga

Lesotho

Eastern Cape

INDIAN OCEAN

Zone 4

Zone 5

Zone 8

Zone 6

Zone 7

Zone 9

Zone 11

Newcastle

Richards Bay

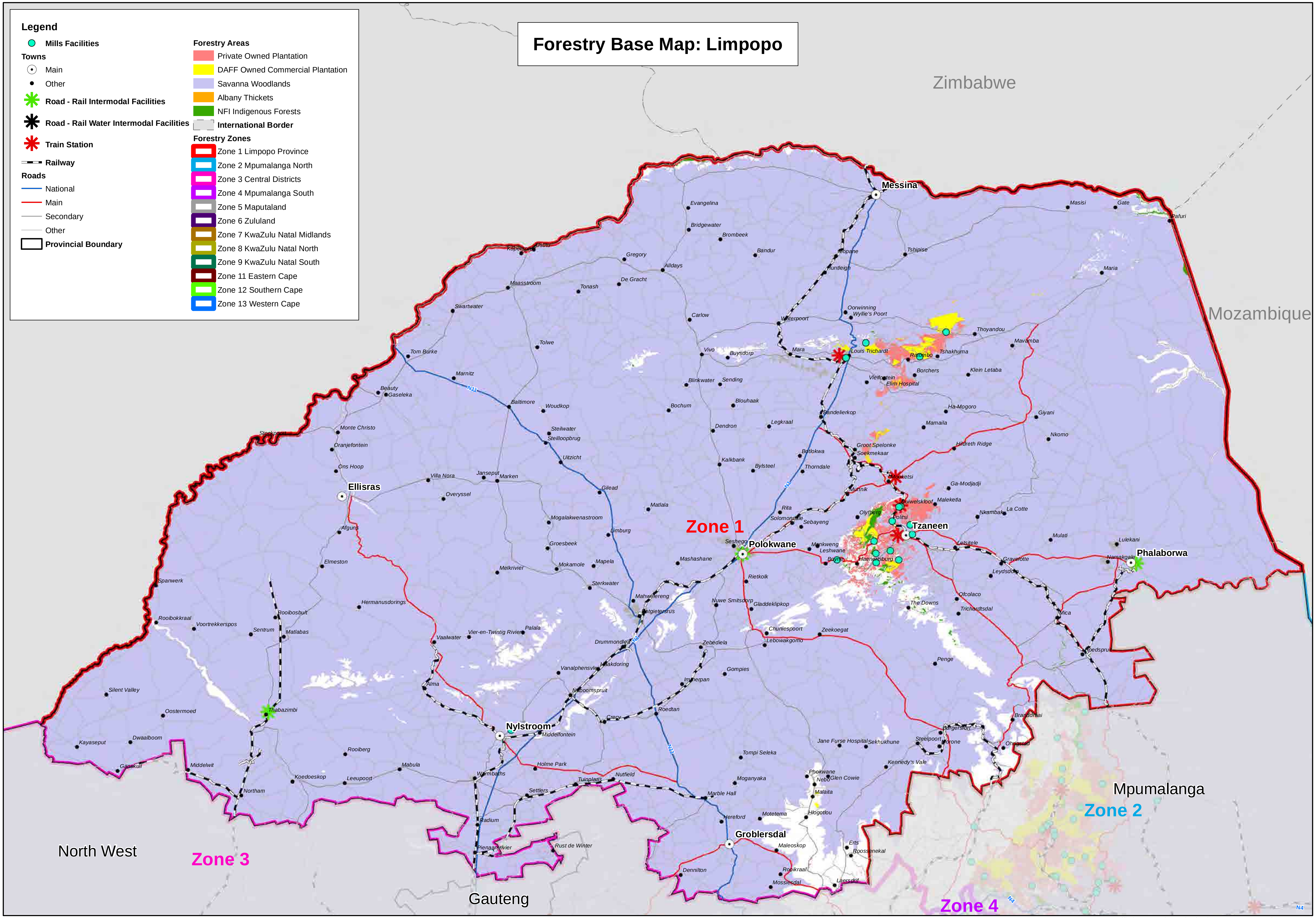
Ballito

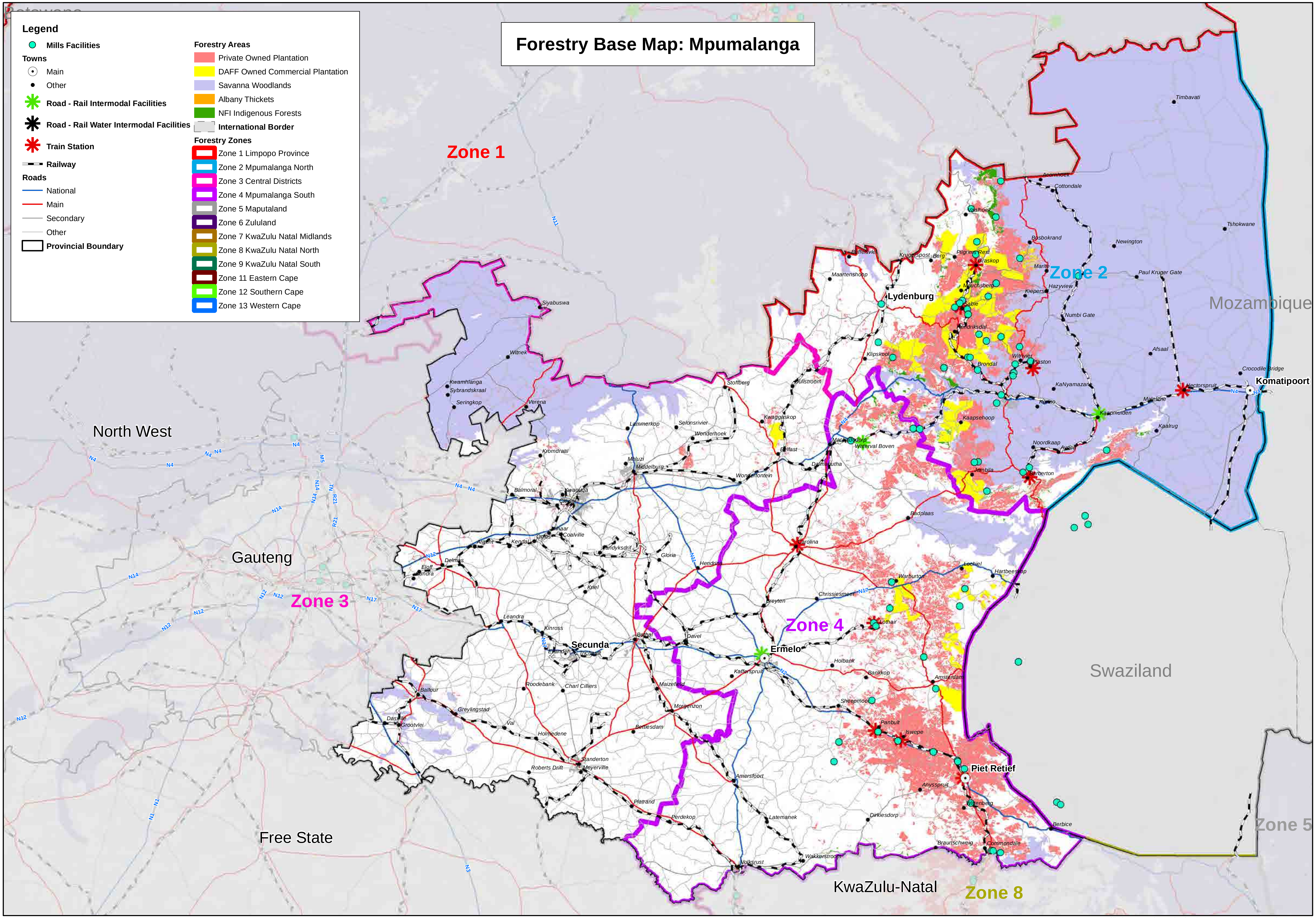
Pietermaritzburg

Durban

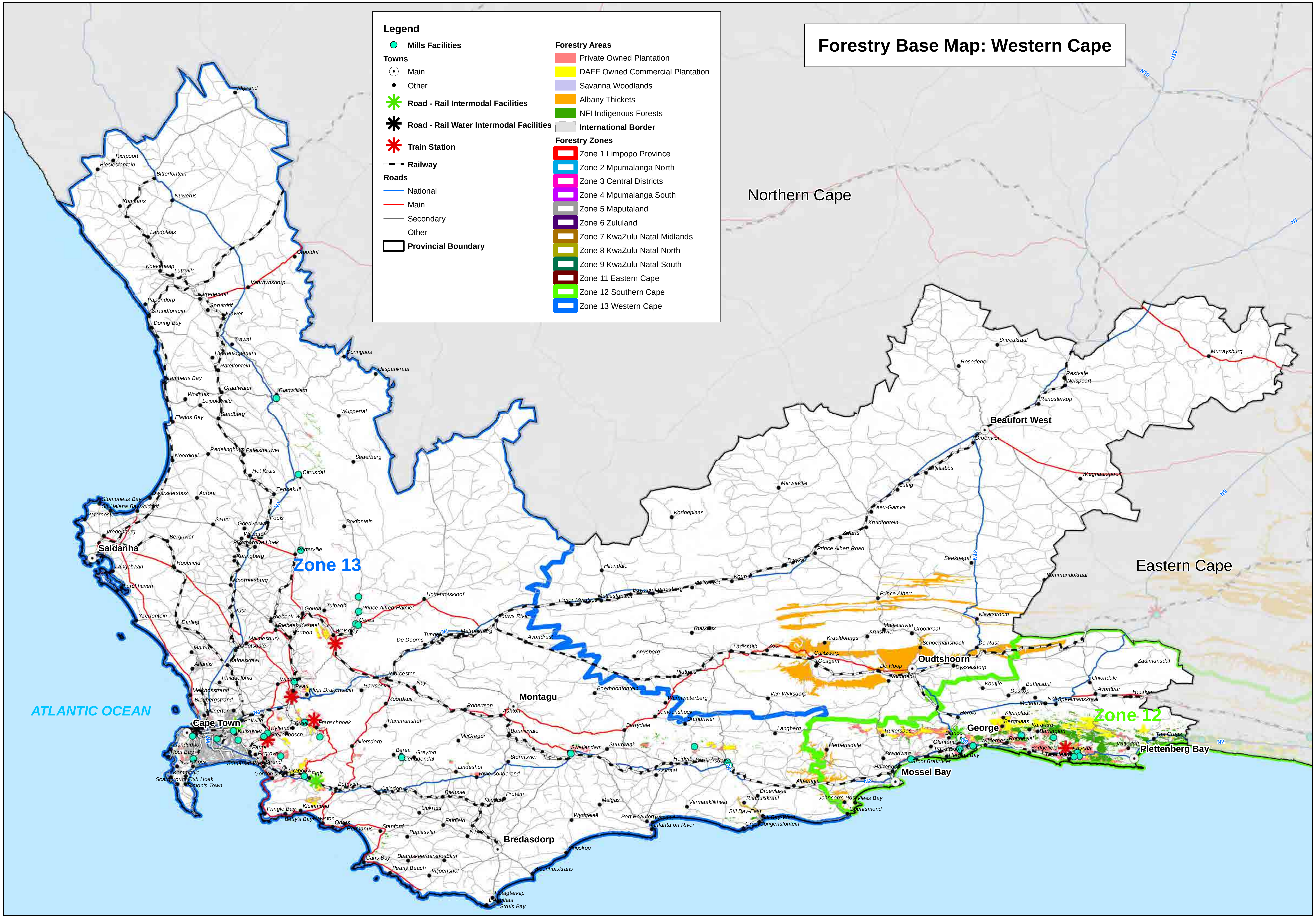
Port Edward

Ref:\\G:\PROJECTS\107518\Projects\03 Forestry Base Map_KwaZulu-Natal_A3.mxd


Forestry Base Map: Limpopo
Legend
Mills Facilities
Towns
Main
Other
Road - Rail Intermodal Facilities
Road - Rail Water Intermodal Facilities
Train Station
Railway
Roads
National
Main
Secondary
Other
Provincial Boundary
Forestry Areas
Private Owned Plantation
DAFF Owned Commercial Plantation
Savanna Woodlands
Albany Thickets
NFI Indigenous Forests
International Border
Forestry Zones
Zone 1 Limpopo Province
Zone 2 Mpumalanga North
Zone 3 Central Districts
Zone 4 Mpumalanga South
Zone 5 Maputaland
Zone 6 Zululand
Zone 7 KwaZulu Natal Midlands
Zone 8 KwaZulu Natal North
Zone 9 KwaZulu Natal South
Zone 11 Eastern Cape
Zone 12 Southern Cape
Zone 13 Western Cape
Zimbabwe
Mozambique
Mpumalanga
North West
Gauteng
Zone 1
Zone 2
Zone 3
Zone 4
Messina
Ellisras
Polokwane
Tzaneen
Phalaborwa
Nylstroom
Groblersdal
Ref:\\G:\PROJECTS\107518\Projects\04 Forestry Base Map_Limpopo_A3.mxd



Ref:\\G:\PROJECTS\107518\Projects\02 Forestry Base Map_Mpumalanga_A3.mxd



Ref:\\G:\PROJECTS\107518\Projects\06 Forestry Base Map_Western Cape_A3.mxd

Forestry Base Map: National

Legend

Mills Facilities

Towns
- Main

Railway

Roads
- National
- Main
- Secondary

Provincial Boundary

Forestry Areas
- Private Owned Plantation
- DAFF Owned Commercial Plantation
- Savanna Woodlands
- Albany Thickets
- NFI Indigenous Forests

International Border

Forestry Zones
- Zone 1 Limpopo Province
- Zone 2 Mpumalanga North
- Zone 3 Central Districts
- Zone 4 Mpumalanga South
- Zone 5 Maputaland
- Zone 6 Zululand
- Zone 7 KwaZulu Natal Midlands
- Zone 8 KwaZulu Natal North
- Zone 9 KwaZulu Natal South
- Zone 11 Eastern Cape
- Zone 12 Southern Cape
- Zone 13 Western Cape

Zimbabwe
Botswana
Mozambique
Swaziland
Lesotho
ATLANTIC OCEAN
INDIAN OCEAN

Limpopo
North West
Gauteng
Mpumalanga
Free State
KwaZulu-Natal
Northern Cape
Eastern Cape
Western Cape

Messina
Ellisras
Tzaneen
Phalaborwa
Polokwane
Nylstroom
Groblersdal
Lydenburg
Komatipoort
Rustenburg
Pretoria
Mafikeng
Lichtenburg
Johannesburg
Secunda
Vereeniging
Ermelo
Piet Retief
Vryburg
Kroonstad
Newcastle
Bethlehem
Harrismith
Richards Bay
Upington
Alexander Bay
Augrabies
Barkly West
Bloemfontein
Ballito
Durban
Pietermaritzburg
De Aar
Colesberg
Port Edward
Middlesburg
Port St. Johns
Queenstown
Beaufort West
Bisho
East London
Saldanha
Oudtshoorn
Port Alfred
Cape Town
George
Port Elizabeth
Montagu
Mossel Bay
Plettenberg Bay
Bredasdorp

Zone 1
Zone 2
Zone 3
Zone 4
Zone 5
Zone 6
Zone 7
Zone 8
Zone 9
Zone 11
Zone 12
Zone 13

species), economic (communication systems) and historic (ingrained usages) considerations. These different economic zones, as well as the plantation area for each zone, are indicated in **Table 2-5**. Over 2008/09, the zones with the largest plantation areas were Mpumalanga South (21%), Mpumalanga North (18%) and KwaZulu Natal North (15%).

Table 2-5: Distribution of Plantation Area by Zone (2008/9)

Forestry Economic Zone		Plantation Area (ha)	% of Total
Zone 1	Limpopo Province	49,669	4%
Zone 2	Mpumalanga North	225,065	18%
Zone 3	Central Districts	24,975	2%
Zone 4	Mpumalanga South	269,777	21%
Zone 5	Maputaland	17,024	1%
Zone 6	Zululand	77,091	6%
Zone 7	KwaZulu Natal Midlands	195,021	7%
Zone 8	KwaZulu Natal North	91,764	15%
Zone 9	KwaZulu Natal South	123,493	10%
Zone 11	Eastern Cape	122,549	10%
Zone 12	Southern Cape	61,623	5%
Zone 13	Western Cape	16,819	1%
Total		1,274,869	100%

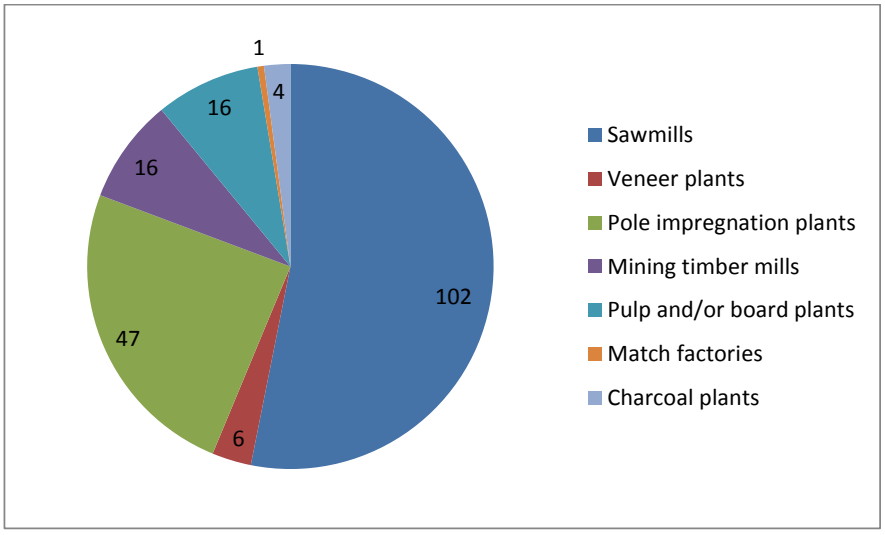
Source: Department of Agriculture, Forestry and Fisheries, 2010.

2.4.2 Facilities

Timber is transported from plantations to processing plants engaged in the sawing, cutting, treating, peeling, slicing, chipping or other processing of roundwood. South Africa had a total of 192 plants in operation during 2008/9 (DAFF, 2010), most of which are sawmills (102) followed by pole impregnation plants (47), as indicated in **Figure 2-9** below.

Processing plants vary in size, from an intake of less than 5,000m^3 per year, to ones taking in more than 200,000 m^3 per year. **Table 2-6** provides a summary of processing plants by size. It can be seen that pulp and board plants, as well as sawmills, generally represent the larger sized plants.

Figure 2-9: Number of Primary Roundwood Processing Plants by Type



Source: Department of Agriculture, Forestry and Fisheries, 2010.

Table 2-6: Primary Roundwood Processing Plants by Size

Type of Plant	Annual Roundwood Intake in m^3					
	0 – 20,000	20,000 – 50,000	50,000 – 100,000	100,000 – 200,000	200,000 +	Total
Sawmills	63	16	9	10	4	102
Veneer plants	6	0	0	0	0	6
Pole impregnation plants	40	6	1	0	0	47
Mining timber mills	8	3	5	0	0	16
Pulp and/or board plants	3	0	3	2	8	16
Match factories	0	1	0	0	0	1
Charcoal plants	2	1	0	1	0	4
Total	122	27	18	13	12	192

Source: Department of Agriculture, Forestry and Fisheries, 2010.

3. Status Quo Assessment of Transport Infrastructure

3.1 Transport Distribution Routes

3.1.1 Introduction

This section investigates the route network being used in the country for the distribution of primary timber products (i.e. for the transport of raw timber from plantations to processing facilities), as well as the extent of usage (i.e. volumes being transported).

In determining the distribution routes and the volumes being transported, one needs to consider the origins and destinations of timber products. This was discussed in detail in the previous section. For the purpose of this section, the following are highlighted again:

- Timber is produced in commercial plantations (i.e. the origins), which cover the five provinces of Mpumalanga, KwaZulu Natal, Limpopo, Eastern Cape and Western Cape.
- Raw timber is transported from plantations to the 192 processing plants (i.e. the destinations), differing in size and in the type of product being produced.

The distribution routes therefore describe how (what route and mode) timber is transported between plantations and processing plants.

In order to investigate the level (volumes) of timber being transported between specific origins and destinations (i.e. plantations and processing plants), one needs to understand the volumes (tonnes of timber) generated at the origin, and attracted to the destination. This investigation will also assist in the potential forecast of trips from new plantation areas, or to new processing plants. This section will therefore also investigate the following important aspects:

- Trip generation, i.e. the total number of trips generated from a specific origin (expressed in terms of vehicles per day or tonnes per annum, or more generally in terms of tonnes per ha of plantation area);
- Trip attraction, i.e. the total number of trips attracted to a specific destination (expressed in terms of vehicles per day or tonnes per annum for a specific processing plant).

A simplified model was developed to simulate the freight demand per road and rail route, and to investigate future demand per route. This section describes the process of developing this model, and presents the current transport patterns in the forestry sector.

3.1.2 Trip Generation Rates

The amount of timber produced at plantations and sold to processing plants amounted to about 16,48 million tonnes for 2008/9 (DAFF, 2010). The production per forestry economic zone, and the resulting trip generation rate per zone (in terms of tonne per ha), is indicated in **Table 3-1**. The production per product type and per zone is indicated graphically in

Figure 3-1. The following observations are made:

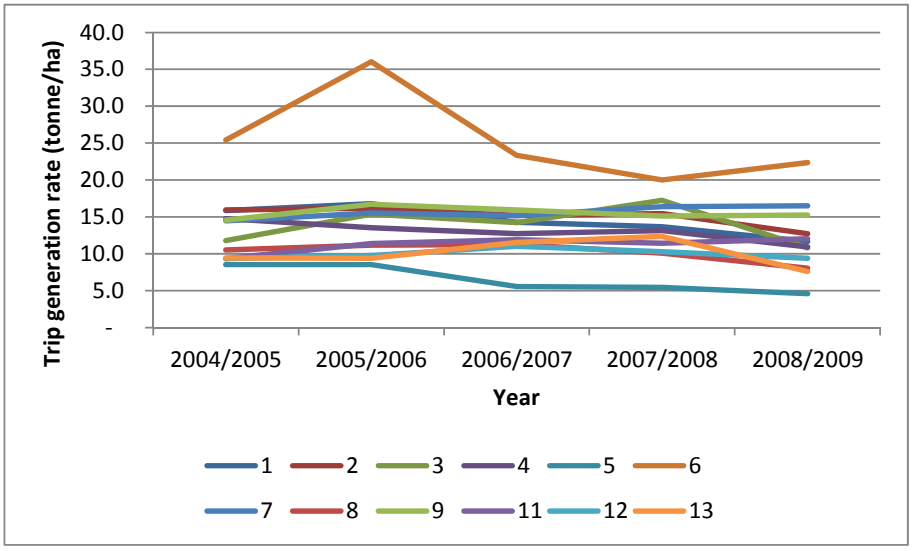
- KwaZulu Natal Midlands produced the highest number of roundwood for sales during 2008/9, namely 3, 22 million tonnes, followed by Mpumalanga South and North, with 2, 95 million tonnes and 2, 86 million tonnes respectively.
- Trip generation rates varied between 4, 6 tonne/ha in Maputaland and 22, 4 tonne/ha in Zululand. The average trip generation rate for the country during 2008/9 was 13 tonne/ha.

Table 3-1: Roundwood Production (and therefore trip generation rate) by Zone (2008/9)

Forestry Economic Zone		Roundwood Production (tonne)	Trip Generation (tonne/ha)
Zone 1	Limpopo Province	579,832	11.7
Zone 2	Mpumalanga North	2,861,425	12.7
Zone 3	Central Districts	270,167	10.8
Zone 4	Mpumalanga South	2,945,344	10.9
Zone 5	Maputaland	78,012	4.6
Zone 6	Zululand	1,723,111	22.4
Zone 7	KwaZulu Natal Midlands	3,221,111	16.5
Zone 8	KwaZulu Natal North	738,749	8.1
Zone 9	KwaZulu Natal South	1,883,747	15.3
Zone 11	Eastern Cape	1,473,857	12.0
Zone 12	Southern Cape	578,640	9.4
Zone 13	Western Cape	127,929	7.6
Total		16,481,924	12.9

Source: Department of Agriculture, Forestry and Fisheries, 2010.

Figure 3-1: Trip Generation Rates over the Period 2004/5 to 2008/9



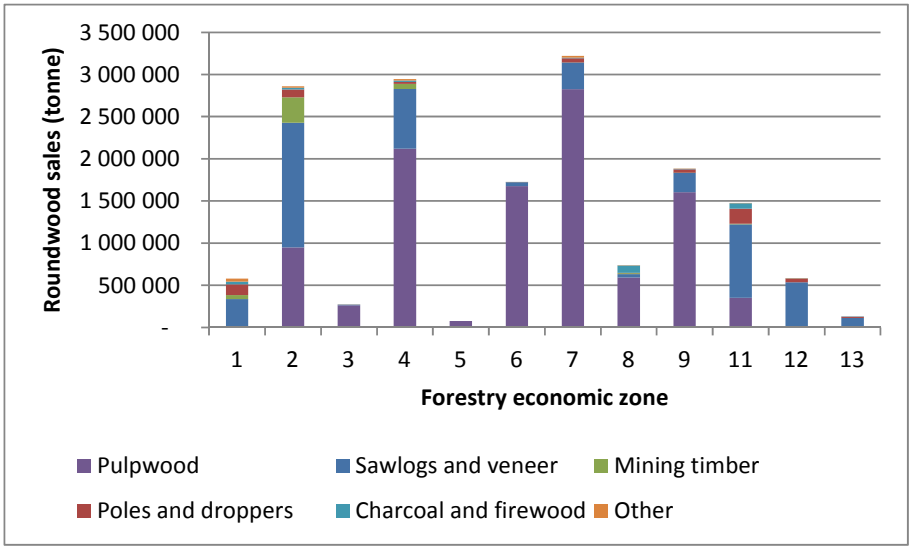
Source: Department of Agriculture, Forestry and Fisheries, 2010.

3.1.3 Trip Attraction Rates

Most of the timber (64%) from plantations is being sold to pulp and/or board plants, followed by sawmills and veneer plants (28%). When this is compared to the number of processing

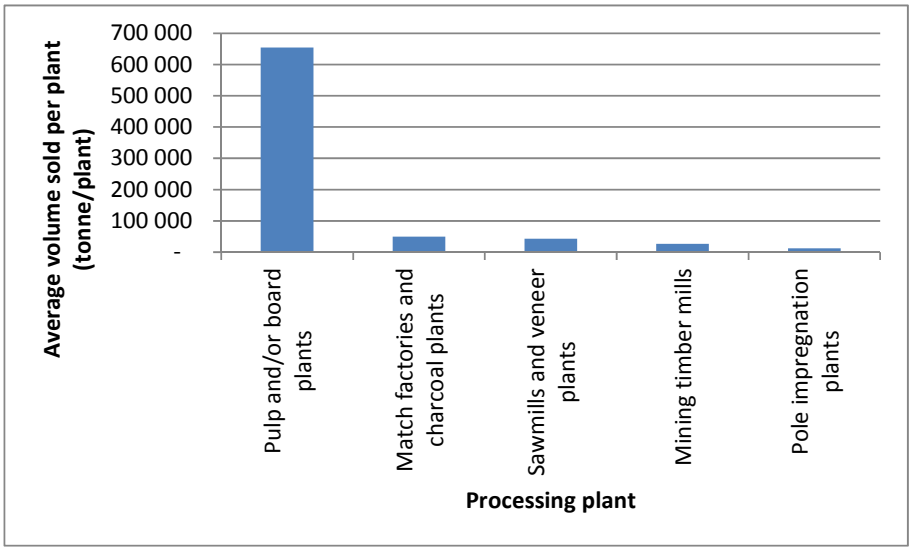
plants as indicated in **Figure 3-2**, an average trip attraction per processing plant can be calculated (refer to **Figure 3-3**). This figure shows that pulp and board plants are major attractors of timber, requiring on average about 650,000 tonnes per year per facility. The rest of the plants require far less timber per year, generally less than 50,000 tonnes per year per facility.

Figure 3-2: Roundwood Production by Product Type and Zone (2008/9)



Source: Department of Agriculture, Forestry and Fisheries, 2010.

Figure 3-3: Average Volume Sold (and therefore trip attraction rate) per Plant (2008/9)[1]



[1]Note: The figure above only shows average trip attraction rates per plant. The reader should note that actual attraction rates can differ within each category.

3.1.4 Forestry Transport Network

Section 2.2.4 noted the two modes of transport available to move the timber off the plantation, namely road or rail.

Based on the location of origins and destinations (i.e. of plantations and processing plants), an exercise was done to "ring-fence" the road and rail network that is considered to be of strategic importance for the forestry sector, and critical for continuous transport of timber products between plantations and processing plants. This network will be referred to as the forestry transport network, and was identified based on the following criteria:

- The shortest route between a plantation and a processing facility; and,
- The results of a survey by Forestry South Africa which identified typical road and rail routes used for transport of timber to 11 major processing plants in Mpumalanga and KwaZulu Natal provinces (FSA, 2011).

The resulting forestry transport network is indicated in **Map 2**. The forestry transport network was used as the transport model network, which is required in the route assignment exercise. The 13 forestry economic zones were disaggregated into 214 traffic zones and a traffic zone was created for each processing facility (mills etc.) (180 zones).

3.1.5 Trip Distribution

Trip distribution is the second component (after trip generation and attraction) in the traditional four-step transportation forecasting model. This step matches origins and destinations to develop a "trip table", a matrix that displays the number of trips going from each origin to each destination.

The results of a survey by Forestry South Africa which identified typical road and rail routes used for transport of timber to 11 major processing plants in Mpumalanga and KwaZulu Natal provinces (FSA, 2011) were used to determine trip distribution characteristics. The aim of the questionnaires used in the survey was to get as good a picture as possible of the situation on rail transport of timber, and not necessarily all timber transport. The survey focussed less on road transport, and only focussed on Mpumalanga and KwaZulu Natal provinces, and therefore the findings of the survey has limitations in country-wide application. However, the survey still represented a significant portion of total timber sales in the country. The findings of this survey were therefore used to identify the typical trip length frequency distributions. The data was weighed according to production totals per origin to compensate for the fact that a large volume of timber that was transported by road was not included in the survey.

The Gravity Distribution model was used in this study, to develop a matrix (trip table). The gravity distribution is the best known synthetic model, originally generated from an analogy with Newton's gravitational law. Gravity models estimate trips for each cell in the matrix without directly using the observed trip pattern. It is a mathematical model for calculating the trip distribution. It is based on the assumption that the trips made in a planning area are directly proportional to:

- The relevant origin and destination demand in all zones; and
- The functional values of the utility function between the zones.

The Gravity model works with distribution parameters, i.e. with values within the utility function, which map the reaction of road users to distance and time relations.

The model can be expressed mathematically as follows:

$$T_{ij} = \alpha P_i A_j f(C_{ij})$$

Where T_{ij}= number of trips between origin i and destination j

α = proportionality factor

P_i = total number of trip productions at zone i

A_j = total number of trip attractions at zone j

$f(C_{ij})$ = deterrence function

The deterrence function represents the disincentive to travel as distance (time) or cost increases. A deterrence function estimated from the calibrated base year is assumed to capture underlying travel behaviour and to be stable in future to allow its use in forecasting. The deterrence function used in this study can be expressed as follows:

f(Cij) = a x Cijbexp (c.Cij)

Where *Cij* = value for the utility between zones, e.g. distance from zones i to j

a, b, c = calibration parameters, calculated during the gravity model calibration

Before using a gravity distribution model it is necessary to go through a process of calibration, in order to ensure that its parameters are such that the model comes as close as possible to reproducing the base-year trip pattern. The parameters are calibrated during the estimation of the gravity model as part of the direct effort to satisfy the constraints. The quality of calibration determined for this model was 0.97 (where 1.0 indicates a very good quality).

The gravity model that resulted from the above exercise was applied to each product type (pulpwood, sawlogs, mining timber etc.), using the parameters determined during the calibration process. The result was five full origin-destination matrices.

The gravity model was also applied to the future trip productions and attractions to generate the potential future origin-destination matrices.

3.1.6 Modal Split

3.1.6.1 Current Situation

Modal split is a term used to allocate total timber trips to the different modes of transport. In South Africa the only two modes of transport available to move the timber between plantations and processing facilities are road and rail.

The proximity of the plantation site to the processing facility influences both the product types produced by the plantations and the transport modes selected. In the case of saw logs being produced for sawn timber this is generally fully transported by road. Sawmills generally have small intake volumes and are generally located within the processing area. In the case of softwoods the timber being sawn is ideally processed within two to four days of harvesting, and this is not suited to the “slower” rail scenario. The same rule can also be applied to the timber volumes used in poles, mining, charcoal and firewood production. In the case of pulp timber however, the option for either road or rail is available.

The FSA survey covered 12 key corporate growers and two co-operatives to determine the current volumes of railed timber compared to the potential volumes that the industry would

rail. It focussed on five destinations (consisting of 11 processing plants), in Richards Bay, Durban, Tugela, Ngodwana and Springs, which cumulatively account for about 44% of national timber sales. The total tonnage (summation of road and rail) covered in the survey was 6,758 million tonnes.

Sixty seven percent (4,5 million tonnes) of the tonnage moved from the plantations to mills is transported by road and the rest by rail. The survey acknowledged though that a large volume of timber transported by road was not included in the survey (and therefore the stated 67% may be much higher). The FSA concluded that the 2,3 million tonnes of timber transported by rail is a fair reflection of the total national volume transported..

The results of the analysis indicate that between 2005 and 2010 the volume of timber transported by rail to key mills in South Africa decreased by 40%. This translates to an additional 37,300 truck trips for the movement of timber per year (S.A Forestry Magazine, 2011, Timber Transport and Logistics, 2011).

One of the main reasons for forestry's migration from rail to road is the consequence of a 191% increase in rail tariffs compared to an 85% increase in road tariffs between 2001 and 2010. It is estimated that for every 1% tariff increase above inflation for rail, 35, 000 tonnes of timber diverts from rail to road per annum. Such a factor has a resounding effect on mode choice since transportation costs are equivalent to about 50% of timber grower's operational costs (S. A. Forestry Magazine, 2011). .

The FSA also attributed the reduction in railed timber to the following current problems:

- Branch line closures and poor condition;
- Tariff issues (level and annual increases);
- The marginalisation of timber by Transnet Freight Rail;
- Poor resource allocation in terms of the following:
  - Truck allocation and availability;
  - Siding allocation;
  - Locomotives;
  - Drivers / staff; and
  - Time slots on main line.

The increasing dependence on trucks has its share of negative impacts. The trade for lower costs and higher efficiency has resulted in pavement damage due to high axle loading, decreased road safety resulting from fatigue and weather conditions, negative environmental impacts due to truck emissions and vulnerability to erratic fuel prices. The industry agrees that dependence on road transportation is an unsustainable solution. The key mills have collaborated and begun an initiative to operate the two rail routes in the KwaZulu Natal Midlands. According to the FSA study, the key mills indicated that should conducive rail conditions exist, members will increase timber volumes by 3 million tonnes per year (about 134%), and they will reduce the volume of timber transported by road by 2, 6 million tonnes per year (by 58%), translating to a reduction of almost 80,000 truck trips on the roads (FSA, 2011).

3.1.6.2 Input into Transport Model

The pulp timber volumes were allocated to road or rail according to the following criteria developed from the FSA survey results:

Table 3-2: Modal Split Criteria Assumed for Pulp Volumes (Current Situation)

Trip Distance	% Allocated to Rail	% Allocated to Road
Shorter than 300 km	11%	89%
Longer than 300 km	30%	70%
TOTAL	19%	81%

For the future, some variations to above modal split were assumed (as discussed under **Section 4.4.2**.

3.1.7 Routes Assignment

A route assignment exercise was performed, to assign the trips generated and attracted on the forestry route network. The results are maps and a supporting database, showing the current and predicted forestry related traffic on the road and rail network.

3.1.8 Forestry Related Traffic Levels (Current Situation)

The forestry traffic volumes and pattern for the current situation, as obtained from the model, are shown graphically in **Figure 3-4** to **Figure 3-9** on the following pages (the figures show a national map, as well as a map for each of the five provinces producing forestry products). The reader should note that this traffic represents forestry products only (i.e. not total traffic).

The following observations can be made on the status quo of transport of forestry products:

- Forestry traffic is predominantly found in KwaZulu Natal and Mpumalanga, with some forestry traffic in the Eastern Cape, Limpopo and very limited traffic in the Western Cape;
- Road transport is currently the dominant mode. The main road based corridors seem to be the following: (1) The N2 in Kwazulu-Natal and Mpumalanga; (2) The N2 in the Eastern Cape; (3) The R36 in Mpumalanga; (4) The R34 in KwaZulu Natal; (5) The R74 in KwaZulu Natal; (6) The R612 in KwaZulu Natal; (7) The R33 in KwaZulu Natal.
- The main rail movement is on the line between Piet Retief (southern Mpumalanga) and Richards Bay in KwaZulu Natal.

Figure 3-4: Current Forestry Volumes per Road and Rail: South Africa

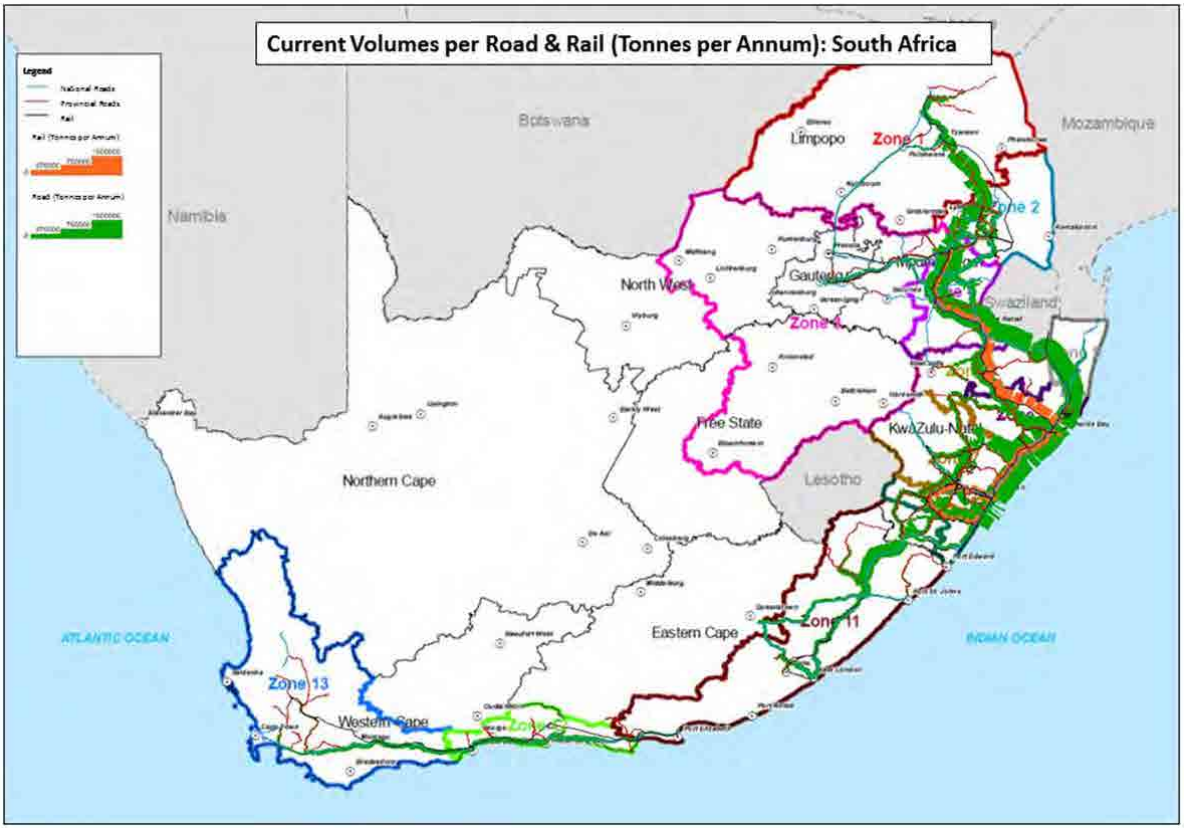


Figure 3-5: Current Forestry Volumes per Road and Rail: Eastern Cape

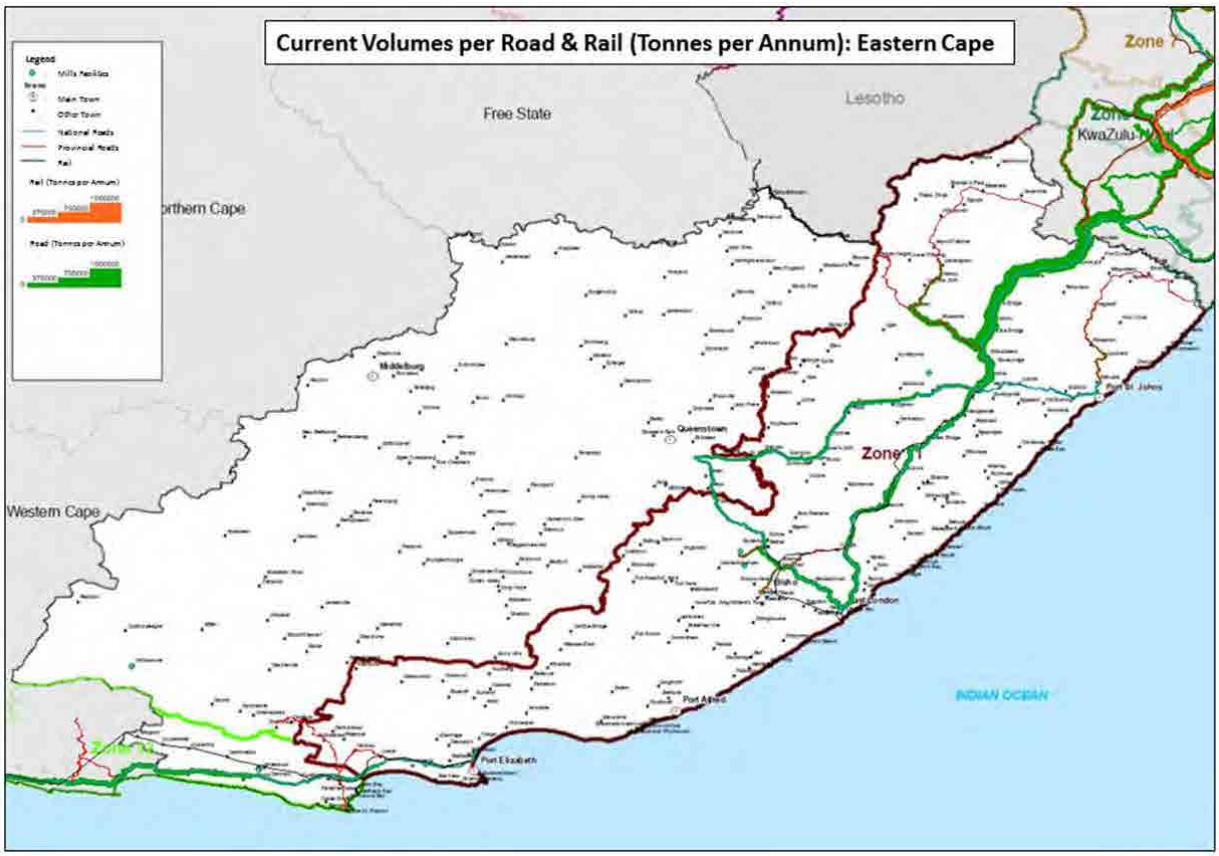


Figure 3-6: Current Forestry Volumes per Road and Rail: KwaZulu Natal

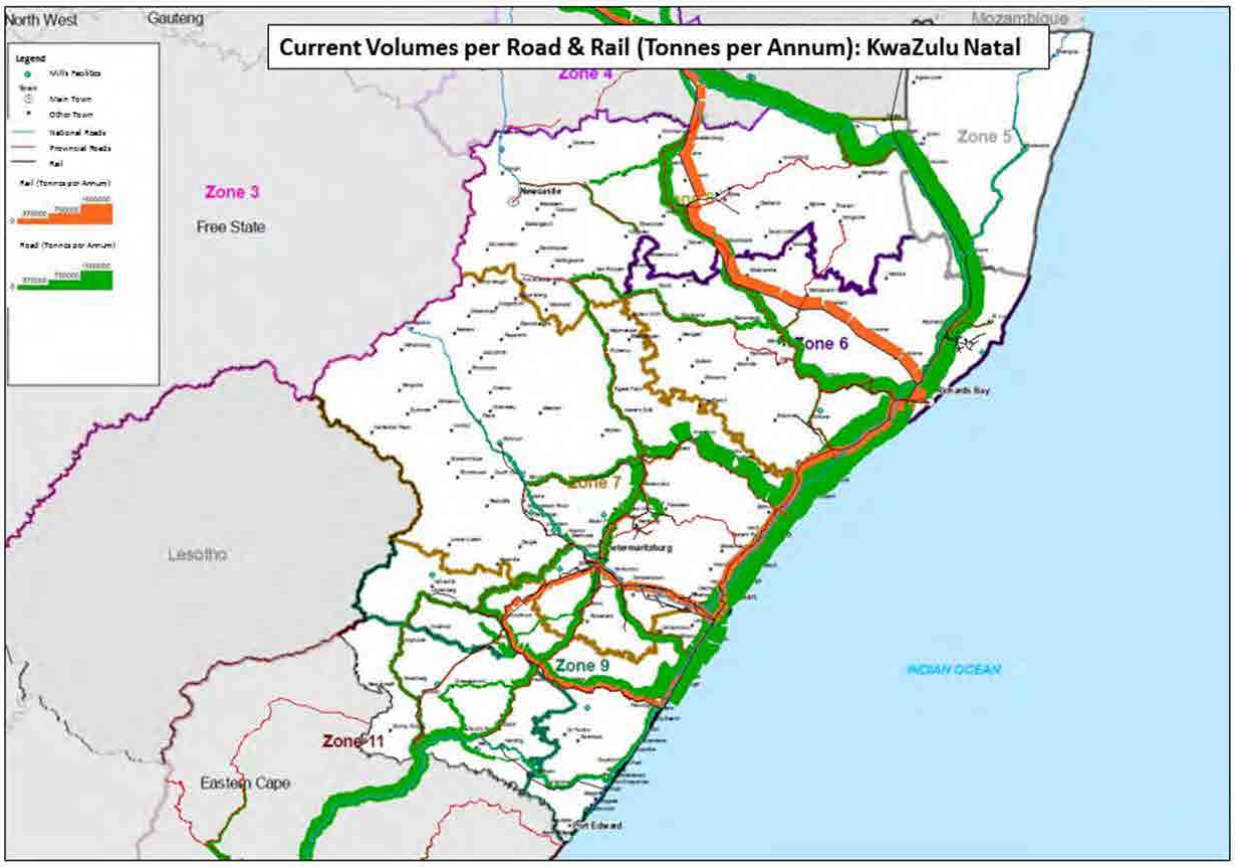


Figure 3-7: Current Forestry Volumes per Road and Rail: Limpopo

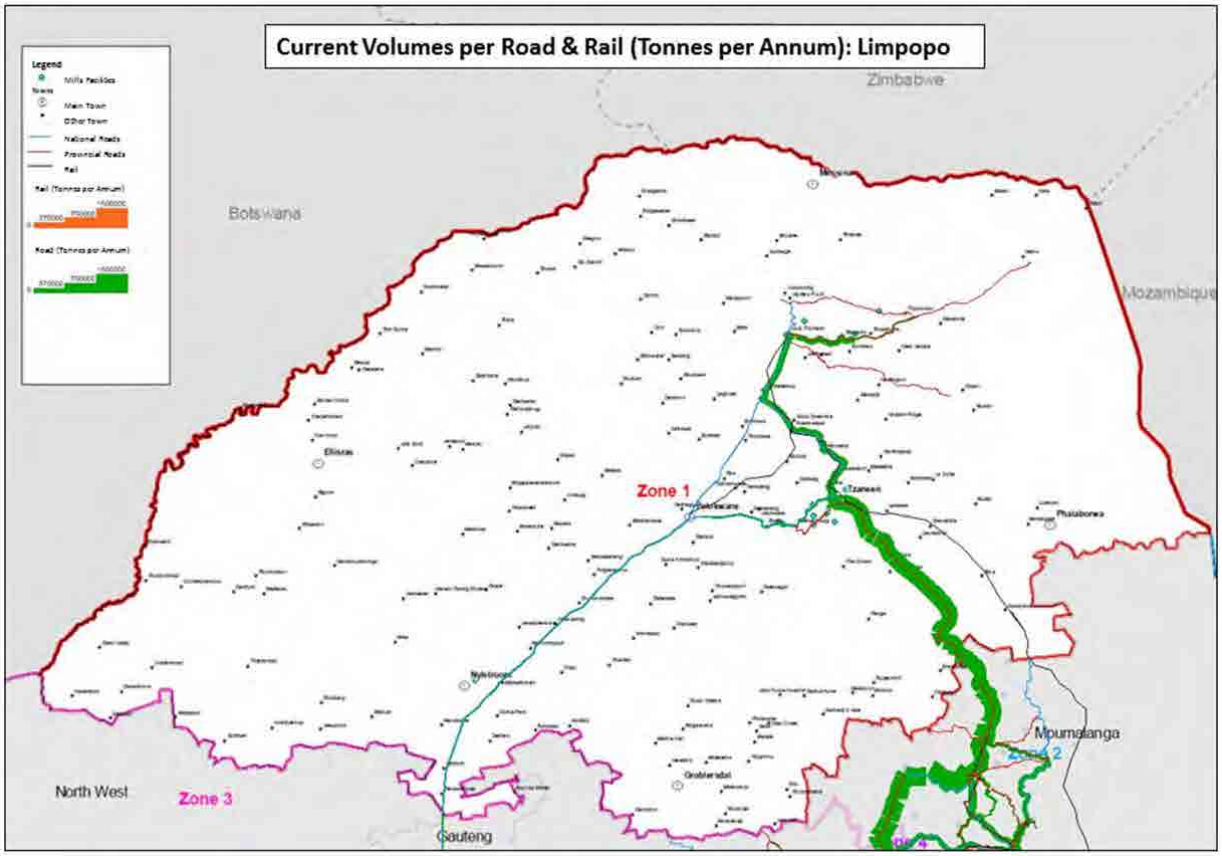


Figure 3-8: Current Forestry Volumes per Road and Rail: Mpumalanga

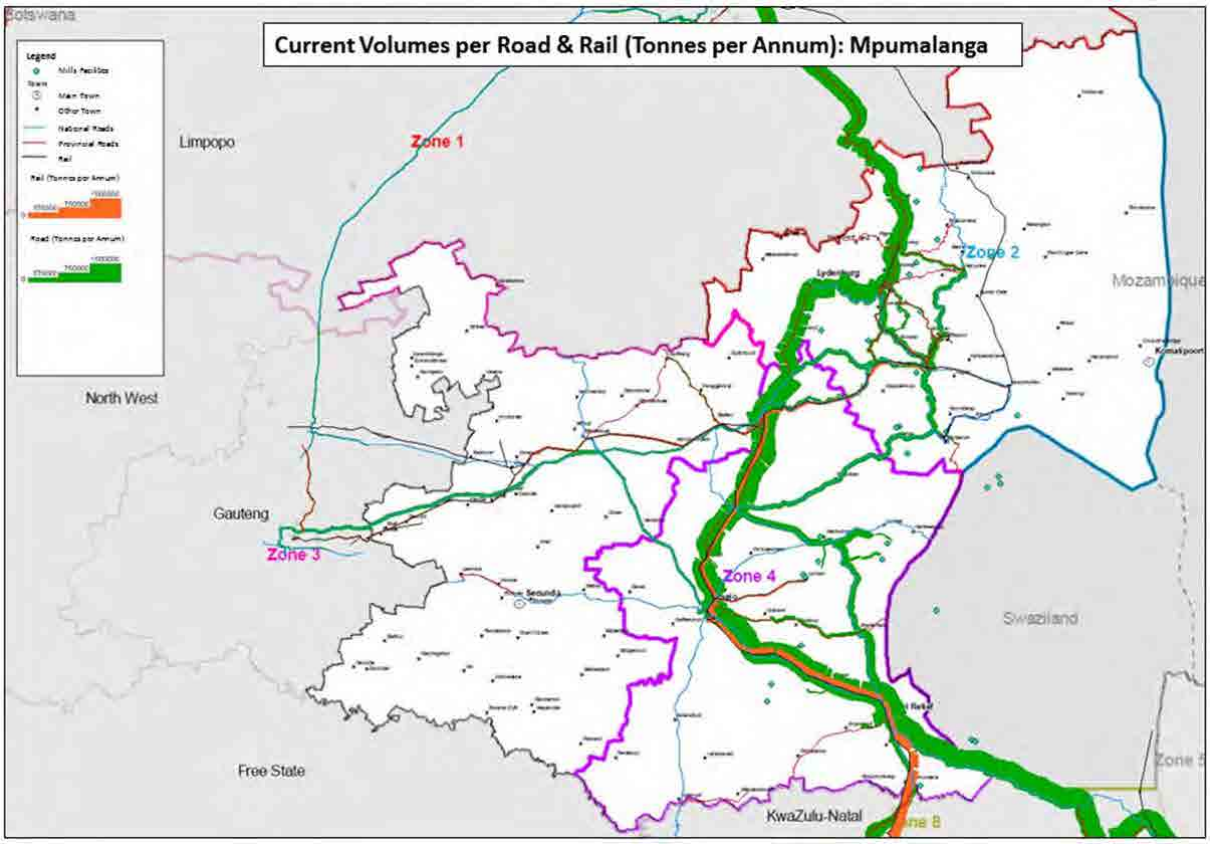
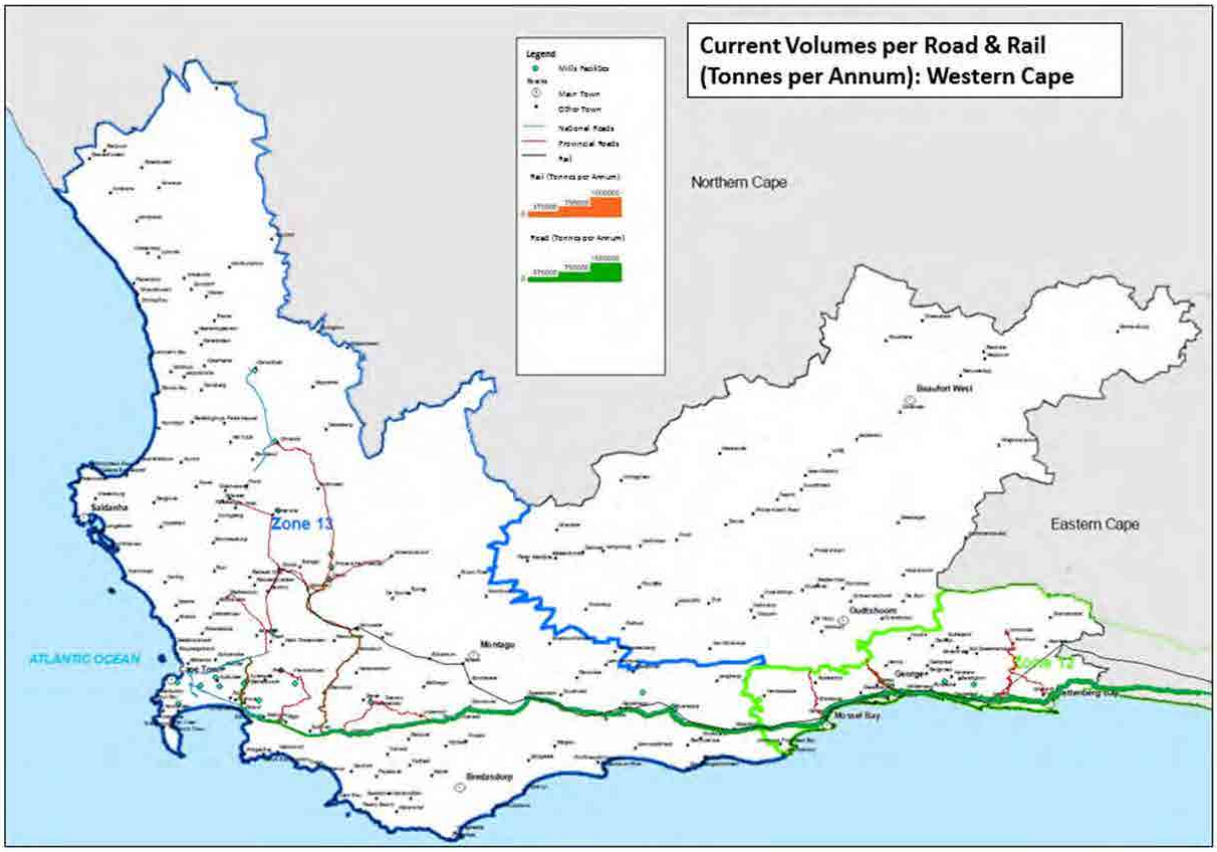


Figure 3-9: Current Forestry Volumes per Road and Rail: Western Cape



3.2 Extent of Forestry Industry Transport Infrastructure

3.2.1 Introduction

For the forestry sector to be more competitive and function efficiently as well as creating more opportunities as identified in the Forestry Sector Transformation Charter, the transport infrastructure needs and obstacles impacting the forestry sector need to be addressed appropriately.

The identification of forestry sector transport infrastructure needs and obstacles is undertaken through the assessment of the extent as well as condition of existing transport infrastructure and the observed gaps with respect to major capacity and supply constraints.

