FEASIBILITY STUDY ON RAIL DEVELOPMENT IN LIMPOPO PROVINCE

Final Draft Report

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LIMPOPO PROVINCE

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

List of Abbreviations used

Abbreviation	Definition
CDTC	Capricorn District Taxi Council
DBSA	Development Bank of South Africa
DM	District Municipality
LP DORT	Limpopo Province Department of Roads and Transport
EPTA	Taxi Association
FPTA	Taxi Association
GDP	Gross Domestic Product
GGP	Gross Geographical Product
GLTP	Great Limpopo Transfrontier Park
GSDM	Greater Sekhukhune District Municipality
GTDM	Greater Thubatse District Municipality
IDP	Integrated Development Plan
ITP	Integrated Transport Plan
LGDS	Limpopo Growth and Development Strategy
LM	Local Municipality
LPTC	Limpopo Province Taxi Council
MCLI	Maputo Corridor Logistics Initiative
NFLS	National Freight Logistics Strategy
NPV	Net Present Value
OD	Origin-Destination
PGM	Platinum Group Metals
PPP	Private Public Partnership
SACOB	South African Chamber of Business
SADC	South African Development Council
SADCC	Southern African Development Coordination Conference
SANRAL	South African National Roads Agency Limited
SAPD	South African Police Department
SARCC	South African Rail Commuter Cooperation
SDF	Spatial Development Forum
SDI	Spatial Development Initiatives
SPV	Special Purpose Vehicle
TAU	Transvaal Agricultural Union
TIF	Tax Increment Financing
TIL	Trade and Investment Limpopo

1. INTRODUCTION

Limpopo Province currently enjoys significant economic growth and the medium and long term development outlook is also highly remarkable. The Provincial Government has been formulating relevant development strategies and policies over the last couple of years to encourage and promote the economic growth and development in the region through the systematic identification of local strengths and weaknesses and formulation of specific tasks and activities in this regard.

The Provincial development outlook and potential were strategically outlined in the Provincial Growth and Development Strategy and then taken forward in the sector specific policy and strategy documents. The transport sector is well known as one of the major contributors towards the economic development in a region. The transport infrastructure and facilities provide accessibility and mobility functions to people and goods, therefore promoting and facilitating social and economic activities.

In many countries on most of the continents rail transport has been regarded as a backbone of a transport system providing relatively safe and low-cost transport solutions for medium-to-long distance passenger and freight movements. The role and utilisation level of the rail service has varied as countries and regions went through different development cycles. The development and expansion of the road infrastructure and related services also influenced the development of the rail services to a great extent. The focus should essentially be on the development of an integrated transport system in which every transport mode and infrastructure component is utilised at a level to optimise the overall transport system.

On the basis of the current economic and transport outlook in the Limpopo Province, and the outcome and recommendations of the Integrated Development Planning processes within the Province, the Limpopo Department of Roads and Transport formulated a study to investigate the preliminary feasibility of improving and expanding the rail transport infrastructure and services in the Province as part of the continuous transport system optimisation efforts.

This document outlines all the tasks and activities undertaken during the rail feasibility study as well as the results and recommendations obtained and formulated on the basis of the relevant investigations.

2. BACKGROUND

Limpopo Province is South Africa's fifth largest province, covering over 10% of the country. The region has a population of 5,2 million, which is approximately 12% of the national total. The Province is regarded as a developing area, mostly exporting primary products and importing manufactured goods and services. Indeed, most of the farming is subsistence based. It has been the fastest developing region in the country over the past decade peaking at the annual economic growth rate of 6.1% in 2001. The main contributors to the economy are the trade, manufacturing and mining sectors, whilst the largest industries in terms of their contribution to GDP are mining and quarrying (21.8%) and the general government services sector.

The Province represents one of the most diversified regions in South Africa with regard to the current and potential development sectors. The extensive mineral reserves, suitable climatic and geographic conditions for vegetation and agricultural products, major national and international tourism attractions etc. represent enormous resources for sustainable growth in the long term.

The Limpopo Government is well aware that an effective and efficient transport system is one of the fundamental requirements to achieve sustainable development and economic growth. Simultaneously to the formulation of the development policies and strategies by Provinces, the National Government and transport-related parastatal organisations have been developing and updating the national transport frameworks and master plans identifying and formulating strategic infrastructure projects to fuel the economic growth and achieve growth targets across the country. The National budgets over the last few years indicated significant allocations towards the implementation of the strategic transport infrastructure e.g. improvement and expansion of rail and road networks on the basis of the National transport-related policy recommendations.

The distribution of the national funds and prioritisation of strategic transportation projects now depend on the readiness of the Provincial and Local authorities in terms of the statutory planning processes (e.g. Integrated Development Planning, Integrated Transportation Planning etc.) and other relevant planning investigations to ensure systematic and sustainable transport-related investments.

In this regard, Limpopo Province has initiated the rail transport infrastructure feasibility study with the aim to investigate feasibility of developing the rail network in the Province and ensure appropriate allocations of the National funds.

2.1 Regional perspective

Limpopo Province shares international borders with three countries: Botswana to the west and north-west, Zimbabwe to the north, and Mozambique to the east. The province is the link between South Africa and countries further a field in sub-Saharan Africa. On its southern flank, the Province shares borders with Gauteng, with its Johannesburg-Pretoria axis, the most industrious metropole on the continent. Thus the province is placed at the centre of regional, national, and international developing markets.

Limpopo's location and role as Gateway to Africa within regional context could best be described through the interpretation of objectives and activities of two regional organizations, namely Southern African Development Community (SADC) and New Partnership for Africa's Development (NEPAD).

2.1.1 SADC

The Southern African Development Community (SADC) has been in existence since 1980, when it was formed as a loose alliance of nine majority-ruled States in Southern Africa known as the Southern African Development Coordination Conference (SADCC), with the main aim of coordinating development projects in order to lessen economic dependence on the then apartheid South Africa. The founding Member States are: Angola, Botswana, Lesotho, Malawi, Mozambique, Swaziland, United Republic of Tanzania, Zambia and Zimbabwe.

SADC has adopted the principal of Regional Economic Development Corridors and the related Spatial Development Initiatives (SDI) as a means of promoting regional economic integration and development. The basic premise behind the approach is to view economic activity especially the development of infrastructure such as energy, water, transport and communications in an holistic manner. The approach recognizes the interdependence of sectors and acknowledges that for example, tourism, agriculture, mining or commerce cannot flourish and basic social services cannot be provided to the wider population without an adequate infrastructure. Thus the approach is based on the existence of proven, inherent, underutilized economic development potential and the mobilization of private sector resources to provide the necessary investment and expertise in project appraisal, financing, construction, operation and maintenance.

2.1.2 NEPAD

The New Partnership for Africa's Development (NEPAD) is designed to address the current challenges facing the African continent. Issues such as the escalating poverty levels,

underdevelopment and the continued marginalization of Africa needed a new radical intervention, spearheaded by African leaders, to develop a new Vision that would guarantee Africa's Renewal.

The NEPAD Programme of Action is a holistic, comprehensive and integrated sustainable development initiative for the revival of Africa, guided by focusing on sustainable growth strategies and the principles of good governance, with the objective of, amongst others, building and improving infrastructure, including Information and Communication Technology (ICT), Energy, Transport, Water and Sanitation.

The Programme Implementation Phases of NEPAD have been designed to fast-track identified projects within the region so as to expedite delivery.

In line with the SADC and NEPAD vision and objectives, it is obvious that inland inter-connectivity amongst the regional partners is crucial. This is achieved by road and rail. With the current difficulties faced in moving commodities across Africa, rail presents an alternative mode that could in many ways be more effective.

Figure 1 shows the current rail network inter-connecting the African continent.

Figure 1: Rail Network in Africa

2.2 Provincial transport strategy (Limpopo in Motion)

The Provincial Transport Strategy, known as Limpopo in Motion was completed in 2003 addressing all aspects of the provincial transport system in terms of the development strategy and planning and implementation recommendations. Rail transport and infrastructure feature prominently in the Provincial strategy document.

It was noted in the strategy document that rail transport systems are a national competency and therefore could not attract much of the Provincial attention. It was, though, realised that the current rail infrastructure in the Province is underutilised and could provide possible opportunities for passenger and freight transport generated within Limpopo Province. In this regard, a number of rail-related planning projects were identified and formulated for further investigation to address the following aspects of the rail system:

- Role of rail transport in the Province
- The Modal split between road and rail
- Focus areas for both road and rail transport
- Linkage of rail and other modes of transport, specifically Gateway airport
- The current line capacities
- Utilisation of railway lines and services
- Identification of corridors and routes appropriate for rail transport
- Development of rail network through Public Private Partnerships (PPPs)

The Provincial Strategy also identified the following corridors with definite potential for rail development:

- Limpopo – Gauteng main Line Services
- Urban Commuter Services between Polokwane and Seshego
- Dilokong Corridor Rail Network

Most of the above mentioned aspects and specific corridors were included in the scope of this study for preliminary investigation and feasibility analyses. In fact, this study has been formulated on the basis of the recommendations made in Limpopo in Motion document.

3. PURPOSE AND OBJECTIVES OF THE STUDY

The purpose of this study was to identify and investigate the role of rail transport in the transport system of Limpopo Province and conduct preliminary feasibility analyses for upgrade and/or provision of rail infrastructure along specific development and transport corridors in the Province.

The following study objectives were formulated in this regard:

- To understand and interpret the structure and dynamics of the transport system in Limpopo Province.
- To understand the current status of the rail infrastructure and operations in South Africa and within Limpopo Province.
- To determine the current freight movements with regard to Limpopo Province
- To analyse and interpret the economic development outlook of Limpopo Province
- To project rail-based freight demand relative to the economic growth in the Province
- To identify and analyse significant development and transport corridors in the Province
- To provide preliminary feasibility evaluations for rail infrastructure development
- To formulate recommendations and way forward in this regard
- To consult and involve relevant stakeholders

It must be emphasized that the Provincial Government conducted a rail planning study during 1990s, though no records of such study could be made available at this stage. The current study has, therefore, been regarded as the initial and preliminary in terms of the rail planning process in Limpopo Province and could not address all the aspects at the ultimate level of detail.

It should also be noted and clarified at this stage that the above objectives were formulated at the inception stage of the study prior to the liaison with the primary stakeholders, which consultation process proven to be of the highest importance at this stage of the rail planning process. The stakeholders opinion expressed during the course of the study shifted the emphasis between the study objectives and influenced the documentation of the study activities and findings to large extent.

4. STUDY APPROACH AND METHODOLOGY

In order to understand the approach and methodology applied in this study, it was regarded important to firstly clarify the meaning of ‘feasibility analyses’ in a context of the transport infrastructure planning and analyses.

The word 'feasible' is defined in the international dictionaries as follows:

- "capable of being done, executed or effected"
- "capable of being managed, utilized or dealt with successfully"
- "reasonable, likely".

In the context of the transportation planning terminology the meaning of 'feasibility' has the following parts as discussed and suggested in the Procedural Guidelines for Highway Feasibility Studies (published by Federal Highway Administration, US Department of transportation):

- the degree to which a given alternative facility, infrastructure, mode, management strategy, design or location is economically justified.
- the degree to which such an alternative is considered preferable from an environmental or social perspective.
- the degree to which eventual construction and operation of such an alternative can be financed and managed

In other words, the comprehensive feasibility investigations of a transport infrastructure should consider three main feasibility components, namely *Economic, Environmental (Social) and Financial* components.

4.1 Economic evaluation

Economic justification is typically a baseline consideration and the most important element in a feasibility study. Economic evaluation is essentially concerned with the economic feasibility of alternative proposals. It thus compares the economic costs of a proposal with the economic benefits, and indicates not only whether the project is worthwhile, but also indicates which project is best to undertake. The economic justification for a facility or infrastructure has three general components, namely:

- a benefit-cost analysis
- non-monetary but quantifiable considerations, and
- non-quantifiable consideration.

4.1.1 Benefit-cost analysis

The benefit-cost analysis developed during a feasibility study is generally considered the most objective and credible product of such studies.

In essence, a benefit-cost analysis is a calculation of the stream of both benefits and costs over the lifetime of the facility or strategy. Both benefits and costs are discounted based on their timing (e.g., today's certainty of having a rand of benefits next year is worth less than actually having a rand of benefits this year even if there is no inflation). In addition, both benefits and costs are adjusted for inflation, preferably by use of constant monetary values (Rand).

The level of detail of the analysis should be appropriate to the importance of the category of benefit or cost considered. The most important benefits related to a new or upgraded transport infrastructure are the monetary equivalent value of time savings to transportation users (for passenger transport), operating cost savings for vehicles and/or operators, the monetary equivalent value of the reduction in accidents, the monetary equivalent value of the reduction in

maintenance costs of alternative facilities that would result from use of a new facility or implementation of a new strategy.

Substantial scrutiny should be given to accurate estimation of time and operating cost savings and accident reduction with more scrutiny applied to whichever of them is the larger in terms of monetary benefits. Similarly, the most important costs are typically the construction cost and associated stream of maintenance and operational costs.

The issue of accounting for local and regional economic development benefits has sometimes resulted in contention within the context of feasibility studies. Typically, development benefits are essentially equivalent to a transfer payment. That is, forecasted local economic growth in the vicinity of a new transportation facility is growth that would have occurred elsewhere if the transportation facility would have occurred elsewhere. In such cases, the development benefits should not be considered in the benefit-cost calculation. Similarly, in the case of the economic impact of the construction of a new transportation facility, the jobs, etc., associated with such construction should not be considered in the benefit-cost calculation since such jobs, etc., would have occurred elsewhere if construction had occurred elsewhere.

In those cases where the total discounted benefits are about equal to the total discounted costs, other considerations could be the deciding factor in determining economic justification. There are two types of such considerations; those that are non-monetary but quantifiable and those that are not quantifiable.

4.1.2 Non-monetary but quantifiable considerations

To the extent possible, all impacts should be translated into monetary terms. Notwithstanding this, however, non-monetary, but quantifiable considerations can sometimes be an important part of the economic justification of a transportation facility or strategy. For example, construction of a transportation facility may lead to quantifiable improvement in access to an important industrial plant, another mode of transport for further transfers etc. Similarly, such construction may lead to a quantifiable decrease in transfer/reloading time.

4.1.3 Non-quantifiable considerations

To the extent possible, all impacts that can not be stated in monetary terms should be quantified in other understandable measures. Notwithstanding this, however, non-quantifiable considerations can also sometimes be an important part of the economic justification of a transportation facility or strategy. For example, construction of a transportation facility may lead to improved stability of the local economy or support a well considered locally funded comprehensive development plan, etc.

4.1.4 Base case and sensitivity analysis

Feasibility studies, by nature, provide imprecise results; therefore, it is vital to present the information in a manner that allows readers to understand exactly what is being assumed as the base condition, and how the final results would be affected by variations in such assumptions. This is accomplished by performing various sensitivity tests and comparing the results with those based on the various assumptions for the base condition. Developing of a model to conduct economic analyses would provide an effective tool in this regard.

4.2 Environmental considerations

In addition to addressing the economic justification for an alternative facility or strategy, feasibility studies should, if possible, determine the degree to which such an alternative is considered preferable from an environmental or social perspective. Typically, feasibility studies are done relatively early in the process of implementing a project or strategy. Therefore, when estimating the number of acres of wetland disturbed or number of residences displaced by a facility it would be appropriate to provide a range or otherwise indicate the extent of the uncertainty in such estimates. However, with respect to environmental considerations, there are specific laws which can have a great deal of influence in planning for potential facilities.

4.3 Financial feasibility

The third meaning of feasibility as noted above is financial feasibility. This is the degree to which eventual construction and operation of a facility or infrastructure or implementation of a strategy can be financed and managed. The feasibility study should, as appropriate, quantify the resources required for construction, operation, etc., and identify funding sources that may be available to support such requirements. These sources should be examined in sufficient degree to determine the likeliness of their availability.

4.4 Study methodology

The study team followed the above approach as far as possible in order to provide a proper framework for the feasibility analyses of rail infrastructure and operations in Limpopo Province and addressing the detail requirements on the basis of data availability and stakeholders' input.

The focus of the study, as seen at its inception stage was on the Economic and Financial feasibility analyses, though the stakeholders' input and contributions influenced the course of the study shifting its focus to the establishment of an effective and efficient stakeholders' environment and facilitation of the rail planning and development process.

Nevertheless, the study methodology entailed most of the main technical tasks in an attempt to ensure the stakeholders' understanding of main issues and aspects that need to be considered in detail during the rail planning exercise. The tasks included the following:

1. Availability and review of the relevant documentation
2. Establishment of stakeholders consultation process
3. Data availability and consolidation
4. Economic evaluation
   - 4.1. Transport system status quo in Limpopo Province
   - 4.2. Spatial and economic development consideration
   - 4.3. Economic profile of Limpopo Province
   - 4.4. Transport demand analyses
   - 4.5. Rail corridor analyses
5. Financial feasibility
6. Way Forward

The objective, approach and outcome of each task are discussed in detail in the following sections of the report.

