Limpopo Coal Company (Pty) Ltd.

Macroeconomic Impact Assessment of the Proposed Vele Colliery near Musina, Limpopo

Final Report

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Conningarth Economists
PO Box 75818, Lynnwood Ridge 0040, Pretoria, South Africa
Tel: +27 (0)12 349 1915
Fax: +27 (0)12 349 1015
E-mail: congarth@global.co.za

EXECUTIVE SUMMARY

LCC, a subsidiary of Coal of Africa Ltd., is conducting a feasibility study to mine coal at the proposed Vele Colliery. LCC is evaluating the feasibility of a dual open cast and underground mine west of Musina to supply coking coal to the local and international markets.

The primary objective of this macroeconomic study has been to measure the nature and magnitude of the economic and socio-economic impacts that will result from the proposed coal mine. The macroeconomic impacts emanating from the proposed mine and rail activities have proven to be significant. The following is a brief summary of the most critical macroeconomic aggregates that have been measured in terms of their impact as a result of the coal mining and rail activities. Table 1 shows the combined results (after deducting negative externalities) in order to arrive at annualised impacts. It was necessary to divide the total construction impacts by 20 years for this purpose.

Table 1: Summary of annual results [R millions, 2008 Prices]`

	Total Construction and Operational Impact		
	Impact on Gross Domestic Product (GDP) [R millions, 2008 Prices]	**Impact on Capital formation [R millions, 2008 Prices]**	**Impact on Employment [numbers]**
Average Construction Phase	**66**	**136**	**646**
Nett Operational Phase	**6 981**	**12 485**	**28 255**
Total Impact	**7 047**	**12 622**	**28 901**

The above results in Table 1 are used to determine the economic effectiveness criteria associated with the construction and operation of the mine and relevant rail line that determine whether or not the project represents a more effective use of scarce economic resources. Since capital is a scarce resource in South Africa, the effectiveness criteria used in this study measure the use of capital in terms of employment and GDP creation, relative to averages for the total South African economy.

The effectiveness criteria measured for the relevant coal mining activities are provided in the table 2 below. This table 2 also reflects the average criteria for the South African economy as a whole.

Table 2: Economic Effectiveness Criteria for the Proposed Mine

	Total Vele Colliery Impact on South Africa	*Average South African Economy*
GDP/Capital	0.56	0.31
Labour/Capital	2.29	4.47

The GDP/Capital ratio of the project is higher than the average criteria for the total South African economy. This demonstrates the high profitability of the project. The Labour/Capital ratio of the coal mine is lower (because of high capital intensity) than the relevant average of the South African economy, but it is still acceptable. This latter result highlights the positive impact the proposed Vele Colliery should have on employment creation in the Limpopo Province (See Annexure C).

The major sectoral impacts are as follows:

- Mining and Quarrying - 40.6%
- Manufacturing - 12.8%
- Transport and communication - 14.9%
- Finance, Real estate and business services - 15.0%

With regard to the most severe impact analyses, it should be noted that when all agricultural activities of citrus would be eliminated together with the trebling (three times) of game farming and tourism inputs (as negative impacts) there could be a reduction of 4% in the GDP forecast, but a 8% reduction in the employment forecast and a 12% reduction in the Capital formation.

Overall, however, the measured macroeconomic impacts of the proposed Vele Coal mine activities exceed the relevant minimum macroeconomic criteria for projects of this nature.

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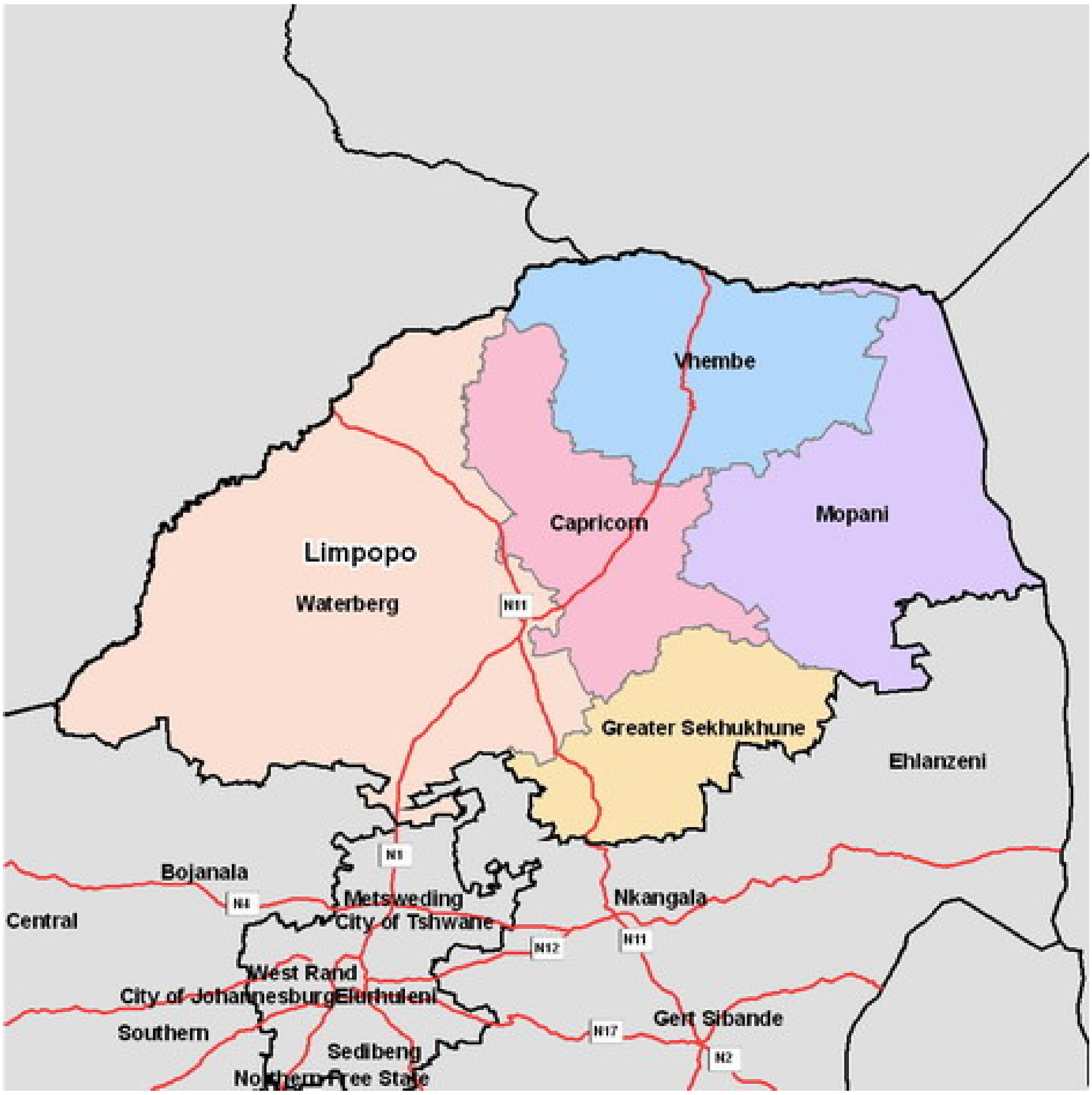
GLOSSARY

CAPEX	Capital Expenditure
EIA	Economic Impact Assessment/ Environmental Impact Assessment
GDP	Gross Domestic Product
LCC	Limpopo Coal Company
OPEX	Operational Expenditure
SAM	Social Accounting Matrix

1 INTRODUCTION AND BACKGROUND

Limpopo Coal Company (Pty) Ltd. (LCC), a subsidiary of Coal of Africa Ltd., is conducting a feasibility study to mine coal west of Musina near the Limpopo River. The proposed Vele Colliery is to be situated within the Musina Local Municipal area which forms part of the Vhembe District of Limpopo Province (See Map 1).

Map 1:



In order to establish whether the proposed coal mining operation will be environmentally feasible, an Environmental Impact Assessment (EIA) is conducted by Jacana Environmentals cc, an independent environmental consultancy that evaluated the potential environmental and social impacts of the proposed project.

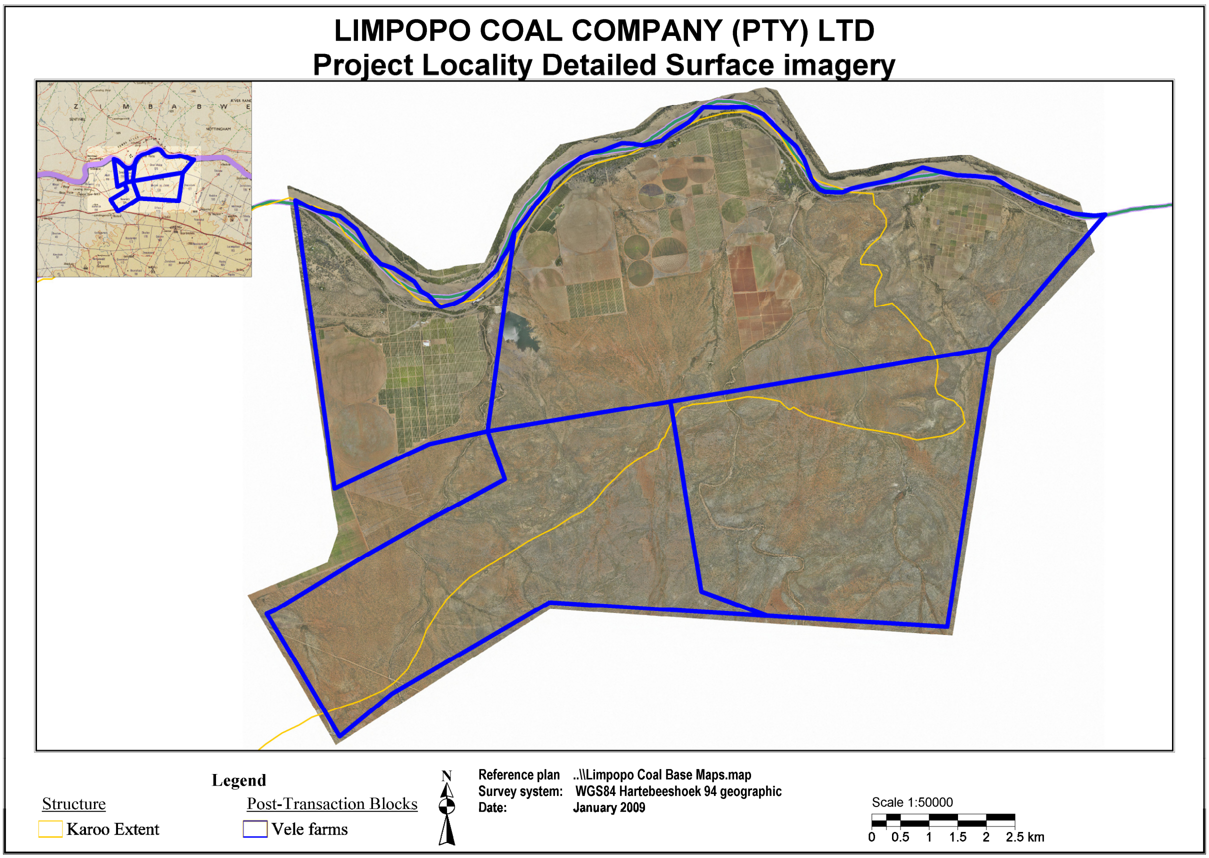
As part of that EIA, Conningarth Economists, a private economic consultancy, was approached by Naledi to conduct a macroeconomic impact assessment of the proposed Vele Colliery to meet the local and international demand for coking coal. In order to establish the impact of all the value-added processes related to the development of these mining activities on various interdependent macroeconomic performance indicators, such as the creation of new job opportunities, stimulation of Gross Domestic Product (GDP), demand for capital and income distribution, some further quantitative analyses are required. In view of the nature and magnitude of the proposed project, the backward linkages of the participating sectors will be of great significance in terms of their contribution to the comprehensive range of the important macroeconomic indicators mentioned above.

1.1 Description of the Vele Colliery project

1.1.1 Location of proposed mining site

Vele Colliery is to be situated in the Tuli Coal field approximately 40 km west from Musina. The mine is to be located near the Limpopo River and a few kilometres north of the R572 road towards Pont Drift and downstream of the confluence of the Sashi and Limpopo rivers (See Map 2).

Map 2:



1.1.2 Coal deposits and mining rates of the mine

The mineable coal reserves within the proposed coal mine comprise approximately 721 million tons. The extent of the mining property is 8 663 ha and comprises the farms: Overvlakte 125 MS, Bergen op Zoom 124 MS, Semple 115 MS and Voorspoed 836 MS.

The Limpopo coalfield forms part of the greater Tuli block/Bubye River Coalfield, and is represented in South Africa by a relatively narrow deposit of the Karoo Sequence rocks on the right hand bank of the Limpopo River.

As is the case of the smaller Limnic Karoo basins outside of the main basin to the south, these basins are fault bounded in which the deposition of the Karoo sediments occurred with concurrent movement on the pre-existing fault planes. This has resulted in a highly truncated sequence of lithologies that are markedly different to those that are encounted in the main Karoo basin.

1.1.3 The Proposed Mining Methods

The planned mining methods for Vele Colliery will be of a dual nature. On the one hand, 69% of the Run of Mine (RoM) production will be achieved by means of the open cast mining method whereas the other 31% will be derived from underground mining.

The open cast mining operations will comprise the use of a box-cut and mechanical shovels and will cover a footprint of 10ha at any time. Usable soil material will be removed (See Figure 1). Thereafter, soft sub-soils will be excavated to expose hard rock overlying the coal seam. Blasting will be necessary in most parts of the pits to break this rock, allowing the rock to be excavated and removed to expose the coal seams. The coal seams are then blasted to fragment the coal, which is trucked to the Run-of-Mine (ROM) tip and crusher. As open cast mining advances, the rock and sub-soil overburden (the material that is removed from above the coal seams) is tipped into the mined out cuts. When these mined out areas have been filled in, the usable soil is replaced and the areas are re-vegetated.

Figure 1: Top soil will be removed and stored to be used later to rehabilitate disturbed areas

The underground mining techniques up to a depth of ±55 metres will have a higher yield of between 47 and 50% than the 30% saleable yield of open cast mining. However, in view of time and cost constraints, the consultants have combined the inputs and outputs of these two mining techniques to do the macroeconomic impact study.

1.1.4 Coal transport infrastructure

The coal will be transported by rail to the Musina siding.

1.2 Objective of the Macroeconomic Impact Assessment

The objective of this study is to determine the economic and socio-economic impacts that both the construction and operation of the coal mining processes to be conducted by LCC will have on the economy. Importantly, this study will reflect the total direct and indirect macroeconomic impacts in quantified terms of this investment that will be generated through the inputs from all of the economic entities that are required to supply goods and services to the construction and operational parts of the project. In addition, quantification will be made of the so-called induced effects that the infrastructural investments will have on economic entities such as households in terms of their income and expenditure activities. For analytical purposes, the total economic impact of the coal mining process can be disaggregated into the following components:

- The impact of the investment phase (i.e. when constructing the project) will be based on an investment of R2.1 billion in the Limpopo Province
- The impact of the everyday operation of the completed infrastructure
- The transportation of coal from the mine to the Musina Rail head

This study's primary focus will be on the contribution that LCC is expected to make towards the economy in terms of:

- Gross Domestic Product (GDP)
- Employment opportunities
- Capital utilization (investment)

In order to measure all of the economic implications associated with the construction and operational phases of this project, a partial general macroeconomic equilibrium analysis will be performed, based on two Social Accounting Matrices (SAMs):

- The national SAM for the South African economy developed for 2004 by Conningarth Economists
- The regional SAM for the Limpopo Province for 2004 also compiled by Conningarth Economists

A detailed description of these SAMs is provided in Appendix 1. Partial general macroeconomic equilibrium analysis is used to determine the nature and magnitude of the macroeconomic impacts that emanate from the project in terms of its impact on macroeconomic performance indicators such as Gross Domestic Product (GDP), employment creation, investment, household income and expenditure, etc.

2 METHODOLOGY

2.1 Overview of the Macroeconomic Impact Assessment Process

A Social Accounting Matrix (SAM) for South Africa, which has been transformed into an economic model (the Leontief inverse), has been used as the basis for the general economic equilibrium analysis. In addition, use was made of a SAM for the Limpopo Province to determine the magnitude of the regional impacts that may be experienced by the Province as a result of construction and operation of the coal mining project.

The analysis takes into account the direct, indirect, as well as the induced effects of the open cast and underground mining project by LCC. For example, the “direct effect” emanating from this mining project refers to the visible effects occurring at the mine. The “indirect effects” refer to those effects occurring in the different economic sectors (those that link backwards to the coal mine due to the supply of intermediate inputs). In addition, the “induced effect” refers to the chain reaction triggered by the salaries and profits (less retained earnings) that are ploughed back into the economy in the form of private consumer expenditure.

The economic and socio-economic impacts have been calculated for both the construction phase of the project, as well as the operational phase. The impact of the construction phase lasts for only a limited period of time, i.e. not more than three to four years, after which the activity stops completely or is scaled down substantially. The impact of the operational (or production) phase is an ongoing process with an annual impact on the economy that will last for the lifetime of the project which in this case is assumed to be 20 years.

Furthermore, additional government revenue generated by the project places the government in a position to spend more on social services. The nature and magnitude of this impact has also been measured.

2.2 The Social Accounting Matrix

In layman’s terms, a SAM is a matrix depicting the linkages that exist between all the different role players in the economy i.e. business sectors, households, and government. It is very similar to the Input/Output Table in the sense that it reflects all of the inter-sectoral linkages that are present in an economy. However, the development of the SAM is very significant in that it provides a framework within the context of the national accounts in which the activities of households are accentuated and distinguished prominently. The household is indeed the basic unit where significant decisions are taken on important economic variables, such as, inter alia expenditure and saving. By combining households into meaningful groups, the SAM makes it possible to study the economic welfare of each group.

The SAM serves a dual purpose in the national accounts of a country. Firstly, it is a reflection of the magnitude and linkages that exist between the stakeholders in an economy and, secondly, it becomes a powerful econometric tool that can be used to conduct various economic analyses such as calculating the impact of investment projects on the economy. For a detailed description of the SAM, see Annexure A.

In order to obtain the highest measure of accuracy and realism possible, suitable disaggregation was performed on the SAM to ensure that all of the sectors that are impacted in a significant manner by the project are taken into account.

By applying the Social Accounting Matrix, it is possible to calculate the multipliers for these investment projects. They are:

- GDP multipliers
- Labour i.e. employment multipliers
- Capital utilisation multipliers

These multipliers, together with the inputs from LCC regarding their proposed Vele Colliery mining activities, have been used to determine the macroeconomic impacts emanating from this development. These inputs are described below.