This section describes the extent of transport infrastructure of national; provincial and district significance in terms of roads and rail. The national infrastructure status quo description is supplemented with relevant data pertaining to transport infrastructure of importance to the forestry industry for regional (provincial) and local (district) level for Gauteng; Limpopo; Mpumalanga; KwaZulu Natal, Eastern Cape and Western Cape Provinces.

The status quo assessment is a desktop investigation of the transport infrastructure based on the following documents:

- The National Transport Master Plan prepared by the South African Department of Transport from 2007 to 2010.
- The Provincial Road Management System for Gauteng; Limpopo; Mpumalanga, KwaZulu Natal; Eastern Cape and the Western Cape Provinces.
- The following provincial documents: Spatial Development Frameworks (SDFs); Provincial Land Transport Frameworks (PLTFs); and, Provincial Growth and Development Strategies (PGDS).
- The following district-level planning documents were also reviewed: Integrated Transport Plans (ITPs); Spatial Development Frameworks (SDFs); Local Economic Development Plans (LEDs); and, Integrated Development Plans (IDPs).

This section will comprise of an overview of the national transport infrastructure relevant to the forestry sector where the extent of South Africa's road and rail infrastructure will be examined. The extent and condition of the relevant road and railway infrastructure within the provinces of interest will also be investigated and assessed.

The status quo assessment will cover primary and secondary roads as well as local roads (i.e. district roads) used by the forestry sector. Any planned infrastructure projects of each of the above mentioned provinces will also be investigated.

3.2.2 Overview of the South African Road Transport Infrastructure

The classification of roads into different operational systems, functional classes, or geometric types is necessary for communication among engineers, administrators and the general public. Functional classification of roads is the grouping of roads by the character of service they provide and was developed for transportation and planning purposes. The Road Classification System proposed by the Department Of Transport (DOT, 2006)) is used to classify roads in the study and is summarised below:

- **Primary Distributors (Class 1)** are high mobility roads with limited access for rapid movement of large volumes of people, raw materials, manufactured goods, and agricultural produce of national importance.
- **Regional Distributors (Class 2)** are relatively high mobility roads with lower levels of access for the movement of large volumes of people, raw materials, manufactured goods, and agricultural produce of regional importance in rural and urban areas.
- **District Distributors (Class 3)** consist of moderate mobility with controlled higher levels of access for the movement of people, raw materials, manufactured goods and agricultural produce in rural and urban areas of regional importance.
- **District Collectors (Class 4)** include high levels of access and lower levels of mobility for lower traffic volumes of people, raw materials, manufactured goods and agricultural produce in rural and urban areas of local importance.
- **Access Roads (Class 5)** are high access and very low mobility routes for the movement of people and goods within urban and rural areas.
- **Non-Motorized Access Ways (Class 6)** are public rights of way for non-motorized transport providing basic and dedicated movement.

The total South African road network is estimated at 440,000 km, with 4% making up the primary road network, 51% the secondary road network, with 45% comprising lower-order roads. The last category includes only the major local road network and excludes the urban collector streets that serve all suburbs and villages, which is estimated to add another 250,000 km to the total. The South African road network is depicted in **Map 2** and illustrated by province in **Table 3-3**.

The following observations are made from **Table 3-3**:

- The Northern Cape Province has the highest percentage of the Primary Distributors (approximately 20%); whilst the Gauteng Province has the least percentage of Primary Distributors (approximately 4%);
- The Eastern Cape Province has the highest Regional Distributors at 21%, followed by KwaZulu Natal Province with 19 percent;;
- The Western Cape and Free State Provinces both have 13% of the Regional Distributor road network;
- Mpumalanga Province has 7% of the Regional Distributor road network;
- Gauteng and Limpopo have the lowest extent of the Regional Distributor road network in comparison to other provinces with only 3% of the total Regional Distributor road network; and
- KwaZulu Natal has the most roads in South Africa with a total of 99,297 km of roads which is 23% of the total road network.

Table 3-3: Extent of Road Network in South Africa

Province	Class 1 Roads (km)	Class 2 Roads (km)	Class 3 – Class 5 Roads (km)	Total Road Length (km)
Eastern Cape	2,456	47,816	23,040	73,312
Free State	1,571	28,356	20,000	49,927
Gauteng	588	6,308	28,830	35,726
KwaZulu Natal	1,232	43,000	55,065	99,297
Limpopo	1,963	7,266	11,760	20,989
Mpumalanga	2,533	14,557	21,000	38,090
Northern Cape	3,197	27,471	27,485	58,153
North West	1,183	19,205	2,926	23,314
Western Cape	1,474	29,894	10,000	41,368
Total	16,197	223,873	200,106	440,176

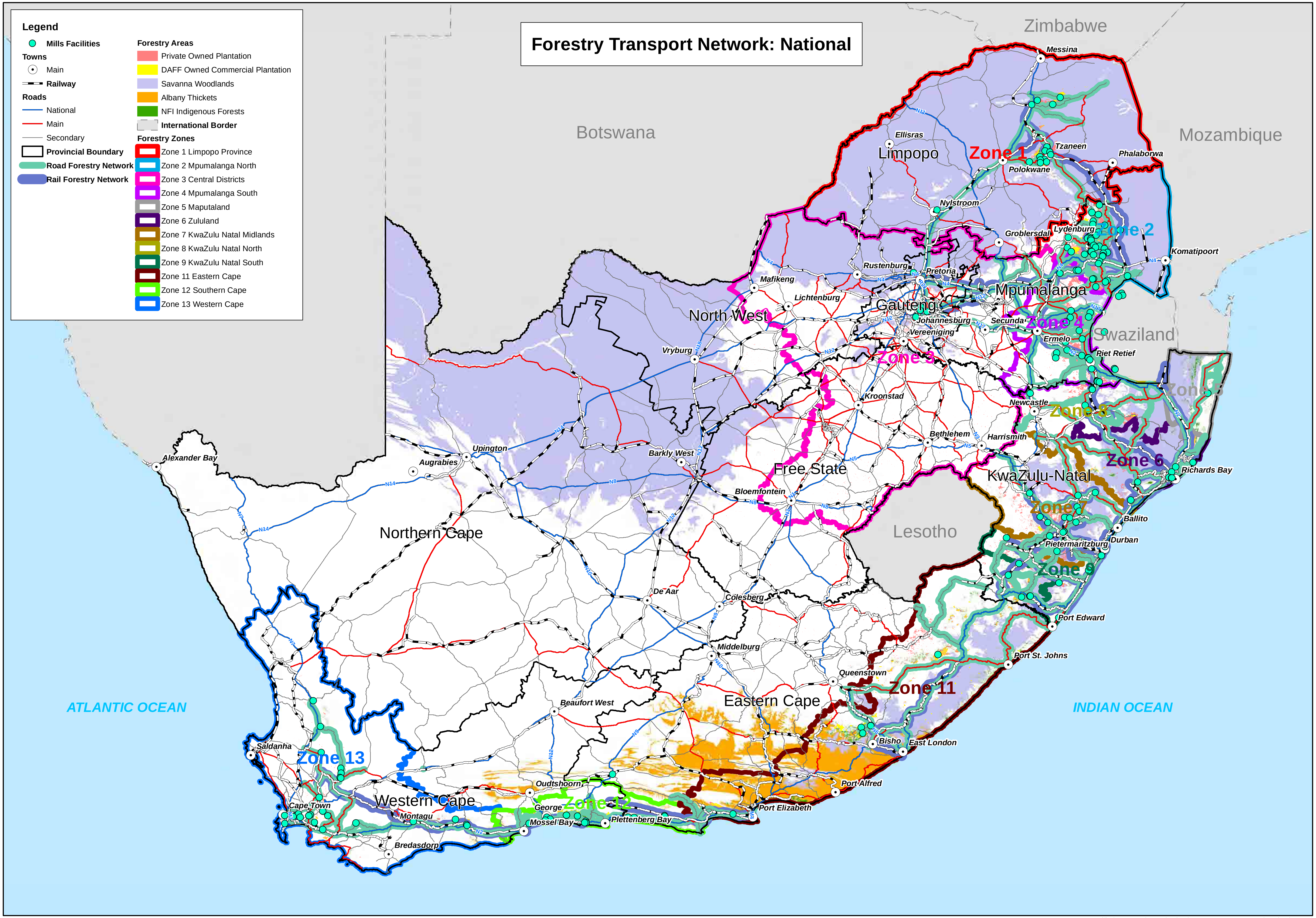
Source: Department of Transport. 2009 .The National Transport Master Plan 2050: Consolidation Report.

3.2.3 Overview of the South African Rail Transport Infrastructure

The South African railway network is owned by two entities namely Transnet and the South African Rail Commuter Corporation (SARCC), and is classified into the core network and branch lines. The Transnet operated Core Network is approximately 12,800km and the branch lines are approximately 7,300km. The extent of the network is shown in **Map 2**. The description of the railway classification as outlined in the National Infrastructure Plan (NIP) is captured in **Table 3-4**.

Table 3-4: Description of the Railway Classification

Classification	Description	Length	Characteristics
Basic Core	Port-Rail Corridor	12 801 km (63.8% of the total network distance of 20 079 km) Includes 74 km of closed line	1. Freight focus 2. Block-loads 3. Hub to hub 4. Corridors 5. Rail, port and pipeline connectivity 6. Intermodalism 7. Operational flexibility
	Port Interconnect		
	Cross-border Interconnect		
Extended Core	High Volume Feeder		
	Network operational flexibility		
	Future Network Expansion Provision		
Branch Line	Closed Lines	3 350 km (16.7%)	1. Multi-use potential 2. Relatively low



Ref:\\G:\PROJECTS\107518\Projects\08 Forestry Transport Network_National_A3.mxd

Classification	Description	Length	Characteristics
	Lifted Lines	874 km (not included)	volumes 3. District train configuration 4. Small scale operations 5. Distinct infrastructure profile 6. Multiple origin-destinations
	Low volume active branch line	3 928 km (19.6%)	
	High volume active branch line		

Source: Transnet, 2011.The National Infrastructure Plan.

The basic core network consists of:

- The Port-Rail corridor that connects the railway lines that extend to the central regions of South Africa connecting them to the South African ports in Saldanha, Cape Town, Port Elizabeth, East London, Durban and Richards Bay.
- Port-interconnect lines, as the name suggests, connect the ports that are in the same region. There is a port interconnect line between Saldanha and Cape Town and another one connecting Worcester and Mossel Bay in the Western Cape. In the Eastern Cape there is a port interconnect line connecting Cookhouse and East London. Durban and Richards Bay in KwaZulu Natal are also connected by a port interconnect line.

The extended core network is divided into:

- High volume feeders operating in the west of the Western Cape, between Durban and Port Shepstone in KwaZulu Natal and some in Mpumalanga and Limpopo;
- The network operational flexibility lines operating in the central regions between KwaZulu Natal, Free State and North West; and
- Transnet have, in the NIP, identified future network expansion lines in Limpopo and the North West Provinces.

The branch line network extends throughout the country and consists of closed lines, lifted lines, low volume active branch lines and high volume active branch lines. The branch line network is characterised by multi-use potential, low volumes, distinct train configuration, small scale operations, a distinct infrastructure profile and multiple origin-destinations. Transnet is currently embarking on a branch lines strategy, which provides for their concessioning to private operators (Transnet, 2011. National Infrastructure Plan). Currently feasibility studies are being conducted to determine the viability of each concession opportunity for private operators. Transnet is also in discussion with the Department of Transport to finalise a sustainability plan for the branch lines strategy.

3.2.4 Extent of Transportation Infrastructure serving the Forestry Sector per Province

The South African road network is vast with a varying distribution of primary, regional and district distributors across every province. Some of the primary, regional and district roads discussed above are used by the forestry sector to transport their raw materials and

processed products in the provinces relevant to the study. Subsequent sections of the report assess in detail the extent of the roads and rail used by the forestry sector per province.

3.2.4.1 Extent of Transport Infrastructure serving the Forestry Sector in Eastern Cape Province

Map 3 below shows the extent of both the rail and road network serving the forestry industry in the Eastern Cape. **Table 3-5** below summarises the roads network (by class and length).

Table 3-5: The Extent of Road Network serving the Forestry Industry in Eastern Cape Province

Road Number	Class	Length (km)
N2	1	661.30
N6	1	161.03
R330	2	51.43
R331	2	26.67
R332	2	81.74
R352	2	17.94
R396	2	133.19
R61	1	485.96
R63	2	71.86
M4	2	6.13
District roads (unknown ID)	3 – 4	167.65
Total		1864.90

The following observations are made from **Map 3** and **Table 3-5**:

- The forestry areas in the Eastern Cape are predominantly in the eastern part of the province with most of the transport infrastructure serving the sector found there;
- The Class 1 roads (N2, N6 and R61) make up about 70% of the forestry road network of the province;
- Two sections of the N2 serve the forestry sector in the Eastern Cape. One section is in the south eastern parts of the province, extending from Storms River to Port Elizabeth. The second section services the north-eastern regions extending from East London to the provincial border of KwaZulu Natal through Brook's Nek;
- The section of the N6 used by the forest sector is a comparatively short section at 161 km and also originates from East London and extends to meet the R61 near Queenstown;

Forestry Transport Network: Eastern Cape

Legend

Mills Facilities

Towns
- Main
- Other

Road - Rail Intermodal Facilities

Road - Rail Water Intermodal Facilities

Train Station

Railway

Roads
- National
- Main
- Secondary
- Other

Provincial Boundary

Road Forestry Network

Rail Forestry Network

Forestry Areas
- Private Owned Plantation
- DAFF Owned Commercial Plantation
- Savanna Woodlands
- Albany Thickets
- NFI Indigenous Forests

International Border

Forestry Zones
- Zone 1 Limpopo Province
- Zone 2 Mpumalanga North
- Zone 3 Central Districts
- Zone 4 Mpumalanga South
- Zone 5 Maputaland
- Zone 6 Zululand
- Zone 7 KwaZulu Natal Midlands
- Zone 8 KwaZulu Natal North
- Zone 9 KwaZulu Natal South
- Zone 11 Eastern Cape
- Zone 12 Southern Cape
- Zone 13 Western Cape

Free State

Lesotho

Zone 7

Zone 9
KwaZulu-Natal

Western Cape

Zone 11

Zone 12

INDIAN OCEAN

Middelburg
Queenstown
Bisho
EastLondon
Port Alfred
Port Elizabeth
Port St. Johns

N1 N2 N3 N6 N8 N9

Ref:\\G:\PROJECTS\107518\Projects\12 Forestry Transport Network_Eastern Cape_A3.mxd

- The R61 is the second longest section of Class 1 road serving the forestry sector with a total length of 486 km. This road extends from the N6 extending all the way towards the east entering KwaZulu Natal at Umtamvuna Bridge;
- The Class 2 roads (R330, R331, R332, R352, R396, R63 and the M4) contribute about 20% of the total forestry road network in the Eastern Cape;
- The district roads jointly contribute167 km to the extent of forestry roads. These roads serve the plantations to transport their goods from the plantation to the Class 1 and Class 2 roads; and
- Total length of the primary, secondary and tertiary network serving the forestry sector in the Eastern Cape is approximately 1,865 km, which is about 2.5% of the total provincial road network.

Table 3-6 below provides characteristics of the road network serving the forestry industry in terms of road density and measure of access.

Table 3-6: The Characteristics of Road Network serving the Forestry Industry in Eastern Cape Province

Total Length of Road Network serving Forestry Industry (km)	Total Area of Forestry Plantation in the Province (ha)	Road Density (Road-km per 100km^2 of Forestry Plantation)	Total Persons dependent on the Forestry Industry (persons)	Measure of Access (Road-km per 1,000 persons employed in the Industry)
1,865	122,549	152	72,100	25,9

The following observations are made from **Table 3-6**:

- The total area of land used by the forestry sector in the Eastern Cape is approximately 122,500 ha. There is about 152 km of road serving the forest sector for every 100 square kilometre of forest area; and
- There is about 26km of road available to every 1000 employed in the forestry industry in the Eastern Cape;

Table 3-7 below, also supported by **Map 3** summarises the rail network that serves the forestry industry in the province.

Table 3-7: Extent of Rail Network serving the Forestry Industry in Eastern Cape Province

Extent of Rail Network	Rail Category	Total Length (km)
	• Branch line: Port Elizabeth to Misgund • Branch line: East London – Bisho–Mthatha • Branch line: Seymour – Port Beaufort - Bisho	714

The following observations are made from **Map 3** and **Table 3-7**:

- There are three branch lines that are key to serving the forestry areas in the Eastern Cape, namely the Misgund to Port Elizabeth line, the East London – Bisho – Mthatha line, and the Seymour – Port Beaufort – Bisho line; and

- The total rail kilometre serving the forestry industry in the Eastern Cape is approximately 730km.

3.2.4.2 Extent of Transport Infrastructure serving the Forestry Sector in KwaZulu Natal Province

Map 4 below shows the extent of both rail and road network serving the forestry industry in KwaZulu Natal. **Table 3-8** below summarises the roads network (by class and length).

Table 3-8: The Extent of Road Network serving the Forestry Industry in KwaZulu Natal Province

Road Number	Class	Length (km)
N11	1	44.58
N2	1	894.74
N3	1	503.72
R102	2	0.06
R103	2	0.28
R22	1	170.23
R33	2	249.91
R34	2	305.15
R543	2	1.82
R602	2	2.23
R603	2	65.84
R61	2	20.9
R612	2	141.29
R614	2	99.86
R617	2	223.85
R618	2	28.1
R622	2	69.4
R66	2	189.54
R68	2	180.41
R69	2	139.34
R74	2	110.72
District roads (unknown ID)	3 – 4	819.07
Total		4261.04

Forestry Transport Network: KwaZulu-Natal

Legend

Mills Facilities

Towns
- Main
- Other

Road - Rail Intermodal Facilities

Road - Rail Water Intermodal Facilities

Train Station

Railway

Roads
- National
- Main
- Secondary
- Other

Provincial Boundary

Road Forestry Network

Rail Forestry Network

Forestry Areas
- Private Owned Plantation
- DAFF Owned Commercial Plantation
- Savanna Woodlands
- Albany Thickets
- NFI Indigenous Forests

International Border

Forestry Zones
- Zone 1 Limpopo Province
- Zone 2 Mpumalanga North
- Zone 3 Central Districts
- Zone 4 Mpumalanga South
- Zone 5 Maputaland
- Zone 6 Zululand
- Zone 7 KwaZulu Natal Midlands
- Zone 8 KwaZulu Natal North
- Zone 9 KwaZulu Natal South
- Zone 11 Eastern Cape
- Zone 12 Southern Cape
- Zone 13 Western Cape

Mozambique

Mpumalanga

Swaziland

Lesotho

Eastern Cape

INDIAN OCEAN

Zone 4

Zone 5

Zone 8

Zone 6

Zone 7

Zone 9

Zone 11

Newcastle

Pietermaritzburg

Durban

Richards Bay

Ballito

Port Edward

Ref:\\G:\PROJECTS\107518\Projects\10 Forestry Transport Network_KwaZulu-Natal_A3.mxd

The following observations are made from **Map 4**and **Table 3-8**:

- Forestry areas in KwaZulu Natal are distributed throughout the province and therefore the transport infrastructure serving the forestry sector in the KwaZulu Natal is similarly widely distributed;
- The Class 1 roads (N11, N2, N3 and R22) make up about 38% of the forestry road network of the province;
- The N2 is the longest Class 1 road serving the forestry sector in KwaZulu Natal, extending 895 km from Brook's Nek to the Northern regions of the province to Mpumalanga passing very close to the border of Swaziland;
- The N3 is the second longest section of road in KwaZulu Natal serving the forest sector, serving as the main link to Gauteng for forestry areas in the central and southern regions of the province. The total length of the N3 serving the forestry industry in KwaZulu Natal is about 504km long;
- Short sections of the N11 and the R22 (45 km and 170 km long respectively) are also used by the forest sector;
- The Class 2 roads are the predominantly used class roads contributing about 43% of the total forestry road network in the KwaZulu Natal;
- The district roads jointly contribute 819 km to the extent of forestry transport roads. These roads serve the plantations to transport their good to the Class 1 and Class 2 roads. This is a very vast network of roads, confirming that the forest areas are widespread across the province; and
- The total length of the primary network, secondary and tertiary network is approximately 4,261km, about 4.3% of the total road network in the province. KwaZulu Natal has, by far, the most roads serving the forestry sector when compared with other provinces with forestry plantations.

Table 3-9 below provides characteristics of the road network serving the forestry industry in terms of road density and measure of access.

Table 3-9: The Characteristics of Road Network serving the Forestry Industry in KwaZulu Natal Province

Total Length of Road Network serving Forestry Industry (km)	Total Area of Forestry Plantation in the Province (ha)	Road Density (Road-km per 100km^2 of Forestry Plantation)	Total Persons dependent on the Forestry Industry (persons)	Measure of Access (Road-km per 1,000 persons employed in the Industry)
4,261	504,393	84.5	242,900	17.9

The following observations are made from **Table 3-9**:

- There is approximately 85 km of road serving the forest sector for every 100 square kilometre of forest area; and
- There is about 18 km of road available to every 1,000 persons employed by the forestry industry.

Table 3-10 below, also supported by **Map 4** summarises the rail network that serves the forestry industry in the province.

Table 3-10: Extent of Rail Network serving the Forestry Industry in KwaZulu Natal Province

	Rail Category	Total Length (km)
Extent of Rail Network	• Durban to Estcourt Port - Rail Corridor; • Richards Bay to Mpumalanga Border Port – Rail Corridor; • Pietermaritzburg – Kranskop branch line; • Pietermaritzburg – Franklin branch line; • Donnybrook – Underberg branch line; • Pietermaritzburg – Richmond branch line; • Richards Bay – Nkwalini branch line; • The Richards Bay to Swaziland border port-rail corridor; and, • Vryheid - Alpha branch line.	2,994

The following observations are made from **Map 4** and **Table 3-10**:

:

- The forestry industry in KwaZulu Natal is served by the following rail network:
  - The Port-Rail Corridor from Durban – to Estcourt as well as the following branches emanating from this basic core corridor: (1) Pietermaritzburg – Kranskop; (2) Pietermaritzburg – Franklin; (3) Donnybrook – Underberg; Pietermaritzburg – Richmond;
  - The Port – Rail Corridor from Richards Bay to Mpumalanga Province, via Vryheid, supported by the Richards Bay – Nkwalini branch line and the Vryheid – Alpha branch line; and
  - The Port – Rail Corridor from Richards Bay to the Swaziland border.
- The total rail kilometre serving the forestry industry in KwaZulu Natal is approximately 2,995 km.

3.2.4.3 Extent of Transport Infrastructure serving the Forestry Sector in Limpopo Province

Map 5 below shows the extent of both rail and road network serving the forestry industry in Limpopo. **Table 3-11** below summarises the roads network (by class and length).

Table 3-11: The Extent of Road Network serving the Forestry Industry in Limpopo Province

Road Number	Class	Length (km)
N1	1	528.2
R36	2	203.27
R523	1	67.34
R524	2	135.3
R528	2	34.76
R532	2	4.33
R578	2	92.36
R71	2	93.39

Forestry Transport Network: Limpopo

Legend

Mills Facilities

Towns
- Main
- Other

Road - Rail Intermodal Facilities

Road - Rail Water Intermodal Facilities

Train Station

Railway

Roads
- National
- Main
- Secondary
- Other

Provincial Boundary

Road Forestry Network

Rail Forestry Network

Forestry Areas
- Private Owned Plantation
- DAFF Owned Commercial Plantation
- Savanna Woodlands
- Albany Thickets
- NFI Indigenous Forests

International Border

Forestry Zones
- Zone 1 Limpopo Province
- Zone 2 Mpumalanga North
- Zone 3 Central Districts
- Zone 4 Mpumalanga South
- Zone 5 Maputaland
- Zone 6 Zululand
- Zone 7 KwaZulu Natal Midlands
- Zone 8 KwaZulu Natal North
- Zone 9 KwaZulu Natal South
- Zone 11 Eastern Cape
- Zone 12 Southern Cape
- Zone 13 Western Cape

Zimbabwe

Mozambique

North West

Gauteng

Mpumalanga

Zone 1

Zone 2

Zone 3

Zone 4

Messina
Evangelina
Masisi
Gate
Pafuri
Bridgewater
Brombeek
Kopjeskraal
Ostuu
Gregory
Bandur
Mopane
Tshipise
Alldays
Huntleigh
Maria
Maasstroom
Tonash
De Gracht
Swartwater
Carlow
Oorwinning
Wylie's Poort
Waterpoort
Thoyandou
Mavamba
Tolwe
Vivo
Buysdorp
Mara
Louis Trichardt
Ramongo
Tshakhuma
Tom Burke
Borchers
Klein Letaba
Marnitz
Vleifontein
Elim Hospital
Blinkwater
Sending
Beauty
Gaseleka
N11
Baltimore
Woudkop
Bochum
Blouhaak
Bandelierkop
Ha-Mogoro
Giyani
Monte Christo
Dendron
Legkraal
Mamaila
Steilwater
Steilloopbrug
Nkomo
Steelpoort
Oranjefontein
Ons Hoop
Ultzicht
Kalkbank
Bylsteel
Thorndale
Botlokwa
Groot Spelonke
Soekmekaar
Hildreth Ridge
Villa Nora
Jansepunt
Marken
Ellisras
Overyssel
Gilead
Wooketsi
Ga-Modjadji
Munnik
Matlala
Rita
Solomondale
Sebayeng
Olyfberg
Polisi
Tzaneen
Maleketla
Nkambak
La Cotte
Mogalakwenastroom
Limburg
Afguns
Groesbeek
Seshego
Polokwane
Mankweng
Leshwane
Boyne
Haenertsburg
Letsitele
Mulati
Lulekani
Phalaborwa
Namakgale
Gravelotte
Leydsdorp
Elmeston
Mokamole
Mapela
Melkrivier
Mashashane
Rietkolk
Spanwerk
Sterkwater
Olcolaco
Trichardtsdal
Hermanusdorings
Mahwelereng
Nuwe Smitsdorp
Gladdeklipkop
The Downs
Rooibosbult
Rooibokkraal
Voortrekkerspos
Sentrum
Matlabas
Vaalwater
Vier-en-Twintig Rivier
Palala
Chuniespoort
Zeekoegat
Lebowakgomo
Drummondale
Zebediela
Mica
Vanalphensvlei
Makdoring
Gompies
Penge
Alma
Immerpan
Silent Valley
Nylstroom
Middelfontein
Roedtan
Crecy
Thabazimbi
Oostermoed
Brandboraai
Burgersfort
Dwaalboom
Kayaseput
Jane Furse Hospital
Sekhukhune
Steelpoort
Ohrigstad
Rooiberg
Tompi Seleka
Kennedy's Vale
Middelwit
Ganekuil
Holme Park
Mabula
Koedoeskop
Leeupoort
Warmbaths
Nutfield
Tuinplaas
Moganyaka
Phokwane
Nebo
Glen Cowie
Malaita
Settlers
Marble Hall
Northam
Motetema
Hlogotlou
Radium
Hereford
Groblersdal
Pienaarsrivier
Rust de Winter
Maleoskop
Erts
Roossenekal
Dennilton
Rooikraal
Mossiesdal
Laersdrif
N4

Ref:\\G:\PROJECTS\107518\Projects\11 Forestry Transport Network_Limpopo_A3.mxd

Road Number	Class	Length (km)
Total		1158.95

The following observations are made from **Map 5** and **Table 3-11**:

- The forestry areas in Limpopo are predominantly around the Tzaneen area and some forestry is also found further north of this region near Venda;
- The Class 1 roads (N1 and R523) make up about 51% of the forestry road network. The N1 section of road serving the forestry areas is the main link to Gauteng and extends 523 km from Wyllie's Poort to the provincial border of Gauteng;
- The R523 is the other national road serving the forestry areas and is 67 km in extent;
- The Class 2 roads (R36, 524, R528, R532, R578 and R71) contribute about 48% of the total forestry road network; whilst the district roads used by the forestry sector are insignificant in length; and
- The total length of the primary network, secondary and tertiary network serving the sector is approximately 1,159 km, about 5.5% of the total road network in Limpopo.

Table 3-12 below provides characteristics of the road network in terms of road density and measure of access.

Table 3-12: The Characteristics of Road Network serving the Forestry Industry in Limpopo Province

Total Length of Road Network serving Forestry Industry (km)	Total Area of Forestry Plantation in the Province (ha)	Road Density (Road-m per 100km^2 of Forestry Plantation)	Total Persons dependent on the Forestry Industry (persons)	Measure of Access (Road-km per 1,000 persons employed in the Industry)
1,159	49,669	233	18,900	61

The following observations are made from Table 3-12:

- The total plantation area is low compared to the other provinces but has a large road network in proportion to the area (i.e. 233 km of road serve the sector for every 1,000 square kilometre of forest area; and
- There is about 61 km of road available to every 1000 persons employed by forestry industry.

Table 3-13 below, also supported by **Map 5** summarises the rail network that serves the forestry industry in the province.

Table 3-13: Extent of Rail Network serving the Forestry Industry in Limpopo Province

Extent of Rail Network	Rail Category	Total Length (km)
	• Makhado – Polokwane Cross Border	399

Extent of Rail Network	Rail Category	Total Length (km)
	Connector; • Groenbult – Limpopo Boundary Cross Border Connector; • Phalaborwa – Hoedspruit High Volume Feeder.	

The following observations are made from **Map 5** and **Table 3-13**:

- The forestry industry in Limpopo is served by the following rail network:
  - The Cross Border Connector from Makhado – to Polokwane;
  - Cross Border Connector from Groenbult to Limpopo Boundary with Mpumalanga Province; and,
  - The High Volume Feeder from Phalaborwa to Hoedspruit.
- The total rail kilometre serving the forestry industry is approximately 400 km.

3.2.4.4 Extent of Transport Infrastructure serving the Forestry Sector in Mpumalanga Province

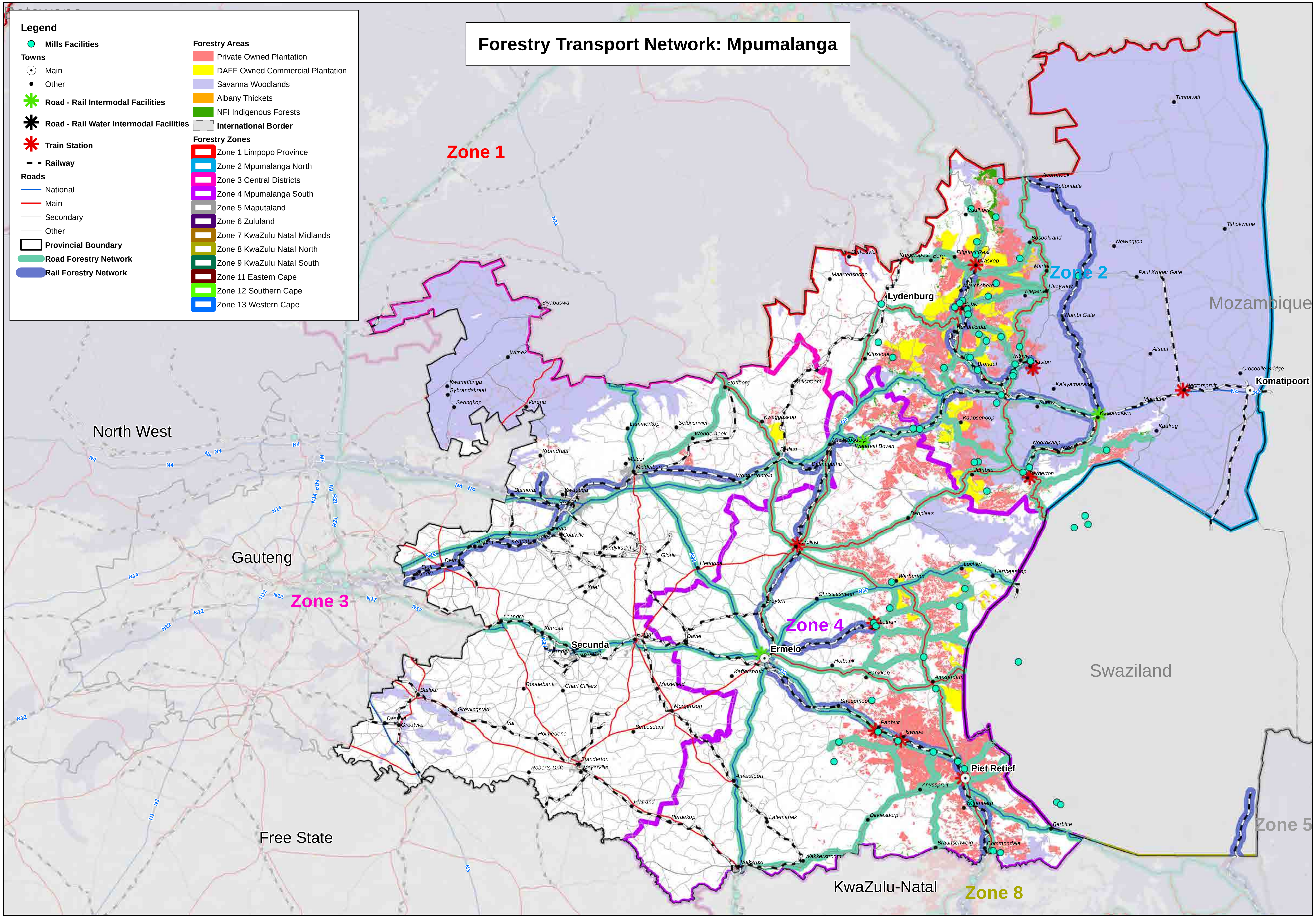
Map 6 below presents the extent of both rail and road network serving the forestry industry in Mpumalanga. **Table 3-14** summarises the roads network (by class and length).

The following observations are made from **Map 6**and **Table 3-14**:

- Approximately 3,123 km of the road network serves the forestry industry in Mpumalanga;
- 48% (about 1,486 km) of the total forestry network comprises of Class 1 roads (the N11,N12,N17,N2,N4,R40 and R555);
- While 37% (1,141 km) and 16% (396 km) of the total road network serving the forestry sector account for Class 2 and Class 3-4 roads respectively; and
- Class 2 roads serving the forestry sector in the province include: the R33, R36, R37, R38, R532, R533, R535, R536, R537, R539, R541, R543 and the R65.

Table 3-14: The Extent of Road Network serving the Forestry Industry in Mpumalanga Province

Road Number	Class	Length (km)
N11	1	256.75
N12	1	163.49
N17	1	250.95
N2	1	154.53
N4	1	396.5
R33	2	245.8
R36	2	146.09
R37	2	95.23



Ref:\\G:\PROJECTS\107518\Projects\09 Forestry Transport Network_Mpumalanga_A3.mxd

Road Number	Class	Length (km)
R38	2	177.67
R40	1	204.45
R532	2	56.33
R533	2	72.84
R535	2	24.73
R536	2	47.55
R537	2	45.69
R539	2	21.79
R541	2	1.02
R543	2	117.65
R555	1	59.01
R65	2	88.35
District roads (unknown ID)	3 – 4	496.1
Total		3122.52

Table 3-15: The Characteristics of Road Network serving the Forestry Industry in Mpumalanga Province

Total Length of Road Network serving Forestry Industry (km)	Total Area of Forestry Plantation in the Province (ha)	Road Density (Road-km per 100km^2 of Forestry Plantation)	Total Persons dependent on the Forestry Industry (persons)	Measure of Access (Road-km per 1,000 persons employed in the Industry)
3,123	494,842	63.11	205,100	15.23

The following observations are made:

- The total area serving the forestry sector is significantly larger than the roads used by the forest sector in the province. There is less than 65 km of road for every square kilometre of forest area; and,
- There is about 15 km of road available to every 1,000 individuals who are dependent on the forestry industry in the Mpumalanga.

Table 3-16 below, also supported by **Map 6** summarises the rail network that serves the forestry industry in the province.

Table 3-16: Extent of Rail Network serving the Forestry Industry in Mpumalanga Province

	Rail Category	Total Length (km)
Extent of Rail Network	• KwaZulu Natal Boundary – Ermelo – Machadodorp – Middleburg –Balmoral – Gauteng Boundary • Nelspruit - Graskop branch line; and, • Kaapmuiden–Numbi Gate – Limpopo Boundary branch line; • Kaapmuiden – Baberton Branch line; • Ermelo – Lothair branch line; • Nelspruit to Plaston.	1,321

The following observations are made from **Map 6** and **Table 3-16**:

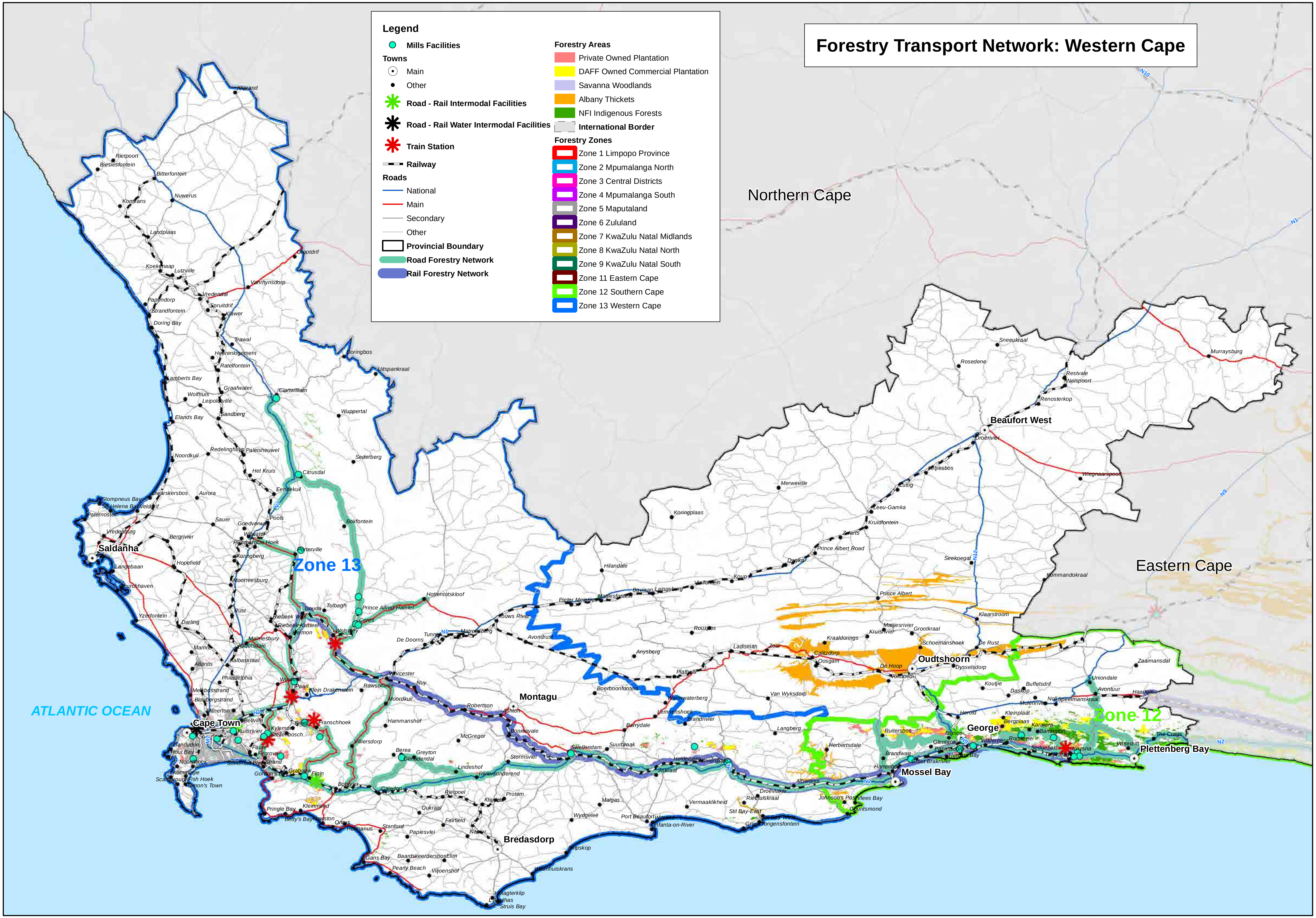
- The forestry industry in Mpumalanga is served by the following rail network:
  - The Port- Rail Corridor from the KwaZulu Natal boundary to the Gauteng boundary, via Ermelo; Machadodorp; Middleburg and Balmoral;
  - Nelspruit - Graskop branch line;
  - Kaapmuiden – Numbi Gate – Limpopo boundary Cross-border Interconnect;
  - Kaapmuiden – Barberton branch line;
  - Ermelo – Lothair branch line; and
  - The Nelspruit - Plaston branch line.
- The total rail kilometre serving the forestry industry is approximately 1,321 km.

3.2.4.5 Extent of Transport Infrastructure serving the Forestry Sector in Western Cape Province

Map 7 below shows the extent of both rail and road network serving the forestry industry in the Western Cape. **Table 3-17** summarises the roads network (by class and length).

Table 3-17: The Extent of Road Network serving the Forestry Industry in Western Cape Province

Road Number	Class	Length (km)
N1	1	95.73
N12	1	1.57
N2	1	646.98
N7	1	74.77
N9	1	31.31
R303	2	114.41
R310	2	0.44
R328	2	36.1
R339	2	80.23



Ref:\\G:\PROJECTS\107518\Projects\13 Forestry Transport Network_Western Cape_A3.mxd

Road Number	Class	Length (km)
R340	2	30.89
R354	2	0.09
R404	2	5.52
R406	2	64.92
R43	2	123.65
R44	2	139.53
R45	2	106.79
R46	2	81.62
R62	2	0.49
M7	2	17.2
District roads (unknown ID)	3 - 4	117.88
Total		1770.12

The following observations are made from **Map 7**and **Table 3-17:**

- A total of 1,770 km of the road network serve the sector in the Western Cape;
- 48% (about 850km) of the road network that moves forestry produce are Class1 roads namely the N1,N12,N2,N7 and N9;
- While 45% (about 802 km) and 7% (about 118 km) of the road network are Class 2 and Class 3-4 roads respectively; and,
- Class 2 roads include the R303, R310, R328, R339, R340, R354, R404, R406, R43, R44, R45, R46, R62 and the M7.

Table 3-18: The Characteristics of Road Network serving the Forestry Industry in Western Cape

Total Length of Road Network serving Forestry Industry (km)	Total Area of Forestry Plantation in the Province (ha)	Road Density (Road-km per 100km^2 of Forestry Plantation)	Total Persons dependent on the Forestry Industry (persons)	Measure of Access (Road-km per 1,000 persons employed in the Industry)
1,770	16,819	1,052	-	-

The following observations are made:

- The total area serving the forestry sector is significantly larger than the roads used by the forest sector. There are 1,052 km of road for every square kilometre of forest area.
- The information regarding individuals who are employed in the forestry sector in the Western Cape was not available during the preparation of this report.

Table 3-19 below, also supported by **Map 6** summarises the rail network that serves the industry.

Table 3-19: Extent of Rail Network serving the Forestry Sector in the Western Cape Province

	Rail Category	Total Length (km)
Extent of Rail Network	• Worcester – Mossel Bay Port interconnect; and, • Hermon – Gouda – Worcester Port – Rail Corridor.	654

The following observations are made from **Map 7** and **Table 3-19**:

- The forestry industry is served by the following rail network:
  - The Port Interconnect between Worcester – Mossel Bay; and
  - The Port – Rail Corridor between Hermon – Gouda – Worcester.
- The total rail kilometres serving the industry is approximately 654 km.

3.3 Condition of Transport Infrastructure serving the Forestry Sector per Province

3.3.1 Condition of Road Infrastructure serving the Forestry Sector

3.3.1.1 Introduction

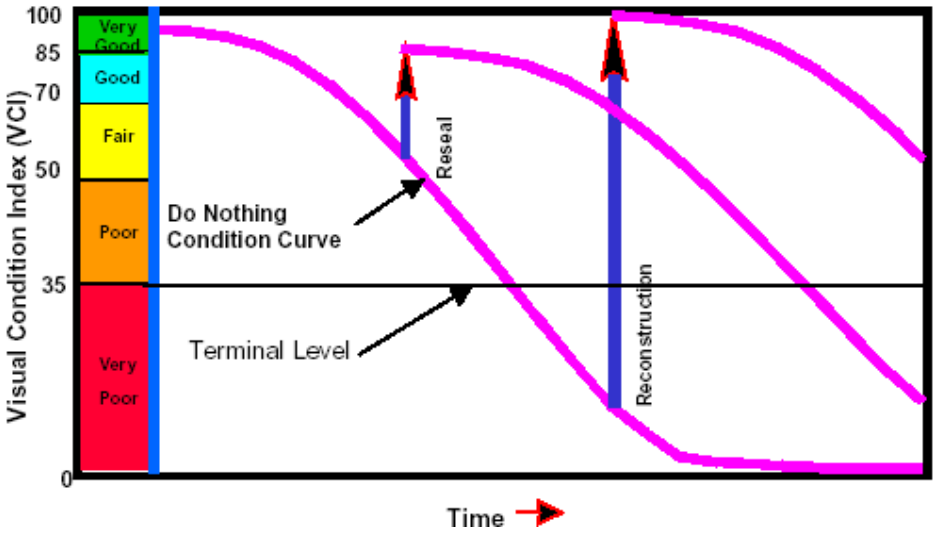
The general state of the road network is usually described in terms of the visual condition index (VCI). The VCI of a road is ideally quantified annually using a five point scale namely very good, good, fair, poor and very poor (refer to **Figure 3-10**).

The higher the VCI the better the service delivered in terms of accessibility; safety and vehicle operation costs (VOC). The information on condition of roads is usually contained within the Road Management Systems (RMS) of road authorities. This information was requested from provincial governments (for provincial roads) as well as from the South African National Road Agency Limited (SANRAL)for national roads. The following data was received from each authority:

- SANRAL's road condition report (as at February 2012), as published on their website, was used to capture the condition of national roads in the forestry network (SANRAL, 2012);
- Road condition data from KwaZulu Natal's RMS, for the year 2006 (KwaZulu Natal Department of Transport, 2012);
- Road condition data from Mpumalanga's RMS, for the year 2011 (Mpumalanga Department of Public Works, Roads and Transport, 2012);
- Road condition data from Eastern Cape's RMS, for the year 2010 (surfaced roads) and 2009 (gravel roads) (Eastern Cape Department of Roads and Public Works, 2012). The Eastern Cape Government highlighted the need for updating the data, and pointed out that the Eastern Cape provincial gravel network has deteriorated significantly subsequent to the data collection. This was as a result of a limited maintenance budget and the extensive flood damages that occurred during 2011;

- Road condition data from Western Cape's RMS, for the year 2011 (Western Cape Government, 2012); and
- Road condition data from Limpopo's RMS, for the year 2010 (surfaced roads) and 2011 (gravel roads) (Roads Agency Limpopo, 2012).

Figure 3-10: Visual Condition Index



Source: Department of Transport, 2006. Road Infrastructure Strategic Framework for South Africa

3.3.1.2 Road Condition

The condition of the roads forming part of the forestry network is indicated on the following pages (for each of the provinces Mpumalanga, KwaZulu Natal, Eastern Cape, Western Cape and Limpopo), and summarised in **Table 3-20**. In addition to the five condition categories as discussed above (very good, good, fair, poor and very poor), the maps and the table also include the categories "fair to good", "fair to poor", and "very good/ fair to poor", to make provision for descriptions found in the SANRAL document.

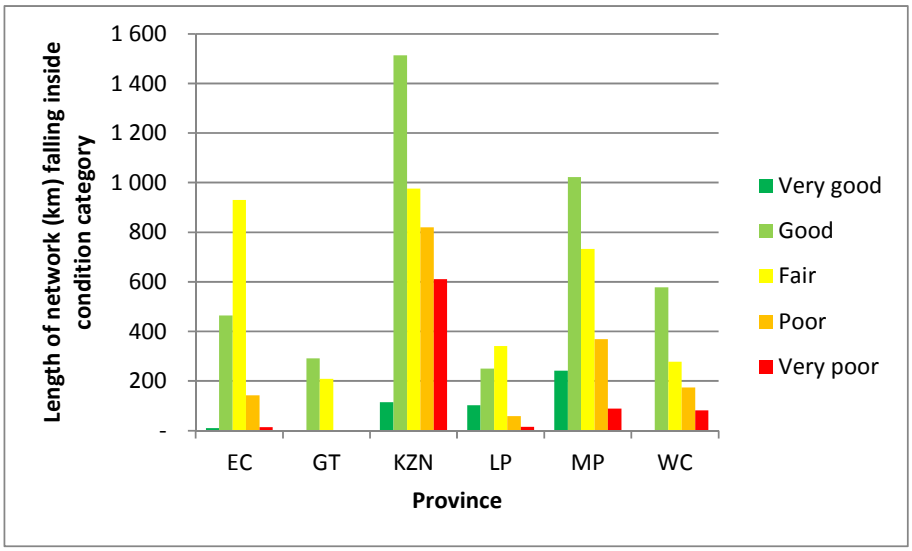
Table 3-20: Condition of Forestry Road Network per Province

Class	Eastern Cape	KwaZulu Natal	Limpopo	Mpuma-langa	Western Cape	Whole Forestry Network
Very good	1%	3%	9%	8%	0%	4%
Good	25%	35%	21%	33%	32%	32%
Fair to good	18%	1%	0%	5%	8%	7%
Fair	32%	22%	29%	17%	7%	20%
Fair to poor	0%	0%	0%	1%	0%	0%
Poor	8%	19%	5%	12%	10%	12%
Very poor	1%	14%	1%	3%	5%	6%

Class	Eastern Cape	KwaZulu Natal	Limpopo	Mpuma-langa	Western Cape	Whole Forestry Network
Unknown	17%	6%	35%	21%	38%	19%
Very Good/ Fair to Poor	0%	0%	0%	1%	0%	0%
Total	100%	100%	100%	100%	100%	100%

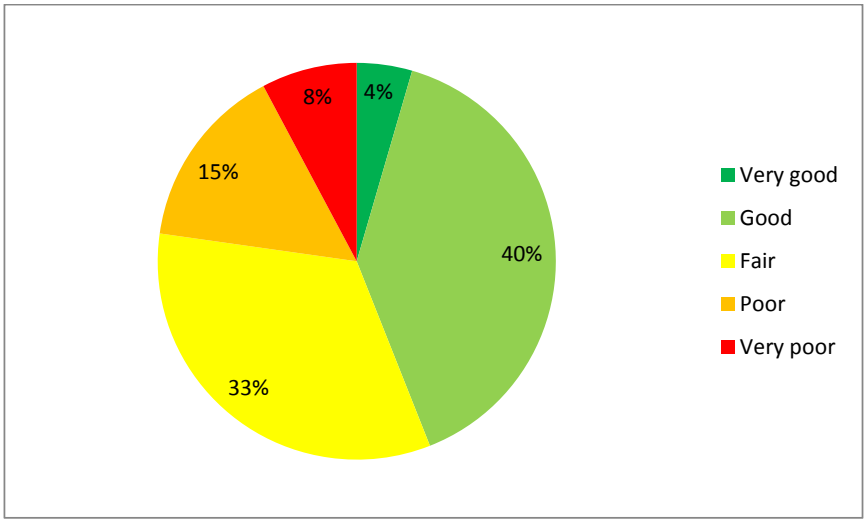
Figure 3-11 provides a summary of the road condition per province, if the unknown portion is removed, and the categories "fair to poor" and "fair to good" is grouped together with the category "fair". **Figure 3-12** then provides a summary of the overall condition of the forestry road network.

Figure 3-11: Condition of Forestry Road Network per Province



Road condition information was unavailable for a large portion (19%) of the forestry road network. However, the remainder of the forestry road network is generally in a good (40%) or fair (33%) condition. A total of 23% of the network is in a poor or very poor condition. In KwaZulu Natal, a significant portion (about 1,400 km) of the forestry road network is in a poor to very poor condition. Mpumalanga, the Western Cape and Eastern Cape also contain some poor or very poor road sections, but to a much lesser extent than KwaZulu Natal (generally less than about 500 km).

Figure 3-12: Overall Condition of Forestry Road Network



Road condition maps are attached on the next page (**Maps 8 – 12**). Analysis of the forestry road network condition maps per province highlight a number of specific areas or roads where problems are experienced, as summarised below:

- KwaZulu Natal: Sections of the R69 and R34 around Vryheid; Sections of the R68, R66 and R34 around Melmoth; The R74 and R622 around Greytown; Sections of the R33 around Dundee; Sections of the N2 around Richards Bay; Sections of the R56 and R603 around Richmond; and Sections of the R612 and R617 around Ixopo.
- Mpumalanga: Sections of the N11 and N2 around Ermelo; and Sections of the R543 around Piet Retief.
- Eastern Cape: Sections of the R61 around Port St Johns; and Sections of the R66 around the border with KwaZulu Natal.
- Western Cape: Sections of the R303 around Citrusdal; The R339 between Uniondale and Knysna; and Sections of the N2 and the R406 between Caledon and Riviersonderend.
- Limpopo: Sections of the R36 between Tzaneen and the border with Mpumalanga.

3.3.2 Condition of Rail Infrastructure serving the Forestry Sector

The state of the rail network serving the forestry network depicted for the five provinces in **Map 13** to **Map 17** are extracted from the Transnet Infrastructure Plan for 2011. The findings are summarised in the table below.