5. AVAILABILITY AND REVIEW OF THE RELEVANT DOCUMENTATION

In order to understand the current transport system in Limpopo Province, status of the transportation planning and development planning processes as well as the aim and objectives of the National transport authorities in terms of the transport system and specifically rail development in the country, the study team investigated and obtained a number of policy documents and reports from previous relevant and related studies. The review and interpretation of the relevant documentation included the following:

- The Limpopo Growth and Development Strategy (LGDS), October 2004
- Integrated Transport Plans for District Municipalities in Limpopo Province
- Integrated Development Plans for District Municipalities in Limpopo Province
- Limpopo in Motion - A Provincial Transport Strategy, Final Report, July 2003
- Limpopo Integrated Infrastructure Development Plan, Draft report, March 2004
- National Freight Logistics Strategy (NFLS), National Department of Transport
- KEI Development Corridor, Brief Progress Report, March 2005
- The First State of Logistics Survey for South Africa, Department of Trade and Industry, 2004
- 5 Year Strategic and Performance Plans, Limpopo Department of Roads and Transport
- Spatial Analysis of Economic Activity in South Africa

Although the study team reviewed and interpreted in the context of this study all documents listed above, the focus was on the three strategies, namely Provincial Growth and Development Strategy, Limpopo in Motion formulating the Provincial transport strategy and the National Freight Logistics Strategy.

The purpose of the LGDS is to provide a vision for development that reflects the development priorities in terms of social needs and competitive economic growth potential of the Province and at the same time consistent with National development imperatives. The integrated growth and development strategy formulated in the document was based on the status of the Provincial economy, its growth and development outlook, status and policy proposals related to social services as well as the status and expectations in terms of the institutional efficiency in the Province. The economic outlook and projected economic sectors' growth provided the core basis for the freight travel demand projections in this study and is discussed in more details later on in the report.

Limpopo in Motion represents the transport strategy for the Province based on the approved transport policy framework contained in the White Paper on Provincial Transport Policy. The Provincial Transport Strategy consists of a number of operational strategies formulated in terms of the strategic objectives, mission statements and specific projects to be implemented. The operational strategies relate to Transportation Planning, Transport Management, Freight Transport, Passenger Transport, Infrastructure and Road Traffic and Safety. The Infrastructure Strategy deals with the rail infrastructure as already discussed in the Background Section of the report.

The objective of the National Freight and Logistics Strategy was to address a number of transport-related issues that undermine the competitive advantage that South Africa enjoys in terms of its products on world markets. The main issues were summarised in the problem statement provided in the NFLS document referring to the inefficiencies of the freight system at all levels, infrastructure shortfalls, inappropriate institutional structure, lack of integrated planning, information gaps etc. The vision of the freight logistics system requires from Government to take more interventionist approach to regulating the freight system and to move from modal regulators to functional regulators. The vision further stipulates the transformation in terms of the infrastructure ownership and separation between the infrastructure owners and operators to promote competition. The special emphasis of the National strategy is on the development of rural freight transport system from a freight system perspective and corridor development along certain defined critical freight corridors.
These and other documents were scrutinised in detail during the course of the study and will be referred to throughout the report.

6. STAKEHOLDERS ENGAGEMENT

Development and provision of rail infrastructure is usually one of the most capital intensive projects in the economy of any country and involves and concerns multitude of stakeholders and role players across all economic and social sectors. Depending on the project size, it can take several years to procure, design and construct a section of a railway line. During this process, an extensive consultation process takes place with regard to the environmental, social, economic and financial issues.

Should the current rail development initiative in Limpopo Province progresses to the next planning level and eventually to the design and implementation stages, involvement of the following stakeholders would be essential and inevitable:

- Limpopo Province Government led by Limpopo Department of Roads and Transport
- Roads Agency Limpopo (RAL)
- National Government led by Department of Transport
- Transnet in terms of the ownership of fixed rail infrastructure
- Spoornet as the major rail operator in the country
- South African Rail Commuter Corporation (SARCC)
- South African National Roads Agency Limited (SANRAL) in terms of the national road freight routes
- Cross-border Agency
- Maputo Corridor Logistics Initiative in terms of promoting benefits of the developments along Maputo Corridor
- Agricultural organisations such as Transvaal Agricultural Union (SA) (TAU)
- National Ports Authority
- Major industries producing rail-based commodities such as Mining, Agriculture and Manufacturing
- Major financing organisations and institutions i.e. Merchant Banks, Development Bank of South Africa (DBSA) etc.
- Southern Africa Development Community (SADC) in terms of the regional interests

At this planning stage it was premature to consult and involve representatives of all stakeholders defined above. The focus was on the Provincial Department of Transport, Spoornet, major industries in Limpopo and major infrastructure financing organisations.

The summary of activities in terms of the stakeholders consultation process conducted at this stage of the Limpopo rail planning process is provided in Table 6.1.

Table 6-1: Schedule of Consultation

No	Date	Representative	Organization / Institution
1	16/01/2006	Gawie Van Dyk	Spoornet
		Sham Maharaj	LTE Consulting
2	27-01-2006	Mr G Rikhotso	LTE Consulting
		M. Molomo	GSDM
		C.L. Baker	GTDM
		R. Nkotolwane	MKM
		M. S. Mokoena	LP DORT
		H.H. Lumadi	LP DORT
3	29-01-2006	D. Radebe	GGM
		Mr G Rikhotso	LTE Consulting
		G.J. Moja	Great North Transport
		L.N. Nyambeni	LP DORT
		K.S. Ntsoane	TPTA Transport
		A. Wtyzack	TPTA Transport
		A.V. Musie	Polokwane International Airport
		M.J. Sewetsi	PLTC
		N.F. Nkoana	Provincial Traffic
		L.J. Maepa	Provincial Traffic
		K.S. Phasha	FPTA
		K.A. Arlo	SAPD
		N. Shilubana	Autopay
		P. Maja	Capricon District Municipality
		L.J. Mohlabe	LETMSN Taxi-Association
		D. Botha	Polokwane Municipality
		L.M. Malowela	Mankweng Taxi
		T.K. Molilola	CDTC
		J.P. Ramohlale	Polokwane Meter Taxi Assoc.
		J.R. Mohloane	Polokwane Meter Taxi Assoc.
		D.T. Mandiwana	LPTC
		M.W. Malaka	LPTC
		M.W. Mangoedi	Polokwane Traffic
		M.I. Madiba	EPTA
		L. Engelbrecht	Grey Hound
4	14/02/2006	T.P. Molqo	PLTC
		Spoornet	Management Team
		Hubert Joynt	LTE Consulting
5	23-02-2006	Mr G Rikhotso	LTE Consulting
		M. Makgoba	Waterberg District Municipality
		H.H. Lumadi	LP DORT
		B. Mamabolo	Waterberg District Municipality
		M. Cocqunt	Lephalale Municipality
		M. Megale	Mogalakwena Municipality
		J. Matshoge	Waterberg District Municipality
		D.M. Sithole	Waterberg District Municipality
6	02/03/2006	Darko Skrbinsek	LTE Consulting
		Sham Maharaj	LTE Consulting

		Strategic Planning Department	Spoornet
7	09/03/2006	M.J. Chauke	LP DORT
		Makhuva	LP DORT
		Mohale	LP DORT
8	24/03/2006	H.H. Lumadi	LP DORT
		Members	Steelpoort Producers Forum
9	10/04/2006	Darko Skrbinsek	LTE Consulting
		Mrs B Horne	MCLI
10	14/04/2006	Mr W Bateman	SACOB
		Hubert Joynt	LTE Consulting
11	16/04/2004	Members	Lephalale Development Forum
		Darko Skrbinsek	LTE Consulting
12	23/05/2006	Dr H Joynt	LTE Consulting
		Mr T Taute	TAU (SA)
13	26/05/2006	Dr Hubert Joynt	LTE Consulting
		K Du Toit	DBSA
14	31/05/2006	Dr Hubert Joynt	LTE Consulting
		H Lumadi	LP DORT
		A Leshaba	LP DORT
		Henni de Beer	LP DORT
		M R Rammbucka	Limpopo Investment Agency (TIL)
		J A Bierman	Anglo Platinum
		T van Tonder	Anglo Platinum
		P Lourens	Impala
		D Strydom	Samancor
		J Prinsloo	Samancor
		D Kleingeld	Steelpoort
		J Louw	Steelpoort
		J Myburg	Kumba Resources
		P J Nel	Kumba Resources
		W Marais	Anglo Coal
		J Spangenburg	DBSA
		Ms D Strydom	Spoornet
		D Engelbrecht	Spoornet
		C Mokgatlhe	Spoornet
		D Budler	Spoornet
		K Chithene	LTE Consulting
		G Rikhotso	LTE Consulting
		D Skrbinsek	LTE Consulting
		Dr H Joubert	LTE Consulting
		Dr H Joynt	LTE Consulting
		S Maharaj	LTE Consulting
15	Telephonic	Hubert Joynt	LTE Consulting
		K Heymans	Inca (Financial Institution)

It is important to emphasise and discuss in more detail consultations with Spoornet, Mining and Agricultural Industry representatives undertaken in this study.

6.1 Spoornet consultation

The liaison with Spoornet's representatives was one of the first consultative efforts of the study team. It was important to obtain information related to the latest and current Spoornet's activities in terms of the rail planning and development initiatives in Limpopo Province as well as nationally, and in the Southern African region.

In this regard the study team attended a presentation of the Strategic Planning unit of Spoornet with regard to their activities related to the development of the Rail Master Plan as well as joint meetings with the Spoornet's planning team to understand the National rail planning process in sufficient detail for the purpose of the Limpopo rail study.

The liaison process assisted the study team to procure valuable information and data sets related to the rail operations in the Province.

It is also important to note and emphasise that the technical experience and in-depth knowledge of Spoornet's planning and operational teams in terms of their commercial and business-related activities and confidentiality in this regard would be very difficult to challenge as far as the economic and financial feasibility investigations are concerned.

6.2 Mining industry consultation

The Mining sector is by far the main generator of rail freight commodities within Limpopo Province. It is also one of the significant economic sectors in terms of the contributions to the economic growth and development in the region. The study team paid specific attention to approach the representatives of the mining industry in the Province and obtain their opinions, concerns and needs with regard to the rail transport and infrastructure development.

The initial consultation entailed participation of the study team members at the relevant meetings of Steelpoort Producers Forum and Lephalale Development Forum introducing the study aims and objectives as well as interpreting the Provincial vision and intentions with regard to the rail development.

The culmination of the consultative process at this stage was the organisation and facilitation of a workshop related to the objectives of this study involving most of the major mining groups in the Province and making an initial effort in consolidating their needs and interests in respect of the rail

transport. The outcome and resolutions of the workshop were incorporated into the Way Forward section of this document.

6.3 Agricultural industry consultation

The consultation with the agricultural industry was mainly limited to the Transvaal Agricultural Union (SA) which is a fairly strong in the agricultural industry in Limpopo. Feedback was based on the following aspects:

- **Potential large projects that may impact on future rail usage**: No such projects are envisaged, and most products are transported by road.
- **Rail requirements for the agricultural sector**: Avocados transported in cold storage may be workable as well as possible rail usage for citrus.
- **Other rail issues**: Rail transport could not substitute road transport. The road transport is much easier in terms of loading and off loading. It is also more effective and reliable.

7. DATA AVAILABILITY AND CONSOLIDATION

The rail transport system planning investigations and analyses entail both passenger and freight transport needs and comprise complex travel demand projections to identify travel desire lines, transport (development) corridors and infrastructure needs and feasibilities. In this regard the following datasets would be essential input into the planning process:

- Current and projected production outputs of major industries, particularly industries producing commodities suitable for rail transport (e.g. mining, agriculture, manufacturing)
- Locations of major industrial plants, warehouses, factories, transport nodes etc.
- Current and projected numbers of passenger trips produced within towns, cities and villages for desired movements within a region
- Origin and destination information of the current freight and passenger movements and projected OD information as far as possible
- Current and preferred transport modes used to transport freight and passengers between origin and destination places
- Current and desired travel time and travel costs
- Intra-modal and inter-modal travel requirements for both freight and passenger movements
- Waiting times at the transport nodes, border posts etc.

A serious attempt was made to obtain majority of the essential information through a questionnaire prepared for distribution among the primary role players in Limpopo Province, without success due to sensitivities related to release and submission of some of the crucial type of information. It was, in fact, established that a proper stakeholders' consultation platform is required before any

significant information sharing could be procured. Significant progress was, however, made in this regard and should continue without delays in the near future.

A copy of the questionnaire submitted to the stakeholders is attached as **Annexure A**.

A summary of datasets obtained during the study and associated sources of information are provided in Table 7.1.

Table 7-1: Summary of the available datasets in this study

Dataset	Source	Data Format
The Limpopo Growth and Development Strategy, October 2004	Limpopo Province Department of Roads and Transport	Document
Limpopo in Motion - A Provincial Transport Strategy, Final Report, July 2003		Document
National Freight Logistics Strategy, National Department of Transport		Document
KEI Development Corridor, Brief Progress Report, March 2005		Document
The First State of Logistics Survey for South Africa, Department of Trade and Industry, 2004		Document
5 Year Strategic and Performance Plans, Limpopo Department of Roads and Transport		Document
Spatial Analysis of Economic Activity in South Africa as per 1998: A Preliminary Assessment		Document
Integrated Development Plans (IDPs) for all Limpopo Municipalities	Municipalities	Document
Integrated Transport Plans (ITPs) for all Limpopo Municipalities		Document
Spatial Development Framework (SDF) for all Limpopo Municipalities		Document
Provincial Economic Development Strategy		Document
Rail freight and passenger timetables	Spoornet	Tabular
Rail freight and passenger volumes and flows		Tabular
Rail accident statistics		Tabular
Rail network		Spatial
Rail stations		Spatial
Road network	Demarcation Board of South Africa (SA Explorer)	Spatial
Landuse		Spatial
Wards		Spatial
Towns		Spatial
Municipal boundaries		Spatial

Traffic Counts along Provincial Roads in Limpopo Province	Vela Vke	Spatial
Traffic Counts along National Roads in Limpopo Province	Mikros Traffic Monitoring (Pty) Ltd	Hardcopy
Limited mining activity in Limpopo Province	Anglo Platinum	Spatial
Road Infrastructure Plan as per Limpopo Growth and Development Strategy	Limpopo Province GIS Department	Hardcopy
Meat industry clusters and features		
Mining clusters		
Tourism clusters and features		
Horticulture Industry features		

It should be noted that the Spoornet's information related to the rail freight movements between the railway stations in the country provided an excellent basis for the planning analyses and projections conducted later on in the study.

8. ECONOMIC EVALUATION

The core of this task certainly refers to the economic analyses and calculation of economic parameters and indicators related to the proposed rail infrastructure in the Province. The input requirements to the economic analyses were based on transportation analyses of certain elements of the transport system in the Province in which regard the study team conducted the following main activities:

- Review and understanding of the transport system in Limpopo Province
- Spatial and economic development consideration
- Economic profile of Limpopo Province
- Transport demand analyses
- Rail corridor analyses
- Cost-benefit analyses, economic parameters

It should be noted that the comprehensive economic feasibility analyses of rail transport system and infrastructure require extensive amount of information, specifically related to the demand side of it. The projected magnitude of the passenger and freight demand along specific corridor is a crucial component of the planning and feasibility tasks used to directly derive the projected income stream. A confident demand projection is a complex process and usually requires extensive surveys among the major role players to determine future commercial and residential development patterns and production plans (in the case of freight demand) as discussed in the previous chapter of the report.

This study required preliminary feasibility investigations and in this regard, the analyses were based on the broad and highly strategic planning level formulating a series of assumptions related to future economic activities and developments of specific industry sectors. The study team has, however, consulted relevant literature extensively to ensure realistic framework of the rail feasibility investigations as far as possible.

8.1 Transport system status quo in Limpopo Province

The objective of this section is to provide a brief overview of the transport system in Limpopo Province, focusing on the elements of the rail transport system in the region. The elements of a transport system could be classified into two basic categories, namely *supply side* and *demand side* of the transport system. The supply side relates to relevant infrastructure (roads, rail, facilities, transport means etc.) and operational and management aspects (routes, schedules, service providers) that need to be in place to ensure efficient transport system. The demand side relates to users of the transport infrastructure and services.

The structure of this section of the report has been formed to cover primarily the rail aspects of the transport system in Limpopo Province, as well as the degree of integration and interaction of other transport network systems (predominantly roads) with the rail network system.

8.1.1 Limpopo Province Transport System Overview

The transport system in Limpopo Province serves both passenger and freight transport needs through the land-based and air transport modes and services. The land-based transport comprise the road and rail networks providing access to local, national and international places of interest. The commercial air-transport is conducted via Gateway International airport in Polokwane as the only commercial airport in the Province.

The geographic location of the Province, representing a gateway between South Africa and Southern African Region, as well as a diversified development potential requires rapid development and upgrade of the transport system to provide the basis to realise a high economic growth in the Province. All District Municipalities and Province completed the first cycles of the Integrated Transportation Planning process through which process the status of the Provincial transport system was established as well as a way forward in terms of the efficient transport system development in the future.

Some of the basic characteristics of the road transport system and more detailed description of the rail transport system were provided further on in this section of the report.

8.1.2 Road Transport System

The road transport system is presented through the description of the road network in the Province and interpretation of the available information related to the road-based freight transport demand. Also, some references were made to the overloading issues related to the heavy vehicles on the roads in the Province and management thereof.

8.1.2.1 Road network

The available information in terms of the spatial referencing of the road network and road classification system indicates that the road network in Limpopo Province comprises approximately 64,000kms of roads. The classification of roads into the road classes is provided in Table 8.1, whilst Figure 8.1 shows the road network in the Province in terms of the road classification system that is currently available.