2.3 Information Requirements

Modelling the macroeconomic impact of the construction and operational phases of the proposed open cast mine requires detailed information regarding these two phases of the project. The next two sub-sections describe the input requirements required. Apart from the detail relating to these two phases of the project, the transportation of coal from the mine was modelled separately and detailed information in this regard was obtained from LCC. The relevant building blocks/bricks containing the required data and information are given in Table 3 below.

Table 3: Bricks showing Information Requirements

Number	*Name*	*Main Activities*
		A Coal Mine Development
1	Mine Construction Phase	A1 Coal Mining
2	Mine Operational Phase	
3	Coal Transport Construction Phase	A2 Transport Coal by Rail
4	Coal Transport Operational Phase	
		Externalities
		B1 Agriculture
5	Game Farming Operational Phase	B1.1 Game Farming
6	Citrus Farming Operational Phase	B1.2 Citrus Farming
		B2 Tourism
7	Private Lodges Operational Phase	B2.1 Private Lodges
8	SAN Parks Operational Phase	B2.2 SAN Parks
9	Through Traffic and Road Maintenance Operational Phase	B2.3 Road & Rail Traffic from mine to Musina

2.3.1 Construction Phase

The information required to model the macroeconomic impact of the construction phase of a project relates to the nature and value of capital formation, according to the following standard breakdown of costs:

- Civil engineering costs:
  - Earth works (i.e. site clearance, foundations, etc)
  - Structures (i.e. bridges, dams, and other structures built mainly from concrete)
  - Roads
- Building and construction costs
  - Non-residential buildings (i.e. storage facilities, offices, etc)
- Machinery and other equipment:
  - Mechanical equipment
  - Electrical and electronic equipment
- Research, design, architecture and development costs

This information was required to be provided in 2008 Rand Values.

2.3.2 Operational Phase

In order to model the macroeconomic impact of the operational phase of the proposed mining project, the following information was required:

- Production turnover, broken down into:
  - Domestic RSA sales turnover, and
  - Export sales turnover
- Operating costs, broken down by:
  - Intermediate, input costs (i.e. all materials and services necessary for the production process) broken down by
  - Industries from which inputs are sourced, based on the Standard Industry Code (SIC) classification system, and
  - Geographical area from which inputs are sourced (i.e. RSA provinces and imports from foreign countries)
  - Remuneration of staff, broken down skill levels (i.e. unskilled, semi- skilled and skilled workers)
- Gross operating surplus (i.e. gross operating profit)

2.3.3 Transportation of coal

The following data elements were required for sufficient modelling of the transportation of coal from the LCC coal mine to the Musina rail head:

- Projected average annual tonnage to be transported
- Transport costs per ton

- Average travelling distance per load
- Number of transport staff

This transport brick also has a bearing on brick number 9, i.e. the maintenance cost of roads especially the provincial road R572 and specifically the section between the entrance to the mine and Musina.

2.3.4 Agriculture

Although the mining footprint will be relatively small, the project will have an impact on the current citrus and game farming activities of the relevant five farms that are affected. The required data has been collected from the relevant farmers and the Department of Agriculture in order to calculate possible negative impacts of the proposed Vele Colliery.

2.3.5 Tourism

At present tourism activities are taking place in the neighbourhood of the proposed mining area. The income and employment generation of these activities were taken into account when calculating the macroeconomic impacts of the proposed Vele Colliery.

2.4 Data Input Provided

Bearing in mind that the SAM-based partial equilibrium model used to determine the macroeconomic impact of the project is a fully integrated model that captures the linkages that exist between the various agents that exist within an economy (i.e. business enterprises, households, government, etc), the input information requirements described above, enables the model to calculate the direct, indirect and induced impacts of the construction and operational phases of the project separately.

2.4.1 Employment numbers

As per the information provided by the client a total of 2 500 workers are expected to be employed during the construction of the Vele Colliery over a period of three years. During the operational phase of the mine, 826 jobs will be created in the following categories:

– Mining and Engineering	677
– Plant	109
– Administration	40
– Total	826

2.4.2 Construction of the Vele Colliery

Table 4 below reflects the Construction Phase Input data. Based on this data, it was calculated that this construction Phase (including the rail line from the mine to Musina) will involve a total investment of R2.1 billion in the Limpopo Province consisting of:

- Construction of the mine	1.528 Billion
- Construction of Railway line between Mine and Musina	0.540 Billion

However, the construction cost of the Railway line is included under 2.4.4 below.

Table 4: Construction Phase Input Data

	Vele Colliery
Total Capital Cost for mine (R millions, 2008 Prices)	R 1 528
Furniture Industries	1%
Structural Metal Industries	36%
Machinery and Equipment Industries	14%
Electrical machinery & apparatus industries	1%
Transport Equipment Industries	23%
Buildings Industries	13%
Other Construction Industries	10%
Business Service Industries	2%
Total	**100%**

2.4.3 Operation of the Vele Colliery

In discussions with Coal of Africa it was agreed that the macroeconomic study would focus on the mining of coking coal. The production of thermal coal (midlings) is therefore excluded in this study. The possibility of a new power station, near the proposed Vele Mine, is also excluded from this Macroeconomic study and its results.

The annual full capacity and production figure of 5 million tons coking coal was provided by Coal of Africa Ltd. The price per ton FOB Maputo was given as US$140 which converted at US$1 = ZAR8.25 (Average exchange rate for 2008) means an annual turnover of R5.8 billion per annum. Table 5 summarises the relevant input data.

Table 5: Operational Phase Input Data

	Vele Colliery
Average projected annual tons	5000000
Price per ton [Rand, 2008 Prices]	R1 155
Mining Operation Cost per Ton [Rand, 2008 Prices]	R380
Percentage split of production	
Intermediate Input	52%
Labour Remuneration	13%
Gross Operating surplus	35%
Total	**100%**

2.4.4 Transportation of coal from mine

According to the information obtained from Coal of Africa, the annual production of 5 mt is planned to be sold as follows:

50% i.e. 2.5 mt to ArcelorMittal
50% i.e. 2.5 mt via Maputo to export markets

It should be noted that the projected coal sales to ArcelorMittal could be substituted with the same quantity of existing coal imports by ArcelorMittal from Australia. Accordingly the relevant transport costs from Vele Mine to Vanderbijlpark can be excluded from the transport cost calculations. On the other hand, the transport cost for the 2.5 mt export coal via Maputo are taken into account.

Table 6 below shows the input data relating to the transportation of coal from the mine to Maputo. However, it should be noted that only 40% of the total rail transport cost relates to the Limpopo rail distance from the mine to Maputo. It is assumed that this rail transport will be integrated with the existing Transnet rail network and operations. These data were obtained from the relevant stakeholders and are also in line with previous macroeconomic studies conducted by Conningarth Economists for other coal mines in South Africa.

Table 6: Transportation of Coal from Vele Colliery by Rail

Projected Average annual tonnage transported [tons] (2.5 mt from the mine to Maputo and 2.5 mt to Vanderbijlpark)	5 million
Transport Cost in Limpopo Province [cost per ton] [Rands,2008prices]	R 82.50
CAPEX for railway line from Mine to Musina	R 540 million

2.4.5 Agriculture

Currently the 8 663 hectares which comprise the proposed Vele Colliery mining area are being used for game and citrus farming. The relevant data set out in the following Table 7 reflect the estimates of the negative impacts on citrus and game farming in the proposed mining area, taking into account the side effects such as dust and noise levels.

Table 7: Agriculture

	Citrus	***Game Farming***
Hectares	332	7999
Turnover (R million 2008 Prices)	R 28.21	R 1.49
Directly affected Labour	558	12
Percentage split of production		
Intermediate Input	48.06%	46.98%
Labour Remuneration	21.42%	20.77%
Gross Operating surplus	30.52%	32.25%
Total	**100%**	**100%**

However in the scenario analysis, provision is made for a more severe impact of the mine on Agriculture (see Section 5).

2.4.6 Tourism

As mentioned above there are various tourism activities taking place in the vicinity of the proposed Vele Colliery. The relevant tourism input data are contained in the following Table 8 which reflects the estimates of the negative impact of the proposed Colliery on tourism in the surrounding area including private lodges and the Mapungubwe Sanpark.

Table 8: Tourism Impact

	Private Lodges	*SAN Parks*
Turnover (R million 2008 Prices)	R 35	R 50
Direct Labour	150	105
Percentage split of production		
Intermediate Input	50%	45%
Labour Remuneration	35%	40%
Gross Operating surplus	15%	15%
Total	100%	100%

2.4.7 Through Traffic and Road Maintenance

From discussions with the stakeholders and also via direct observation by a specialist from Conningarth Economists it became apparent that the proposed Vele Colliery should have a minimal impact on the previous through traffic via the relevant section of the R572 road. In fact, at present at least 90% of the relevant tourism and business traffic is using the Alldays instead of the Musina route to reach the study area. However, after the mine becomes operative an increase in road traffic between the Vele mine and Musina can be expected.

As mentioned under Section 2.3.3 provision therefore had to be made for the negative impact of road maintenance activities on the Provincial Road R572. For this purpose a distance of 35km has been taken into account (see Table 9).

Table 9: Through Traffic & Road Maintenance

	Through Traffic & Road Maintenance
Turnover (R million 2008 Prices)	R 3.5
Direct Labour	20
Percentage split of production	
Intermediate Input	70%
Labour Remuneration	29%
Gross Operating surplus	1%
Total	**100%**

3 RESULTS OF THE MACROECONOMIC IMPACT ASSESSMENT OF THE VELE COLLIERY

3.1 Nature and magnitude of results

In this section of the report the results of the macroeconomic impact assessment of the Vele colliery will be discussed as follows:

- Results relating to the Mine and Rail construction phase
- Results of the Coal mining and transport operations which will take into account the negative impact of the externalities
- Combined results of the Mine and Rail construction phase and the Coal mining and transport operations.

3.1.1 Construction

It is important to note that the construction analysis comprises of a mine construction (capital) and a rail construction phase. This allows the calculation of the capital impact of the proposed coal mine. The capital impact is defined as the economic impact that will result from the activities related to the construction of the mine and rail line. Normally, the economic impact of the construction phase of a project is relatively small in comparison with the operational phase due to the fact that construction is a once-off economic activity with a relatively short lifespan, whereas the operational (production) phase continues over a longer period of time. However, the importance of the construction phase lies in the kick-start it provides for economic activities.

3.1.2 Magnitude of linkages

The SAM-based partial equilibrium model measures the direct, indirect and induced impacts emanating from any stimulation of the economy resulting from the construction and operation of the open cast mine.

- **The Direct Impact**

As far as the construction phase is concerned, the direct impact refers to the effect of the activities that take place on the construction site, as well as activities related to the production and installation of capital assets such as mechanical and electrical equipment that will form part of the investment project.

With regard to the operational phase, the direct impact refers to the income and expenditure that is associated with the everyday operations of the project.

- **The Indirect Impact**

Indirect impacts include all of the impacts that the construction and operation of the mine will have on all of the other industries that supply inputs to the investment project (i.e. cement, steel, electricity, water, etc), as well as the people who will be employed in producing the capital equipment items that will be installed (See also Annexure E).

- **The Induced Impact**

Induced impacts include all of the economic impacts that will result from the payment of salaries and wages to people who are employed in constructing and operating the project. This impact also takes into account the salaries and wages paid by businesses operating in the sectors indirectly linked to the project through the supply of inputs. These additional salaries and wages lead to an increased demand for various consumable goods that need to be supplied by other economic sectors of the economy.

It is important to note that a standard SAM analysis (input-output analysis) was used to calculate the indirect and induced impacts of the proposed mine. The result of this was that the model was closed in terms of the household sector. The impact of closing the household sector is that it is assumed that, if households receive more income, they will automatically consume it and therefore stimulate the economy further. The same argument, to a lesser extent, holds also for additional government income and savings which will result through the activities at the mine. The more income government receives, the more it will consume, and the more savings will accrue in the South African economy and the higher investment will be. The relationship with government income and savings, in relation to the rest of the economy, is not as automatic as it is, for instance, with household income and spending, and therefore economists would rather view this additional spending and investment resulting from additional government income as a conscious decision, and not an automatic event. The result of not closing the model in terms of government income and savings is that the impact could be viewed as conservative.

Taken together, the direct, indirect and induced impacts provide the total impact that the investment project will have on the national economy. The results provided below focus on the total impact even though cognizance was taken of each of these three levels of impacts.

- **Regional Impacts**

As per the agreement between the client and Conningarth Economists, the results of the macroeconomic assessment are disaggregated as follows:

→ Musina Municipal area
→ Vhembe District
→ Limpopo Province
→ South Africa

It should be noted that these results are based on the following bricks which serve as an exogenous shock to the modelling system:

- Mine Construction phase

– Mine Operational phase
– Transport by rail construction phase
– Transport by rail operation phase
– Through traffic and Road Maintenance Operational Phase

The detailed results are contained in Annexures B (showing the results per brick) and C (Total Regional Impacts).

3.1.3 Impact of Construction Phase

The following Table 10 provides a quick overview of the macroeconomic impacts associated with the mine and rail construction phase in terms of:

– GDP
– Capital Formation
– Employment

Table 10: Macroeconomic Impact of the Construction Phase of the Mine including the Rail Link (2008 Prices)

	Construction Phase			
	Musina	*Vhembe*	*Limpopo*	*South Africa*
Impact on Gross Domestic Product (GDP) [R millions, 2008 Prices]	47	166	738	1 323
Impact on Capital formation [R millions, 2008 Prices]	85	320	1 399	2 727
Impact on Employment [numbers]	723	2 546	10 713	12 926

The figures shown in Table 10 are regional totals over the entire construction phase and not annual averages. Once the construction of the coal mine and the rail link between the mine and Musina reaches completion, these construction impacts will cease. However, the figures in Table 10 will be annualised (over 20 years) and combined with those annual figures for the operation phase (20 years) in Table 11 to arrive at the combined figures in Table 12.

3.1.4 Operation Phase

In Table 11 the total regional macroeconomic impacts of the operational phase of the Vele Colliery and related rail activities are provided.

However, it should be noted that the following negative externalities have been deducted from the operational impacts of the mine and rail operations:

- Agriculture: According to the inputs which the consultants received, the existing citrus farming activities will be halved from 664 ha to 332 ha when the mine starts operating. The game farming activities on the 7 999 ha within the relevant mining study area will also be negatively affected (See Table 7).

- Tourism: The tourism activities in the study area as well as the Mapungubwe Sanpark will also probably be negatively affected (See Table 8).

- Through Traffic and Road Maintenance: As mentioned before (See Section 2.4.7) the construction of the mine and its operations could possibly necessitate increased road maintenance work on the relevant road section on the R572 between the entrance to the Mine and Musina (See Table 9).

Table 11: Macroeconomic Annual Impact over 20 Years of the Operational Phase in the Musina Magisterial District, Vhembe Magisterial District, Limpopo Province and Total of South Africa (2008 prices)

	Operational Phase			
	Musina	**Vhembe**	**Limpopo**	**South Africa**
Impact on Gross Domestic Product (GDP) [R millions, 2008 Prices]	**2 910**	**3 233**	**4 465**	**6 981**
- Mine and Rail operations	2 975	3 305	4 567	7 139
- Less Externalities	66	73	102	158
Impact on Capital formation [R millions, 2008 Prices]	**1 933**	**2 763**	**5 735**	**12 485**
- Mine and Rail	2 534	3 380	6 415	13 286
- Less Externalities	601	617	680	801
Impact on Employment [numbers]	**1 169**	**4 137**	**16 859**	**28 255**
- Mine and Rail operations	2 030	5 080	18 189	29 773
- Less Externalities	861	943	1 330	1 518

3.1.5 Total Construction & Operational Impact

In order to arrive at annualised impacts, it was necessary to divide the total construction impacts by 20 years. The following Table 12 shows the combined annual impacts of the mine and rail construction together with mine and rail operations (after externalities were deducted).

Table 12: Summary of the Combined Annual Macroeconomic Total Impact of the Construction and Operational phases (2008 Prices)

	Total Construction and Operational Impact		
	Impact on Gross Domestic Product (GDP) [R millions, 2008 Prices]	Impact on Capital formation [R millions, 2008 Prices]	Impact on Employment [numbers]
Average Construction Phase	**66**	**136**	**646**
Nett Operational Phase	**6 981**	**12 485**	**28 255**
Total Impact	**7 047**	**12 622**	**28 901**

Note: The above figures are rounded off to the nearest Rand million as throughout the Report and Annexure.

The results shown in Table 12 above will now be discussed and analysed in more detail. However, it should again be noted that the results of the mine and rail construction phase (See Table 10) have been annualised over a period of 20 years in Table 12 for comparison purposes.

- **Impact on Gross Domestic Product (GDP)**

GDP reflects the magnitude of the value added in the economy. GDP is an indication of the contribution towards economic growth of the interventions. Value added consists of three elements, namely:

- Remuneration of employees
- Gross operating surplus (which includes, amongst others, profits and depreciation)
- Net indirect taxes

According to Table 12, the total GDP impact in South Africa of the mine and rail construction and their operational phases will amount to R7 billion.

Charts 1a and 1b reflect the relevant shares of the annual increases in GDP for the mine construction and operations per region.