Forestry Transport Network - Condition Index: Eastern Cape

Legend

Mills Facilities

Towns
- Main
- Other

- Unknown
- Very Poor
- Poor
- Fair to Poor
- Fair
- Fair to Good
- Good
- Very Good
- Very Good/Fair to Poor
- **Railway**

Roads
- National
- Main
- Secondary
- Other

Provincial Boundary

Forestry Areas
- Private Owned Plantation
- DAFF Owned Commercial Plantation
- **International Border**

Forestry Zones
- Zone 1 Limpopo Province
- Zone 2 Mpumalanga North
- Zone 3 Central Districts
- Zone 4 Mpumalanga South
- Zone 5 Maputaland
- Zone 6 Zululand
- Zone 7 KwaZulu Natal Midlands
- Zone 8 KwaZulu Natal North
- Zone 9 KwaZulu Natal South
- Zone 11 Eastern Cape
- Zone 12 Southern Cape
- Zone 13 Western Cape

Free State

Lesotho

Zone 7

Zone 9
KwaZulu-Natal

Zone 11

Western Cape

Zone 12

INDIAN OCEAN

Middelburg
Queenstown
Bisho
East London
Port St. Johns
Port Alfred
Port Elizabeth

N1 N2 N3 N6 N8 N9 N10 N12 R61

Ref:\\G:\PROJECTS\107518\Projects\17 Forestry Transport Network_Level of Service_Eastern Cape_A3.mxd

Forestry Transport Network - Condition Index: KwaZulu-Natal

Legend

Mills Facilities

Towns
- Main
- Other

- Unknown
- Very Poor
- Poor
- Fair to Poor
- Fair
- Fair to Good
- Good
- Very Good
- Very Good/Fair to Poor

Railway

Roads
- National
- Main
- Secondary
- Other

Provincial Boundary

Forestry Zones
- Zone 1 Limpopo Province
- Zone 2 Mpumalanga North
- Zone 3 Central Districts
- Zone 4 Mpumalanga South
- Zone 5 Maputaland
- Zone 6 Zululand
- Zone 7 KwaZulu Natal Midlands
- Zone 8 KwaZulu Natal North
- Zone 9 KwaZulu Natal South
- Zone 11 Eastern Cape
- Zone 12 Southern Cape
- Zone 13 Western Cape

Forestry Areas
- Private Owned Plantation
- DAFF Owned Commercial Plantation
- Savanna Woodlands
- Albany Thickets
- NFI Indigenous Forests

International Border

Mozambique

Gauteng

Mpumalanga

Free State

Lesotho

Eastern Cape

INDIAN OCEAN

Zone 3

Zone 4

Zone 5

Zone 6

Zone 7

Zone 8

Zone 9

Zone 11

Newcastle

Pietermaritzburg

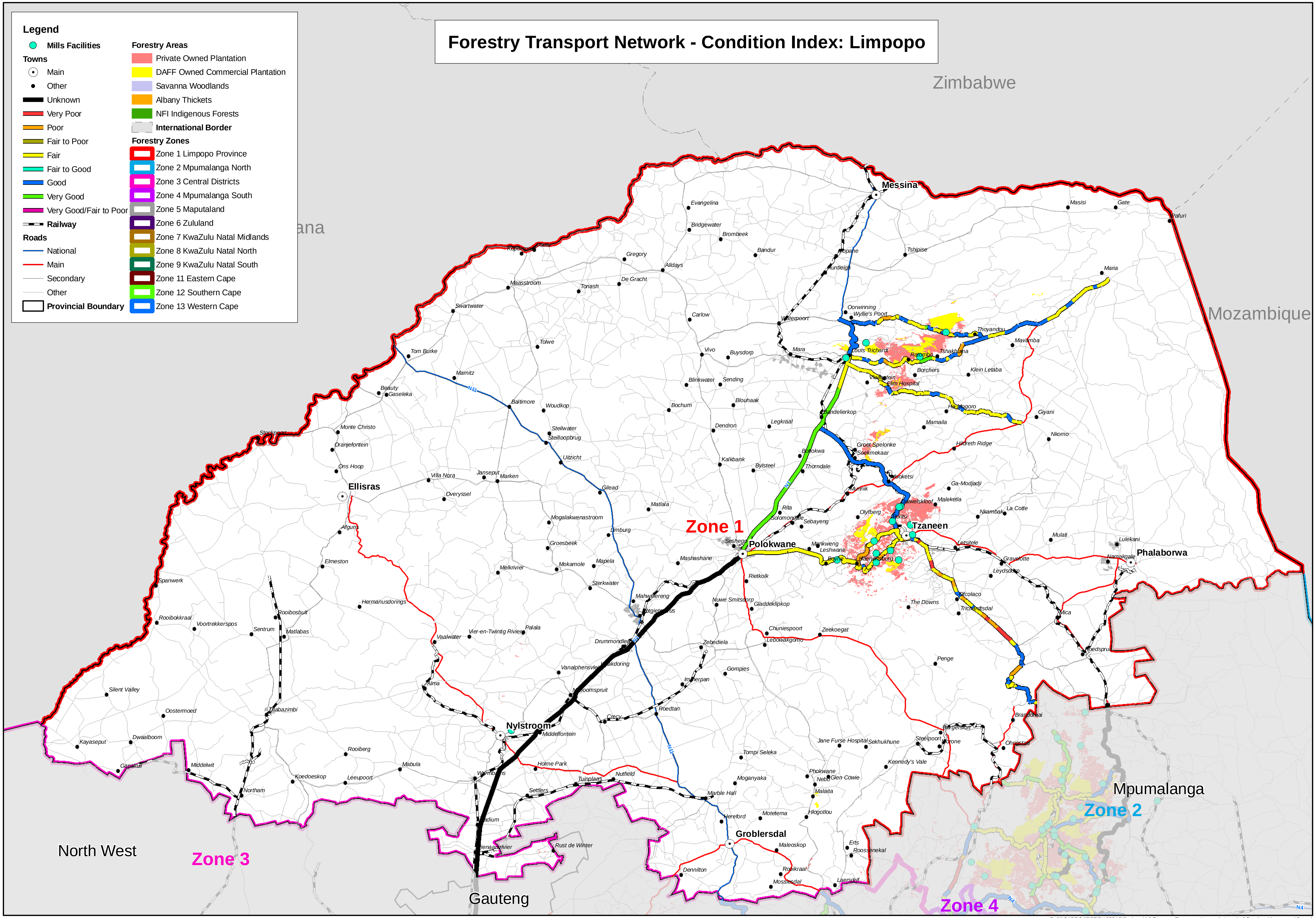
Durban

Richards Bay

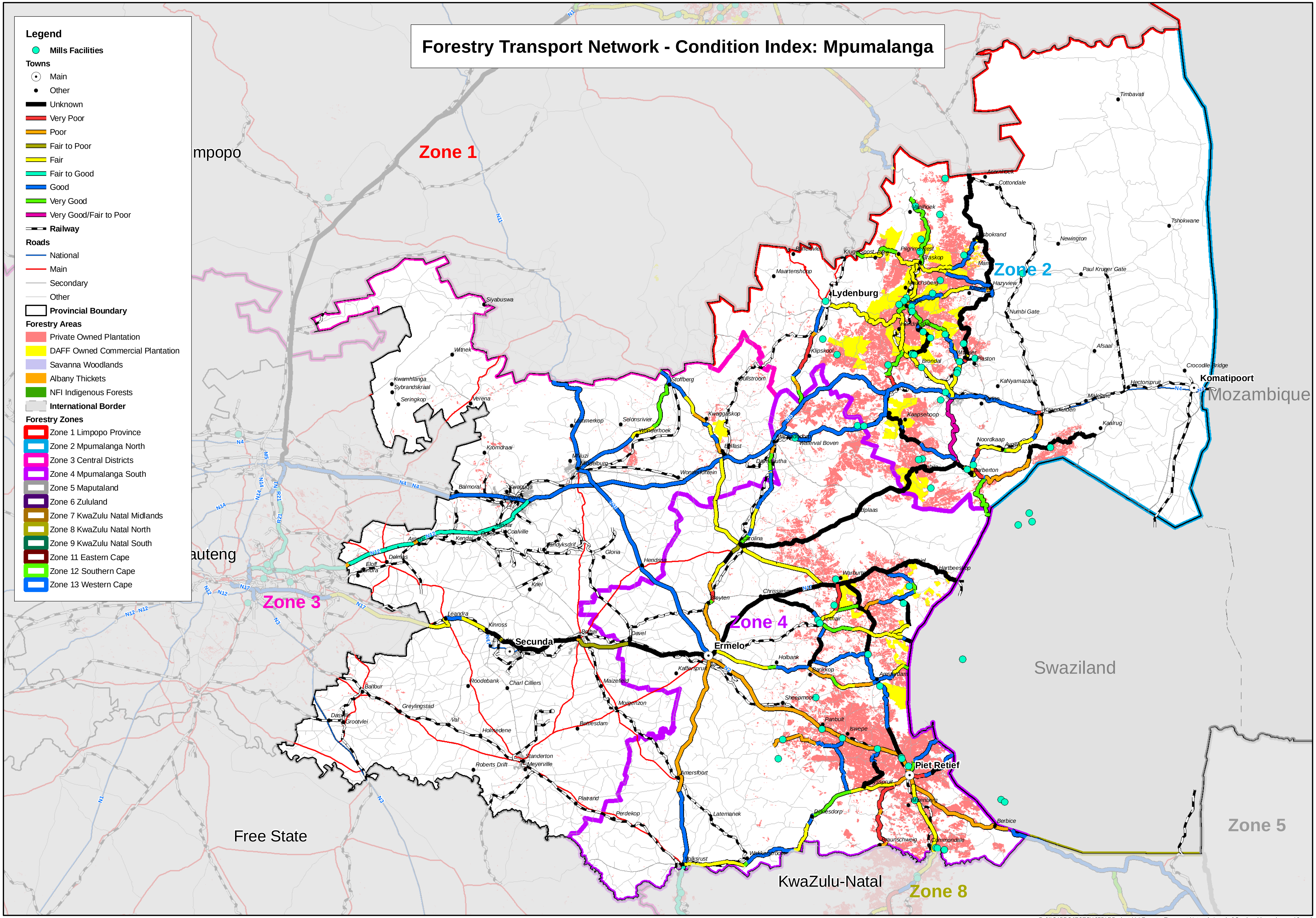
Ballito

Port Edward

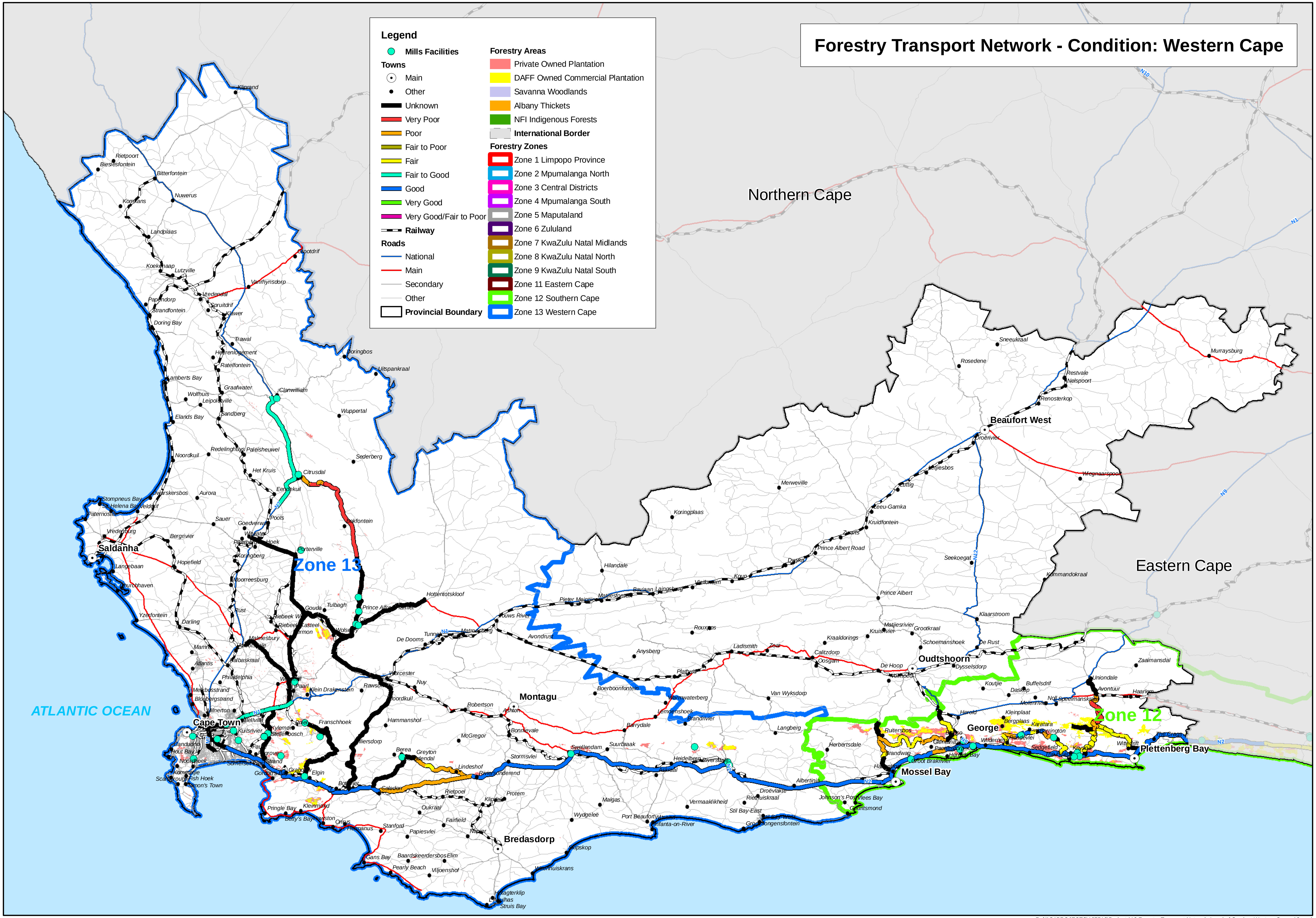
Ref:\\G:\PROJECTS\107518\Projects\15 Forestry Transport Network_Level of Service_KwaZulu-Natal_A3.mxd



Ref:\\G:\PROJECTS\107518\Projects\16 Forestry Transport Network_Level of Service_Limpopo_A3.mxd



Ref:\\G:\PROJECTS\107518\Projects\14 Forestry Transport Network_Level of Service_Mpumalanga_A3.mxd



Ref:\\G:\PROJECTS\107518\Projects\18 Forestry Transport Network_Level of Service_Western Cape_A3.mxd

Table 3-21: State of Rail Network serving the Forestry Sector

Province	Description	Current Condition	Conditional Issue	Proposed Upgrade	Proposed Timeframe
Eastern Cape	Branch line: Port Elizabeth to Misgund	Not known		Not applicable	
	Branch line: East London – Bisho – Mthatha				
	Branch line: Port Beaufort – Bisho				
	Mainline: East London – Springfontein	Warning	Steep gradients, tight curvatures increasing wear.	Additional passing loops, with improved alignment	2022 - 2028
KwaZulu Natal	Durban to Estcourt Port - Rail Corridor	Warning	Formation, due to geology and topography causes slips.		
	Port – Rail Corridor: Richards Bay to Mpumalanga Border	Warning		Upgrading to 81mtpa, including Overvaal tunnel and grade separation	Not mentioned
	Port – Rail Corridor: Richards Bay to Swaziland Border	Warning			
	Richards Bay to Durban	Poor	Humidity and electrical problems, very old	Doubling line, electrification with CTC signal	2020 - 2022
	Branch line: Pietermaritzburg – Kranskop	Not known		Not applicable	
	Branch line: Pietermaritzburg – Franklin				
	Branch line: Donnybrook – Underberg				
	Branch line: Pietermaritzburg – Richmond				
	Branch line: Richards Bay – Nkwalini				

Province	Description	Current Condition	Conditional Issue	Proposed Upgrade	Proposed Timeframe
	Branch line: Vryheid – Alpha				
Limpopo	Cross-border Connector: Makhado – Polokwane	Warning	Theft, poor alignment in Makhado	Upgrades, passing loops	2021-2027
	Cross-border Connector: Groenbult – Limpopo Boundary	Warning	Drainage, sleeper issue	Upgrades, passing loops	2012 - 2016
	High Volume Feeder: Phalaborwa – Hoedspruit	Not Known		Not applicable	
Mpumalanga	KwaZulu Natal Boundary – Ermelo – Machadodorp – Middleburg – Balmoral – Gauteng Boundary	Warning			
	Branch line: Nelspruit - Graskop	Not known		Not applicable	
	Branch line: Kaapmuiden – Numbi Gate – Limpopo Boundary	Warning		Upgrades, passing loops	2012 - 2016
	Branch line: Kaapmuiden – Baberton	Not known		Not applicable	
	Branch line: Ermelo – Lothair				
	Nelspruit – Plaston				
Western Cape	Port interconnect: Worcester – Mossel Bay				
	Port – Rail Corridor: Hermon – Gouda – Worcester	Warning	Bridge weakening	Not mentioned	

Source: Transnet, 2011.The National Infrastructure Plan.

Overall Rail Network Condition: Eastern Cape

Legend

Mills Facilities

Towns
- Main
- Other

Road - Rail Intermodal Facilities

Road - Rail Water Intermodal Facilities

Train Station

Railway

Roads
- National
- Main
- Secondary
- Other

Provincial Boundary

Rail Forestry Network
- Unknown
- Warning

Forestry Areas
- Private Owned Plantation
- DAFF Owned Commercial Plantation
- Savanna Woodlands
- Albany Thickets
- NFI Indigenous Forests

International Border

Forestry Zones
- Zone 1 Limpopo Province
- Zone 2 Mpumalanga North
- Zone 3 Central Districts
- Zone 4 Mpumalanga South
- Zone 5 Maputaland
- Zone 6 Zululand
- Zone 7 KwaZulu Natal Midlands
- Zone 8 KwaZulu Natal North
- Zone 9 KwaZulu Natal South
- Zone 11 Eastern Cape
- Zone 12 Southern Cape
- Zone 13 Western Cape

Free State

Lesotho

Zone 7

Zone 9
KwaZulu-Natal

Zone 11

Western Cape

Zone 12

INDIAN OCEAN

Middelburg
Queenstown
Bisho
East London
Port St. Johns
Port Alfred
Port Elizabeth

Ref:\\G:\PROJECTS\107518\Projects\Willie\12 Forestry Transport Network_Eastern Cape_A3_Rail_Condition.mxd

Overall Rail Network Condition: KwaZulu-Natal

Legend

Mills Facilities

Towns
- Main
- Other

Road - Rail Intermodal Facilities

Road - Rail Water Intermodal Facilities

Train Station

Railway

Roads
- National
- Main
- Secondary
- Other

Provincial Boundary

Rail Forestry Network
- Unknown
- Warning

Forestry Areas
- Private Owned Plantation
- DAFF Owned Commercial Plantation
- Savanna Woodlands
- Albany Thickets
- NFI Indigenous Forests
- **International Border**

Forestry Zones
- Zone 1 Limpopo Province
- Zone 2 Mpumalanga North
- Zone 3 Central Districts
- Zone 4 Mpumalanga South
- Zone 5 Maputaland
- Zone 6 Zululand
- Zone 7 KwaZulu Natal Midlands
- Zone 8 KwaZulu Natal North
- Zone 9 KwaZulu Natal South
- Zone 11 Eastern Cape
- Zone 12 Southern Cape
- Zone 13 Western Cape

Mozambique

Mpumalanga

Zone 4

Zone 5

Zone 8

Zone 6

Zone 7

Zone 9

Zone 11

Lesotho

Eastern Cape

INDIAN OCEAN

Newcastle

Pietermaritzburg

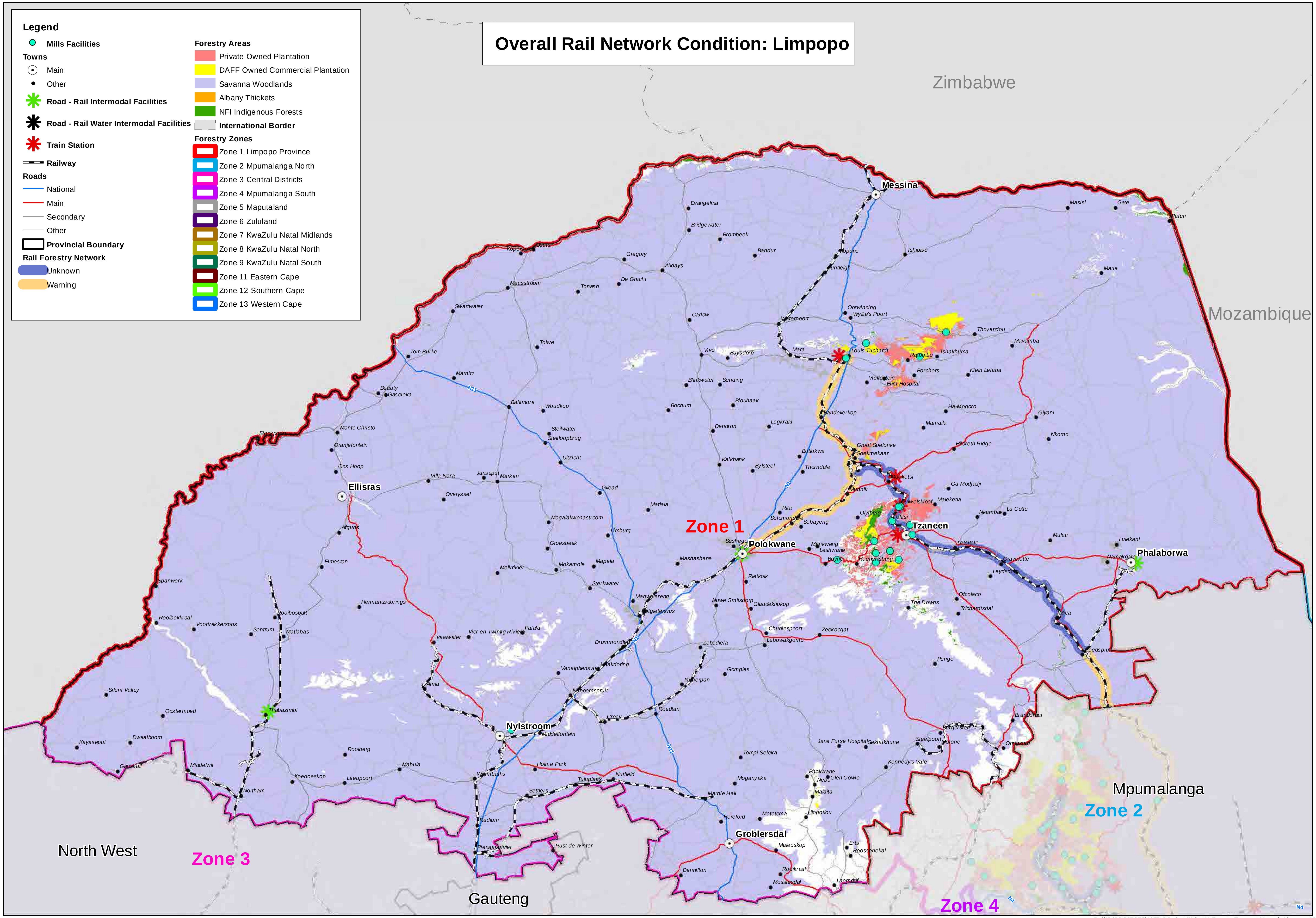
Durban

Richards Bay

Ballito

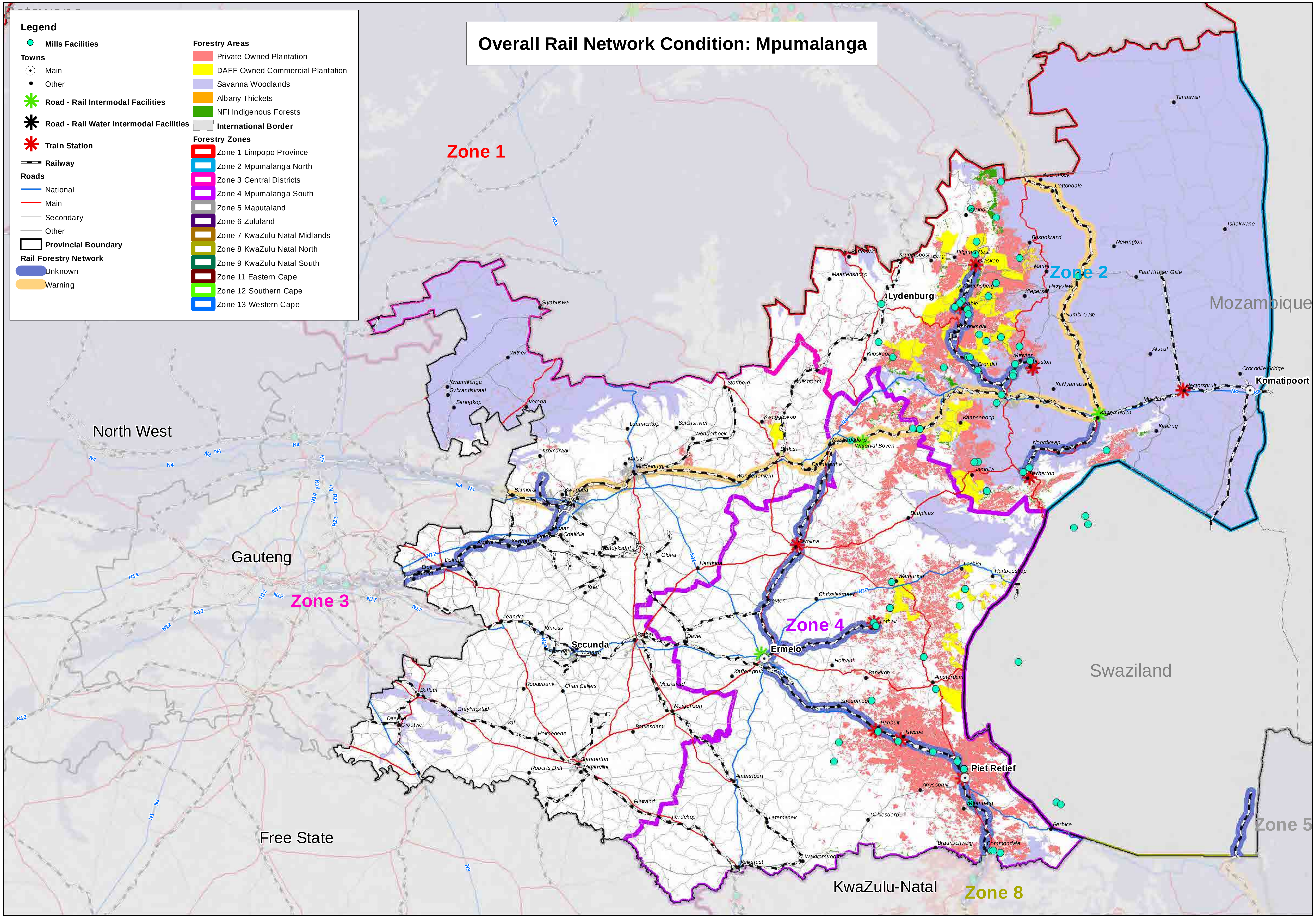
Port Edward

Ref:\\G:\PROJECTS\107518\Projects\Willie\10 Forestry Transport Network_KwaZulu-Natal_A3_Rail_Condition.mxd

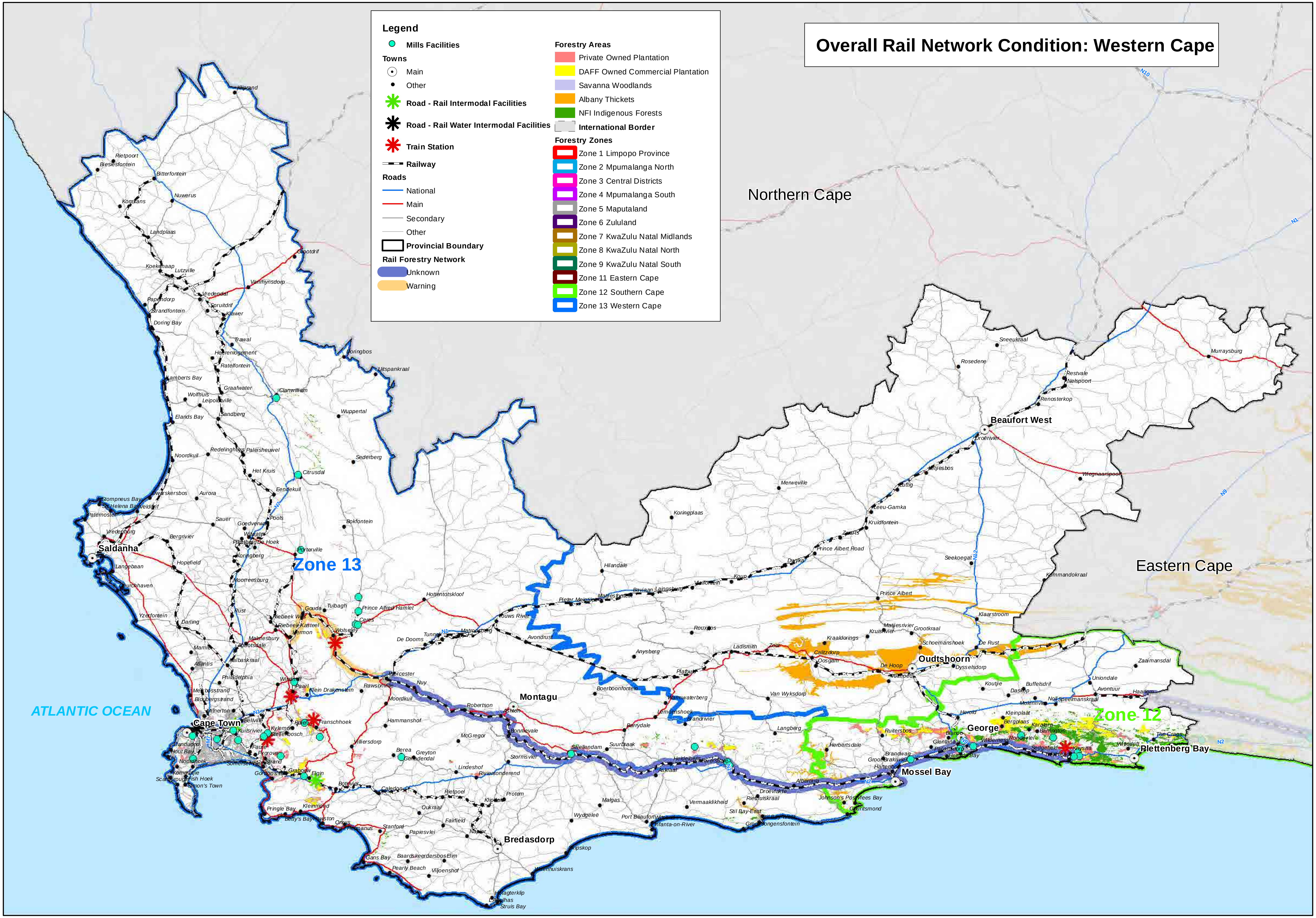


Ref:\\G:\PROJECTS\107518\Projects\Willie\11 Forestry Transport Network_Limpopo_A3_Rail_

Overall Rail Network Condition: Mpumalanga



Ref:\\G:\PROJECTS\107518\Projects\Willie\09 Forestry Transport Network_Mpumalanga_A3_Rail_Condition.mxd



Ref:\\G:\PROJECTS\107518\Projects\Willie\13 Forestry Transport Network_Western Cape_A3_Rail_Condition.mxd

3.4 Extent and Condition of Intermodal Facilities

An Intermodal facility refers to a terminal that serves multiple transit operators, at a high degree of connectivity and interchange between modes (City of Sacramento, 2004. p.1). There are two types of intermodal facilities that handle forest traffic produce in the five provinces, namely:

- Road – Rail –Water intermodal facilities; and
- Road – Rail intermodal facilities.

3.4.1 Road-Rail-Water Intermodal Facilities

Road-Rail-Water intermodal facilities are mainly terminals which are served by rail corridors, road network and port facilities for the transfer of forestry produce. These terminals also offer the following services including: storage, provisioning and servicing of rolling stock, management of rail wagons and other relevant maintenance activities. They are mostly positioned at the multi-purpose terminals within the main ports which primarily handle break bulk of which forest produce is a part. The following section presents the extent and condition of road-rail-water intermodal facilities found in the Eastern Cape, KwaZulu Natal and the Western Cape Provinces.

3.4.1.1 Road-Rail-Water Intermodal Facilities in the Eastern Cape

Two road-rail-water intermodal facilities handle forestry produce at East London and Port Elizabeth ports respectively, located within the multi- purpose terminals.

Multipurpose Terminal at the East London Port

The multi-purpose terminal is also known as the Combi Terminal and has a capacity to handle 90,000 twenty-foot equivalent unit (teu) per annum, a measure used for capacity in a container, and a potential capacity of 120,000 teu per annum. There is also a potential to develop new terminal with capacity of up to 800,000 teu's per annum:

Straddle carriers transport forestry produce within the terminal. The landing and shipping of the timber is carried out using ship's gear (Transnet National Ports Authority 2011, Ports Section);

The terminal currently operates across five berths in the port, with throughput capacity of 460,000 tons per annum and covers a land surface area of 14 m^2. It offers 4,000 m^2 of covered storage for break bulk cargo (which includes forestry produce). The terminal has an average ship turn-around time of 32.8 hours for break bulk and the average truck turn-around time is 17 minutes;

The terminal is good in condition, with a fully computerized elevator with a Programmable Logical Controller (PLC) system (Transnet National Ports Authority,2011); and

The port has good rail and road connections within the vicinity (Free State and Gauteng provinces) and north and southwest to KwaZulu Natal and Port Elizabeth respectively.

Multipurpose Terminal at the Port of Port Elizabeth

This port's multi-purpose terminal also handles forestry traffic/ produce. The port is in a very good condition and is striving to be a world class port by adhering to international standards. It has a Vessel Traffic System (VTS) and radar to ensure safety of vessel movements (Transnet National Ports Authority, 2011); and

The port has direct transport links with the main consumer markets and industrial zones in the Southern African continent. It also has direct links to electrified railways (20 tonne per axel load capacity) and the road network that links the port with Gauteng.

3.4.1.2 Road-Rail-Water Intermodal Facilities in KwaZulu Natal Province

The province has two road-rail-water intermodal facilities that handle forestry produce situated in Durban and Richards Bay Ports within the multi-purpose terminals.

Maydon Wharf Terminal at the Durban Port

Maydon Wharf Terminal is situated within a cluster of private terminal operators located within the Durban Harbour. Within the same terminal a wood chipping facility owned by Natal Cooperative Timbers is also present. According to the KwaZulu Natal Freight Data Bank (2003, Rail Freight Section), debarked 2,4m logs are transported to the wood chipping mill by rail and trucks where they are deposited into a Camura-Metso chipper. A conveyor belt moves the woodchips to the storage shed with a capacity of 80,000 tons. It also has a capacity to hold 360,000 air dry tonnes of hard wood per annum. The woodchips are conveyed to a ship loader fitted with a jet-slinger that evenly sprays the chips into the hold. It takes about four days to load a ship.

On average the ship turnaround time is 60 hours, with an average 40 tons per gross crane hour achieved.

Berths 13 and 15 handle forest products in Maydon Wharf. The former has a storage capacity of 20,000 tons for an open storage area and 25,000 cm^3 covered storage area. It has a supply of 16,000 tonne per month while the latter has storage capacity ranging from 12,157m^3 to 16,129m^3. It also has containers which store wood pulp ranging from 5,916m^3 to 10,500m^3 (www.iss-shipping.com).

According to Transnet, plans to improve Maydon Wharf terminal are underway due to the increasing demand for cargo to be transported. Other improvement plans considered include resurfacing of the operating area and widening of the quay in order to allow entry of vessels that require deeper drafts.

The port is served with excellent rail and road links to Gauteng in the west as well as the south and north points. A total of 302 km of rail tracks extend throughout the port area along with several major marshalling yards.

Multipurpose Terminal at the Richards Bay Port

Forestry produce is handled at the multi-purpose terminal within the Richards Bay Port which is the product of a merger of the bulk metal and combi terminals. This has subsequently resulted in improved ability to manage a variety of cargo types; namely break-bulk, neo-bulk and containers (Transnet Port Authority, 2011, Agriculture Terminals Section).

It currently operates across seven berths in the port, has a throughput capacity of 5, 6 million tons per annum and covers a land surface area of 62, 2 hectares. It offers a wide-range of warehousing and covered storage areas for sensitive cargo, and a huge open storage area comprising 330,000m^2 for cargo handling as well as a 75,000 m^2 ferro handling facility and a 55,000 m^2 log terminal, which is leased. It also has 70,000 m^2 of undeveloped land.

Covered storage comprises two warehouses of 10,000m^2, with a canopy between the warehouses that provides an additional 8,000m^2 of covered storage for sensitive cargo. It also has a 4,500m^2 shed (Transnet Port Authority, 2011, Agriculture Terminals section).

The terminal has two wood chipping plants owned by the Natal Timber Co-operative (NTC) and Silvacell, located at the Richards Bay Port**.** The NTC plant has a wood chipping line, a

chip screening section and conveyor system to transport the chips to a storage area. The debarked logs are lifted onto a log deck conveyor and then onto a transfer belt conveyor, through a diverter and then fed rateably into two 96" (2, 4 m) chippers. The chips are then transported via conveyors to the screen. The function of the screen is to remove all the undesirable chips. The chips are then sent to a stock pile. It has a M6 conveyor which provides additional capacity to the existing C5 conveyor, and also enables the concurrent loading of two vessels (SA Instrumentation & Control, 2006).

The enclosed conveyor is 589 m long utilising a 1, 5 m wide conveyor belt running at 3, 9 m/s with a design capacity in excess of 1000 T.P.H. The concrete 'U' beams enclosure ensures that there is no adverse impact on the adjoining town of Byrne and local bird life. It also ensures longevity of the conveyor system in the corrosive Richards Bay atmosphere. The complex conveyor belt structure links directly into the port system (SA Instrumentation & Control, 2006).

A second 460 tonne pneumatic ship loader was constructed by NTC in 2004. This loader moves on a 21m rail span the length of the 300m jetty. The 40m loading boom has a telescopic pipe which is capable of spanning the width of the wood chip bulk carriers. Loading is achieved by means of a 54000 CFM Roots Single Stage Centrifugal Blower blowing chips into the ship's hold - in this way, wood chip carriers can be loaded in 40 hours.

3.4.1.3 Road-Rail-Water Intermodal Facilities in Western Cape Province

In the Western Cape there is only one intermodal facility that handles forestry produce which is positioned in the Cape Town Harbour. The combi terminal handles forestry produce and is located at Duncan Dock which offers docking space for up to six vessels and has the ability to discharge three simultaneously. The terminal has the advantage of catering for deep-drafted vessels due to its position in water depths ranging from 10 to 12.8 meters (Transnet Port Authority, 2011, Agriculture Terminals section).

The Duncan dock has 14 berths (A – M) and the tanker berths. The terminal has decreased its turnaround time from 20 hours per shift to a minimum of 18 hours per shift. The operating area has rail and road access capabilities, and the terminal is situated in close proximity to major transport routes.

3.4.2 Road-Rail Intermodal Facilities

Road-rail intermodal facilities that handle timber come in the form of marshalling yards, and are served by rail lines and a number of roads. Their services include storage facilities, servicing of rolling stock and maintenance of rail wagons. They are found in found in all five provinces. The following section presents the road-rail intermodal facilities found in the five provinces.

3.4.2.1 Road-Rail Intermodal Facilities in KwaZulu Natal Province

It is likely that much of this available data could now be outdated. However, according to the KwaZulu Natal Freight Data Bank 2003, Rail Freight Section, the marshalling yards handling forest traffic produce in KwaZulu Natal Province include:

- **Bayhead Yard** is the main marshalling yard and is located in Durban. This very large yard has north and south sections with further sub-divisions into five units. The north section alone comprises over 45 roads, and has an electric running shed known as Umbilo located adjacent on the north-east side. Umbilo caters for electric locos and local electric shunting services. The yard also has a very large PX

shed which is located on to the south-west of the north yard. Container trains use the Kings Rest yard and can by-pass the Bayhead yard for access;

- **Clairwood Yard** is situated in Montclair. It is utilized to handle incoming timber traffic, liquid fuel traffic and for automobile trains. There are some 10 roads in the yard;
- **Masons Mill Yard** is located in Pietermaritzburg. It is utilized to load over 600,000 tons of forestry traffic originating on the branches to Kranskop, Franklin, Richmond, and the sub-branches along these routes. It has diesel maintenance facilities;
- **Victoria - Pietermaritzburg** is located north of the city centre in Pietermaritzburg. It is mostly utilized to load forestry traffic produce and also utilized as a staging point for traffic to and from the Willowton Industrial area, located north of the N3 highway and bounded by the R33 to Greytown;
- **Richards Bay Harbour Yard** is the main yard for the multi-purpose dry bulk terminal. It serves the terminal which has a capacity to handle four million tons of exports and six million tons of imports a year. A significant amount of export traffic arrives at the yard in its raw state and is 'processed,' such as round wood which is delivered to private sidings, chipped, and fed to the port itself by large overhead conveyor systems; and
- **Nseleni Yard** is located near Richards Bay. It is used to handle roundwood traffic routed over the coal line. It has a large diesel shed and repair facility and it is an important crewing point.

Train Stations handling Forestry Traffic produce in KwaZulu Natal

There are train stations which handle forestry produce but are not referred to as marshalling yards in KwaZulu Natal Province. Although the information contained in the Freight Databank is out-dated, the following stations are (were) handling forestry in the province:

Table 3-22: Train Stations handling Forestry produce in KwaZulu Natal Province

Rail Station	Location with regards to Rail Line	Highest load handled in tons	Destination of Forest Produce
Cedara Station	143 km from Durban on the Volksrust main line	Over 40 000 tons of pulpwood	Umkomaas and Mandini
Baynesfield Station	21 km from Pentrich on the Richmond branch	4 500 tons of roundwood	Maydon Wharf Umkomaas and Richards Bay
Donnybrook Station	125 km from Depot (Pietermaritzburg) on the Donnybrook - Franklin line	Nearly 7 000 tons of pulpwood	North and South Coast
Draycott Station	11 km from Ennersdale on the Bergville branch	Over 36 000 tons of pulpwood and round wood	Durban and various North and South Coast points
Estcourt Station	256 km from Durban on the Volksrust mainline	board factory is currently receiving round wood by road but has begun to receive by rail	
Greytown Station	103 km from Pietermaritzburg on the Greytown and Kranskop	17 000 tons of pulpwood and roundwood	Durban, Richards Bay and Mandini

Rail Station	Location with regards to Rail Line	Highest load handled in tons	Destination of Forest Produce
	line		
Kleinveld Station	35 km from Chailey on Mount Alida branch	Over 6 000 tons of pulp and roundwood	Richards Bay
Kwa-Mbonambi Station	along the Durban – Empangeni – Golela line	305,985 tons of hardwood (gum)	Umkomaas
Loskop Station	21 km from Ennersdale on the Bergville branch	Over 40 000 tons of pulpwood	Umkomaas and Mandini
Mandini Station	106 km from Durban on the Durban – Empangeni – Golela line	over 300 000 tons of hardwood and softwood 18 000 tons of paper products	Western Cape
Mkabela Station	18 km from Schroeders on the Bruyns Hill branch	3 000 tons of treated timber	Namibia
Menne Station	8 km from Greytown on the Kranskop branch	Over 8 000 tons of pulpwood	Richards Bay
Mollissma Station	13 km from Chailey on the Kranskop branch	Over 20 000 tons of round and pulpwood	Richards Bay
Mpolwenni Station	36,5 km from Pietermaritzburg on the Greytown line	Over 48 000 tons of pulpwood over 1 400 tons of poles	Mandini Namibia
Mvozana Station	15 km from Greytown on the Kranskop branch	about 7 000 tons of round wood	Richards Bay
New Hanover Station	48 km from Pietermaritzburg on the Greytown	Over 20 000 tons of round and pulpwood	Mandini and Richards Bay
Ottos Bluff Station	21 km from Pietermaritzburg on the Greytown line	Over 40 000 tons of pulpwood	Umkomaas and Mandini
Richmond Station	41 km from Pentrich and terminus of branch	17 000 of pulpwood and roundwood	points in Durban, and North and South Coast
Seven Oaks Station	82 km from Pietermaritzburg on the Greytown line	Over 10 000 tons of round and pulpwood	Mandini and Richards Bay
Singisi Station	205 km from Depot (Pietermaritzburg) on the Donnybrook - Franklin line	Over 46 000 tons of pulpwood plus 25 000 tons of wood chips	Montclair and Mandini
Taylors Station	38 km from Depot	About 15 000 tons of	Maydon wharf and

Rail Station	Location with regards to Rail Line	Highest load handled in tons	Destination of Forest Produce
	(Pietermaritzburg on the Franklin line	round and pulpwood	Richards Bay
Underberg Station	62 km from Donnybrook and terminus of the Underberg branch	Some 17 000 tons of pulpwood	Umkomaas on the South Coast line
Voorkeur Station	25,5 km from Chailey on the Mount Alida branch	Over 40 000 tons of pulpwood	Umkomaas and Mandini
Welgegund Station	24 km from Greytown on the Kranskop branch	Over 40 000 tons of pulpwood	Umkomaas and Mandini
Woodford Station	55 km from Donnybrook on the Underberg branch	Some 3 000 tons of pulpwood	Umkomaas

Source: KZN Freight Data Bank, 2003, Rail Freight Section

3.4.2.2 Road-Rail Intermodal Facilities in Limpopo Province

According to the Limpopo Freight Data Bank, (2006, Rail Freight Section) the marshalling yards found in the province are as follows:

- **Phalaborwa Yard:** This large yard is used to marshall trains. A train control officer dispatches an average of eight trains a day from this point. Rock phosphate trains are made up into 75 wagon blocks while magnetite trains are marshalled into 58 wagon blocks. The operating staff compliment consists of 13 loco drivers and 10 assistants. Class 18E electric locomotives are used on trains and they are operated from Komatipoort;

Phalaborwa Yard

- **Thabazimbi Yard:** A ten “road” yard is situated adjacent to the former station. The 10 lines are used to make up iron ore trains from the nearby Kumba mine. In normal circumstances, coal trains from Lephalale bypass the yard itself. An open loco service and stand-by area is located at the north end of the yard and both diesel and electric locomotives can be found here;
- **Polokwane Yard:** This yard operates 10-12 trains on average per direction. There are two types of trains that are operational in this yard namely 40 wagon air brake trains (normally from Musina) and vacuum braked trains. According to the Limpopo Freight Data bank this yard is not used to its full capacity due to a reduction in general freight traffic;

Polokwane Yard

Electric locomotives are operated from Pyramid

South, but Polokwane has an allocation of 32 Class 34 diesel-electric units for main line traffic and 10 Class 36 for shunting. The operating staff complement consists of 38 drivers and 35 assistants who work to crossing point on both main lines, north and south;

Polokwane yard has an important wagon repair depot which has been transferred to the Transwerk a division of Transnet. An intermodal container terminal is situated in Polokwane but it is not currently being used. The facilities, including a portal gantry, are still intact and can be used in the future should circumstances warrant.

The train stations that handle forestry produce in Limpopo Province include:

- **Duiwelskloof Station** – this station is located 66 km east of Groenbult on the Kaapmuiden line. It is located adjacent to a large timber pole treating plant and private plantations. It should be noted that the siding is intact and currently not being utilized (Limpopo Freight Data Bank, 2006);
- **Louis Trichardt Station**- this station is along the Polokwane-Messina line. Adjacent to the station are private and commercial plantations and a sawmill.
- **Mooketsi Station** - this station is located 44 km east of Groenbult on the Kaapmuiden line. There are private and commercial plantations within the vicinity. There has been no rail traffic here for a number of years but the fruit loading shed is still intact and could be used in the future; and
- **Tzaneen Station**- this station is located along the Groenbult on the Kaapmiuden line. It is positioned close to indigenous Forests, private and commercial owned plantations and saw mills. The station has intact PX sheds which are currently not utilized (Limpopo Freight Data Bank, 2006, Rail Freight Section).

3.4.2.3 Road-Rail Intermodal Facilities in Mpumalanga Province

According to the Mpumalanga Freight Data Bank (2010, Rail Freight Section), the marshalling yards that handle forest traffic product in Mpumalanga province include:

- **Ermelo Yard:** Ermelo is said to have one of the largest yards in the province. It is located several kilometres to the south of "old" Ermelo. It provides a swap-over between shorter trains on the 3 kV section to the north and the longer trains which operate on the 25 kV line to the south and Richards Bay.

Ermelo Yard

It has a capacity to operate 200 wagon trains from the Ogies and Wonderfontein areas, with the introduction of new AC/DC electric locomotives. The yard has two separate yards for general freight traffic and coal traffic. In addition, workshops have been provided for both locomotive and rolling stock running repairs;

- **Kaapmuiden Yard:** There are two yards at Kaapmuiden. The first is the old yard for mainline traffic from Komatipoort to WatervalBoven and Barberton branch traffic, while the second is for traffic on the Phalaborwa and Tzaneen liners. The yards are not used to a great extent at present;
- **WatervalBoven Yard:** TheWatervalBoven yard is used largely to load forestry traffic on the Machadodorp– Ermelo line and for local traffic to the chrome smelter at Fairview; and

- **Nelspruit Yard**: This yard is also comparatively large and serves the mainline, Graskop branch line and the local industrial area. The yard offers maintenance facilities for 18 electric locomotives. It also ensures the smooth operations of the trains from Phalaborwa en-route to Richards Bay via Komatipoort by checking all the wagons.

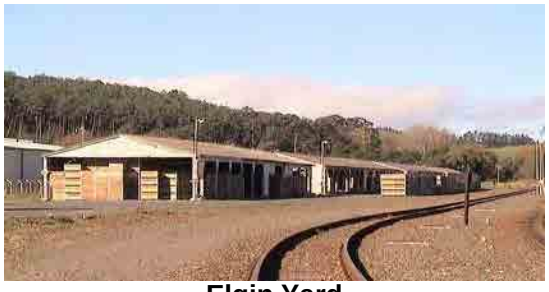
Train Stations handling forestry traffic produce in Mpumalanga:

- **Hectorspruit Station** is located 29 km from Komatipoort and handles forest product traffic. Pulp wood is loaded at this point and railed to Ngodwana. The station is situated in close proximity to the N4 (Mpumalanga Freight Data Bank, 2010, Rail Freight Section);
- **Hemlock Station** is located 63 km west of Nelspruit on the Witbank - Komatipoort line. There has been a halt with sidings for handling forest product traffic.
- **Lothair Station** is a terminus of the branch from Buhrmanskop. Commercial plantations and sawmills and timber plants are in the vicinity of the station. Forest traffic produce is transported to Ngodwana Mill, Geduld Mill in Gauteng and Richards Bay;
- **Ngodwana Station** is situated 55 km from Nelspruit on the Maputo - Pretoria line. There is a major pulpwood mill west of the station.
- **Rivulets Station is** located 28 km west of Nelspruit on the Witbank - Komatipoort line is also used to load forest produce;
- **Carolina Station** is situated along the Ermelo-Machadodorp rail section. It is adjacent to privately owned plantations. Forest traffic produce is moved to Ngodwana Mill, Geduld Mill in Gauteng and Richards Bay;
- **Baberton Station**- is located along the Kaapmuiden – Barberton branch line and is one of its loading points. Privately owned plantations and a number of sawmills are within the vicinity of the station. It is served by major forest plantation areas which generate over 500,000 (down from 750,000 in 2005) tonnes of timber traffic routed to the large paper mill at Ngodwana (Mpumalanga Freight Data Bank, 2010);
- **Nelspruit, Graskop, Sabie and Plaston Stations** are located along the Nelspruit-Graskop-Plaston branch line. The four stations are loading points of forestry produce on this branch line. All forest produce handled at these stations is moved to Ngodwana mill; and
- **Piet Retief Station** which is situated along the Ermelo-Commondale rail section. It is also served by major privately owned plantations. A number of sawmill and timber plants are within the vicinity of the station. The N2 is also at close proximity to the station.

3.4.2.4 Road-Rail Intermodal Facilities in Western Cape Province

The marshalling yards that handle forestry produce in the Western Cape include:

- **Elgin Yard:** It has 4 open sided sheds. Three sheds were used by Molteno Bros for storage purposes while one was utilized as a saw mill and had electrical connections. There is a post office at the yard. According to (Knott, 2005), spiked point and rails have been removed just beyond the level crossing when approaching the station from the western direction. Elgin station is not in a good condition



Elgin Yard

(www.sa-transport.co.za/trains/sa_stations/w-cape_1.html);

- **George Yard:** This yard is in a good condition. It has locomotive sheds, a number rail lines, rolling stock and also has storage facilities; and
- **Kuilsrivier Yard:** This yard used to have 3MR simplex 2 gauge locos. It is currently not in a good condition.

The train stations that handle forestry traffic produce in the Western Cape Province are as follows:

- **Knysna Station** is located within the vicinity of timber processing plants, indigenous forests, and private plantations. This station handles forestry produce and is in a very good condition;
- **Freranschhoek Station** is situated close to sawmills, plantations, private and commercially owned plantations. This station handles forestry produce and is in a good condition;
- **Worsley Station** is situated close to private plantations. This station is also good in a condition; and
- **Paarl Station** is located close to private and commercially owned plantations as well as timber plants and is in a good condition.

3.4.2.5 Road-Rail Intermodal Facilities in Eastern Cape Province

The marshalling yard that handles forestry produce in the Eastern Cape is the **Port Elizabeth Yard**, which is in close proximity to main road N2 /M4 and the Port Elizabeth Harbour**.** It is also very good in condition.

Train Stations handling Forestry Traffic Produce in Eastern Cape

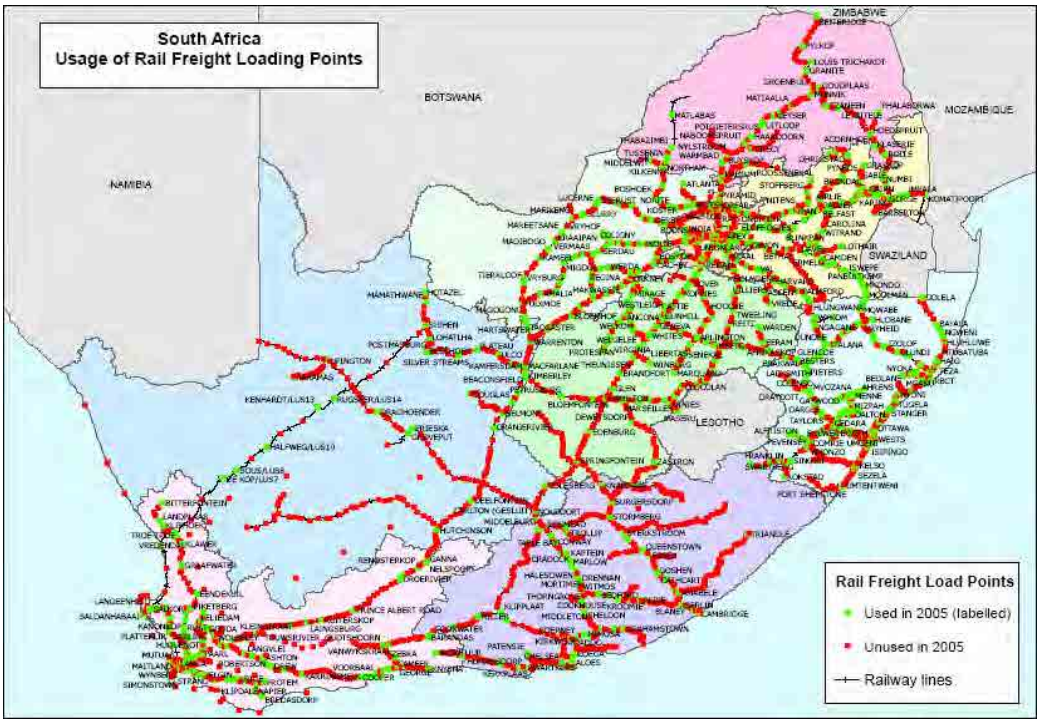
The train stations that handle forestry produce in the Eastern Cape Province include:

- **Lorie Station**- which is in good condition and also handles forestry traffic produce;
- **Willowmore Station**- not in a good condition;
- **Humewood Station**- about 15,610 tons of forestry produced per annum is transported from this station to Richards Bay via Welgedag (Mpumalanga Freight Data Bank, 2010, Rail Statistics Section);
- **Stutterheim Station**- this station handles about 1,295 tons of forestry produce which is then transported to Richards Bay via Welgedag; and
- **Amabele Station**- which according to the Mpumalanga Freight Data Bank, 2010, Rail Statistics Section, about 175 tons of forest traffic produce is moved to Richards Bay via Welgedag.

3.5 Reduced Activities on Rail Facilities

Although the information presented above indicate substantial rail service to the forestry sector, **Figure 3-13** illustrate that there has been reduction in railway stations and loading points usage.

Figure 3-13: Usage of Stations and Loading Points for South Africa (2005)



Source: NATMAP 2050 – Phase 2 Report on Freight Transport Operations 2009, pp. 13)

The impacted facilities include siding to siding rail transport, which are now generally only available for more than 10 wagons in a consignment (i.e. a minimum of approximately 400 tonnes per consignment). This impact is too much for most small businesses – resulting in several million tonnes of rail commodities, including timber being delivered over long distances by road throughout the country.

3.6 Major Capacity Constraints

The service capacity and bottlenecks on the road network serving the forestry sector for the base year (2015) is presented in this section, with the future year scenarios (i.e. 2020 and 2030) presented in **Section 4.4** (refer to Chapter 4).

The **First Order Network Assessment** approach or **FONA (HCM 2000 Methodology)** was used to determining road network capacity for the base year, taking into consideration existing traffic demand and existing infrastructure to accommodate this demand.

The strategic nature of the analysis is taken into account as well as realistic timeframes in which meaningful results could be produced. The methodology contained in the Highway Capacity Manual (HCM) of 2000 (published by the Transportation Research Board in Washing D.C.) was selected as the most appropriate methodology to adopt for this purpose. The specific methodologies prescribed for the analysis two-lane and multi-lane freeways are of relevance (Chapters 20 and 21 of the HCM).

The key performance indicator that is used to evaluate the status of vehicular operations on a roadway is expressed in terms of Level of Service (LOS). LOS is indicated by using the letters of the alphabet ("A" through to "F"), "A" representing the best operating conditions and

"F" the worst. For the purposes of this report a **LOS D** was deemed to be an acceptable level of service to be maintained on the country's roads of national importance.

The implication of the above is that the road capacity analysis excludes the identified gravel districts roads that serve the forestry sector.

On the other hand, capacity utilisation of the rail network serving the forestry sector was based on observations presented by Transnet in their Infrastructure Plan of 2011.

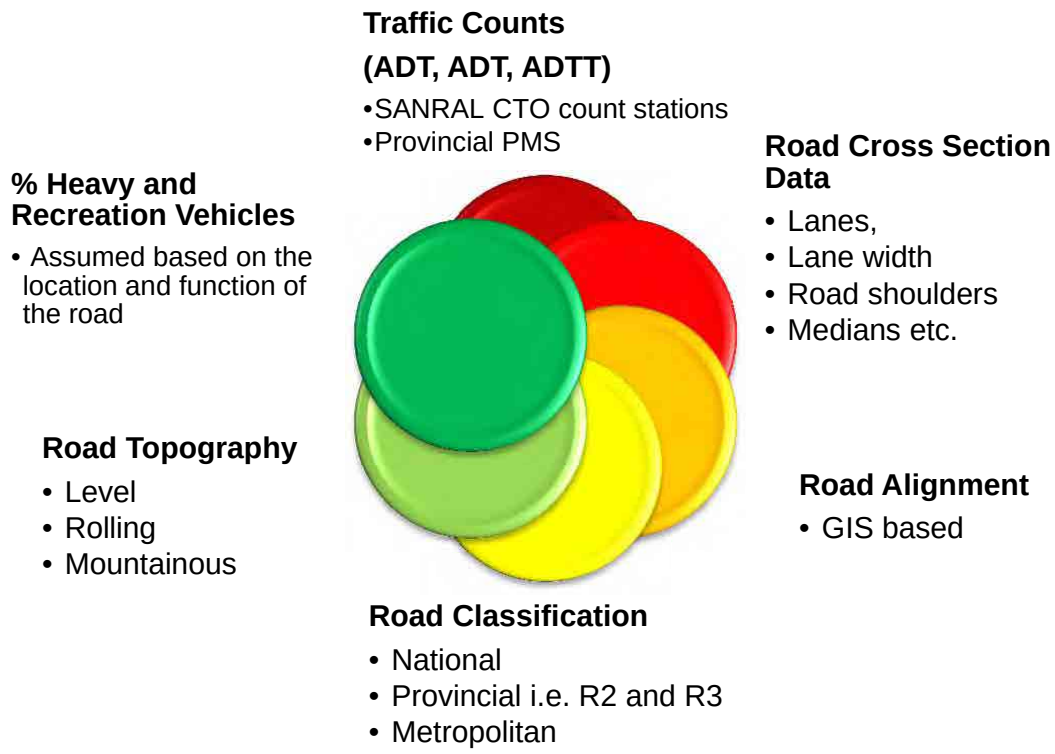
3.6.1 Capacity Constraints for Road Network Serving the Forestry Sector

3.6.1.1 Data Needs

The data that was used as input into the FONA process is similar to that used during the NATMAP process, namely:

- traffic counts for the determination of percentage heavy vehicles as well as the directional split;
- road cross section data - number of lanes, width of lanes, width of road shoulders and the presence of a median – this assisted in the estimation of free flow speeds;
- geographical location of roads (based on a GIS or Geographical Information System) – this assisted with the stratification of results per province;
- the classification of the roads (National, Provincial i.e. R2 and R3 routes or Metropolitan) – this assisted in making informed assumptions about the number of recreational vehicles and daily commuters within the respective traffic streams;
- the topography traversed by the road (rolling, flat or mountainous) derived from the GIS contour map – this assisted in estimating the effects on flow and capacity caused by heavy vehicles and recreational vehicles and provided input into the estimation of percentage no-passing zones per roadway; and
- the percentage heavy vehicles and the percentage recreation vehicles (traffic counts always provide the percentage heavy vehicles directly, however, the percentage recreational vehicles had to be assumed based on the location and function of the road) – this assisted in the determination of actual traffic flow characteristics and capacity.