Table 8-1: Classified road network for Limpopo Province

Road Class	Road Length (kms)
Freeway	500
Main Roads	3700
Secondary Roads	20000
Local Streets (incl. gravel)	40000
TOTAL	**64200**

Responsibility for the road network in Limpopo Province rests with the following agencies/authorities:

- **The South African National Roads Agency Limited (SANRAL)**, responsible for the national route network. The national route network within Limpopo area comprises approximately 500 km of the N1 and N11Roads.
- **Roads Agency Limpopo,** responsible for the provincial road network (no classification provided at this stage)
- **Local Municipalities,** responsible for the local road network (no classification provided at this stage)

The summary of the road network responsibilities within the Limpopo Province area is provided in Table 8.2.

Table 8-2: Summary of Road Network Responsibilities

Road Responsibility in Limpopo	Road Length
National	500
Provincial (estimated)	22000
Local Municipalities (estimated)	40000
Total	62500

It is also important to note that the roads responsibilities in the Province have been in a process of being reviewed over the last couple of years. A number of road sections under the jurisdiction of RAL have been and will be transferred to the jurisdiction of SANRAL and / or District Municipalities.

The proposed jurisdictional distribution between RAL and SANRAL is shown in Figure 8.2.

8.1.2.2 Road freight transport demand

Without conducting detailed investigations of the road-related freight market, the most conventional way of evaluating the road freight transport demand is by analysing the traffic counts of heavy vehicles on the road network in a planning area.

The traffic counts for the provincial and national road network sections in Limpopo Province were provided by the RAL and SANRAL, respectively to the study team. The traffic information on the national road sections included also the proportional composition of the heavy vehicles in terms of the vehicle axle categories and freight tonnage capacity. The available traffic information was then used to analyse the road-based freight movements in terms of the following parameters:

- Identifying road freight corridors in terms of the number of heavy vehicles
- Estimating the daily freight tonnages transported in the Province based on the heavy vehicle counts, projected composition of heavy vehicles and tonnage capacities

The above analyses are displayed on the maps in Figures 8.3 and 8.4.

Further analyses as well as the records of the freight operators found in a literature showed that the following road corridors are significant in terms of freight movements in the Province:

- N1, which runs in a North-South direction towards Beitbridge Border Post at the RSA – Zimbabwe border;
- R35 between Martin's Drift Border Post (RSA- Botswana Border) and Mokopane
- R518 between Stockpoort Border Post (RSA- Botswana Border) and Mokopane
- R517 between Stockpoort Border Post and Modimolle

- R510 between Stockpoort Border Post and Thabazimbi
- R511 between Thabazimbi and Bela-Bela
- R36 and R40 from Makhado into Mpumalanga, towards the N4 in an Eastern Direction to Komatipoort Border Post (RSA Mozambique border)
- R37 between Polokwane and Nelspruit
- R518 between Polokwane and Nelspruit
- R518 and R37 between Mokopane and Nelspruit

Figure 8-1: Limpopo Province Road network

Figure 8-2: Proposed SANRAL roads jurisdiction in Limpopo Province

Figure 8-3: Road freight vehicle movements

Figure 8-4: Daily freight movements

8.1.3 Rail Transport System

The rail transport system in Limpopo serves both passenger and freight transport needs though freight transport demand dominates the rail operations in this region. The status of the rail system in the province was analysed and presented in terms of the railway infrastructure, railway operations and rail transport demand.

8.1.3.1 Railway infrastructure

The railway infrastructure comprises a few basic infrastructure categories, namely rail network, railway stations, intermodal / transfer facilities and rolling stock.

Railway network

It should firstly be noted that the National Rail Master Plan has been developing over the last few years with one of the objectives to review and re-categorise the railway network in the country to align the railway operations with the restructuring of the parastatal organisations responsible for the construction, maintenance and operations of the railway system.

The national physical network has been divided into two main categories, namely the primary and secondary network, whereas the secondary network has been categorised between the light and the low-density networks. The total length of the railway network is 18,700kms, of which length the primary network constitute 9,800kms.

There are two dedicated national lines servicing export demand for iron ore and coal. The rest of the network is largely used for general freight, and very small proportion of the network is used for tourism and public transport.

With regard to Limpopo Province, the total length of the railway network and the breakdown in terms of relevant categories are presented in Table 8.3.

Table 8-3: Railway network in Limpopo Province

Line Type	Length		Traction	Length
Main	1053		Electric	433
Branch	283		Diesel	620
			Non-Operational	283
TOTAL	**1336**		**TOTAL**	**1336**

The railway network in Limpopo Province is shown on a map in Figure 8.5.

Railway stations in Limpopo Province

The railway infrastructure in terms of railway stations in Limpopo Province is fairly well developed with stations at most main towns within the Province.

There are 178 railway stations in the Province though not all of them operational. The importance and utilisation of the stations will be presented later in this section in terms of interpreting the current rail freight demand.

The railway stations and rail line status are also shown on the map in Figure 8.6.

Rolling Stock

The rolling stock in the context of the railway transport system refers to railway equipment designed for movement on its wheels on the rails of a railway. It typically includes locomotives, engines, wagons, coaches etc.

Since the railway operations are provided by the single National operator, the status of the rolling stock is not necessarily relevant with regard to the operations in Limpopo Province only in terms of the scope of this study.

It is, however, important to note that according to the National Freight Transport Strategy the average age of the rail rolling stock is 25 years which is far beyond the international norms of 15 years. The under-investment in assets is one of the factors that contribute to poor reliability and inefficiency of the rail transport service and reduction of the market share relative to the road transport mode.

Intermodal / Transfer facilities

Moving freight between point of origin to the point of destination (door-to-door) in many instances require transfers between different transport modes and/or consolidation of loads. This specifically refers to air and rail-based freight transport though some bulk commodities are loaded and off-loaded directly onto trains within exclusive railway siding facilities. Most of the transfer requirements take place within urban areas as well as at ports, airports and container terminals.

Nationally, the intermodal interface is rated as poor. There are many reasons for such rating including poor asset quality, poor customer interface, inadequate equipment, lack of maintenance of the equipment, technology backlog, inefficient information flow and institutional constraints.

Figure 8-5: Railway Network in Limpopo Province

Figure 8-6: Railway stations in Limpopo Province

There is no specific information on the status and conditions of the intermodal facilities within Limpopo Province. The ITP document for Capricorn DM deals with the freight aspects and issues within this DM area specifically addressing the issues in Polokwane being the major nodal point for freight transfers between major freight routes and other transport modes. A need for a freight hub close to Polokwane has been identified for further investigations.

Although no intermodal activities take place at border posts, it is important to emphasise that extensive delays to the freight transport are caused by the inefficient operations and lack of skills. The Beitbridge border post is one of the main international crossings in terms of the freight movements by rail to and from South Africa which has also been recognised in the National Freight Logistics Strategy through the identification of the Gauteng – Beitbridge corridor as one of the strategic rail corridors in the country.

8.1.4 Rail operations

The rail operations were analysed and interpreted from a perspective of efficiency and effectiveness as well as with regard to the rail passenger and freight services currently in operation within Limpopo Province.

The efficiency and competitiveness of the rail operations in South Africa were evaluated and interpreted in the National Freight Logistics Strategy document. The rating of the rail operations in South Africa is fairly poor relative to the international trends and standards. The poor performance is attributed to the under-spending into the replacement of the rolling stock and maintenance and replacement of the infrastructure. The rating among the local rail customers also indicated dissatisfaction in terms of the reliability and punctuality of the rail operations. This has resulted in rail losing the market to the road transport sector in terms of transporting high-value commodities. These issues are, however, not applicable to Limpopo Province only and should and will be addressed at the National level.

Passenger Service in Limpopo Province

In terms of passenger movements, the only service in operation is on the line between Johannesburg and Musina. It is managed by Shosholoza Meyl and provided on the daily basis. Its time schedule is provided in Table 8.4.

It is basically an overnight train running at a low speed and highly inconvenient for passengers who need to spend a day in Gauteng or Polokwane.

Table 8-4: Passenger train time schedule between Johannesburg and Musina

Town	Arrival	Departure	Town	Arrival	Departure
Johannesburg		19:00	Musina		18:30
Germiston	19:29	19:40	Mopane	19:26	19:29
Pretoria	20:36	20:56	Mara	20:48	20:51
Pyramid	21:29	21:49	Makhado	21:20	21:23
Hammanskraal	22:09	22:19	Soekmekaar	22:39	22:41
Bela-Bela	23:14	23:19	Polokwane	00:45	01:05
Naboomspruit	00:46	00:51	Mokopane	02:26	02:29
Mokopane	01:50	01:55	Naboomspruit	03:15	03:20
Polokwane	03:31	03:51	Bela-Bela	04:30	04:35
Soekmekaar	05:34	05:39	Hammanskraal	05:24	06:23
Makhado	06:57	07:02	Pyramid	05:54	06:23
Mara	07:34	07:36	Pretoria	06:57	07:05
Mopane	08:55	09:00	Germiston	08:11	08:16
Musina	10:20		Johannesburg	08:41	

Frequency - Daily except Saturdays *Source: Spoornet: Shosholoza Meyl Timetable*

According to the input provided by the local communities in Limpopo through the ITP and IDP-related public participation processes, the main request by the current and/or potential passengers was noted for the 'express' type train between Polokwane and Pretoria, arriving in Pretoria in the morning and returning to Polokwane in the late afternoon. The extent of the potential demand is not known at this stage and could be investigated in the future in detail.

Freight rail service in Limpopo Province

The freight service is provided along all main lines and one secondary line in terms of the rail network classification presented earlier. Two secondary lines are not in operation at present. The summary of some of the operational characteristics per line is provided in Table 8.5.

The information provided in this table indicates the highest line utilisation along Pienaarsriver-Polokwane- Musina line, whilst the highest train utilisation take place along Northam-Thabazimbi-Lephalale line.

Table 8-5: Freight rail services in Limpopo Province

SECTION	DISTANCE (KM)	TYPE OF LINE	LINE HIERARCHY	TYPE OF TRACTION	2004/2005				
					GROSS TON-KILOMETRES ('000 000)	AXLE-KILOMETRES ('000 000)	TRAIN-KILOMETRES ('000)	AVERAGE TONS PER TRAIN	AVERAGE AXLES PER TRAIN
Pienaarsrivier - Polokwane	219	Single	main	25kV AC Electric	1,049.9	99.7	835.1	1,257	119
Polokwane - Groenbult	76	Single	main	Diesel	227.8	22.5	189.9	1,200	118
Groenbult – Musina	201	Single	main	Diesel	699.3	65.0	517.2	1,352	126
Musina - Beit Bridge	16	Single	main	Diesel	29.7	2.8	22.1	1,344	127
Pienaarsrivier - Marble Hall	123	Single	branch	Line closed - no traffic running					
Modimolle - Vaalwater	74	Single	branch	Line closed - no traffic running					
Mookgopong - Zebediela	84	Single	branch	Line closed - no traffic running					
Groenbult – Tzaneen	89	Single	main	Diesel	112.4	9.9	91.5	1,228	108
Tzaneen - Hoedspruit	126	Single	main	Diesel	124.3	10.1	83.5	1,489	121
Hoedspruit – Mkhuhlu	91	Single	main	3kV DC Electric	626.2	52.4	326.4	1,919	161
Hoedspruit - Phalaborwa	50	Single	main	3kV DC Electric	292.8	24.5	144.0	2,033	170
Northam - Thabazimbi	46	Single	main	25kV AC Electric	471.6	40.2	137.8	3,422	292
Thabazimbi - Lephalale	112	Single	main	Diesel	690.7	59.2	224.0	3,083	264
Northam - Middelwit	27	Single	main	25kV AC Electric	34.8	3.1	20.5	1,698	151

8.1.4.1 Rail transport demand

The rail transport demand analysis is one of the crucial tasks in the rail planning process and feasibility investigations. The current and projected transport demand provides direct input and basis for the possible income projections and streams over the design life of the rail infrastructure.

In terms of the current situation and existing rail freight transport demand in respect of Limpopo Province, reasonable set of information was obtained from Spoornet including the following data:

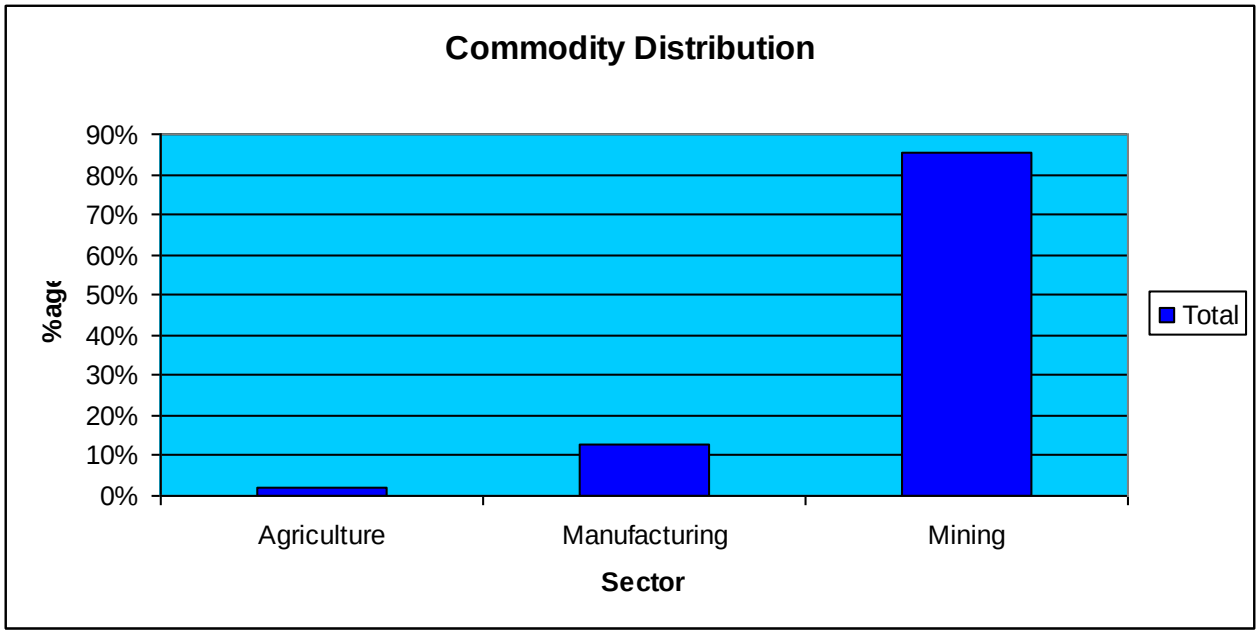
- Commodity flows forwarded from railway stations within Limpopo Province for period 2001-2005
- Commodity flows received at the railway stations within Limpopo province for period 2001-2005

These information sets were used to firstly analyse the commodity volumes by type of commodity, therefore determining the most suitable rail-based commodities as far as the Provincial area is concerned. Secondly, the commodity-based trip matrices were derived and then consolidated into the rail freight trip matrix for Limpopo Province to reveal the current rail freight corridors in this region.

The commodity analyses were summarized in Table 8.6 whilst the freight transport matrix was spatially analyzed and presented on a map in Figure 8.7.

Table 8-6: Commodity analyses

Commodity	Sector	Percentage
COAL EOHP	Mining	19.64%
IRON ORE	Mining	14.09%
PHOSPHATE ROCK	Mining	11.59%
LIMESTONE BAG/LOOSE	Mining	5.40%
COAL EXPORT	Mining	4.56%
MAGNETITE	Mining	4.31%
FERROCHROME	Mining	4.28%
CHROME ORE SAND CRUDE	Mining	3.41%
CHROME ORE AND SAND	Mining	2.82%
PULPWOOD (SOFTWOOD)	Manufacturing	2.73%
GRANITE	Mining	2.34%
PULPWOOD (HARD WOOD)	Manufacturing	1.81%
DIESEL FUEL OIL	Manufacturing	1.67%
CEMENT ORDINARY	Manufacturing	1.63%
PETROL LEADED IN T/W	Manufacturing	1.61%
MAIZE LOOSE	Agriculture	1.57%
PHOSPHORIC ACID	Manufacturing	1.54%
PERCENTILE		**85.00%**



The rail freight transport desire lines shown in Figure 8.7 reveal three significant rail corridors in this area, namely the Lephalale (Thabazimbi) – Gauteng, Lephalale (Thabazimbi) – Richards Bay and Phalaborwa – Richrds Bay corridors. There are few other freight corridors with reasonable demand in the Province though not of the magnitude of these three.