Chart 1a: Total Impact on GDP in Limpopo Province (percentages)

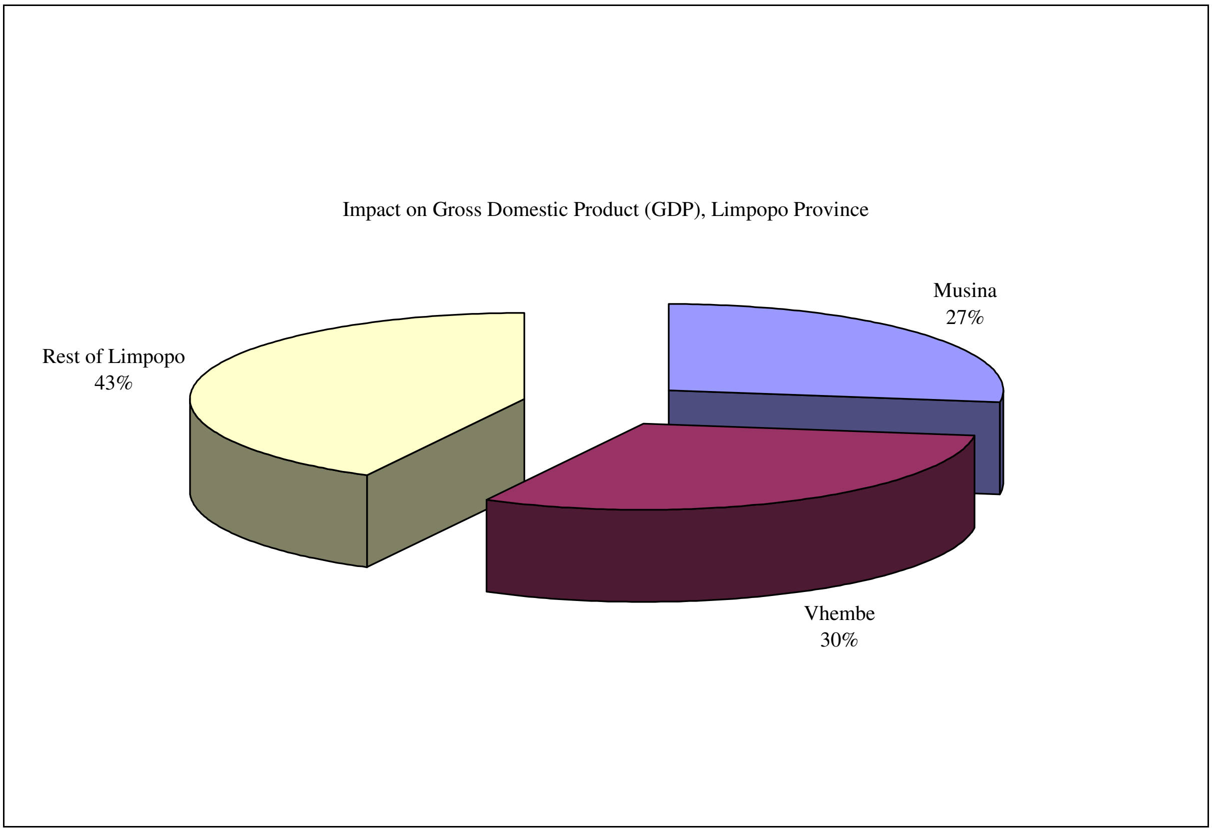
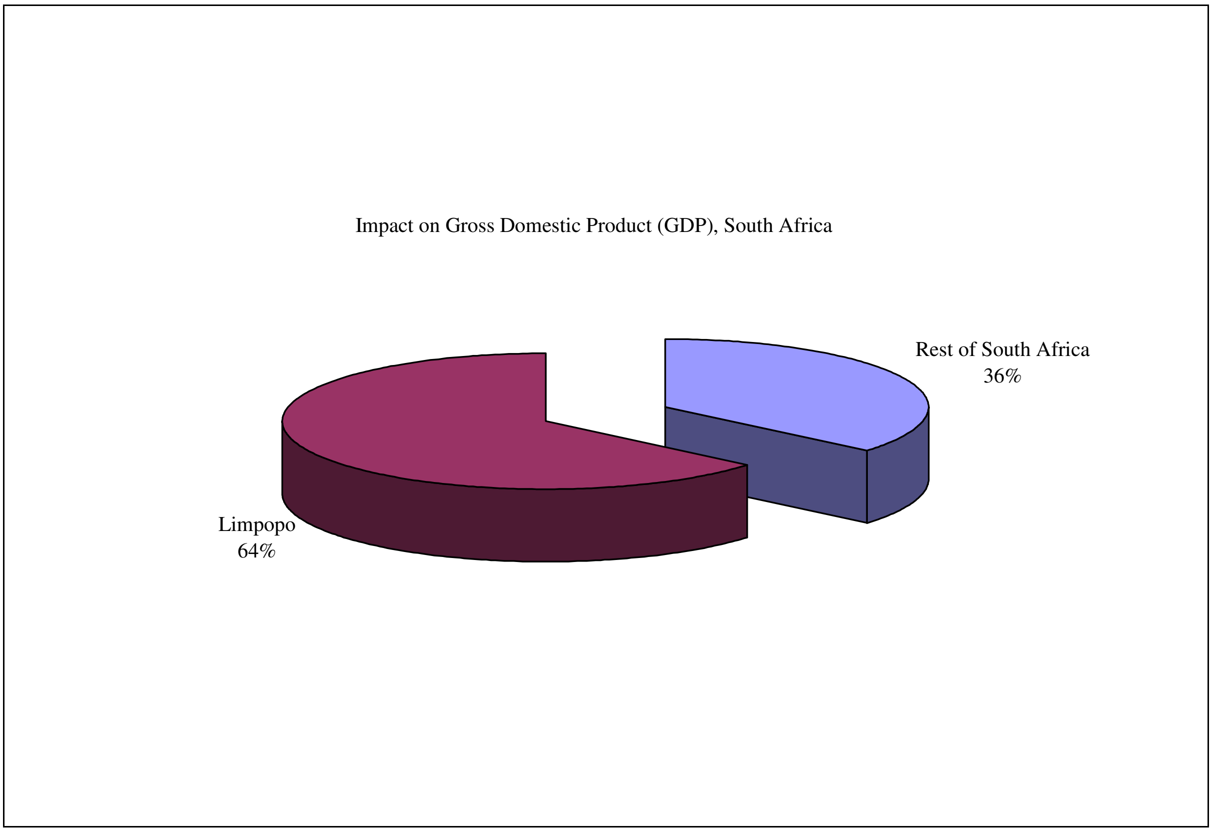


Chart 1a shows that the bulk i.e. 57% of the GDP impact in the Limpopo Province is expected to occur within the neighbouring area of the mine and rail activities i.e. the Musina municipal area and the Vhembe district.

Chart 1b: Total Impact on GDP in Limpopo Province and the rest of South Africa (percentages)



According to Chart 1b, the main impact i.e. nearly two thirds of the GDP impact of the mine and rail activities should occur in the Limpopo Province and slightly more than one third in the rest of South Africa.

- **Employment creation**

Labour is a key element of the production process. It is one of the main production factors in the economy and it also serves as an indicator as to what extent participation takes place in the economic process. This study has determined the number of new employment opportunities that will be created and sustained by the construction and operation of the intervention.

As can be seen from Table 12, the mine construction and operational phases are expected to create and maintain a total 28 901 employment opportunities per annum in South Africa over a period of 20 years.

Charts 2a and 2b illustrate the relevant regional shares of the total employment opportunities to be created by the proposed Vele Colliery.

Chart 2a: Total Impact on Employment in the Limpopo Province [numbers]

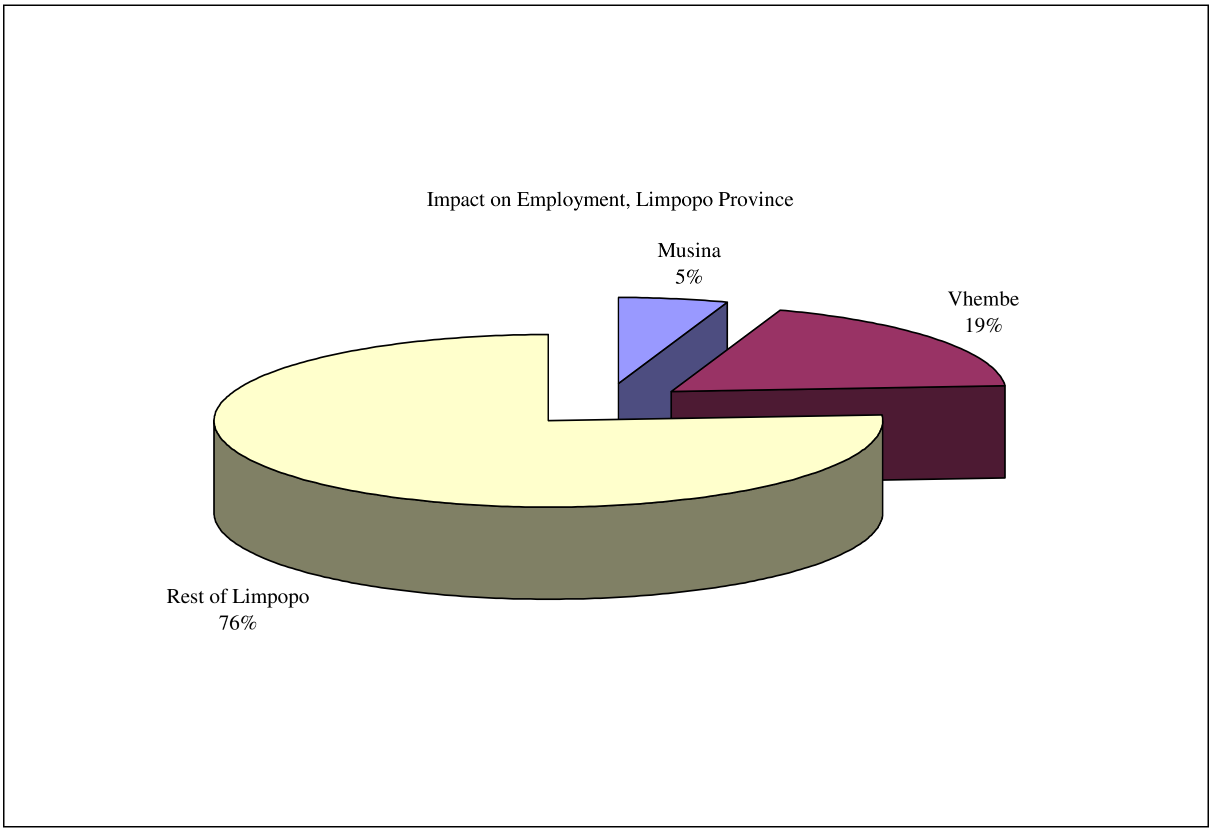
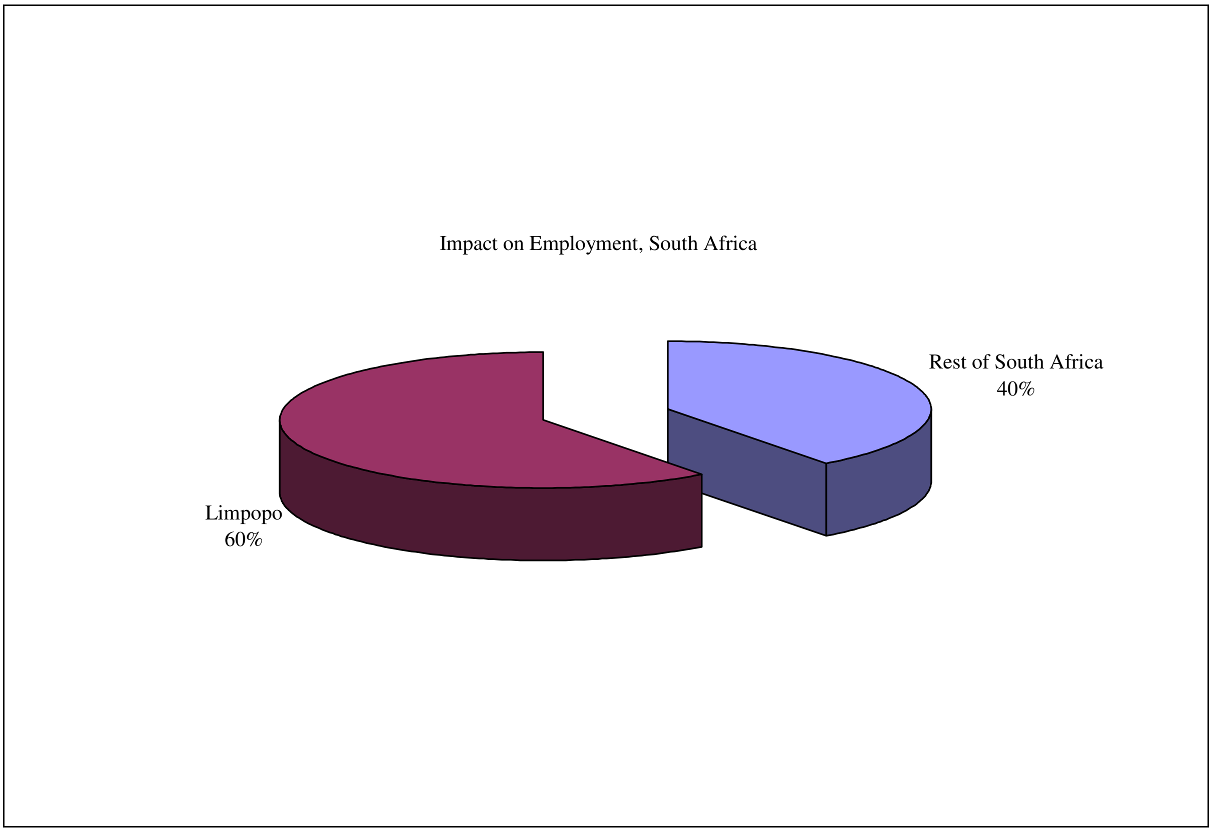


Chart 2a shows that nearly one quarter of the expected employment creation and maintaining of jobs is expected to occur in the Musina municipal and Vhembe district areas whereas three quarters of those jobs will be in the rest of Limpopo Province.

Chart 2b: Total Impact on Employment in the Limpopo Province and the rest of South Africa [numbers]



According to Chart 2b the employment impacts of the mine and rail construction and operations are greater (60%) in the Limpopo Province than in the rest of South Africa (40%).

- **Capital utilization**

For an economy to operate at a specific level, an amount of capital investment is needed to support such level of activity. Capital, together with labour and entrepreneurship form the basic factors needed for production in the economy. In a developing country, capital is a scarce resource and the availability thereof ultimately determines the long-term economic growth potential of a country. The effectiveness and efficiency with which these factors are combined influences the overall level of productivity/profitability of the production process.

According to Table 12 the total impact of the mine construction and operational phases on Capital formation is forecasted to amount to R12.6 billion in South Africa. Chart 3a and 3b reflect the distribution of this Capital formation in Limpopo and the rest of South Africa.

Chart 3a: Total Impact on Capital Utilization in the Limpopo Province (R millions, 2008 prices)

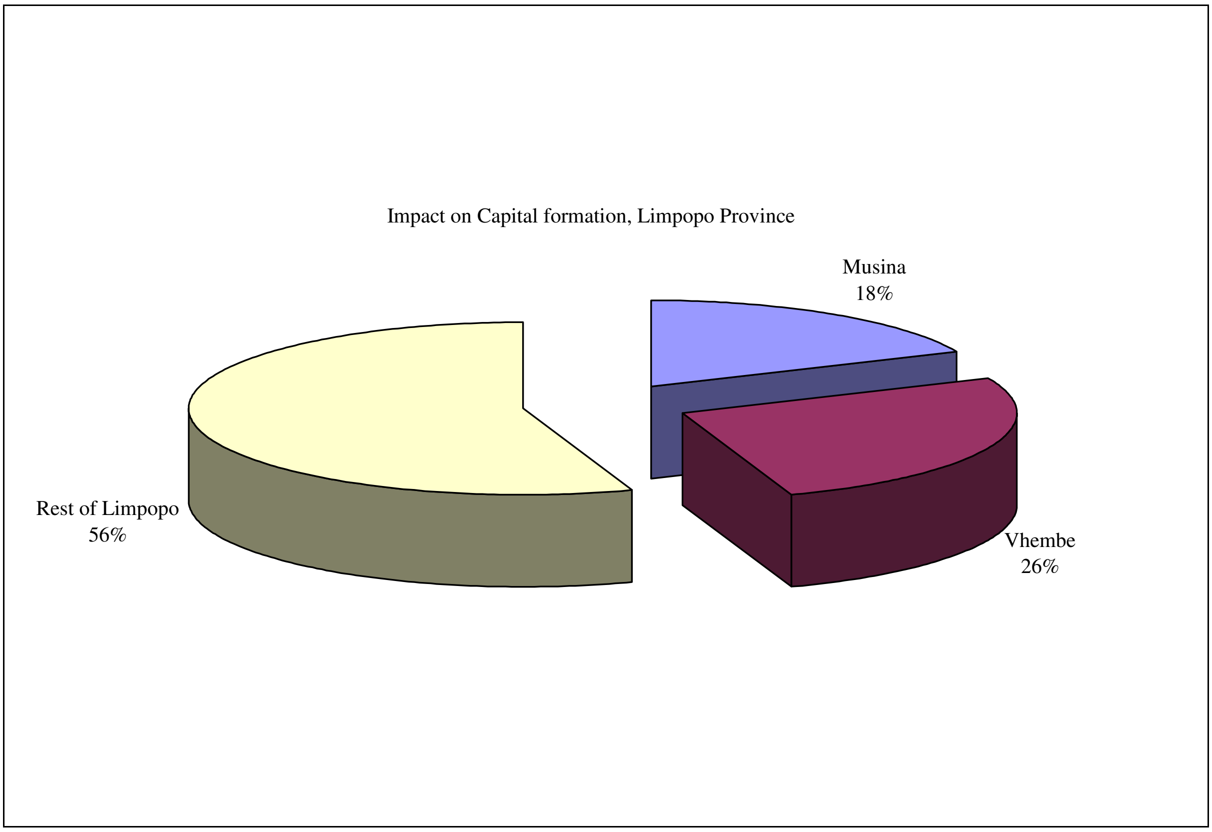


Chart 3a shows that the Capital formation as a result of the mine and rail activities is nearly equally divided between the Musina/ Vhembe region and the Limpopo Province.

