CoAL of Africa

GREATER SOUTPANSBERG PROJECT

Mopane Project Final Report

Macro and Micro-Economic Impact Analysis of the Coal of Africa Mopane Project located near Makhado within the Vhembe District Municipality

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6 November 2013

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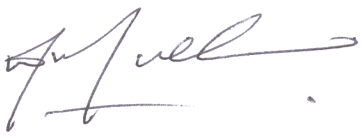
Name of Project: Greater Soutpansberg – Mopane Project

Report Title: Macro and Micro-Economic Impact Analysis of the Coal of Africa Mopane Project located near Makhado within the Vhembe District Municipality.

Name	Responsibility	Curriculum Vitae
William Mullins	Project Manager Local Economic Impacts and Report	Appendix F
Tefelo Majoro	Cost Benefit Analysis	Appendix F
Jeaunes Viljoen	Macro-Econometric Modelling	Appendix F
Daan Hamman	Data Collection and Final Report	Appendix F
Phindile Nkosi	Local Economic Impacts and Report	Appendix F



William Mullins – Project Manager

Date: 6 November 2013

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The field work done by Naledi Development Restructured (Pty) Ltd to collect the necessary information from landowners and the inputs from the impact specialist consultants is very much appreciated.

The co-operation of landowners visited or contacted that were prepared to assist with the gathering of information in respect of their farming enterprises, is much appreciated. Notwithstanding the fact that they did not necessarily support the intended mining operations, they were prepared to submit information for the purpose of this study.

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GLOSSARY OF TERMS

Term/Abbreviation		Meaning
AU	-	Animal Unit
BCR	-	Benefit Cost Ratio
CBA	-	Cost Benefit Analysis
CoAL	-	Coal of Africa Limited
DAFF	-	Department of Agriculture, Forestry and Fisheries
DMR	-	Department of Mineral Resources
DMS	-	Dense Medium Separation
DWA	-	Department of Water Affairs
EIA	-	Environmental Impact Assessment
EMP	-	Environmental Management Programme
FEL	-	Front End Loader
GAP	-	Good Agriculture Practice
GDP	-	Gross Domestic Product
GOS	-	Gross Operating Surplus
IRR	-	Internal Rate of Return
LOM	-	Life of Mine
MEIM	-	Macro-Economic Impact Model
MRA	-	Mining Right Application
MT	-	Million Tonnes
NPV	-	Net Present Value
RBCT	-	Richards Bay Coal Terminal
RLT	-	Rapid Load-out Terminal
ROM	-	Run-of-Mine
SAM	-	Social Accounting Matrix
TFR	-	Transnet Freight Rail
WIM	-	Water Impact Model
WARMS	-	Water Use Authorisation and Registration Management System
WRC		Water Research Commission

EXECUTIVE SUMMARY

The primary objective of this macro-economic study is to determine the nature and magnitude of the economic and socio-economic impacts that will result from the proposed Greater Soutpansberg Mopane Colliery. The study has been divided into the following sections which were investigated separately and eventually integrated to come to a conclusion and make a recommendation:

- The quantification of the Current Local Economic Activities in the project area and the possible impact of the mining activities, short, medium and long term,
- The determination of the Economic Viability of the mining project from a governmental and societal viewpoint, this is done by using two economic tools, namely:
  - Economic Cost Benefit Analysis, incorporating possible negative impacts to the local economic activities, natural environment, social structures and rehabilitation costs, where identified by the other project studies.
  - Macro-economic Impacts of the Mining Project, estimating the projected impacts on the Gross Domestic Product, Employment, Payments to Households, Capital Formation, Payments to Fiscus and Impact on Balance of Payments.

Initially three mining layout options were developed of which one (Huntleigh Siding Load out) was not further considered as it did not offer the same benefits as the other options. Of the remaining two options, namely, Option 1: Jutland and Voorburg Sections operating as two separate entities and Option 2: a combined mining operation, with the two mining pits sharing common facilities each with independent infrastructure and coal beneficiation plants, Option 2 was decided upon due to the advantages offered.