Figure 8-7: Current freight transport demand in Limpopo Province

Passenger transport demand

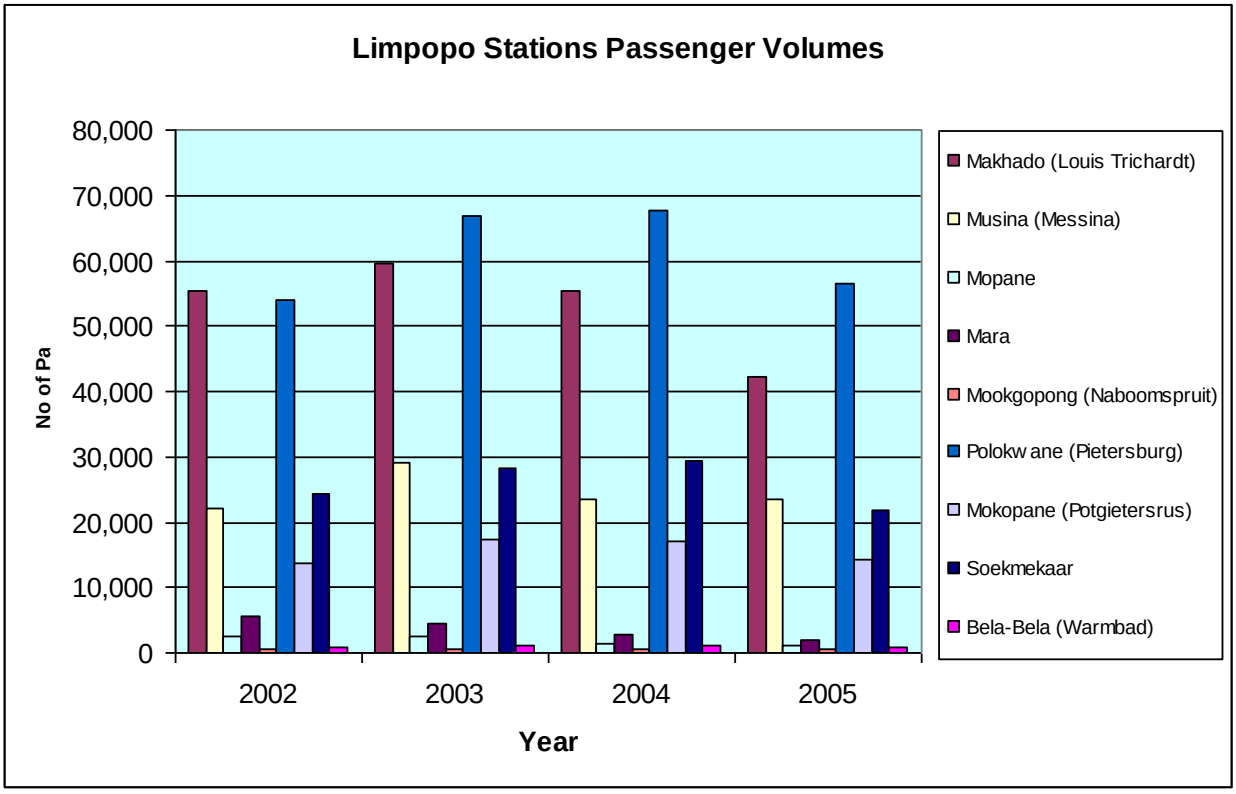
Some basic passenger demand estimates were undertaken in order to provide relevant basis for further more detailed analyses. The passenger numbers using the railway stations within Limpopo Province on the Johannesburg-Musina line were provided by Spoornet on an annual basis since 2002 as shown in Table 8.7 and presented in Figure 8.8.

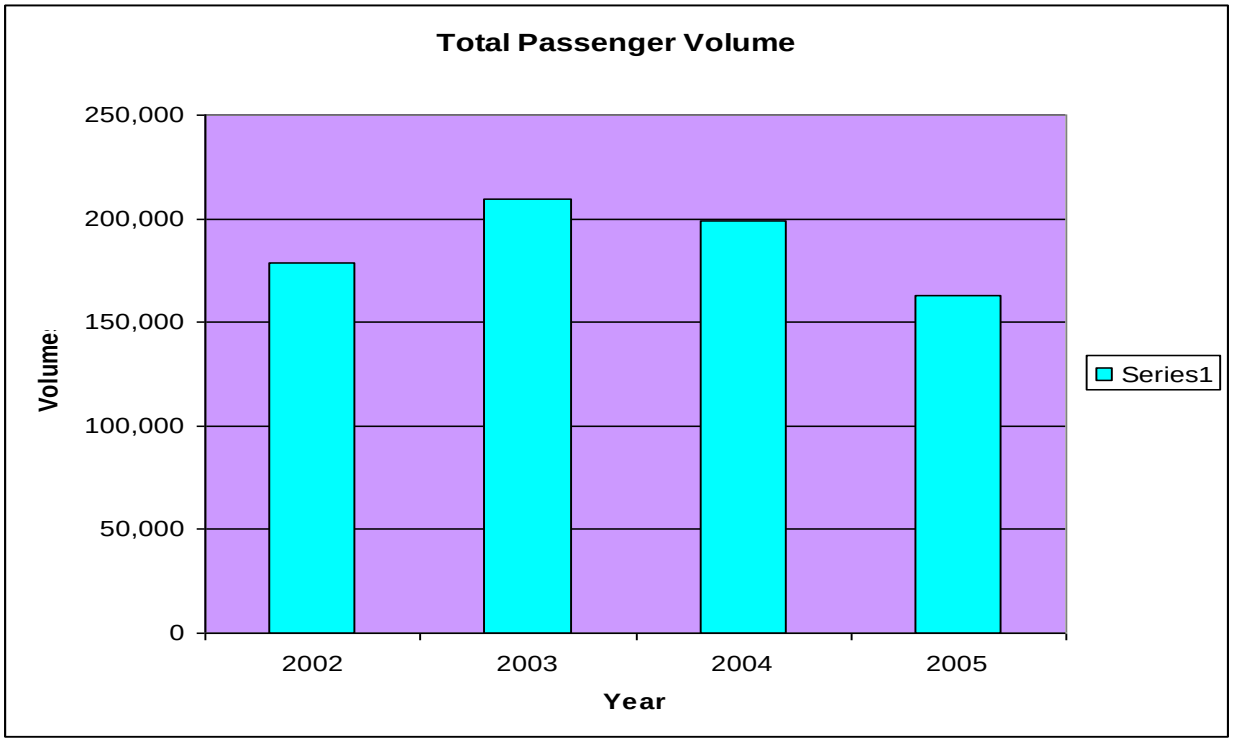
Table 8-7: Passenger statistics at the railway stations in Limpopo Province

STATION	2002	2003	2004	2005
Makhado (Louis Trichardt)	55,375	59,644	55,376	42,130
Musina (Messina)	22,003	29,011	23,611	23,499
Mopane	2,443	2,550	1,433	1,185
Mara	5,546	4,578	2,798	2,067
Mookgopong (Naboomspruit)	697	650	610	510
Polokwane (Pietersburg)	54,028	66,729	67,812	56,557
Mokopane (Potgietersrus)	13,606	17,322	17,141	14,156
Soekmekaar	24,390	28,230	29,299	21,736
Bela-Bela (Warmbad)	856	1,107	1,070	789
Total	**178,944**	**209,821**	**199,150**	**162,629**

Source: Spoornet

Figure 8-8: Limpopo Stations passenger volumes





Based on the annual passenger statistics, the current passenger demand between Polokwane and Pretoria was estimated between 150-200 passengers per day. The consultation with the minibus-taxi drivers and taxi rank marshals in Pretoria indicated the demand of approximately 200 passengers per day on a week days and up to 500 passengers on a weekend day. These investigations provided the basic input into the preliminary economic evaluations discussed and interpreted later on in the report.

The review of the current rail transport demand in Limpopo Province revealed that the freight transport demand dominates the utilisation of the rail infrastructure in this area and will most likely remain as such in the near future. The utilisation of rail in terms of the passenger movements especially with regard to the passenger demand in the rural areas between the towns or towns and major activity nodes could possibly be explored on specific corridors and be planned to supplement the freight transport demand. This will further be discussed in the later sections of the report dealing with the projected transport demand evaluations.

The table above indicates that the number of rail passengers increased from 2002 to 2003 by *17,26%*. Table 10.1 further indicates a decline in the number of rail passenger between 2003 and 2005. The number of passengers between 2003 and 2004 declined by *5,09%* and in the following period between 2004 to 2005 by *18,34%.*

Possible reasons for the decline in rail passenger numbers could have been as a result of the following conditions:

- Safety and security on trains as well as in and around stations
- Unreliability of the service (not arriving and departing on time)
- Economic growth allows more individuals the opportunity to alternative methods of transport such as motor vehicles
- Competitive nature of the industry i.e. (Buses-taxi's and private vehicles)
- Unattractiveness of the service (old and dilapidated coaches)
- Immigration to Metropolitan areas where the majority of job opportunities exist

8.2 Economic Profile of Limpopo Province

The population growth in Limpopo Province has been projected at an aggregate growth rate of 3,08% in 1996 (Stats SA). Based on the 2001 population figures and this growth rate, the projected population in 2005 was estimated at above six million as indicated in Table 8.8.

Table 8-8: Population for the Limpopo Province per district

Name of District	Population (2001)	Projected Population (2005)
Capricorn	1 120 222	1 264 741
Bohlabela	540 463*	610 188*
Mopani	993 605	1 121 790
Sekhukhune	912 871	1 030 640
Vhembe	1 192 252	1 346 064
Waterberg	625 518	706 216
Limpopo Province	**5 384 931**	**6 079 639**

Source: Provincial Spatial Rationale ** Only the Population for Bushbuckridge*

Table 8.9 provides the Gross Geographic Product (GGP) for Limpopo Province by economic sector. The three main economic sectors, which jointly contribute 66,7% of the Provincial GGP include Commercial Services (29,4%), Mining (19%) and Trade (18,3%). The contributions of other economic sectors vary between 2,5% and 9,0%. It is, however, important to note that from a rail freight transport perspective only mining, manufacturing and agriculture sector (27% of the economy) were taken into consideration as these sectors produce large majority of rail-based commodities.

Table 8-9: GGP at Factor Cost for Limpopo Province per Economic Sector

Sector	% Contribution (2000)
Commercial Services	29,4
Financial Services	8,6
Transport and Communication	4,9
Trade	18,3
Construction	2,5
Electricity & Water	9,0
Manufacturing	4,3
Mining	19,0
Agriculture	4,0
Total	**100,0%**

(Source: Provincial Transport Strategy- Limpopo in Motion)

Tables 8-10 to 8-15 provide GGP information for each District Municipality within Limpopo. This was the important information as the freight demand for each DM has been derived from its economic profile.

Bohlabela DistrictMunicipality

Table 8-10: GGP per Economic Sector at Factor Prices for Bohlabela DM: R(m)

Sectors	Contribution to GGP at Factor Cost (1996) (R'000)	% Contribution towards Total GGP 1996	Contribution to GGP at Factor Cost (1998) (R'000)	% Contribution towards Total GGP 1998	Contribution to GGP at Factor Cost (2000) (R'000)	% Contribution towards Total GGP 2000
Agriculture	66	5.14%	56	3.12%	62	2.96%
Mining	0	0.00%	0	0.00%	0	0.00%
Manufacturing	50	3.89%	51	2.84%	65	3.10%
Electricity & Water	81	6.30%	104	5.80%	129	6.15%
Construction	14	1.09%	16	0.89%	36	1.72%
Trade	227	17.67%	337	18.80%	434	20.69%
Transport & Communication	75	5.84%	108	6.02%	120	5.72%
Financial Services	60	4.67%	81	4.52%	95	4.53%
Government	712	55.41%	1,040	58.00%	1,157	55.15%
Totals	**1,285**	**100.00%**	**1,793**	**100.00%**	**2,098**	**100.00%**

(Source: Industrial Development Strategy)

The dominant sector in terms of the GGP contribution to this DM is the Government Sector at 55,41%. In this instance the mining, manufacturing and agriculture sectors only provide about 6% of the GGP. The Agriculture Sector showed a significant decline from 1996 to 2000 in this DM.

Capricorn District Municipality

Table 8-11: GGP per Sector at Factor Prices for Capricorn DM: R(m)

Sectors	Contribution to GGP at Factor Cost (1996) (R'000)	% Contribution towards Total GGP 1996	Contribution to GGP at Factor Cost (1998) (R'000)	% Contribution towards Total GGP 1998	Contribution to GGP at Factor Cost (2000) (R'000)	% Contribution towards Total GGP 2000
Agriculture	198	3.90%	178	2.53%	212	2.45%
Mining	129	2.54%	206	2.93%	235	2.72%
Manufacturing	486	9.57%	579	8.24%	688	7.96%
Electricity & Water	272	5.35%	407	5.79%	493	5.70%
Construction	241	4.74%	342	4.87%	364	4.21%
Trade	1,188	23.38%	1,699	24.18%	2,158	24.97%
Transport & Communication	432	8.50%	592	8.43%	715	8.27%
Financial Services	675	13.28%	932	13.27%	1,126	13.03%
Government	1,460	28.73%	2,091	29.76%	2,652	30.68%
Totals	**5,081**	**100.00%**	**7,026**	**100.00%**	**8,643**	**100.00%**

(Source: Industrial Development Strategy)

For Capricorn the Mining, Manufacturing and Agriculture sectors provide about 13% of the GGP. Both the agriculture and manufacturing sectors declined in relative terms with regard to the GGP contribution to the DM's economy between 1996 and 2000.

Mopani District Municipality

Table 8-12: GGP per Sector at Factor Prices for Mopani District: R(m)

Sectors	Contribution to GGP at Factor Cost (1996) (R'000)	% Contribution towards Total GGP 1996	Contribution to GGP at Factor Cost (1998) (R'000)	% Contribution towards Total GGP 1998	Contribution to GGP at Factor Cost (2000) (R'000)	% Contribution towards Total GGP 2000
Agriculture	306	*6.77%*	359	*6.08%*	400	*5.59%*
Mining	1,085	*24.01%*	1,256	*21.26%*	1,432	*20.02%*
Manufacturing	241	*5.33%*	242	*4.10%*	290	*4.05%*
Electricity & Water	391	*8.65%*	485	*8.21%*	605	*8.46%*
Construction	70	*1.55%*	93	*1.57%*	272	*3.80%*
Trade	591	*13.08%*	907	*15.35%*	1,129	*15.78%*
Transport & Communication	223	*4.93%*	310	*5.25%*	376	*5.26%*
Financial Services	428	*9.47%*	520	*8.80%*	594	*8.30%*
Government	1,184	*26.20%*	1,737	*29.40%*	2,055	*28.73%*
Totals	**4,519**	**100.00%**	**5,909**	**100.00%**	**7,153**	**100.00%**

(Source: Industrial Development Strategy)

In Mopani DM the Mining, Manufacturing and Agriculture sectors contribute approximately 30% to the GGP of this district. It is noteworthy to record a decline in the Mining sector's contribution to the economy in this DM.

Greater Sekhukhune District Municipality

Table 8-13: GGP per Sector at Factor Prices for Greater Sekhukhune DM: R(m)

Sectors	Contribution to GGP at Factor Cost (1996) (R'000)	% Contribution towards Total GGP 1996	Contribution to GGP at Factor Cost (1998) (R'000)	% Contribution towards Total GGP 1998	Contribution to GGP at Factor Cost (2000) (R'000)	% Contribution towards Total GGP 2000
Agriculture	11	*0.70%*	12	*0.54%*	12	*0.46%*
Mining	341	*21.73%*	433	*19.52%*	510	*19.66%*
Manufacturing	36	*2.29%*	46	*2.07%*	61	*2.35%*
Electricity & Water	46	*2.93%*	77	*3.47%*	97	*3.74%*
Construction	13	*0.83%*	13	*0.59%*	11	*0.42%*
Trade	253	*16.12%*	364	*16.41%*	450	*17.35%*
Transport & Communication	56	*3.57%*	75	*3.38%*	81	*3.12%*
Financial Services	5	*0.32%*	6	*0.27%*	10	*0.39%*
Government	808	*51.50%*	1,192	*53.74%*	1,362	*52.51%*
Totals	**1,569**	**100.00%**	**2,218**	**100.00%**	**2,594**	**100.00%**

(Source: Industrial Development Strategy)

In Greater Sekhukhune DM the contribution of three rail-freight generating sectors to the GGP is about 22%. The Mining Sector experienced a decline in the GGP contributions between 1996 and 2000.

Vhembe District Municipality

Table 8-14: GGP per Sector at Factor Prices for Vhembe DM: R(m)

Sectors	Contribution to GGP at Factor Cost (1996) (R'000)	% Contribution towards Total GGP 1996	Contribution to GGP at Factor Cost (1998) (R'000)	% Contribution towards Total GGP 1998	Contribution to GGP at Factor Cost (2000) (R'000)	% Contribution towards Total GGP 2000
Agriculture	224	*6.34%*	261	*5.57%*	323	*5.67%*
Mining	405	*11.46%*	550	*11.74%*	713	*12.52%*
Manufacturing	157	*4.44%*	167	*3.56%*	202	*3.55%*
Electricity & Water	200	*5.66%*	268	*5.72%*	329	*5.77%*
Construction	175	*4.95%*	208	*4.44%*	192	*3.37%*
Trade	789	*22.33%*	1,075	*22.95%*	1,372	*24.08%*
Transport & Communication	8	*0.23%*	10	*0.21%*	16	*0.28%*
Financial Services	449	*12.71%*	515	*10.99%*	578	*10.15%*
Government	1,126	*31.87%*	1,631	*34.81%*	1,972	*34.61%*
Totals	**3,533**	**100.00%**	**4,685**	**100.00%**	**5,697**	**100.00%**

(Source: Industrial Development Strategy)

In Vhembe DM the mining, manufacturing and agriculture sectors contribute to approximately 21% to the economy.