Figure 3-14: Data Needs for FONA



Source: NATMAP 2050, 2009. Round Table Presentation on Capacity Building

3.6.1.2 FONA Network

The FONA road network used for this study is identical to that which was developed for the NATMAP process. It encompasses (1) national roads (such as N1, N2, N7, N9 and N12); (2) R2 provincial roads (such as R27, R45, R60, R61 and R62); (3) R3 provincial roads (such as R300, R302, R303 and R317) and (4) major metropolitan roads (such as M8, M10 and M12).

3.6.1.3 Level of Service for Base Year 2015

The FONA road network used for this study is identical to that which was developed for the NATMAP process. It encompasses (1) national roads (such as N1, N2, N7, N9 and N12); (2) R2 provincial roads (such as R27, R45, R60, R61 and R62); (3) R3 provincial roads (such as R300, R302, R303 and R317) and (4) major metropolitan roads (such as M8, M10 and M12). The extent of the FONA network for this report is shown in the table below:

Table 3-23: Forestry Road Network FONA Summary

Province	Metropolitan	National	R2 (i.e. R21)	R3 (i.e. R574)	Total (km)
Eastern Cape	9	1, 049	1, 454	869	3, 381
Gauteng	-	491	99	-	590
KwaZulu Natal	-	1, 953	3, 025	1, 284	6, 262

Province	Metropolitan	National	R2 (i.e. R21)	R3 (i.e. R574)	Total (km)
Limpopo	-	686	585	670	1, 941
Mpumalanga	-	2, 257	1, 939	938	5, 134
Western Cape	34	1, 416	691	899	3, 040
Grand Total	43	7, 852	7, 793	4, 660	20, 348

The average directional (50/50 split) on the forestry road network is presented in **Figure 3-15** for each province under analysis.

Figure 3-15: Average Directional (50/50 Split) ADT per Province for Base Year 2015

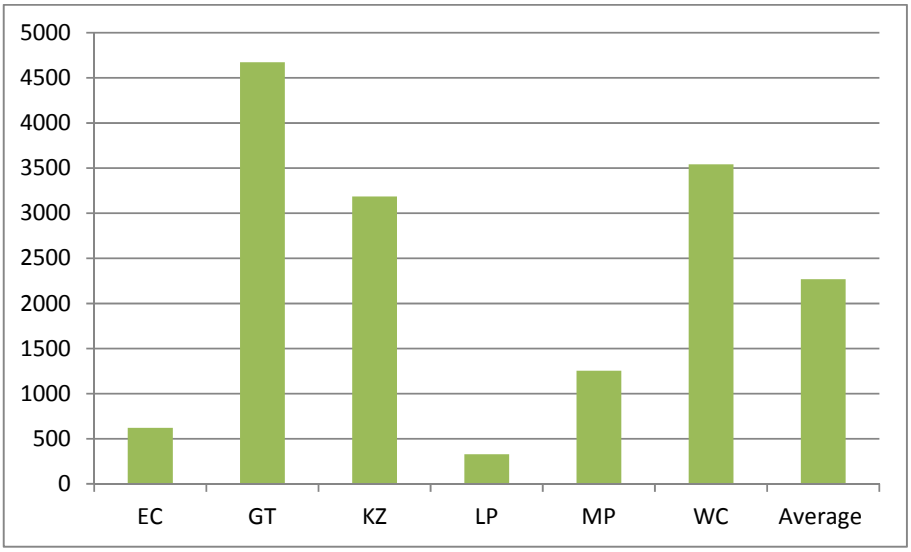
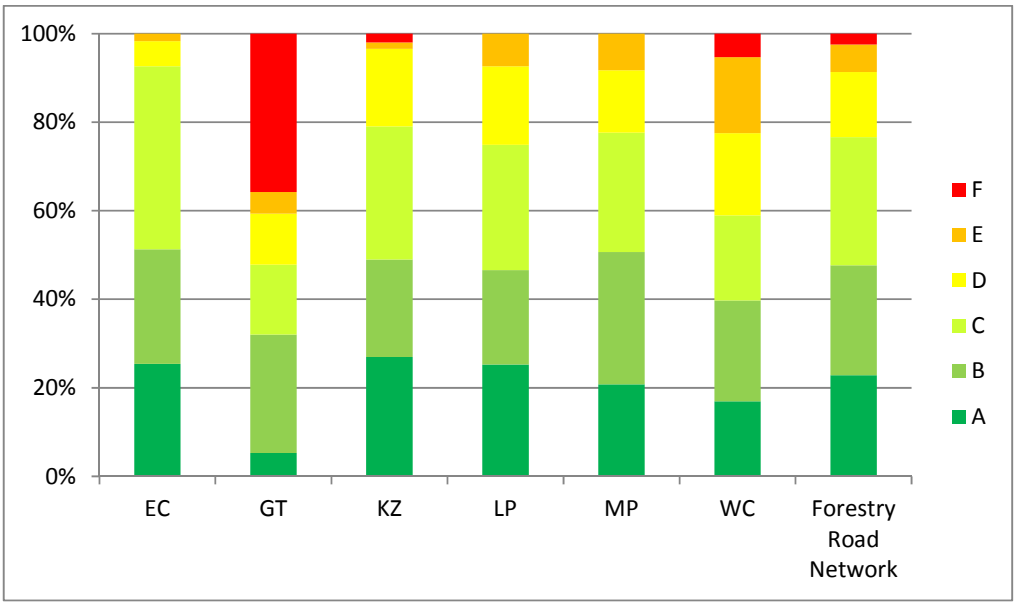


Figure 3-15 indicates that the road network being used by the forestry sector in the Gauteng and Western Cape Provinces will carry approximately 4,500 and 3,500 vehicles per day per direction. The KwaZulu Natal forestry road network will carry approximately 3,000 vehicles per day per direction, whilst Eastern Cape and Limpopo Provinces are envisaged to carry less than 500 vehicles per day per direction.

The ability of the forestry road network to carry the base year traffic is presented by an illustration of percentage of road length operating at each LOS. **Figure 3-16** shows the percentage of forestry road network, with great emphasis on road sections operating at level of service beyond LOS D.

Figure 3-16: Percentage of Forestry Road Network Operating at LOS D per Province for Base Year 2015



The above extract is supported spatially by **Map 18**. The following observations are drawn from the LOS analysis:

- Eastern Cape:
  - 3 km of the M4 is operating at LOS D and beyond prior to this study's base year of 2015;
  - 328 km of the N2 is found to be operating at capacity – with 26% of the N2 reaching capacity prior to the study's base year of 2015; 28% reaching capacity from 2016 – 2020; and 46% between 2021;and
  - A total of 84 km require upgrading to one lane prior to 2015.
- Gauteng: The following lengths of kilometres are operating at LOS D and beyond:
  - 7 km of the N1, 21 km of the N3, 23 km of the N4, 8 km of the N12, and 24 km of the N17;
  - 1 km of the R24; and
  - 21 km of the forestry road network needs an additional lane prior to the base year of 2015.
- Mpumalanga: The following lengths of kilometre are operating at LOS D and beyond:
  - 119 km of the N2, 344 km of the N4, 5 km of the N11; and 138 km of the N17;
  - 245 km of the R38, 280 km of the R40, and 18 km of the R533; and
  - A total of 424 km require upgrading to one lane by 2015.
- KwaZulu Natal:
  - 510 km of the N2 is operating at LOS D, with 11% of the N2 requiring an additional lane prior to 2015;
  - 170 km of the N3 is operating at LOS D, with 28% of the N3 needing an additional lane prior to 2015;
  - The R61 has 43 km operating at LOS D, with 19% needing an additional lane prior to 2015; and.
  - The R620 has 15 km operating at LOS D – with all of it needing an additional lane prior to 2015.

Forestry Transport Network - Level of Service 2010: Eastern Cape

Legend

Mills Facilities

Towns
- Main
- Other

Railway

2010 Level of Service
- F
- E
- D
- C
- B
- A

Roads
- National
- Main
- Secondary
- Other

Provincial Boundary

Forestry Areas
- Private Owned Plantation
- DAFF Owned Commercial Plantation

International Border

Forestry Zones
- Zone 1 Limpopo Province
- Zone 2 Mpumalanga North
- Zone 3 Central Districts
- Zone 4 Mpumalanga South
- Zone 5 Maputaland
- Zone 6 Zululand
- Zone 7 KwaZulu Natal Midlands
- Zone 8 KwaZulu Natal North
- Zone 9 KwaZulu Natal South
- Zone 11 Eastern Cape
- Zone 12 Southern Cape
- Zone 13 Western Cape

Free State

Lesotho

Zone 7

Zone 9
KwaZulu-Natal

Zone 11

Western Cape

Zone 12

INDIAN OCEAN

Middelburg
Port Alfred
Port Elizabeth
Queenstown
Bisho
East London
Port St. Johns

Ref:\\G:\PROJECTS\107518\Projects\17 Forestry Transport Network_Level of Service_Eastern Cape_A3.mxd

Forestry Transport Network - Level of Service 2010: KwaZulu-Natal

Legend

- **Mills Facilities**

Towns

- Main
- Other
- **Railway**

2010 Level of Service

- F
- E
- D
- C
- B
- A

Roads

- National
- Main
- Secondary
- Other
- **Provincial Boundary**

Forestry Areas

- Private Owned Plantation
- DAFF Owned Commercial Plantation
- Savanna Woodlands
- Albany Thickets
- NFI Indigenous Forests
- **International Border**

Forestry Zones

- Zone 1 Limpopo Province
- Zone 2 Mpumalanga North
- Zone 3 Central Districts
- Zone 4 Mpumalanga South
- Zone 5 Maputaland
- Zone 6 Zululand
- Zone 7 KwaZulu Natal Midlands
- Zone 8 KwaZulu Natal North
- Zone 9 KwaZulu Natal South
- Zone 11 Eastern Cape
- Zone 12 Southern Cape
- Zone 13 Western Cape

Mozambique

Zone 4

Zone 3

Free State

Zone 5

Zone 8

Zone 6

Zone 7

Zone 9

Zone 11

Lesotho

Eastern Cape

INDIAN OCEAN

Newcastle

Pietermaritzburg

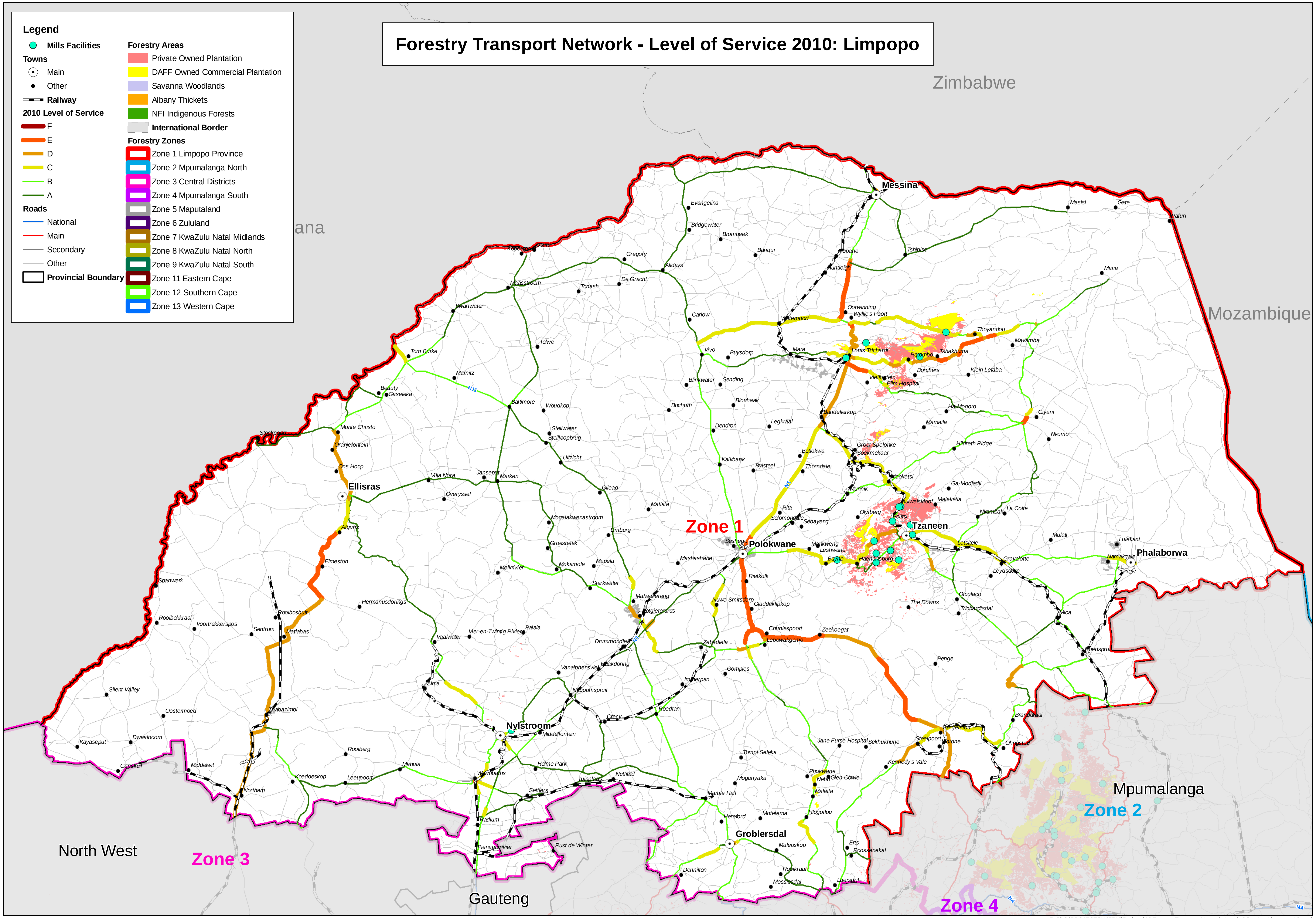
Durban

Richards Bay

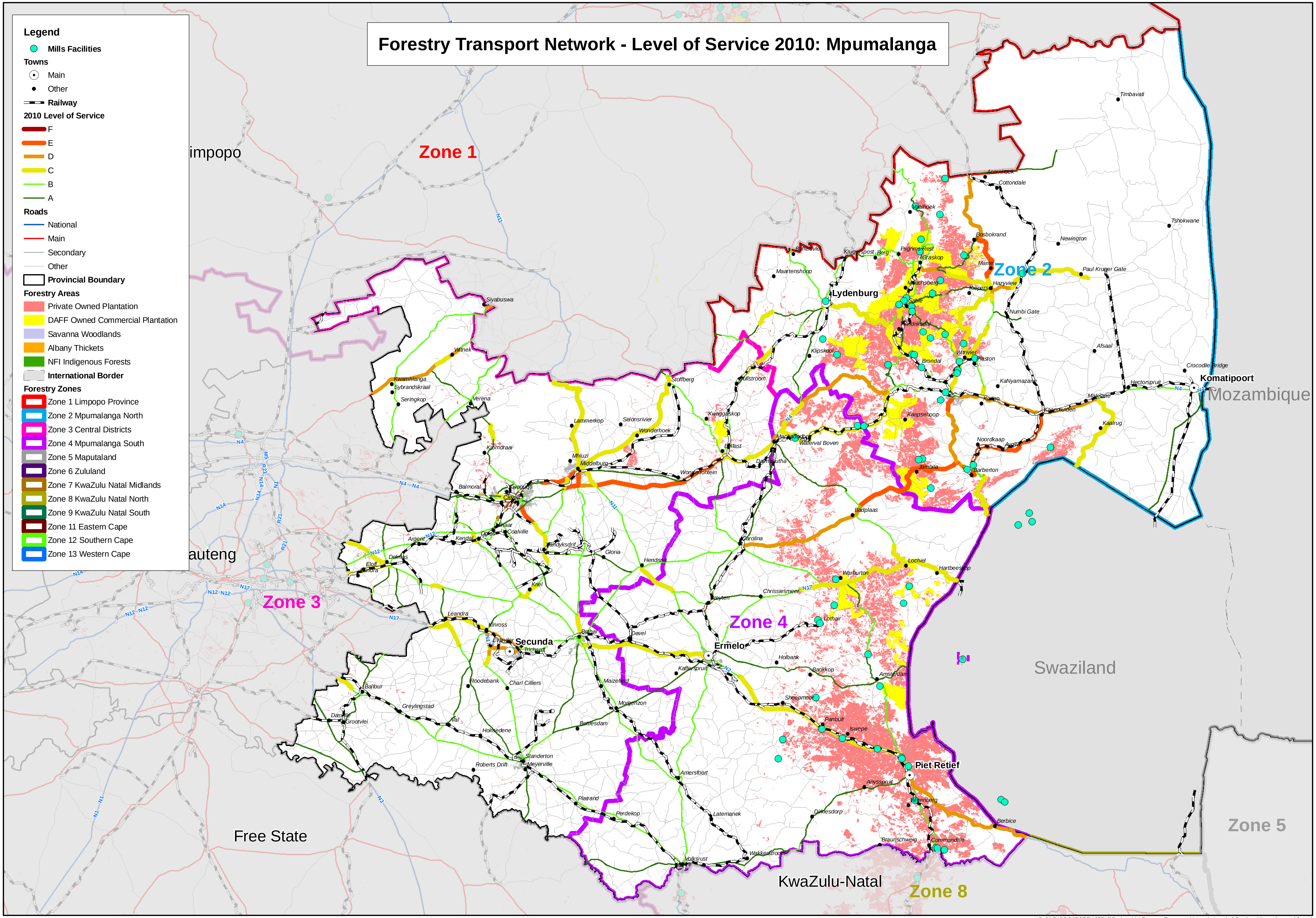
Ballito

Port Edward

Ref:\\G:\PROJECTS\107518\Projects\15 Forestry Transport Network_Level of Service_KwaZulu-Natal_A3.mxd



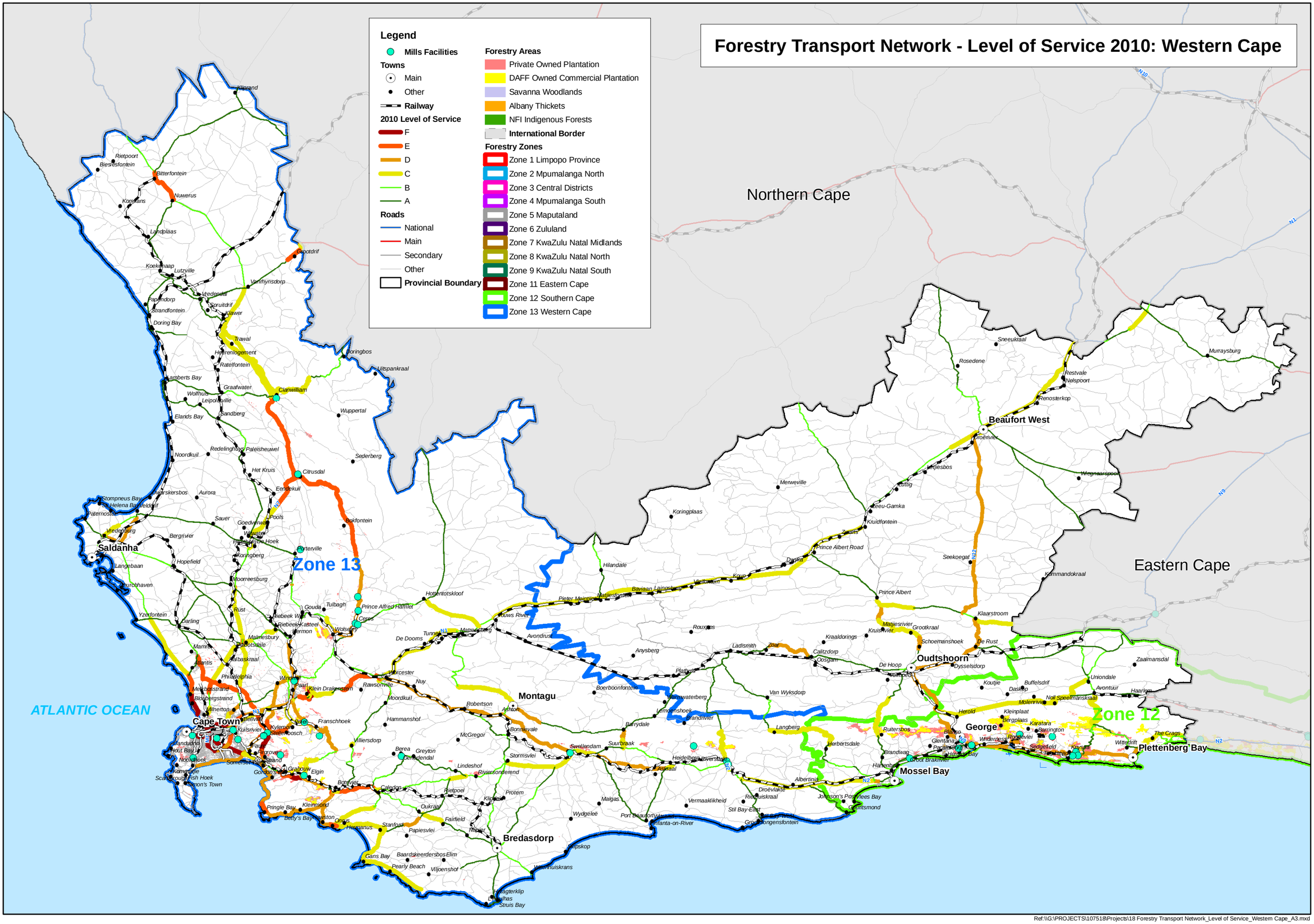
Ref:\\G:\PROJECTS\107518\Projects\16 Forestry Transport Network_Level of Service_Limpopo_A3.mxd



Forestry Transport Network - Level of Service 2010: Mpumalanga

Ref:\\G:\PROJECTS\107518\Projects\14 Forestry Transport Network_Level of Service_Mpumalanga_A3.mxd

Forestry Transport Network - Level of Service 2010: Western Cape



Ref:\\G:\PROJECTS\107518\Projects\18 Forestry Transport Network_Level of Service_Western Cape_A3.mxd

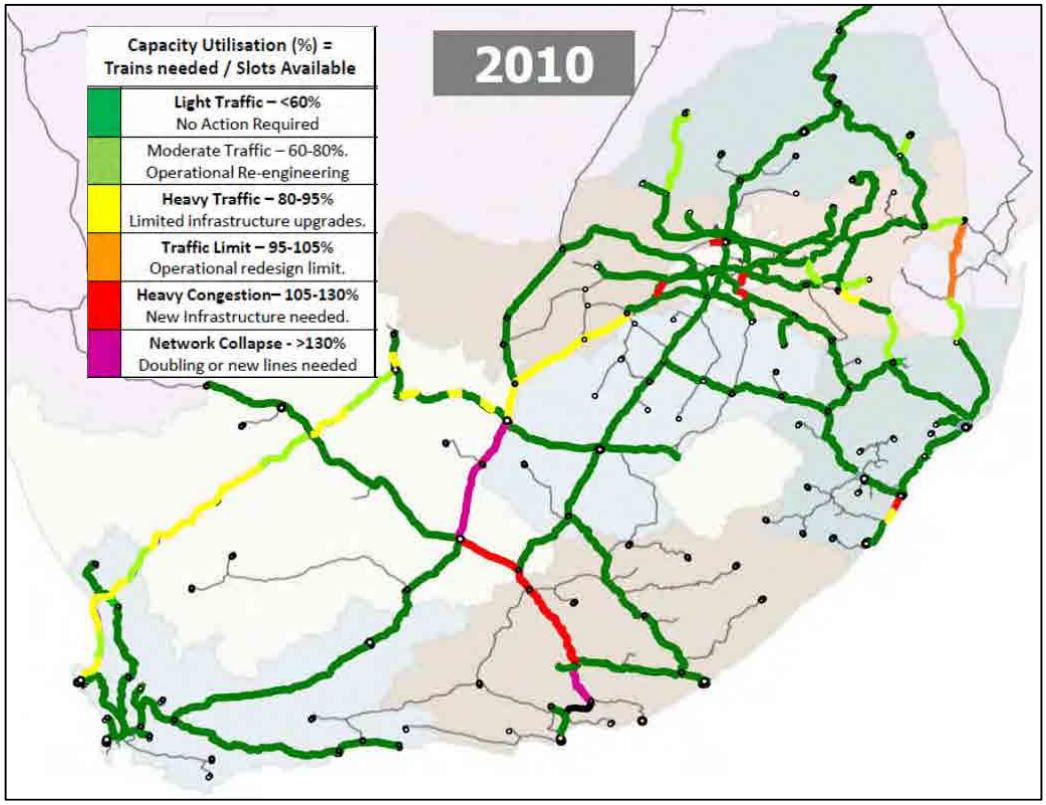
  - The remainder of the forestry network does not require any road upgrading.
  - A total of 125 km require upgrading to one lane by 2015.
- Limpopo: The following lengths of kilometres are operating at LOS D and beyond:
  - 148 km of the N1;.
  - 54 km of the R36, 135 km of the R71, 27 km of the R523, 104 km of the R524 and 18 km of the R578;
  - 141 km of the forestry road network need an additional lane prior to the base year of 2015.
- Western Cape: The following lengths of kilometres are operating at LOS D and beyond
  - 74 km of the N1, 8 km of the N2, 149 km of the N7 and 50 km of the N9;
  - 228 km of the R303, 5 km of the R43, 101 km of the R44, 68 km of the R45 and 33 km of the R46.
  - A total of 436 km require upgrading to one lane prior to the base year of 2015.

The required lane addition for the base year is depicted on **Map 19**.

3.6.2 Capacity Constraints of Rail Network serving the Forestry Sector

Figure 3-17 shows the capacity utilisation on the core rail network for 2010, drawn from Transnet's Transport Infrastructure Plan (Transnet, 2011).

Figure 3-17: Capacity Utilisation for Rail (2010)



Source: Transnet, 2011.

Forestry Transport Network - The Required Lane Additions - 2015 Base Year

Legend

- Mills Facilities
- Provincial Boundary

Towns
- Main
- 1
- 2
- 3

Railway

Roads
- National
- Main
- Secondary

Forestry Areas
- Private Owned Plantation
- DAFF Owned Commercial Plantation

Forestry Zones
- Zone 1 Limpopo Province
- Zone 2 Mpumalanga North
- Zone 3 Central Districts
- Zone 4 Mpumalanga South
- Zone 5 Maputaland
- Zone 6 Zululand
- Zone 7 KwaZulu Natal Midlands
- Zone 8 KwaZulu Natal North
- Zone 9 KwaZulu Natal South
- Zone 11 Eastern Cape
- Zone 12 Southern Cape
- Zone 13 Western Cape
- International Border

Botswana
Mozambique
Swaziland
Lesotho
ATLANTIC OCEAN
INDIAN OCEAN

Messina
Ellisras
Tzaneen
Phalaborwa
Polokwane
Nylstroom
Groblersdal
Lydenburg
Komatipoort
Rustenburg
Pretoria
Mafikeng
Lichtenburg
Vereeniging
Secunda
Ermelo
Piet Retief
Vryburg
Kroonstad
Newcastle
Bethlehem
Harrismith
Richards Bay
Upington
Alexander Bay
Augrabies
Barkly West
Bloemfontein
Ballito
Durban
Pietermaritzburg
De Aar
Colesberg
Port Edward
Middelburg
Port St. Johns
Queenstown
Beaufort West
Bisho
East London
Saldanha
Oudtshoorn
Port Alfred
Montagu
George
Port Elizabeth
Cape Town
Mossel Bay
Plettenberg Bay
Bredasdorp

Zone 1
Zone 2
Zone 3
Zone 4
Zone 5
Zone 6
Zone 7
Zone 8
Zone 9
Zone 11
Zone 12
Zone 13

The following observations can be made with regards to capacity on the forestry transport rail network:

- In general, most of the forestry transport rail network has sufficient capacity, and should be able to accommodate additional traffic;
- The only areas of bottlenecks are the following:
  - Durban to Pennington, where capacity utilisation falls within the categories of 95% to 130%. New infrastructure may therefore be required.
  - Vryheid to Ermelo. The section Vryheid to Piet Retief operates at a capacity utilisation of 60% to 80% ("moderate traffic"), and the section just south of Ermelo operates at a capacity utilisation of 80% to 95% (heavy traffic). Limited infrastructure upgrades are required for the latter section, in order to improve service levels for rail traffic.

3.7 Major Operational Constraints

The NATMAP 2050 process undertook an extensive assessment of both the road and rail infrastructural operational issues. The discussion below is based on the Phase 2 and 3 findings:

3.7.1 Operational Constraints impacting the Forestry Road Network

Reduction in road operation is attributed to:

- The cost of providing roads impacts on the sustainability of road freight transport;
- Availability of diesel;
- Skills shortages and the lack of adequately trained and competent personnel;
- Externalities such as:
  - Overloading;
  - Road transport quality system and vehicle condition;
  - Long driving hours; and
  - Shift of freight movement from rail to road.

3.7.2 Operational Constraints impacting the Forestry Rail Network

Reduction in railway operating efficiencies is ascribed to:

- A lack of short and long term maintenance;
- The age of railway equipment;
- Reduced operating staff experience resulting in breakdowns, derailments and accidents;
- A decline in rolling stock and locomotives; and
- Shortages of qualified and experience staff.

Increase in tariffs – with the forestry sector showing rail rates increasing by 66% in average from 2002 to 2007, whilst road tariffs increased by 35% during the same time (NATMAP 2050 - Freight Transport Operations Report for Phase 2, 2009, pp. 64).

4. Future Forestry Industry Planning

4.1 Overview of Policy Objectives and Strategic Planning

The situational analysis in **Section 1.2** established the major policy, regulatory and strategic instruments and arrangements which have been established in support of the forestry sector. The overarching strategic plan for the Forestry Sector as a whole is the appropriately named Forestry Roadmap 2030 (2009). The major challenges it identified which cut across this report on transport infrastructure are:

- Land reform, where issues in tenure security promote uncertainty over long term ownership in large, medium and small companies. Post settlement support has not allways been successful, and the models for and partnerships in transfers to communities and to the private sector in the commercialisation of state assets are continually under review and change. The implications are in future supply projections for timber, and in future demand for suitable transport infrastructure, at the different 'levels' of ownership and production;
- The current profile of the sector, often negative, despite its environmental standards and contribution to rural development, and the potential for this to be raised by government and the industry;
- The extent of the timber supply shortages mentioned in introductory sections and the impacts on production in various sub-sectors, on employment in rural areas, and on prices with increased future reliance on imports;
- The extent and rate of new afforestation;
- Access to finance and forest development support arrangements, in both formal and emerging enterprises;
- The dire shortage of critical, scarce and core skills as well as shortcomings in skills development infrastructure in the sector, being key constraints to transformational growth; and
- Addressing climate change and the industry challenge in addressing mitigation, adaptation and its contribution to a low carbon, green economy.

Those of major import for this transport study are covered comprehensively in Chapter Five below, where **Section 5.1** sets out landmark legislation and future plans for the organisation of transport infrastructure, and particularly the policy guidelines on the shift of freight from road to rail. These include:

- the Deregulation of Freight Transport White Paper on National Transport Policy;
- the National Freight Logistics Strategy;
- the Road Freight Strategy for South Africa;
- the Draft Green Paper on Rail Transport which is in the process of being finalised;
- The National Transport Master Plan (NATMAP) 2050, and
- Transnet Concessioning of Branch Lines.

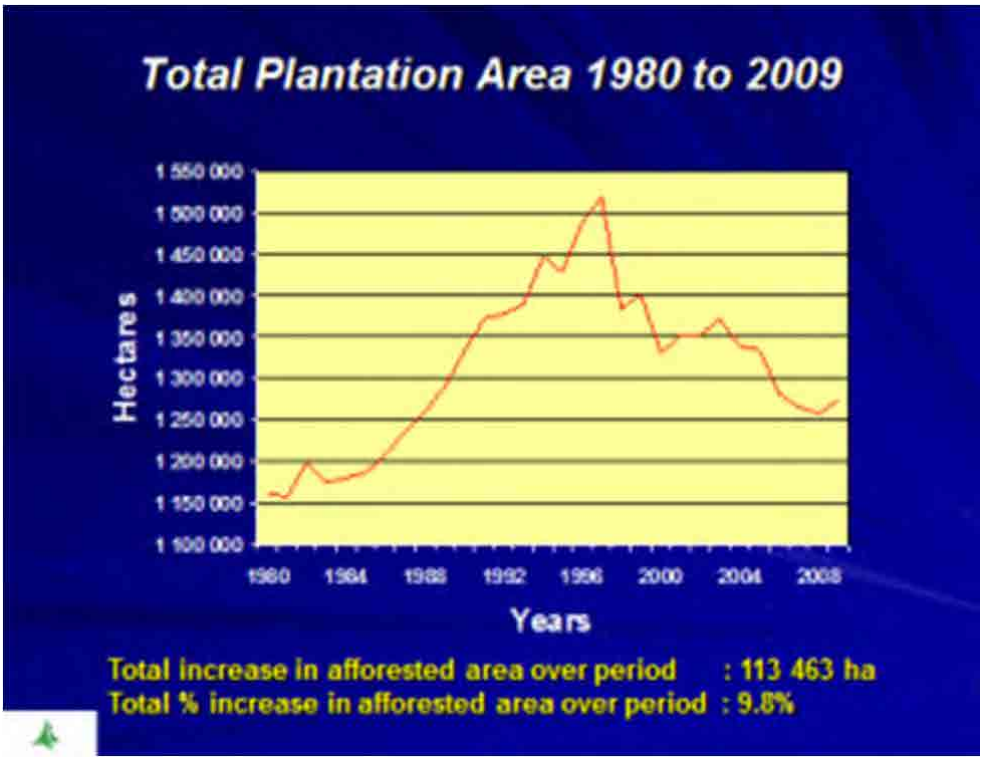
The Transport and Forestry sectors are also of course key actors in current and future planning for the shift to a low carbon transport economy and towards a green economy, under current conditions of increasing global and national energy resource constraints, supply and prices volatility, as well as increasing climate change and emissions. Therefore the rapidly changing strategic, policy and regulatory environment, and some of the instruments and incentives in future planning for Energy, and for the National Climate Change Response Strategy are set out **Section 5.3** and **Section 5.5**.

4.2 Overview of Areas of Potential Identified for Future Planting and Processing and their Implications for Transport Infrastructure

The trend in South Africa for the past decade had been for a net decrease in forestry areas. This has occurred primarily due to the return of wetland areas to their natural condition and the concomitant removal of plantation forestry there primarily as a result of compliance to the FSC standards and not as a planned move away from plantation forestry. There has also been a significant exiting of plantation areas in the Western Cape from marginal plantations back to the indigenous fynbos vegetation.

The average growth in plantation area has been at 9.8% since 1980 with significant expansion to a peak of over 1,510,000 ha planted in 1996. However this figure has fallen back to the current level of 1,275,000 planted hectares.

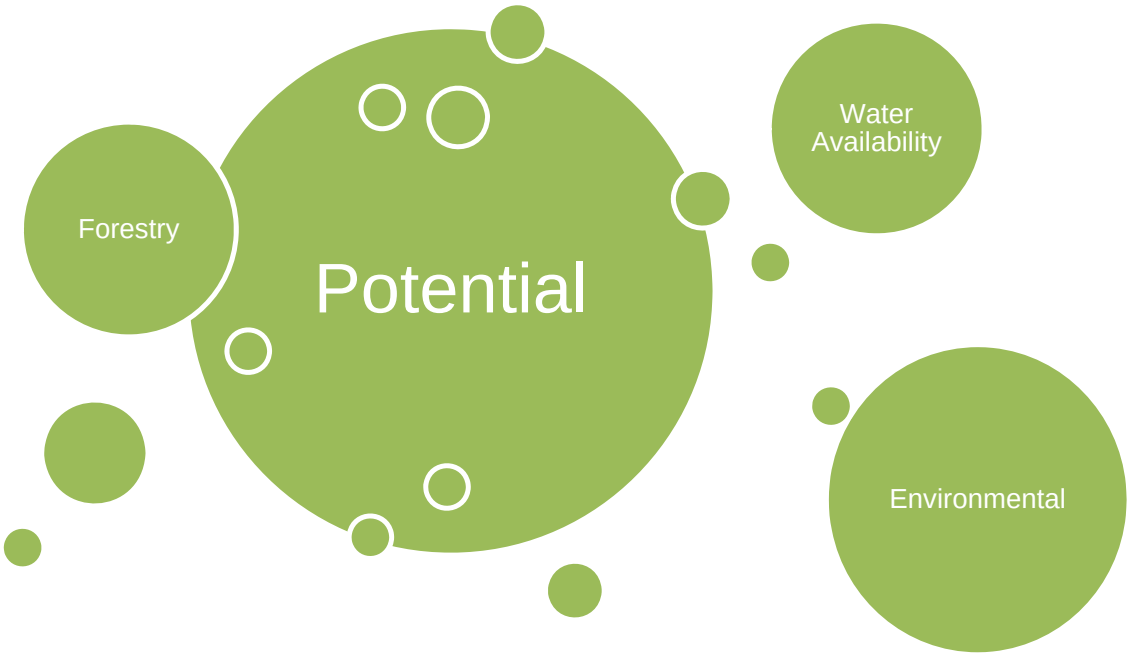
Figure 4-1: Total Plantation Area (1980 – 2009)



Source: Godsmark, 2010.

In assessing the land available for forestation there are three critical criteria which need to be considered:

- **Forestry potential** – suitable soils, rainfall and growing potential within the area and the commercial viability of the timber resource within the area and in relation to markets;
- **Water availability** – the water availability within the rainfall catchment and the impact of timber plantations on the stream flows;
- **Environmental considerations** – the environmental impact of introducing timber plantations into the existing environment and catchments' biodiversity.



Only once all three of the above have been carefully considered can the potential areas for afforestation be identified. The potential tree farmer will need to be familiar with the following national regulations in order to assess the potential of the applicable site for timber establishment and before the grower can apply for a planting permit:

- The National Water Act;
- The National Environmental Management Act and the Environmental Impact Assessment (EIA) Regulations;
- The National Environmental Management: Biodiversity Act;
- The National Environmental Management: Waste Act;
- The Conservation of Agricultural Resources Act and its Regulations;
- The National Forests Act; and
- The National Heritage Resources Act.

Only when all of the above have been considered through a comprehensive Environmental Impact Assessment and a Water Use Licence has been issued can the grower then apply for a planting permit. The implications for the emerging farmers, which represent the largest areas of growth potential available to the industry, is that the process is both detailed and complex and in most cases will require the input of external consultants at a significant cost to the potential grower. As a result, many of the small to medium scale growers are focusing their agricultural activities on alternative crops which can be established without these complicated and costly inputs and which result in short term cash flows when viewed against the 8 – 28 year rotation of timber plantations.

Irrespective of the above, there is still suitable land available for afforestation in South Africa and should the permit system be streamlined, new planting will become a reality.

In assessing the potential impact of new planting on the demand for transport infrastructure in each province, a number of factors are considered in each provincial sub section below.

Firstly, the Mean Annual Increment (MAI), the volume of timber grown in one hectare over a year, which is dependent on a number of factors including tree species, soils, rainfall and climate. In forestry terms a MAI of 8m^3/ annum would be considered a very marginal growth

rate and below that level would be classified as uneconomical. A good growth rate for pine would be a MAI range of 14 – 22 m^3 / annum, while a good eucalyptus site would have a MAI range of 18 – 25 m^3 / annum. In exceptional eucalyptus sites MAI's of up to 40 m^3 / annum are measured. For a moderate pines site, a MAI of 8 – 15 m^3 / annum would be acceptable and moderate eucalyptus would range 10 - 20 m^3 / annum.

Secondly, the total available ha per province, its likely species composition and growing conditions, and projected MAI are calculated to envisage a total annual cubic metre of product, which is then converted to tonnes. This is then converted to the tonnage needed to be transported daily over a year, and the resultant potential increase in the number of trucks on the roads per day.

4.2.1 Limpopo

There are currently 49,720 ha of plantation in the province. A report by Water for Africa and Fractal Forestry (December 2008) delineated a potential area of 15,000 – 20,000 ha, particularly in the Groot Letaba, Luvhuvhu, Mutale and Nzhelele catchments. However, there is no possibility of a potential grower being issued a water licence in these catchments due to there being no additional water available for additional water licences. Any new water licences would have to be at the cost of a water swap with an existing water user on another agricultural crop. There have been three areas identified as possible forestry development areas where water licences could become available for the issuing of the planting permit if swapped against current unutilised agricultural irrigation quotas.

Table 4-1: Possible Forestry Development Area in Limpopo

Region	Hectares	Comments
Groot Letaba	671 ha	Re-afforestation from Sapekoe Tea Plantations
Luvhuvhu	5,000 ha	Re-assignment of un-used water quotas
Mutale	400 ha	Re-assignment of un-used water quotas
	6,071 ha	

Figure 4-2 below shows the areas of rainfall (>650mm) and suitable for forestry development in the green shaded areas.

Assuming 6,000 ha of predominately eucalyptus plantations, and good and above moderate growth expected from the areas that could be swapped out on the water licence exchanges, and new plantation areas located within or adjacent to existing forestry plantation or agricultural areas, thus not requiring further road developments, an expected MAI of 18 m^3 / annum would result in the production of an additional 108,000 m^3 per annum. Converting the eucalyptus from cubic metres into tonnes, this would result in an additional 75,000 tonnes per annum on the road network. While this is potentially an increase of 13% in the timber tonnage it would only convert into an additional 8 -10 truck trips per day on the road network across the province.

There is no specified time frame for the potential expansion and this would depend on the willingness of government departments to issue water licences and planting permits to farmers in the catchments. The rotation age for timber in the region would be 10 years so it is unlikely that the impact on the road network would be felt before 2024, even if the process was started immediately.

Figure 4-2: Areas Suitable for Forestry Development in Limpopo (green shades)

Source: Water for Africa & Fractal Forestry, December 2008.

4.2.2 Mpumalanga

Mpumalanga is currently the province with the largest area under plantation forestry with 520,146 hectare planted. As a result the water resources within the province are under severe pressure according to the report by Water for Africa & Fractal Forestry (December 2008).

Currently the Olifants, Crocodile, Sabie and Sand River catchments are all under pressure and there is no potential for expansion in these catchments. The only catchment with opportunity is the Komati Basin where the possibility of approximately 10,000 ha could be available through the reallocation of water licences due to failed irrigation schemes in the catchment. It is currently felt that there is little opportunity for the expansion of plantation forestry within Mpumalanga unless this is achieved through small scale water licence swap agreements.

Assessing the impacts on transport infrastructure an average MAI is assumed for the pine saw logs and cold tolerant eucalyptus pulp timber grown in the area of about 15 m^3 / annum, resulting in an annual production of 150,000m^3 of timber or around 125,000 tonnes of timber based on an equal split between pine and eucalyptus species. This would equate to an additional 13 - 15 truck trips per day on the road network. There is no specified time frame for the potential expansion, which would depend on the willingness of government departments to issue water licences and planting permits to farmers in the catchments. The rotation age for timber in the region would be 10 - 25 years depending on the species and product type. It is unlikely that the impact on the road network would be felt before 2024, with full production impact only materialising in 2039.

4.2.3 KwaZulu Natal

KwaZulu Natal is the focus of the pulp timber plantations in South Africa with 504,848 ha of established plantations. The most suitable timber producing areas have already been established to plantations or are dedicated to alternate agricultural crops. The report by Water for Africa & Fractal Forestry (April 2009) concluded that while water licensing was available for a potential forestry expansion of up to 95,297 ha, it was not expected that more than 40,000 ha of suitable areas was available for afforestation.

A large portion of the land available for afforestation is located within the traditional tribal community areas. This has the advantage of creating employment and wealth in rural areas but does make the management of the plantations difficult, there are however a number of success cases where community forests have been established and work in partnership with the larger forestry growers and processors. The following areas are seen as potential growth points in KwaZulu Natal.

Table 4-2: Possible Forestry Development Area in KwaZulu Natal

Region	Hectares	Comments
Southern KZN Mzimkulu / Umvoti	1,500 – 2,000 ha	These small land parcels are adjacent to existing plantations.
Central KZN Thukela	12,000 – 18,000ha	The Thukela basin is a marginal site with reference to both soils and rainfall.
Northern KZN Usutu Mhlathuze	5,000 – 10,000 ha	
Northern KZN Sibaya / Pongola	6,000 – 10,000 ha	The area is of conservation importance and the impact of forestry on the water table is unknown. There are already 20, 000ha established in the area.
	24,500 – 40,000 ha	

Figure 4-3 below shows the potential development areas within KwaZulu Natal.

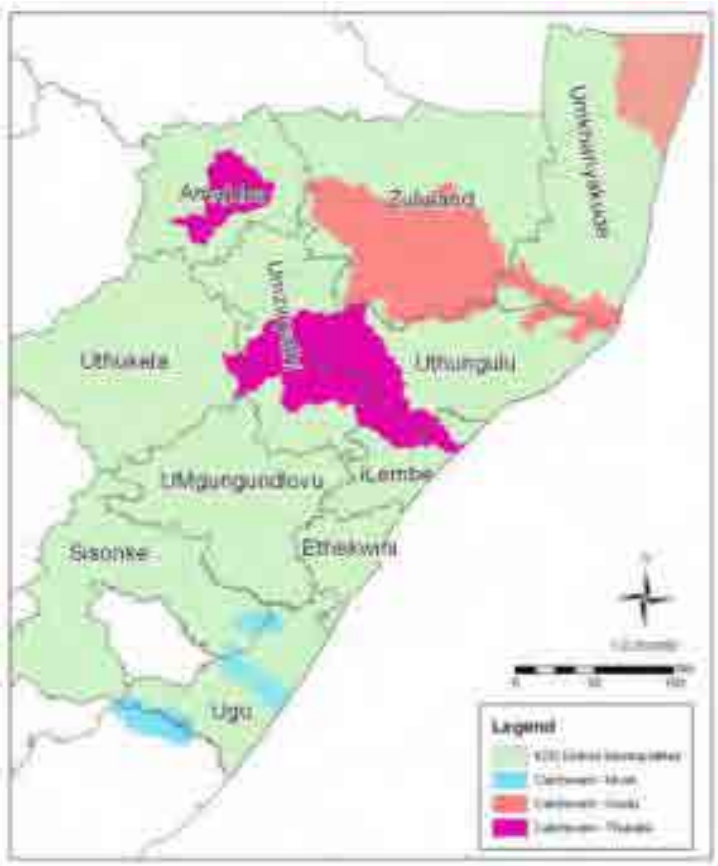
In southern Kwazulu-Natal the new plantations in the Mzimkulu and Umvoti catchments would be an extension to the current existing plantation and the 2,000 ha at an average MAI of 18 m^3 / annum would result in an additional 36,000m^3 per annum. This would convert into an additional 25,000 tonnes on the road network or 3 - 4 truck trips per day. The impact of the additional plantings would only impact on the road network in 2024.

For central Kwazulu-Natal, the Thukela plantations are the more marginal planting sites and in most cases outside the existing plantation forestry area. The 18,000 hectare at an average MAI of 12 m^3 / annum would result in an additional 216,000m^3 per annum, converting into an additional 150,000 tonnes on the road network or 16 - 20 truck trip per day. This would only impact the road network in 2026.

The northern areas of Ushutu-Mhlatuze would be based on eucalyptus plantations for the pulp and chip markets in Richards Bay. The 10,000 hectare at an average MAI of 16 m^3 / annum would result in an additional 160,000m^3 per annum, converting into an additional 110,000 tonnes on the road network or 12 - 15 truck trips per day with the impact the road network only in 2024.

In the Sibaya –Pongola areas new plantations would also be eucalyptus for the same markets in Richards Bay. The 10,000 hectare at an average MAI of 16 m^3 per annum would result in an additional 160,000m^3 per annum and convert into an additional 110,000 tonnes on the network or 12 - 15 truck trips per day, with impacts of the additional plantings only be in 2024.

Figure 4-3: Potential Forestry Development Areas in KwaZulu Natal



Source: Water for Africa & Fractal Forestry, April 2009.

4.2.4 Eastern Cape

The Eastern Cape is currently the third largest province under timber plantations with up to 120,246 ha established. The province has also been targeted as the most suitable area for the establishment of new plantations with government promoting the establishment of over 100,000 ha. A detailed study – 'Strategic Environmental Assessment for Water Management -Area 12', (2006) was conducted on behalf of the then Department of Water Affairs and Forestry, forms the basis for planning the 100,000 hectare.

The following blocks of land were identified as potential forestry expansion areas.

Table 4-3: Existing and Potential Forestry Blocks in the Study Area (ha)

Block	Existing Forestry	Net Potential (@15% of Available Area)	Total
Mzimkhulu	51,741 ha	29,813 ha	81,554 ha
Ugie / Matiwane	43,313 ha	27,121 ha	70,434 ha
Pondoland	7,408 ha	34,350 ha	41,758 ha
Amatole	17,784 ha	5,175 ha	22,959 ha
Total	120,246 ha	96,459 ha	216,705 ha

Source: Coastal Environmental Services. 2006.

The focus area of the study was around the O.R Tambo District Municipality which comprises six local municipalities. The report suggests that within the OR Tambo District Municipality and with a mix of good and moderate areas planted to 15% of the currently available area, an area of 113,000 ha is available for the establishment of plantations.

Table 4-4: Existing and Potential Forestry Blocks in the Study Area (ha)

Local Municipality	Good Area	Moderate	Available Area (15% planted)	Available Area (30% planted)
Umzimvubu	48, 419 ha	302, 696 ha	52, 000 ha	105,000 ha
Qaukeni (Flagstaff)	13, 613 ha	84, 296 ha	14, 000 ha	29, 000 ha
Nyandeni (Port St John's)	3,764 ha	106,166 ha	16, 000 ha	33,000 ha
Ntabankulu	13,827 ha	35,774 ha	7, 000 ha	14, 000 ha
Mbizana	2,590 ha	119,706 ha	18,000 ha	36,000 ha
King Sabata Dalindyebo (Mthatha)	2,839 ha	41,049 ha	6,000 ha	13, 000 ha
TOTAL	85,052 ha	689,687 ha	113,000 ha	230,000 ha

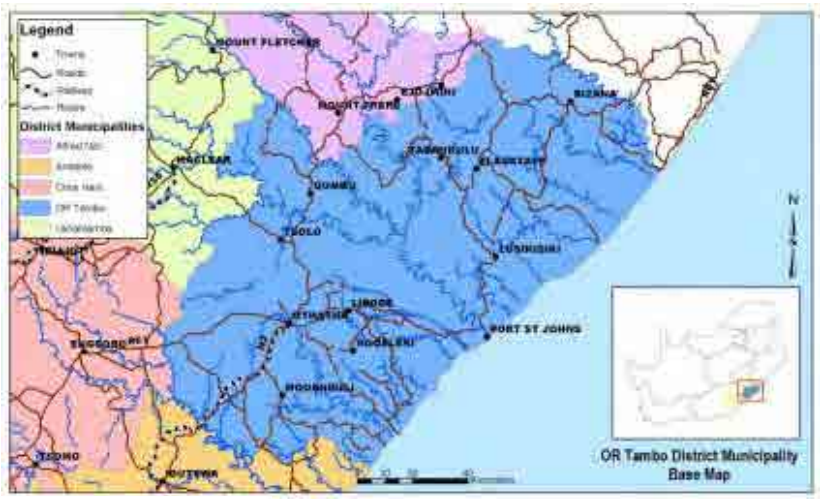
When considering the larger Eastern Cape region the study identified an area equivalent to the current South African plantation forests in size as suitable for afforestation. Even with a 15% of the available area established it would still create an area of 223,000 ha of plantations.

Table 4-5: Existing and Potential Forestry Blocks in the Eastern Cape

District	Good Area	Moderate	Available Area (15% planted)	Available Area (30% planted)
DM OR Tambo	66,233 ha	649, 818 ha	107,000 ha	214,000 ha
DM Ukhahlamba	129, 840 ha	248, 036 ha	56, 000 ha	113, 000 ha
DM Chris Hani	28, 958 ha	189, 292 ha	33, 000 ha	65,000 ha
DM Amatole	9, 579 ha	169,768 ha	27,000 ha	53,000 ha
TOTAL	234, 610 ha	1,256,914 ha	223,000ha	445,000 ha

Source: - Coastal Environmental Services. 2006.

With the focus of the Eastern Cape establishment in the O.R Tambo District Municipality this will provide two potential planting species and product types. The current growth models would suggest that both Pine and Eucalyptus would be suitable for establishment. There are currently existing sawmills in Weza (Harding KZN) and Langeni (North of Umtata) for pine sawlog operations, including some



emerging sawmillers, with smaller pine timber being used in the boardmill at Ugie or pulp operations in KwaZulu Natal. If eucalyptus plantations were to be established the product could either be utilised in pulp operations in KwaZulu Natal or processed for treated poles locally.

The establishment of 100,000 hectares of new plantation forest would potentially create 3,600 to 4, 000 new and sustainable jobs in the area.

Other sections of this report describe ongoing work and funding in establishing these areas to plantations with the small scale grower sector. One constraint, as in other provinces, is the ability of government to issue the necessary water

licences and planting permits, although this is being addressed consistently. From the growth rates on current plantations within the region and based on best forestry practices a MAI of 17 m^3 / annum would be realistic. However it must be cautioned that in new plantations to be developed from previous agricultural activities the MAI can be lower due to limited forestry practice, poor fire protection precautions, livestock damage to young trees and the harvesting of young trees for domestic use. Nevertheless the establishment of the 100,000 hectares could result in the production of 1,700,000 m^3 of timber or 1,172,000 tonnes of timber per annum. This would result in an additional 120 – 140 truck trips per day on the road network, over a variable time period (depending on start-up dates in different areas), beginning approximately in 2020.

4.2.5 Western Cape

There is no planned expansion of forestry areas within the Western Cape region. In the Southern Cape particularly, plantation areas are declining due to the planned withdrawal of forestry operations from areas which conflict with conservation priorities. The plan is to return 40,000 ha to conservation areas, of which 20,000 ha has already been completed. There is currently representation to government to place a moratorium on the exiting of forestry plantation areas due to the impacts on the local economies and potential job losses, which will be felt in both the forestry and sawmilling processing operations.

4.3 Overview of Constraints and Opportunities per Industry Sub-Segment

4.3.1 Introduction

The purpose of this section is to complement other sections and develop a general overview of issues which arise where the major industry sub-sectors are making, or anticipate, changes in the type of forestry economic activity- leading to increased or decreasing inputs and outputs and new products. The aim is to point towards whether there are likely to be any positive or negative consequences for the future demand and planning of transport infrastructure. While this report has modelled major future demand, and there are ongoing discussions in various transport fora between public authorities and private interests in planning for these changes, the case study and questionnaire responses show that the latter is often not substantive enough, or not enough action is taken to target and support changing and future sub-sector requirements effectively. The overall purpose is to provide an indicative interpretation of issues which can influence where future demand for relevant transport infrastructure can occur in a changing forestry economy.

The section is divided into the industry sub-sectors of growing (plantations), processing – fibre (pulp, paper, paperboard, timberboard product, woodchip and wattle bark) in transport contracting, sawmilling, and in poles (treatment plants, farm and transmission poles, mining poles).

It should be read against the general trends identified and drawn from **Section 5.2** vis; Assessment of Climate Change and its Industry Impacts, and particularly **Box 5.1**, which highlights issues in 'The South African Forest Sector in the Green Economy', as well as trends and forecasts in other sections of the report. Those which cut across this necessarily general exposition per sub-sector here are:

- A green economy has been described as the process of reconfiguring businesses and infrastructure to deliver better returns on natural, human and economic capital

investments while at the same time reducing greenhouse gas emissions, extracting and using fewer natural resources, creating less waste and reducing social disparities;

- The three main routes in which the timber and forest sectors can contribute are in biomass energy, green infrastructure and building - related to sourcing sustainably generated forest products, and the role of forest resources as carbon sinks;
- Massive market growth, environmental imperatives and rapid advances in technology are moving the forest sector into a new paradigm of a ligucellulose sector within a biological products economy. These trends, when properly developed, open countless opportunities for the entry and growth of new forest based industries and the lifting of households out of poverty; and
- These challenges imply that the development of green markets for wood such as energy and the green buildings industry could result in a change of supply to traditional markets such as in pulp and paper and in mining and saw timber. This could have an impact on wood prices in some regions and for certain categories of wood products, as well as the demand for transport infrastructure locally and regionally.