Surface properties included in the NOMR Ancaster 501MS (RE, Ptns 1, 2 and 3), Banff 502MS (All), Bellevue 534MS (Verdun) (Ptn 13-15&19), Bierman 559MS (All), Cavan 508MS (RE, Ptns 1 and 2), Cohen 591MS (All), Delft 499MS (RE, Ptns 1 and 2), Du Toit 563MS (RE), Erasmus 529MS (RE and Ptn 11), Faure 562MS (All), Goosen 530MS (All), Grootpraat 564MS (All), Hermanus 533MS (All), Jutland 536MS (All), Kitchener 504MS (All), Krige 495MS (All), Mons 557MS (All), Otto 650MS (now Honeymoon 610MS) (RE), Pretorius 531MS (RE and Ptn 1), Schalk 542MS (All), Stubbs 558MS (All), Ursa Minor 551MS (All), Vera 815MS (Ptns 1, 3 to 9, RE of Ptn 10, 13 to 24, 26, 27, 29, 30, 35 to 41, 44 to 46, 48 to 52 and 54), Verdun 535MS (RE) and Voorburg 503MS (All).

For the combined option a second washing plant module, to process the Voorburg coal, will be placed next to the Jutland plant from where product will be transferred to the RLT close by. Two options were considered for the transport of product from Voorburg to Jutland i.e. by rail or by conveyor. Due to the advantages, the conveyor option was chosen.

Production at the Voorburg Section will commence in late 2019 and build up to 4 Mtpa RoM (2.5 Mtpa product) by 2020. Due to rail logistics constraints, mining at the Voorburg Section continues for ±33 years to exhaustion of the resource. It is expected that additional rail capacity will become available after 2030, allowing for an increase in coal production. Mine development at the Jutland Section will therefore commence in 2030 with first production in 2032. The total life of the Mopane Project is in excess of 50 years.

Current Local Economic Activities

The following Current Economic Activities have been identified as being present in the area:

- Live Stock Farming.
  - Commercial Cattle.
- Game Farming.
  - Live Sales.
  - Hunting, subdivided in "Trophy" and "Biltong".
    - Trophy hunting including the services likes professional hunter, skinner, tracker, etc.
    - Biltong hunting including tracker, skinner, etc.
  - Hunting Accommodation.
- Eco Tourism, visitors to the lodges without any hunting motivation.
- Irrigation.

The approach followed was to first establish the current activities in the area which then formed the baseline used to draw up a risk profile[1] in order to calculate the projected impacts and lastly convert it to macro-economic parameters. However, as so often happens, the economic benefits accruing from the mining project could put a negative burden on the current local economic activities in the project area. For analytical purposes the project area was divided into three farming areas, the so-called Category 1 representing roughly 1 472 hectares and the Category 2 farms roughly 20 169 hectares together with the Category 3 farms of roughly 3 539 hectares.

The following give an indication of the makeup of the different categories. A map and a detailed explanation is provided in the main report.

- Category 1 land use: The following farming practices were included in this group:
  - Cultivation of irrigation crops as the main source of income; and/or
  - Cattle only; and/or
  - Cattle farms together with irrigation crops.
- Category 2 land use. The following farming practices were included in this group:
  - Game farming with lodge/chalet accommodation facilities for both trophy and biltong hunters; and/or
  - Game farms with accommodation and irrigation crops; and/or
  - Game farms with accommodation and cattle; and/or
  - Game farms with accommodation with both cattle and irrigation crops.
- Category 3 land use. The following farming practices were included in this group:
  - Farms with game but without accommodation facilities for either trophy/biltong hunters; and/or
  - Farms with game but without accommodation facilities for either trophy/biltong hunters but also stocking cattle; and/or
  - Farms without accommodation facilities for either trophy/biltong hunters with irrigation crop production.

[1] The Risk Analyses of Category 1, 2 and 3 farms are available in Appendix D.