Waterberg District Municiaplity

Table 8-15: GGP per Sector at Factor Prices for Waterberg District: R(m)

Sectors	Contribution to GGP at Factor Cost (1996) (R'000)	% Contribution towards Total GGP 1996	Contribution to GGP at Factor Cost (1998) (R'000)	% Contribution towards Total GGP 1998	Contribution to GGP at Factor Cost (2000) (R'000)	% Contribution towards Total GGP 2000
Agriculture	366	*5.96%*	379	*4.83%*	408	*4.26%*
Mining	2,299	*37.44%*	3,010	*38.37%*	3,905	*40.75%*
Manufacturing	147	*2.39%*	171	*2.18%*	212	*2.21%*
Electricity & Water	1,179	*19.20%*	1,358	*17.31%*	1,577	*16.46%*
Construction	21	*0.34%*	21	*0.27%*	19	*0.20%*
Trade	565	*9.20%*	818	*10.43%*	1,010	*10.54%*
Transport & Communication	253	*4.12%*	352	*4.49%*	451	*4.71%*
Financial Services	514	*8.37%*	591	*7.53%*	675	*7.04%*
Government	796	*12.96%*	1,144	*14.58%*	1,325	*13.83%*
Totals	**6,140**	**100.00%**	**7,844**	**100.00%**	**9,582**	**100.00%**

(Source: Industrial Development Strategy)

Mining, Manufacturing and Agriculture sectors in the Waterberg DM contribute approximately 47% of the GGP of the area. The GGP contribution of the mining sector increased during the assessment period.

Another important consideration is economic growth per DM as this parameter has been taken into consideration in estimating the future freight demand per district. From the above tables it is evident that certain DMs play a significant part in the economy of Limpopo and should thus generate higher transport demand.

Table 8-16: Economic growth per District Municipality

District Municipality	Growth Factor (%)
Capricorn	4.5
Bohlabela	1.8
Mopani	3.6
Sekhukhune	1.7
Vhembe	3.6
Waterberg	4.1

Source: KB Mehale, (2003), Limpopo Transport Summit

The economic growth factor for specific regions remains relatively stable over a period of time provided no drastic changes are experienced within the open economy. This remains so unless major export markets are exploited to increase the economic growth of the region. For the purpose of this study the economic growth factors reflected in Table 8-16 were utilized to determine projections of the future economic growth (GGP for the region) based on the 2003 growth rates.

From this information the 2005 freight tonnage calculated for the combined three sectors (agriculture, mining and manufacturing) in the Province was projected and indicated in Table 8-17 below.

Table 8-17: Estimated 2005 freight volumes generated in Limpopo Province

Year	Freight Volume (Tons)	Increase (1998-2005)
1998	48 039 000	28%
2005	61 406 410	

Note: 3.57% year on year growth

8.3 Spatial and economic development consideration

Studies by the World Bank have shown that there is a direct relationship between a country's economic activity (Gross Domestic Product) and demand for freight transport. This feasibility study accepts this axiom as the foundation of the freight demand estimation.

As explained earlier in the report, the following economic sectors were taken into consideration in the analyses of freight volumes:

- Agriculture
- Mining
- Manufacturing

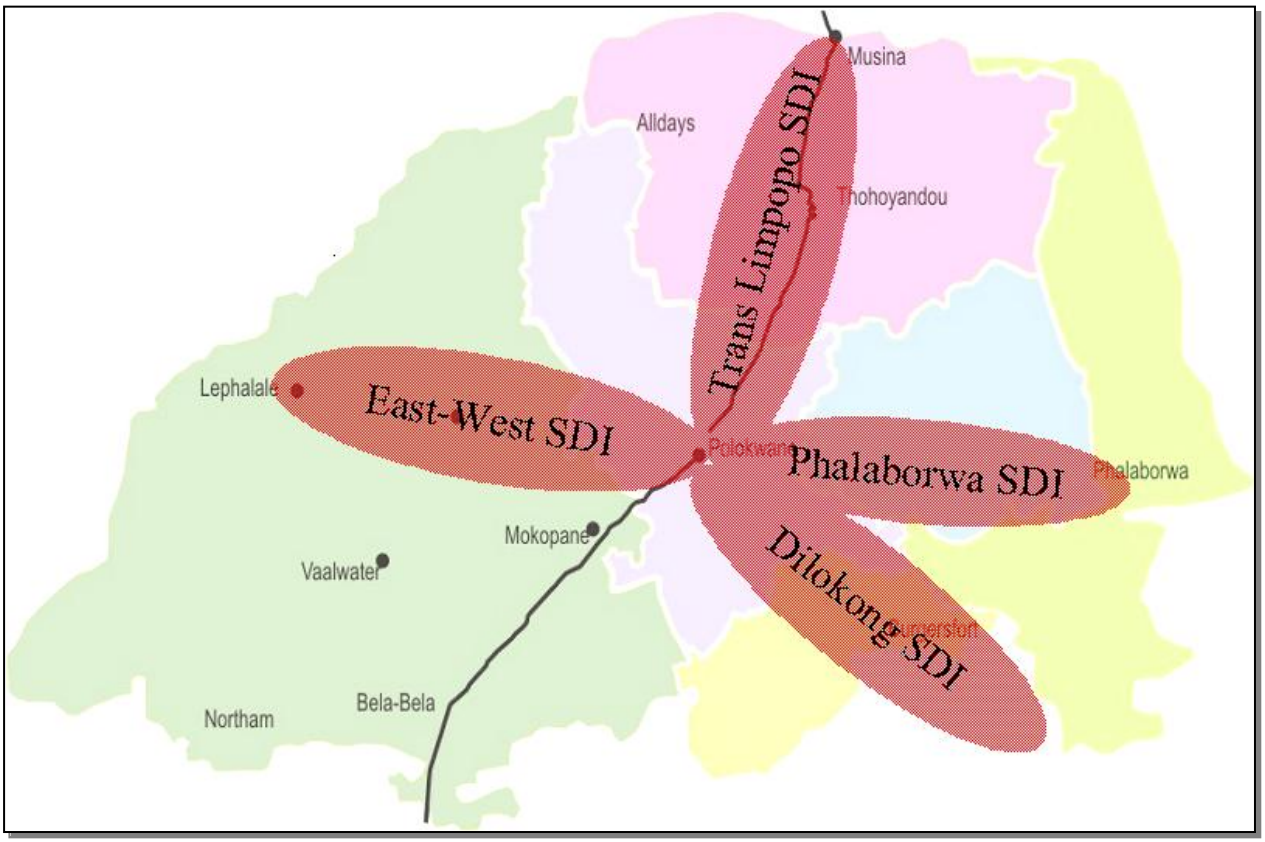
This is based on the fact that these three economic sectors generate a significant proportion of freight demand, especially rail-based, and the review of local and international literature indicated that most of the related studies have been approached on a similar basis (eg. *2004 Logistics Survey* and the *Spatial Analysis of Economic Activity in South Africa as per 1998: A Preliminary Assessment*).

Tourism, although not a freight generating sector, is also a significant contributor to the economic development to areas with similar the characteristics of Limpopo Province.

In order to accelerate economic development, specific targets have been set for capital investment, economic growth and job creation for each year from 2004 to 2014, in Limpopo Province. Seven competitive cluster value chains have been selected for priority attention as a basis to achieve the capital investment, sustainable economic growth, job creation, and economic and spatial diversification targets, as well as for the integration of public development interventions.

Spatial Development Initiatives (SDIs) are targeted interventions by central government for helping to unlock economic potential and facilitate new investment and job creation in a local area or region. To exemplify such initiatives, an East-West corridor was identified, and is indicated in Figure 8-9. Several mining and tourism projects were identified along the East-West corridor.

Figure 8-9: Spatial Development Initiatives in the Limpopo Province



8.3.1 Agriculture

Limpopo Province has a thriving, export-driven agricultural and agri-processing sector. This is based on Limpopo's production of 70% of South Africa's avocados and tomatoes, 75% of the country's mangos and macadamia nuts, 65% of its papayas, 36% of its tea, and 25% of its citrus.

Limpopo also has numerous state-owned agricultural estates and irrigation schemes, many of which are open for development on a Public-Private-Partnership basis in association with local communities.

While Limpopo is internationally renowned for prolific production of export quality sub-tropical fruit, investors are finding fertile ground for different crops and livestock, and the establishment of new processing industries such as the following:

- Establishment of South Africa's biggest soya-based food manufacturing plant at Thabazimbi in south-west parts of Limpopo Province.
- Development of a sugar industry through establishment of a R476 million sugar mill supplied by large- and small-scale farmers in the Limpopo Lowveld.
- An ambitious initiative to raise one million goats a year to supply meat to the Middle East. The initiative will also produce goat's milk, cheese, kefir and hides for processing into leather for manufacturing of crafted products such as wallets. Products will be marketed under a brand to be known as Limpopo Kid.

8.3.2 Mining in Limpopo Province

Limpopo has no less than 70 operational mines producing 9% of South Africa's income from minerals and contributing 22% of the province's GDP.

Its treasure trove of resources includes:

- Three types of precious metals and stones such as diamonds, gold and platinum group metals.
- 12 types of ferrous and base metals including antimony, chromium, copper, iron, lead manganese, nickel, silicon, tin and vanadium.
- 23 types of industrial minerals such as andalusite, coal, granite, graphite, gypsum, limestone, mica, magnesite, phosphate and vermiculite.

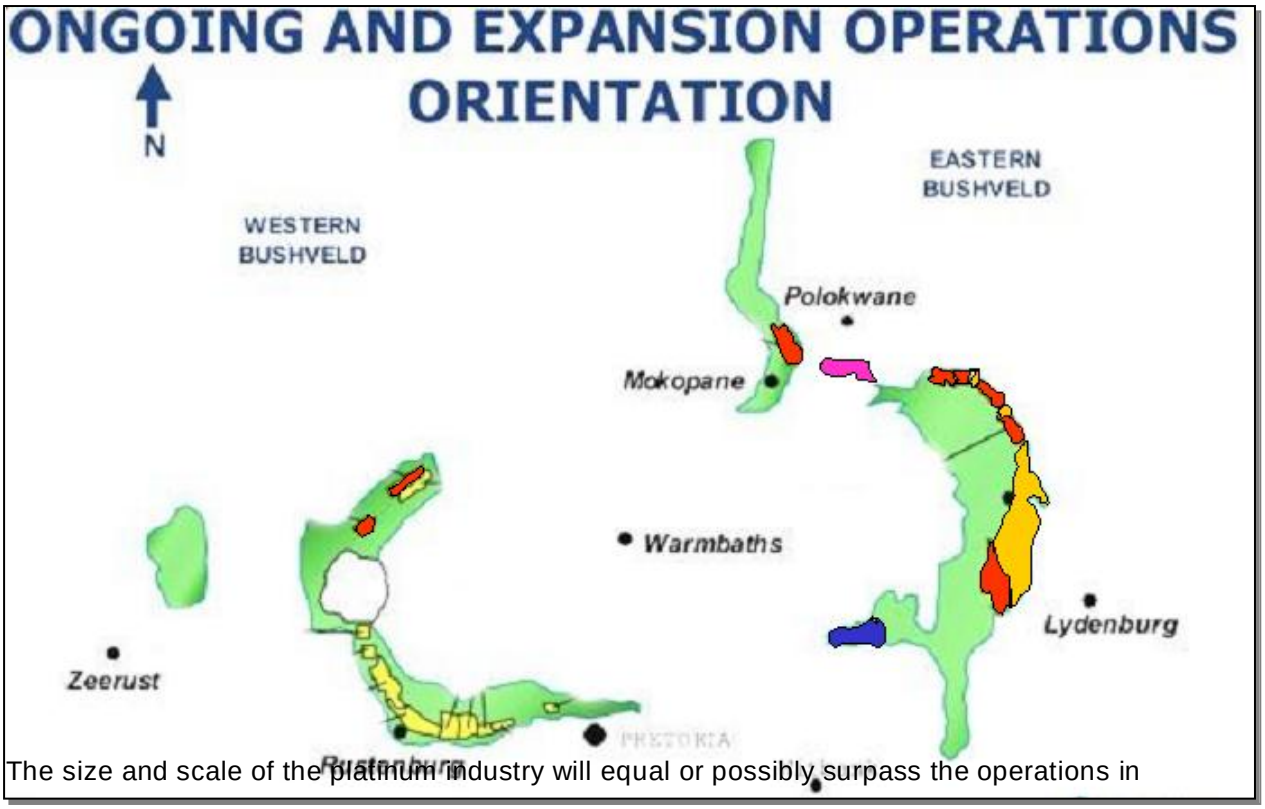
The major platinum expansion will take place over the next five years. The Platinum mining locations are described in Figure 8-10**.** The four areas where the new platinum mines will be concentrated include:

- The Lebowakgomo District (South)
- Groblersdal – Cluff mining
- Dilokong or Burgersfort / Steelpoort Corridor
- Mokopane – Anglo Platinum & African Minerals

More than R7 billion is being invested to develop new mines in the Eastern Limb of the Bushveld Igneous Complex, the world's largest concentration of platinum group metals (PGMs). Investments include:

- A R1,4 billion platinum smelter near Polokwane. The smelter, which is part of Anglo Platinum's R5,5 billion expansion in Limpopo, processes concentrate from two existing mines -- Potgietersrus Platinum and Lebowa -- and will do so for two new mines:
  - the R1,6 billion Modikwa mine and the R2,7 billion Twickenham mine.
  - Impala Platinum's R1,7 billion Marula platinum mine.
- Southern Era's R524 million re-development of the Messina Platinum Mine.
- Kumba Resources which plans a R7 billion expansion of its coal mining operations in the Lephalale (formerly Ellisras) area where a second power station could be built and coal beneficiation plants could be established, leading to investment of as much as R50 billion and turning the area into South Africa's new coal hub.
- Canadian group African Minerals which has already invested more than R150 million on exploration of a huge multi-metal deposit that will require investment of R15 billion to fully develop. The deposit, in the Northern Limb of the Bushveld Complex, includes not only platinum and palladium which dominate in the Eastern Limb; it also contains nickel, copper, gold, silver and cobalt.

Figure 8-10: Platinum mines in the Limpopo Province



The size and scale of the platinum industry will equal or possibly surpass the operations in

Rustenburg in the North West Province, making Limpopo the largest national contributor of platinum production. Most of the platinum concentrate from the above-specified areas will be transported in the form of platinum to the Polokwane Smelter.

The largest coal production shift in the history of South Africa is scheduled to take place progressively towards 2015, with the production of coal progressively moving from Witbank to Lephalale (Ellisras). The upper-Waterberg coalfield, north of Lephalale, holds approximately 40% of the national coal reserves of South Africa. At current production rates it holds 300 years of export potential and unlocks the coalfields into Botswana and Zambia.

Kumba Resources and Anglo Coal expect Lephalale to become the *Coal Gate into Africa*, with significant Botswana / Zambia coal exports through Limpopo's "Coal Gate to Africa". Kumba Resources currently exports coal via road from Lephalale to Zambia. This export market is expected to grow.

In order to unlock the coal mining potential in the Upper Waterberg (Ellisras / Lephalale) the existing Matimba power station must be upgraded within the next four years followed by the construction of a new power station (the close proximity of power stations to the coal mines is essential to even out the global demand / supply cycle fluctuations). The estimated investment required for the power generation upgrade is R 10 billion and the new power station is estimated at R30 billion. Kumba Resources aims to upgrade Grootegeluk Coal mine from 16 million ton per annum to 46 million ton per annum coal production through an R10 billion investment. In addition Anglo Coal are planning major investment and already own 68 farms totalling 68,000Ha in the Lephalale region. Anglo Coal and Kumba Resources are currently being involved in preparing the development plans for the coalmines in Lephalale.

Further expansions of the coal mining operations in Limpopo are planned into the Soutpansberg and Springbok Flats coalfields, but the emphasis over the next ten-year horizon will be focused on the Lephalale Coalfield.

From the above summary of the mining sector and particularly the expansion potential, it is clear that the role of public transport for the transport of mining employees, as well as the development of road and rail infrastructure to support mining activities, would be a very important priority for the future.

8.3.3 Manufacturing

Manufacturing contributes to about 7% of the GGP of the province. Manufacturing is mainly related to the processing of mining and agricultural related products. This again emphases the relationship between these three economic sectors and freight transport.

In the agricultural sector, manufacturing is related to the processing facilities for livestock, fruit, vegetables and timber production. For instance fruit processing such as jam production is limited to the northern and lowveld areas, as is paper pulp production, while meat production are done in all districts.

From a mineral perspective the conversion of coal into electricity and the manufacturing of mining supplies are relevant. In addition other manufacturing activities focus on the manufacturing of construction materials which are done across the province.

8.3.4 Tourism in Limpopo Province

Limpopo is a premier eco-tourism destination in its own right but it is also an integral part of a rapidly emerging, cross-border Southern African wildlife wilderness.

Most of Limpopo's game and nature reserves lie along the horseshoe-shaped western, northern and eastern peripheries of Limpopo, prompting the Limpopo Provincial Government to promote the concept of the GOLDEN HORSESHOE. This area encompasses the greatest concentration of game farms in the world, three national parks including Kruger National Park, and more than 50 public and private game and nature reserves. Parts of the area lie within, or adjacent to, two transfrontier parks and neighboring countries.

With increasing private investment in game farms and lodges, commercialization of State-owned parks, and establishment of transfrontier conservation areas, the Golden Horseshoe is becoming part of a vast wilderness of inter-connected and contiguous wildlife reserves, offering huge scope for investment in development of eco-tourism.