Chart 3b: Total Impact on Capital Utilization in the Limpopo Province and the rest of South Africa (R millions, 2008 prices)

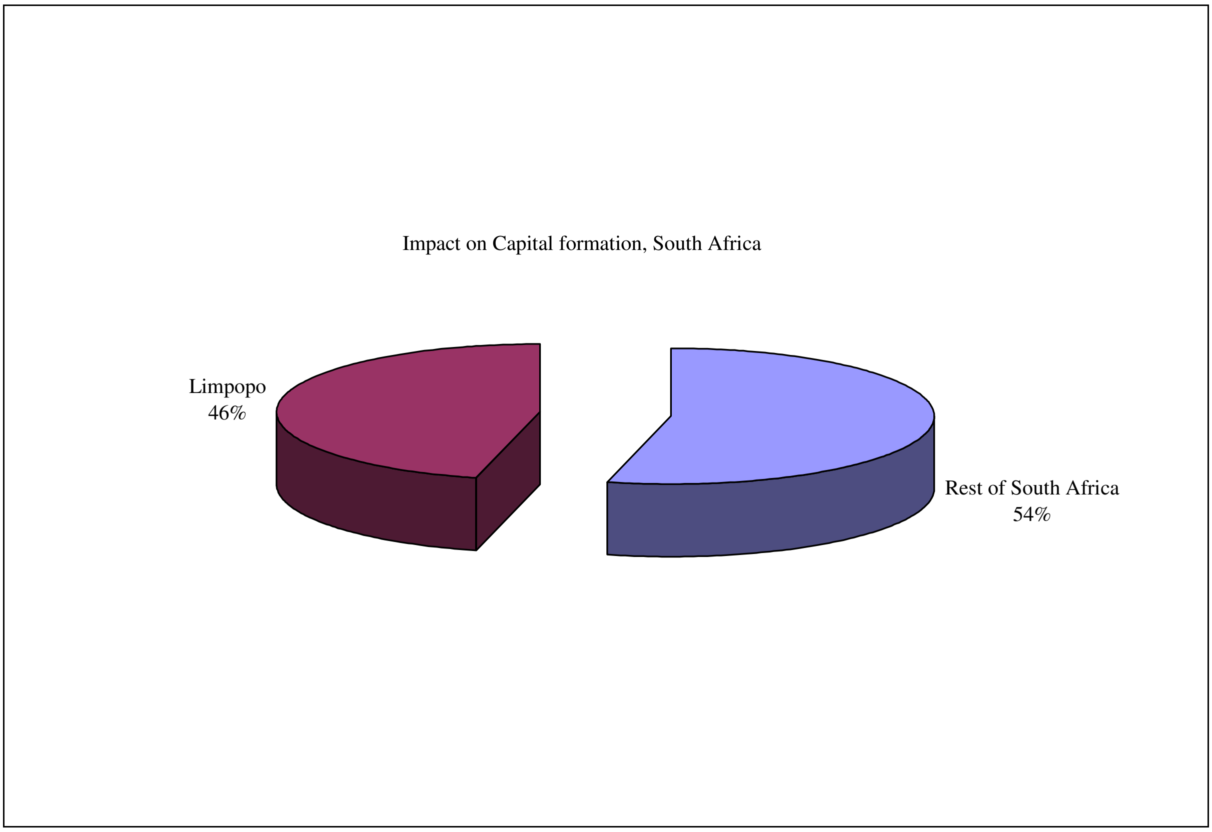


Chart 3b shows that the impact on the Capital formation as a result of the mine and its rail operations is also nearly equally distributed between Limpopo and the rest of South Africa.

3.2 Economic Effectiveness Criteria

The macroeconomic impacts discussed above provide a sense of the contribution that the construction and operation of the proposed coal mine will make to economic and socio-economic performance indicators. However, it is also necessary to further interpret these impacts in order to determine whether or not the project represents a more effective use of scarce economic resources. Since capital is a scarce resource in South Africa, the effectiveness criteria used in this study measure the use of capital in terms of job and GDP creation, relative to such averages for the total South African economy.

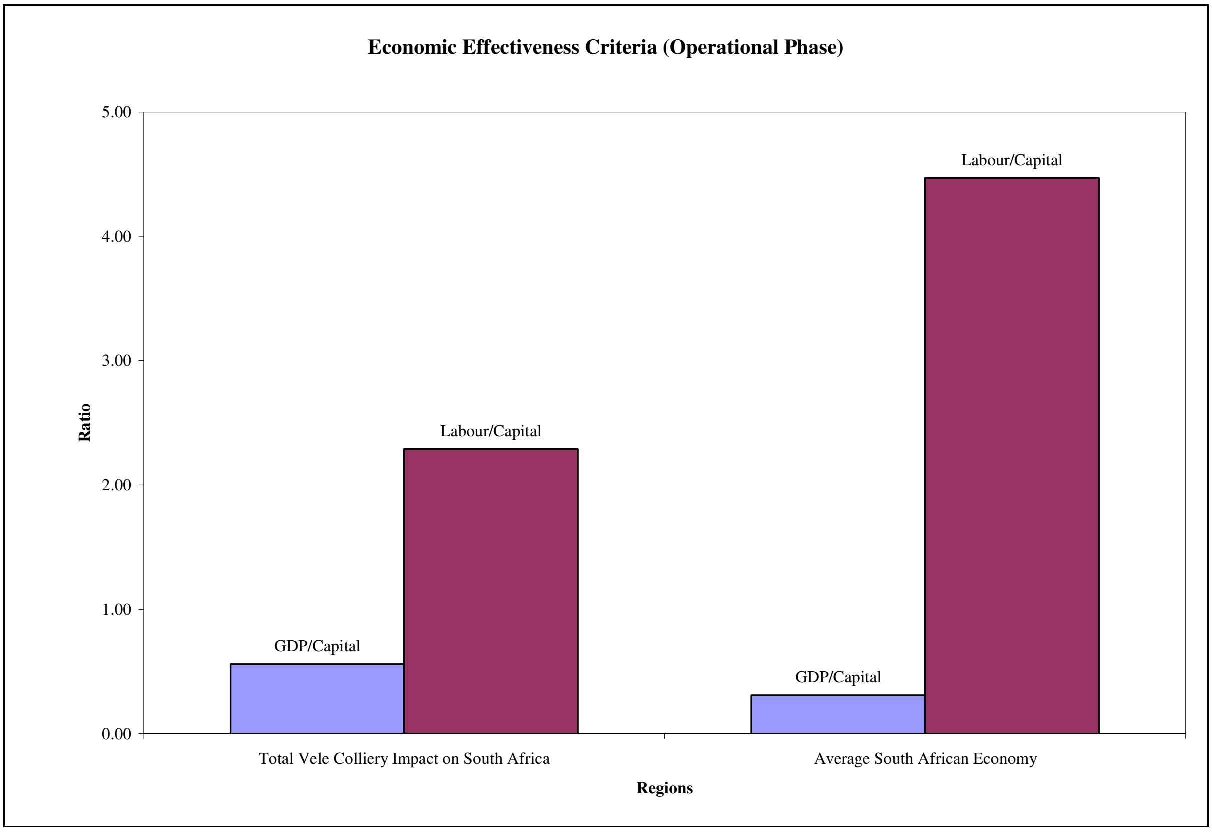
In order to make these comparisons, two key multipliers/ratios have been calculated i.e. the GDP/Capital ratio, and the Labour/Capital ratio. Using these two ratios, it is possible to establish the contribution that the capital employed on this project will make towards economic growth and job creation. If continuous economic growth in the long-term is considered to be more important than job creation in the short-term, then the GDP/Capital ratio is the more important of the two. However, if job creation has priority, particularly in the short term, then the Labour/Capital ratio is the more important one to use in evaluating the project.

The effectiveness criteria measured for the total Vele Colliery impact on South Africa are provided in Table 13 below. This table also reflects the average criteria for the South African economy as a whole. Chart 4 also illustrates the relevant criteria.

Table 13: Economic Effectiveness Criteria for the Construction and Operation of the Proposed Vele Colliery

Effectiveness Criteria	*Total Vele Colliery Impact on South Africa*	*Average South African Economy*
GDP/Capital Ratio (per R1 invested)	0.56	0.31
Labour/Capital Ratio (per R million invested)	2.29	4.47

Chart 4: Economic Effectiveness Criteria (Operational Phase)



A comparison of the GDP/Capital ratio for the total Vele Colliery on South Africa with the average for the total RSA economy, indicates that every Rand invested in the coal mine and relevant rail line produces a greater contribution of nearly double to overall GDP than the average Rand invested in the RSA economy. This suggests that the project represents an effective use of scarce capital, and that the proposed increased mining activity will contribute toward over-all profitability in the South African economy.

When one makes a similar comparison of the Labour/Capital ratios, one finds that the proposed coal mine will generate slightly less jobs (2.29), per rand million invested, as compared to the relevant national average (4.47). This is not a surprising result when one considers the fact that the mine is relatively highly capital intensive.

4 SECTORAL IMPACT ON GDP

Conningarth has also calculated the sectoral impact on GDP of the proposed Vele Colliery. This part of the study was conducted in terms of not only South Africa, but also the sectoral impacts in the Limpopo Province as well as the Musina Municipal area and the Vhembe district. The relevant detailed results are contained in Annexure D and a summary is provided in Table 14.

Table 14: The GDP Total Annual Impact per Sector for South Africa (R millions, 2008 Prices)

Construction and Operational Phase	Average Construction Phase	Operational Phase Positive GDP Impact Sub-Total (R millions, 2008 Prices)	Operational Phase Negative GDP Impact Sub-Total (R millions, 2008 Prices)	Nett Operational Phase	Total Impact per Sector	Total Impact per Sector %
Sectors						
Agriculture, forestry and fishing	1.41	108.84	21.92	86.92	88.32	1.25%
Mining and quarrying	2.86	2 861.04	1.74	2 859.30	2 862.16	40.62%
Manufacturing	16.92	903.67	18.71	884.96	901.87	12.80%
Electricity and water	1.38	112.07	3.03	109.04	110.42	1.57%
Construction	9.33	51.52	1.42	50.10	59.43	0.84%
Wholesale & retail trade; hotels & restaurants	10.25	605.83	62.93	542.90	553.16	7.85%
Transport and communication	5.90	1 056.65	11.45	1 045.19	1 051.09	14.92%
Finance, real estate and business services	15.01	1 074.40	29.60	1 044.80	1 059.80	15.04%
Community, social and other personal services	3.10	364.71	7.14	357.57	360.67	5.12%
Total GDP Impact (rounded off)	**66**	**7 139**	**158**	**6 981**	**7 047**	**100.00%**

Note: See Annexure D for Detail

From the results in Table 14 it can be noted that the following sectors will gain considerably:

- Mining and Quarrying
- Manufacturing
- Transport and Communication Services
- Finance, Real Estate and Business Services

5 MOST SEVERE IMPACT

The above macroeconomic impact analyses are based on the economic data provided to the consultants. The focus in the above analyses is on the economic activities in the study area and the negative externalities (farming, tourism and through traffic as explained in Annexure

C) where the proposed Vele coal mine is to be located. However, it can be argued that there are many concerns regarding a wider impact of the proposed mining on, for example, eco-tourism in the surrounding areas. In view of the fact that eco-tourism i.e. outdoor life which includes camping, has also gained considerable interest over the past few years, cognisance is to be taken of such economic impacts of the proposed mine. This will be done below by means of a more severe impact analyses.

However, it should be noted that the impacts of noise and dust beyond the study i.e. mining area, fall largely outside the scope of this macroeconomic study. This also applies to the land-use and market values of farms and other properties which could be affected by the construction and operation of the proposed Vele coal mine and rail line.

It should also be noted that the economic impacts (including results) of any possible power station near the relevant mining area are excluded from this macroeconomic impact study.

5.1 Most Severe Impact Analyses

Table 15 below reflects the most severe impact scenario i.e. negative impacts, when all citrus farming in the mining area is eliminated. In order to provide for a case where the provisions for economic impacts for game farming and tourism are regarded being too low, the most severe impact analyses makes provision for the trebling (three times) of these impacts in Table 15.

Table 15: Scenario – All Citrus Farming Eliminated, Game Farming and Tourism Inputs Trebled (Three times) (2008 Prices)

	Total Impact				
	Musina	*Vhembe*	*Limpopo*	**Combined Results South Africa*	*Severe Impact South Africa*
Impact on Gross Domestic Product (GDP) [R millions, 2008 Prices]	2 804	3 119	4 325	7 047	6 783
Impact on Capital formation [R millions, 2008 Prices]	758	1 571	4 475	12 622	11 095
Impact on Employment [numbers]	82	2 984	15 378	28 901	26 643

***Note: See Table 12**

As can be seen from Table 15, the results from the most severe impacts reflecting the elimination of citrus farming and the trebling (three times) of all game farming and tourism (as negative impacts) decrease the relevant results shown in Table 12. In the case of the GDP impact there is a decrease of 4% and a 8% reduction in the expected increase of employment. On the other hand, the Impact on Capital Formation shows a reduction of 12%.

6 CONCLUSIONS

LCC, a subsidiary of Coal of Africa Ltd., is conducting a feasibility study to mine coal at the proposed Vele Colliery. LCC is evaluating the feasibility of a dual open cast and underground mine west of Musina to supply coking coal to the local and international markets.

The primary objective of this macroeconomic study has been to measure the nature and magnitude of the economic and socio-economic impacts that will result from the proposed coal mine. The macroeconomic impacts emanating from the proposed mine and rail activities have proven to be significant. The following is a brief summary of the most critical macroeconomic aggregates that have been measured in terms of their impact as a result of the coal mining and rail activities. Table 16 shows the combined results (after deducting negative externalities) in order to arrive at annualised impacts. It was necessary to divide the total construction impacts by 20 years for this purpose.

Table 16: Summary of annual results [R millions, 2008 Prices]

	Total Construction and Operational Impact		
	Impact on Gross Domestic Product (GDP) [R millions, 2008 Prices]	**Impact on Capital formation [R millions, 2008 Prices]**	**Impact on Employment [numbers]**
Average Construction Phase	**66**	**136**	**646**
Nett Operational Phase	**6 981**	**12 485**	**28 255**
Total Impact	**7 047**	**12 622**	**28 901**

As can be seen from Table 16, the results of the construction phase (See Table 10) have been annualised over a period of 20 years in Table 12 for comparison purposes.

The above results in Table 16 are used to determine the economic effectiveness criteria associated with the construction and operation of the mine and relevant rail line that determine whether or not the project represents a more effective use of scarce economic resources. Since capital is a scarce resource in South Africa, the effectiveness criteria used in this study measure the use of capital in terms of employment and GDP creation, relative to averages for the total South African economy.

The effectiveness criteria measured for the relevant coal mining activities are provided in the table 17 below. This table 17 also reflects the relevant average criteria for the South African economy as a whole.

Table 17: Economic Effectiveness Criteria for the Proposed Mine

	Total Vele Colliery Impact on South Africa	*Average South African Economy*
GDP/Capital	0.56	0.31
Labour/Capital	2.29	4.47

The GDP/Capital ratio of the project is higher than the average criteria for the total South African economy. This demonstrates the high profitability of the project. The Labour/Capital ratio of the coal mine is lower (because of high capital intensity) than the relevant average of the South African economy, but it is still acceptable. This latter result highlights the positive impact the proposed Vele Colliery should have on employment creation in the Limpopo Province (See Annexure C).

The major sectoral impacts are as follows (See also Table 14).

- Mining and Quarrying - 40.6%
- Manufacturing - 12.8%
- Transport and communication - 14.9%
- Finance, Real estate and business services - 15.0%

With regard to the most severe impact analyses, it should be noted that when all agricultural activities of citrus would be eliminated together with the trebling (three times) of game farming and tourism inputs (as negative impacts) there could be a reduction of 4% in the GDP forecast, but a 8% reduction in the employment forecast and a 12% reduction in the Capital formation.

Overall, however, the measured macroeconomic impacts of the proposed Vele Coal mine activities exceed the relevant minimum macroeconomic criteria for projects of this nature.

ANNEXURE A: THE FOUNDATIONS OF THE SOCIAL ACCOUNTING MATRIX

Introduction and Background to the Social Accounting Matrix

A Social Accounting Matrix (SAM) is a comprehensive, economy-wide database that contains information about the flow of resources that takes place between the different economic agents that exist within an economy (i.e. business enterprises, households, government, etc) during a given period of time – usually one calendar year.

The development of the ideas that underpin the SAM is largely attributable to Sir Richard Stone and the work undertaken by the Cambridge Growth Project in the 1950's and 60's (Stone, R et al, 1959). This group started out by integrating disaggregated production accounts in the form of input-output tables into the System of National Accounts (SNA). A SAM is a presentation of the SNA in a matrix format that incorporates an analysis of the interrelationships that exist between the various economic agents in the economy, including the distribution of income and expenditure amongst household groups, thereby, providing the national accounts with a social dimension.

The development of the SAM is very significant as it provides a framework within the context of the SNA in which the activities of all economic agents are accentuated and prominently distinguished. By combining these agents into meaningful groups, the SAM makes it possible to clearly distinguish between groups, to research the effects of interaction between groups, and to measure the economic welfare of each group. There are two key reasons for compiling a SAM:

- Firstly, a SAM provides a framework for organising information about the economic and social structure of a particular geographical entity (i.e. a country, region or province) for a particular time period (usually one calendar year), and
- Secondly, to provide a database that can be used by any one of a number of different macroeconomic modelling tools for evaluating the impact of different economic decisions and/or economic development programmes

The data requirements for all economic models can always be expressed in the form of a SAM. If it is not possible to express the data in this particular manner, the model will invariably be flawed, making its application in the model-building arena impossible. It is this particular characteristic of the SAM that has made it popular as the database of preference for multi-sector economic models that are used to assess the economic implications of policy changes (or shocks) that will have effects not only on macroeconomic aggregates such as GDP, job opportunities, the Balance of Payments, etc., but also upon the structure of the economy. As such, these models must have access to information about production, consumption, labour markets, and the functional distribution of income and the composition of trade.

A defining feature of multi-sector macroeconomic models is their recognition of the extent to which economic systems are characterised by interdependency, in terms of which economic events that impact one sector will have repercussions that are experienced, to a greater or lesser extent, throughout the economy. As such, these models can be used to quantify the magnitude of these repercussions, and to assess the efficacy of alternative economic policies and development initiatives.

Theoretical Principles Underpinning the SAM

When economic agents in an economy are involved in transactions, financial resources change hands. The SAM provides a complete database of all transactions that take place between these agents in a given period, thereby presenting a "snapshot" of the structure of the economy for that time period. As a system for organising information, a SAM represents a powerful tool in terms of which the economy can be described in a complete and consistent way:

- Complete in the sense that it provides a comprehensive accounting of all economic transactions for the entity being represented (i.e. country, region/province, city, etc.), and
- Consistent in that all incomes and expenditures are matched

Consequently, a SAM can provide a unifying structure within which the statistical authorities can compile and present the national accounts. As an economic framework, SAMs are not limited to economic data only. Considerable effort has been devoted to extending the SAM to incorporate social, demographic and environmental information.

The Concepts of Circular Flow and Double-Entry Bookkeeping

The most basic principles underlying a SAM are the concepts of circular flows and double-entry bookkeeping.