4.3.2 Growing

A range of factors make up this sub sector's future potential impacts on transport and infrastructure planning. These include industry views regarding the reduction of forest areas and therefore output due to riparian delineation, and to land claims, where many might not succeed in keeping transferred plantations producing timber at previous volumes. Tree breeding, while improving yields per hectare over time, will probably not be sufficient to make up for the lost land, and thus compensate in any loss of transported tonnages. In this view forestry will not be contributing to increased volumes of conventional roundwood products travelling over district and provincial roads.

However, this view could be tempered by the achievements of certain companies, for example in upgrading 57,000 ha of former DAFF plantations in the Eastern Cape, where significant progress has been made with replanting, thinning, pruning and weeding programmes which have caught up with inherited backlogs when the company took over operations. The well managed plantation resource is contributing to large increases in volumes transported to regional sawmills and local processors in southern KwaZulu Natal and in the North Eastern Cape. This increases demand for improvements in transport infrastructure – both on road and rail.

Other contrasting factors however, are the increasing short term demand scenario for pulpwood depicted in

Figure 2-6 in **Section 2.2.3** above, and views in the grower sector that there is a huge future for timber production due to the increasing gaps between supply and demand, that it is environment friendly with many uses, and in view of the growing need for biomass for green energy. If the use of harvesting residue and other woody biomass materialises consistently, this could contribute to volumes on the roads and could offset the traffic volume losses due to plantation area loss. However there are also views that use of biomass will be localised, as processing or energy generation facilities need to be close by or transport costs become prohibitive, since it is difficult to achieve economic payloads when transporting biomass.

Section 4.2 identified additional areas of potential where afforestation can take place in Limpopo (6,000ha), Mpumalanga (10,000ha) Kwazulu-Natal (24,500-40,000ha) and in the Eastern Cape (113,000ha), where the Eastern Cape Rural Finance Corporation have recently secured R100 million for support to the small scale grower sector. While the sections indicate very small increases in daily truck trips in most provinces, the time frames for this to occur at scale are for the long term. Nevertheless, key action plans have been

developed which cover expediting the afforestation licensing process, confirmation of land rights holdings for land holding communities, and both technical and the aforementioned financial support to small scale growers. In the Eastern Cape an additional 120-140 truck trips per day can be anticipated (See Chapter 7, Case Study).

Current small scale grower activity is increasing, leading to increased numbers of smaller transport operators, operating under many constraints. Furthermore, as land claims progress, many communities will make use of their own transport, or small transport contractors such as those operating in areas close to the coastal Zululand areas. They operate on some of the worst roads due to them not being organised and having little input into government structures. This group's needs are considered, insofar as they will increasingly use those secondary routes identified for upgrading and improvement. Many mills are going to be increasingly reliant on small scale growers and the contractors who transport their timber. Some companies are developing comprehensive programmes in support of secondary transport contractors. However some companies will collect with their own fleet. In summary, transport planning needs to consider all areas where products need to be accessed, and not just the most organised organisations who are trying to influence spending.

4.3.3 Processing

One predominant driver of changes in processing (and in the destinations of some raw material and finished product) has been advances in the lignocellulose market for chemical cellulose derived from wood fibre and used in a growing array of products such as viscose fabric, substituting cotton in the clothing industry. Global demand over 2010-2030 has been forecast at about 20 million metric tons.

One large corporation, a global leader in this field, has expanded and upgraded one mill in KwaZulu Natal bringing on board 210,000 tonnes of annual production, and is completing a R2,4 billion expansion in a mill in Mpumalanga with the view to total annual production of one million tonnes a year. It is not clear what proportion will be exported, but it can be assumed that container facilities in Richards Bay would be a priority (and are currently not planned for by the relevant authorities), as an example of anticipated demand for transport infrastructure.

The raw material requirements of chemical cellulose entail a switch of timber type, which frees up extensive pine plantations to be used for high value sawn timber, the supply of which is declining nationally (see 4.3.4 Sawmilling below). The organisation will thus divert its pine product to its sawmill near Barberton, and further divert saw timber from other plantations elsewhere. The implication of these changes is that the demand for upgrades/improvements on certain routes to the processing plant could decrease while on other routes to sawmills could increase. Possible future plans to build a value adding process at the sawmill combining sawmilling and bio-energy could further increase demand for upgrades on routes to the sawmill.

Another industry view is that woodchip exports have declined materially from their highs of 5 million green metric tonnes to current levels of below 2 million tonnes, and is expected to gradually continue should the currency remain strong and local demand remains buoyant. This has implications for demand on certain routes and infrastructure to Richards Bay. It is unclear whether this is in fact the case but indicates the fluctuations in markets, both local and international and their impacts on demand for infrastructure. Another example is in the newsprint sub sector where the newsprint production from softwood logs as opposed to recycled fibre remains uncertain. Rising production costs (especially electricity) may see a material reduction in log demand from this sub-sector over time, and a growing reliance on recycled paper, as well as increased imports, both factors which could affect the demand for

transport infrastructures. Sources: PAMSA (April 2012), S.A Forestry (November 2011) and other industry comment submitted in questionnaires.

4.3.4 Transport Contracting

Considering the future of road transport contracting, the obvious indicator of changes is the planned general shift towards rail transport covered in Chapter 5 and elsewhere. These changes could imply a reduced demand for upgrades and improvements for many secondary routes used by the forestry sector, unless a) the contractors shift towards other commodities within the constituent forestry regions such as sugar cane, or b) other changing market demands imply a change in demand for exports or processing requirements such as in the transmission pole sub-sector.

4.3.5 Sawmilling

The sub-sector comprises a) the 'formal' sawmilling sector – the larger players with access to their own timber resource and a larger investment in infrastructure and plant who currently cut approximately 70% of the total S.A sawmilling intake of 4 million m^3 (one m^3 = one tonne), and tend to transport larger logs over longer distances in slightly bigger loads (12 to 30 tonnes) and b) the 'informal' sector- not necessarily including only 'emerging sawmillers' often operating only portable sawmills, but including sawmillers with more permanent mills but not usually with access to their own timber resource. Smaller sawmillers cut about 30% of the South African intake.

While generalising, future growth for the sub-sector and its implications for transport infrastructure and planning has been described by the Sawmilling Association of South Africa in terms of two scenarios as follows (Southey, 2012).

4.3.5.1 'Formal'

The greatest challenge will be to better utilise the resource at their disposal, in other words how to get more recovery from the log. This can and will be achieved by employing innovative and improved forestry practises to produce better, faster and more suitable trees and employing updated sawmill technology which will result in improved yields**.** This means that there is not likely to be an increase in the volume of raw material going into these mills but a small and steady increase in output volumes. The mills are situated in reasonably industrialised areas of Mpumalanga, KwaZulu Natal and the Eastern Cape and the implications for transport infrastructure and future planning are to expect small but growing increases in volumes on the road.

However, with appropriate rail services and tariffs, it could be expected that product could move off the road network over the medium to long term.

4.3.5.2 'Informal'

These mills' greatest challenge is to find sufficient timber resource to sustain their activity in the long term and so it is these mills that will face the most closures as a result of the shrinkage in the S.A forest resource. Shrinkage is the biggest problem, and in the longer term growers (their suppliers) could and will find alternative uses and markets for their trees such as in fluctuations in pulp demand, power from biomass, plastic pallets, and other new green industries*.*

The case study however in Chapter 7 shows the efforts of emerging sawmillers in attempting to secure timber from DAFF plantations in the Eastern Cape. There will always be a demand for the products from these mills as they generally sell into the semi-formal and informal markets, which will not go away overnight. The proportion of the intake they cut could shrink. The logs are generally of a smaller diameter and the loads transported into the mills tend to be smaller (8 to 12 tons).

The implications for transport infrastructure and planning are that there is potential for reduction of existing pressures- particularly on rural roads, but the case study shows that with appropriate support from DAFF, they can increase input and output, particularly if rail is provided to enable them to access wider, more formal markets in the cities at reasonable tariffs.

4.3.5.3 Importation

The association representative maintains that it is highly unlikely that sawlogs will be imported into the country as the economics of this do not make sense, and are unlikely to do so in the future. The exception may be a small amount of logs coming into S.A from other SADC countries. Sawn board is another prospect altogether and as demand for sawn product grows with the economy, the shortage between local production and demand will be filled from overseas. These imports will chiefly be consumed on the coast at centres close to the ports and will thus form part of the transport demands in those areas.

4.3.6 Poles

Within the poles sub sector (treatment plants, farm and transmission poles, mining poles) a significant challenge is emerging in a rapid growth in exports. Grower cum processors are changing production methods to achieve log diameters which are better suited to the processing of transmission poles for local and export purposes, rather than for pulping. In some companies exports are expected to increase by 20% annually over five years, with implications for a reduction of transport needs to pulp mills on the coast, and increases in transport infrastructure demand on routes to Durban's port.

4.4 Current and Future Transport Requirements for the Forestry Sector

4.4.1 Introduction

The purpose of this section is to investigate the future traffic patterns, and to identify current and future transport requirements for the forestry sector. For purposes of comprehending traffic movements that will emanate from future potential forestry developments a simplified model was developed to estimate the current (as discussed in Chapter 3) and future freight demand per road and rail route. The future freight demand from the forestry sector per route is mainly dependant on afforestation potential and the modal split between road and rail.

4.4.2 Modal split

For the future, two modal split scenarios were developed for the assignment exercise:

- **Trend scenario** where it is assumed that the current modal split will still be applicable in the future;
- **Rail scenario** where it is assumed that the rail conditions are conducive for a modal shift from road to rail. The modal split for this scenario was based on the findings of

the FSA survey for potential future tonnage via rail. The assumed modal split for the rail scenario is summarised in **Table 4-6**.

Table 4-6: Modal Split Criteria Assumed for Pulp Volumes (Rail Scenario)

Trip Distance	% Allocated to Rail	% Allocated to Road
Shorter than 300 km	59%	41%
Longer than 300 km	89%	11%
TOTAL	73%	27%

4.4.3 Resulting Future Traffic Patterns

4.4.3.1 Future Situation: Trend Scenario

The forestry traffic volumes and pattern for the future trend scenario, as obtained from the model, are shown graphically in **Figure 4-4** to **Figure 4-9** on the following pages. The future trend scenario assumes that the current modal split will still be applicable in the future. Once again, the reader should note that this traffic represents forestry products only (i.e. not total traffic).

The main forestry transport corridors for the future trend scenario is then identified and indicated graphically in **Figure 4-10**. For purpose of this project, a main corridor was defined as a road or rail road that carries more than 750 000 tonnes per annum.

From the figures below, the following observations can be made on the future transport patterns of forestry products, should the modal split remain as per the current conditions:

- Forestry traffic is expected to still be concentrated within the KwaZulu Natal and Mpumalanga provinces. The Eastern Cape however (specifically the northern region of the province) is expected to see a substantial increase in forestry traffic;
- The main road based corridors will be similar to the current situation, namely the following:
  - The N2 in Kwazulu-Natal and Mpumalanga;
  - The N2 in the Eastern Cape;
  - The R36 in Mpumalanga;
  - The R34 in KwaZulu Natal;
  - The R74 in KwaZulu Natal;
  - The R612 in KwaZulu Natal; and
  - The R33 in KwaZulu Natal.
- The future model assumes that the N2 Wild Coast road project will be implemented by SANRAL. However, it is expected the “old” N2 road will still carry most of the forestry traffic;

Figure 4-4: Future Forestry Volumes per Road and Rail (Trend Scenario): South Africa

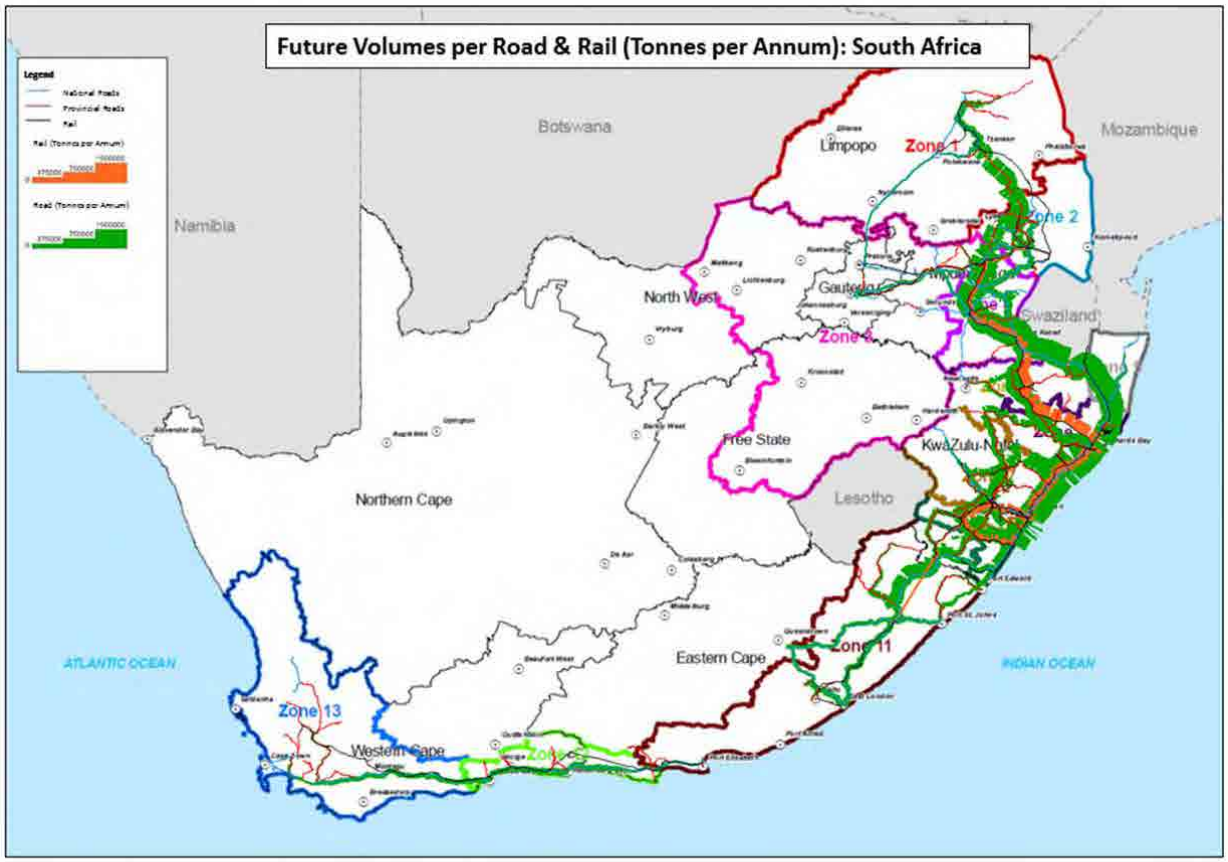


Figure 4-5: Future Forestry Volumes per Road and Rail (Trend Scenario): Eastern Cape

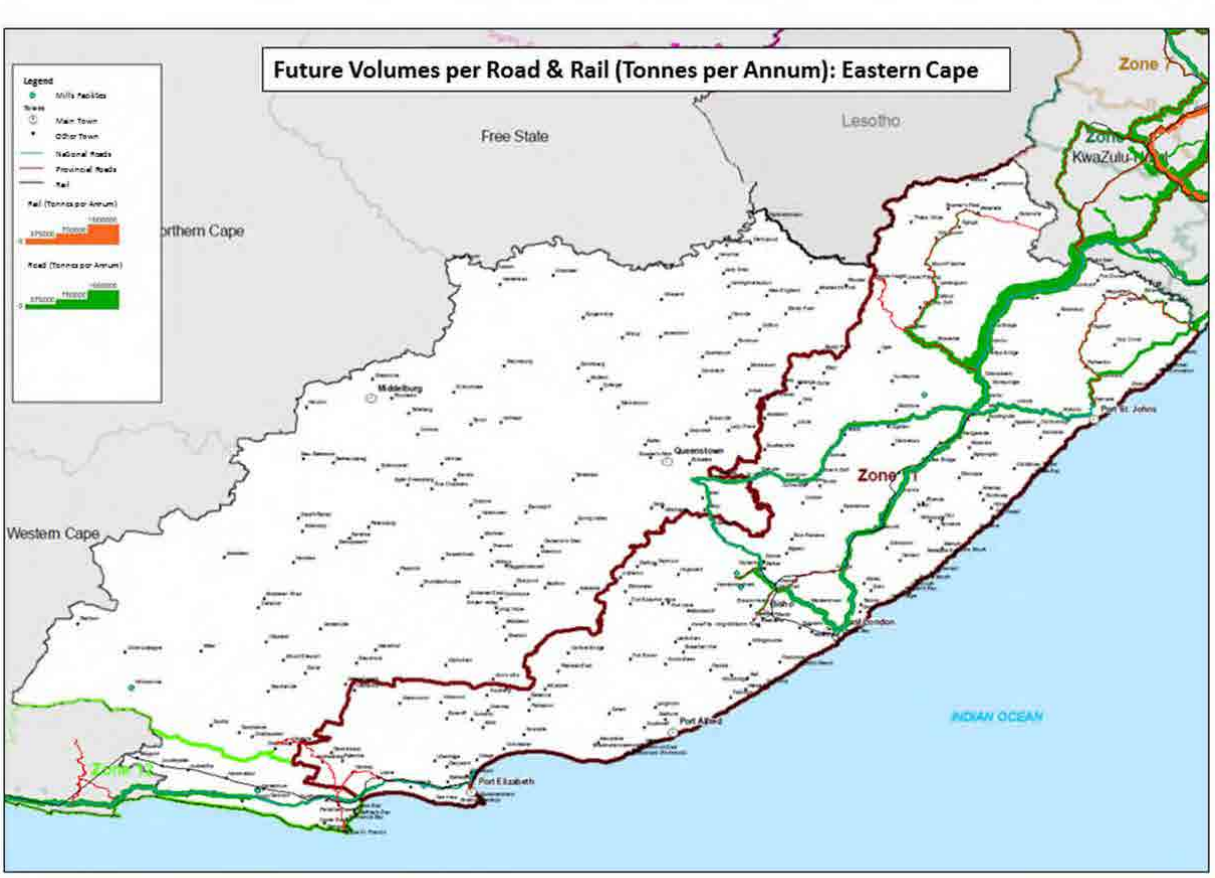


Figure 4-6: Future Forestry Volumes per Road and Rail (Trend Scenario): KwaZulu Natal

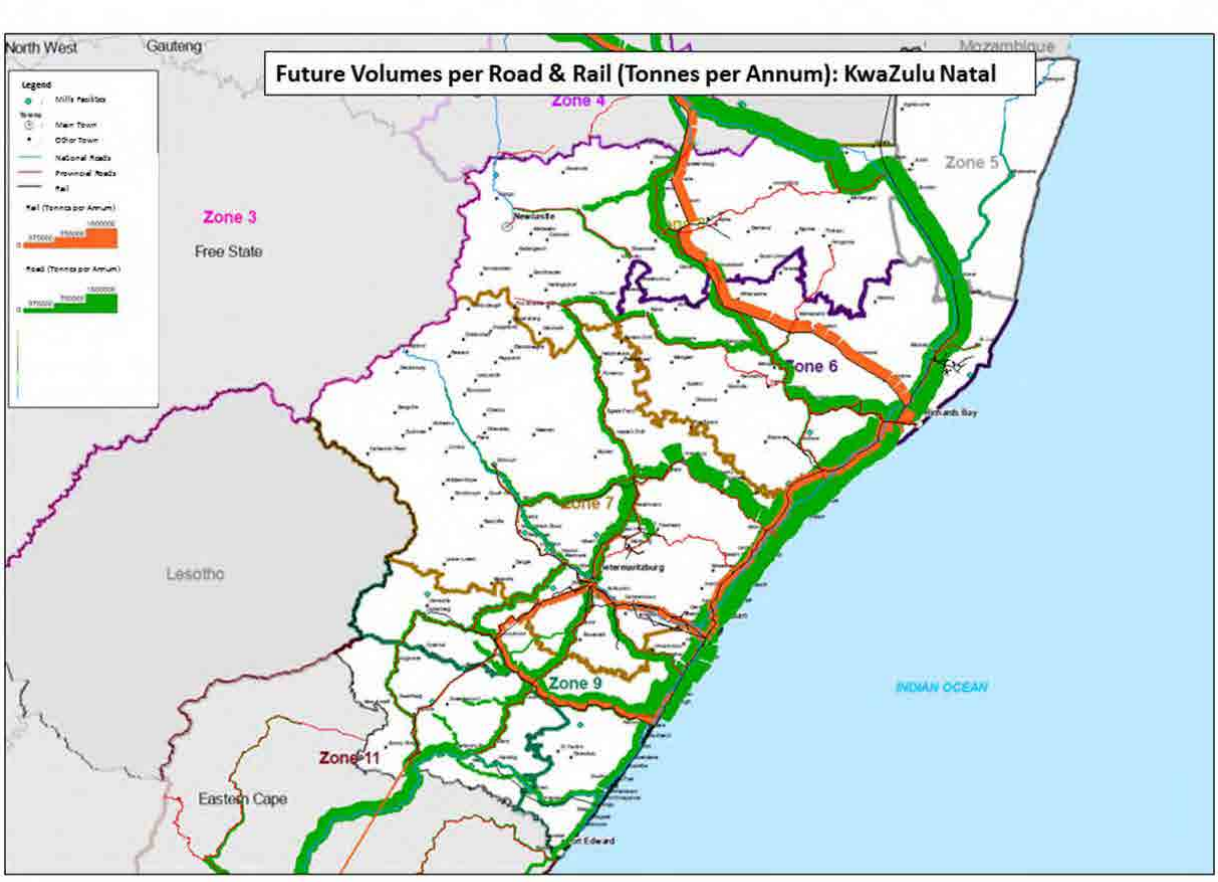


Figure 4-7: Future Forestry Volumes per Road and Rail (Trend Scenario): Limpopo

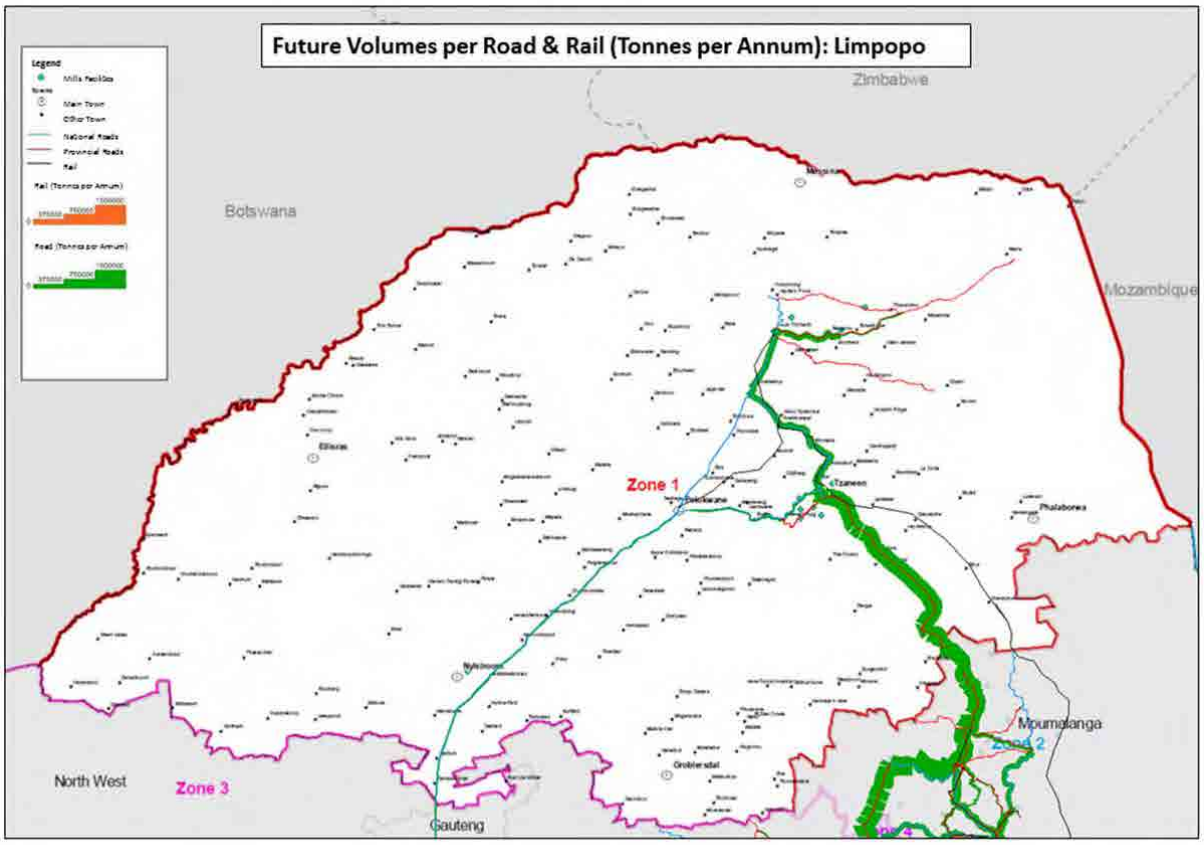


Figure 4-8: Future Forestry Volumes per Road and Rail (Trend Scenario): Mpumalanga

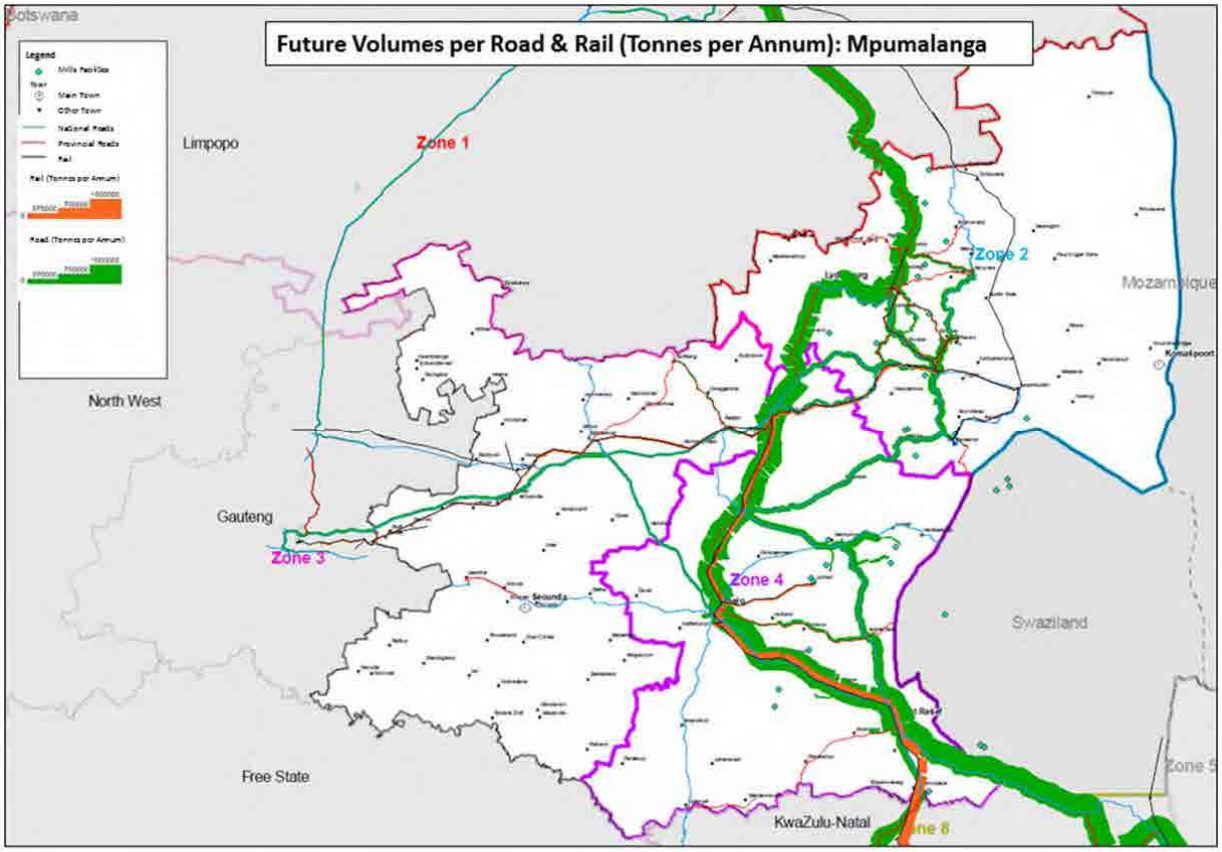


Figure 4-9: Future Forestry Volumes per Road and Rail (Trend Scenario): Western Cape

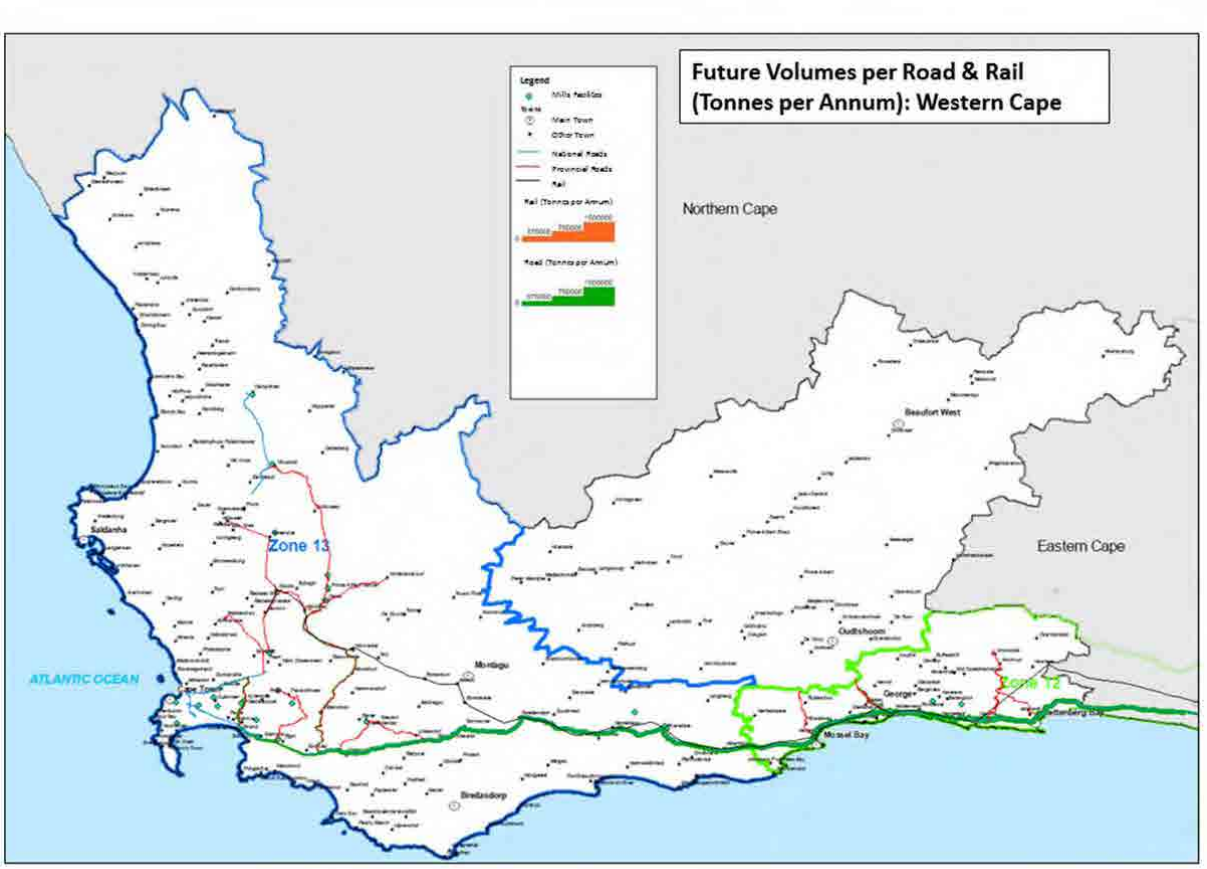
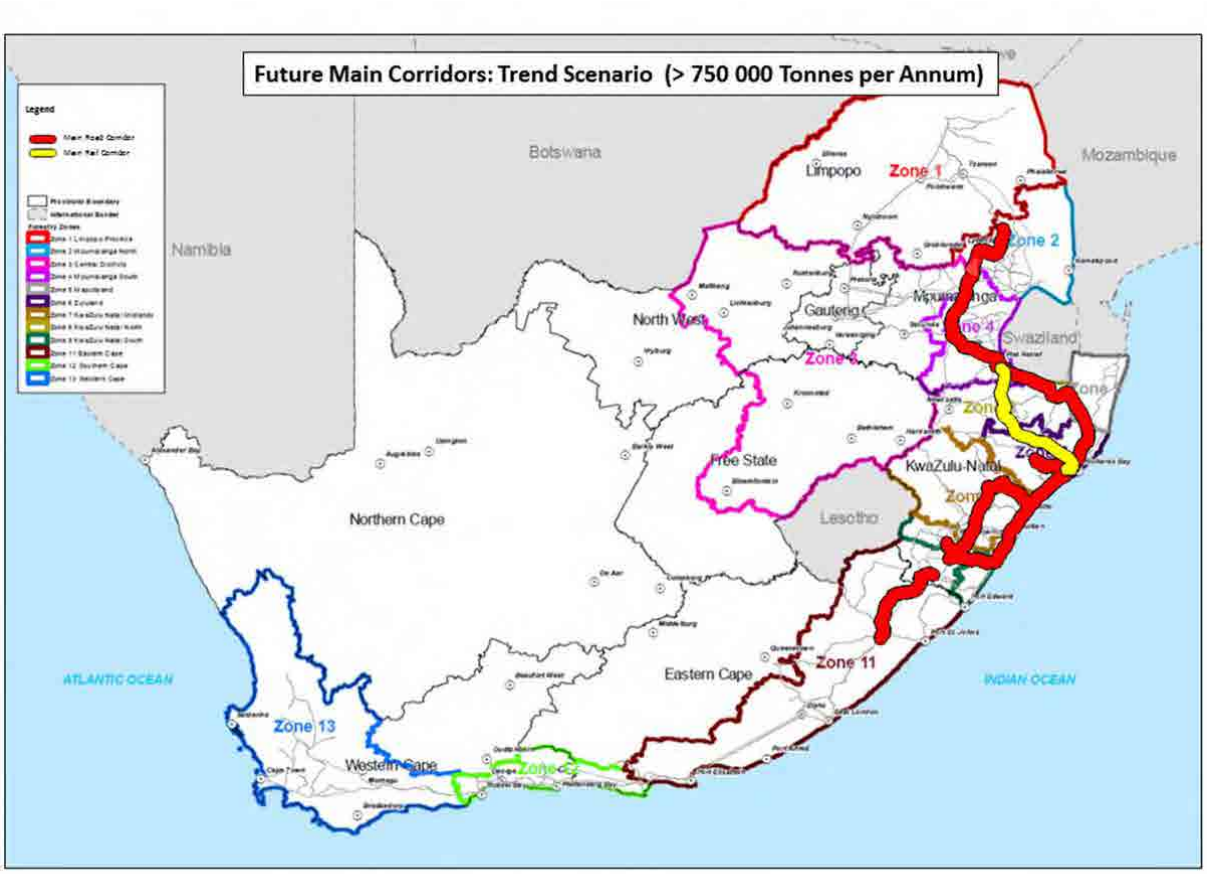


Figure 4-10: Future Main Forestry Corridors (Trend Scenario): South Africa



- The main rail movement will be on the line between Piet Retief (southern Mpumalanga) and Richards Bay in KwaZulu Natal, similar to the current situation; and
- The main forestry transport corridors are road-based, and run from the northern parts of Mpumalanga, through Ermelo to Richards Bay and the Durban-Pietermaritzburg area, and across the provincial border into the northern parts of Eastern Cape. A small section of rail, between Piet Retief and Richards Bay, is also classified as a forestry transport corridor.

4.4.3.2 Future Situation: Rail Scenario

The forestry traffic volumes and patterns for the future rail scenario, as obtained from the model, are shown graphically in **Figure 4-11** to **Figure 4-16** on the following pages. In the future rail scenario it is assumed that the rail conditions are conducive for a modal shift from road to rail. Once again, the reader should note that this traffic represents forestry products only (i.e. not total traffic).

Rail Scenario?

"Rail conditions are conducive for modal shift from road to rail..."

73% of Forestry Products on rail…

The main forestry transport corridors for the future rail scenario is then identified and indicated graphically in **Figure 4-17**. For purpose of this project, a main corridor was defined as a road or rail road that carries more than 750 000 tonnes per annum.

From the figures below, the following observations can be made on the future transport patterns of forestry products, should the modal split change in favour of rail (as per **Table 4-6**):

- Forestry traffic is expected to still be concentrated within the KwaZulu Natal and Mpumalanga provinces. The Eastern Cape however (specifically the north eastern region) is expected to see a substantial increase in forestry traffic;
- The main rail corridor will be from the Highlands Local Municipality in Mpumalanga right through to Richards Bay and Durban in KwaZulu Natal;
- The main road based corridors will be the following:
  - The N2 in Kwazulu-Natal and Mpumalanga;
  - The N2 in the Eastern Cape; and,
  - The R36 in Mpumalanga.
- The main forestry transport corridors are similar to that of the trend scenario, with the difference that most of them are now represented by the rail mode.

The future model assumes that the N2 Wild Coast road project will be implemented by SANRAL. As can be seen from **Figure 4-12**, some traffic is expected to divert to this road. However, it is expected that the "old" N2 road will still carry most of the forestry traffic.

Figure 4-11: Future Forestry Volumes per Road and Rail (Rail Scenario): South Africa

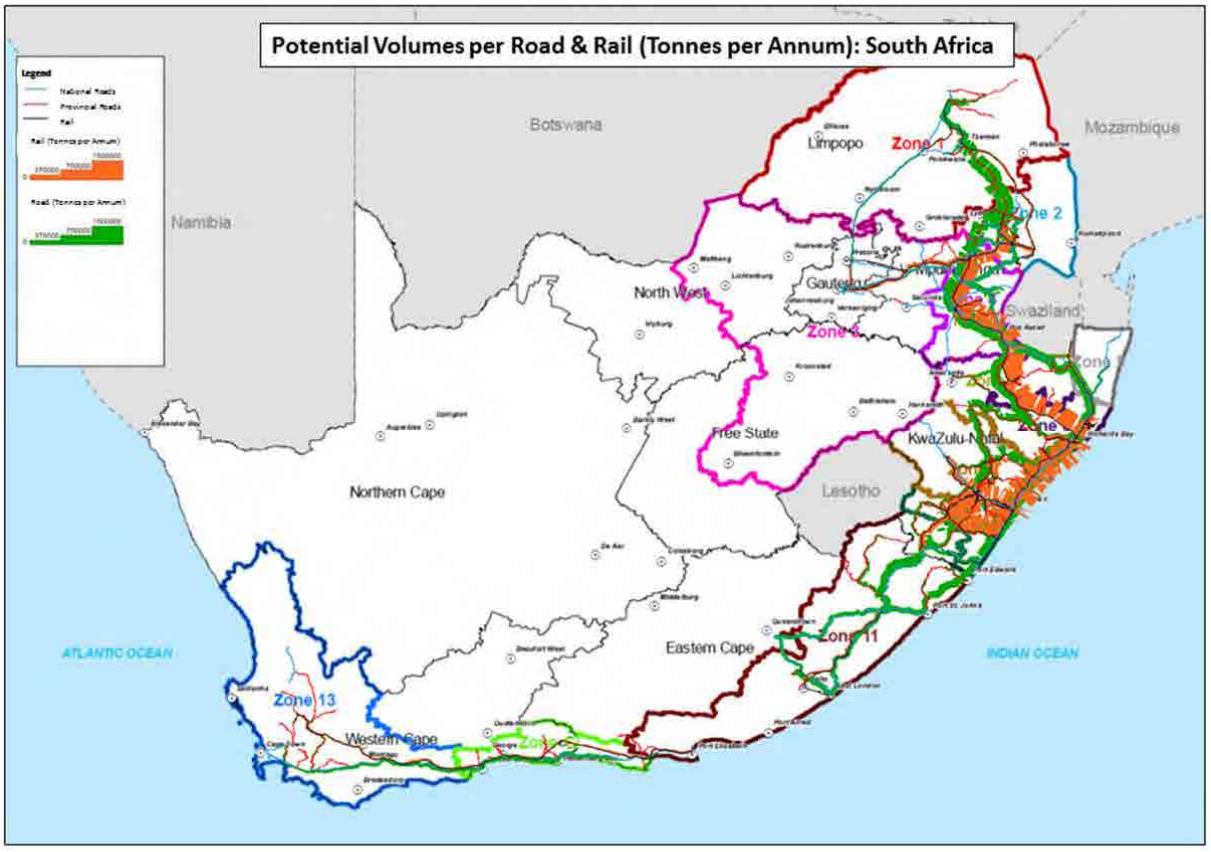


Figure 4-12: Future Forestry Volumes per Road and Rail (Rail Scenario): Eastern Cape

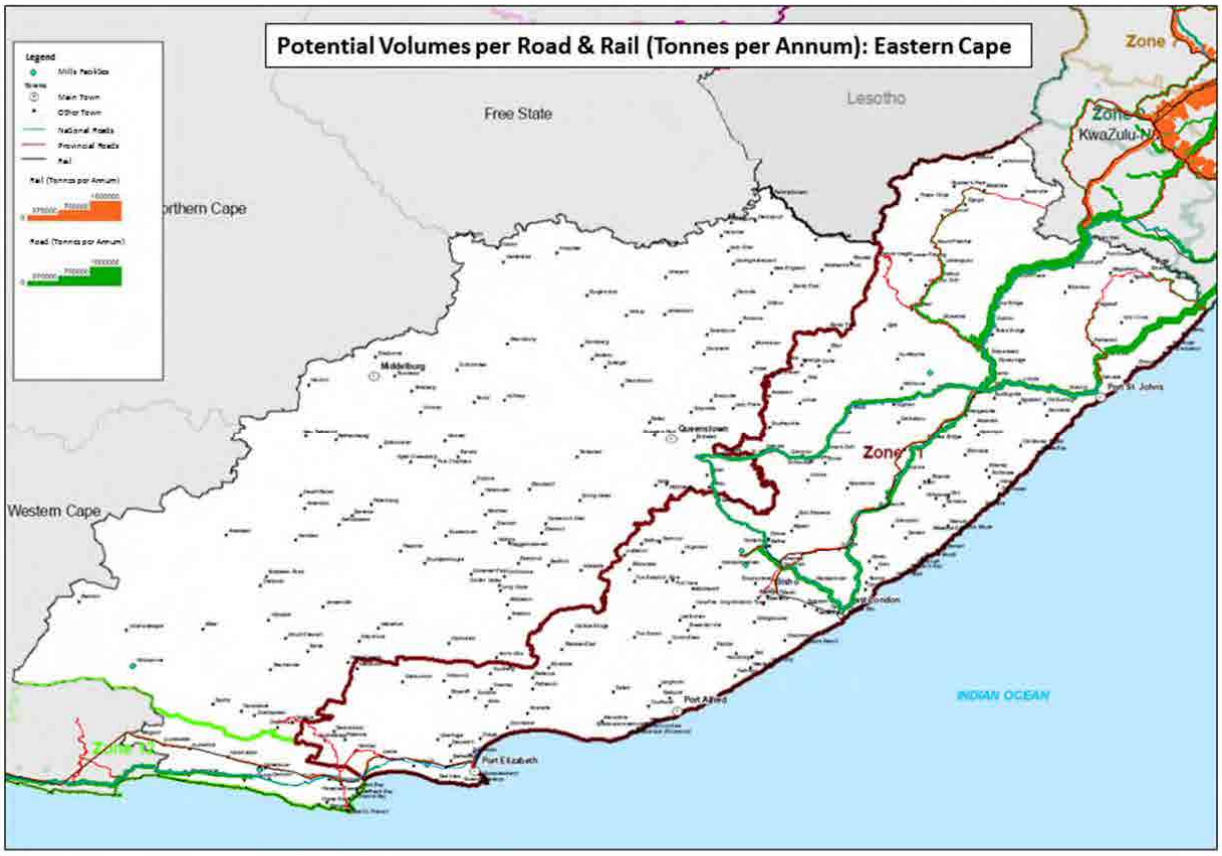


Figure 4-13: Future Forestry Volumes per Road and Rail (Rail Scenario): KwaZulu Natal

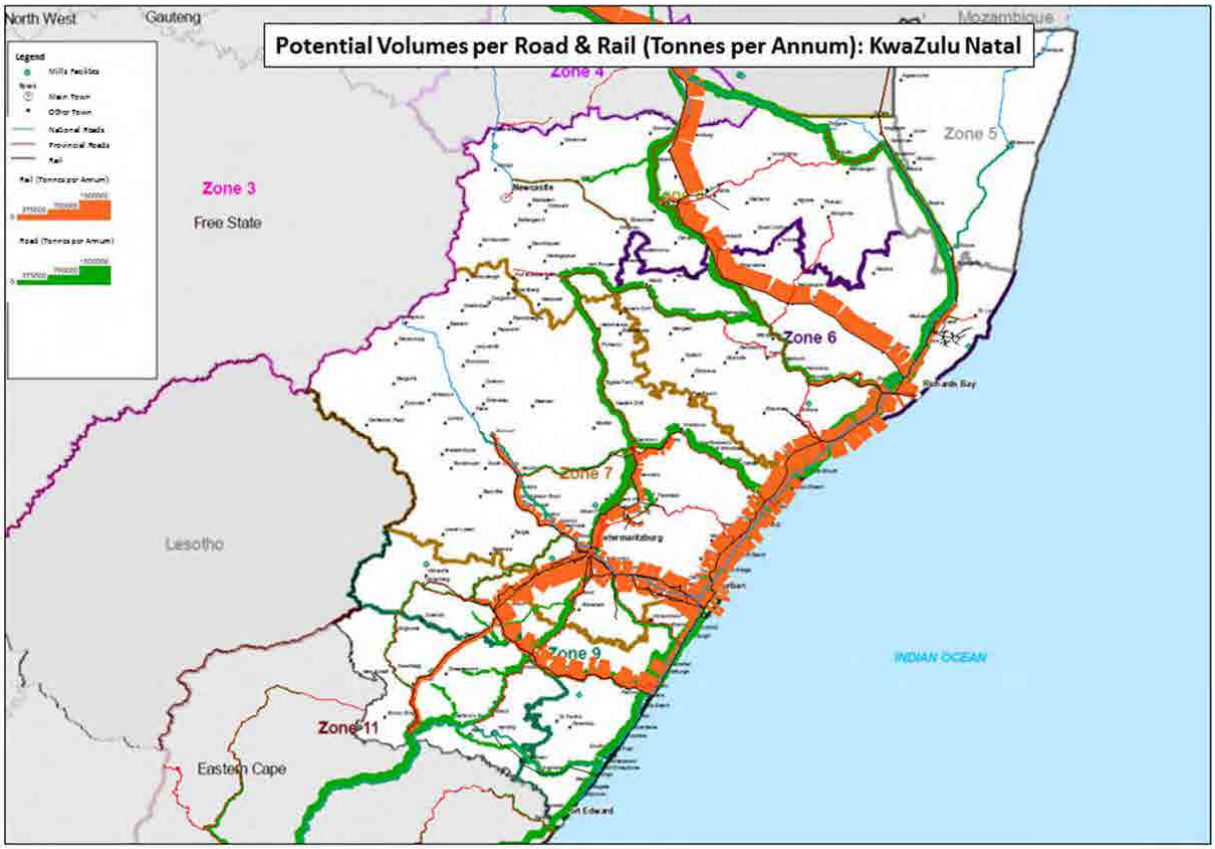


Figure 4-14: Future Forestry Volumes per Road and Rail (Rail Scenario): Limpopo

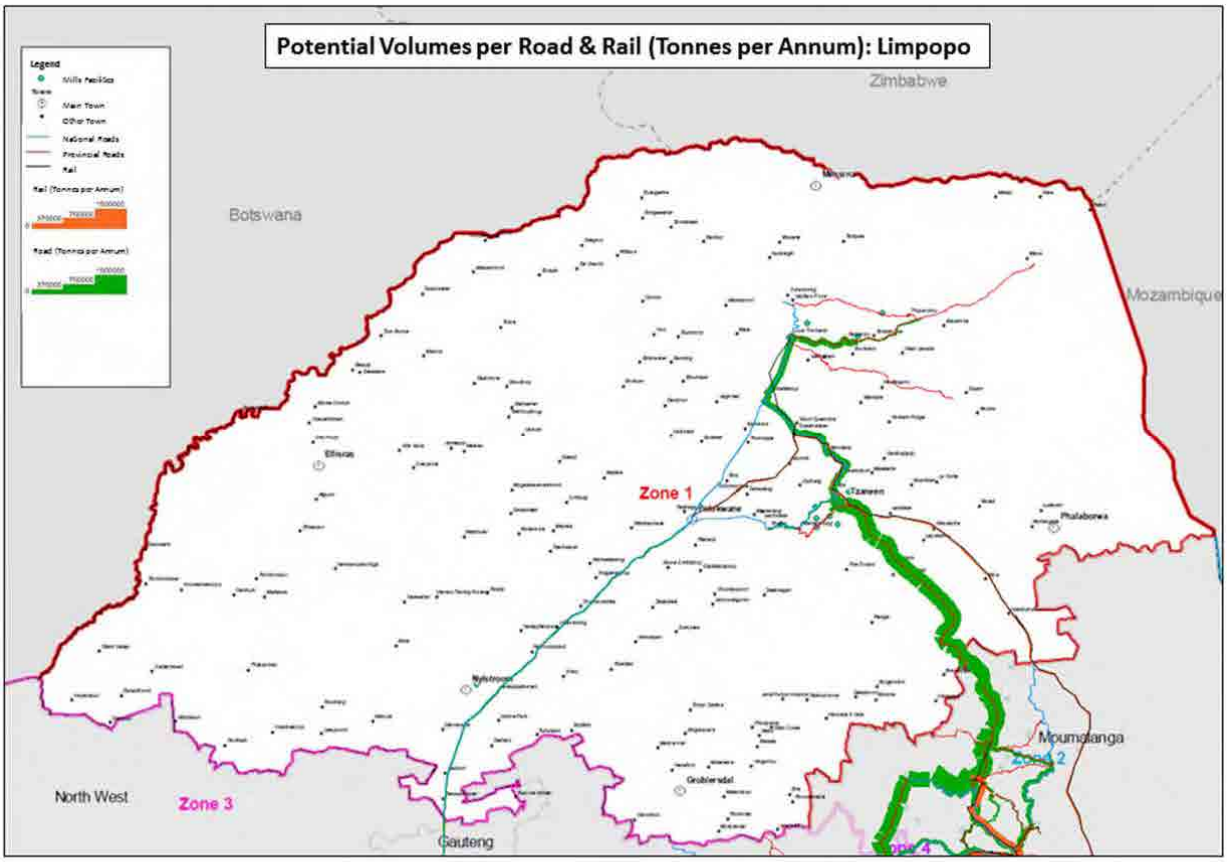


Figure 4-15: Future Forestry Volumes per Road and Rail (Rail Scenario): Mpumalanga

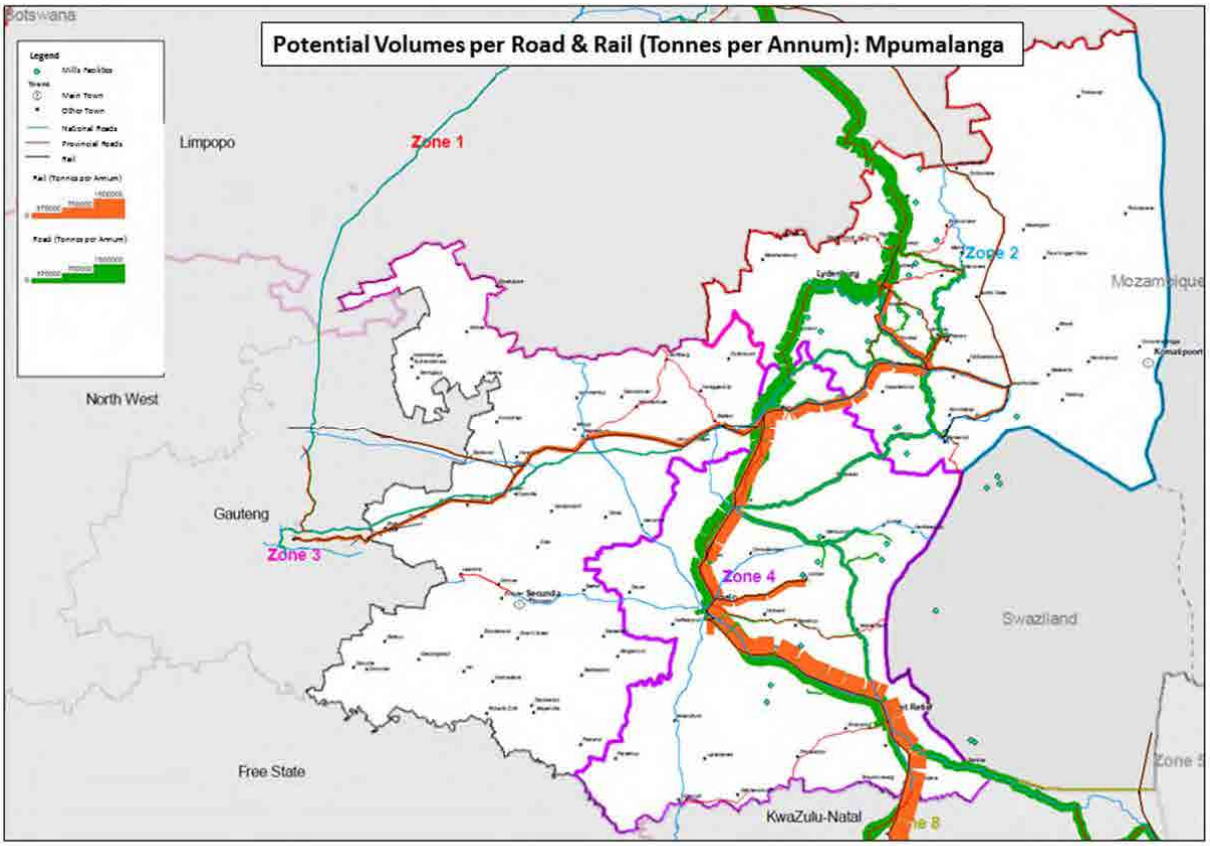


Figure 4-16: Future Forestry Volumes per Road and Rail (Rail Scenario): Western Cape

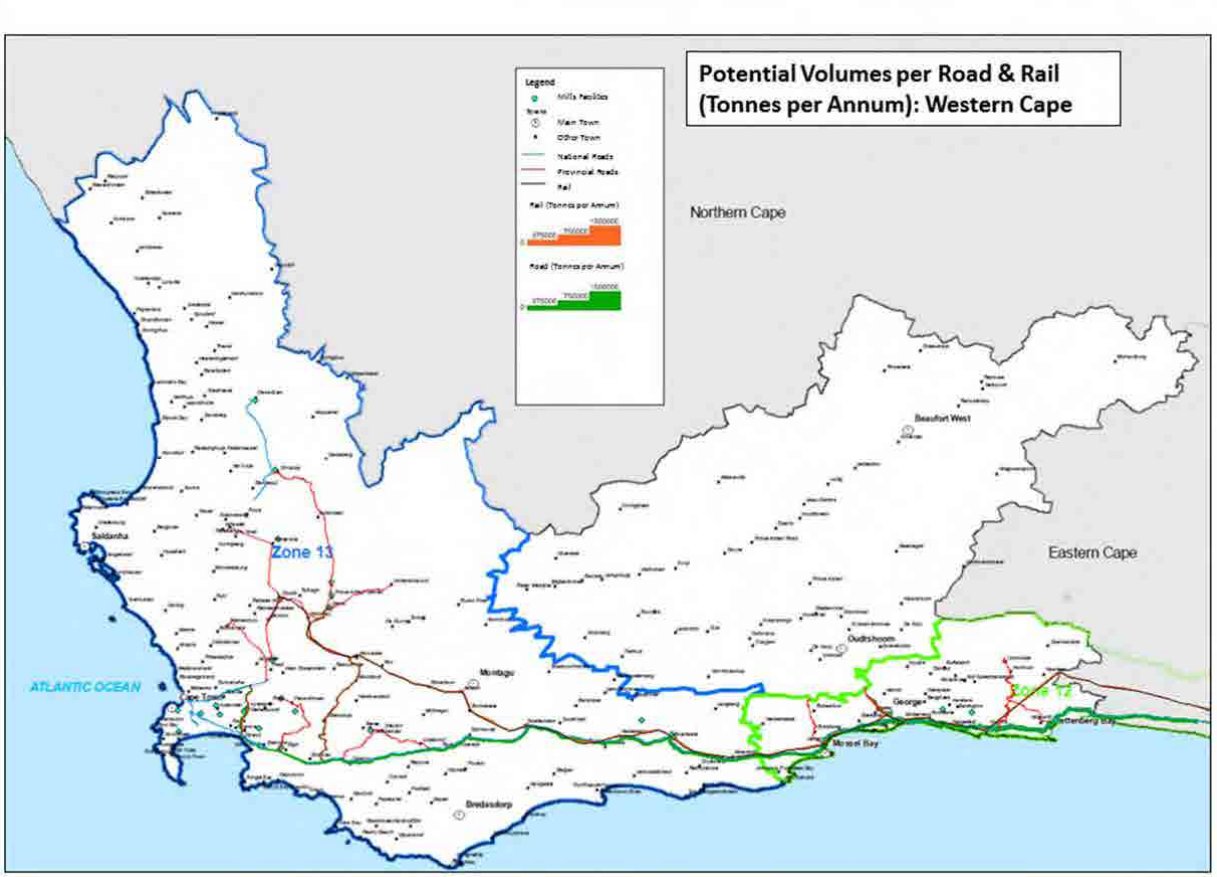
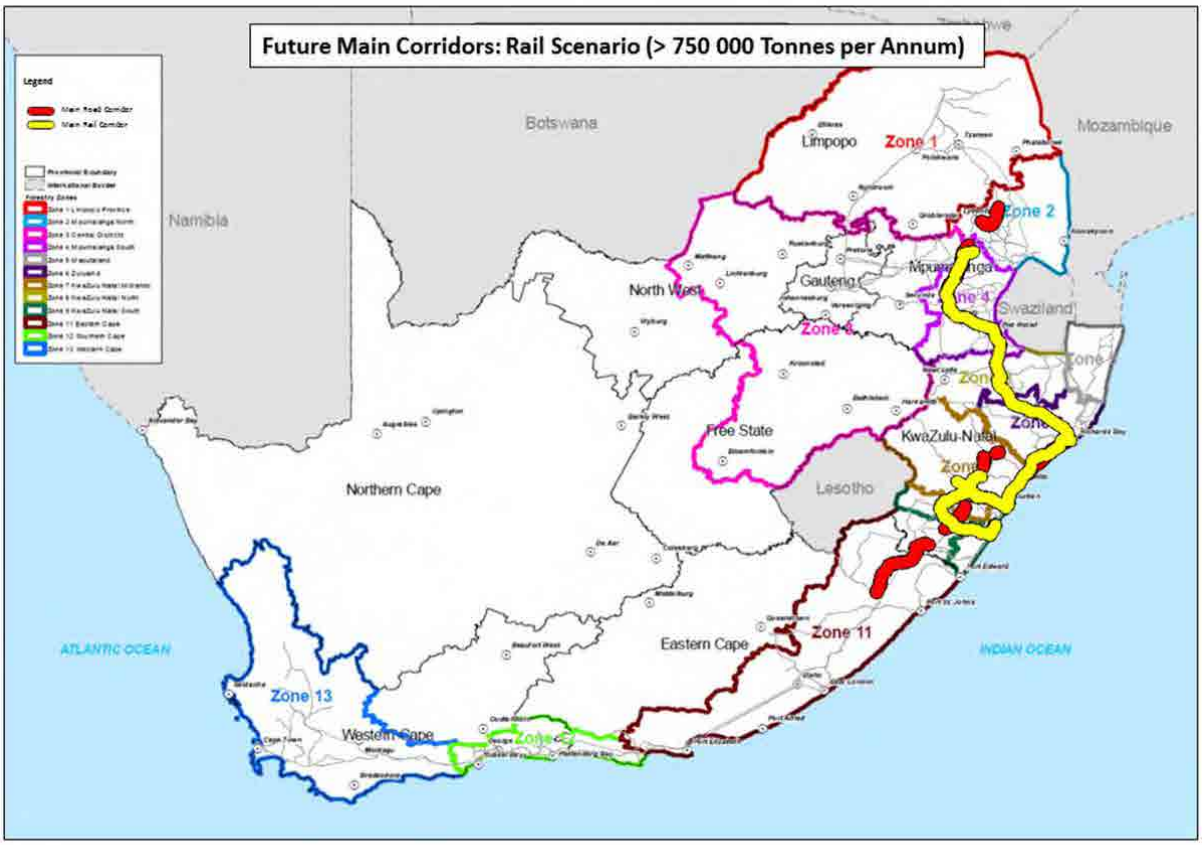


Figure 4-17: Future Main Forestry Corridors (Rail Scenario): South Africa



4.4.4 Capacity and Supply Constraints

4.4.4.1 Road Infrastructure

The categorisation of road capacity and bottlenecks on the network serving the forestry sector are presented in this section for the following two futuristic states:

- A 2020 future year assumes that 50% of the afforestation potential will be using the road and rail network. Within the 2020 future year analysis the road bottlenecks were determined for both the trend and rail scenarios. Furthermore the assessment also allowed the project team to determine the impact of shifting forestry products from road to rail on road investment.
- Another future year scenario assumes that all afforestation potential will be realised by 2030. The approach to determination of road bottlenecks is similar to that undertaken for the 2020 future analysis.