Already, the Golden Horseshoe includes:

- Kruger National Park; and
- Two vast new cross-border peace parks
    - The Great Limpopo Transfrontier Park (GLTP) linking Kruger National Park, Limpopo National Park in Mozambique and Gonarezhou National Park in Zimbabwe. The 35 000 sq kilometer GLTP is the first phase in the development of a 100 000 sq kilometre peace park including other State reserves in Mozambique and publicly-

and privately-owned parks bordering the GLTP in South Africa and Mozambique. This opens wide ranging opportunities for development of bush 'n beach tourism taking in the GLTP and the pristine Mozambique coast and its paradise islands.

- The Limpopo Shashe Transfrontier Park covering 500 000 hectares of adjoining publicly- and privately-owned reserves in north-west Limpopo, Botswana and Zimbabwe. This emerging park provides opportunities for the development of lodges on and close to its borders and, in some cases, in the park itself.

- A wide variety of well established privately-owned nature and game reserves including some of Africa's most luxurious lodges.
- More than 50 State-owned nature and game reserves, many of which the Limpopo Provincial Government plans to commercialize, thus opening them for development by the private sector in partnership with local communities.
- Two Biosphere Reserves:
  - The Waterberg Biosphere Reserve which has been officially recognised by the United Nations. This status ensures that conservation will be the paramount consideration in future developments in the Waterberg area of western Limpopo which is becoming increasingly popular as a tourism destination.
  - The Kruger to Canyons Biosphere Reserve in eastern Limpopo which is seeking international recognition.
- World Heritage Sites.
  - The Mapungubwe cultural landscape in the Limpopo Shashe Transfrontier Park has been declared as a World Heritage Site. Generally regarded as southern Africa's first kingdom, Mapungubwe emerged in about 900 AD and was a forerunner of the Great Zimbabwe civilization. The kingdom seems to have flourished as part of an Indian Ocean trade route, with goods, including gold and ivory, being transported along the Limpopo River to the coast. The site is being developed as a major tourism attraction in the Limpopo Shashe Transfrontier Park.
  - The Makapans Valley which is a candidate World Heritage Site. Situated in central Limpopo, the Makapan Valley is unique because it encapsulates an almost unbroken record of proto-human and human occupation and resource exploitation extending from Australopithecine times about 3,5 million years ago to the present.

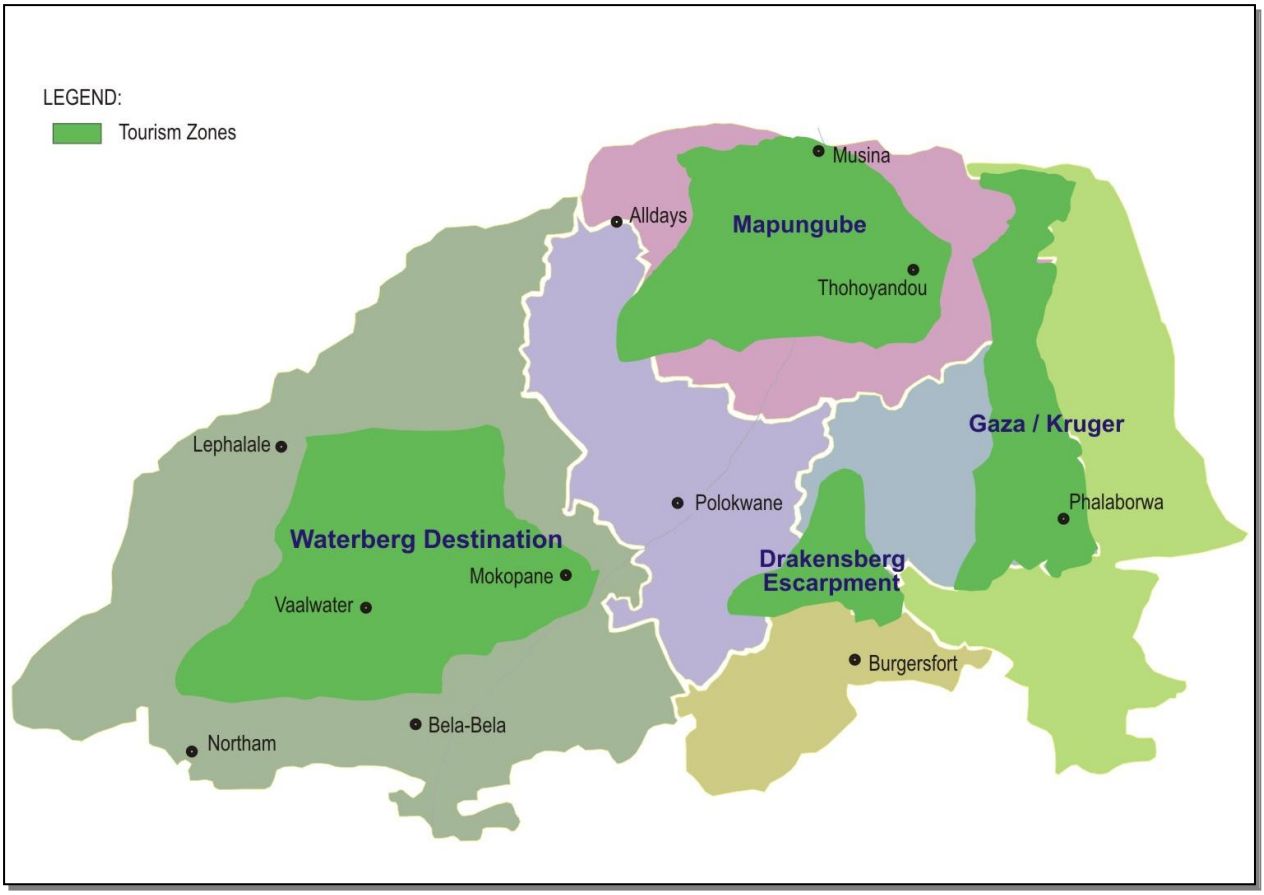
Figure 8.11 is a graphical presentation of the primary tourism zones in Limpopo:

- Drakensberg Escarpment - Tourism development plan has been completed with the focus on development of the Tzaneen, Doorndraai, Ebenezer, and Flag Boshielo dams.

- Mapungubwe World Heritage Site - The provincial strategy is to merge Soutpansberg complex with Limpopo Valley to create provincial destination and to stimulate tourism development around Alldays.
- Waterberg Biosphere World Heritage Site - The establishment of 100 000 hectare “Wildlife Wilderness Park” is envisaged with the Biosphere Reserve initiative forming the basis for partnerships.

High-level project feasibility studies have been completed on several projects, for presentation to investors in order to attract investment in the tourism sector. According to a recent survey (16 municipalities participated), the condition of roads is considered to be the biggest threat to the tourism industry. Other public infrastructure requiring maintenance include parking, signage and public transport.

Figure 8-11: Tourism Zones in the Limpopo Province



8.4 Transport demand analyses

This section of the report describes and interprets the transportation/econometric modelling task that was conducted during the course of the study in order to understand and analyse the transport demand to, from and through the Limpopo area.

The transportation modelling task was approached with an objective to reveal the transportation dynamics in the area in more detail and produce the relevant information for the rail network planning decisions with reasonable confidence. The modelling was conducted using the MS Excel spreadsheet tools and TransCAD modelling software for certain specific modelling tasks.

The core component of the modelling task was to establish current freight travel demand patterns in the study area and project freight demand patterns over the time period relevant in the feasibility analyses of rail infrastructure. In this regard the following main activities were required:

- Setting-up of the transport zoning system
- Consolidate and evaluate the current rail demand (Base-year 2005) based on the Spoornet information
- Project the transport demand generated within Limpopo
- Project the demand distribution and allocate to the specific corridors

8.4.1 Transport Zoning System

The data obtained from Spoornet regarding freight movements in terms of the trip origins and destinations was spatially referenced and analysed and then used as the basis for the design of the transport zoning system for the purposes of this study. The spatial analyses of the trip origins and destinations (based on the railway stations' freight shipments departed from and arrived to) provided also an important orientation with regard to the concentration thereof and the regional rail transport-related perspective of Limpopo Province.

The zoning of the Provincial territory was important in order to identify regions within the Province generating major rail freight commodities. The zoning system consists of 29 internal zones (within Limpopo Province) and 15 external zones. The internal zones' demarcations coincide with the boundaries of Local Municipalities to large extent. The external zones could be further categorised between regions within South Africa and international zones (via export ports and neighbouring countries).

The zoning system used in the study is shown in Figures 8.12 and 8.13 and listed in Table 8.18.

Table 8-18: Traffic zones in the study area

LIST OF ZONES				
ID	**LONGITUDE**	**LATITUDE**	**ZONE**	**ZONE_NAME**
1	27295604	-24670939	1	Thabazimbi
2	27454787	-23863950	2	Lephalale A
3	28171112	-23161089	3	Lephalale B
4	28245019	-24504335	4	Modimolle
5	28893122	-23036136	5	Blouberg
6	28660032	-23848331	6	Mogalakwena
7	29620817	-23541155	7	Molemole
8	29632187	-25014560	8	Greater Groblersdaal
9	29410468	-24384588	9	Lepele-Nkumpi
10	30223439	-23166296	10	Makhado B
11	30354197	-22728960	11	Mutale A
12	30780581	-22905977	12	Thulamela
13	31206965	-24806305	13	Bushbuckridge
14	30752155	-24322111	14	Maruleng
15	29069361	-23660901	15	Aganang
16	29870962	-24374175	16	Fetakgomo
17	29507115	-23900395	17	Polokwane
18	29677668	-22442609	18	Musina
19	30968190	-22421784	19	Mutale B
20	29592391	-22973660	20	Makhado A
21	30848802	-23395376	21	Greater Giyani
22	30956819	-23874363	22	Ba-Phalaborwa
23	30257550	-23874363	23	Greater Tzaneen
24	29728834	-24691764	24	Makhuduthamaga
25	30308716	-24488716	25	Greater Tubatse
26	28949973	-24681351	26	Mookgopong
27	30200699	-23509917	27	Greater Letaba
28	31332037	-23379757	28	Kruger Park
29	28370091	-24993734	29	Bela-Bela
30	30028791	-26019530	30	Mpumalanga
31	28040314	-26104866	31	Gauteng
32	25301871	-26267506	32	North West
33	21369374	-30093763	33	Northern Cape
34	26538296	-28632106	34	Free State
35	32004992	-28480277	35	Richards Bay
36	28156609	-29581917	36	Lesotho
37	27899337	-32924140	37	East London
38	18433040	-34176095	38	Cape Town
39	30977901	-29914137	39	Durban
40	18276668	-26602915	40	Namibia
41	24506015	-23343588	41	Botswana
42	33480554	-24751088	42	Mozambique
43	30562732	-20647922	43	Zimbabwe
44	31504366	-26540605	44	Swaziland

8.4.2 Base year freight demand

The freight demand in Limpopo Province was revealed on the basis of the Spoornet's information provided in terms of the following:

- Freight tonnage per commodity forwarded from and arrived to the railway stations within Limpopo Province
- Freight movement records for the last five years of operation i.e. between 2001 and 2005

The freight movements were firstly analysed on a commodity basis and then consolidated into a total freight movement matrix on the railway station basis. The spatial representation and analyses of the consolidated freight movements (using TransCAD software) on the station basis provided adequate environment for the development of the freight movement matrix on the transportation zone basis. This was, however, conducted on the assumption that the freight commodities loaded or offloaded at a specific station would also be generated in the transport zone in which the railway station is geographically located in. This assumption might not be correct in case the station is used as a major intermodal point from which it is further distributed to a relatively long distance from the railway line by the road-based transport modes. The information related to the final origin/destination places of the freight commodities was not available at this planning stage.

In terms of the revealed rail freight transport demand, the following findings should be emphasised:

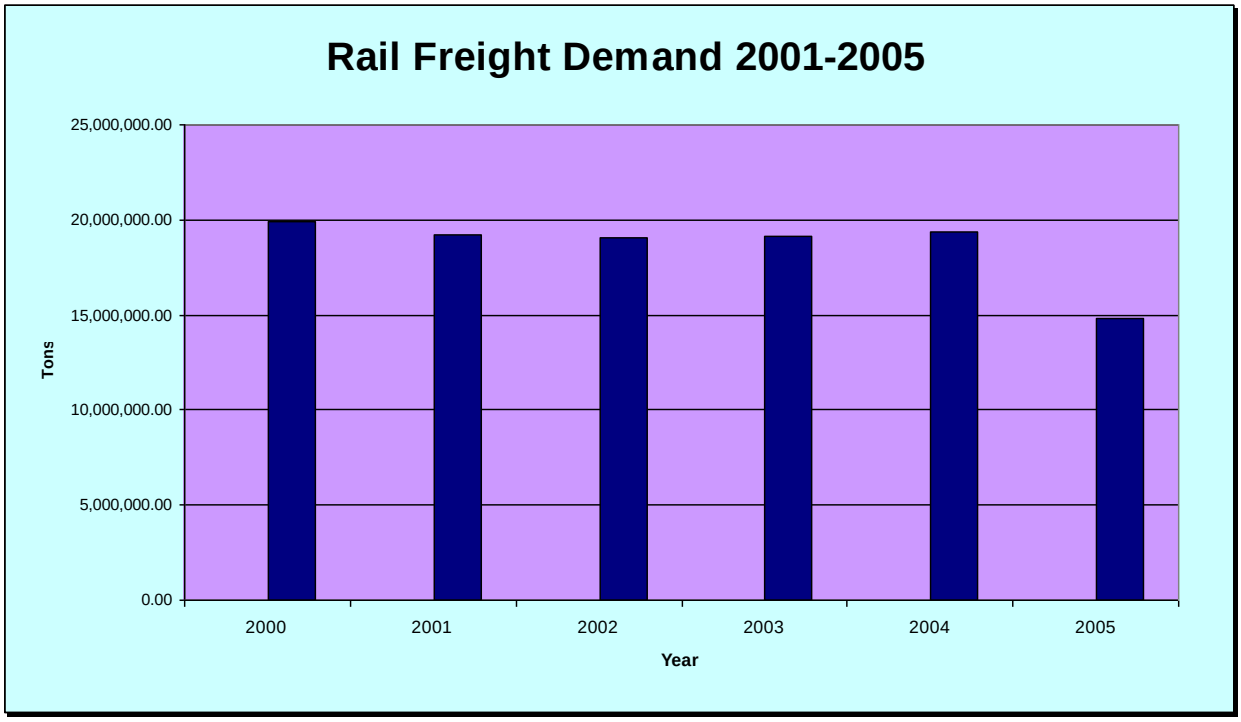
- Total rail-based freight tonnage generated in the Province in 2005 amounts to 14mt
- The rail-based freight tonnage over the last five years declined, most likely indicating significant preference of the road-based freight transport (Figure 8.14)
- Over 80% of rail commodities are mining related
- The main rail freight corridors include the following:
  - Lephalale – Richards Bay
  - Lephalale – Cape Town
  - Lephalale – Gauteng
  - Phalaborwa – Richards bay
  - Thabazimbi – Richards bay
  - Thabazimbi – Gauteng
  - Musina – Gauteng

- The main railway stations in terms of the rail freight movements include the following:
  - Phalaborwa
  - Lephalale
  - Thabazimbi
  - Polokwane
  - Musina

Figure 8-12: Transport zoning system for Limpopo Province

Figure 8-13: Internal zoning system for Limpopo Province

Figure 8-14: Rail freight demand (2001 – 2005)



The 2005 Limpopo rail freight transport matrix is presented in Figures 8.15 and 8.16 in a format of desire line movements between the railway stations from a regional perspective and focusing on the Province, respectively.

8.4.3 Transport demand projections

Projecting the transport demand is the most complex and sensitive process in terms of the technical tasks involved in the planning process providing that the planning level is advanced in terms of the time-frame for infrastructure implementation. The detailed and confident planning recommendations require more precise technical investigations and analyses and surely significant information resources in this regard.

This study represent an initial rail planning initiative of its kind in the Province for a long time, and could not be undertaken at a highly detailed level for a number of reasons as discussed in the introductory sections of the report.

The basic transport demand projections were undertaken for freight rail transport sector, whilst some passenger projection estimates were made for Polokwane-Gauteng corridor only.

8.4.3.1 Freight demand projections

The freight transport demand projections in this study were based on a very broad economic analyses and growth projections of the economic sectors producing commodities suitable for rail transport i.e. Mining, Manufacturing and Agriculture.

The review and analysis of the local and international literature provided the basis for the rail freight demand projections. The following are the important notes and findings in this regard:

- South Africa moved 693 millions of tons of freight domestically in 2003 (National Freight Logistics Strategy) of which 74% was by road and 26% by rail. The same source indicates, however, that the modal split along the main corridor in Limpopo province i.e. between Gauteng and BeitBridge (through to Zimbabwe) is significantly different in favour of road mode which carries 90% of freight demand.
- According to the CSIR document related to Spatial Analyses of Economic Activity in South Africa (CSIR Transportek, 1998) the actual freight demand transported by road and rail during 1998 and generated in Limpopo region was equivalent to over 48mt. This was taken as a point of departure in the estimation of firstly, the Base year (2005) transport demand and secondly the future freight transport demand over the 30-year time period.
- The previously presented GGP contributions among the District Municipalities within Limpopo Province provided the basis for the distribution of the projected generation of freight commodities. Also, the GGP contributions of the three economic sectors within each DM, revealed from the relevant literature, were used as the basis for further distribution of the projected freight commodities. The information summary regarding the current GGP and freight demand distribution within Limpopo Province is shown in Table 8.19.