- **Circular Flow**

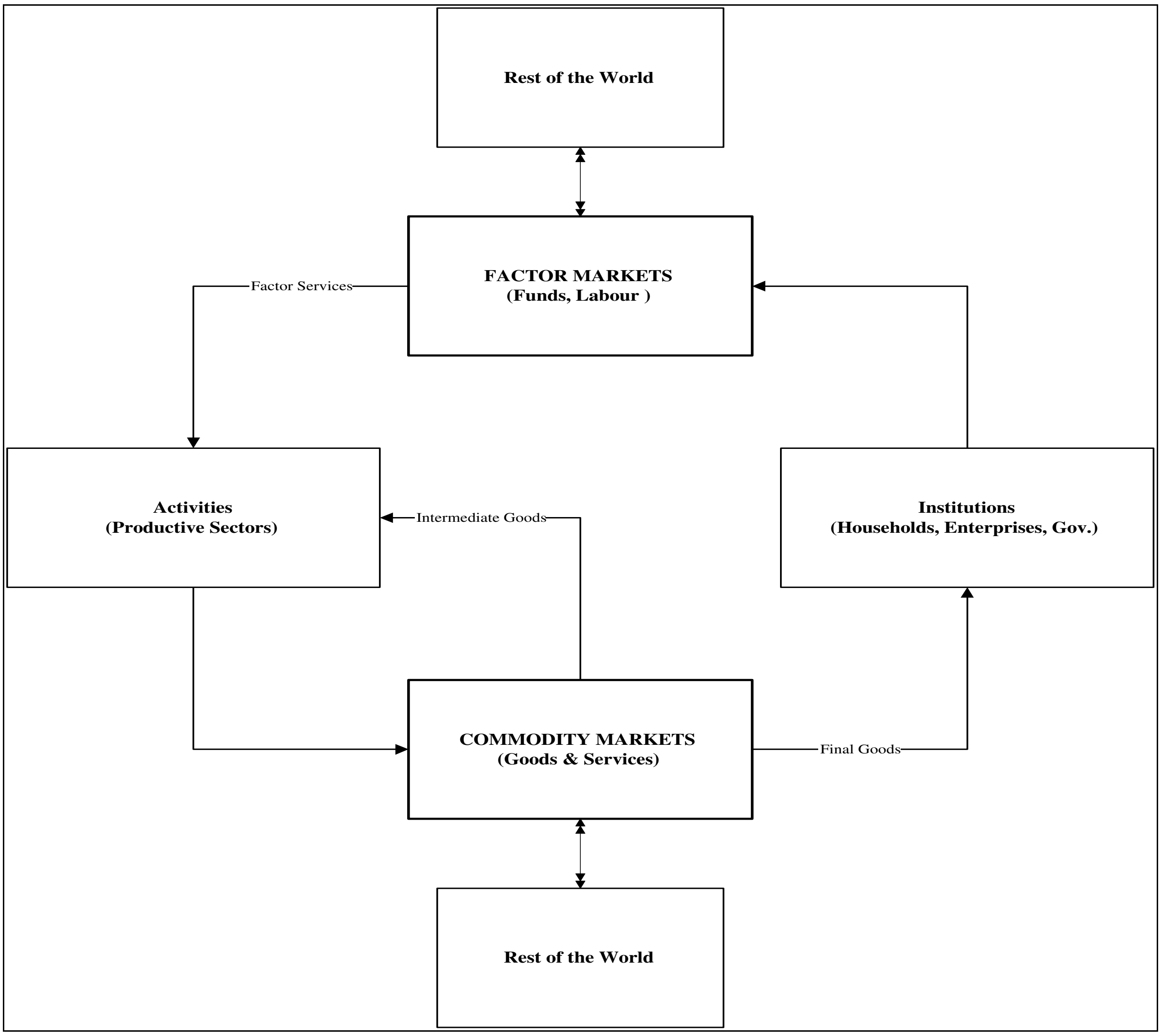
The concept of circular flows relates to a particular angle from which an economic system is viewed and traced. The various productive sectors (i.e. the "activities") in the economy act as producers and sellers of goods and services (i.e. the "commodities") to institutions such as households, business enterprises, and the government (the "purchasers" of the commodities). For their part, households, enterprises and the government act as sellers of factor services to the various activities, who then become the purchasers of these factors (i.e. labour, capital, etc.).

Going one way around the circular flow, involves tracing out the flows of goods and services (i.e. the commodity markets). Going the other way around, the circular flow traces out the flows of funds (i.e. the factor markets). Transactions with the rest of the world can take place through both the commodity and factor markets. Diagram 1 presents a schematic representation of these flows.

According to Diagram 1, a continuous flow of factor services exists from the factor markets to the activities in the economy, which in turn provides commodities (i.e. products/goods and services) to the commodity markets, from where these reach all of the institutions in the economy (i.e. households, enterprises and government). For their part, institutions provide factor services in factor markets, where activities act as purchasers.

The commodity market provides goods and services to two types of users. The first type of user includes the institutions, such as households, that use goods and services for purposes of final consumption (i.e. final goods). The second type of user is other producers in the economy that use goods and services in their own production process (i.e. intermediate goods). In addition, both the factor and commodity markets can interface with the rest of the world.

Diagram 1: Circular Flow of all Transactions in an Economy



- **Double-Entry Bookkeeping**

The SAM captures the monetary value of economic transactions, and organises them into a series of "accounts". There are six major types of accounts that form the basis of a SAM:

- Commodity Accounts that capture the value of products/goods and services traded in an economy
- Activity Accounts that capture the value of products/goods and services produced in an economy
- Factor Accounts that capture the value of payments made to the essential factors of production (i.e. labour, capital, land, etc)

- Institutional Accounts that capture the value of transactions by business enterprises, households and government
- Capital Accounts that reflect savings and investments, and
- The Rest of the World (RoW) Accounts that capture the value of imports and exports

Box 1 provides a detailed description of these six accounts.

Box 1: Description of the Major SAM Accounts

Activity Accounts

Production activities use raw materials and intermediate goods and hire factor services to produce commodities. The expenditures of activities include the purchase of intermediate commodities with the remainder being value added which is distributed to factors of production in the form of wage payments and of rent and in part payable to the government (e.g. a value added tax [VAT]). The receipts of the production activities derived from sales on the domestic market, exports and export subsidies received from the government (export taxes to the government are noted as negative export subsidies).

Commodity Accounts

The commodity account represents a giant department store. It buys goods, from domestic producers and foreigners (imports) and sells them to demanders including exports. The commodity account defines Gross National Product (GNP) from the expenditure side.

Factor Accounts

Factors of production accounts typically include labour and capital sub-accounts. They receive income from the sale of their services to production activities in the form of wages, rent and net factor income received from abroad. In turn, these revenues are distributed to households as the labour income and distributed profits and to firms as non-distributed profits.

Institutional Accounts

Institutions include households (typically further broken down by socio economic groups), firms and the government. Households receive factor income, as well as transfers from government and the rest of the world (e.g. remittances). Households' expenditures consist of consumption on goods, transfers, and direct taxes with residual savings transferred to the capital account. Firms receive profits and transfers, and spend on taxes and transfers with their residual savings channelled into the capital account.

Government Accounts

The government account is distinct from administrative public activities included in the production activities' account. These public services (such as education) buy intermediate goods, pay wages and deliver public and administrative services. The government account per se allocates its current expenditures on buying the services provided by the commodities' account. Other government expenditures are transfers and subsidies to households and companies the remaining savings are transferred to the capital account. On the income side the government receives tax revenues from a variety of sources and current transfers from abroad.

Capital Accounts

The fifth account is a combined capital account. On the income side, it collects savings from households, companies, the government as well as foreign savings, and in turn, channels these aggregate savings into investment.

Rest of the World Accounts

Finally, transactions between domestic residents, and foreign residents, respectively, are recorded in the RoW account. These transactions include, on the receipt side the commodities' account expenditures on imported final goods as well as intermediate goods and raw materials, factor payments and current transfers. The economy receives income from the RoW from export and factor and non-factor income earned. The difference between total foreign exchanged receipts and imports is by definition net capital received from abroad.

SAM Applications

In many instances, SAMs have been used to analyse the interrelationships that exist between the main economic variables of an economy such as the distribution of income and expenditure among household groups. Because SAMs are closely related to national accounts and their typical focus on the role of people in the economy (i.e. the labour markets), this makes them attractive for analytical purposes. Given that the design and construction methods used to compile SAMs are largely standardised according to the SNA, countries have the flexibility to design a SAM according to their own specific situations.

In view of its unique position in the field of national accounting, the SAM has had a huge impact on the design and use of economic and social indicators. The interaction between socio-economic policies in various fields can now be analysed in a more logical fashion. The SAM has also made a tremendous contribution in pinpointing gaps in data sets and the results/efficiency of surveys. However, the biggest contribution has come in the field of quantitative economic analysis and economic modelling

Because the SAM is a comprehensive, disaggregated, consistent, and complete data system of economic entities that captures the interdependence that exists within a socio-economic system, it can be used as a conceptual framework for exploring the impact of exogenous changes in such variables as exports, certain categories of government expenditure, and investment on the entire, interdependent socio-economic system. In this regard, sophisticated macroeconometric models, such as the Computable General Equilibrium models (CGEs), and INFORUM models have been based on the SAM. The SAM, because of its finer disaggregation of private household expenditure into relatively homogenous social-economic categories that are recognisable for policy purposes, has been used to explore issues related to income distribution.

The SAMs main contribution in the field of economic policy planning and impact analysis is divided in two categories:

- **As a Primary Source of Economic Information**

Being a detailed and integrated national and regional accounting framework consistent with officially published socio-economic data, a SAM instantly projects a picture of the nature of a country's or region's economy. It lends itself to both descriptive and structural analysis

- **As a Planning Tool**

Due to its mathematical/statistical underpinnings it can be transformed into a macroeconometric model that can be used to:

→ Conduct economic forecasting exercises/scenario building
→ Conduct economic impact analysis both for policy adjustments at a national and provincial level, and for large project evaluation
→ Self-sufficiency analysis (i.e. gap analysis to determine, with the help of the inter industry and commodity flows contained in the provincial SAM, where possible investment opportunities exist, and
→ Calculate the inflationary impacts on provincial level of price changes instigated at national level (i.e. administered prices, Value Added Tax (VAT), etc.)

To sum up, the SAM mechanism provides a universally acceptable framework within which the economic impact of development projects and policy adjustments can be reviewed and assessed at both national and provincial/regional levels. It serves as an extension to the official National Accounts of a country's economy and, therefore, provides a wealth of additional information, especially when disaggregated to more detailed levels.

ANNEXURE B: INPUT DATA AND RESULTS ON THE IMPACT OF THE CONSTRUCTION AND OPERATIONAL PHASES (2008 PRICES)

Table B1.1: Input Data for the Mine Construction Phase of Direct Effects on Coal Mining in the Limpopo Province (2008 Prices)

	Coal Mining
Total Investment (R millions, 2008 Prices)	*R 1 528*
Breakdown of Asset base	*Percentage*
Furniture	1%
Structural Metal	36%
Machinery and Equipment	14%
Electrical machinery & apparatus	1%
Transport equipment	23%
Buildings	13%
Other Construction	10%
Business Services	2%
Total	**100%**

Table B1.2: Results of the Impact of the Construction Phase of Coal Mining on the Economy of Limpopo Province (2008 Prices)

	Impact on The Limpopo Province			*Vhembe*	*Musina*	*South Africa*
	Direct & Indirect Effect	*Induced Effect*	*Total Impact*	*Total Impact*	*Total Impact*	*Total Impact*
Impact on Gross Domestic Product (GDP) [R millions, 2008 Prices]	359	48	407	78	13	817
Impact on Capital formation [R millions, 2008 Prices]	645	110	755	151	26	1 647
Impact on Employment [numbers]	5 657	618	6 275	1 147	88	7 995

Table B2.1: Input Data for the Mine Operational Phase of Direct Effects on Coal Mining in the Limpopo Province (2008 Prices)

	Coal Mining
Production per annum[R millions, 2008 Prices]	**R5 775**
Number of labourers[Number]	**826**
Capital requirements [R millions, 2008 Prices]	**R 1 900**
Percentage split of production	**Percentage**
Intermediate demand	52%
Labour remuneration	13%
Gross operating surplus	35%
Total	**100%**

Table B2.2: Results of the Impact of the Operational Phase of Coal Mining on the Economy of the Limpopo Province (2008 Prices)

	Impact on The Limpopo Province				*Vhembe*	*Musina*	*South Africa*
	Direct Effect	*Indirect Effect*	*Induced Effect*	*Total Impact*	*Total Impact*	*Total Impact*	*Total Impact*
Impact on Gross Domestic Product (GDP) [R millions, 2008 Prices]	2773	1086	407	4266	3113	2807	6672
Impact on Capital formation [R millions, 2008 Prices]	1900	2737	930	5568	2780	1986	12078
Impact on Employment [numbers]	826	9953	5190	15969	4001	1207	26839

Table B3.1: Input Data for the Construction Phase of Direct Effect on Rail Transport in the Limpopo Province (2008 Prices)

	Rail Transport
Total Investment (R millions)	*R 540*
Breakdown of Asset base	*Percentage*
Structural Metal	23%
Electrical machinery & apparatus	8%
Buildings	5%
Other Construction	43%
Business Services	21%
Total	**100%**

Table B3.2: Results of the Impact of the Construction Phase of Rail Transport on the Economy of the Limpopo Province (2008 Prices)

	Impact on The Limpopo Province				*Vhembe*	*Musina*	*South Africa*
	Direct Effect	*Indirect Effect*	*Induced Effect*	*Total Impact*	*Total Impact*	*Total Impact*	*Total Impact*
Impact on Gross Domestic Product (GDP) [R millions]	27	267	38	332	88	34	506
Impact on Capital formation [R millions]	42	514	88	643	169	59	1080
Impact on Employment [numbers]	560	3438	441	4439	1399	635	4931

Table B4.1: Input Data for the Operational Phase of Direct Effect on Rail Transport in the Limpopo Province (2008 Prices)

	Rail Transport
Production per annum[R millions, 2008 Prices]	R412.50
Number of labourers[Number]	788
Capital requirements [R millions, 2008 Prices]	R 540.00
Percentage split of production	**Percentage**
Intermediate demand	60%
Labour remuneration	15%
Gross operating surplus	25%
Total	**100%**

Table B4.2: Results of the Impact of the Operational Phase of Rail Transport on the Economy of the Limpopo Province (2008 Prices)

	Impact on The Limpopo Province				*Vhembe*	*Musina*	*South Africa*
	Direct Effect	*Indirect Effect*	*Induced Effect*	*Total Impact*	*Total Impact*	*Total Impact*	*Total Impact*
Impact on Gross Domestic Product (GDP) [R millions]	165	103	33	301	192	168	467
Impact on Capital formation [R millions]	540	232	76	848	600	548	1208
Impact on Employment [numbers]	788	1014	418	2220	1079	822	2934

Table B5.1: Input Data for the Operational Phase of Direct Effect on Citrus Farming in the Limpopo Province (2008 Prices)

	Citrus Farming
Production per annum[R millions, 2008 Prices]	R 28.21
Number of labourers[Number]	558
Capital requirements [R millions, 2008 Prices]	R 13.34
Percentage split of production	**Percentage**
Intermediate demand	48%
Labour remuneration	21%
Gross operating surplus	31%
Total	100%

Table B5.2: Results of the Impact of the Operational Phase of Citrus Farming on the Economy of the Limpopo Province (2008 Prices)

	Impact on The Limpopo Province				*Vhembe*	*Musina*	*South Africa*
	Direct Effect	*Indirect Effect*	*Induced Effect*	*Total Impact*	*Total Impact*	*Total Impact*	*Total Impact*
Impact on Gross Domestic Product (GDP) [R millions, 2008 Prices]	15	2	2	19	16	15	33
Impact on Capital formation [R millions, 2008 Prices]	13	2	5	21	15	14	49
Impact on Employment [numbers]	558	25	29	613	569	559	688

Table B6.1: Input Data for the Operational Phase of Direct Effect on Game Farming in the Limpopo Province (2008 Prices)

	Game Farming
Production per annum[R millions, 2008 Prices]	R 1.49
Number of labourers[Number]	12
Capital requirements [R millions, 2008 Prices]	R 10.68
Percentage split of production	**Percentage**
Intermediate demand	47%
Labour remuneration	21%
Gross operating surplus	32%
Total	100%

Table B6.2: Results of the Impact of the Operational Phase of Game Farming on the Economy of the Limpopo Province (2008 Prices)

	Impact on The Limpopo Province				*Vhembe*	*Musina*	*South Africa*
	Direct Effect	*Indirect Effect*	*Induced Effect*	*Total Impact*	*Total Impact*	*Total Impact*	*Total Impact*
Impact on Gross Domestic Product (GDP) [R millions, 2008 Prices]	0.8	0.4	0.2	1.4	0.9	0.8	1.8
Impact on Capital formation [R millions, 2008 Prices]	10.7	0.6	0.4	11.7	10.9	10.7	13.1
Impact on Employment [numbers]	12.0	5.4	2.4	19.8	13.7	12.2	19.5

Table B7.1: Input Data for the Operational Phase of Direct Effect on Private Lodges in the Limpopo Province (2008 Prices)

	Private Lodges
Production per annum[R millions, 2008 Prices]	R 35
Number of labourers[Number]	150
Capital requirements [R millions, 2008 Prices]	R 220
Percentage split of production	**Percentage**
Intermediate demand	50%
Labour remuneration	35%
Gross operating surplus	15%
Total	100%

Table B7.2: Results of the Impact of the Operational Phase of Private Lodges on the Economy of the Limpopo Province (2008 Prices)

	Impact on The Limpopo Province				*Vhembe*	*Musina*	*South Africa*
	Direct Effect	*Indirect Effect*	*Induced Effect*	*Total Impact*	*Total Impact*	*Total Impact*	*Total Impact*
Impact on Gross Domestic Product (GDP) [R millions, 2008 Prices]	18	9	4	31	21	19	48
Impact on Capital formation [R millions, 2008 Prices]	220	19	10	249	226	221	284
Impact on Employment [numbers]	150	116	56	322	185	156	362

Table B8.1: Input Data for the Operational Phase of Direct Effect on South African National Parks in the Limpopo Province (2008 Prices)

	South African National Parks
Production per annum[R millions, 2008 Prices]	**R 50**
Number of labourers[Number]	**105**
Capital requirements [R millions, 2008 Prices]	**R 350**
Percentage split of production	**Percentage**
Intermediate demand	**45%**
Labour remuneration	**40%**
Gross operating surplus	**15%**
Total	**100%**

Table B8.2: Results of the Impact of the Operational Phase of South African National Parks on the Economy of Limpopo (2008 Prices)

	Impact on The Limpopo Province				*Vhembe*	*Musina*	*South Africa*
	Direct Effect	*Indirect Effect*	*Induced Effect*	*Total Impact*	*Total Impact*	*Total Impact*	*Total Impact*
Impact on Gross Domestic Product (GDP) [R millions, 2008 Prices]	28	12	7	47	32	29	70
Impact on Capital formation [R millions, 2008 Prices]	350	25	15	391	359	351	442
Impact on Employment [numbers]	105	152	87	343	154	113	404

Table B9.1: Input Data for the Operational Phase of Direct Effect on Tourism through Traffic in the Limpopo Province (2008 Prices)

	Tourism Through Traffic
Production per annum[R millions, 2008 Prices]	R 3.5
Number of labourers[Number]	20
Capital requirements [R millions, 2008 Prices]	R 5.0
Percentage split of production	**Percentage**
Intermediate demand	70%
Labour remuneration	29%
Gross operating surplus	1%
Total	100%

Table B9.2: Results of the Impact of the Operational Phase of Tourism through Traffic on the Economy of the Limpopo Province (2008 Prices)