It should be noted that the forestry road network used during the FONA analysis for future year assessment is the same for all provinces except the Eastern Cape, where approximately 500km of road network was added to the forestry transport network. The extent of the FONA network for the future year analysis is shown in the table below:

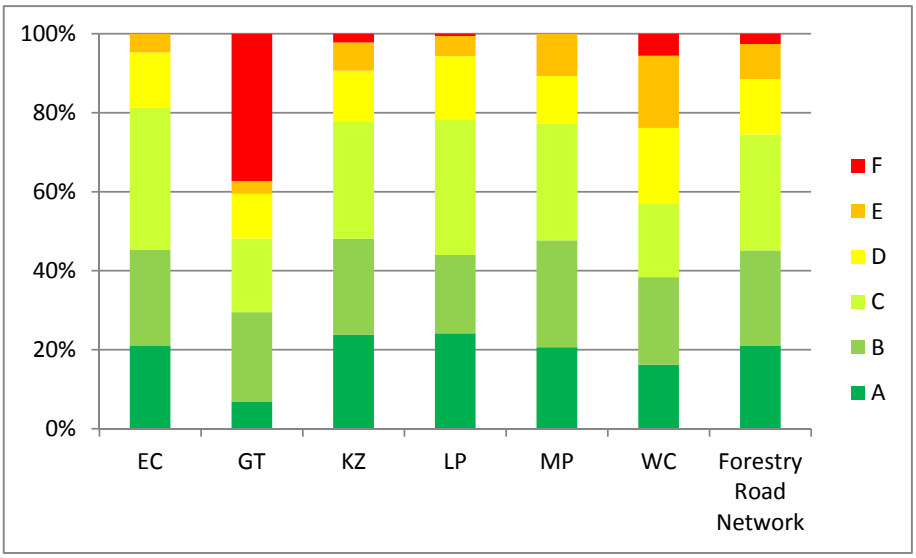
Table 4-7: Forestry Road Network FONA Summary

Province	Metropolitan	National	R2 (i.e. R21)	R3 (i.e. R574)	Total (km)
Eastern Cape	12	1, 525	1, 454	869	3, 860
Gauteng	-	491	99	-	590
KwaZulu Natal	-	1, 953	3, 025	1, 284	6, 262
Limpopo	-	686	585	670	1, 941
Mpumalanga	-	2, 257	1, 939	938	5, 134
Western Cape	34	1, 416	691	899	3, 040
Grand Total	43	7, 852	7, 793	4, 660	20, 827

4.4.4.2 Future Year 2020 Road Capacity Assessment

The ability of the forestry road network to carry the background traffic as well as 50% of the anticipated afforestation potential traffic is illustrated below through the presentation of percentage of road length operating at each LOS (refer to **Figure 4-19** below).

Figure 4-18: Percentage of Forestry Road Network Operating at LOS D per Province for Trend Scenario in Future Year 2020



When compared to base year 2015 LOS results, the following are observed:

- There is significant increase in kilometres length with LOSD and beyond in the Eastern Cape, with slight increase in KwaZulu Natal, Western Cape and Mpumalanga.
- Decrease in kilometre length with LOS D and beyond is observed for Limpopo and Gauteng provinces.

Figure 4-19, which is also supported spatially by **Map 20**, indicates the following with respect to the extent of kilometre upgrading required when 50% of the afforestation potential is realised:

- In the Eastern Cape: a total of 170km require an additional lane upgrade;
- In Gauteng: 18km requires an additional lane upgrade;
- In Mpumalanga: a total of 550km require an additional lane upgrade;
- In KwaZulu Natal: a total of 445km require upgrade to one lane;
- In Limpopo: 99km of the forestry road network need an additional lane; and
- In the Western Cape: a total of 555km require upgrade to one lane;

When comparing the 2020 Trend Scenario with the 2020 Rail Scenario the following observations are made:

- In the Eastern Cape: a total of 133km, instead of 170km, require upgrade to one lane;
- In Gauteng: 63km, instead of 18km of the forestry road network, need an additional lane;
- In Mpumalanga: a total of 550km require upgrading to one lane – depicting no change in length of road network needing upgrading;
- In KwaZulu Natal: a total of 316km, instead of 445km, require upgrade to one lane;
- In Limpopo: 110km of upgrade, instead of 99km, is required; and
- In the Western Cape: a total of 615km, instead of 555km, require upgrade to one lane.

The above observation brings about the following conclusions:

- The only provinces benefiting from a modal shift of forestry products from road to rail are the Eastern Cape and KwaZulu Natal provinces.
- The shift in mode does not make any significant impact to reduction in road investment in Mpumalanga. It is increasing the length of road network needing upgrading in Gauteng and Western Cape.

4.4.4.3 Future Year 2030 Road Capacity Assessment

Figure 4-20 shows the percentage of forestry road network operating at level of service beyond LOS D for trend scenario in 2030.

When compared to 2020 Trend Scenario LOS results, there is an increase in kilometres length with LOS D in all provinces, with significance increase in Limpopo Province. **Table 4-8** summarises the impact of modal shift on extent of road infrastructure investment.

The following conclusions are drawn from the table above:

- The shift in mode results in a slight reduction in road kilometre that needs to be upgraded;
- The shift from road to rail has some impact in the forestry road network located in Eastern Cape; KwaZulu Natal; and, Mpumalanga; and
- The anticipated modal shift of 73% to rail and 27% on road has little impact on the extent of investment on road infrastructure.

Forestry Transport Network - 2020 - Rail Scenario 50% of traffic

Legend

- Mills Facilities
- Provincial Boundary

Towns
- Main
- 1
- 2
- 3

Railway

Roads
- National
- Main
- Secondary

Forestry Zones
- Zone 1 Limpopo Province
- Zone 2 Mpumalanga North
- Zone 3 Central Districts
- Zone 4 Mpumalanga South
- Zone 5 Maputaland
- Zone 6 Zululand
- Zone 7 KwaZulu Natal Midlands
- Zone 8 KwaZulu Natal North
- Zone 9 KwaZulu Natal South
- Zone 11 Eastern Cape
- Zone 12 Southern Cape
- Zone 13 Western Cape

Forestry Areas
- Private Owned Plantation
- DAFF Owned Commercial Plantation
- International Border

Zimbabwe
Botswana
Mozambique
Swaziland
Lesotho
ATLANTIC OCEAN
INDIAN OCEAN

Limpopo
North West
Gauteng
Mpumalanga
Free State
KwaZulu-Natal
Northern Cape
Western Cape

Zone 1
Zone 2
Zone 3
Zone 4
Zone 5
Zone 6
Zone 7
Zone 8
Zone 9
Zone 11
Zone 12
Zone 13

Messina
Ellisras
Tzaneen
Phalaborwa
Polokwane
Nylstroom
Lydenburg
Groblersdal
Komatipoort
Rustenburg
Pretoria
Mafikeng
Lichtenburg
Secunda
Johannesburg
Vereeniging
Ermelo
Riet Retief
Vryburg
Kroonstad
Newcastle
Bethlehem
Harrismith
Richards Bay
Alexander Bay
Upington
Augrabies
Barkly West
Bloemfontein
Ballito
Durban
Pietermaritzburg
Port Edward
De Aar
Colesberg
Middelburg
Port St. Johns
Queenstown
Beaufort West
Bisho
East London
Saldanha
Cape Town
Oudtshoorn
George
Montagu
Mossel Bay
Plettenberg Bay
Port Alfred
Port Elizabeth
Bredasdorp

Ref:\\G:\PROJECTS\107518\Projects\17 Forestry Transport Network_Rail_2020_50_A3.mxd

Figure 4-19: Percentage of Forestry Road Network Operating at LOS D per Province for Trend Scenario in Future Year 2030

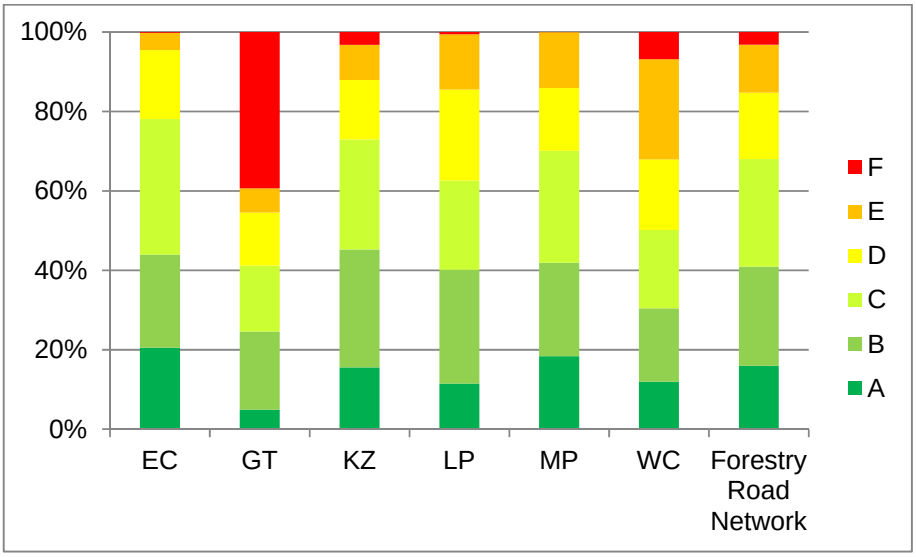


Table 4-8: Comparison of Required Road Upgrades for 2030

Province	Trend vs. Rail Scenario							
	Trend Scenario				Rail Scenario			
	1-lane	2-lane	3-lane	Total	1-lane	2-lane	3-lane	Total
Eastern Cape	175	-	-	175	172	-	-	172
Gauteng	44	79	146	272	44	79	146	272
KwaZulu Natal	613	84	58	755	604	84	58	746
Limpopo	280	-	-	280	280	-	-	280
Mpumalanga	723	-	-	723	719	-	-	719
Western Cape	850	32	92	974	850	32	92	974
Grand Total	2, 685	195	296	3, 176	2, 669	195	296	3, 163

4.4.4.4 Rail Infrastructure

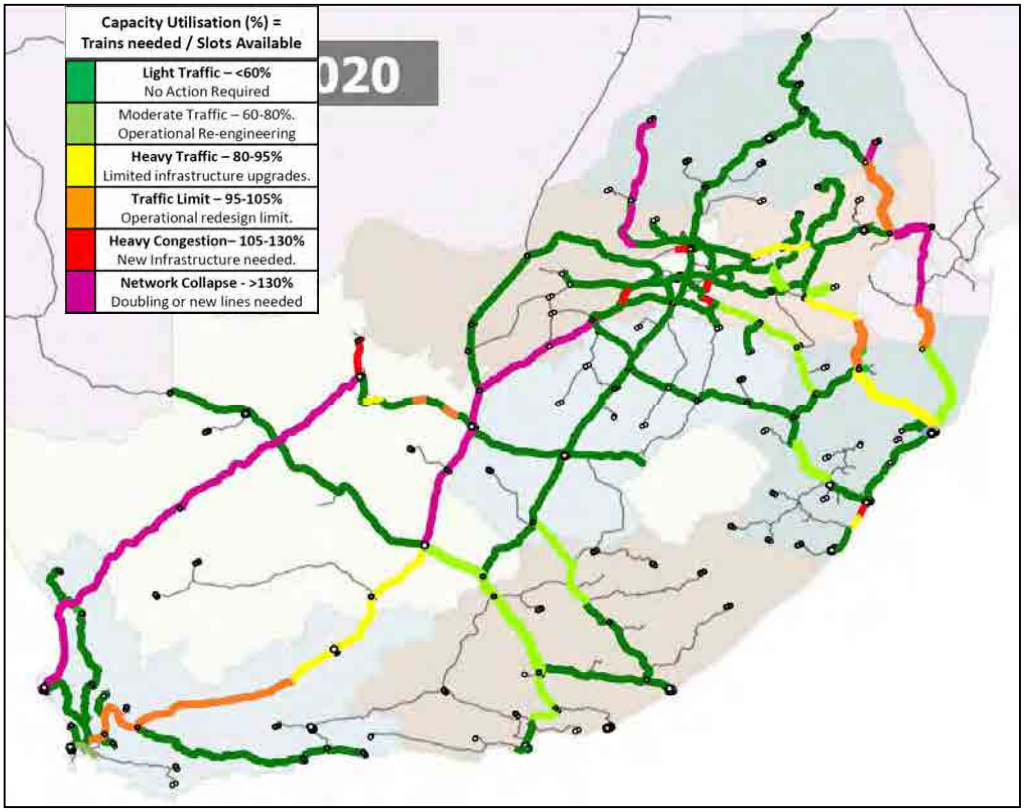
Figure 4-20 and **Figure 4-21** shows the expected capacity utilisation on the core rail network for 2020 and 2030 respectively, as from Transnet's Transport Infrastructure Plan (Transnet 2011, slide 43).

The following observations can be made with regards to rail capacity on the forestry transport rail network by the year 2020:

- In general, most of the forestry transport rail network is still expected to operate at capacity utilisation levels of less than 100 percent. However, certain lines will experience increased pressure on its available capacity, which may lead to reduced service levels and/or the inability to take on additional traffic.

- The following areas of bottlenecks are expected by 2020:
  - Durban to Pennington. Capacity utilisation is expected to fall within the categories of 95% to 130 percent. New infrastructure may therefore be required;
  - Richards Bay to Ermelo. Capacity utilisation is expected to fall within the categories of 80% to 105 percent. Infrastructure upgrades will be required;
  - Kaapmuiden to Phalaborwa. Capacity utilisation is expected to fall within the category of 95% to 105 percent. Infrastructure upgrades will be required;
  - Belfast to eMalahleni (Witbank). Capacity utilisation is expected to fall within the category of 80% to 95 percent. Limited infrastructure upgrades will be required;
  - Worcester to Cape Town. Capacity utilisation is expected to fall within the category of 95% to 105 percent. Infrastructure upgrades will be required.

Figure 4-20: Expected Capacity Utilisation for Rail (2020) (assuming no investments made)



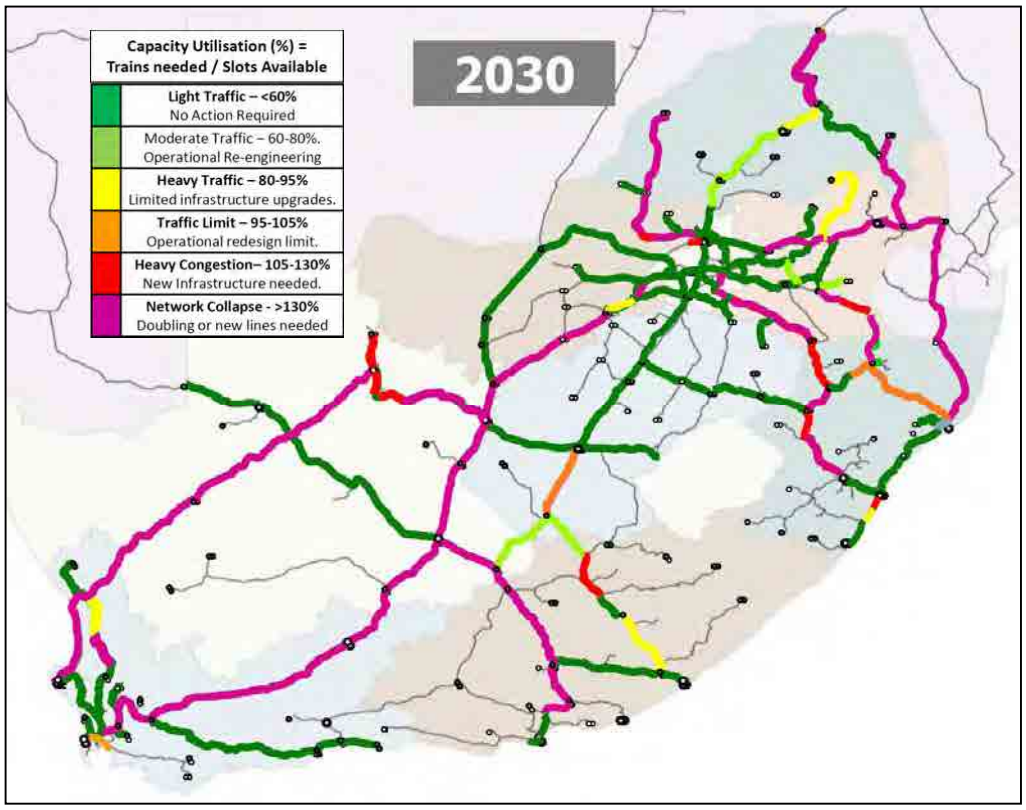
Source: Transnet, Transport Infrastructure Plan. 2011.

For the year 2030, the following observations can be made:

- Large portions of the forestry transport infrastructure network are expected to become under severe pressure in terms of capacity, especially along the major corridors.
- The following areas of bottlenecks are expected by 2030:
  - Durban to Pennington. Capacity utilisation is expected to fall within the categories of 95% to 130 percent. New infrastructure may therefore be required;
  - Richards Bay to Ermelo. Capacity utilisation is expected to fall within the categories of 95% to 130% and greater. New infrastructure will be required, and doubling of the line or new lines should be considered;
  - Kaapmuiden to Phalaborwa. Capacity utilisation is expected to be greater than 130 percent. Doubling of the line or a new line will be required;

- Mbombela to eMalahleni (Witbank). Capacity utilisation is expected to be greater than 130 percent. Doubling of the line or a new line will be required;
- Worcester to Cape Town. Capacity utilisation is expected to be greater than 130 percent. Doubling of the line or a new line will be required;
- Pietermaritzburg to Estcourt. Capacity utilisation is expected to be greater than 130 percent. Doubling of the line or a new line will be required.

Figure 4-21: Expected Capacity Utilisation for Rail (2030) (assuming no investments made)



Source: Transnet, Transport Infrastructure Plan. 2011

5. Specific Issues in relation to Forestry Transport Planning and their Implications for Future Transport Infrastructure Needs

5.1 Policy Guidelines on Shift of Freight from Road to Rail Mode

5.1.1 Introduction

Competition between road and rail transport has become a major issue during the past 50 years. Factors such as the deregulation of freight transport, development of modern road vehicles and operational problems experienced within the rail sector, has brought the rail mode into disfavour with many transport users. This has led to a gradual increasing shift from rail to road transport.

During recent years, there has been a concerted effort from the government to promote a shift in freight transport from road back to rail, as can be seen in *inter alia* the National Transport Master Plan (NATMAP) 2050 issued by the Department of Transport (DOT) and the drive by Transnet to outsource the management and operation of branch lines as concession contracts (see section 5.1.7 and 5.1.8 below).

This section will investigate the way in which transport policies (historic, current and planned) in South Africa influence the selection of an appropriate mode for transport of freight products, and will assess the impact of current and future policies on transport planning in the forestry sector.

5.1.2 Deregulation of Freight Transport

The National Transport Policy Study (NTPS) during the 1980s examined the liberalisation and deregulation of the transport sector. As a result of the NTPS, the decision was made to abandon the road permit system with effect from 1989. The freight transport system was deregulated, allowing road transport to compete openly with rail.

When the decision to deregulate was made, it was stipulated that a Road Transport Quality System (RTQS) would be implemented, imposing strict standards with regard to vehicle roadworthiness, training of drivers, control of overloading, and in general greater traffic policing. However, deregulation proceeded without the implementation of the RTQS, which contributed to inequitable intermodal competition and a significant shift in freight transport from road to rail.

Another important aspect of the deregulation policy that has not been implemented, and has led to a decline in rail freight transport, is the recovery of full user charges for road transport. Jones (2002) refers to “the emergence of a road freight industry based on prices that are emphatically wrong, in so far as heavy freight vehicles systematically underpay for the use of the road infrastructure”. The result is that the market fails to give the right price signals, particularly with regard to externalities.

South Africa today has underutilised rail infrastructure, much of the network having been allowed to fall into disuse, while road infrastructure is deteriorating rapidly. Most of the road network was constructed before the end of the 1970s, and certainly before new articulated combinations were introduced onto South African roads. The road network in general, with the exception of toll highways, was not constructed to handle these heavy-vehicle combinations, but heavy vehicles are not restricted to any designated routes. With

overloading being a concern in many provinces, severe damage is inflicted to the road surfaces leading to higher costs in fuel and vehicle maintenance.

5.1.3 White Paper on National Transport Policy

The White Paper on National Transport Policy (Department of Transport, 1996) states the following with regards to the selection of modes (own underlining):

> *"While there are preferred roles for the various transport modes, often in a hierarchical framework, and there are benefits to be gained by the use of the most appropriate mode, or of multiple modes with effective interchanges between them, it is not the intention of government to dictate such mode choices. In promoting intermodalism the Government intends to level playing fields and eliminate constraints or disincentives resulting in inefficiencies, including the use of inappropriate modes. A key driver of reducing costs of transport is capacity utilisation. As such, a goal of infrastructure and modal planning will be to optimise capacity utilisation and to achieve a level of integration between modes. Government will not however force the use of particular modes simply to utilise existing spare capacity, and customer service criteria (cost, timeliness, reliability, security etc.) will be the determining factor in mode choice. In principle, intermodalism will be fostered by incentives, and not regulation."*

The White Paper on National Transport Policy further includes the following policy principles that guides freight transport in South Africa:

- *"The existing policy of economic deregulation of land freight transport within South Africa is reaffirmed, subject to strict and effective regulation in respect of traffic quality and safety matters. Operator fitness will be controlled through the implementation of the Road Transport Quality System (RTQS), which will include operator licenses."*
- *"The key issue regarding level playing fields between the transport modes is equity in the recovery of infrastructure provision, management, operation, and maintenance costs. An equitable distribution of infrastructure cost recovery (capital, management, operating and maintenance) will make a positive contribution to reducing artificial modal shifts and distorted tariff structures created by cross-subsidisation."*
- *"Government will strive to level the playing fields to enable fair competition between the various land transport modes. A monitoring system will be established, and specific and regular cost recovery studies will be undertaken to determine and equitably allocate costs for the provision, management, operation, and maintenance of all freight transport infrastructure (including road, rail, port, and airport)."*
- *"A simplified Road Transport Quality System (RTQS) will be enunciated and fully implemented as a matter of urgency. The emphasis of RTQS on operator fitness and operator liability is reaffirmed, and operator compliance with the RTQS will be stressed. Programmes to control speed, alcohol and drugs related offences, and the overloading of vehicles will receive special attention."*
- *"Rail is seen as an essential long-term component of the network for both freight and passenger transport. The provision and maintenance of rail infrastructure for bulk and general cargo freight transport, and for inter-city passenger transport, will be determined by market needs and commercial viability."*

In summary, the following can be concluded from the White Paper on National Transport Policy with regards to policy principles on freight movement by road versus that by rail:

- The government does not intend to dictate (or regulate) mode choices;

- Mode choice will be determined by customer service criteria (cost, timeliness, reliability etc.);
- The government however intends to level playing fields between modes. This includes actions to ensure equity in recovery of actual costs, and to ensure full implementation of RTQS.

5.1.4 National Freight Logistics Strategy

The National Freight Logistics Strategy (Department of Transport, 2005) does not comment on appropriate modes for the transport of specific freight commodities.

The strategy however includes the following general statements and principles which are of importance to this study:

- The strategy acknowledges the freight system's inability to fulfill the demand for cargo movement at prices, levels of service, quality of service, and acceptable levels of reliability. It attributes this failure to inappropriate institutional and regulatory structure that does not punish inefficiency and reward efficiency, and the incapability of appropriately allocating external costs;
- The strategy requires the government to ensure that incidental costs of externalities are correctly allocated;
- The strategy articulates the need to own infrastructure in three ways, i.e. state infrastructure utilities (with a strategic and economic development mandate), state-owned enterprises (commercialised public infrastructure owners with socio-economic obligations) and private sector owners (where the focus is more on profit making);
- The strategy advocates that infrastructure owners are separated from operators;
- The strategy further advocates for management of infrastructure to be done (mainly) by the state;
- The strategy proposes for economic regulators to ensure that mechanisms and processes are in place to reduce the external costs involved in freight transport systems.

5.1.5 Road Freight Strategy for South Africa

The DOT is currently in the process of drawing up a Road Freight Strategy for South Africa. While this strategy is still to be finalised however, initial indications (Department of Transport, 2011) are that the strategy will have the following goals, and will advocate the following principles with regards to modal split of freight products:

- The strategy aims to achieve the following strategic goals:
  - Promote an optimal split between road and rail;
  - Enable sustainable road infrastructure maintenance and funding;
  - Curb overloading through the improvement of law enforcement and use of technology;
  - Promote self-regulation;
  - Promote regional economic and social integration; and
  - Establish a system to collect freight data to support decision making and policy formulation.
- The road freight strategy addresses the key issues by providing solutions clustered into four strategic thrusts as follows:
  - Integrated transport;
  - Road infrastructure management and funding;
  - Overload control management system; and

  - Self-regulation and road safety.
- The strategy states that major transport modes (i.e. road, rail, air, maritime and pipelines), should function together to provide an efficient and cost-effective transport logistics system. The strategy further promotes the transfer of rail friendly cargo back to rail through facilitative interventions, taking into account the available capacity of rail for higher volume. Rail friendly commodities are listed as various bulk commodities, coal, cement, timber, rock, stone and other ore materials;
- The strategy recommends that the DOT focuses on improvement of the connecting infrastructure between rail and other modes, and improvement of infrastructure and services on the major freight corridors, in order to promote a more sustainable modal split.

In summary, the following can be concluded from the (Draft) Road Freight Strategy for South Africa with regards to policy principles on freight movement by road versus that by rail:

- The strategy will probably promote a general shift from road to rail, for transport of freight products;
- The strategy will advocate measures to level the playing field between road and rail modes, e.g. increased overload control and enforcement on roads, more equitable cost recovery on roads, and improving operational efficiency on the rail network; and
- The strategy will advocate intermodal solutions by improving connecting infrastructure between rail and other modes.

5.1.6 Draft Green Paper on Rail Transport

A Draft Green Paper on Rail Transport is currently being developed for South Africa. It is not clear whether this document will promote policy principles or regulations to shift freight transport back to rail. However, the policy will focus on increasing efficiency within the rail sector and improving its general competitiveness. The Green Paper will (Sabinet, 2012) provide an overarching governance framework for the rail sector and will, amongst other things:

- Examine arguments for and against separating the ownership of operations from infrastructure, particularly in the case of Transnet Freight Rail;
- Pave the way for establishing a rail economic regulator;
- Include branch line revitalisation;
- Address the issue of combining Metrorail services with city-led integrated public transport networks; and
- Explore the feasibility of high-speed lines.

5.1.7 National Transport Master Plan (NATMAP) 2050

The National Transport Master Plan (NATMAP) 2050 was developed by the DOT as a master plan to guide future infrastructure development, as well as operational, institutional and legal reform in South Africa. NATMAP proposed certain benchmarks for freight modes in South Africa, including the following:

- “Recognized policy views & principles to determine benchmarks for appropriate freight modes;
  - Freedom of choice amongst the available modes to the market or users of freight services is a non-negotiable principle within the free market environment;
  - Nevertheless, there are justifiable reasons for government to impose both technical and economic regulatory measures that could inhibit the complete

freedom of choice to freight users. These reasons include the protection of national assets such as the road network, protection of the safety of the general public, alleviating pressures on congested corridors, the longer term collective benefit and protection of the economy by promoting specific modes, and the risks and negative effects of modal monopolies;
  - The general characteristics of freight commodities (value, volume and weight, perishability), as well as consumer requirements (time, speed, reliability, packaging and general product condition etc.) are the most important indicators to determine appropriate modes;
- Road freight transportation will remain the most important mover of freight traffic for both long distance and short distance traffic given the extensive road network coverage of the country and will always be the default mode in the absence of other modes for any particular corridor;
  - Over time its current market dominance is expected to change as other modes – and in particular the rail mode – becomes more competitive in terms of technology and ability to compete;
  - Its predominant profile will be the very short to medium distance traffic and corridors where no rail systems are available, as well as traffic that require speed and preservation facilities;
  - Road freight transportation will become more and more the less preferred mode due to the increasing cost of accessing the road network, the cost of fuel, global shortages of crude oil, the greenhouse effect and other environmental reasons. Available alternative choices will remain the dominant factor;
- Rail freight transportation will systematically recover from historic market losses and regain the market share on commodities that would under normal circumstances prefer the rail mode;
  - Its predominant profile will be all lower value, high weight and volume commodities that pose damage to the road network, general commodities that can be marginal in mode preference to road and air transport, and transport along corridors where road traffic congestion and traffic safety considerations require a reduction in road freight traffic;
  - Rail freight efficiency levels will enhance at least for long distance traffic and become comparable to road efficiency levels, particularly in terms of transit time, product quality aspects and door-to-door delivery requirements. It will also compete with air and road on speed services; and
  - Modal transfer facilities will be located outside congested urban areas with good road access.
- Optimized Road-Rail Modal Split Strategy: A detailed strategy and specification of regulatory measures and a time programme will be developed and implemented by the Department of Transport to optimize the road-rail freight modal split. It includes a monitoring programme, an information database as part of the DOT Central Data Base system, supplemented by a legalising process to enforce the strategy to obtain an acceptable balance between road and rail freight:
- Road transportation will be subjected to increased pricing measures for the use and access of public roads, as well as limited or additional cost for access authority to designated areas such as CBDs (refer to the section on finances). Pricing mechanisms will also be introduced to discourage road transportation of goods that are considered to be more suited to rail transport."

In summary, the following can be concluded from NATMAP with regards to policy principles on freight movement by road versus that by rail:

- Freedom of choice amongst the available modes to the market or users of freight services should be maintained.
- However, based on strategic considerations, government should impose both technical and economic regulatory measures to allow rail freight to recover and improve its market share. The focus should be on certain commodities (lower value, high weight and volume commodities that pose damage to the road network) and corridors, where a general shift to rail will improve overall efficiency of the freight transport system.

5.1.8 Transnet Concessioning of Branch Lines

During 2010, Transnet commenced with a process of concessioning the branch line rail network in the country. Expressions of Interest (EOI) were requested from the private sector, and a total of 115 companies indicated their interest in partaking in this initiative (Transnet, 2012). The broad objectives of this initiative were to engage the private sector in the revitalisation of the Branch Line network wherever feasible to:

- Promote the inter-modal shift of freight from road to rail;
- Lower the social and commercial costs of freight transportation; and
- Stimulate economic opportunities in rural areas.

The concessioning will entail the operation and maintenance of clusters of lines and associated properties, through concession agreements. Concessionaires will be entitled to operate passenger or freight services, or a combination thereof. Transnet will retain ownership of the branch line assets, and only grant the concessionaire long-term right of use in respect of such assets. The EOI information specifies the following responsibilities for the concessionaire:

- The concessionaire will be required to make the necessary capital investments to maintain the assets to agreed standards;
- The concessionaire will have to operate railway services (passengers and/or freight services) to a range of customers, on a common user basis;
- The concessionaire will have to assume the risk and cost relating to the design, condition, functioning and operation of the branch line, as well as integration with the core network;
- The concessionaire will have to provide forms of security (e.g. Performance Bonds) for the proper maintenance of the capital assets;
- The concessionaire will be required to obtain and retain insurance cover;
- The concessionaire will have to pay rent for the use of the station properties associated with the branch lines, as well as property rates and taxes;
- The concessionaire will have to be responsible for train authorisation systems;
- The concessionaire will be required to operate in accordance with the South African National Safety Standards;
- The concessionaire will have to obtain a permit from the Railway Safety Regulator in terms of the National Railway Safety Regulator Act, 2002 (Act No. 16 of 2002);
- The concessionaire will have to appoint and fund independent experts to perform periodic inspections of the assets to ensure it meets the agreed operating standard;
- The concessionaire may require track access on the core network, for short travel distances, to connect to a marshalling yard or a branch line destination point. Transnet will provide limited access to the concessionaire from an end point on a branch line to the nearest consolidation point on the core network. Transnet will however further

transport the consignment from the consolidation point to the destination point on the core network.

The following clusters accommodating forestry products have been identified by Transnet as part of the concessioning process:

Table 5-1: Branch Line Clusters Carrying Wood Products

Cluster	Branch Line	Province	Length of Line (km)	Rail Service Status	Major Commodities
Pietermaritzburg link	Victoria-Schroeders-Dalto	KZN	69	Active	Sugar, wood chips, wheat, Pulpwood
	Dalton–Chailey–Kranskop	KZN	129	Active	Wood chips, wheat, Pulpwood
	Schroeders–Bruyns Hill	KZN	24	Active	Sugar, wood chips, wheat, Pulpwood
	Dalton–Glenside	KZN	19	Active	Wood chips, wheat, Pulpwood
	Chailey-Mount Alida	KZN	40	Active	Wood chips, wheat, Pulpwood
	Masons Mill–Donnybrook–Franklin–Kokstad	KZN	262	Active	Wood chips, Pulpwood
	Donnybrook–Underberg	KZN	62	Active	Wood chips, Pulpwood
	Pentrich–Thornville–Richmond	KZN	41	Closed	Wood chips, Pulpwood
	Franklin–Matatiele	KZN	77	Closed	Wood chips, Pulpwood
Nelspruit link	Nelspruit–Citrus–Graskop	MP	130	Active	Diesel, petrol, timber, Pulpwood,
	Citrus–Plaston	MP	30	Active	Diesel, petrol, timber, Pulpwood,
	Kaapmuiden–Barberton	MP	56	Active	Timber, Pulpwood
Lothair link	Lothair–Buhrmanskop	MP	49	Active	Maize, Pulpwood
Port Elizabeth narrow gauge link	Port Elizabeth–Gamtoos–Avontuur	EC	282	Active	Citrus fruit, pulpwood, Infrastructure
Bergville link	Ennersdale-Bergville	KZN	67	Active	Pulpwood, maize, beans

Note: KZN stands for KwaZulu Natal, MP for Mpumalanga and EC for Eastern Cape

5.1.9 Conclusions and Impact on Forestry Industry

Considering the documents listed and evaluated in the previous sections, the following general conclusions can be drawn with regards to current and future policy principles relating to the use of road or rail modes for transport of freight products:

- Government's intention is not to dictate mode choice, and freedom of choice will be maintained even in future;
- Mode choice will be determined by customer service criteria;
- There is however a general acknowledgement of the fact that the playing field between road and rail has not been levelled yet, and that urgent action is required to address aspects such as the following:
  - Ensure equity in recovery of actual costs;
  - Ensure full implementation of RTQS to effectively regulate safety, technical and operational items with regards to road freight transport;
  - Increased overload control and enforcement on roads; and
  - Improving operational efficiency on the rail network.
- There is further a general acknowledgement that rail's share in freight transport has decreased to levels that impact negatively on the overall economics of the country. Government is therefore considering imposing both technical and economic regulatory measures to promote a general shift of freight transport from road to rail, and to allow rail freight to recover and improve its market share. The focus will probably be on certain commodities and corridors, where a general shift to rail will improve overall efficiency of the freight transport system.

The impact on the forestry industry, with regards to transport of their products, will therefore be improved technical and safety regulation on roads transport, as well as increased enforcement on road transport. Cost of road transport will also probably increase relative to rail transport, as allocation and recovery of actual costs improve.

However, the industry can further expect an improvement in the operational efficiency of the rail network, as well as the opening of new opportunities for rail transport of timber products such as the (re)introduction of rail routes, private sector involvement in management of rail infrastructure maintenance and operations, and possible government support in rail freight transport.

5.2 Assessment of Climate Change and its Industry Impacts

5.2.1 Broad Policy and Context -Agriculture and Commercial Forestry

Despite being a developing economy, South Africa is a major contributor to climate change, and the world's 12th-largest carbon dioxide emitter due to its resource and energy intensive economy. The National Climate Change Response White Paper (November 2011, p.17) noted that:

> *"climate change significantly impacts agriculture and commercial forestry and they have significant potential for adaptation. Globally, agriculture is a key contributor to climate change, being responsible for about 14% of all GHG emissions. In both the agriculture and commercial forestry sectors synergy and overlap exists between adaptation and mitigation measures, and climate-resilient sectoral plans have the potential to directly address the plight of those most impacted by climate change – the rural poor. Furthermore, in these sectors climate resilience addresses issues of strategic national importance: food security, water, health, and land reform.''*

To build resilience to climate change, the priorities for agriculture and commercial forestry in the White Paper are to:

- Integrate agriculture and forestry into climate-resilient rural development planning to address job creation, food security and livelihoods with a particular emphasis on building climate resilience through leveraging synergies between adaptation and mitigation;
- Using the results of available risk and vulnerability studies, develop and update short-medium- and long-term adaptation scenarios to identify climate-resilient land-uses. This will support the agricultural industry's proactive efforts to exploit new agricultural opportunities, new areas and new crops and it will reduce the impacts of climate change on existing agricultural potential;
- Invest in and improve research into water, nutrient and soil conservation technologies and techniques, climate-resistant crops and livestock, as well as agricultural production, ownership, and financing models to promote the development of "climate-smart agriculture" that lowers agricultural emissions, is more resilient to climate changes, and boosts agricultural yields;
- Use early warning systems to give timely warnings of adverse weather and possibly related pests and disease occurrence. This will also provide up-to-date information and decision support tools to assess the vulnerability of farmers and inform farm management decisions;
- Invest in education and awareness programmes in rural areas and link these to agricultural extension activities to enable both subsistence and commercial producers to understand, respond and adapt to the challenges of climate change.

Forests and forestry have thus regained prominence on the international and national agenda due to their potential role in climate change mitigation. The sector is also ideally positioned to respond to the related global and national trends in greening economies (see **Box 5.1** below). Forests are a major carbon sink, holding as much as 46 percent of the world's terrestrial carbon stores. In South Africa, the Paper Manufacturers Association of South Africa (PAMSA) (April 2011) estimates that 600 million trees across 762,000 hectares are grown for use in pulp and paper manufacture, with over 260,000 trees planted every day.

Box 5.1: The South African Forest Sector in the Green Economy

The UNEP Environment programme defines the green economy as one that results in improved human wellbeing and social equity, while significantly reducing environmental risks and ecological scarcities. In its simple expression, a green economy can be thought of as a low carbon, resource efficient and socially inclusive economy. Practically speaking it is one whose growth in income and employment is driven by public and private investments that reduce carbon emissions and pollution, enhance energy and resource efficiency, and reduce the loss of biodiversity and ecosystems services. These investment need to be catalysed and supported by targeted public expenditure, policy reforms and regulation changes.

A green economy has also been described as the process of reconfiguring businesses and infrastructure to deliver better returns on natural, human and economic capital investments while at the same time reducing greenhouse gas emissions, extracting and using fewer natural resources, creating less waste and reducing social disparities.

The global shift towards valuing and trading the whole basket of forest ecosystem goods and services, such as carbon trades will result in sustainable delivery of these goods and services which will have increasing economic importance and value, both in planted and natural resources. Recent diverse technological breakthroughs, as well as high energy prices and the imperative to reduce GHG emissions all act to open the door for the development of the bio-products economy.

There are major consequences for the South African Forest Sector. Massive market growth, environmental imperatives and rapid advances in technology are moving the forest sector into a new paradigm of a ligucellulose sector within a biological products economy. These trends, when properly developed, open countless opportunities for the entry and growth of new forest based industries and the lifting of households out of poverty.

The three main routes in which the timber and forest sectors can contribute, are in biomass energy, green infrastructure and building - related to sourcing sustainably generated forest products, and the role of forest resources as carbon sinks. Even though the South African sector has made significant strides in support of a green economy (particularly through the international certification of 97% of plantation areas against globally derived sustainability and environmental criteria and standards), the challenge is to further develop these characteristics through (increasing) sustainable consumption patterns, (increasing) the recycling and recovery of products, and increasing supplies of both renewable energy and ecosystems services. It should also compensate forest owners for non-marketed benefits they provide, which is a tool for the sector to adapt to climate change imperatives.

These challenges imply that the development of green markets for wood such as energy and the green buildings industry could result in a change of supply to traditional markets such as in pulp and paper and in mining and saw timber. This could have an impact on wood prices in some regions and for certain categories of wood products.

Source: Rampedi, M. S.A Forestry. February 2012.

South Africa's National Climate Change Response Green Paper (2010), which preceded the White Paper noted how:

- The transport sector is the most rapidly growing source of greenhouse gas emissions in South Africa, and is the second most significant source of greenhouse gas emissions therefore significant mitigation benefits can be found in the transport sector;
- Transport was responsible for 25.7% of energy demand in 2004. Road transport represented 84% of transport energy use;
- Through transport mitigation there are co-benefits that can be realised such as reduction in accidents, improved urban air quality, increased productivity through reduction of time between trips, etc.; and
- Climate change impacts could result in the destruction of transportation infrastructure. Floods and storm surges have in the past destroyed roads, bridges and railway lines and sea level rise poses threats to coastal transport infrastructure, including harbours.

Climate change can affect infrastructures and its demand in a number of ways (Cervini,R. 2912; Infrastructure for Climate Change; United Nations Economic Commission for Africa-World Bank.), vis;

- More frequent extreme events, where the cost of meeting a given infrastructure reliability standard can be expected to increase. For example, more storage may be needed to keep flood risk at existing levels;
- More frequent damages to infrastructures and changes in the optimal investment-maintenance balance. For example, reductions in the traffic threshold for which paving becomes optimal;
- Changing performance of different types of infrastructure with effects on optimal choice of infrastructure technologies. For example, a drier climate may make hydro-power less attractive; and
- Altering the pattern of demand for infrastructure. For example, changes in crop patterns will affect the need for rural roads.

The Green Paper proposed, inter alia, the following responses to these challenges:

- To continue to put in place transport policies and developments that result in a modal shift in passenger transport to public and low carbon forms of transport including plans to move freight from road to rail over time;
- Encourage the integration of land use and transportation planning in cities in a manner that encourages public transport and non-motorised transport and encourage telecommuting in order to reduce long term transport fuel use patterns;
- Improve the efficiency of the vehicle fleet across the board through a range of measures including the use of fuel standards;
- Invest in the further development and deployment of cleaner technologies for the transport sector such as electric vehicles and hybrids;
- Build capacity to deal with transport mitigation in the areas of planning, engineering, and relevant technical skills;
- Support the production and use of cleaner fuel technologies and alternative fuels away from current fossil fuels.
- Implement the flat rate specific excise tax based on passenger vehicle carbon emissions which applies to each gram CO_2 vehicle emissions above a target range and investigate expanding the emissions tax to include other categories of motor vehicles;
- Consider further incentives in the form of lower fuel taxes to encourage cleaner fuels, e.g. cleaner diesel fuel; and
- Integrate climate change information into transport planning, in order to minimise the potential risk to infrastructure from extreme weather events.

5.2.2 Relevant Policy Implementation Measures and Instruments

5.2.2.1 Near-term Priority Flagship Programmes

Most elements of the foregoing challenges in the Green Paper and policies established in the White Paper are being implemented through a set of Near-term Priority Flagship Programmes. Many represent economic and financial opportunities, some of which are already being taken up by the forestry and transport sectors and its constituent sub- sectors (See **Section 5.2.3** below).

Those of relevance to climate change mitigation and adaptation in agriculture and forestry and to transport and infrastructure are:

The Transport Flagship Programme

The DOT is facilitating the development of an enhanced public transport programme to promote lower-carbon mobility in five metros and in ten smaller cities and create an Efficient Vehicles Programme with interventions that result in measurable improvements in the average efficiency of the South African vehicle fleet by 2020. The rail re-capitalisation programme (covered in section 6.2.1 below) is considered an important component of this flagship programme in so far as it will facilitate both passenger modal shifts and the shift of freight from road to rail. The programme will also include a Government Vehicle Efficiency Programme that will measurably improve the efficiency of the government vehicle fleet by 2020. It will encourage new efficient-vehicle technologies, such as electric vehicles, by setting procurement objectives for acquiring such vehicles.

The Renewable Energy Flagship Programme

This is inclusive of a scaled-up renewable energy programme, based on the current programme specified in the Integrated Resource Plan (2010) and using, for example, the evolving South African Renewables Initiative led by the Department of Public Enterprise and Department of Trade and Industry (DTI), as a driver for the deployment of renewable energy technologies. The programme is informed by enhanced domestic manufacturing potential and the implementation of energy efficiency and renewable energy plans by local government.

The Energy Efficiency and Energy Demand Management Flagship Programme

Here, the Department of Energy will continue to develop and facilitate an aggressive energy efficiency programme in industry, building on the experience of Eskom's Demand Side Management programme and the DTI's National Cleaner Production Centre, and covering non-electricity energy efficiency as well. A structured programme is being established with appropriate initiatives, incentives and regulation, and a well-resourced information collection and dissemination process.

The Water Conservation and Demand Management Flagship Programme

This includes the accelerated implementation of the National Water Conservation and Water Demand Management Strategy in the industry, mining, power generation, agriculture and water services sectors.

The Waste Management Flagship Programme

This programme, led by the Department of Environmental Affairs (DEA), is establishing the Green House Gas (GHG) mitigation potential of the waste management sector including, but not limited to, investigating waste-to-energy opportunities available within the solid, semi-solid and liquid-waste management sectors, especially the generation, capture, conversion and/or use of methane emissions. This information will be used to develop and implement a detailed Waste-related GHG Emission Mitigation Action Plan aimed at measurable GHG reductions aligned with any sectoral carbon budgets (see Section 5.2.2.3 below) that may be set.

The Carbon Capture and Sequestration Flagship Programme

Led by the Department of Energy (DOE) in partnership with the South African Energy Research Institute, the programme includes, among other initiatives, the development of a Carbon Capture and Sequestration Demonstration Plant to store the process emissions from an existing high carbon emissions facility.

The Adaptation Research Flagship Programme

Led by the South African National Biodiversity Institute, this comprises the design and roll-out of a national and regional research programme to scope sectoral adaptation requirements and costs and identify adaptation strategies with cross-sectoral linkages and benefits, including an assessment of climate change vulnerabilities in the sub-region, with a detailed scenario planning process to define potential sub regional response strategies.

The Climate Change Response Public Works Flagship Programme

This includes the consolidation and expansion of the Expanded Public Works Programme and its sector components such as the Non-State Sector's Community Works Programme and the suite of Environment and Culture Sector programmes including Working for Water, Working on Fire, and Working for Energy as these have proven effective in building climate resilience and relieving poverty.

5.2.2.2 Economic Instruments in Place

Economic instruments already introduced by government to promote mitigation include, among others, an electricity generation levy, the motor vehicle emissions tax, a levy on incandescent light bulbs complemented by a range of tax incentive measures to support renewable energy investments (depreciation allowances for renewable electricity generation and biofuels production), investments in projects under the Clean Development Mechanism (CDM) which include income tax exemption for revenues from the sale of certified emission reduction units resulting from CDM projects.

5.2.2.3 Carbon Budgets

The White Paper states that Carbon Budgets (CB'S) will be drawn up within two years of its publication (by end 2013) for relevant economic sectors and sub-sectors, particularly in the major energy supply (electricity and liquid fuels) and use (mining, industry and transport) sectors. These will enable the development and use of lowest-cost options such as offset and other types of market-based mechanisms. A CB approach specifies desired emission reduction outcomes consistent with the benchmark national GHG emissions range trajectory.

These are being developed at present - but information on which sectors or subsectors is currently not available.

5.2.2.4 Additional and Related Instruments

These include the DTI's 2011 Industrial Policy Action Plan 2 (IPAP 2) which plays a central role in relation to the recently released New Growth Path, and focuses on manufacturing and other value-added sectors, with a combination of high employment and growth multipliers. This includes the co-ordination of certain value chains where manufacturing mediates the progression from primary to final goods.

It created a cluster of industrial sub-sectors as 'Qualitatively New Areas of Focus' (Cluster One) which includes:

- Transport equipment arising from large public investment;
- Oil and gas;
- Green and energy saving industries investments, and
- Agro-processing.

It also created Cluster Two for 'Scaled Up and Broadened Interventions in Existing IPAP Sectors' including:

- Medium and heavy commercial vehicles
- Biofuels
- Forestry, paper, pulp, and furniture.

5.2.3 Forestry and Transport Infrastructure sub-sectors Response to Date

This section draws from published industry association data (PAMSA 2012), industry publications (S.A Forestry Magazine), the questionnaires and interviews undertaken for this study and websites of companies in the forestry sector. It is not a complete record of the multifaceted industry response to date but is indicative of the extent of engagement with the opportunities and constraints inherent in the national and global climate change response.

It indicates its current and potential future contribution towards both a low carbon economy overall and in the transport sector, its contribution to a reduction in energy intensity and future risks in supplies and prices in the economy , as well as to resource scarcity.

5.2.3.1 The Forestry Response

Carbon Sequestration

The industry is playing a positive role in reducing the rate of climate change with its associations engaging successfully with both the Treasury and the Department of Environment on plantation forestry's ability to sequestrate carbon. Credits are being discussed with Treasury, and the methods for monitoring, verifying and reporting (MVR) emissions reductions with the DEA. The industry is discussing participation in the Clean Development Mechanism (CDM) process. It is also working hard to ensure the planned increase of 100,000 ha to plantations in the small scale grower sub-sector with the DTI, while furthering efforts to measure its carbon footprint in accordance with international best practice.

Waste Reduction and Recycling

The industry recycling recovery rate is improving annually off a high base (currently 44%), with some grades increasingly being exported. Approximately R640 million of recycled product was collected in 2011. Sixty percent of recoverable paper is recovered.

Renewable Energy and Energy Efficiency

Use of renewable biomass-based energy has enabled the industry to avoid the use of 1,3 million tons of fossil fuels such as coal, oil and gas annually and therefore associated carbon emissions. Collectively, companies in the sector have successfully lobbied the South African Revenue Services and Treasury for exemption from the electricity levy due to combined investments in cogeneration (creating annual savings of over R40 million). One company alone has produced 79% of its energy needs from renewable sources, and only relies on Eskom for 2% of its electricity needs. Its own generating capacity enables it to run independently from the national grid if required, either at slightly reduced rates or by shedding some chemical production temporarily.

The industry wishes to develop a meaningful cogeneration and biomass procurement programme within the context of the evolving policy and regulatory environment outlined in the Flagship programme above. It has eight projects in line, all of which involve energy efficiency and production of renewable energy which will facilitate job creation, economic growth and a move to a lower carbon transport (and energy) economy. The potential is also for an additional 500 megawatts of power, and for feeding into the national electricity distribution network.

Through the maximisation of existing fibre sources, the industry has a real opportunity with timelines for pilot projects in the near future pending finance availability to produce a working unit producing energy and liquid fuel/chemicals, which could be running within 9 months. Further work is being done on pyrolysis which can be used to make biofuel. Moreover, the sawmilling sub-sector is beginning to make a strong contribution to alternative energy sources through the use of sawdust and off cuts in milling, in the manufacture of pellets used in heating and cogeneration projects. Much of this is currently exported, but uptake locally will be determined by the further development of the regulatory environment, continued administrative price increases for coal fired electricity as well as local demand and preferences.

Water Demand Management

Forestry companies have for long been involved in water supply and demand management, principally through developing comprehensive wetland management programmes, and through the introduction and use of best practice technologies which reduce water use and improve grey water quality for re-use. The industry and its associations are also deepening their efforts at measuring its water footprint in accordance with international best practice.

5.2.4 Transport and Infrastructure

Forestry transport and its infrastructure requirements can make a significant contribution to climate change and associated emission reduction and energy saving requirements, but with some costs. These are covered in **Section 5.1**above, and **Section 5.3** below, and can be summarised thus;

- The planned rail capitalisation process initiated by Transnet this year and covering the next eight years will, if implemented optimally and taken up by the forestry industry with confidence, make a significant contribution towards the reduction of the current energy, resource and emission intensive high carbon road transport economy. The planned local construction of diesel- electric locomotives at the projected cost of about R77 billion also provides the capacity for this programme to make adjustments to fuel and electricity price and supply risks through the ability of the locomotives to switch power sources.
- The forestry transport sub sector has already taken a leading role in engaging with transport authorities in fuel, vehicle and payload efficiencies through the RTMS system

and the PBS system, which have a collective impact on energy savings and reductions in damage to road infrastructure. Where these have been put in place, companies report marked savings of up to 15% in fleet costs.

- Research has identified that the proposed carbon taxes on vehicle emissions will have an impact on the competitiveness of the country's logistics and supply chain sector and on consumers and end-users. South Africa's consistently high cost of logistics, which came in at 13.5% of GDP in 2009 will be negatively impacted by the proposed taxation levels, Projected costs for 2010 were around 15%. (Swanepoel and Havenga (2011). This report shows that the forestry industry is leading in reducing vehicle and fuel efficiencies and costs.

5.2.5 Summary and Conclusions

Summarising the foregoing, both the growing, processing and transport subsectors response to the demands of climate change can make a significant contribution in addressing global and national climate change mitigation strategies and adaptation programmes. In so doing, they are contributing towards a lower carbon transport economy, while leading to reductions in the use of potentially scarce and carbon emission intensive energy sources, supporting the shift to alternative and renewable energy sources, and promoting water resource supply and demand management.

Concluding this section, the implications for the continued and increasing contribution of the sector to a low carbon economy are the need for deeper and successful engagement with the multilateral, national, provincial and local transport authorities, and with the key Flagship Programmes of the Department of Environment and supporting ministries, the continuation of research and development, sourcing of appropriate and relevant funding, and the design of suitable public - private partnerships in order to achieve these objectives.

5.3 Assessment of Change in Energy Source and its Impacts on Industry

5.3.1 Introduction

The transport sector in South Africa is highly dependent on energy, as a supply of e.g. fuel or electricity is required to propel road and rail vehicles.