Table 8-19: Sector Comparison of contribution towards GGP versus tonnage transported-(2005)

Limpopo Province				1998	% Growth	2005
Tonnage				48,037,000	0.0357	61,406,410
Area	**Sector**	**2005 Districts Contribution to GGP (R)**	**2005 Districts Contribution to GGP %**	**%**	**2005 % Split per District**	**2005 Tonnage Split**
Capricorn	Agriculture	**R 10,770,750.49**	2.45%	18.66%	**25.09%**	**15,404,029.64**
	Mining		2.72%	20.72%		
	Manufacturing		7.96%	60.62%		
	Other Sectors		86.87%			
Bohlabela	Agriculture	**R 2,293,740.98**	2.96%	48.84%	**5.34%**	**3,280,444.95**
	Mining		0.00%	0.00%		
	Manufacturing		3.10%	51.16%		
	Other Sectors		93.94%			
Mopani	Agriculture	**R 8,536,640.69**	5.59%	18.85%	**19.88%**	**12,208,867.55**
	Mining		20.02%	67.50%		
	Manufacturing		4.05%	13.65%		
	Other Sectors		70.34%			
Sekhukhune	Agriculture	**R 2,822,115.19**	0.46%	2.05%	**6.57%**	**4,036,111.14**
	Mining		19.66%	87.49%		
	Manufacturing		2.35%	10.46%		
	Other Sectors		77.53%			
Vhembe	Agriculture	**R 6,798,999.30**	5.67%	26.08%	**15.84%**	**9,723,740.87**
	Mining		12.52%	57.59%		
	Manufacturing		3.55%	16.33%		
	Other Sectors		78.26%			
Waterberg	Agriculture	**R 11,714,123.92**	4.26%	9.02%	**27.28%**	**16,753,216.25**
	Mining		40.75%	86.30%		
	Manufacturing		2.21%	4.68%		
	Other Sectors		52.78%			
Limpopo Province		**R 42,936,370.57**			**100.00%**	**61,406,410.40**

Source: Spatial Analysis of Economic Activity in South Africa as per 1998: A Preliminary Assessment

- In order to identify the freight demand along the specific rail corridors, it was necessary to conduct further spatial distribution analyses within the District Municipalities and identify specific transport zones expected to generate future freight demand. The outcome of this exercise is presented on a map in Figure 8.17.
- The future freight demand on a transport zone basis was projected by applying an annual growth rate equivalent to the projected economic growth rate for every DM in the Province. The freight demand projection was made for the 30-year time period.

- To estimate the distribution of the freight demand along the rail and/or road corridors, the projected freight transport demand generation was conceptually distributed between three possible destination categories, namely within Limpopo Province, outside of the Province but within South Africa and Export destinations either through the ports in South Africa or via land-based border crossings. The distribution split was based on the information provided in ***Spatial Analysis of Economic Activity in South Africa as per 1998: A Preliminary Assessment*** and indicated in Table 8.20.

Table 8-20: Applied distribution of the freight transport demand generated in Limpopo Province

Distribution		
Local	**Provincial**	**International**
67%	**30%**	**3%**

The basic economic growth analysis and the relationship between the economic activities in Limpopo Province and freight generation and associated transport demand were consolidated into a relatively simplified spreadsheet model providing the basis for future sensitivity analyses as well as more detailed and precise planning exercises.

Figure 8-15: Spatial representation of the regional freight demand relative to Limpopo Province

Figure 8-16: Spatial representation of the freight demand within Limpopo Province

8.4.3.2 Projected freight demand along specific corridors

The previous Development Planning and Transportation Planning studies and processes undertaken at the Provincial or District levels in Limpopo Province identified and addressed to some extent many issues related to the freight transport in the Province as well as many development opportunities which would be implemented at accelerated pace should the adequate transport infrastructure and operational and logistic systems are in place. In this regard, the Province identified, through its planning processes and activities, several key development corridors along which the focus of relevant infrastructure and operations should take place. With regard to the rail transport operations, the following corridors were identified and specifically included in the scope of this study for preliminary feasibility investigations:

- Rustenburg-Notham-Polokwane
- Burgersfort-Polokwane (Dilokong Corridor)
- Lydenburg-Zebediela-Polokwane
- Polokwane-Tshwane passenger corridor
- Lephalale-Thabazimbi
- Thabazimbi-Richardsbay

Some of these corridors or corridor sections have already been serviced by the rail lines and would require upgrading or capacity improvements, whilst some of the corridor sections would require the implementation of new rail infrastructure. More detailed discussion regarding the corridors has been provided in the following section of the report.

With regard to the estimated freight transport demand along the corridors, the projected freight tonnages on the transportation zone basis were distributed onto the corridors simulating a traffic assignment task of the conventional transportation modelling process. The outcome of this activity was summarised in a table format for each corridor and specific target years (2005, 2010, 2020 and 2030) and presented in Table 8.21.

Table 8-21: Projected freight demand on a corridor basis

Corridors	Type	Estimated line length (km)	Existing Rail Freight Transported	Projected Rail Freight Transported				
			2005	2010	2015	2020	2025	2035
			Year0	Year5	Year10	Year15	Year20	Year30
Rustenburg-Northam-Polokwane	Freight	**324.9**	**3,826,712.26**	**4,721,593.44**	**5,826,278.62**	**7,190,081.46**	**8,873,935.90**	**13,520,756.86**
Rustenburg								
Northam		175.8						
Polokwane		149.1						
Burgersfort-Polokwane (Dilokong Corridor)	Freight	**139.3**	**3,304,823.93**	**4,009,835.63**	**4,878,860.34**	**5,951,435.41**	**7,276,757.80**	**10,945,542.27**
Burgersfort								
Polokwane		139.3						
Lydenburg-Zebediela-Polokwane	Freight	**189.6**	**3,304,823.93**	**4,009,835.63**	**4,878,860.34**	**5,951,435.41**	**7,276,757.80**	**10,945,542.27**
Lydenburg								
Zebediela		142.2						
Polokwane		47.4						
Polokwane-Tshwane	Commuter	**315.95**						
Polokwane								
Pienaarsrivier		228.55						
Tshwane		87.4						
Lephalale-Thabazimbi	Freight	**120.53**	**1,708,828.06**	**2,089,065.29**	**2,553,910.43**	**3,122,189.86**	**3,816,919.11**	**5,704,535.03**
Lephalale								
Thabazimbi		120.53						
Thabazimbi-Richardsbay	Freight		**385,829**	**463,888**	**558,557**	**673,471**	**813,074**	**1,189,313**
Thabazimbi								
Richardsbay								

8.5 Rail corridor analyses

Based on the developments and stakeholders' inputs during the course of the study, the study team could not identify potential rail corridors other than the six corridors defined in the scope of the study and listed in the previous section of the report.

The comprehensive rail corridor analyses would be conducted in the next planning phase entailing the following activities:

- Rail capacity analyses providing relatively precise estimates of the rail infrastructure that would be required along specific corridors, possible and/or required loading capacities etc
- Rail infrastructure analyses including determination of possible routes, the type and cost of infrastructure, possible railway stations etc.
- Operational analyses referring to the rail operational elements including signaling technology, operational resources, rolling stock technology etc.
- Environmental consideration relating to the environmental impact of the rail infrastructure and operations

At this planning stage, relatively brief interpretation of these corridors in terms of understanding background and the fundamentals related to the proposed provision and/or upgrade of the rail infrastructure was undertaken and recorded in this section of the report.

8.5.1 Rustenburg-Northam-Polokwane corridor

This corridor proposes rail linkage of two existing rail corridors, namely Rustenburg-Northam-Lephalale and Polokwane-Gauteng corridors. The former corridor follows an established mining belt dominated by extensive coal resources within North West and Limpopo Provinces. The current and projected mining activities along this belt will extend well into the future based on the identified mineral resources and coal deposits in the Waterberg region as well as further north within Botswana.

The Polokwane-Gauteng corridor mainly serves the general freight demand and follows one of the major National corridor sections between Gauteng and Beitbridge providing also a getaway to the Southern African subcontinent. The linking of the two corridors would facilitate possible time and distance savings for coal export demand currently serviced through the port of Richards Bay via Rustenburg and Gauteng as well as the possible demand for transport of mineral deposits from the eastern mineral belt (Polokwane-Burgersfort) to smelters and further production in the Rustenburg area. A significant analysis of the passenger demand along this corridor could not be estimated at this stage. The proposed corridor is shown on a map in Figure 8.17.

Figure 8-17: Rustenburg-Northam-Lephalale corridor

The representation of the corridor on the map does not suggest precise route of the rail link, it is merely a conceptual presentation of the current considerations. It means, that the link between the two corridors could be established at the optimal location.

8.5.2 Burgersfort-Polokwane (Dilokong Corridor)

This rail corridor had been identified to serve one of the development corridors in Limpopo Province established as the Spatial Development Initiative and known as Dilokong Corridor. It follows predominantly Platinum Belt stretching between Polokwane and Burgersfort and linking further south to the Richards Bay rail corridor.

This corridor is one of the fastest growing development corridors in the country on the basis of extensive current and projected mining activities. It is characterised by significant deposits of high-value minerals which are not necessarily rail-friendly commodities at later stages of a production process thereof.

Based on the input of stakeholders involved in the production and development activities along this corridor, the type and quantity of commodities generated by the mining industry in this area could provide supplementary demand for rail transport should the railway line be implemented.

The passenger demand along this corridor could not be estimated at this stage.

The proposed corridor is shown on a map in Figure 8.18.

Figure 8-18: Burgersfort-Polokwane (Dilokong corridor)

8.5.3 Lydenburg-Zebediela-Polokwane

This route would in essence also serve the Dilokong Corridor with the proposed alignment running parallel and close to the Polokwane-Burgersfort corridor, though extending southwards between Burgersfort and Lydenburg linking to the Richards Bay railway line. It is important to note that considerable chrome mining takes place in this southern section of the corridor generating commodities for export via the Richards Bay port.

It was therefore decided to combine the needs and demand projections for these two corridors for the purpose of this study and conduct cost-benefit analyses for a single integrated corridor in this regard.

8.5.4 Polokwane-Tshwane passenger corridor

The existing rail passenger service operates between Johannesburg and Musina on a daily basis as shown in the Shosholoza Meyl time table presented earlier in the report. The departure and arrival times between two main centres, namely Polokwane and Pretoria have been scheduled at odd hours causing extreme inconvenience for a single day visits to the two cities. Apparent demand for more convenient service has been recorded over the recent years by the local and provincial planning teams providing the basis for including this corridor into the scope of this study for preliminary investigations.

The preliminary investigations took into consideration the estimated current passenger demand as recorded by the rail operator (on annual basis) as well as some consultations with the minibus-taxi service providers along this route investigating the current passengers demand between Pretoria and Polokwane using the minibus-taxi transport mode.

The spatial representation of this corridor is provided in Figure 8.19.

Figure 8-19: Polokwane-Tshwane passenger corridor

8.5.5 Lephalale-Thabazimbi

This is the northern most section of the current Lephalale-Thabazimbi-Northam-Rustenburg-Richards Bay railway corridor. This corridor section primarily serves coal export transport demand from the coal resources in the Waterberg region via the Richards Bay port. The extensive coal and other mineral deposits in this region as well as further north, in Botswana and Zimbabwe indicate a long-term sustainability of the existing railway line and requirements for improved capacities as well as the highly likely extension of the current railway line to the north.

Some of the concerns expressed by the stakeholders with regard to this corridor relate to sections of the railway line which require realignment to improve the capacity and reduce travel times. The future improvements along this corridor will depend also on the detailed feasibility analyses of the proposed Lephalale-Polokwane-Burgersfort rail links which would create an alternative accessibility to Richards Bay.

This corridor is shown on a map in Figure 8.20.

Figure 8-20: Lephalale-Thabazimbi corridor

8.5.6 Thabazimbi-Richards Bay

This rail link forms part of the existing corridor defined and interpreted in the previous section. It has been approached as a single corridor at this planning stage and analysed as such with regard to the cost-benefit considerations.

8.5.7 Stakeholder input

The overview of the stakeholders' consultation process undertaken at this planning stage was recorded and discussed in Chapter 6 of this document. The focus of the liaison process was on the discussions with the primary role players representing mining industry in Limpopo Province. Although, the consultation process at this stage did not include many other important stakeholders and role players, it should also be noted that the mining sector generates major types and quantities of rail-based commodities and therefore the study team had required their inputs at this preliminary stage of the rail planning and development process.

The inputs and contributions obtained during the consultation sessions were used to consolidate their medium and long-term needs and projected development patterns in terms of possible rail needs and corridor developments. The spatial interpretation and presentation is provided on a map in Figure 8.21. The spatial interpretation indicates that the Lephalale-Polokwane-Burgersfort-Lydenburg-Richards Bay corridor could be the highest priority corridor for rail development in the Province on the basis of the information obtained in this study. This should be, however, confirmed in the following planning stage through the consultation of other stakeholders as well.

Figure 8-21: Spatial interpretation of Stakeholder Input

8.5.8 Cost-benefit analyses

The basis for and approach to the cost-benefit analysis of the railway infrastructure in Limpopo Province were established at the inception stage of the study with the objective to conduct it in a comprehensive manner as far as possible.

This approach was followed to a great extent resulting in the development of the cost-benefit analysis framework and determining values of the relevant cost components using the available sources of information and references found in the literature.

As the planning process in this study had been unfolded, especially through the consultations with stakeholders and role-players, it was realised that detailed analyses and projections of monetary costs and benefits associated with the rail infrastructure were premature activities at this stage. This was particularly evident at the stakeholders' workshop held in a final phase of the study, at which session the following issues were emphasised:

- The monetary rates used in this study to estimate the rail infrastructure implementation costs, rail operational costs as well as tariff values vary significantly from the current and projected rates used by the Spoornet's planning team in their planning exercises
- The rail transport-related stakeholders' environment needs to be properly established and consolidated prior to conducting detailed feasibility and cost-benefit calculations. The rail infrastructure implementation projects are massive initiatives and require comprehensive mobilisation of the role-players in this regard

The reporting on the study team's activities related to the cost-benefit analyses in this section of the report was therefore reduced focusing on the formulation of the relevant framework and presenting some basic output of the analyses.

8.5.8.1 Cost Benefit Framework

The cost-benefit analysis basically entails the comparison of two monetary streams, namely a cost stream on the one side and a benefit (income and/or saving) stream on the other side, projected over a design life-time of a transport infrastructure being analysed in terms of implementation or upgrading requirements.

It should be noted that in most instances the implementation of a specific transport infrastructure impacts on the utilisation of alternative infrastructure and/or transport modes. This impact also needs to be taken into consideration in these analyses.

The following categories of costs and benefits are most often formulated with regard to the rail transport infrastructure:

COST ELEMENTS	BENEFIT ELEMENTS
Capital costs (implementation) of the following typical elements Tracks Stations Bridges Controlling (signalling) equipment Rolling stock Land expropriation **Operating costs including** Running costs Maintenance costs Insurance costs Labour costs **Other costs** Accident costs	**Income benefits** Direct operational income (tariff-based) **Indirect savings** Reduced road maintenance including roads providing alternative transport along the same corridor Reduced road-based accidents Travel time savings of road users

It is important to note that there are other costs and benefits that may not be of primary importance or not easily quantifiable, and usually taken into consideration if the above framework could not provide a clear direction for decision-makers.

This cost-benefit framework was established in a format of a spreadsheet tool and could be used for further more detailed cost-benefit analyses and sensitivity assessments.

8.5.8.2 Review of New Corridors

The summary of input information and output of the cost-benefit evaluations for the proposed rail corridors defined in this section of the report is provided in Table 8-22.

Table 8-22: Summary of Cost-Benefit Analysis

Corridor vs Time Period	20 Year		30 Year	
	Net Present Value (R0.00)	Required Tariff for NPV = 0 (R0.00/tonkm)	Net Present Value (R0.00)	Required Tariff for NPV = 0 (R0.00/tonkm
Lephalale - Polokwane	-3,581,963,540.17	0.67	-3,558,386,488.18	0.58
Burgersfort - Polokwane	-3,348,580,593.52	0.73	-3,327,617,871.67	0.64
Thabazimbi-Richards Bay	-71,508,968.38	0.18	-81,811,071.10	0.17

9. FINANCIAL FEASIBILITY

Finance is one of the most restrictive aspects of rail development due to the significant cost of rail infrastructure implementation, overall decline in rail utilisation in the last decade and an extensive time period required for investment returns. In most cases, unique and tailor-made financing solutions are required to fund new rail infrastructure. One of the important considerations in this regard relates to the balancing of economic justification versus the financial viability.

The study team firstly reviewed international perspective in this regard and then provided various options for further investigations in the following stages of the rail planning process.

9.1 International experience

Internationally three types of financing alternatives for railways are considered, namely:

- **Revenue sources for operating costs**: Revenue sources are those funds raised through the normal operation of the rail service. Typical revenue sources include farebox, advertising and on-board concessions.
- **Funding sources for capital costs**: Funding sources are typically utilised to cover the up-front capital costs of the rail system such as future capital improvements. Most funding sources are from federal (national), state or local government agencies.