The following table presents a summary of the current land use in the project area. Please take note that the irrigation figures below represents crop hectares and not physical hectares to make provision for double cropping.

	Cattle hectares	Game hectares	Irrigation Crop hectares	Total hectares
Category 1 Farms	1 047	53	60	1 160
Category 2 Farms	470	20 748	80	21 298
Category 3 Farms	234	3 215	46	3 495
Total	**1 751**	**24 015**	**186**	**25 953**

The following table gives an indication of the magnitude of the current activities in the project area.

	Annual Income	Annual Income	Annual Income	Annual Income
	Rand Million	Rand Million	Rand Million	Rand Million
	Category 1	Category 2	Category 3	Total
Beef Farming	0.32	0.57	0.05	0.93
Game Farming - Animals(Turn Over)	**0.07**	**5.32**	**0.18**	**5.57**
- *Game Sales*	0.07	0.52	-	0.59
- *Trophy Hunting*	0.00	2.86	0.09	2.94
- *Biltong Hunting*	0.00	1.94	0.10	2.04
Hunting				
- Professional Hunting Services (including game catching)	0.00	6.42	0.03	6.45
- *Taxidermy*	0.00	1.91	0.58	2.49
- *Accommodation*	0.00	15.47	-	15.47
Total	**0.00**	**23.79**	**0.61**	**24.40**
Eco-Tourism	0.00	7.74	0	7.74
Irrigation	3.16	5.55	6.85	15.56
Grand Total	**3.55**	**42.96**	**7.69**	**54.21**

The table shows that game farming and the related activities such as accommodation are by far the largest income generators in the area, representing 57.4% of the total annual turnover, expressed in 2013 prices.

In the following table the total economic activities for the three farming areas identified and analysed are expressed in terms of GDP and employment opportunities.

The impact on GDP reflects the magnitude of the values added to the coal mining industry from activities within the industry. Value added is made up of three elements, namely:

- Remuneration of employees,
- Gross operating surplus (which includes profit and depreciation), and
- Net indirect taxes.

It is important to keep in mind that GDP excludes any income taxes and interest payments on loans.

	Gross Domestic Product			Employment		
	Direct R mil.	**Indirect/ Induced R mil.**	**Total R mil.**	**Direct Number**	**Indirect/ Induced Number**	**Total Number**
Irrigation	8.33	8.64	16.98	122	42	164
Beef Farming	0.41	0.22	0.63	2	2	4
Game Farming	2.36	3.33	5.69	20	33	53
Hunting	3.13	3.06	6.20	17	13	30
Taxidermy, Game catching, etc.	4.93	4.97	9.90	27	19	46
Accomodation	10.53	12.29	22.82	70	51	121
Total	**29.70**	**32.52**	**62.22**	**257**	**160**	**417**

The table shows that the activities support 257 full time direct employment opportunities with another 160 indirect and induced opportunities and in total 417. It generates a total of R62.22 million in GDP of which R29.70 million is direct, expressed in 2013 prices. It is necessary that the direct GDP be evaluated in terms of its per hectare value, which is only about R1 150 per hectare per annum expressed in 2013 prices.

The following table presents the estimated incremental negative impact of the mine in the study area expressed in macro-economic parameters for the rail transport option; the coal will be loaded at the mining site then railed to the selected railway siding. In total the impact of all the areas identified are reflected in the table below.

	Gross Domestic Product			Employment		
	Direct R mil.	**Indirect/ Induced R mil.**	**Total R mil.**	**Direct Number**	**Indirect/ Induced Number**	**Total Number**
Irrigation	-3.50	-3.61	-7.11	-52	-18	-70
Beef Farming	-0.14	-0.08	-0.22	-1	-1	-2
Game Farming	-0.27	-1.21	-1.47	-8	-13	-21
Hunting	-1.96	-1.92	-3.88	-10	-8	-18
Taxidermy, Game catching, etc.	-2.96	-2.98	-5.94	-16	-11	-27
Accomodation	-6.27	-7.31	-13.57	-41	-30	-71
Total	**-15.09**	**-17.10**	**-32.19**	**-128**	**-81**	**-209**

The table shows that as many as 128 direct employment opportunities can be lost in the project area and a total of 209 overall. The projected direct GDP loss is R15.09 million with a total of R32.19 million.