	Impact on The Limpopo Province				*Vhembe*	*Musina*	*South Africa*
	Direct Effect	*Indirect Effect*	*Induced Effect*	*Total Impact*	*Total Impact*	*Total Impact*	*Total Impact*
Impact on Gross Domestic Product (GDP) [R millions, 2008 Prices]	2.1	0.7	0.2	3.0	2.3	2.1	6.0
Impact on Capital formation [R millions, 2008 Prices]	5.0	1.6	0.5	7.1	5.5	5.1	13.0
Impact on Employment [numbers]	20.0	8.5	3.0	31.5	22.4	20.4	44.8

ANNEXURE C: MACROECONOMIC TOTAL IMPACT OF THE CONSTRUCITON AND OPERATIONAL PHASES PER SECTOR (2008 PRICES)

Table C1: MUSINA - The Macroeconomic Total Impact of the Construction and Operational Phases per Brick (2008 Prices)

		Musina		
	Sectors	**Impact on Gross Domestic Product (GDP) [R millions, 2008 Prices]**	**Impact on Capital formation [R millions, 2008 Prices]**	**Impact on Employment [numbers]**
Construction Phase	Coal Mining	1	1	4
	Rail Transport	2	3	32
Average Construction Phase		**2**	**4**	**36**
Operational Phase	Coal Mining	2 807	1 986	1 207
	Rail Transport	168	548	822
Positive Impact Sub-Total		**2 975**	**2 534**	**2 030**
	Game Farming	1	11	12
	Citrus Farming	15	14	559
	Private Lodges	19	221	156
	SAN Parks	29	351	113
	Through Traffic	2	5	20
Negative Impact Sub-Total		**66**	**601**	**861**
Nett Operational Phase		**2 910**	**1 933**	**1 169**
Total Impact		**2 912**	**1 937**	**1 205**

Table C2: <u>VHEMBE</u> - Macroeconomic Total Impact of the Construction and Operational Phases per Brick (2008 Prices)

		Vhembe		
	Sectors	**Impact on Gross Domestic Product (GDP) [R millions, 2008 Prices]**	**Impact on Capital formation [R millions, 2008 Prices]**	**Impact on Employment [numbers]**
Construction Phase	Coal Mining	4	8	57
	Rail Transport	4	8	70
Average Construction Phase		**8**	**16**	**127**
Operational Phase	Coal Mining	3 113	2 780	4 001
	Rail Transport	192	600	1 079
Positive Impact Sub-Total		**3 305**	**3 380**	**5 080**
	Game Farming	1	11	14
	Citrus Farming	16	15	569
	Private Lodges	21	226	185
	SAN Parks	32	359	154
	Tourism Through Traffic	2	5	22
Negative Impact Sub-Total		**73**	**617**	**943**
Nett Operational Phase		**3 233**	**2 763**	**4 137**
Total Impact		**3 241**	**2 779**	**4 264**

Table C3: LIMPOPO PROVINCE - Macroeconomic Total impact of the Construction and Operational Phases per Brick (2008 Prices)

		Limpopo Province		
	Sectors	**Impact on Gross Domestic Product (GDP) [R millions, 2008 Prices]**	**Impact on Capital formation [R millions, 2008 Prices]**	**Impact on Employment [numbers]**
Construction Phase	Coal Mining	20	38	314
	Rail Transport	17	32	222
Average Construction Phase		**37**	**70**	**536**
Operational Phase	Coal Mining	4 266	5 568	15 969
	Rail Transport	301	848	2 220
Positive Impact Sub-Total		**4 567**	**6 415**	**18 189**
	Game Farming	1	12	20
	Citrus Farming	19	21	613
	Private Lodges	31	249	322
	SAN Parks	47	391	343
	Tourism Through Traffic	3	7	32
Negative Impact Sub-Total		**102**	**680**	**1 330**
Nett Operational Phase		**4 465**	**5 735**	**16 859**
Total Impact		**4 502**	**5 805**	**17 395**

Table C4: SOUTH AFRICA/ TOTAL - Macroeconomic Impact of the Construction and Operational Phases per Brick (2008 Prices)

		South Africa / Total		
	Sectors	**Impact on Gross Domestic Product (GDP) [R millions, 2008 Prices]**	**Impact on Capital formation [R millions, 2008 Prices]**	**Impact on Employment [numbers]**
Construction Phase	Coal Mining	41	82	400
	Rail Transport	25	54	247
Average Construction Phase		**66**	**136**	**646**
Operational Phase	Coal Mining	6 672	12 078	26 839
	Rail Transport	467	1 208	2 934
Positive Impact Sub-Total		**7 139**	**13 286**	**29 773**
	Game Farming	2	13	20
	Citrus Farming	33	49	688
	Private Lodges	48	284	362
	SAN Parks	70	442	404
	Tourism Through Traffic	6	13	45
Negative Impact Sub-Total		**158**	**801**	**1 518**
Nett Operational Phase		**6 981**	**12 485**	**28 255**
Total Impact		**7 047**	**12 622**	**28 901**

ANNEXURE D: THE GDP TOTAL IMPACT PER SECTOR AND PER BRICK FOR EACH REGION (2008 PRICES)

Table D1: The GDP Total Impact per Sector and per Brick for the Musina Municipal Area (R millions, 2008 Prices)

Construction and Operational Phase	Construction Phase		Average Construction Phase	Operational Phase		Positive GDP Impact Sub-Total (R millions, 2008 Prices)
Sectors / Bricks	**Coal Mining GDP (R millions, 2008 Prices)**	**Rail Transport GDP (R millions, 2008 Prices)**		**Coal Mining GDP (R millions, 2008 Prices)**	**Rail Transport GDP (R millions, 2008 Prices)**	
Citrus farming	0.00	0.00	**0.00**	0.00	0.00	**0.00**
Sub-tropical fruit farming	0.00	0.00	**0.00**	0.13	0.01	**0.14**
Vegetable farming	0.01	0.00	**0.01**	1.36	0.07	**1.42**
Livestock farming	0.00	0.00	**0.00**	0.23	0.02	**0.24**
Game farming	0.00	0.00	**0.00**	0.01	0.00	**0.01**
Forestry (Plantations)	0.00	0.00	**0.00**	0.00	0.00	**0.00**
Other agriculture	0.00	0.00	**0.01**	0.75	0.05	**0.80**
Agriculture - Subsistence	0.00	0.00	**0.00**	0.08	0.01	**0.09**
Coal & lignite mining	0.08	0.00	**0.08**	2 772.78	0.00	**2 772.78**
PGM mining	0.00	0.00	**0.00**	0.00	0.00	**0.00**
Ferrous mineral mining	0.00	0.00	**0.00**	0.00	0.00	**0.00**
Non-ferrous mineral mining	0.28	0.07	**0.35**	2.41	0.09	**2.50**
Other mining & quarrying	0.06	0.05	**0.11**	1.85	0.14	**1.99**
Meat, fish, fruit, vegetables, oils & fat industries	0.00	0.00	**0.00**	0.15	0.02	**0.17**
Dairy industries	0.00	0.00	**0.00**	0.00	0.00	**0.00**
Grain mill, bakery & animal feed industries	0.00	0.00	**0.00**	0.06	0.01	**0.07**
Other food industries	0.00	0.00	**0.00**	0.25	0.02	**0.27**
Beverages & tobacco industries	0.00	0.00	**0.00**	0.02	0.00	**0.02**
Textiles, clothing, leather products & footwear industries	0.00	0.00	**0.00**	0.00	0.00	**0.00**
Wood & wood product industries	0.00	0.00	**0.00**	0.03	0.01	**0.03**
Furniture industries	0.00	0.00	**0.00**	0.04	0.00	**0.04**
Paper & paper product industries	0.00	0.00	**0.00**	0.02	0.00	**0.02**

Table D1: The GDP Total Impact per Sector and per Brick for the Musina Municipal Area (R millions, 2008 Prices) (continued)

Construction and Operational Phase	Operational Phase					Negative GDP Impact Sub-Total (R millions, 2008 Prices)	Nett Operational Phase	Total Impact per Sector
Sectors / Bricks	Game Farming GDP (R millions, 2008 Prices)	Citrus Farming GDP (R millions, 2008 Prices)	Private Lodges GDP (R millions, 2008 Prices)	SAN Parks GDP (R millions, 2008 Prices)	Tourism Through Traffic GDP (R millions, 2008 Prices)			
Citrus farming	0.00	15.39	0.00	0.00	0.00	**15.39**	**-15.39**	**-15.39**
Sub-tropical fruit farming	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.13**	**0.14**
Vegetable farming	0.00	0.00	0.05	0.07	0.00	**0.12**	**1.30**	**1.31**
Livestock farming	0.00	0.00	0.00	0.00	0.00	**0.01**	**0.24**	**0.24**
Game farming	0.79	0.00	0.00	0.00	0.00	**0.79**	**-0.78**	**-0.78**
Forestry (Plantations)	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**	**0.00**
Other agriculture	0.00	0.00	0.01	0.02	0.00	**0.03**	**0.77**	**0.77**
Agriculture - Subsistence	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.08**	**0.08**
Coal & lignite mining	0.00	0.00	0.00	0.00	0.00	**0.00**	**2 772.78**	**2 772.86**
PGM mining	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**	**0.00**
Ferrous mineral mining	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**	**0.00**
Non-ferrous mineral mining	0.00	0.02	0.04	0.05	0.00	**0.10**	**2.40**	**2.75**
Other mining & quarrying	0.00	0.00	0.00	0.01	0.00	**0.01**	**1.98**	**2.08**
Meat, fish, fruit, vegetables, oils & fat industries	0.00	0.00	0.01	0.02	0.00	**0.03**	**0.14**	**0.14**
Dairy industries	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**	**0.00**
Grain mill, bakery & animal feed industries	0.00	0.00	0.00	0.00	0.00	**0.01**	**0.06**	**0.07**
Other food industries	0.00	0.00	0.01	0.01	0.00	**0.02**	**0.25**	**0.26**
Beverages & tobacco industries	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.02**	**0.02**
Textiles, clothing, leather products & footwear industries	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**	**0.00**
Wood & wood product industries	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.03**	**0.03**
Furniture industries	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.04**	**0.04**
Paper & paper product industries	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.02**	**0.02**

Table D1: The GDP Total Impact per Sector and per Brick for the Musina Municipal Area (R millions, 2008 Prices) (continued)

Construction and Operational Phase	Construction Phase		Average Construction Phase	Operational Phase		Positive GDP Impact Sub-Total (R millions, 2008 Prices)
Sectors / Bricks	Coal Mining GDP (R millions, 2008 Prices)	Rail Transport GDP (R millions, 2008 Prices)		Coal Mining GDP (R millions, 2008 Prices)	Rail Transport GDP (R millions, 2008 Prices)	
Publishing & printing industries	0.00	0.00	**0.00**	0.01	0.00	**0.01**
Petroleum industries	0.00	0.00	**0.00**	0.00	0.00	**0.00**
Chemical & chemical product industries (incl Plastic Products)	0.00	0.00	**0.00**	0.01	0.00	**0.02**
Rubber industries	0.00	0.00	**0.00**	0.00	0.00	**0.00**
Non-metallic mineral industries	0.00	0.00	**0.00**	0.02	0.02	**0.03**
Basic Metal industries	0.00	0.00	**0.00**	0.00	0.00	**0.00**
Structural metal industries	0.02	0.10	**0.12**	0.03	0.00	**0.03**
Other fabricated metal industries	0.00	0.00	**0.00**	0.00	0.00	**0.00**
Machinery & equipment industries	0.00	0.00	**0.00**	0.09	0.00	**0.09**
Electrical machinery & apparatus industries	0.00	0.02	**0.02**	0.02	0.00	**0.02**
Communication, medical & other electronic equipment industries	0.00	0.00	**0.00**	0.00	0.00	**0.00**
Transport equipment industries	0.00	0.00	**0.00**	0.02	164.62	**164.63**
Handcrafts & curios - Informal	0.00	0.00	**0.00**	0.00	0.00	**0.00**
Other manufacturing & recycling industries	0.02	0.01	**0.03**	2.23	0.34	**2.57**
Other manufacturing - Informal	0.00	0.00	**0.00**	0.34	0.03	**0.37**
Electricity industries	0.00	0.00	**0.00**	0.46	0.01	**0.47**
Water industries	0.00	0.00	**0.00**	0.08	0.00	**0.08**
Building industries	0.01	0.06	**0.07**	0.04	0.00	**0.04**
Other construction industries	0.01	0.71	**0.73**	0.03	0.00	**0.03**
Construction - Informal	0.00	0.00	**0.00**	0.00	0.00	**0.01**
Trade	0.03	0.02	**0.05**	3.03	0.44	**3.47**
Accommodation	0.00	0.00	**0.01**	0.44	0.05	**0.49**
Trade, accommodation & entertainment - Informal	0.00	0.00	**0.01**	0.30	0.03	**0.33**
Transport service industries	0.02	0.02	**0.04**	7.09	0.74	**7.83**
Transport - Combi-taxi	0.00	0.00	**0.00**	0.11	0.01	**0.12**
Communication industries	0.01	0.01	**0.02**	1.37	0.28	**1.65**
Insurance industries	0.02	0.02	**0.03**	2.39	0.33	**2.72**
Real estate industries	0.02	0.02	**0.04**	2.57	0.19	**2.76**
Business service industries	0.04	0.58	**0.62**	3.79	0.30	**4.10**
General Government	0.00	0.00	**0.00**	0.01	0.00	**0.01**
Health and social work	0.00	0.00	**0.01**	2.52	0.13	**2.64**
Activities/services	0.00	0.00	**0.00**	0.23	0.02	**0.25**
Other services - Informal	0.00	0.00	**0.00**	0.05	0.00	**0.05**
Total GDP Impact	**1**	**2**	**2**	**2 807**	**168**	**2 975**

Table D1: The GDP Total Impact per Sector and per Brick for the Musina Municipal Area (R millions, 2008 Prices) (continued)

Construction and Operational Phase	Operational Phase					Negative GDP Impact Sub-Total (R millions, 2008 Prices)	Nett Operational Phase	Total Impact per Sector
Sectors / Bricks	Game Farming GDP (R millions, 2008 Prices)	Citrus Farming GDP (R millions, 2008 Prices)	Private Lodges GDP (R millions, 2008 Prices)	SAN Parks GDP (R millions, 2008 Prices)	Tourism Through Traffic GDP (R millions, 2008 Prices)			
Publishing & printing industries	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.01**	**0.01**
Petroleum industries	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**	**0.00**
Chemical & chemical product industries (incl Plastic Products)	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.02**	**0.02**
Rubber industries	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**	**0.00**
Non-metallic mineral industries	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.03**	**0.03**
Basic Metal industries	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**	**0.00**
Structural metal industries	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.03**	**0.14**
Other fabricated metal industries	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**	**0.00**
Machinery & equipment industries	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.09**	**0.09**
Electrical machinery & apparatus industries	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.02**	**0.04**
Communication, medical & other electronic equipment industries	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**	**0.00**
Transport equipment industries	0.00	0.00	0.00	0.00	0.00	**0.00**	**164.63**	**164.63**
Handcrafts & curios - Informal	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**	**0.00**
Other manufacturing & recycling industries	0.00	0.01	0.04	0.05	0.00	**0.10**	**2.47**	**2.51**
Other manufacturing - Informal	0.00	0.00	0.00	0.01	0.00	**0.01**	**0.36**	**0.36**
Electricity industries	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.47**	**0.47**
Water industries	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.08**	**0.08**
Building industries	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.04**	**0.11**
Other construction industries	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.03**	**0.75**
Construction - Informal	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.01**	**0.01**
Trade	0.00	0.01	0.05	0.06	0.00	**0.12**	**3.35**	**3.40**
Accommodation	0.00	0.00	18.25	28.18	0.00	**46.44**	**-45.95**	**-45.94**
Trade, accommodation & entertainment - Informal	0.00	0.00	0.00	0.00	2.10	**2.11**	**-1.78**	**-1.78**
Transport service industries	0.00	0.01	0.04	0.05	0.00	**0.10**	**7.73**	**7.77**
Transport - Combi-taxi	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.11**	**0.12**
Communication industries	0.00	0.00	0.02	0.02	0.00	**0.04**	**1.61**	**1.63**
Insurance industries	0.00	0.01	0.03	0.04	0.00	**0.08**	**2.64**	**2.67**
Real estate industries	0.00	0.00	0.04	0.05	0.00	**0.09**	**2.67**	**2.70**
Business service industries	0.00	0.01	0.04	0.06	0.00	**0.12**	**3.97**	**4.60**
General Government	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.01**	**0.01**
Health and social work	0.00	0.00	0.00	0.00	0.00	**0.01**	**2.63**	**2.64**
Activities/services	0.00	0.00	0.00	0.00	0.00	**0.01**	**0.24**	**0.24**
Other services - Informal	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.05**	**0.05**
Total GDP Impact	**1**	**15**	**19**	**29**	**2**	**66**	**2 910**	**2 912**

Table D2: The GDP Total Impact per Sector and per Brick for the Vhembe District (R millions, 2008 Prices)

Construction and Operational Phase	Construction Phase		Average Construction Phase	Operational Phase		Positive GDP Impact Sub-Total (R millions, 2008 Prices)
Sectors / Bricks	Coal Mining GDP (R millions, 2008 Prices)	Rail Transport GDP (R millions, 2008 Prices)		Coal Mining GDP (R millions, 2008 Prices)	Rail Transport GDP (R millions, 2008 Prices)	
Citrus farming	0.00	0.00	**0.00**	0.13	0.00	**0.14**
Sub-tropical fruit farming	0.01	0.01	**0.01**	1.05	0.08	**1.13**
Vegetable farming	0.01	0.01	**0.02**	2.71	0.13	**2.84**
Livestock farming	0.01	0.01	**0.02**	1.40	0.11	**1.51**
Game farming	0.00	0.00	**0.00**	0.05	0.00	**0.05**
Forestry (Plantations)	0.02	0.01	**0.03**	1.21	0.21	**1.42**
Other agriculture	0.01	0.01	**0.02**	1.98	0.12	**2.10**
Agriculture - Subsistence	0.00	0.00	**0.00**	0.21	0.02	**0.23**
Coal & lignite mining	0.44	0.28	**0.72**	2 819.26	1.48	**2 820.74**
PGM mining	0.22	0.06	**0.28**	7.38	0.79	**8.17**
Ferrous mineral mining	0.00	0.00	**0.00**	0.00	0.00	**0.00**
Non-ferrous mineral mining	0.28	0.07	**0.35**	2.41	0.09	**2.50**
Other mining & quarrying	0.07	0.05	**0.12**	2.17	0.16	**2.33**
Meat, fish, fruit, vegetables, oils & fat industries	0.01	0.01	**0.01**	0.89	0.10	**1.00**
Dairy industries	0.00	0.00	**0.00**	0.00	0.00	**0.00**
Grain mill, bakery & animal feed industries	0.00	0.00	**0.00**	0.38	0.03	**0.41**
Other food industries	0.01	0.01	**0.02**	1.47	0.14	**1.60**
Beverages & tobacco industries	0.01	0.01	**0.01**	1.23	0.10	**1.34**
Textiles, clothing, leather products & footwear industries	0.00	0.00	**0.00**	0.00	0.00	**0.00**
Wood & wood product industries	0.01	0.00	**0.01**	0.36	0.07	**0.43**
Furniture industries	0.02	0.01	**0.03**	0.46	0.03	**0.49**
Paper & paper product industries	0.00	0.00	**0.00**	0.26	0.04	**0.30**