Research has shown that the availability of oil is expected to reach a peak in the short to medium term, after which it will start to decline. This will have a severe impact on transport in general, and therefore also on future planning in the forestry sector.

This section investigates the extent of this problem, and proposes measures to mitigate the negative impacts on the forestry sector.

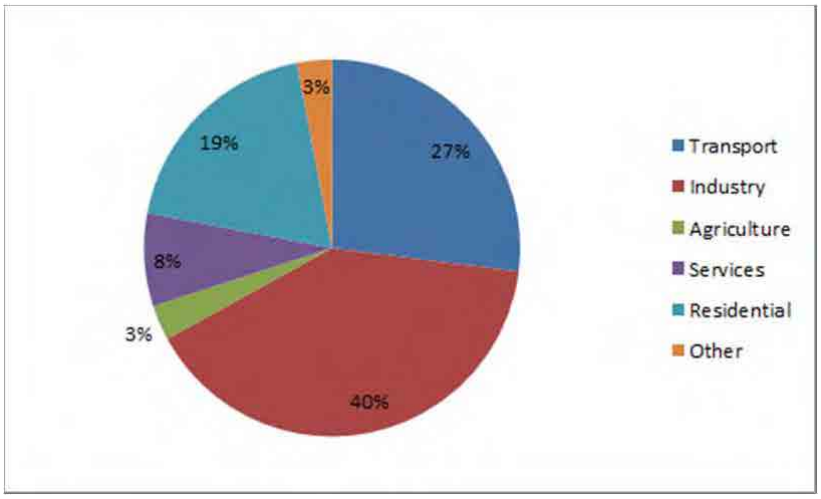
5.3.2 Status Quo

Figure 5-1 shows the share per sector of final energy consumption in 2006 in South Africa. Transportation used 27% of the energy consumed in the country, second only to industry at 40% of the total.

Most of the energy consumed by transport (98%) was in the form of petroleum liquids, with the remainder (2%) being electricity. Seventy eight percent of all petroleum liquids are

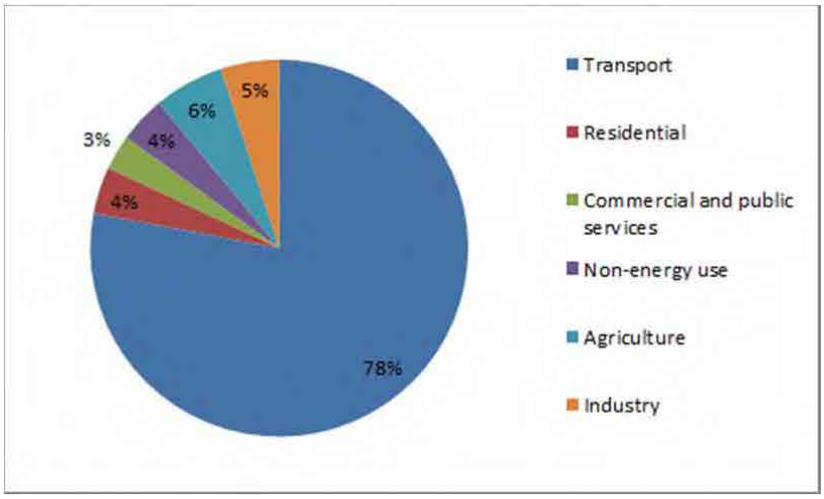
consumed by the transport sector, as indicated in **Figure 5-2**. Most of the petroleum liquids in South Africa (70%) are derived from imported oil, although a significant portion comes from Sasol (coal to liquid) (23%) and 7% from PetroSA (gas to liquid).

Figure 5-1: Energy Use in South Africa (2006)



Source: DOT, 2010.

Figure 5-2: Petroleum Consumption by Sector (2006)



Source: DOT, 2010.

From the above it is clear that, to all intents and purposes, transportation is totally dependent on petroleum liquids and there is very little scope of improving the availability of petroleum liquids for transportation by savings from the other user sectors.

An analysis of where the energy in transportation is used (see **Table 5-2**) reveals that about 89% of the petroleum liquids are used in road transportation. This is for both passenger transport and freight. The next biggest user is air transport, which uses 11% of the liquid petroleum.

Table 5-2: Energy Use in Transportation

Transport Sector	Petroleum		Electricity		Total	
	TJ	%	TJ	%	TJ	%
International civil aviation	35,178	4.9	-	-	35,178	4.8
Domestic air transport	43,510	6.1	180	1.4	43,690	6.0
Road	632,489	88.6	71	0.6	632,560	87.1
Rail	2892	0.4	11,810	94.3	14,702	2.0
Pipeline transport	-	-	284	2.3	284	0.04
Internal navigation	-	-	181	1.4	181	0.02
Non-specified	-	-	1	0.0	1	0.00
Total	714,069	100.0	12,527	100.0	726,596	100.0

Source: DOT, 2010.

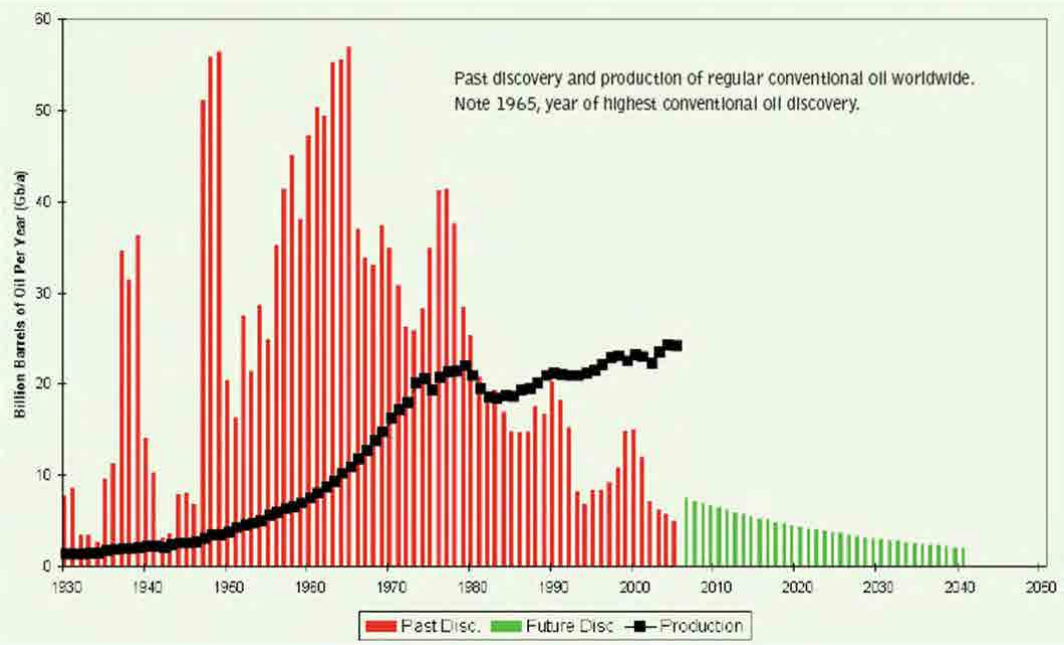
5.3.3 Challenges

Discovery of oil reserves worldwide reached a peak in 1965 (see **Figure 5-3**), and have since then steadily declined. Based on current information, some reserves still remain to be discovered, but these are relatively small.

Production of oil from these resources has steadily increased, but as this is from a finite source, it is predicted that this will decline as the resources are depleted. Production is expected to reach a peak in 2012, and thereafter it will decline. By 2030 the production of oil will have declined to an estimated 50% of the peak in 2012.

At that point in time the available oil will be used by nations who have access to oil, and can pay for it. The competition for oil will be fierce, and the price can be expected to be very high. A best case scenario is that South Africa will be able to retain its market share of the available oil at whatever the cost will be. This means that the availability of oil in South Africa will decline to about 50% of what it is today, but probably somewhat less.

Figure 5-3: Discovery of Oil Fields and Historical Production



Source: DOT, 2010.

5.3.4 Scenarios of Availability of Liquid Fuel

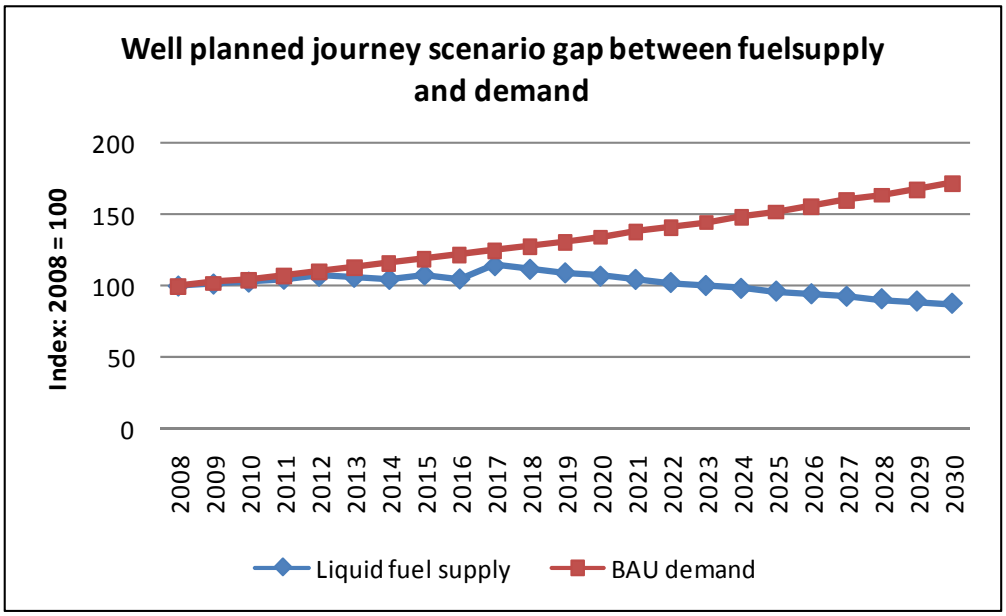
Four scenarios for the availability of liquid fuel in South Africa have been identified during the NATMAP process, as discussed below.

5.3.4.1 Scenario One1: Well Planned Journey

In this scenario, there has been an early move to improving transport energy efficiency and to developing alternative energy and transportation fuels and systems, while the peak is late with a slow decline, providing everyone with an opportunity to be better prepared for the events as they unfold. Sasol proceeds with the planned 20% expansion of its Secunda CTL plant, and also builds a new greenfields CTL plant (Mafutha). PetroSA manages to maintain production at its GTL plant using either new oil or gas discoveries or imports, or is replaced by a facility using inland gas reserves.

In this scenario the availability of fuel will more or less remain at present day levels, while the gap between the demand if there were no restrictions on supply (the business-as-usual demand) will be about 75% of the current use.

Figure 5-4: Scenario 1: Well-planned journey



Source: DOT, 2010.

5.3.4.2 Scenario Two: Riding the Wave

In this scenario, although there has been an early move to improving transport energy efficiency and to developing alternative energy and transportation fuels and systems, the onset of peak oil occurs almost simultaneous to the pro-active response. The early peak reinforces the response in an upward "virtuous" cycle but with a great deal of stress on the transportation system because there is little time for planning and implementation. The rapid decline in oil availability is somewhat off-set by the planned expansion of the coal to liquid plants and the gas to liquid plants.

In this scenario the availability of fuel declines to about 60% of current use, and the gap in availability and demand grows to about 120% of the current use.

5.3.4.3 Scenario Three: Taking the Back Roads

In this scenario there has been a hesitant move to improving transport energy efficiency and to developing alternative energy and transportation fuels and systems. Fortunately there is a late peak and a slow decline with consequences less severe than first feared. The slow adoption of alternatives hampers decisive progress and creates unexpected events to catch planners and policy makers by surprise.

There is no significant difference between this scenario and Scenario 2. The gap is about 110% of the current use. One of these scenarios, Scenario 2 or Scenario 3, is the most likely to occur. The shortfall in fuel will therefore be about 120% of the current use.

5.3.4.4 Scenario Four: Bumpy Road

In this scenario the state, markets and civil society have generally continued practicing 'business as usual', while the impact of peak oil is severe, with an early peak and a rapid

decline rate. The proposed increase in the coal to liquid plants and the gas to liquid plants do not materialise.

In this scenario the availability of fuel reduces to less than 50% of the current use, and the gap between availability and demand increases to about 130 percent. This scenario is unlikely to occur, unless a shortage of resources prevents any expansion of the coal to liquid or gas to liquid plants.

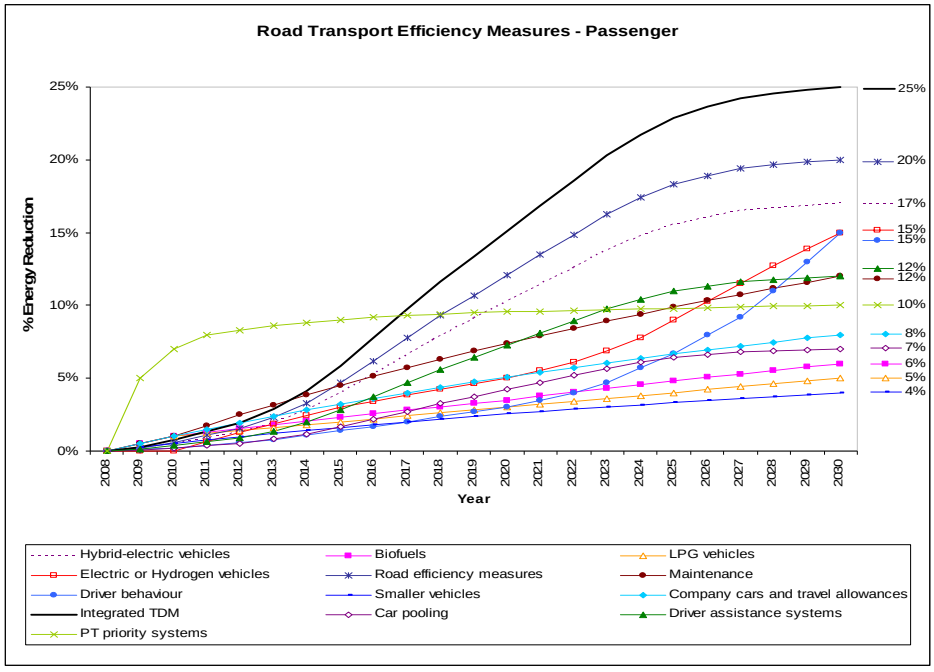
5.3.5 Bridging the Gap

The predicted decline in the availability of oil will place a limit on the future supply of fuel. In order to address this reduced supply, one will have to reduce the demand for liquid petroleum. The demand can be reduced in one of three ways:

- Implement fuel efficiency measures where less fuel derived from oil is used to shift the same quantity of freight or transport the same number of passengers;
- Reduce the quantity of freight and the number of passengers; and/or
- Change the way in which freight and passengers are transported (modal shift).

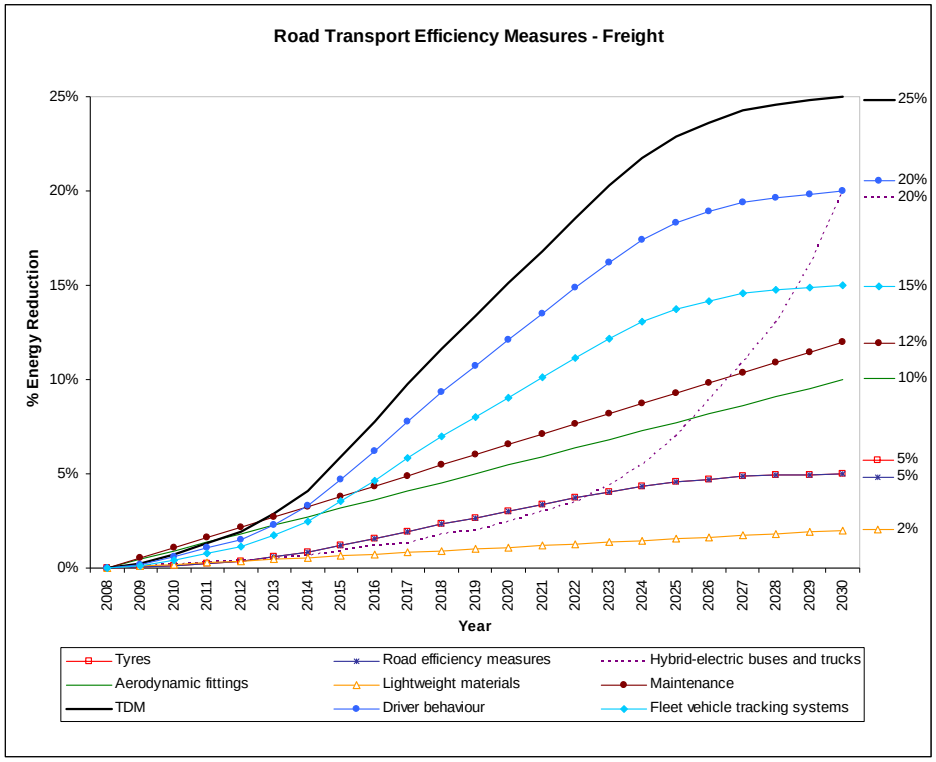
Different measures to reduce energy requirements with regards to road-based passenger transport and road-based freight transport, as well as the efficiency of these measures, are indicated in **Figure 5-5** and **Figure 5-6**. It should be noted that the measures are not cumulative. For instance, if integrated transport demand management is wholly successful and reduces the demand by 25%, road efficiency measures will reduce the demand by 20% of 75%, i.e. the reduction will be a further 15 percent.

Figure 5-5: Road Transport Efficiency Measures – Passenger



Source: DOT, 2010.

Figure 5-6: Road Transport Efficiency Measures – Freight



Source: DOT, 2010.

Road based transport demand management measures and fuel efficiency measures on their own will only serve to bridge the gap in the case of Scenario 1. For the other scenarios, more intense transport interventions are required, e.g. road, rail and air based measures as well as a mode shift from road transport to rail and a move to new technologies, depending on the type of scenario realising, as indicated in **Table 5-3**.

Table 5-3: Transport Interventions and its Perceived Impact

Peak Oil Projections	Transport Interventions			
	Road based measures only	Road, rail and air based measures	Mode specific measures and mode shifts	Move to new technologies
Scenario 1	Entirely sufficient	Not required	Not required	Not required
Scenario 2	Insufficient	Insufficient	Sufficient	Not required
Scenario 3	Insufficient	Barely sufficient	Not required	Not required
Scenario 4	Insufficient	Insufficient	Insufficient	Entirely sufficient

Source: DOT, 2010.

5.3.6 Conclusions and Recommendations

Preparations to manage the changes (in supply of petroleum liquids) properly have to start timeously (immediately). The immediate focus should be on transport demand management, while longer term actions should focus on a modal shift from road to rail, and by implication from liquid fuel to electricity (coal). The following actions are proposed:

- Short term (next three years):
  - Create an energy awareness programme;
  - Promote non-motorised transportation;
  - Promote fuel efficiency measures; and
  - Plan for new long-term transportation infrastructure.
- Medium term (up to seven years):
  - Continue further public education and awareness programme;
  - Finalise long-distance infrastructure investment and planning;
  - Implement transport mode shifts; and
  - Review earlier short-term measures.
- Long term (up to ten years):
  - Implement long-distance infrastructure;
  - Expand the quantity of goods and number of people affected by transport mode shifts; and
  - Review earlier medium-term measures.

5.3.7 Conclusions and Implications for the Forestry Industry

A high percentage of forestry products (about 67% based on a survey conducted by FSA during 2011 that represented about 44% of national timber sales) are currently being transported by road. As discussed in previous sections, road-based transport is expected to become under severe pressure in the medium term due to decreasing fuel supply. It is therefore clear that the forestry industry will be hard hit by diminishing fuel supply levels, and need to react immediately in order to ensure continuous transport service.

It is recommended that the industry and/or government consider implementation of the following measures:

- Continue to promote fuel efficiency measures by expanding participation in the RTMS and PBS initiatives both across the industry and in other major transport sectors;
- Strengthen and expand the initiatives for the shift of timber products from road to rail, in order to become less dependent on the supply of petroleum. This can be achieved with assistance from government (implementation of the policy principles to move certain commodities back to rail) and Transnet Freight Rail (implementation of the branch line concessioning programme); and
- Continue with research and actual development of renewable forms of energy.

5.4 Assessment of Technology Change in Harvesting and Processing of Timber

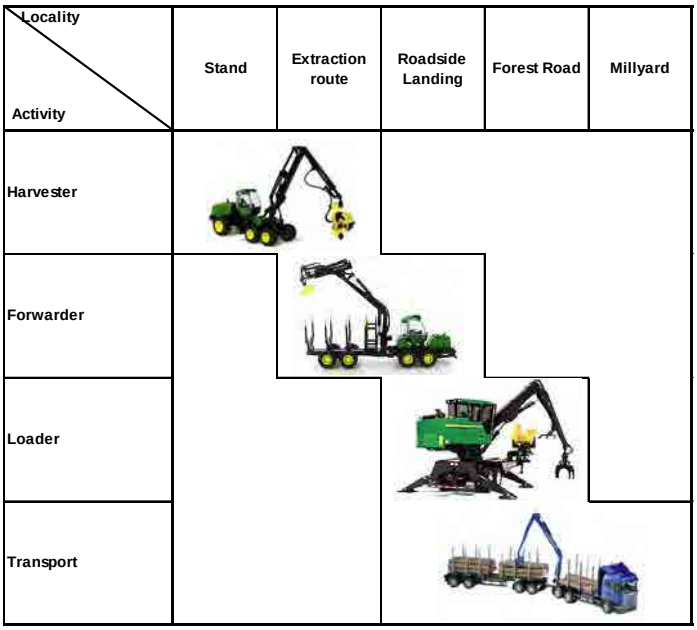
5.4.1 Current Harvesting Systems

The first mechanized harvesting operations were introduced to South Africa in the early 1990's. Up until that point harvesting mechanization had been limited to the skidder extraction operations and all felling, debranching, crosscutting and if required debarking was done manually. With the increased awareness around safety in the plantation, labour costs, employment legislation and more recently the unavailability of labour to conduct forestry operations, there has been a significant move to mechanise forestry operations. In the eucalyptus pulp harvesting operations, mechanisation has moved from 30% to over 80% in the past 10 years.

The South African forestry operation is small in the world forestry operation and the harvesting systems and equipment selection is based on what is currently available from the large forestry equipment manufactures based predominately in the northern hemisphere. These manufactures develop purpose built sophisticated and high technology equipment for plantation forestry applications. As a result much of the equipment used is state of the art, ergonomically designed and fitted with the latest technology engines. Most of the purpose built harvesting equipment, even with the latest engine designs, is still not fuel efficient and consumptions on purpose built harvesters of 28 litres per hour is the norm.

The harvesting system selection is based on a number of criteria but a dominate driver in the mechanised pulpwood operations is the tree size. The two most common harvesting systems applied are multi-stem (MS) harvesting and cut to length (CTL) harvesting. The cut to length system uses a harvester to fell, debranch & debark (if required) and cuts the tree into log lengths infield. The timber is then loaded and moved to roadside using a forwarder and then loaded at roadside onto trucks for transport to the mill.

Figure 5-7: Cut to Length Harvesting System



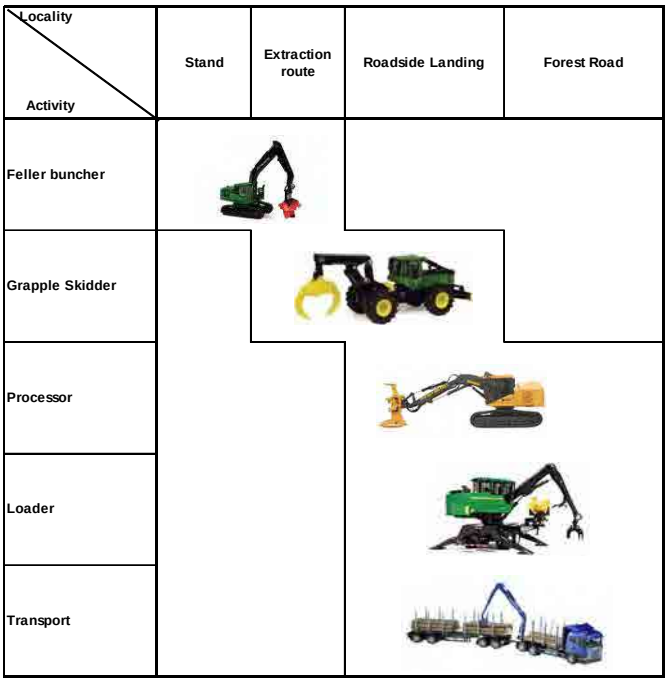
In the multi stem process the timber is felled infield using a feller buncher and then skidded to roadside for processing (debranch, debark, crosscutting). The timber is automatically stacked at crosscutting and then later loaded and transported. The system is usually balanced with a feller buncher and a skidder supplying timber to 2 – 4 processors at roadside depending on conditions.

As a rule of thumb, multi stem harvesting operations are for trees up to a tree volume of 0.20m^3 per tree and the cut to length system is designed for tree volumes above 0.20m^3 in pulpwood operations. For very large sawlog operations above 1.0m^3 trees the operations revert back to multi stem harvesting, due to the trees size being outside of the handling capabilities of the harvesters.

Key drivers going forward on the harvesting equipment will be

- Precision forestry through the application of computer systems on equipment;
- Engine improvements and fuel efficiencies;
- Operator training improvements; and
- Driver ergonomics.

Figure 5-8: Multi-Stem Harvesting System



5.4.2 Shift to Biomass as a Key Product

The global trend to move to renewable energy resources has focused the role that forestry can provide in providing renewable energy through the use of the harvesting residue as a biofuel. Due to the tree form and the heavier branching of pine, the pine harvesting operations result in a far higher biomass remaining in the compartment after harvesting than with the eucalyptus species. The highest biomasses have been found in pine sawlog harvesting operations, where up to 100m^3 per hectare of residue in both branches and timber offcuts remain in the compartment after harvesting. Little study data is available on

eucalyptus and this will vary per species, and the biomass remaining after harvesting is likely to be below 20m^3 per hectare.

The biomass has traditionally been classified as waste and previously had no monetary value, but if required would still carry a collection and transportation cost. In the two harvesting systems described above there is a fundamental difference which carries a value if biomass is to be marketable product. In the cut to length system the processing and crosscutting is done infield and the waste biomass remains infield. The harvester operators have also been taught to drive over the harvest residue or biomass which results in the breakdown of branches and brush lines. In the multi stem system the whole tree is skidded to roadside and then processed on roadside, resulting in the tree harvest residue or biomass being available on roadside. If the biomass accrues a monetary value through the collection and sale of the product then it may influence the harvesting system selection back to multi stem where the biomass may be collected at little cost on roadside.

In the application of the cut to length system if the infield biomass is to be used then a slash bundler will need to be used to collect and bundle the biomass. It is possible to collect and load slash directly to a bin on a truck but due to the weight to volume ratio the transport costs will be very high due to the low payloads if the biomass, particularly the slash is not compressed.

The collection and usage of biomass from sawmilling operations has significant advantages in that all waste generated including solid wood offcuts and rejects, as well as sawdust from sawmilling is easily collected and available as a biofuel for power generation. Traditionally pine logs are sold with bark on and debarked at the sawmill, while eucalyptus is debarked infield and the bark remains infield. The option to leave bark on the logs for debarking at the processing plant would provide the biomass at the processing plant while significantly reducing the harvesting costs.

5.4.3 Summary

Future developments in the regulatory environment and in the economics of extraction, transport and processing- at scale- will determine the expansion of markets for biomass and biofuels. The forestry industry is well placed to capitalise on the global shift to securing biofuels from sustainable and/or renewable sources (as shown with current research and developments in the sections immediately above), and since its supply source (the residues) do not displace food supplies, as in the case of maize, for example. The implications for transport infrastructure are two fold and lie in a) the possibility of achieving economic payloads in moving a low mass /high volume product to larger processing plants, and where this is not viable, in b) the establishment of smaller decentralised processing facilities.

Beyond the respective merits of the two harvesting systems covered above in realising usable residues at roadside, in scenario a) above those pine plantations close to centralised processing plants could place increased demand on transport infrastructure in future, provided that an economical truck- trailer configuration to achieve viable payloads is developed. In scenario b) a string of smaller, decentralised processing plants would place increased demand on local transport infrastructure. It is however beyond the scope of this project to quantify this potential demand, in the absence of any detailed work undertaken to determine the viabilities of both scenarios. Both are however areas of work which require

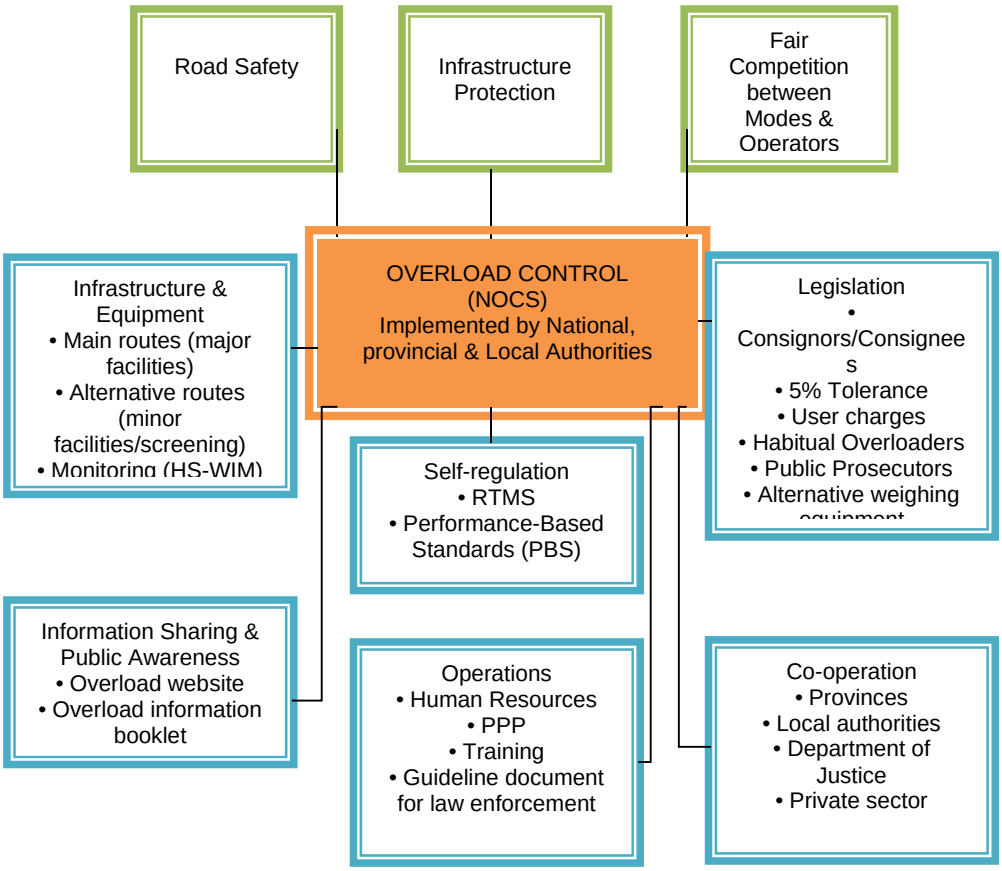
considerable future attention, as biomass and biofuels potentials will increasingly occupy central stage in light of changing global, national and local energy policies and the continual supply and price uncertainties detailed in this report.

5.5 Assessment of Progress with the Road Transport Management System

5.5.1 Introduction

Borrowing from an Australian Model[2], South Africa developed a five-year Road Transport Management System (RTMS) during 2006, to address heavy vehicle overloading and thus preserve road infrastructure, improve road safety in general and promote efficient road based operations (The Technical Working Group, 2006; Nordengen and Piennaar, 2007). This initiative supports the Department of Transport's National Overload Control Strategy (NOCS), as indicated in the figure below.

Figure 5-9: NOCS in Relation to RTMS



Source: Nordengen, 2011

[2]Australian National Heavy Vehicle Accreditation Scheme (NHVAS)

5.5.2 What is RTMS?

RTMS is an industry-led, voluntary self-regulation scheme that encourages collaborative participation of all stakeholders engaged in the road logistics value chain to implement a vehicle management system that preserves road infrastructure, improves road safety and increases the productivity of the logistics value chain (The Technical Working Group, 2006).

RTMS Vision 2012 is that "RTMS will be a nationally recognised self-regulating scheme for heavy vehicle road transport, resulting in a safe, equitable and competitive heavy vehicle logistics value chain". RTMS further has the mission to provide a national certification scheme (standards, auditors, manuals) and implementation support (information portals, recognition, technology transfer) for heavy vehicle road transport to consignees, consignors and transport operators, focusing on:

- Load optimisation;
- Driver wellness;
- Vehicle maintenance;
- Productivity.

This system will have standards focussing on four main aspects, namely loading, driver wellness, vehicle operations and productivity, as depicted in **Figure 5-10**.

Figure 5-10: RTMS Main Standards

Source: The Technical Working Group, 2006 and Nordengen, 2011

In an attempt to accomplish its vision, RTMS has established the following key objectives:

- Financial sustainability within the first three years of establishment;
- Substantial market penetration within the first five years of implementation;
- Reduce overloading by 40% by the end of the first five years of implementation;
- 95% road traffic regulation compliance among certified operators;
- Establish RTMS as a recognised national standard;
- RTMS recognised for safety and environmental hygiene;

- Achieve SADC harmonisation, within the first four years of implementation.

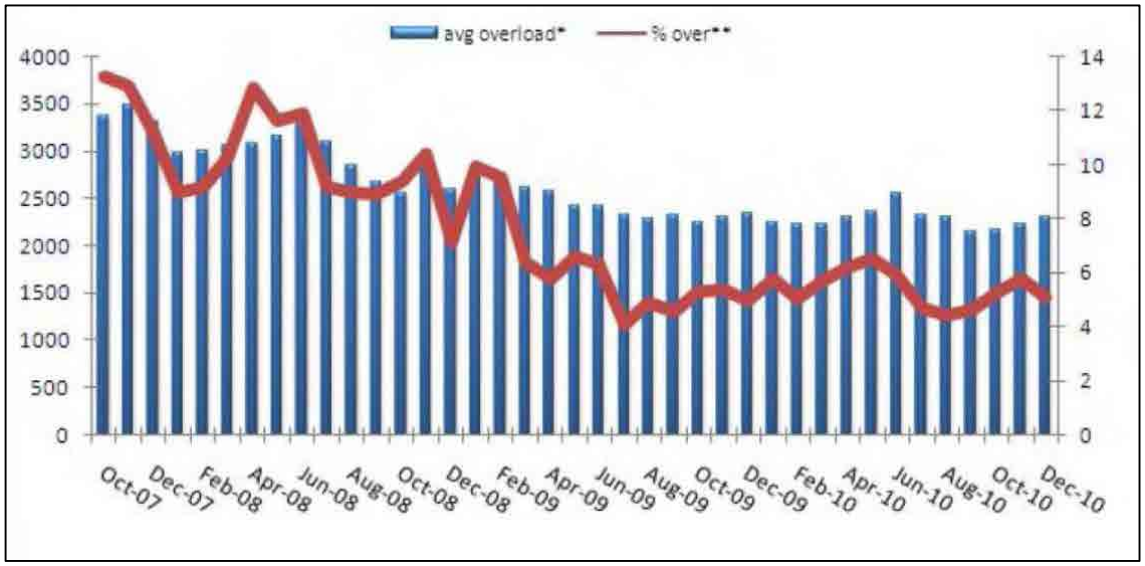
5.5.3 Major Advantages of RTMS for Heavy Vehicle Transporters

The major advantage of RTMS (National Productivity Institute, 2006) is that it will create an environment for transporters, consigners and consignees where all parties act responsibly, trustworthily and fairly. Accredited companies in the supply chain can expect several benefits such as the following:

- Improved road safety (less accidents and other losses as a result of better maintained vehicles);
- Improved infrastructure (better roads as a result of less overloading);
- Improved productivity (less under-loading of vehicles, less vehicle downtime, opportunity to take part in the Performance Based Standards (PBS) programme);
- Cost savings (lower vehicle operating costs, lower insurance premiums, saving in time lost at weigh bridges); and
- Operational benefits (less confrontation with the law, improved driver conditions).

Since the implementation of RTMS in 2007, positive feedback has been received from the transport, industry, confirming the benefits of RTMS. **Figure 5-11** shows the impact of RMTS on overloading within the forestry industry. The average number of overloaded vehicles per month has shown a consistent decrease between the period October 2007 to December 2010. Furthermore, the degree of overloading (for those vehicles that have been overloaded) has also decreased during the same period.

Figure 5-11: Overload Reduction in the Forestry Industry



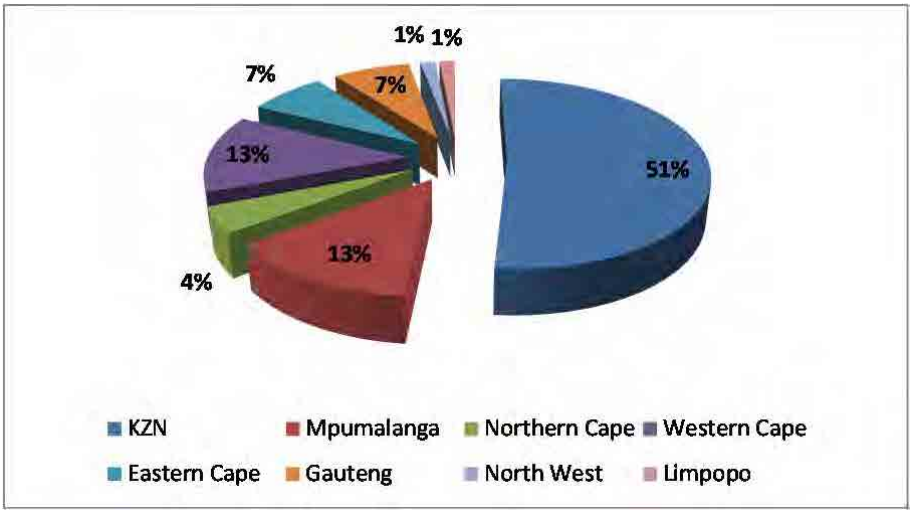
Source: RTMS National Steering Committee, 2011.

5.5.4 Status of Implementation of RTMS

RTMS implementation followed a 5-year implementation plan over 2007 to 2012 and has received a lot of interest from various stakeholders across all industries of South Africa. A total of 68 companies have already been registered as accredited operators, of which about 34% belong to the forestry industry (www.rtms.co.za). In terms of spatial distribution, RTMS accredited companies represent all provinces of South Africa except for the Free State (see

Figure 5-12 below). Over 50% of the accredit companies are based in KwaZulu Natal, followed by Mpumalanga and Western Cape with 13% each.

Figure 5-12: Spatial Distribution of RTMS Accredited Companies within South Africa



Source: www.rtms.co.za

5.5.5 Feedback from Stakeholders

Stakeholders consulted during the course of this project had the following feedback on RTMS:

- Stakeholders agreed that RTMS is a good system and is working well;
- RTMS has led to a reduction in overloading, and an improvement in under-loading;
- Some stakeholders felt that tangible savings should be put in place to attract participation, e.g. a reduction in license fees; and
- Some stakeholders commented that RTMS vehicles are still being stopped by Road Traffic Inspectorate (RTI) officials.

5.5.6 Conclusions and Implications for the Forestry Industry

RTMS holds significant benefits for the forestry industry as a whole, for the individual transport operator (and therefore indirectly the individual producer and processor) and for road transport in general. If implemented by all players in the market, road condition and safety will improve and transport of products will become more cost effective.

Although RTMS is still growing as a regulation system, it has already achieved substantial market penetration in the forestry industry. It is expected that this trend will continue, also amongst smaller transporters (take-up amongst smaller transporters has been somewhat slow to date, according to the RTMS Technical Committee (Robert, 2012)), as the benefits of the system become clear to the rest of the market.

It is recommended that this initiative be promoted and supported as far as possible by DAFF and DOT since it is currently not yet self-funded (Robert, 2012). Funds are required especially for auditing of accredited companies, and financial support to the system should therefore be considered by DAFF and/or DOT.

5.6 Assessment of Progress with Performance Based Standards

5.6.1 Introduction

A Performance-based standards (PBS) strategy for heavy vehicles was developed in 2006 with the aim of improving productivity, efficiency and safety of road freight vehicles.

To date, the forestry industry has been the main focus of this initiative, mainly because the RTMS self-regulation for heavy vehicles was initiated and implemented in this industry.

5.6.2 What is PBS?

Performance based standards is the ability to use modern technology to model the behaviour of heavy vehicles, which makes it possible to design far safer vehicles that can be operated on roads under various traffic conditions with greater ease and efficiency and that will improve transport productivity, safety and protection of road infrastructure (PBS Steering Committee, 2007).

PBS is a flexible non-prescription framework for regulating the weight and dimensions as well as network access of road freight vehicles (Hassall and Thompson, 2010). It specifies the performance required from the operation of a vehicle on a network rather than prescribing how the specified level of performance is to be achieved. PBS therefore lets road hauliers realise higher productivity and safety through more innovative vehicle design. The PBS framework follows the concept that more productive vehicles equal less emissions, less fuel and less road space, as depicted in the figure below.

Figure 5-13: Benefits of More Productive Vehicles

Source: Queensland Transport and Logistics Council, undated.

The main objective of PBS is to design heavy vehicles and trailers that would conform to road infrastructure and safety conservation principles and according to specific standards as a point of departure, but accepting that some of the constraints in the current prescriptive regulations (such as maximum vehicle length and maximum gross weight per vehicle) may be relaxed to allow for PBS to be developed. An example of a typical PBS vehicle used in the timber industry is indicated in **Figure 5-14**. This vehicle has an overall length of 27.0m and a maximum combination mass of 67.5 tonnes, while the legal limits for heavy vehicles (i.e. the "baseline vehicle") are 22.0m and 56.0 tonnes. All the axle and axle unit loads of the PBS vehicles however comply with the requirements of the National Road Traffic Act (Nordengen et al, 2009).

Figure 5-14: Example of the PBS Vehicles used by Sappi (overall length of 27.0m and maximum combination mass of 67.5 tonnes)

5.6.3 Major Advantages of PBS for Heavy Vehicle Transporters

PBS holds advantages for government as well as for the forestry transport industry, as indicated in **Figure 5-15** below. The main advantage for the industry is improved efficiency and productivity, which can be recognised in the following;

- Improved payloads;
- Fewer vehicles required to complete a given freight task (smaller vehicle fleet required);
- Optimisation of technology;
- Less downtime;
- Less unscheduled maintenance;
- Fewer accidents; and
- Reduced operating costs.

Two PBS demonstration projects, commissioned by Mondi and Sappi, were implemented in the forestry industry during 2007, in order to gain practical experience of PBS for heavy vehicles and to quantify and evaluate the potential productivity and safety benefits for the road freight industry. The findings from the demonstration projects are summarised in T**able 5-4**.

.

Table 5-4: Measured Benefits from the Two PBS Demonstration Projects

Performance indicator	Measured result
Payload	Average improvement: 19.3%
Payload Efficiency Factor	Increase from 69.3 % to 70.5%
Tonnes transported per month	Average increase: 19.3%
Fuel consumption	Average savings: 12.7%
Fuel savings (based on 700,000 tons/annum contract)	485,000 litres per annum
Fleet size	Reduction of 17%
Incident / accidents	Reduction from 3.1 to 1.1 per month
CO^2 emissions (based on 700,000 tons/annum contract)	Reduction of 1,280 tons of CO^2 per annum
Road wear	Reduction varies from 2% to 23%

Note: The result for incidents / accidents is based on a fleet of 45 new vehicle combinations incorporating a number of PBS design features.

Source: Nordengen et al, 2009

Figure 5-15: PBS Role Players and their Objectives

Source: PBS Steering Committee, 2007

5.6.4 Status of Implementation of PBS

The use of PBS vehicles is open to anyone who is accredited with RTMS, and who has passed the technical evaluation of vehicles proposed by the transporter. Since its

implementation in the forestry industry (the abovementioned demonstration projects of 2007), other companies and sectors have taken up this initiative as well (Roberts, 2012).

Information on the exact number of companies that are currently operating PBS vehicles is however not currently available.

5.6.5 Feedback from Stakeholders

Stakeholders consulted during the course of this project had the following feedback on PBS:

- Stakeholders generally felt that the use of PBS vehicles will result in cost savings (estimates were in the order of about 10% to 15%); and
- Stakeholders agreed that PBS is a good system, but felt that permits were difficult to obtain.

5.6.6 Conclusions and Implications for the Forestry Industry

PBS, similar to RTMS, holds significant benefits for the forestry industry as a whole, for the individual transport operator (and therefore indirectly the individual producer and processor) and for road transport in general. PBS leads to increased productivity and efficiency, better service levels, and also increased capacity on roads (fewer vehicles required to carry the same load).

PBS has successfully been implemented by a number of companies to date, including Sappi and Mondi in the forestry industry. It is expected that this trend will continue as the benefits of PBS become clear to the rest of the market.

It is recommended that this initiative be promoted and supported as far as possible by DAFF and DOT. It is further recommended that frequent auditing of PBS vehicles is required to ensure that they continue to conform to performance measurements.

6. Review: Adequacy and Implications of Existing Infrastructure Programmes and Transport Plans on Forestry Transport Infrastructure Needs

6.1 Introduction

As one of the key sectors with the potential to contribute to poverty alleviation as well as economic growth and development – the forestry industry is a land use of national importance. One of the ways to unlock this potential, is to provide transportation infrastructure that will enable the movement of forestry resources through the different forestry-related processes (refer to Chapter 2).

As a land-use of national importance that contributes economically at the different spheres of government, it was anticipated that the different transport frameworks and plans prepared by the different spheres of government would encompass the forestry industries transport infrastructure needs. This chapter, a desktop exercise, reviews the inclusion, sufficiency and suitability of forestry transport infrastructure projects in the planning and programmes of relevant national and provincial governments departments, as well as in district level transport planning.

The review is limited to the following infrastructure programmes:

- Transport Planning documents prepared by government at national, provincial as well as district levels;
- Transnet's Rail Plans; and,
- Infrastructure Planning Programmes under the custodianship of national government.

6.2 Status and Adequacy of Transport Frameworks and Plans

Transport planning process in South Africa is guided by the National Land Transport Act (NLTA), Act 5 of 2009. The general principle of the NLTA is that land transport planning must be integrated with land development and land use planning. The Act requires the following three transport plans for the three spheres of government:

- The National Land Transport Strategic Framework (NLTSF) – under the custodianship of the Minister of Transport – must be prepared every five years for purposes of guiding land transport planning countrywide. The framework needs to take into account the National Transport Master Plan, the National Rail Plan as well as the National Freight Logistics Strategy.
- The Provincial Land Transport Framework (PLTF), prepared by the provincial MECs responsible for transport planning, is a strategic framework for the development of provincial transport perspectives. The PLTF is also key to coordination of the Integrated Transport Plans (ITP's) within the jurisdiction of the province.
- Integrated Transport Plans are provided by the local planning authorities.

6.2.1 The National Transport Master Plan (NATMAP 2050)

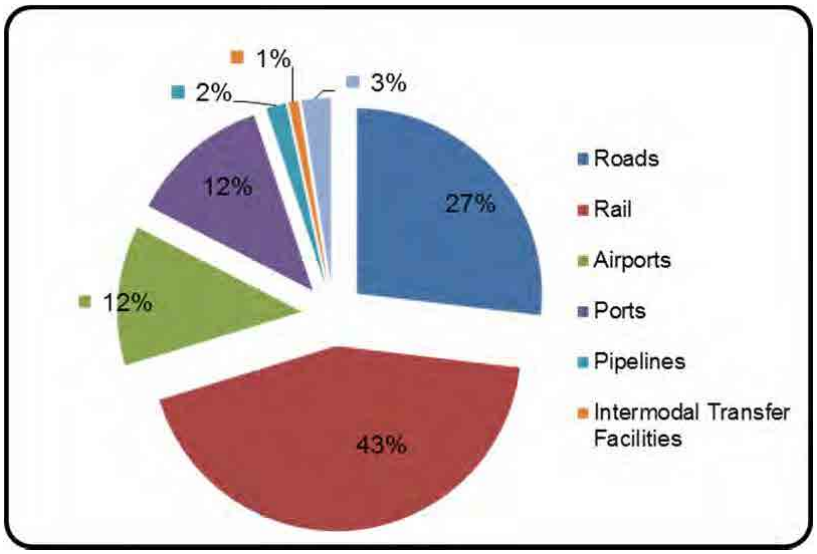
The National Transport Master Plan, the transport infrastructure plan with a horizon of 2050, is under the custodianship of the DOT. In the absence of a NLTSF, NATMAP has taken the approach of providing a comprehensive, multimodal and integrated transport plan for the

country. The transport infrastructure framework is demand responsive to various land uses and sectoral investments, including the forestry sector.

Therefore the transport infrastructure needs of the forestry sector, together with transport needs of other land uses, were examined, determined, and crystallised to develop an integrated transportation plan and investment strategy. The findings of this transport infrastructure investment strategy does not single out the transport infrastructure needs of the forestry sector – however these needs are conglomerated to ensure integration planning between various land uses as well as across modes.

The NATMAP process envisaged an investment of R751 million across the different transport modes (refer to figure below for split in cost per transport sector).

Figure 6-1: Total Cost per Transport Sector (2010 – 2050)



Source: NATMAP 2010.

6.2.2 The Review of Provincial and District Transport Plans

The review of all provincial (PLTFs) and district transport plans (DITPs) indicated that these transport planning documents do not specifically outline transport needs for the forestry sector.

In the Eastern Cape the forestry areas are found in the Central and Eastern Regions of the province. The transport needs for the forestry sector are articulated in the Provincial Spatial Development Plan[3] (PSDP) (November 2010). The strategic transport routes supporting the forestry sector in the province include the N2, N6, N11, R48, R68, R65.

NOTE

Majority of the districts under review have outdated district Integrated Transport Plans, with some at different stages of being updated.

The review was substituted by other provincial and district strategic plans.

The Integrated Transport Plans of districts with forestry plantations were found to be silent on forestry transport infrastructure needs – particularly on access roads to forestry plantations.

[3] The Eastern Cape Provincial Land Transport Framework was not available for assessing the transport infrastructure needs of the forestry sector.

The forestry cluster in Limpopo Province is found in Vhembe and Mopani districts. Both ITPs of the respective districts do not indicate definitive transport infrastructure needs of the forestry sector. However the Provincial Growth and Development Strategy (2004, pp. 36 and Map 9 on pp. 40) illustrates the extent of forestry plantation with the supportive transport infrastructure. Although this framework does not specifically make mention of explicit forestry transport infrastructure needs, the current Limpopo Employment Growth and Development Plan (2009, pp. 54) indicates that one of the high impact projects for the current five year plan include the development of a Provincial Road Master Plan that will prioritise the implementation of road infrastructure through the determination of provincial, districts and collector roads as well as the identification of the purpose served by these roads.

The forestry transport infrastructure needs in Mpumalanga are discussed in the province's Growth and Economic Path (2011). Although the Growth and Economic Path does not stipulate the extent of transport infrastructure serving the forestry sector, one of the key areas for intervention identified is the investment in infrastructure.

The province considers infrastructure development as one of the key drivers for economic growth and job creation in the forestry sector. The driver for infrastructure implementation is identified as the Mpumalanga Infrastructure Development Plan (MIDP). Furthermore, the vehicle for implementation during the roll-out of the Infrastructure Plan is the Expanded Public Works Programme.

The Ehlanzeni district developed a road master plan in 2009, which identified and classified all roads within the district. The process also determined the status of the roads for intervention purposes, such as upgrading, rehabilitation and maintenance. Gert Sibande district on the other hand, has identified gravel roads for upgrading through the development of local road network master plans (GSDM IDP 2011, pp. 174).

6.3 Status, Adequacy and Implications of Transnet's Rail Plans

6.3.1 Budget

Future spending by Transnet announced this year (Swart, 2012) on rail will be on both expansion and replacement of all rail assets. The planned capital allocation envisioned is considerable, with a total R106,1 billion to expansion and R94,9 billion to replacement over the seven financial years from 2012/13 to 2018/19. The first two years see a greater relative concentration on replacement and over the subsequent four year period this is on expansion. The final year sees a greater focus on replacement of the assets. Total annual spending envisioned increases per year up to a peak of R36.7 billion during 2016/17, after which it decreases slightly.

This capital expenditure by Asset Class (wagons, locomotives and infrastructure respectively) shows a fairly equal cumulative concentration on locomotives and infrastructure, at R77.2 billion and R76.7 billon respectively over the 7-year period. Expenditure planned for new wagons is estimated at R 47.1billion over the same period.

Of the R215.7 billion planned capital allocation over the 7-year period, the bulk will go to general freight (a total of R140.5 billion), followed by export coal, export iron ore, manganese, containers and domestic coal.

Table 6-1: Annual Expenditure on Capital and Replacement of Rail Assets

Year	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19
Expansion (R billions)	4.8	8.2	R11.2	16.6	19.9	21.1	17.4	11.7
Replacement (R billions)	9.9	11.3	11.3	11.8	12.7	15.6	15.7	16.5
Total Spending per Year (R billions)	4.7	19.5	22.5	28.4	32.5	36.7	33.1	28.2

Source: Swart, 2012.

Table 6-2: Annual Expenditure by Asset Class

Year	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	20/18/19
Locomotives (R billions)	5.2	6.9	9.2	10.4	12.4	14.1	12.9	11.3
Infrastructure (R billions)	5.0	6.8	8.9	12.7	13.4	13.4	12.0	9.5
Wagons (R billions)	4.5	5.9	4.5	5.3	6.6	9.2	8.2	7.4

Source: Swart, 2012

Transnet representatives (Swart, 2012) indicated that the forestry sector will benefit from investments planned for General Freight Business (GFB), which includes more locomotives and wagons as well as improved infrastructure. Transnet expects a 40% increase in timber tonnages over the 7-year budget period.

The Transnet view is that planning and investment in replenishing and increasing wagons will not be a major problem, which is in getting suitable numbers of efficient locomotives in place to address these and other regional challenges. A recent joint venture has been formed with American interests who have recently supplied diesel- electric locomotives, with plant and production facilities established to begin a new build programme for local requirements and African markets. The technologies being developed are such that locomotives are capable of switching between diesel and electricity use, managing any supply and price crises and spikes, as well as reducing emissions considerably.

6.3.2 Planned Infrastructure Projects

Transnet's Infrastructure Plan (Transnet, 2011) lists the following infrastructure projects for the period up to 2030, which will impact on the forestry transport rail network:

Table 6-3: Rail Projects in Transnet's Infrastructure Plan that impact on Forestry Transport Rail Network

Area and Project Description	Research and Study	Construction	Expected Cost (R mill)
Western Cape Province (Transnet's "Western ports links")			
New passing loops and extensions, signalling and electrification between De Aar and Bellville	2013 to 2015	2016 to 2019	190
Re-signalling fully directional with CTC (outdated) between Wellington and Bellville	2014 to 2016	2017 to 2019	491
Eastern Cape (Transnet's "Central ports links")			
Springfontein to East London: Additional passing loops. Improve alignments by reducing steep gradients and sharp curves.	2022 to 2024	2025 to 2028	295
KwaZulu Natal and Mpumalanga (Transnet's "Eastern Ports links")			
Durban to Stanger: (PRASA interface within Ethikwini area)	2019 to 2021	2022 to 2023	250
Durban to Richards Bay: Provide double line for the single line section between Stanger and Richards Bay. 3kV DC electrification with CTC signalling (if traffic is to be diverted from the NATCOR)	2020	2012 to 2022	3 595
Kaydale to Pietermaritzburg: Implement signal infill scheme to achieve headway of 8 minutes	2021 to 2022	2023 to 2028	272
Ogies to Richards Bay: 78 mtpa upgrades	Completed	2010 to 2012	1 321
Ogies to Richards Bay: 81 mtpa upgrades	Completed	2011 to 2015	5 676
Construction of a new line from Lothair into Swaziland, connecting to the Komatipoort-Golela line	Completed	Estimated 2012 to 2016	Cost not available
Ermelo to Richards Bay: 81+ mtpa upgrades, including Overvaal tunnel and grade separation	On the plans, but details still need to be confirmed by Transnet.		
Mpumalanga and Limpopo (Transnet's "Northern region")			
Phalaborwa-Kaapmuiden:Upgrades, passing	2012 to 2013	2014 to 2016	120

Area and Project Description	Research and Study	Construction	Expected Cost (R mill)
loops			
Nsese Port Link: Partial doubling	Completed	2012 to 2013	160
Witbank to Machadodorp: Doubling and upgrades	2014 to 2016	2017 to 2021	1 045
Machadodorp to Nelspruit: Doubling and upgrades	2013 to 2015	2016 to 2020	785
Nelspruit to Kaapmuiden: Doubling and upgrades	2018 to 2020	2021 to 2024	822

Note: CTC stands for centralised traffic control

Source: Transnet, 2011.

6.3.3 Branch Line Concession Approach

During 2010, Transnet commenced with a process of concessioning the branch line rail network in the country. Expressions of Interest (EOI) were requested from the private sector, and a total of 115 companies indicated their interest in partaking in this initiative (Transnet, 2012). The EOI specified specific responsibilities which the concessionaire had to take over (refer to section 5.1 for a detailed description of these responsibilities). These responsibilities included capital investments to upgrade and maintain infrastructure to agreed standards.