Property Values

The estimated property values depend on a number of issues and are normally valuated using a number of different fixed capital improvements. The ***economic*** values, not market values, differ from R1 503 per hectare for a beef producing unit, R2 344 basic game producing unit without any value added improvements to R12 204 for the units catering for the luxury market.

It is accepted that some of the property owners will probably not only suffer losses as far as income is concerned but also face the possibility that their property value will be devaluated, especially farms with accommodation facilities. It must be kept in mind that the major contributing factor to a possible devaluation in property values is the negative experience of "sense of place" for a specific property by a number of visitors. The two main issues affecting the formation of these perceptions are noise and visual intrusions.

Cost Benefit Analysis – Economic Viability

A detailed Economic Cost Benefit Analysis was performed for the mining activity and the coal rail transport option to the identified siding in current financial prices using 6% inflation and constant economic prices. The CBA analysis incorporated the negative impacts on current local activities as a cost item over the mining period, environmental and loss of biodiversity costs and identified social costs.

In the following table the differences between a private sector financial CBA and a public sector economic CBA is presented.

Attributes	Public Sector Economic CBA	Private Sector Financial CBA
Perspective	The broader community.	Project shareholders/capital providers.
Goal	The most effective application of scarce resources.	Maximization of net value.
Discount Rate	Social discount rate.	Market determined weighted cost of capital.
Unit of Valuation	Opportunity costs.	Market prices.
Scope	All aspects necessary for a rational, economic decision.	Limited to aspects that affect profits.
Benefits	Additional goods, services, income and/or cost saving.	Profit and financial return on capital employed.
Costs	Opportunity costs of goods and services foregone.	Financial payments and depreciation calculated according to generally accepted accounting principles.
Income Tax	Income tax is not part of the calculations.	Very often income tax is included in the calculations

The benefits associated with the project are the revenue resulting from the sale of the coking coal and Eskom quality coal.

Approximately 25.6 million tons of coking coal is expected to be produced over the LOM. The 2011 price of coking coal was at an all-time high, the Australian coking coal varied from July 2010 to June 2011 from US$ 225 to $328 per ton FOB. Currently, September 2013 the price is varying around US$ 147 per ton FOB. As the coking coal from the proposed mine will have to compete with the imported variety, the determination of the price will be an important aspect and the exchange rate also plays a vital role. Determining the Free-on-Board (FOB.) price was therefore a bit of a puzzle and it is necessary to discuss some of the parameters used in the calculations:

1) The 2011 situation

- FOR price expressed in US$ - $207 ton/coking coal, the average 2010 price,
- Exchange rate – R7 per 1US$,

- Providing a FOR price of R1449 per ton.

2) Current 2013 situation

- Average 2013 FOB price expressed in US$ - $147 per ton[2],
- Exchange Rate –R9.50 per 1 US$,
- Providing a FOB price of R1 396 person.

Although the price has dropped in US$ terms by 8%, expressed in terms of Rands the reduction is only 3.7%.

CoAl had a separate coking coal market study done by Wood Mackenzie; the report forecasted the following price scenario for the next number of years based on the different coking quality coal.