Table D2: The GDP Total Impact per Sector and per Brick for the Vhembe District (R millions, 2008 Prices) (continued)

Construction and Operational Phase	Operational Phase					Negative GDP Impact Sub-Total (R millions, 2008 Prices)	Nett Operational Phase	Total Impact per Sector
Sectors / Bricks	Game Farming GDP (R millions, 2008 Prices)	Citrus Farming GDP (R millions, 2008 Prices)	Private Lodges GDP (R millions, 2008 Prices)	SAN Parks GDP (R millions, 2008 Prices)	Tourism Through Traffic GDP (R millions, 2008 Prices)			
Citrus farming	0.00	15.39	0.00	0.00	0.00	**15.39**	**-15.26**	**-15.25**
Sub-tropical fruit farming	0.00	0.01	0.01	0.02	0.00	**0.04**	**1.09**	**1.10**
Vegetable farming	0.00	0.01	0.10	0.13	0.00	**0.24**	**2.60**	**2.62**
Livestock farming	0.00	0.01	0.02	0.02	0.00	**0.05**	**1.46**	**1.48**
Game farming	0.80	0.00	0.00	0.00	0.00	**0.80**	**-0.74**	**-0.74**
Forestry (Plantations)	0.00	0.00	0.01	0.01	0.00	**0.03**	**1.39**	**1.42**
Other agriculture	0.00	0.01	0.03	0.04	0.00	**0.08**	**2.02**	**2.04**
Agriculture - Subsistence	0.00	0.00	0.00	0.01	0.00	**0.01**	**0.22**	**0.22**
Coal & lignite mining	0.01	0.07	0.24	0.33	0.01	**0.65**	**2 820.08**	**2 820.80**
PGM mining	0.00	0.05	0.08	0.11	0.01	**0.25**	**7.92**	**8.20**
Ferrous mineral mining	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**	**0.00**
Non-ferrous mineral mining	0.00	0.02	0.04	0.05	0.00	**0.10**	**2.40**	**2.75**
Other mining & quarrying	0.00	0.01	0.00	0.01	0.00	**0.02**	**2.32**	**2.44**
Meat, fish, fruit, vegetables, oils & fat industries	0.00	0.00	0.08	0.10	0.00	**0.19**	**0.81**	**0.82**
Dairy industries	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**	**0.00**
Grain mill, bakery & animal feed industries	0.00	0.00	0.01	0.02	0.00	**0.03**	**0.38**	**0.38**
Other food industries	0.00	0.01	0.05	0.07	0.00	**0.13**	**1.47**	**1.49**
Beverages & tobacco industries	0.00	0.00	0.06	0.08	0.00	**0.15**	**1.19**	**1.20**
Textiles, clothing, leather products & footwear industries	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**	**0.00**
Wood & wood product industries	0.00	0.00	0.00	0.00	0.00	**0.01**	**0.42**	**0.43**
Furniture industries	0.00	0.00	0.00	0.00	0.00	**0.01**	**0.48**	**0.51**
Paper & paper product industries	0.00	0.00	0.00	0.00	0.00	**0.01**	**0.29**	**0.30**

Table D2: The GDP Total Impact per Sector and per Brick for the Vhembe District (R millions, 2008 Prices) (continued)

Construction and Operational Phase	Construction Phase		Average Construction Phase	Operational Phase		Positive GDP Impact Sub-Total (R millions, 2008 Prices)
Sectors / Bricks	**Coal Mining GDP (R millions, 2008 Prices)**	**Rail Transport GDP (R millions, 2008 Prices)**		**Coal Mining GDP (R millions, 2008 Prices)**	**Rail Transport GDP (R millions, 2008 Prices)**	
Publishing & printing industries	0.00	0.00	**0.00**	0.08	0.02	**0.10**
Petroleum industries	0.00	0.00	**0.00**	0.00	0.00	**0.00**
Chemical & chemical product industries (incl Plastic Products)	0.00	0.00	**0.00**	0.11	0.03	**0.14**
Rubber industries	0.00	0.00	**0.00**	0.00	0.00	**0.00**
Non-metallic mineral industries	0.01	0.01	**0.02**	0.19	0.20	**0.39**
Basic Metal industries	0.00	0.00	**0.00**	0.00	0.00	**0.00**
Structural metal industries	0.26	0.15	**0.42**	0.35	0.03	**0.38**
Other fabricated metal industries	0.00	0.00	**0.00**	0.00	0.00	**0.00**
Machinery & equipment industries	0.03	0.00	**0.04**	1.22	0.01	**1.23**
Electrical machinery & apparatus industries	0.00	0.02	**0.03**	0.31	0.00	**0.31**
Communication, medical & other electronic equipment industries	0.00	0.00	**0.00**	0.00	0.00	**0.00**
Transport equipment industries	0.00	0.00	**0.00**	0.02	164.62	**164.63**
Handcrafts & curios - Informal	0.00	0.00	**0.00**	0.00	0.00	**0.00**
Other manufacturing & recycling industries	0.04	0.03	**0.07**	4.51	0.69	**5.21**
Other manufacturing - Informal	0.00	0.00	**0.00**	0.00	0.00	**0.00**
Electricity industries	0.12	0.11	**0.23**	35.25	0.67	**35.93**
Water industries	0.03	0.02	**0.05**	6.14	0.25	**6.39**
Building industries	0.44	0.13	**0.57**	1.28	0.10	**1.38**
Other construction industries	0.44	1.30	**1.74**	0.95	0.06	**1.01**
Construction - Informal	0.00	0.00	**0.01**	0.17	0.02	**0.19**
Trade	0.48	0.30	**0.78**	47.14	6.81	**53.95**
Accommodation	0.04	0.05	**0.09**	6.83	0.83	**7.65**
Trade, accommodation & entertainment - Informal	0.04	0.04	**0.08**	4.60	0.52	**5.11**
Transport service industries	0.12	0.10	**0.22**	34.91	3.66	**38.57**
Transport - Combi-taxi	0.00	0.01	**0.01**	0.52	0.06	**0.58**
Communication industries	0.06	0.06	**0.11**	6.76	1.37	**8.13**
Insurance industries	0.12	0.11	**0.23**	16.79	2.34	**19.12**
Real estate industries	0.12	0.14	**0.26**	18.09	1.34	**19.43**
Business service industries	0.31	1.20	**1.51**	26.70	2.15	**28.84**
General Government	0.00	0.00	**0.00**	0.21	0.01	**0.22**
Health and social work	0.07	0.05	**0.13**	49.39	2.47	**51.86**
Activities/services	0.03	0.04	**0.06**	4.52	0.39	**4.91**
Other services - Informal	0.01	0.01	**0.01**	0.90	0.08	**0.98**
Total GDP Impact	**4**	**4**	**8**	**3 113**	**192**	**3 305**

Table D2: The GDP Total Impact per Sector and per Brick for the Vhembe District (R millions, 2008 Prices) (continued)

Construction and Operational Phase	Operational Phase					Negative GDP Impact Sub-Total (R millions, 2008 Prices)	Nett Operational Phase	Total Impact per Sector
Sectors / Bricks	Game Farming GDP (R millions, 2008 Prices)	Citrus Farming GDP (R millions, 2008 Prices)	Private Lodges GDP (R millions, 2008 Prices)	SAN Parks GDP (R millions, 2008 Prices)	Tourism Through Traffic GDP (R millions, 2008 Prices)			
Publishing & printing industries	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.10**	**0.10**
Petroleum industries	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**	**0.00**
Chemical & chemical product industries (incl Plastic Products)	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.14**	**0.14**
Rubber industries	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**	**0.00**
Non-metallic mineral industries	0.00	0.00	0.00	0.00	0.00	**0.01**	**0.38**	**0.40**
Basic Metal industries	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**	**0.00**
Structural metal industries	0.00	0.01	0.00	0.00	0.00	**0.01**	**0.37**	**0.79**
Other fabricated metal industries	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**	**0.00**
Machinery & equipment industries	0.00	0.02	0.00	0.00	0.00	**0.02**	**1.21**	**1.24**
Electrical machinery & apparatus industries	0.00	0.01	0.00	0.00	0.00	**0.01**	**0.30**	**0.32**
Communication, medical & other electronic equipment industries	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**	**0.00**
Transport equipment industries	0.00	0.00	0.00	0.00	0.00	**0.00**	**164.63**	**164.63**
Handcrafts & curios - Informal	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**	**0.00**
Other manufacturing & recycling industries	0.00	0.02	0.07	0.10	0.00	**0.20**	**5.01**	**5.08**
Other manufacturing - Informal	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**	**0.00**
Electricity industries	0.00	0.04	0.09	0.14	0.01	**0.28**	**35.65**	**35.88**
Water industries	0.00	0.01	0.03	0.05	0.00	**0.10**	**6.30**	**6.34**
Building industries	0.00	0.06	0.01	0.02	0.00	**0.09**	**1.29**	**1.87**
Other construction industries	0.00	0.01	0.01	0.01	0.00	**0.03**	**0.98**	**2.72**
Construction - Informal	0.00	0.00	0.00	0.00	0.00	**0.01**	**0.18**	**0.19**
Trade	0.02	0.12	0.72	0.98	0.04	**1.88**	**52.07**	**52.86**
Accommodation	0.01	0.02	18.32	28.27	0.01	**46.62**	**-38.97**	**-38.87**
Trade, accommodation & entertainment - Informal	0.00	0.01	0.05	0.07	2.11	**2.25**	**2.86**	**2.94**
Transport service industries	0.00	0.03	0.19	0.27	0.01	**0.51**	**38.06**	**38.28**
Transport - Combi-taxi	0.00	0.00	0.01	0.01	0.00	**0.02**	**0.56**	**0.57**
Communication industries	0.00	0.02	0.07	0.10	0.01	**0.21**	**7.92**	**8.03**
Insurance industries	0.01	0.07	0.18	0.26	0.02	**0.54**	**18.59**	**18.82**
Real estate industries	0.01	0.03	0.25	0.34	0.02	**0.65**	**18.78**	**19.04**
Business service industries	0.01	0.08	0.32	0.44	0.03	**0.88**	**27.97**	**29.48**
General Government	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.22**	**0.22**
Health and social work	0.00	0.02	0.06	0.08	0.00	**0.17**	**51.69**	**51.81**
Activities/services	0.04	0.02	0.05	0.07	0.00	**0.18**	**4.73**	**4.79**
Other services - Informal	0.00	0.00	0.01	0.02	0.00	**0.03**	**0.94**	**0.96**
Total GDP Impact	**1**	**16**	**21**	**32**	**2**	**73**	**3 233**	**3 241**

Table D3: The GDP Total Impact per Sector and per Brick for the Limpopo Province (R millions, 2008 Prices)

Construction and Operational Phase	Construction Phase		Average Construction Phase	Operational Phase		Positive GDP Impact Sub-Total (R millions, 2008 Prices)
Sectors / Bricks	Coal Mining GDP (R millions, 2008 Prices)	Rail Transport GDP (R millions, 2008 Prices)		Coal Mining GDP (R millions, 2008 Prices)	Rail Transport GDP (R millions, 2008 Prices)	
Citrus farming	0.01	0.01	**0.02**	3.20	0.11	**3.31**
Sub-tropical fruit farming	0.02	0.02	**0.03**	3.01	0.23	**3.25**
Vegetable farming	0.06	0.05	**0.11**	15.90	0.76	**16.66**
Livestock farming	0.04	0.03	**0.07**	6.49	0.52	**7.01**
Game farming	0.00	0.00	**0.00**	0.23	0.02	**0.25**
Forestry (Plantations)	0.11	0.05	**0.16**	7.23	1.27	**8.50**
Other agriculture	0.07	0.05	**0.12**	11.80	0.74	**12.54**
Agriculture - Subsistence	0.01	0.01	**0.02**	1.25	0.11	**1.36**
Coal & lignite mining	0.44	0.28	**0.72**	2 819.26	1.48	**2 820.74**
PGM mining	0.60	0.15	**0.75**	19.68	2.10	**21.78**
Ferrous mineral mining	0.00	0.00	**0.00**	0.00	0.00	**0.00**
Non-ferrous mineral mining	0.37	0.10	**0.47**	3.21	0.13	**3.34**
Other mining & quarrying	3.39	2.66	**6.05**	105.22	7.80	**113.02**
Meat, fish, fruit, vegetables, oils & fat industries	0.04	0.04	**0.09**	7.18	0.84	**8.02**
Dairy industries	0.00	0.00	**0.00**	0.00	0.00	**0.00**
Grain mill, bakery & animal feed industries	0.02	0.02	**0.04**	3.04	0.25	**3.28**
Other food industries	0.08	0.07	**0.15**	11.77	1.09	**12.86**
Beverages & tobacco industries	0.06	0.05	**0.11**	11.53	0.98	**12.52**
Textiles, clothing, leather products & footwear industries	0.01	0.01	**0.02**	1.70	0.25	**1.96**
Wood & wood product industries	0.16	0.06	**0.23**	8.78	1.75	**10.53**
Furniture industries	0.15	0.06	**0.21**	3.40	0.24	**3.64**
Paper & paper product industries	0.01	0.01	**0.03**	1.92	0.30	**2.22**

Table D3: The GDP Total Impact per Sector and per Brick for the Limpopo Province (R millions, 2008 Prices) (continued)

Construction and Operational Phase	Operational Phase					Negative GDP Impact Sub-Total (R millions, 2008 Prices)	Nett Operational Phase	Total Impact per Sector
Sectors / Bricks	Game Farming GDP (R millions, 2008 Prices)	Citrus Farming GDP (R millions, 2008 Prices)	Private Lodges GDP (R millions, 2008 Prices)	SAN Parks GDP (R millions, 2008 Prices)	Tourism Through Traffic GDP (R millions, 2008 Prices)			
Citrus farming	0.00	15.40	0.03	0.05	0.00	**15.48**	**-12.17**	**-12.16**
Sub-tropical fruit farming	0.00	0.02	0.03	0.05	0.00	**0.11**	**3.14**	**3.17**
Vegetable farming	0.00	0.05	0.58	0.79	0.01	**1.44**	**15.23**	**15.33**
Livestock farming	0.00	0.04	0.07	0.11	0.00	**0.22**	**6.79**	**6.86**
Game farming	0.82	0.00	0.00	0.00	0.00	**0.83**	**-0.58**	**-0.58**
Forestry (Plantations)	0.00	0.02	0.06	0.09	0.00	**0.18**	**8.31**	**8.47**
Other agriculture	0.00	0.06	0.16	0.24	0.03	**0.49**	**12.05**	**12.16**
Agriculture - Subsistence	0.00	0.01	0.02	0.03	0.00	**0.06**	**1.30**	**1.32**
Coal & lignite mining	0.01	0.07	0.24	0.33	0.01	**0.65**	**2 820.08**	**2 820.80**
PGM mining	0.01	0.13	0.20	0.29	0.03	**0.66**	**21.12**	**21.87**
Ferrous mineral mining	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**	**0.00**
Non-ferrous mineral mining	0.00	0.03	0.05	0.06	0.00	**0.14**	**3.20**	**3.67**
Other mining & quarrying	0.01	0.27	0.23	0.32	0.03	**0.85**	**112.18**	**118.23**
Meat, fish, fruit, vegetables, oils & fat industries	0.01	0.03	0.62	0.83	0.01	**1.50**	**6.52**	**6.61**
Dairy industries	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**	**0.00**
Grain mill, bakery & animal feed industries	0.00	0.02	0.09	0.13	0.01	**0.24**	**3.04**	**3.08**
Other food industries	0.01	0.06	0.40	0.54	0.04	**1.04**	**11.81**	**11.96**
Beverages & tobacco industries	0.01	0.04	0.56	0.75	0.01	**1.37**	**11.15**	**11.26**
Textiles, clothing, leather products & footwear industries	0.00	0.00	0.01	0.02	0.00	**0.04**	**1.92**	**1.94**
Wood & wood product industries	0.00	0.03	0.04	0.06	0.00	**0.14**	**10.39**	**10.61**
Furniture industries	0.00	0.02	0.01	0.02	0.00	**0.06**	**3.58**	**3.79**
Paper & paper product industries	0.00	0.01	0.02	0.03	0.00	**0.05**	**2.16**	**2.19**

Table D3: The GDP Total Impact per Sector and per Brick for the Limpopo Province (R millions, 2008 Prices) (continued)