Initial plans were for the proposal stage to commence towards the end of 2011. However, this process was delayed due to a review of the concessionaire's responsibilities, requested by the Minister. Transnet has resubmitted and is currently awaiting further directives from the Minister.

Transnet indicated (Links, 2012) that the revised document for branch line concessioning is a response from Transnet to the New Growth Path, the National Development Plan, etc. Transnet will have a branchlines operations and management division as part of an enhancement model that seeks to add value, provide packaged services, encourage private sector participation, enterprise development etc. Transnet Freight Rail has current private sector participation initiatives under way in the timber environment, typically the opportunities in the KwaZulu Natal environment around Pietermaritzburg, Nkwalini, etc.

The forestry industry is engaging extensively with international rail concessioning experts with experience in public private partnerships in formulating their preferred approaches to concessioning, and their specific branch line priorities.

6.3.4 Stakeholder Feedback on Transnet Current Services

Stakeholders were consulted during the course of the study (issuing of questionnaires). Most stakeholders indicated their dissatisfaction with current service levels on rail. The following specific concerns were raised:

- High tariffs for rail services (compared to road transport);
- Delay in the concession of the branch lines;
- No competition to Transnet as an operator;

- Lack of services on the less trafficked rail lines; and
- Some proposed that, in order for branch line concessioning to be an attractive option to the private sector, Transnet should be able to guarantee the availability of rolling stock and should be responsible for the maintenance of the rail infrastructure.

Transnet, in their feedback, acknowledged problems such as old resources (wagons and locomotives), the availability of slots on certain main lines and the conditions of certain rail networks (especially the branch lines, which are currently poorly maintained). Transnet further indicated the following:

- Transnet have embarked on a project to replenish old resources;
- Provision has been made to improve on infrastructure, specifically on the branch line network around Pietermaritzburg. However, Transnet noted that the low traffic lines are normally costly to repair and therefore not a high priority; and
- Rail transport by itself is not expensive. However, all the "other cost" that customers incur (harvesting, extracting from difficult terrains, stacking at roadside depots, shorthaul, off-loading, loading and mostly double handling) add up to make it expensive;

6.3.5 Adequacy of Transnet Plans

Transnet's infrastructure plans generally addresses all the capacity problems identified on the forestry transport rail network, as discussed in section 4.5. The major focus in Transnet's plans is to increase capacity along the Ermelo-Richards Bay line, which is expected to be the major future rail corridor for transport of forestry products.

Areas where Transnet will have to focus on further, in order to better serve the forestry industry, include the following:

- Speeding up the concessioning of branch lines, and providing adequate support to the private sector in order to make it financially feasible;
- High tariffs seem to be a major problem to many stakeholders consulted: Transnet should consider ways to become more competitive (in terms of cost) to road transport; and
- Transnet should take note of concerns on levels of service (efficiency, reliability etc.) raised by stakeholders.

6.4 Status and Adequacy of Infrastructure Programme

There are two infrastructure programmes that were reviewed to determine if governmental infrastructure programmes take into account forestry transport needs. This subsection of the report reports back on the observations made.

6.4.1 Extended Public Works Programme

The Expanded Public Works Programme (EPWP) is one of government's programmes aimed at providing poverty and income relief through temporary work for the unemployed to carry out socially useful activities. The programme provides funding for infrastructure implementation through four distinct clusters, namely infrastructure, environment and culture; social; and, non-state or non-governmental and community-based. Assessment of EPWP documentation indicates that there is some investment into the forestry industry through the infrastructure and environment and culture clusters, however it is not clear if these projects are for improving infrastructure supporting the forestry sector.

Further assessment were undertaken for EPWP initiatives at provincial level – it revealed that some provinces such as the Eastern Cape and KwaZulu Natal, have numerous EPWP initiatives that might have an impact on the sector, although the exact extent cannot be established. The Eastern Cape has a programme called Vukuzakhe – roads for rural development that considers upgrading of access roads.

6.4.2 The Comprehensive Agricultural Support Programme (CASP)

The agricultural sector developed and adopted the Comprehensive Agricultural Support Programme (CASP) in 2003, with four categories of beneficiaries in mind, namely the hungry and vulnerable; the household food producers; the beneficiaries of land and agrarian reform programmes; and, the operators in the macro-economic environment. These beneficiaries are supported by government in the following six critical areas:

- Knowledge and Information Management;
- Technical and advocacy assistance;
- Financing mechanism;
- Training and capacity building;
- Marketing and business development; and
- On and off-farm infrastructure.

Currently the programme is targeting agricultural small holders, subsistence or commercial farmers only. There was no direct evidence that the CASP is directly targeting the transport infrastructure needs of forestry's small scale grower sector.

6.4.3 Municipal Infrastructure Grant Planning

The South African Cabinet approved the establishment of the Municipal Infrastructure Grant (MIG) in 2003. The MIG is a municipal infrastructure funding arrangement that replaced all existing capital grants for municipal infrastructure, thus incorporating seven previous infrastructure programmes listed below:

- The Consolidated Municipal Infrastructure Programme;
- The Water Services Projects;
- The Community Based Public Works Programme;
- The Local Economic Development Fund;
- The Building for Sports and Recreation Programme;
- The Integrated National Electrification Programme to local government
- The National Electrification Programme implemented by Eskom; and,
- The Urban Transport Fund.

The MIG is under the custodianship of the Department of Cooperative Governance, with the Department of Agriculture, Forestry and Fisheries being part of the Municipal Infrastructure Task Team.

The table below shows the infrastructure categories that are funded by the MIG:

Table 6-4: Comparison of Required Road Upgrades for 2030

Infrastructure Category	Services included
Residential Services	'Plot package' including: electricity, stormwater management, water supply, sanitation, municipal roads, refuse removal and street lighting.
Services provided to institutions other than public municipal services.	The type of infrastructure which may be funded with MIG funds is set out below: This applies particularly to services which are the responsibility of other government departments, such as schools, provincial clinics etc. This is limited to the 'plot package'.
Public municipal services	Facilities required for: • Municipal public transport. • Emergency services such as fire stations. • Community services such as cemeteries, local sports facilities and local amenities.
Standard services' to business premises	Only the 'plot package' may be provided. Buildings are excluded.

Source: Introduction to the Municipal Infrastructure Grant Programme, 2004.

MIG funds are earmarked for basic infrastructure, which can include access roads.

6.5 Implications of the Review Findings for Forestry Transport Requirements

Planning and implementation of both secondary and local rural access roads forms part of only some of the plans discussed, and there is insufficient evidence that these plans and programmes sufficiently encompass the transport infrastructure requirements in the forestry sector. Observations made from the different transport planning frameworks and plans indicate that the approach to provision of transport infrastructure needs does not single out specific needs for a particular land use – investment in transport infrastructure is rather integrated. The vast network of unproclaimed local roads is of concern, as it impacts negatively on upgrading and maintenance frequencies on these access roads that might hinder provision of transport infrastructure to the forestry sector.

7. Case Study and Interviews

7.1 Introduction

The case study covered an area from Richards Bay in northern Kwazulu-Natal to Ugie in the North Eastern Cape. The aim was to capture individual and company perspectives on the state of both incoming and outgoing transport operations, infrastructure and intermodal facilities, as well as to generate general perspective on economic interactions and likely future trends within and between the different organisations, and any desirable changes required. Its purpose was to complement the questionnaires and stimulate their completion. Managers of procurement, transport and logistics from the large corporate companies, large private grower organisations, medium sized enterprises, smaller enterprises and the small scale grower and sawmilling subsectors were visited.

It covered five large companies (growers and processors), three medium sized companies (one grower cum processor and two pole processors), four small scale grower organisations and one emerging saw miller representing an association of 18 emerging saw millers in the Eastern Cape. It also covered one medium sized transport contractor and three small transport contractors.

7.2 Perspectives on limits and strengths in existing and planned transport infrastructure

7.2.1 Larger Organisations

For the larger organisations the predominant issues were the organisation and future prospects for rail transport, the costs in both own transport operations and outsourced fleets, and the extent of their interaction with transport authorities and contractors.

Two organisations have standing agreements for three 'ringfenced' trains to their own processing facilities varying from an ideal 120 wagons to 40 wagons, running at varying frequencies per week (daily, three times a week, every two days). One described their operation as 70 percent efficient, while another maintained that the efficiencies – in terms of actual wagons delivering against agreed numbers- was running at 50 percent. One maintained that they had repaired wagons at own cost to ensure safety and maximum permissible loads. Currently the industry is engaging with Transnet in the co-design of suitable wagons which could increase payloads from 34 tonnes to 'about 60 tonnes'. It was mentioned that there was a real possibility for a public private partnership here in the future.

The former maintained that they had moved off rail to about 80% of operations on road due to slow turnaround times, and strongly maintained that while rail was the preferred mode for the future, even if the network across the three provinces it works in were increased, rehabilitated or upgraded, they would still be cautious of engaging fully with rail since the nature of processing operations requires a demand led system that cannot afford to have delays and reductions in planned throughput. 'The nature of our business means we have to dictate terms of delivery'. They are well aware however of public sentiment on the extent to which their own fleet (transporting 52 % their products in and out) and contractors fleets can lead to deterioration of roads and to traffic congestion, particularly in and around the smaller towns where the forestry sector is active.

Interaction with transport authorities in Kwazulu-Natal was said by one organisation to be very good, particularly with the organisation and operation of the RTMS system, where every

one of their suppliers is represented, and described how it intends stopping using certain contractors who struggle to meet the systems requirements, but are however helping them to do so.

A third large organisation of private growers describe how they have come to use road for 90% of their requirements for exports from Richards Bay due to the double digit increases experienced in tariffs, making many operations unaffordable and believe that this year could be the last year of operations for branch lines if the situation does not change. The achievements of a recent successful cooperative project named 'Thuthi'hlati', between themselves and two other major organisations and the rail authorities in establishing a dedicated project/train of 150 wagons every 2 days to reduce the number of 'slots' on rail in relation to the authorities requirements for priority 'slots' for the coal exports sector were described. It was said that coal trains get allocated 200 wagons a day. There is a belief that this could have been replicated elsewhere, or be revitalised, but for the issues of uneconomical pricing and some arbitrary tariff setting.

Figure 7-1: Thuthithali Timber Train

Source: NCT, 2012.

This organisation has not yet fully gone the RTMS route, but report on an awareness programme on consignor-consignee cooperation to the Dept. of Transport, which has contributed to helping contractors reduce load sizes downwards. They regularly sit on provincial transport forums but feel that their motivations and arguments are not allways acted on, despite a commitment from the relevant authorities to support agriculture generally, and to maintain the economic role of the industry and small towns in growth and poverty alleviation.

Another large company similarly maintains that, given their remoter location and thus key role in the sub-regional and regional economy, they regularly sit on district and municipal forums- both Transport and Local Economic Development, but despite great discussions and promises, minutes can take up to three months to be circulated, and apparently nobody takes action on the agreed decisions. This company attributes these issues to a lack of real champions who take charge of seeing the actions through. They report that on the Creighton line to near their mill transporting roundlogs and off cuts, no trains have run since last August, and they do not know what to do next in order to revive this service.

All major organisations expressed a feeling that the forestry sector is not getting the attention it needs from the relevant transport authorities– both in the attention required to rehabilitating and re-establishing certain branch lines, as well as in priority setting for 'slots' from rail

authorities due to the low value/volumes of product it manages in relation to the bulk volumes and values in chrome, coal and iron ore exports.

Most of these organisations (and the smaller exporters) maintain that the handling facilities in Durban are now suitable for exports at this stage. Exporters at Durban described how traffic congestion into the port and to the relevant terminal has long been a problem for timber transporters but has recently been alleviated by the construction and dedication of lay bye areas for incoming trucks. Documentation processing and approvals at the terminal have been upgraded with a new electronic ticketing system.

In Richards Bay the absence of a container terminal and facilities means that companies have to transport paper and pulp exports by road to Durban at huge additional cost. Apparently current planning by the authorities does not include this. The intermodal or multimodal systems and infrastructure for rail and road shipments – particularly for the four wood chip facilities (the conveyer belts for example) are said to be good in Richards Bay (with one company planning the establishment of a new facility currently put on hold due to the recent high administered price increases for electricity).

The general view is that tariffs set by Transnet Port Terminals for these and other dockside equipment and facilities (as opposed to those set by the Regulator) are however set too high every year, at around 10% and approximating the Consumer Price Index. Despite annual negotiations these were held to be arbitrary, and without desirable Service Level Agreements to promote more efficient service delivery. Many of the Mpumalanga based growers experiencing some of the problems with rail described above (but not on the ringfenced lines) have turned to road transport, with severe congestion problems described as a result on the N2 coming into Richards Bay.

One medium sized company exporting transmission poles expects an annual average increase to Africa of 20% over the next five years, and greater use of available timber supplies for poles instead of for pulping, with its lower financial returns, with thus more pressure on the routes to Durban and Richards Bay. Similarly, the organisation establishing the new facility at Richards Bay for exports anticipates further pressure on the relevant routes. Large scale upgrading of capacity for cellulose fibre exports in the industry currently in place was said by some as being likely to add to pressures on road and port infrastructures, while the increased imports of sawlog timber anticipated was mentioned as another factor.

All large and medium sized organisations maintain that if the infrastructure linkages – beyond the work already done in upgrading transport infrastructure to the Langeni plantations outside Umtata –were improved between Kwazulu-Natal, and the Eastern and Northern Cape provinces, particularly the reintroduction of efficient rail and the approval of the N2 Toll road from Port Edward to East London, their operations, and support for small scale grower development would expand and enable them to realise benefits for all.

One large organisation, which reduced its processing operations in other parts of the country in relocating to the North Eastern Cape maintains it is likely to suffer significant losses in necessary margins due to fuel increases, linked to reductions in demand for exports from Europe. They currently run a fleet of 27 thirty four tonne trucks a day, with 70% through Matatiele and Kokstad, and the balance to Port Elizabeth and Cape Town via Dordrecht. They described these route conditions as poor, and maintained that if there were effective rail links, exports to the Cape markets and to ports for exports, and to Gauteng markets could be significantly enhanced and large savings on transport realised, particularly given global trends in fuel supplies and prices. It's fleet engagement with the RTMS system was reportedly very good.

On their harvesting transport operations they anticipate large (unspecified) increases in tonnages brought in, and with all transport operations done in house, are looking to expand their fleet and also establish a dedicated collection and transport service for the small scale grower sector whose supplies to them are increasing, given their location. For both of these operations the fact that South Africa has not converted its oil refineries to produce lower emission content fuels yet as per European Union standards is a the major inhibitor to reducing their emissions.

Surprisingly, none of these organisations were aware of, nor had engaged with any authorities regarding the planning for infrastructure described in the State of the Nation address this year which announced the development of a major new 'South Eastern Node' in the (North) Eastern Cape aimed to expand the provinces economic and logistical linkages with the Northern Cape and Kwazulu-Natal to improve industrial and agricultural development and export capacity.

7.2.2 Smaller Organisations and Contractors

Small scale grower organisations maintain they have some good relationships with local and district municipalities and forums, but that there is an overemphasis in many municipalities on social and institutional support for poverty alleviation and health (particularly in sanitation) at the expense of much need economic development such as forestry transport infrastructure. One result is that many small growers (particularly on land reform operations) have to get contractors to haul additional distances of up to 50 km due to the lack of maintenance or widening of district roads and bridges to accommodate better and more cost effective trucks.

Currently FSA is engaging with Kwazulu Natal's Office of the Premier regarding forestry transport infrastructure for both small and large growers (and processors), where their provincial growth and development planning is concentrating on infrastructure, in line with the national emphasis and priority spend announced in this year's budget.

Another small grower organisation reported very uneven engagements with district and municipal offices, with one complaint that the DAFF tractors in many district offices remain idle for many months of the year, and could be effectively used in a scheme of support to smaller short haul forestry contractors. There is reportedly a lack of dedicated contractors and high failure rates with new contractors, together leading growers to under realise the full value of their timber, promoting a reduced interest in forestry.

They are developing a training course for harvesting and short haul contractors, as well as a programme of support for secondary transport, where the trucks used range from 7 to 38 tonnes. Depots are 'scattered', with small volumes on these. A standard rates schedule is applied for depots, which are classified as an 'area' of supply, with loading generally done by hand but with bigger transporters using Bell loaders. Scheduling is mostly done by the transporters, with foresters and growers phoning transporters with stock reports. All trucks are registered on the relevant system, with number plate recognition at the mill used to pay transporters, with loading costs paid to the transporter, and overloading and roadworthiness controlled at the mill weigh bridge. If this programme of support expands in both KwaZulu Natal and the Eastern Cape, they believe that both the production and the volumes transported will increase significantly, with more pressure on the existing road conditions.

Figure 7-2: Medium Sized Transport Contractor at Roadside

Source: S.A Forestry, 2011.

Of the medium and small contractors interviewed, most are intending to expand their existing fleets but maintained that relationships with district and municipal transport forums and provincial transport authorities were not good. All are not part of the RTMS system, arguing that the cost of upgrades are prohibitive and that road conditions, with the exception of the national roads, are such that they are continually faced with repairs and parts replacements. Smaller contractors are acutely aware of their routes conditions. FSA are currently conducting a forestry road condition survey across all representative small scale grower groups in eight district municipalities and the constituent local municipalities across KwaZulu Natal as a result of this report and case study, to be forwarded to DAFF for actioning. The table below indicates just one group of local transport contractors combined perspectives (expressed very generally) of which district and local roads require attention in their northern Kwazulu Natal areas of operation.

Table 7-1: Emerging Contractors Views on District Road Conditions

District Route	Condition
Kwambonambi to Sokhulu	Poor
Eteza road to Sokhulu road junction	Poor
Charters Creek road to boom gate, and after boom gate to Fanie's Island	Poor
Richards Bay Minerals (RBM) road from Richards Bay to RBM and from RBM to Sokhulu	Poor
Road from Mtubatuba Town to N2	High accident zone. No bridge or ring road

District Route	Condition
Road from RBM to Nseleni	Poor
Port Durnford road to the 'old Durban and Empangeni road'	Poor
Teza to the Umfolozi road that loops back to the N2	Poor

Source: Emerging Contractor Interviews. Siyaqhubekha Offices, April.2012

General demands covered throughout the case study area was the need for more decentralised weighbridges closer to operations (currently in Empangeni and Umtata, for example) which necessitate long and expensive trips, as well as for bypasses around the many towns, which slow down their operations significantly, while contributing to the towns' infrastructure deterioration.

One small scale grower group maintains that they are at disadvantage when to comes to transport since the larger contractors regularly 'drop them' in the middle of a loading operation to answer the call of the larger companies for transport, given the more regular and longer term period of these contracts. One result is that they can lose up to 10% of the value of wood because its stands cut for long periods and is classified 'dry' (with a concomitant wait of months for income to pay labourers for tasks done long before). This group bemoans the lack of dedicated funds for contractor development, and their own efforts to raise funds from the European Union supported Gijima Local Economic Development Fund amounted to nothing after their application was accepted, but no due diligence done by the fund, as promised. **Box 7.1** summarises the many challenges faced by small scale growers and transport contractors as at mid-2010.

The sawmiller who leads an association of 18 emerging sawmillers in the Eastern Cape reports on very good relations with DAFF in that province and nationally, with price support on DAFF plantation timber secured. He maintains that they listen to members, assist greatly on the matter of pricing and try to address road conditions. However, he maintains that the Department of Trade and Industry approved grants for the establishment of his joinery shop, but 'nothing happened'. Road conditions to his major markets in Pondoland hardware stores were reportedly poor, including Lusikisiki, Bizana, Flagstaff, Port St.Johns, Matatiele and Mount Fletcher.

He is planning to expand a second sawmill to 10,000 cubic metres per annum if he secures a tender for three DAFF plantation forests near Mount Frere, Tabankulu and Mount Ayliff which have not been transferred. Doing all the work from clear felling to transporting to the sawmill, he is planning to expand his fleet of two 8 tonne trucks, which currently handle 90% of his timber transport. Established timber hauliers do the balance, which is over 50km from his mill radius. He reports that roads to the DAFF plantations 'gate' are 'O.K' but not regularly maintained, with internal roads not maintained while graders are 'standing'. His operations could expand even further, increasing output of saw timber and furniture related products to Gauteng and Pietermaritzburg immediately, if the relevant (unspecified) rail links were revitalised.

Box 7.1: Challenges faced by Small Scale Growers and Transport Contractors

Grower/contractor Nkosi Nkosinathi Zulu told me that the costs of moving timber to the pulp market are high. Transport over a 43 km distance is costing R96 per tonne. Harvesting and extraction costs up to R80 per tonne as timber has to be physically carried out of compartments. Currently pulp prices are hovering around R350 per tonne which leaves the grower with R174 before the deduction of growing costs. The net profit might be R74 per tonne or R2,200 per ha after eight years. This reflects an annual income of R277- hardly a reasonable return.

Walter Ntuli, a prominent Samungu farmer and timber grower, told me that the community has been waiting for assistance and hoping for interventions, but nothing has manifested itself on the ground. They have never received government support and currently industry is only there when it suits them- to procure timber. The question they are asking is what can be done and by whom? Ultimately they feel that unless there is effective intervention and assistance, there is no future for sustainable timber production.

In my view, the regeneration of small scale grower plantations and sustainable development can be achieved if the following issues are dealt with:

- **Infrastructure: most of the rural areas where forestry development has taken place historically lack basic infrastructure. It is commonly known that the lack of access road infrastructure places a major cost and risk burden on small scale growers. Generally speaking the harvesting and transport costs are anything from 40% to 60% more than those of commercial growers, and this is not only driven by small plantation areas**.
- **Sustainability: a strong institutional structure is required to ensure sustainability. Research and practice have shown that support in its current format is unsustainable as no economies of scale can be drawn on for extension support to small scale growers.**

Source: Mack, S.A Forestry. June 2010.

7.3 Future Requirements

Partly covered above, the future requirements in the light of existing and future patterns in the respective sub sector trades, production and processing and exports are obviously for an overhaul and upgrade of the rail network , new infrastructure in the north eastern Cape (both road and rail), and improvements to the condition of the secondary road network. More fruitfull engagement with transport authorities and forums at provincial level is anticipated by some of the larger organisations, particularly with the new national and provincial emphases on infrastructure planning and spend. Both rail and port tariffs will continue to be an issue that needs to be managed (downwards) by the authorities in conjunction with the industry players. Details of specific planning and projects are provided in **Table 8.1**.

For the smaller grower organisations and contractors, priorities are:

- Greater support from district and local levels in planning and investing in improved transport infrastructure for secondary transport operations, either district or local roads;
- Dedicated funding to enhance the improvement and expansion of the respective operations on the larger land reform projects, and thereby increase their participation in meeting industry targets;
- Targeting of both the EPWP and Community Agricultural Support Programme by the small scale grower authorities in DAFF for a joint public-private programme of support around (to be) clearly identified needs and priorities in transport infrastructure-both on secondary roads and in field to clearly defined loading zones (in support of the harvesting and shorthaul contractors operations);
- Either with the Community Agricultural Support Programme or as stand-alone support, technical and financial support should be given to emerging contractors, both in secondary transport operations and in field harvesting and shorthaul operations. The support scheme for secondary transport contractors currently being put in place by a small scale grower support organisation should be replicated within appropriate forms of public private partnerships beyond southern KwaZulu Natal to the other provinces, with due considerations given to any copyright issues. One end objective here should be to get these contractors to participate in the RTMS across the provinces, thus achieving payload efficiencies, reducing secondary road wear, fuel consumption and concomitant emissions;
- Targeted once off investments by the provincial DOT's into well planned and negotiated weighbridges and into bypasses at relevant towns across the provinces would make a significant difference to all transport operators;
- Future Planning in the north Eastern Cape: Section 4.2 highlighted the predominant areas for the further expansion of afforestation as being in the north Eastern Cape. Consultations with the Eastern Cape Rural Finance Corporation indicate that R100 million of a planned R3.2 billion for these developments has been raised, and that detailed planning is in progress with approximately 50,000 ha in sixteen separate locations. The specific requirements for transport infrastructure to facilitate these investments are indicated in **Table 7-2**. These projects should be read along with the General Projects identified in **Table 8.1**.

Table 7-2: General Projects: Transport Infrastructure for New Afforestation in Northern Parts of Eastern Cape

Road: Name and Type	Requirement	Timeline
Flagstaff to Mkambati local	Upgrade and realignment	Immediate
Bizana to Port Edward: District	Upgrade	Immediate
Bizana Port Edward feeder/ roads to residential, forestry and agricultural areas for North Pondoland timber	Upgrade gravel roads	Immediate and up to 5 years
Access roads from large forestry sites to Matatiele to Mt Fletcher District road	Upgrade gravel access roads, both local and district	5-10 years
Ntwenka access road to Maclear-Tsolo District road	Upgrade and realign to carry timber loads	3 years

Road: Name and Type	Requirement	Timeline
Road from the R56 from Katkop (near Maclear) along plateau past Ntumbeni Village to Sulenkama village	a) access road b) log transport	a) immediate b) align for log transport in 10 years
Road from Sulenkama village through Etwa plantation towards Ntaboduli plantation, linking with above road	a) access road b) log transport	a) Immediate b) align for log transport in 10 years
Rail: From Maclear to Matatiele	Install. One of Eastern Cape rail gaps	5 years

Source: Keet, Eastern Cape Rural Finance Corporation (May 2012)

8. Barriers, Challenges and Opportunities in Meeting Forestry Transport Needs

8.1 Introduction

Foregoing chapters have detailed how the creation of a sustainable transport system and in particular providing enough capacity for the movement of timber products in a changing economic environment is, one of the most critical sustainability issues for the forestry sector. Although transportation infrastructure provision is not a core responsibility of DAFF, it is mandated to promote the forestry sector by achieving increased transport choices.

The department therefore has a responsibility to keep the issue 'live' and to influence and promote more sustainable movement of forestry products as part of the sustainable development of the sector.

This summary chapter presents challenges facing forestry in meeting their forestry transport needs, and the opportunities brought about by these challenges are outlined for the department.

8.2 A Profile of Transport Infrastructure Issues and Needs

The profile of the transport infrastructure needs for the forestry sector reflects the following:

- Poor condition of both road and rail infrastructure due to a poor maintenance programme;
- Shortfalls in capacity in both the road and rail network;
- Poor connectivity between different aspects of the modes (intermodal) in the forestry transport infrastructure;
- Changing national and global market conditions and the trends towards a green economy, which can determine increases or decreases in demand for transport infrastructure regionally and sub regionally;
- Slow progress with most new afforestation, with long time frames for it to make significant demands on transport infrastructure;
- Institutional complexity in both transport planning and in support arrangements provincially, and at district and local levels, leading to limited responsiveness to forestry transport infrastructure requirements;
- Poor alignment of public works programmes with the demands of small scale growers and contractors' transport needs; pressures on the performance of forestry transport due to energy price and supply insecurities and:
- Immediate requirements for support for new afforestation in the north Eastern Cape.

8.3 Barriers to Meeting the Transport Infrastructure Needs

Obstacles that have the potential to hamper provision of forestry transport are;

- The inability to match capacity to demand;
- The elimination of operational characteristics that result in bottlenecks;
- The limited network connectivity between the different modes of transport;
- The availability of funding for the required transport infrastructure investment (currently being overcome in rail);
- Aligning funding with corridor utilisation and demand; and

- The speedy finalisation of Transnet's branch line strategy.

8.4 Required Infrastructure Programme for Future Years

Based on the findings of investigations discussed in previous sections, **Table 8-1** provides a summary of the identified infrastructure constraints and the required actions in order to address them and ensure good levels of service to the forestry industry. The following types of actions are shown:

- Rehabilitation of roads in poor condition;
- Continued road maintenance of forestry road network;
- Rehabilitation of rail in poor condition;
- Addressing capacity constraints on the road network;
- Addressing capacity constraints on the rail network;
- Branch line concessioning;
- Improving Intermodal facilities; and
- General projects.

The table also indicates the responsible implementing agencies; generally SANRAL, provincial road authorities, Transnet, DAFF and DOT. Projects have been categorised according to the following timelines (in line with the requirements of NATMAP):

- Short term or current: 2012 to 2015;
- Medium term: 2015 to 2020; and
- Long term: 2020 to 2030.

The cost estimates for road rehabilitation and road maintenance should be considered as first order cost estimates, and were based on the following assumptions:

- A two-lane road, with road width of 3.6m;
- An assumption that a road in a poor or very poor condition will require a heavy rehabilitation in order to reinstate the road into a very good condition;
- An assumption that the road network will require periodic maintenance in the form of a reseal, with a frequency of once every 6 years;
- Unit rates of R1 000 per m^2 for heavy rehabilitation, and R110 per m^2 for reseal (based on unit rates obtained from the Mpumalanga Road Management System).

Table 8-1: Summary of Infrastructure Upgrades Required to Forestry Transport Network

Issue	Actions to perform	Specific areas to address		Timeframe	Already addressed in current planning?		Implementing agency	First order cost estimate (R mill)	Comment
		Province	Route description		Yes/No	If yes, name the plan			
Poor road condition; improve all roads to condition of fair or better	Road rehabilitation (about 160km of roads in poor or very poor condition)	Eastern Cape	Sections of the R61 around Port St Johns (see condition map)	2012-2015	To certain extent in the provincial road rehabilitation programmes. However, DAFF and DOT to coordinate with provinces to ensure these areas are being addressed.	Provincial maintenance and rehabilitation programmes	SANRAL and provincial roads authorities	1 150	Based on assumptions as described above
			Sections of the R66 around the border with KwaZulu Natal (see condition map)	2012-2015					
	Road rehabilitation (about 1 500km of roads in poor or very poor condition)	KwaZulu Natal	Sections of the R69 and R34 around Vryheid (see condition map)	2012-2015				10 800	Based on assumptions as described above
			Sections of the R68, R66 and R34 around Melmoth (see condition map)	2012-2015					
			The R74 and R622 around Greytown (see condition map)	2012-2015					
			Sections of the R33 around Dundee (see condition map)	2012-2015					
			Sections of the N2 around Richards Bay (see condition map)	2012-2015					
			Sections of the R56 and R603 around Richmond (see condition map)	2012-2015					
			Sections of the R612 and R617 around Ixopo (see condition map)	2012-2015					
	Road rehabilitation (about 450km of roads in poor or very poor condition)	Mpumalanga	Sections of the N11 and N2 around Ermelo (see condition map)	2012-2015				3 200	Based on assumptions as described above
			Sections of the R543 around Piet Retief (see condition map)	2012-2015					
	Road rehabilitation (about 250km of roads in poor or very poor condition)	Western Cape	Sections of the R303 around Citrusdal (see condition map)	2012-2015				1 800	Based on assumptions as described above
			The R339 between Uniondale and Knysna (see condition map)	2012-2015					
			Sections of the N2 and the R406 between Caledon and Riviersonderend (see condition map)	2012-2015					
	Road rehabilitation (about 100km of roads in poor or very poor condition)	Limpopo	Sections of the R36 between Tzaneen and the border with Mpumalanga (see condition map)	2012-2015				720	Based on assumptions as described above
Continued road maintenance	Road maintenance (1 864km of forestry road network)	Eastern Cape	All of forestry road network in the province	2012-2030	To certain extent in the provincial road	Provincial maintenance	SANRAL and provincial roads	250/yr	Based on assumptions as described above

Issue	Actions to perform	Specific areas to address		Timeframe	Already addressed in current planning?		Implementing agency	First order cost estimate (R mill)	Comment
		Province	Route description		Yes/No	If yes, name the plan			
	Road maintenance (4 261km of forestry road network)	KwaZulu Natal	All of forestry road network in the province	2012-2030	rehabilitation programmes. However, DAFF and DOT to coordinate with provinces to ensure these areas are being addressed.	and rehabilitation programmes	authorities	560/yr	Based on assumptions as described above
	Road maintenance (3 122km of forestry road network)	Mpumalanga	All of forestry road network in the province	2012-2030				410/yr	Based on assumptions as described above
	Road maintenance (1 770km of forestry road network)	Western Cape	All of forestry road network in the province	2012-2030				230/yr	Based on assumptions as described above
	Road maintenance (1 158km of forestry road network)	Limpopo	All of forestry road network in the province	2012-2030				150/yr	Based on assumptions as described above
Poor rail condition	Additional passing loops, alignment improvement	Eastern Cape	East London – Springfontein	2020 - 2030	Yes	Transnet's Infrastructure Plan (TIP)	Transnet	295	
	Line doubling, electrification with CTC signal	KwaZulu Natal	Richards Bay to Durban	2020 - 2030	Yes	TIP	Transnet	3595	
	Partial doubling	KwaZulu Natal	Richards Bay to Swaziland	2010 - 2015	Yes	TIP	Transnet	160	
	Upgrading to 81mpt, includingOvervaal tunnel and grade separation	KwaZulu Natal	Richards Bay to Mpumalanga border	Not confirmed	Yes	TIP	Transnet	6 000	
	Upgrades and passing loops	Limpopo	Makhado – Polokwane	2020 - 2030	Yes	TIP	Transnet	230	
	Upgrades and passing loops	Limpopo	Groenbult - Limpopo border	2010 - 2015	Yes	TIP	Transnet	120	
Road capacity constraints	One lane addition (175km of forestry road network)	Eastern Cape	Sections of the N2 and M4	2020 - 2030	Yes	NATMAP 2050	SANRAL / Provincial Roads Authorities	918.75	NATMAP 2050 has envisaged R13 470 million to provincial and national road network
	One lane addition (48km of forestry road network)	Gauteng	Sections of the N1, N3, N4, N12, N17, R21, R24	2020 - 2030				252	NATMAP 2050 has envisaged R7 259 million to provincial and national road network
	Two lane additions (97km of forestry road network)		Sections of the N1, N3, N12, R21	2020 - 2030				829.5	
	Three lane additions (146km of forestry road network)		Sections of the N1, N3, N4, N12, R21	2020 - 2030				2299.5	
	One lane addition (614km of forestry road network)	KwaZulu Natal	Sections of the N2, N3, N11, R34, R61, R602, R620	2020 - 2030				3223.5	NATMAP 2050 has envisaged R22 815 million to provincial and national road network
	Two lanes addition (84km of forestry road network)		Sections of the N2 and N3	2020 - 2030				882	
	Three lanes addition (58km of		Sections of the N2 and N3	2020 - 2030				913.5	

Issue	Actions to perform	Specific areas to address		Timeframe	Already addressed in current planning?		Implementing agency	First order cost estimate (R mill)	Comment
		Province	Route description		Yes/No	If yes, name the plan			
	forestry road network)								
	Lane addition (280km of forestry road network)	Limpopo	Sections of N1, R36, R523, R524, R71	2020 - 2030				1470	NATMAP 2050 has envisaged R2 114 million to provincial and national road network
	Lane addition (723km of forestry road network)	Mpumalanga	Sections of N4, R38, R40, N17	2020 - 2030				3795.75	NATMAP 2050 has envisaged R1 637 million to provincial and national road network
	One lane addition (850km of forestry road network)	Western Cape	Sections of the N1, N2, N7, N9, R44, R46, R303	2020 - 2030				4462.5	NATMAP 2050 has envisaged R35 060 million to provincial and national road network
	Two lane additions (32km of forestry road network)		Sections of the N1, N2, M7, R44	2020 - 2030				336	
	Three lane additions (93km of forestry road network)		Sections of the N1, N2, M7	2020 - 2030				1464.75	
Rail capacity constraints - add new capacity	New infrastructure required	KwaZulu Natal	Durban to Pennington, where capacity utilisation falls within the categories of 95% to 130%.	2010-2015	No	-	Transnet		
	New line or doubling of lines	KwaZulu Natal	Pietermaritzburg to Estcourt. Capacity utilisation is expected to be greater than 130%.	2020-2030	Yes	TIP	Transnet	272	Planned for completion by 2022
	Limited infrastructure upgrades	KwaZulu Natal, Mpumalanga	Vryheid to Ermelo. The section Vryheid to Piet Retief operate at a capacity utilisation of 60% to 80% (“moderate traffic”), and the section just south of Ermelo operate at a capacity utilisation of 80% to 95% (heavy traffic)	2010-2015	Yes	TIP	Transnet	6997	Planned for completion by 2015 (upgrade to 81mtpa capacity). Cost from TIP. Excludes the cost for the new Lothair-Golela line, and further plans to upgrade Coalline to 81+mtpa.
	Infrastructure upgrades	KwaZulu Natal, Mpumalanga	Richards Bay to Ermelo. Capacity utilisation is expected to fall within the categories of 80% to 105%.	2015-2020					
	New infrastructure required, as well as new lines or doubling of lines	KwaZulu Natal, Mpumalanga	Richards Bay to Ermelo. Capacity utilisation is expected to fall within the categories of 95% to 130% and greater.	2020-2030					
	Infrastructure upgrades	Mpumalanga, Limpopo	Kaapmuiden to Phalaborwa. Capacity utilisation is expected to fall within the category of 95% to 105%.	2015-2020	Yes	TIP	Transnet	120	Planned for completion by 2013. Cost from TIP.
	New line or doubling of lines	Mpumalanga, Limpopo	Kaapmuiden to Phalaborwa. Capacity utilisation is expected to be greater than	2020-2030					

Issue	Actions to perform	Specific areas to address		Timeframe	Already addressed in current planning?		Implementing agency	First order cost estimate (R mill)	Comment
		Province	Route description		Yes/No	If yes, name the plan			
			130%.						
	Limited infrastructure upgrades	Mpumalanga	Belfast to eMalahleni (Witbank). Capacity utilisation is expected to fall within the category of 80% to 95%.	2015-2020	Yes	TIP	Transnet	2652	Planned for completion by 2020. Cost from TIP.
	New line or doubling of lines	Mpumalanga	Kaapmuiden to eMalahleni (Witbank). Capacity utilisation is expected to be greater than 130%.	2020-2030	Yes	TIP	Transnet	(included in above cost)	Planned for completion by 2020. Cost from TIP.
	Infrastructure upgrades	Western Cape	Worcester to Cape Town. Capacity utilisation is expected to fall within the category of 95% to 105%.	2015-2020	Yes	Transnet Infrastructure Plan (TIP)	Transnet	681	Planned for completion by 2019. Cost from TIP. Cost represent works planned for the line De Aar to Bellville
	New line or doubling of lines	Western Cape	Worcester to Cape Town. Capacity utilisation is expected to be greater than 130%.	2020-2030					
Branch lines concessioning	Implement branch line concessioning as soon as possible. Specifically the Pietermaritzburg link cluster, which contains a number of lines that have the potential to carry significant volumes of forestry products.	KwaZulu Natal	Pietermaritzburg link cluster	2015-2020	Yes (although delayed)	Transnet branch line concessioning programme	Transnet	N/A	Transnet to consider providing support to concessionaire with regards to capital investment, in order to ensure financial feasibility. Transnet also to consider giving access to operator on main line (i.e. start to finish trip) in order to reduce number of handlings.
General Projects									
Increased shift of freight products from road to rail	Promote the shift of forestry products (specifically pulp) from road to rail, with the focus on main corridors for forestry products	KwaZulu Natal, Mpumalanga	Ermelo to Richards Bay to Durban; Durban to Pietermaritzburg to Ixopo to Pennington; Pietermaritzburg link branch line cluster	2012-2020	Yes (although delayed)	Transnet branch line concessioning programme	Transnet	N/A	
Align forestry industry to operate under conditions of low fuel supply	Promote fuel efficiency measures (vehicles, technology, driver training); participate in RTMS and PBS programmes; promote a shift of transport of forestry products from road to rail	All	All of forestry road and rail network	2012-2020	Not sufficiently	-	DAFF, DOT	N/A	

Issue	Actions to perform	Specific areas to address		Timeframe	Already addressed in current planning?		Implementing agency	First order cost estimate (R mill)	Comment
		Province	Route description		Yes/No	If yes, name the plan			
Forestry industry to have high level of participation in RTMS and PBS programmes	Promote industry participation in RTMS and PBS programmes; consider financial support to the programmes (they are not financially sustainable at current).	All	All of forestry road and rail network	2012-2020	To certain extent	The programmes are driven by technical committees. DAFF should however include formally in their planning as well.	DAFF, DOT	N/A	

9. Infrastructure Requirements for the Forestry Sector

9.1 Review of Project Objectives

The goal of the project was to assess the forestry transport infrastructure requirements. In line with this goal, eight objectives were stated in the Terms of Reference, as described in **Section 1.3**.

Table 9-1 provides a review of the eight project objectives, and a summary of the main findings related to each of them.

The rest of this Chapter will provide a brief summary (with reference to the previous chapters) of the findings and recommendations on infrastructure and operational requirements, in order to meet current and future needs of the forestry sector. This Chapter will also identify the key role players that need to act on the findings of this project.

9.2 List of Recommendations to Key Departments

DAFF, as the custodian of the forestry sector in South Africa, should take ownership of the findings of the study, and should liaise with DOT, SANRAL, Transnet, provincial transport authorities and other relevant organisations to ensure implementation of the findings of the study. The needs of the forestry sector, as reported in this study and in the feedback received from questionnaires, should be communicated to these agencies, clearly aligned with their own planning, implementing and budgeting schedules and cycles and DAFF should monitor progress on projects together with the respective organisations to ensure continual promotion and implementation.

The DOT Technical and Financial Committee of NATMAP should take account of the infrastructure projects required to address constraints in the transport of forestry products, as summarised in **Table 8-1**. DOT should ensure that these projects are implemented at the relevant government level. It is noted that budget constraints at provincial and district level may delay implementation of certain of the projects. DOT is requested to consider, from a strategic importance point of view, providing financial assistance to provincial and district road authorities to ensure timely implementation of road improvement projects related to the forestry sector.

Transnet should take account of the following:

- The extent of the forestry transport rail network, and the specific importance of the corridor from Ermelo to Richards Bay and Durban, and the “half circle” from Durban to Pietermaritzburg to Ixopo and Pennington;
- The high potential for the transport of forestry products in the Pietermaritzburg link cluster. This should be treated as a priority branch line concessioning project. Transnet should consider assistance to the concessionaire to ensure that branch lines are in a fair condition before takeover by the concessionaire;
- Ensure implementation of projects affecting the forestry transport rail network, as summarised in earlier sections.

Provincial road authorities should take note of the extent of the forestry transport road network, and the areas of poor condition on this network as identified in earlier sections, and address these as a matter of priority.

Table 9-1: Review on Project Objectives

No	Project Objective	Reference Chapter	Main Findings
1	Assessment of the transport requirements for the Forestry Sector	Chapter 8	An assessment was made of the status quo of transport infrastructure (see discussion under objective 2), as well as the future needs of transport infrastructure. A transport model was developed to investigate future forestry traffic patterns, and to assess its impact on the forestry transport network infrastructure. Two scenarios were considered, namely a scenario where the current trend of mainly road-based transport continues, or a new scenario where rail takes over a significant portion of forestry traffic. The assessment of status quo and future conditions allowed the listing of specific requirements in terms of transport infrastructure, for the forestry sector. These requirements were categorised as follows: • Rehabilitation of roads in poor condition; • Continued road maintenance of forestry road network; • Rehabilitation of rail in poor condition; • Addressing capacity constraints on the road network; • Addressing capacity constraints on the rail network; • Branch line concessioning; • Improving Intermodal facilities; and • General projects.

No	Project Objective	Reference Chapter	Main Findings
2	Determine the status of the transport infrastructure in provinces with the potential for Forestry Development (KwaZulu Natal; Eastern Cape; Mpumalanga; Western Cape and Limpopo)	Chapter 3	The project identified a "forestry transport network", consisting of about 12 175 km of road network and 6 359 km of rail network. This network was considered as of strategic importance for transport of forestry products. The status of this network was investigated in terms of condition, usage (i.e. traffic levels), and levels of service (i.e. traffic in relation to capacity). Most of the road network (40% and 33%) was found to be in a good or fair condition, with only 23% (mostly in KwaZulu Natal) being in a poor or very poor condition. Most of the rail network however was classified as being in a "warning" or "poor" condition, with the condition on some lines (mainly branch lines) being unknown. Forestry traffic was found to be heaviest in KwaZulu Natal and Mpumalanga, with a major "forestry transport corridor" stretching from the south eastern parts of Limpopo, through Mpumalanga to Richards Bay and Durban in KwaZulu Natal. Most of the traffic was found to be transported by road. Levels of service (LOS) on the road network were found to be generally good (i.e. LOS A to C). All provinces however had specific areas with capacity constraints, which were pointed out. Capacity utilisation on the rail network was also generally low (i.e. spare capacity available), except for specific sections around Durban and between Ermelo and Vryheid.
3	Investigate whether afforestation plans in Eastern Cape and KwaZulu Natal are depicted in	Chapter 4	An assessment was made of the afforestation plans for the provinces Eastern Cape and KwaZulu Natal, and also for Limpopo, Mpumalanga and

No	Project Objective	Reference Chapter	Main Findings
	transportation plans	Chapter 6	Western Cape. Possible forestry development areas have been identified and quantified, with Eastern Cape and KwaZulu Natal showing the biggest potential for future expansion of forestry areas (about 100 000 ha and 40 000 ha respectively). The extent to which these plans were taken into account in national, provincial and district plans were assessed as part of objectives 4 and 5 below (and are further discussed under these objectives).
4	Review national, provincial and district road and rail transport plans	Chapter 6 Chapter 8	A review was done of the national transport plans (the National Transport Master Plan (NATMAP) 2050), provincial and district transport plans (Provincial Land Transport Frameworks, district Integrated Transport Plans) and rail transport plans (Transnet's Infrastructure Plan), to identify the extent to which they base their planning on the forestry sector, and the extent to which their planning caters for the forestry sector needs. Generally it was found that district plans did not include an assessment of or recommendations on forestry transport needs, including access roads to forestry plantations. On provincial level, some provinces acknowledged the importance of forestry as an economic sector, and the need to invest in appropriate infrastructure. The NATMAP 2050 included an assessment of the forestry sector and incorporated expected future growth in this sector into its transport model. Transnet's Infrastructure Plan also took into account expected future growth in the forestry sector. After identification of current and future transport infrastructure requirements for the forestry sector, a comparison was made of the requirements versus

No	Project Objective	Reference Chapter	Main Findings
			current planning at national, provincial and district level (Chapter 8). The general findings were as follows: • Road rehabilitation and maintenance was to certain extent included in rehabilitation and maintenance programmes. NATMAP 2050 also highlighted the need for continued maintenance, and included this into its programmes; • Road capacity upgrades were included in NATMAP 2050; • Most of the required rail rehabilitation and capacity upgrades were included in the Transnet's Infrastructure Plan.
5	Investigate whether infrastructure programmes of governments (i.e. Expanded Public Works Programme (EPWP); Comprehensive Agricultural Support Programme; and, other road infrastructural programmes) do not address issues of forestry transport adequately	Chapter 6	A review was done of the Expanded Public Works Programme (EPWP) and the Comprehensive Agricultural Support Programme (CASP), to identify the extent to which they address forestry infrastructure needs. The EPWP planned the rehabilitation of various access (generally lower order) roads throughout the country. Although the programme does not specifically target the forestry industry's needs, some of the road works included in their plan may benefit the sector's activities. However, the impact on higher order roads forming part of the forestry transport network is limited. The CASP was found to target agricultural small holders, subsistence or commercial farmers only. There was no direct evidence that the CASP is directly targeting the transport infrastructure needs of forestry's small scale grower sector.

No	Project Objective	Reference Chapter	Main Findings
6	Profile the transport infrastructure challenges and recommendations per sub-sector	Chapter 3 Chapter 4 Chapter 5 Chapter 8	An assessment was made of challenges and opportunities in the forestry sector. This was based on review of documentation, as well as the consultation process with the forestry industry role players. Challenges included infrastructure constraints (condition and capacity of infrastructure; although most of the network were found to be in fair or even good condition, some specific and current problem areas were identified, and the future problems were identified) and operational constraints (for road and rail), as well as other more general challenges (policy and regulations on freight modes, climate change, depletion of oil, technology changes in harvesting and processing, Road Transport Management System and Performance Based Standards). Opportunities were identified and discussed including areas for possible future expansion of forestry plantations (specifically in the Eastern Cape), new opportunities and markets related to the ligucellulose sector and opportunities for private sector to become involve in the transport of forestry products on the Pietermaritzburg Branch Line Cluster.
7	Ensure opportunities as identified in the Forestry Transformation Charter are aligned to the transport infrastructure requirements	Chapter 6	Provinces and districts with the potential for Forestry Development (KwaZulu Natal; Eastern Cape; Mpumalanga; Western Cape and Limpopo) are currently taking consideration of forestry development needs and opportunities into their planning. There is however room for improvement as there is insufficient evidence that provincial and municipal plans and programmes sufficiently encompass the transport infrastructure requirements in the forestry sector, especially lower order roads.

No	Project Objective	Reference Chapter	Main Findings
			Observations made from the different transport planning frameworks and plans indicate that the approach to provision of transport infrastructure needs does not single out specific needs for a particular land use – investment in transport infrastructure is rather integrated. The vast network of unproclaimed local roads is of concern, as it impacts negatively on upgrading and maintenance frequencies on these access roads that might hinder provision of transport infrastructure to the forestry sector.
8	Investigate the barriers to the development of forestry transport infrastructure	Chapter 3 Chapter 4 Chapter 5 Chapter 8	This objective was addressed as part of objective 6.

9.3 Infrastructure Requirements for the Forestry Sector

The following types of infrastructure requirements have been identified:

- Rehabilitation of roads in poor condition;
- Continued road maintenance of forestry road network;
- Rehabilitation of rail in poor condition;
- Addressing capacity constraints on the road network;
- Addressing capacity constraints on the rail network;
- Intermodal facilities; and
- General projects.

A summary of all identified infrastructure projects, to cater for current and future needs in the forestry sector, is provided in **Table 8-1**.

9.4 Major Operational Requirements for the Forestry Sector

The following types of operational requirements have been identified:

- The need for branch line concessioning;
- A need for a modal shift from road to rail;
- The need for the forestry sector to further develop its capacities to respond to conditions in climate change with public sector programmes, particularly in renewable energies, in order to address the fuel and energy scenarios provided;
- Increased participation of the sector in self-regulation programmes (RTMS, and the related PBS).

References

Blake, N. (1998); *Using the web in undergraduate education*. Journal of Educational Computing, 5, (2), 234-251.

Blake, N. (1999a); *The promise of mobile technologies for education*. Edulink 3 (2).

Blake, N. (1999b); *Higher Education in the 21st Century*. New York: University Press.

Cervini, R. 2012; *Infrastructure for Climate Change: United Nations Economic Commission for Africa-World Bank. Addis Ababa*. February 8, 2001 http://www.joburg.ac.za/edtech/pubs/edulink/992/blake.html.

Davis, K. (1987); *Computer-based training for accountants*. Unpublished doctoral thesis, Rand Afrikaans University, Johannesburg, South Africa.

De Jongh, H. *Exciting future for forest products.S.A Forestry magazine*. Accessed April 10, 2012 http://www.saforestrymag.co.za/articles/detail/exciting_future_for_forest_products

Department of Agriculture, Forestry and Fisheries; (2009). *Forestry 2030 Roadmap* (Forestry Strategy 2009-2030). Pretoria.

Department of Agriculture, Forestry and Fisheries: Forestry Branch (2008/2009); *Report on Commercial Timber Resources and Primary Roundwood Processing in South Africa*. Pretoria.

Department of Environment; 2011; *National Climate Change Response White Paper*, Pretoria

Department of Public Enterprises; 2010; *New Growth Path*. Accessed December 1, 2011. www.info.gov.za/view/DownloadFileAction?id=135748

Department of Trade and Industries; 2011; *Industrial Policy Action Plan 2011/2012. Economic Sectors and Employment Cluster*; Pretoria.

Department of Transport. 2005. *National Freight Logistics Strategy*. Pretoria.

Department of Transport. 1996. *White Paper on National Transport Policy*. Pretoria.

Department of Transport. 2010. *National Transport Master Plan (NATMAP) 2050: The Implications of Global Oil Depletion for Transportation Systems in South Afric*a. Pretoria.

Education Trust. (1999). *Using videos in your classroom [Brochure*]. Sandton: Eduprint.

Education Trust. (2000). *Issues in the use of educational technologies: Report to the Executive Committee*. (Available from S. Landry, Education Trust, 501 Grayston Drive, Sandton, South Africa).

Forestry South Africa. 2011. *Forestry Sector's Concerns Regarding the Railage of Timber and Possible Solutions*. Overhead received from FSA November 2011.

Forestry South Africa. 2010. *Results of the FSA Investigation into the Situation Regarding the Transport of Timber by Rail during the Last Five Years*.

Forestry South Africa. 2011. *Results of the FSA Survey to Determine Current Volume of Timber Railed vs The Potential volume that the Industry would like to rail given the appropriate circumstances*.

Genesis Analytics. 2005. *The Contribution, Costs and Development Opportunities of the Forestry, Timber, Pulp and Paper Industries in South Africa*. Johannesburg.

Godsmark, R. 2009. The South African Forestry and Forest Products Industry. Forestry South Africa. Overhead received from FSA. November 2011.

Government Gazette No 32320. June 2009. Forest Sector Code. Government of the Republic of South Africa. Pretoria.

Hassall, K and Thompson, R.G. 2010. Estimating the Benefits of Performance Based Standards Vehicles. Transportation Research Record. Committee AT055 Motor Vehicle Size and Weight. Paper Number 11 – 1628.

Havenga,J and Swanepoel, M. 2012. Carbon Tax will push up S.A. transport bill by up to R6 billion. Stellenbosch University Centre for Supply Chain Management. Stellenbosch.

Johnson, L. (n.d.). Will technology save the education system? Retrieved January 16, 2000, from http://www.netscape.com/users/johnl/save.html

Jones, T. 2002. The Freight Transport Sector, 1970-2000, in S. Jones (ed), The Decline of the South African Economy. Edward Elgar. Cheltenham.

KwaZulu Natal Department of Transport. 2003. KwaZulu- Natal Freight Data Bank

Limpopo Provincial Department of Roads and Transport. 2006. Limpopo Freight Data Bank

Mellers, A. (1998). Transform your classroom with technology [CD]. Sacramento: Crunch Pod Media.

Mpumalanga Department of Works Roads and Transport. 2010. Mpumalanga Province Freight Data Bank

Mack, R. June 2010. Small Growers on the Ropes. S.A Forestry. Artworks. Durban.

National Productivity Institute. 2006. Brochure on the Road Transport Management System. Pretoria.

Nordengen, P. 2011. The Road Transport Management System and observed successes in South Africa. RTMS National Steering Committee.Presentation for MCLI AGM & Conference. Maputo.

Nordengen, P.A., Armstrong, D. and Pretorius, R. 2009.Performance Based Standards for Heavy Vehicles: Monitoring report on two PBS vehicles operating in the forestry industry: Nov 2007 to July 2008. Report number: CSIR/BE/ISO/IR/2009/0067/B. GWDMS No: 147643.

Nordengen, P.A. and Piennaar, N. 2007. The Road Transport Management System (RTMS): A Self-Regulation Initiative in Heavy Vehicle Transport in South Africa. Paper presented at the 26th South African Transport Conference. Pretoria.

PBS Steering Committee.2007. Performance-Based Standards (PBS) Strategy for Heavy Vehicles in South Africa. (published where ?)

Rampedi, M. February 2012. The South African Forest Sector and the Green Economy. S.A. Forestry. Artworks. Durban.

Robert, K. 10 April 2012. Interview with Mr K Robert (DOT representative on the RTMS Technical Committee) on the status of RTMS implementation in South Africa.

RTMS National Steering Committee. 2011.*Progress of the Road Transport Management System (RTMS): A voluntary standard adopted by various stakeholders in the broader South African transport sector*. Department of Transport.

Transnet. National Infrastructure Plan. 2009. Johannesburg.

Tyson, T., Burke, R.L., & Jacobs, G.M. (1994, May). *Preliminary findings regarding the use of computers in secondary schools*. Paper presented at the meeting of the South African Association of Teachers, Bloemfontein, South Africa

Websites:

Department of Transport. 2011. *Road Freight Strategy for South Africa*. Final Draft. Accessed on April 4th; http://www.agbiz.co.za/LinkClick.aspx?fileticket=eEDB8eDPB4Y%3D&tabid=113 (accessed on 4 April 2012).

Engineering News: http://www.engineeringnews.co.za/article/carbon-tax-will-push-up-sa-tran...

Mondi South Africa: http://www.mondigroup.com/desktopdefault.aspx/tabid-349/

Port of Durban: www.iss-shipping.com

Sabinet. 2012. *Rail Policy: Draft Green Paper Yet To Be Finalised*. Available from: http://www.sabinetlaw.co.za/transport/articles/rail-policy-draft-green-paper-yet-be-finalised (accessed on 4 April 2012).

S.A. Forestry: http://www.saforestrymagazine.co.za/

Sappi Ltd. http://www.sappi.com/regions/sa/Pages/default.aspx

Transnet National Ports Authority: http://www.transnetnationalportsauthority.net/

Transnet Port Terminals: http://www.transnetportterminals.net/PortTerminals.asp?Terminal=10

Trains and Rail: http://www.sa-transport.co.za/trains/sa_stations/sta.htlm

Transnet. 2012. *Branch Line Concessions*. Available from: http://www.transnet.net/BranchLines/branchlines.aspx (accessed on 5 April 2012).

Queensland Transport and Logistics Council. Undated. Performance Based Standards (PBS) - What are the benefits of PBS? Available at

http://www.qtlc.com.au/News_And_Projects/Performance_Based_Standards__PBS_/ (accessed on 19 March 2012).

The Technical Working Group.2006. Road Transport Management System

(RTMS) Five Year Strategy. www.rtms.co.za (access on 5 April 2012)