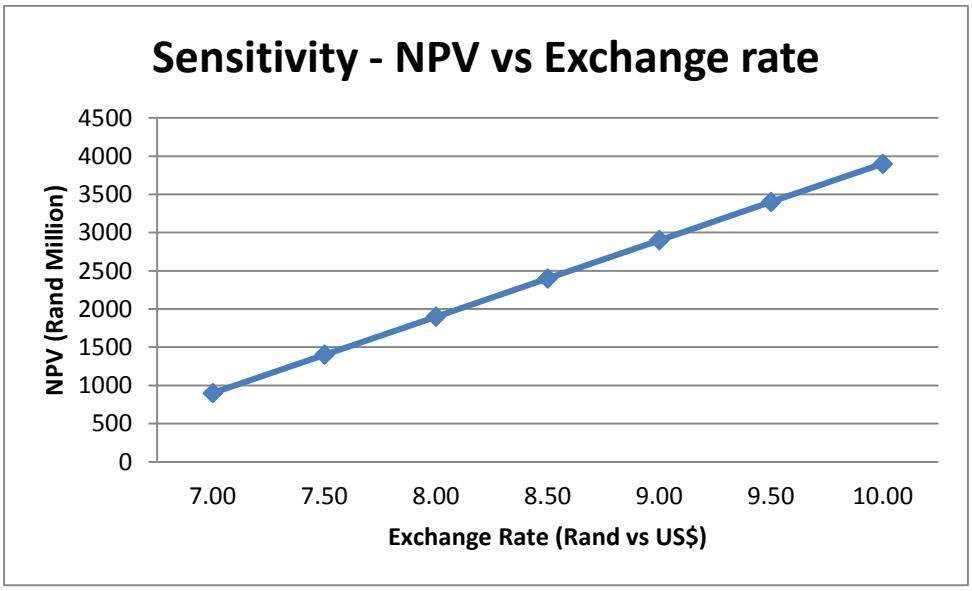
	2012	2013	2014	2015	2020	2025	2030
SSCC[3] benchmark (NSW)	147.16	117.69	119.85	125.12	145.50	171.75	178.60

The table shows that they expect the price over time will increase in constant terms; we accepted these figures for the base scenario as they are in line with other predictions found on the internet.

The second issue is the possible movement of the South African Rand exchange rate, we accepted for the base scenario an annual weakening of 1.67% against the US dollar as forecasted in the Manuel for Cost Benefit Analysis[4].

The Eskom destined coal is priced according to the average 2012 price of R349 per ton FOR with a 10% annual escalation for the first number of years as announced by Eskom and then a constant price.

The following graph shows the impact of different exchange rates on the Net Present Value for the $147.16 per ton, the average 2011 price.



[2] Wood Mackenzie - Market Study for CoAL - 2012

[3] SSCC – Semi – soft coking coal

[4] WRC Report No. TT 305/07 – A Manuel for Cost Benefit Analysis in South Africa with specific reference to Water Resource Development - August 2007.

The graph shows that a linear relationship exists between the exchange rate and economic viability of the project. Currently the exchange rate is very volatile with dramatic movements up and down, however a consensus opinion is that the lower limit would be R9 to the US$, although no guarantee exists that this would be the lower limit.

The following table presents the results of the financial and economic price CBA models developed by Mosaka Economic Consultants and based on the interpretation of the economic assumptions as detailed above.

	Financial CBA	Economic CBA
Net Present Value (NPV) (Rand million)	R 4 656.01	R 2 272.79
Benefit Cost Ratio (BCR)	1.89	1.64
Internal Rate of Return (IRR)	18.9%	14.3%

The results show that the project is economically viable when the inflation adapted financial prices have positive parameters for all three the price scenarios as well as the economic CBA in constant economic prices.

Macro-Economic Impact Analysis

The macro-economic impact analysis also shows a positive picture for both the economic impacts on the Limpopo Province as well as the South African economy. In the following table a summary of the Construction Phase annual impact results [R millions, 2012/2013 Prices] is presented.

In the following table the total macro-economic impacts on the RSA and the Limpopo Province is presented.