Construction and Operational Phase	Construction Phase		Average Construction Phase	Operational Phase		Positive GDP Impact Sub-Total (R millions, 2008 Prices)
Sectors / Bricks	**Coal Mining GDP (R millions, 2008 Prices)**	**Rail Transport GDP (R millions, 2008 Prices)**		**Coal Mining GDP (R millions, 2008 Prices)**	**Rail Transport GDP (R millions, 2008 Prices)**	
Publishing & printing industries	0.00	0.00	**0.01**	0.37	0.11	**0.48**
Petroleum industries	0.00	0.00	**0.00**	0.00	0.00	**0.00**
Chemical & chemical product industries (incl Plastic Products)	0.01	0.01	**0.02**	3.98	1.09	**5.06**
Rubber industries	0.00	0.00	**0.00**	1.18	0.07	**1.25**
Non-metallic mineral industries	0.26	0.15	**0.42**	4.63	4.67	**9.29**
Basic Metal industries	0.00	0.00	**0.00**	0.00	0.00	**0.00**
Structural metal industries	1.95	0.46	**2.41**	2.58	0.20	**2.78**
Other fabricated metal industries	0.11	0.03	**0.14**	4.94	0.07	**5.00**
Machinery & equipment industries	0.19	0.02	**0.21**	7.18	0.06	**7.24**
Electrical machinery & apparatus industries	0.03	0.05	**0.08**	2.27	0.02	**2.28**
Communication, medical & other electronic equipment industries	0.00	0.00	**0.00**	0.00	0.00	**0.00**
Transport equipment industries	0.20	0.03	**0.23**	3.20	164.78	**167.98**
Handcrafts & curios - Informal	0.00	0.00	**0.00**	0.15	0.01	**0.16**
Other manufacturing & recycling industries	0.19	0.13	**0.32**	20.36	3.12	**23.48**
Other manufacturing - Informal	0.02	0.02	**0.04**	3.12	0.27	**3.39**
Electricity industries	0.34	0.33	**0.67**	102.63	1.96	**104.59**
Water industries	0.08	0.05	**0.13**	17.88	0.73	**18.61**
Building industries	2.50	0.43	**2.93**	7.19	0.57	**7.77**
Other construction industries	2.49	3.40	**5.89**	5.32	0.34	**5.65**
Construction - Informal	0.02	0.02	**0.04**	0.96	0.09	**1.04**
Trade	1.56	0.99	**2.55**	153.87	22.24	**176.11**
Accommodation	0.14	0.16	**0.31**	22.28	2.69	**24.97**
Trade, accommodation & entertainment - Informal	0.12	0.14	**0.25**	15.01	1.68	**16.69**
Transport service industries	0.72	0.60	**1.32**	209.91	22.01	**231.92**
Transport - Combi-taxi	0.03	0.04	**0.07**	3.13	0.36	**3.49**
Communication industries	0.34	0.33	**0.67**	40.65	8.24	**48.89**
Insurance industries	0.61	0.56	**1.17**	86.27	12.00	**98.27**
Real estate industries	0.61	0.71	**1.32**	92.97	6.87	**99.84**
Business service industries	1.60	3.73	**5.34**	137.18	11.02	**148.21**
General Government	0.00	0.00	**0.00**	1.02	0.06	**1.08**
Health and social work	0.36	0.26	**0.62**	243.57	12.19	**255.76**
Activities/services	0.14	0.18	**0.32**	22.27	1.93	**24.20**
Other services - Informal	0.03	0.03	**0.06**	4.43	0.39	**4.83**
Total GDP Impact	**20**	**17**	**37**	**4 266**	**301**	**4 567**

Table D3: The GDP Total Impact per Sector and per Brick for the Limpopo Province (R millions, 2008 Prices) (continued)

Construction and Operational Phase	Operational Phase					Negative GDP Impact Sub-Total (R millions, 2008 Prices)	Nett Operational Phase	Total Impact per Sector
Sectors / Bricks	Game Farming GDP (R millions, 2008 Prices)	Citrus Farming GDP (R millions, 2008 Prices)	Private Lodges GDP (R millions, 2008 Prices)	SAN Parks GDP (R millions, 2008 Prices)	Tourism Through Traffic GDP (R millions, 2008 Prices)			
Publishing & printing industries	0.00	0.00	0.00	0.00	0.00	**0.01**	**0.47**	**0.48**
Petroleum industries	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**	**0.00**
Chemical & chemical product industries (incl Plastic Products)	0.00	0.01	0.01	0.02	0.00	**0.04**	**5.02**	**5.04**
Rubber industries	0.00	0.00	0.00	0.00	0.00	**0.00**	**1.24**	**1.25**
Non-metallic mineral industries	0.00	0.03	0.05	0.06	0.00	**0.14**	**9.15**	**9.57**
Basic Metal industries	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**	**0.00**
Structural metal industries	0.00	0.04	0.00	0.00	0.00	**0.05**	**2.73**	**5.15**
Other fabricated metal industries	0.00	0.01	0.00	0.01	0.00	**0.03**	**4.98**	**5.12**
Machinery & equipment industries	0.00	0.10	0.01	0.01	0.00	**0.12**	**7.12**	**7.33**
Electrical machinery & apparatus industries	0.00	0.06	0.00	0.00	0.00	**0.07**	**2.21**	**2.29**
Communication, medical & other electronic equipment industries	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**	**0.00**
Transport equipment industries	0.00	0.03	0.01	0.02	0.00	**0.06**	**167.92**	**168.15**
Handcrafts & curios - Informal	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.16**	**0.16**
Other manufacturing & recycling industries	0.01	0.08	0.33	0.46	0.02	**0.89**	**22.59**	**22.91**
Other manufacturing - Informal	0.00	0.01	0.03	0.05	0.01	**0.11**	**3.28**	**3.32**
Electricity industries	0.01	0.11	0.28	0.41	0.02	**0.82**	**103.77**	**104.44**
Water industries	0.00	0.03	0.10	0.14	0.01	**0.28**	**18.33**	**18.47**
Building industries	0.00	0.32	0.07	0.10	0.01	**0.50**	**7.26**	**10.19**
Other construction industries	0.00	0.05	0.04	0.06	0.00	**0.15**	**5.50**	**11.39**
Construction - Informal	0.00	0.00	0.01	0.02	0.00	**0.03**	**1.01**	**1.05**
Trade	0.06	0.38	2.36	3.21	0.12	**6.14**	**169.97**	**172.52**
Accommodation	0.03	0.06	18.46	28.48	0.02	**47.05**	**-22.08**	**-21.77**
Trade, accommodation & entertainment - Informal	0.02	0.04	0.17	0.24	2.12	**2.59**	**14.10**	**14.35**
Transport service industries	0.03	0.21	1.17	1.61	0.08	**3.09**	**228.83**	**230.15**
Transport - Combi-taxi	0.00	0.01	0.04	0.06	0.02	**0.13**	**3.36**	**3.42**
Communication industries	0.02	0.12	0.45	0.63	0.04	**1.25**	**47.63**	**48.31**
Insurance industries	0.04	0.36	0.92	1.35	0.08	**2.76**	**95.51**	**96.69**
Real estate industries	0.03	0.16	1.30	1.75	0.10	**3.34**	**96.50**	**97.82**
Business service industries	0.06	0.42	1.63	2.25	0.15	**4.51**	**143.70**	**149.03**
General Government	0.00	0.00	0.00	0.00	0.00	**0.01**	**1.07**	**1.08**
Health and social work	0.02	0.11	0.28	0.42	0.02	**0.85**	**254.91**	**255.52**
Activities/services	0.17	0.09	0.24	0.35	0.02	**0.88**	**23.32**	**23.64**
Other services - Informal	0.00	0.02	0.06	0.08	0.00	**0.17**	**4.66**	**4.72**
Total GDP Impact	**1**	**19**	**31**	**47**	**3**	**102**	**4 465**	**4 502**

Table D4: The GDP Total Impact per Sector and per Brick for South Africa (R millions, 2008 Prices)

Construction and Operational Phase	Construction Phase		Average Construction Phase	Operational Phase		Positive GDP Impact Sub-Total (R millions, 2008 Prices)
Sectors	Coal Mining GDP (R millions, 2008 Prices)	Rail Transport GDP (R millions, 2008 Prices)		Coal Mining GDP (R millions, 2008 Prices)	Rail Transport GDP (R millions, 2008 Prices)	
Agriculture - Commercial	0.82	0.58	**1.40**	100.13	8.03	**108.15**
Agriculture - Subsistence	0.00	0.00	**0.01**	0.59	0.10	**0.68**
Coal and lignite mining	0.36	0.17	**0.53**	2 795.43	1.59	**2 797.02**
Gold mining	0.24	0.26	**0.50**	6.43	0.68	**7.11**
Other mining	1.05	0.78	**1.82**	52.17	4.75	**56.92**
Meat, Fish, Fruit, Vegetables, Oils and Fat Products	0.08	0.06	**0.14**	12.11	0.90	**13.02**
Dairy products	0.05	0.03	**0.07**	6.97	0.53	**7.51**
Grain Mill, Bakery and Animal Feed Products	0.07	0.04	**0.11**	10.29	0.77	**11.05**
Other food products	0.37	0.24	**0.61**	53.61	4.00	**57.60**
Beverages and tobacco products	0.22	0.13	**0.34**	32.05	2.56	**34.60**
Textiles, Clothing, Leather Products and Footwear	0.32	0.19	**0.51**	48.09	5.08	**53.17**
Wood and Wood Products	0.21	0.08	**0.29**	8.76	1.92	**10.67**
Furniture	0.01	0.01	**0.02**	0.46	0.05	**0.51**
Paper and Paper Products	0.24	0.16	**0.40**	29.51	3.12	**32.63**
Publishing and Printing	0.25	0.18	**0.43**	27.23	4.81	**32.04**
Petroleum	0.40	0.27	**0.67**	63.39	5.02	**68.40**
Chemicals & Chemical Products (incl Plastic Products)	0.71	0.48	**1.19**	106.08	15.35	**121.43**
Rubber Products	0.04	0.02	**0.06**	13.40	1.15	**14.55**
Non-Metallic Mineral Products	0.87	0.59	**1.47**	26.65	5.74	**32.38**
Basic Metal Products	1.55	0.76	**2.32**	45.73	3.17	**48.90**
Structural Metal Products	2.28	0.90	**3.18**	3.78	0.48	**4.26**
Other Fabricated Metal Products	0.94	0.43	**1.37**	40.06	1.92	**41.98**

Table D4: The GDP Total Impact per Sector and per Brick for South Africa (R millions, 2008 Prices) (continued)

Construction and Operational Phase	Operational Phase					Negative GDP Impact Sub-Total (R millions, 2008 Prices)	Nett Operational Phase	Total Impact per Sector
Sectors	Game Farming GDP (R millions, 2008 Prices)	Citrus Farming GDP (R millions, 2008 Prices)	Private Lodges GDP (R millions, 2008 Prices)	SAN Parks GDP (R millions, 2008 Prices)	Tourism Through Traffic GDP (R millions, 2008 Prices)			
Agriculture - Commercial	0.85	16.65	1.77	2.44	0.16	**21.87**	**86.28**	**87.68**
Agriculture - Subsistence	0.00	0.00	0.00	0.01	0.04	**0.05**	**0.63**	**0.64**
Coal and lignite mining	0.01	0.10	0.15	0.22	0.02	**0.50**	**2 796.52**	**2 797.05**
Gold mining	0.00	0.03	0.05	0.08	0.01	**0.17**	**6.94**	**7.44**
Other mining	0.02	0.25	0.32	0.45	0.04	**1.08**	**55.84**	**57.67**
Meat, Fish, Fruit, Vegetables, Oils and Fat Products	0.00	0.07	0.20	0.28	0.01	**0.56**	**12.45**	**12.59**
Dairy products	0.00	0.04	0.21	0.29	0.01	**0.55**	**6.95**	**7.03**
Grain Mill, Bakery and Animal Feed Products	0.01	0.06	0.13	0.19	0.01	**0.40**	**10.65**	**10.76**
Other food products	0.02	0.30	0.80	1.13	0.07	**2.32**	**55.29**	**55.90**
Beverages and tobacco products	0.01	0.17	0.70	0.96	0.03	**1.87**	**32.73**	**33.07**
Textiles, Clothing, Leather Products and Footwear	0.01	0.19	0.34	0.49	0.04	**1.07**	**52.10**	**52.61**
Wood and Wood Products	0.00	0.05	0.07	0.10	0.01	**0.23**	**10.44**	**10.73**
Furniture	0.00	0.00	0.00	0.00	0.00	**0.01**	**0.50**	**0.51**
Paper and Paper Products	0.01	0.12	0.24	0.34	0.03	**0.75**	**31.88**	**32.28**
Publishing and Printing	0.01	0.12	0.27	0.38	0.04	**0.82**	**31.22**	**31.65**
Petroleum	0.02	0.20	0.33	0.48	0.05	**1.08**	**67.32**	**67.99**
Chemicals & Chemical Products (incl Plastic Products)	0.04	0.36	0.67	0.95	0.08	**2.10**	**119.33**	**120.52**
Rubber Products	0.00	0.02	0.03	0.04	0.01	**0.09**	**14.46**	**14.52**
Non-Metallic Mineral Products	0.01	0.13	0.28	0.38	0.02	**0.81**	**31.57**	**33.04**
Basic Metal Products	0.01	0.42	0.28	0.40	0.03	**1.14**	**47.77**	**50.09**
Structural Metal Products	0.00	0.09	0.02	0.03	0.00	**0.14**	**4.12**	**7.30**
Other Fabricated Metal Products	0.01	0.24	0.20	0.28	0.02	**0.75**	**41.23**	**42.59**

Table D4: The GDP Total Impact per Sector and per Brick for South Africa (R millions, 2008 Prices) (continued)

Construction and Operational Phase	Construction Phase		Average Construction Phase	Operational Phase		Positive GDP Impact Sub-Total (R millions, 2008 Prices)
Sectors	Coal Mining GDP (R millions, 2008 Prices)	Rail Transport GDP (R millions, 2008 Prices)		Coal Mining GDP (R millions, 2008 Prices)	Rail Transport GDP (R millions, 2008 Prices)	
Machinery & Equipment	1.03	0.20	**1.23**	37.59	1.37	**38.97**
Electrical Machinery & Apparatus	0.26	0.35	**0.61**	11.91	0.36	**12.27**
Communication, Medical and other Electronic Equipment	0.04	0.04	**0.08**	6.31	0.54	**6.85**
Manufacturing of Transport Equipment	0.87	0.39	**1.26**	50.06	168.52	**218.58**
Handcrafts & curios - Informal	0.01	0.01	**0.01**	1.10	0.18	**1.29**
Other Manufacturing & Recycling	0.35	0.16	**0.51**	33.40	4.40	**37.80**
Other manufacturing - Informal	0.02	0.01	**0.04**	2.75	0.45	**3.20**
Electricity	0.74	0.56	**1.30**	96.68	5.78	**102.46**
Water	0.05	0.03	**0.09**	8.82	0.79	**9.61**
Buildings	2.65	0.54	**3.20**	21.12	1.51	**22.63**
Other construction	2.67	3.46	**6.12**	27.40	1.15	**28.56**
Construction - Informal	0.00	0.00	**0.00**	0.31	0.02	**0.33**
Trade	6.85	2.41	**9.27**	460.38	44.01	**504.39**
Accommodation	0.48	0.31	**0.79**	75.35	5.82	**81.17**
Trade, accommodation & entertainment - Informal	0.13	0.08	**0.20**	18.82	1.44	**20.27**
Transport services	2.46	1.49	**3.95**	824.68	32.86	**857.54**
Transport - Combi-taxi	1.22	0.73	**1.95**	183.10	13.70	**196.80**
Communications	0.00	0.00	**0.00**	0.13	2.17	**2.30**
Insurance	4.37	2.81	**7.18**	604.60	45.88	**650.47**
Real estate	2.32	1.52	**3.84**	242.92	20.53	**263.45**
Business activities	1.39	2.59	**3.99**	150.05	10.42	**160.47**
Health and social work	0.66	0.44	**1.10**	143.64	19.25	**162.89**
Activities/services	1.19	0.77	**1.96**	184.74	13.63	**198.37**
Other services - Informal	0.02	0.01	**0.03**	3.20	0.26	**3.45**
Total GDP Impact	**41**	**25**	**66**	**6 672**	**467**	**7 139**

Table D4: The GDP Total Impact per Sector and per Brick for South Africa (R millions, 2008 Prices) (continued)

Construction and Operational Phase	Operational Phase					Negative GDP Impact Sub-Total (R millions, 2008 Prices)	Nett Operational Phase	Total Impact per Sector
Sectors	Game Farming GDP (R millions, 2008 Prices)	Citrus Farming GDP (R millions, 2008 Prices)	Private Lodges GDP (R millions, 2008 Prices)	SAN Parks GDP (R millions, 2008 Prices)	Tourism Through Traffic GDP (R millions, 2008 Prices)			
Machinery & Equipment	0.01	0.83	0.13	0.19	0.02	**1.17**	**37.79**	**39.02**
Electrical Machinery & Apparatus	0.00	0.41	0.06	0.08	0.01	**0.56**	**11.71**	**12.33**
Communication, Medical and other Electronic Equipment	0.00	0.03	0.04	0.06	0.01	**0.14**	**6.71**	**6.79**
Manufacturing of Transport Equipment	0.01	0.32	0.28	0.40	0.04	**1.05**	**217.54**	**218.80**
Handcrafts & curios - Informal	0.00	0.00	0.01	0.01	0.00	**0.03**	**1.26**	**1.27**
Other Manufacturing & Recycling	0.01	0.16	0.32	0.47	0.03	**0.99**	**36.81**	**37.31**
Other manufacturing - Informal	0.00	0.01	0.02	0.03	0.00	**0.07**	**3.13**	**3.17**
Electricity	0.02	0.34	0.94	1.31	0.07	**2.69**	**99.77**	**101.07**
Water	0.00	0.05	0.12	0.17	0.01	**0.34**	**9.27**	**9.36**
Buildings	0.01	0.40	0.20	0.28	0.02	**0.91**	**21.72**	**24.92**
Other construction	0.01	0.12	0.15	0.21	0.02	**0.50**	**28.06**	**34.18**
Construction - Informal	0.00	0.00	0.00	0.00	0.00	**0.01**	**0.32**	**0.33**
Trade	0.13	2.50	2.91	4.16	0.37	**10.06**	**494.33**	**503.59**
Accommodation	0.02	0.32	19.52	29.78	0.06	**49.70**	**31.48**	**32.26**
Trade, accommodation & entertainment - Informal	0.01	0.11	0.16	0.25	2.64	**3.17**	**17.10**	**17.30**
Transport services	0.13	1.26	1.70	2.46	0.25	**5.80**	**851.74**	**855.69**
Transport - Combi-taxi	0.06	1.07	1.61	2.46	0.43	**5.64**	**191.16**	**193.11**
Communications	0.00	0.00	0.01	0.01	0.00	**0.02**	**2.29**	**2.29**
Insurance	0.17	2.36	4.57	6.58	0.56	**14.23**	**636.24**	**643.42**
Real estate	0.06	1.06	4.23	5.67	0.32	**11.34**	**252.11**	**255.96**
Business activities	0.04	0.64	1.33	1.88	0.14	**4.03**	**156.44**	**160.43**
Health and social work	0.03	0.40	0.74	1.08	0.08	**2.33**	**160.56**	**161.66**
Activities/services	0.07	0.86	1.45	2.17	0.15	**4.69**	**193.68**	**195.64**
Other services - Informal	0.00	0.02	0.03	0.04	0.03	**0.12**	**3.33**	**3.37**
Total GDP Impact	**2**	**33**	**48**	**70**	**6**	**158**	**6 981**	**7 047**

ANNEXURE E: EXPLANATION OF INDIRECT IMPACTS

In order to further explain the meaning of the concept of Indirect Impacts various examples can be used. For example when the Vele mine starts producing it will require materials such as explosives, fuel, electricity and even inputs such as stationery, bank services, etc. In order to produce these products and services, the relevant suppliers require in turn certain specific inputs from other producers in different economic sectors. The indirect impacts therefore represent the total interactions that occur in order to supply the direct materials and services used by the mine as well as the products and services that are required due to their linkages with the products and services used by the mine.

These interactions are then expressed in terms of their contributions to the Gross domestic Product (GDP), employment creation and maintenance as well as other macroeconomic variables.