- **Financing sources for capital costs**: While funding sources do not require repayment, financing sources provide lump sum capital and require repayment through a stream of debt service payments. This is also referred to as debt financing.

Some of case studies relating to rail investment and financing within the context of Africa may serve as example. The following are two examples:

- **The Nacala Corridor between Malawi and Mozambique**: In this instance distinction is made between ownership and concessions as this impact on the operations of the rail corridor. Investment in the project focussed on investment from the shareholders (equity) and debt financing. In terms of this project, debt financing surfaced as a major problem due to the fact that initial actions from the project to solicit debt financing proved unsuccessful.
- **The Sitarail in West Africa**: In this instance the private sector (Sitarail) manages the railway by way of Concession. The assets and rolling stock remains the ownership of each country, while a fund was created for the rental of rolling stock. Income to Sitarail is by way of user charging. The financing challenges of this project relates to the fact that debt servicing expenses are very high for the concessionaire.

The debt servicing for railway infrastructure may adversely impact on the viability of any potential contractual agreement between railway concessionaires and the public sector. Donor or grant funding or even greater equity contributions may be required to ensure viable rail implementation. A number of funding mechanisms must be identified for local application (refer to section 9.3).

9.2 South African perspective

There were not many large rail infrastructure developments and investments in South Africa in recent years. Traditionally, the capital budget is the main source of funding transport infrastructure (including rail) in South Africa. This source has been limited recently hence the limited extension of railways in this country.

9.3 Funding mechanisms

Funding possibilities for rail development in Limpopo Province is discussed and interpreted in this section.

9.3.1 POTENTIAL REVENUE SOURCES FOR OPERATING COSTS

9.3.1.1 Farebox Revenue

- **Background**

  The total farebox revenue is a function of the number of riders purchasing tickets at various fares for travel within a rail corridor. From a freight perspective this relates to the tariffs which are usually charged on a tonne/kilometre basis.

- **Applicability**

  Although farebox revenue has the potential to increase over time with growth in ridership, predicting ridership and farebox revenue with certainty is not possible. It is thus difficult to rely on this as a source of debt service. Comprehensive modelling estimates could, perhaps, assist in predicting freight demand more accurately and therefore use the projected farebox revenue in the financial analyses and investment decision-making with more confidence.

9.3.1.2 On-Board Concessions and Advertising

- **Background**

  On-board concessions would involve the sale of goods and services on the train such as food, beverages etc. Advertising revenue would come from the selling of space in or around the rail station.

- **Applicability**

  These revenues would generally be small and not sufficient to cover extensively the operational costs of a rail service.

9.3.1.3 Capital budget

- **Background**

  Capital budgeting is the decision-making process involved in formally planning the investments of capital. The role of the capital budget is to reflect a government's future development proposals and is a good indicator of its priorities. The capital budget is traditionally the primary, if not the only, source of funding transport infrastructure at all levels of government.

- **Applicability**

  The applicability of the capital budget cannot be denied. However the purpose of this report is to identify what sources will ensure higher income for rail projects. From this perspective the capital budget offers very limited scope due to the budget constraint and the pressures from other departments for a larger portion of the capital budget.

9.3.2 POTENTIAL FUNDING SOURCES FOR CAPITAL COSTS

9.3.2.1 Donor Funding

- **Background**

  Donor funding is funding provided by the donor community for specific projects or programmes. Donor funding is generally provided by international agencies or institutions.

- **Application**

  The impact of donor funding towards the provision of rail infrastructure and services is unknown. There is a number of donor agencies which focus on public transport related projects.

9.3.2.2 Governmental Funding

- **Background**

  This type of funding is funding provided by the different levels of government for specific projects or programmes.

- **Application**

  The impact of governmental funding towards the provision of rail infrastructure and services is limited. There are a number of Funds that can be approached for possible rail assistance such as the funds from the Department of Trade and Industry for critical infrastructure funding.

9.3.2.3 Sale or Lease of Developmental Rights

- **Background**

  In this instance the rail authority sells or leases land near the rail infrastructure to a developer who is granted permission to develop the land subject only to certain conditions being met.

- **Applicability**

  The selling or leasing of development rights can provide a source of cash or income to reduce capital requirements. Town planning and environmental considerations may impact on the specific use of land for property development proposals. Processes are also quite lengthy and may impact on short term financial requirements.

9.3.2.4 Local Value Capture Methods

- **Background**

  In order to capture revenues associated with enhanced real estate development resulting from improved transport corridors such as rail investment both special benefit assessment rates and tax increment financing can be used for development or real estate taxes or collections. Special benefit assessment rates are based on the premise that some or all the costs associated with public improvement should be borne by properties within a well-defined area benefiting from the project. This assessment can be either a one-time fee or a recurring charge

over a period of years. This rate is an additional charge over-and-above the normal property rates and taxes. Tax Increment Financing (TIF) is based upon the premise that public improvements spur developments in areas surrounding them and, thereby increasing property tax revenues. Projected increases in property tax revenues are then used to back bonds with which the public improvements are financed, or alternatively annual increments of tax revenue are deposited into a fund dedicated to improvements within the TIF district.

- **Application**

  It is evident that this method can only be applied to areas where the land development demand is elastic. This implies that more development create higher property taxes to finance debt. This method can be applied to road infrastructure provision as areas experiencing development pressure require road access. These methods are not highly applicable to rail corridors as most of the rail infrastructure is required between urban areas and not within.

9.3.2.5 Regional Taxation Districts

- **Background**

  This approach is based on the premise that rail infrastructure can lead to the benefit of an entire region and that businesses and industry within this taxation district is responsible to pay for the costs of the infrastructure. This rate is an additional charge over-and-above the normal property rates and taxes.

- **Application**

  The mere fact that this approach is an extra tax limits its application. This method can however be successfully applied for rail developments if strong industry players such as mining companies will benefit from the rail infrastructure.

9.3.3 POTENTIAL FINANCING SOURCES FOR CAPITAL COSTS

9.3.3.1 Bonds

- **Background**

  A small number of bonds are available to government to enable it to raise capital in order to pay for public projects such as rail and other infrastructure.

- **Application**

  These bonds must be serviced and it seems to require dedicated revenue streams. The relevance of these bonds relate to the fact that projects can be financed outside the capital budget of government. It is a new way of financing infrastructure projects and no information is available of any projects that have been financed via this approach. This source offers no solution to the rail infrastructure in the short-to-medium time frame.

9.3.3.2 Private Finance Initiatives

- **Background**

  This is also described as public-private partnerships (PPP's) with the emphasis of using private finance to fund municipal activities or projects. A PPP is defined as a formal relationship within which the public and private sector partners look for a win-win solution towards a common goal to ensure the delivery of public services at a pre-agreed price and length of time with each party benefiting from the transaction in an appropriate manner. Project financing or infrastructure financing is required to ensure the successful financing of transport infrastructure. This implies that debt must be serviced via the operating revenue stream of the infrastructure system.

- **Application**

  PPP's can be formed in many formats for instance service and management contracts; leasing; concessions and privatization. Some PPP's in the transport industry have been formed in S.A such as the Gautrain project. This approach has great potential for growth in the rail sector. Issues that need further investigation relate to the duration of PPP-contracts and labour issues.

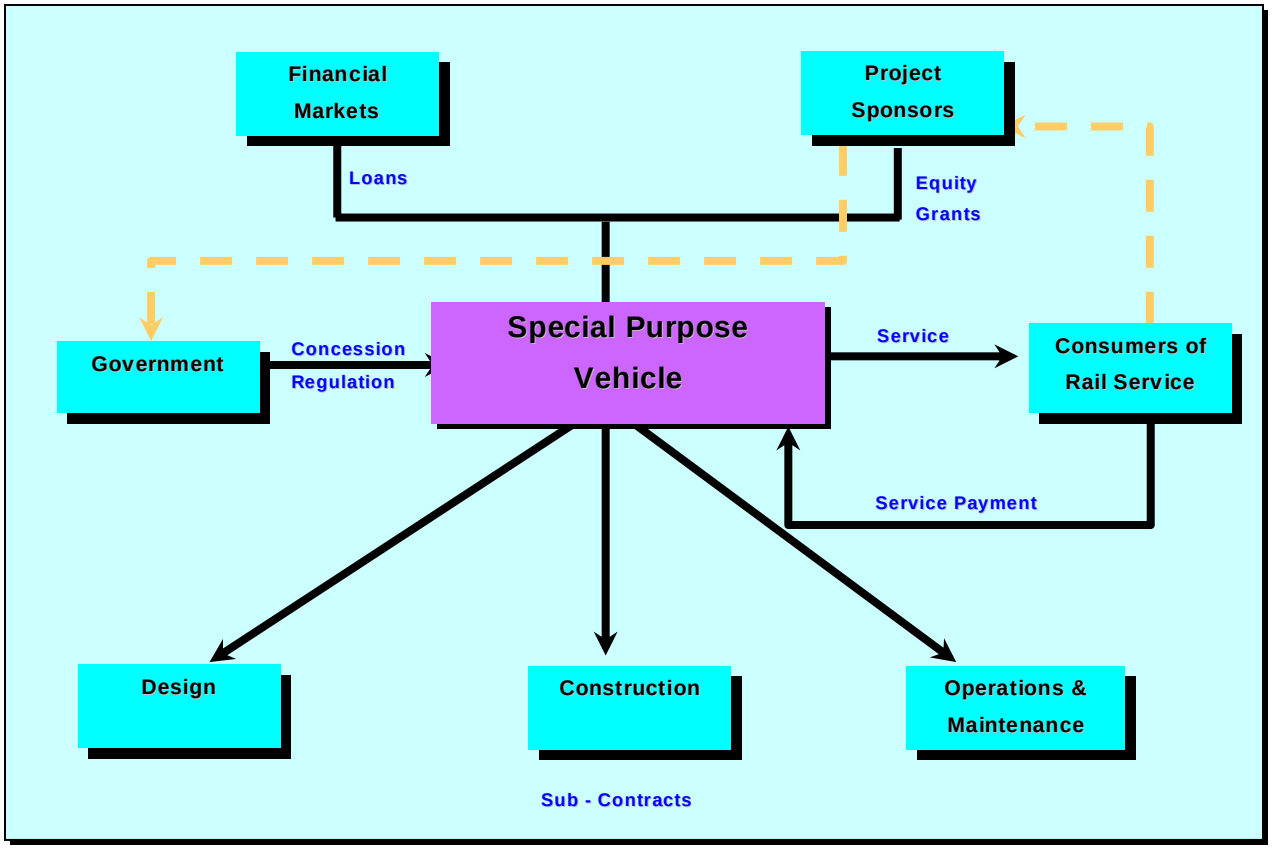
9.4 Rail financing options in Limpopo

From the above instruments it is quite obvious that a number of alternative approaches are available for rail financing, however it is of prime importance to note that rail infrastructure investment is not always viable from a purely financial perspective.

Another financing solution is thus sought for Limpopo. Although it is perhaps premature to elaborate with regard to this issue, based on many alternative funding approaches presented in this section, the most likely approach with regard to the rail financing in Limpopo at this stage refers to the establishment of a Special Purpose Vehicle (SPV) for the implementation of rail infrastructure in this province.

This may be a fairly complex process that requires commitment by all stakeholders. The main significance of the SPV is that it will identify stakeholders' responsibilities and financing solutions. A typical SPV structure used for the implementation of transport infrastructure may be viewed in Figure 9.1 below.

Figure 9-1: Typical Special Purpose Vehicle Structure for Transport Infrastructure



From the above figure it is evident that an SPV will ensure the following:

- Stakeholders – The SPV will identify and assign the roles and responsibilities to the relevant stakeholders. Project sponsors, champions, operators, financiers, contractors, regulators, government spheres, rail users etc. will be identified.
- Infrastructure – The SPV will ensure planning, design and implementation of rail infrastructure.
- Financing – The SPV will identify financial risk, sources of grant funding, financing solutions and appropriate debt to equity ratios.
- Operations – The SPV will ensure that all operational requirements of rail for the province will be complied with.

This SPV can, however, not be established without proper consultation between the different stakeholders.

10. RAIL DEVELOPMENT PLAN / WAY FORWARD

The rail planning and development is conventionally relatively long process involving many planning tasks and activities prior to the design and implementation tasks. Based on the situational

analyses conducted in this study as well as initial consultation process with selected role players and stakeholders, it is believed that the next planning stage should focus on the following three major activities:

- Formal establishment and co-ordination of the stakeholders consultation process with regard to the rail planning and development initiatives in Limpopo Province
- Prioritisation of the potential rail corridors in the Province
- Detailed corridor investigations

These three activities were further defined in more detail in terms of specific actions/projects and associated costs and time-frame requirements. This format of the formulation of future tasks coincides with the format requirements used in the ITP processes and can easily be incorporated in the relevant ITPs and Provincial Transport Plans.

10.1 Stakeholders co-ordination requirements

The establishment and pro-active management and co-ordination of the stakeholders consultation process is the most important and fundamental requirement at this planning stage. This was agreed upon at the stakeholders' workshop held in the final phase of this study. In this regard the following specific actions are proposed:

- Establishment of a Limpopo Rail Development Forum. This consultative body should be founded and managed by the relevant provincial authority (Department of Roads and Transport) involving representatives of among others the following interested parties:
  - Limpopo Provincial Government
  - National Department of Transport
  - Relevant economic sectors i.e. Mining, Agriculture and Manufacturing
  - Spoornet
  - District and Local Municipalities
- Formulation of the LRDF action programme based on the following:
  - Submission of Expression of Interest by all Forum members with regard to the rail development in the Province i.e. for rail line, corridor development, section of a line, upgrading needs, operating interests, financing interests etc.
  - Prioritisation of interests
  - Formulating detailed planning investigations for the selected initiative
- Procurement of resources required for the detailed investigations

This action should be implemented as soon as possible by the relevant government authority to ensure pro-active approach and continuous interest and participation of a private sector in terms of the rail development initiatives.

10.2 Detailed planning and feasibility requirements

The successful and co-operative stakeholders engagement process would create a positive attitude among them to provide relevant information and fully participate in the detailed planning exercises related to the rail infrastructure. The detailed planning tasks require extensive data and information sets in order to ensure valid and confident outputs and planning/implementation recommendations.

The stakeholders' suggestions made in this study imply that the Spoornet's rail transport and logistics planning team could be in the best position to lead the detailed investigations for the rail infrastructure development assisted by other relevant professional teams. It is therefore proposed that Spoornet forms a Project Team for a specific project identified by the LRDF and manage technical aspects of the detailed planning study.

10.3 Summary

The proposed tasks and activities with regard to the rail planning process in Limpopo province which could be identified at this stage were summarised in Table 10.1 providing also estimated cost and time-frame implications.

It should be noted that the rail transport planning is a continuous process which should be updated on a regular basis i.e. annually to ensure consolidated and cohesive approach by all interested parties.

Table 10-1: Summary of the proposed tasks in terms of the rail planning and development process in Limpopo province

Proposed Task / Activity	Estimated Cost (Rmil)	Proposed implementation time-frame
Establishment and Administration of Limpopo Rail Development Forum (one year)	R0.25	2006/2007
Prioritisation of the rail needs/interests in the Province	R0.15	2006/2007
Detailed rail development analyses of a selected corridor	R1.00	2006/2007
Update of the Rail Development Plan for Limpopo Province	R0.25	2006/2007

11. CONCLUSIONS

The commissioning of this study by the Limpopo department of Roads and Transport was based on the National drive to enhance strategic transport system in the country and policy-based decisions to improve and expand the railway network as well as on the recommendations of the Integrated Transportation planning process in the Province with regard to the improvements of the freight transport system with specific emphasis on the provision of the rail infrastructure. The freight transport system in the country depends heavily on the road infrastructure at present and should the current road utilisation trends by heavy vehicles continue, severe problems have been foreseen in terms of the road deterioration and maintenance requirements. In this regard, the National Government allocated significant funds for transport infrastructure improvements and expansion with specific emphasis on the rail network.

The basis for the procurement of funds for actual rail implementation comprises of the preparation of relevant transport plans addressing statutory planning requirements as a minimum and continuous updating of plans involving stakeholders and role players in the most meaningful manner as far as possible.

Against this background, the Province has formulated a scope for this study in order to conduct preliminary investigations with regard to the rail needs in the Province and formulate further planning tasks with the ultimate objective to improve and promote integrated transport system and optimise the Government's investments in the transport infrastructure. It is strongly believed that the rail transport could play a significant role in this regard in the long term.

The study objectives defined at the inception of this project included the stakeholders' consultation as an important though supportive objective, focusing rather on the technical elements of the transportation planning process and rail feasibility analyses. The course of the study has been, however, shifted from the initially defined focus towards the consolidation of stakeholders' interests and needs as a primary task to actually create the appropriate environment for detailed technical investigations. This is absolutely essential step since the rail infrastructure implementation presents a huge challenge for entire country which has not been faced very often in the recent time and only a handful of people still involved in the transportation planning field could have been in position to experience the full rail development process.

The proposed way forward therefore initially focuses on the proper establishment and consolidation of the stakeholders' environment with regard to the rail development in Limpopo province. Only then, the detailed technical tasks and activities should be reinstated focusing on the provision of

relevant information for implementation and investment-related decisions in respect of the transport and rail infrastructure.

Annexure A

Stakeholder Questionnaire