Summary of the Construction Phase Results [R millions, 2010/2011 Prices]

	National - RSA Economy	Provincial - Limpopo Economy
Impact on Total GDP (R millions)	**1 196**	**270**
Impact on Total Employment[5] [numbers]:	**4 834**	**1 987**
Impact on Households (R millions):	**809**	**143**
Low Income Households (R millions)	126	46
Medium Income Households (R millions)	156	24
High Income Households (R millions)	527	74
Fiscal Impact (R million):	**364**	**60**

The above table shows that the construction phase will have a positive impact on the National as well as the Limpopo Provincial economy for the duration of the construction phase. It is interesting to observe that out of a total 4 834 employment opportunities created, 1 987 will be in the Limpopo Province.

In the following table a summary of the annual total Operational Phase results [R millions, 2011/2012 Prices] is presented.

[5] Total Employment – Direct, Indirect and Induced Employment Opportunities

Summary of the Operational Phase Results showing the impact on the National and Limpopo Province economies [R millions, 2011/2012 Prices]. The Limpopo results are included in the National results.

	National - RSA Economy	Provincial - Limpopo Economy
Impact on GDP (R millions)	**6 580**	**2 073**
Impact on Total Employment[6] [numbers]:	**12 093**	**2 741**
Impact on Households (R millions):	**4 601**	**1 083**
Low Income Households (R millions)	765	325
Medium Income Households (R millions)	1 890	213
High Income Households (R millions)	2 213	545
Fiscal Impact (R million):	**1 808**	**417**
Balance of Payments (R million)	**2 813**	

The table shows that the operational phase of the proposed mine will have a very positive impact on the economy of the province and that as much as 2 741 employment opportunities can be created of which over 917 will be direct employment opportunities on the mine itself.

The mine will, at full production, pay various taxes amounting to R1 808 million annually and have a positive contribution to the "Balance of Payments" of R2 813 million per annum if expressed in 2013 prices and values.

Conclusion

Comparison of the Local Economic Activities Baseline and estimated Negative Impact with the estimated impact of the proposed mine (2012 prices).

Baseline Local Economic Activities and Impact of Mining							
	Mining Operational Phase – Annual Impact Current Activities						
		Baseline	*Impact*			Base Line	Impact
Gross Domestic Product Rand million	*Direct*	*29.70*	*-15.09*	*Employment*	*Direct*	257	-128
	Indirect/Induced	*32.52*	*-17.10*		*Indirect/Induced*	160	-81
	Total	*62.22*	*-32.19*		*Total*	417	-209
	Mining Operational Phase – Annual Impact Limpopo Province						
Gross Domestic Product Rand million	*Direct*	1 518		*Employment*	*Direct*	917	
	Indirect/Induced	555			*Indirect/Induced*	1 824	
	Total	2 073			*Total*	2 741	

From the above table it appears that the current local economic activities in the defined project area contribute R62.22 million in total GDP and sustain 417 total employment opportunities of which 257 are direct. The mine activity will cost the local economic activities R32.19 million in GDP and 209 employment opportunities, of which 128 will be direct, in the project area.

The mine will offer 917 direct employment opportunities compensating for the loss 135 jobs in the project area. It is however in the rest of the Limpopo province where the mine will create many more jobs than the current activities namely 1 824 versus 160.

[6] Provincial and National numbers differ because of number of issues including transport and applications by Eskom

From the above and the rest of the analysis it appears that the proposed mining project will be an economic viable entity which will add value to the Limpopo province. This will take place at the expense of the local economic activities, especially the game with ecology included, however, proper mitigation and even compensation must be part of the final solution. The investment the owner has made to a property can be negatively impacted if the hunting and accommodation facilities on the property are not fully utilised because of a down turn in visitors resulting from the mining activities.

The possible threat of underground and surface water contamination to the irrigators is of utmost importance and possible mitigation will have to be in place.

Probably the two most important benefits to the national economy are:

- The annual impact on the "Fiscus" with an annual tax contribution of R1 808 million expressed in 2013 prices, which at present represents the salary package of roughly 5 000 teachers or 5 200 nursing staff, if the government were to apply it for that purpose.
- The second impact is the favourable annual impact on the "Balance of Payments "amounting to R2 813 million, if expressed in 2013 prices.

From the above and the rest of the analysis it appears that the proposed mining project will be an economic viable entity which will add value to the Limpopo province. However, it will take place at the expense of some of the current local economic activities, specifically those in the irrigation, the game and ecology sectors and proper mitigation and even compensation might be part of the final solution. The investment the owner has made to the property can be negatively impacted if the hunting and accommodation facilities on the property is not fully utilised because of a down turn in visitors resulting

As stated, this will be a permanent impact and it will be necessary for the mining company to negotiate a proper mitigation programme.

1 Introduction and Background

The proposed Mopane Project straddles the Musina and Makhado Local Municipalities (LM), with the greater area being in the Musina LM, both are under the jurisdiction of the Vhembe District which comprises of four local municipalities covering 21 407 km^2 of the surface area of the province. The town Makhado is the main business centre in the area. The Makhado Region has an active tourism industry with a wide variety of hotels and lodges which sport panoramic views to the north and south of the Soutpansberg with a variety of meanders. The Soutpansberg also attracts birdwatchers to the area which hosts a large variety of species. See Map 1 for the locality of the proposed Mopane Project.

The Mopane Project forms part of the Greater Soutpansberg Project (GSP) situated to the north of the Soutpansberg in the Limpopo Province. Map 1 depicts the locality of the various GSP projects, from which it is evident that they are within close vicinity of each other, permitting possible rationalisation of infrastructure. Map 2 depicts the location of the Voorburg and Jutland Sections.

The project is to be undertaken in the magisterial district of Vhembe, in the Limpopo Province, approximately 40 km (direct) and 63 km (via road) north of the town Makhado and 7 km west of Mopane in the Musina and Makhado Local Municipal areas. The nearest town is Musina, situated approximately 30 km to the north. Musina and Makhado are connected by well-developed road infrastructure.

Coal deposits have been preserved in four down-faulted basins in the Limpopo Province, in the areas known as the Waterberg, in the vicinity of Lephalale (Ellisras), the Soutpansberg (along the northern flank of the Soutpansberg Mountains), the Limpopo (along the southern bank of the Limpopo River, west of Musina) and the Springbok Flats coalfields.

The Mopane Project, consisting of the Voorburg and Jutland Sections (Map 1), is well situated in respect to major infrastructure, including rail, road and power supply. The Mopane Railway Station is situated between the Voorburg and Jutland Sections to the east and is linked to the N1 with a surfaced road of 7 km distance. The Jutland Section is traversed by the R525 road between Mopane and Alldays. Private roads to connect mine infrastructure will need to be established.

Most of the Mopane region can be classified as rural with commercial game farming as the main activity. The land coverage in the Mopane Project area is approximately 21 897 ha. The area covered by the New Order Mining Rights (NOMR) applications includes twenty-one (21) farms, the majority of the properties are privately owned. According to the Regional Land Claims Commissioner (LCC) a number of farms are claimed by the Mulambwane Community and one farm (Ursa Minor 551 MS) by the Tshivhula and Leshivha Communities. Ssurface water is scarce in the area and underground water is the main source of water for farming purposes.

The current planning is that construction and mining will commence at the Voorburg Section first, followed by the Jutland Section as capacity in infrastructure is developed. The Voorburg Section will be mined at 2.5 Mtpa product for a period of 33 years followed by the Jutland Section mined at 2.5 Mtpa products for a period of 28 years. From the date of granting of the mining right (anticipated to

be in 2015) further exploration, feasibility studies and final design studies will be undertaken. Construction is anticipated only to commence in 2018.

The primary objective of this socio-economic study is to determine the nature and magnitude of the economic and socio-economic impacts that will result from the proposed Mopane Colliery. The study has been divided in the following sections which were investigated separately and eventually integrated to come to a conclusion and make a recommendation:

- The quantification of the current local economic activities in the project area and the possible impact of the mining activities, short, medium and long term,
- The possible impact on the game, cattle and irrigation activities in the area,
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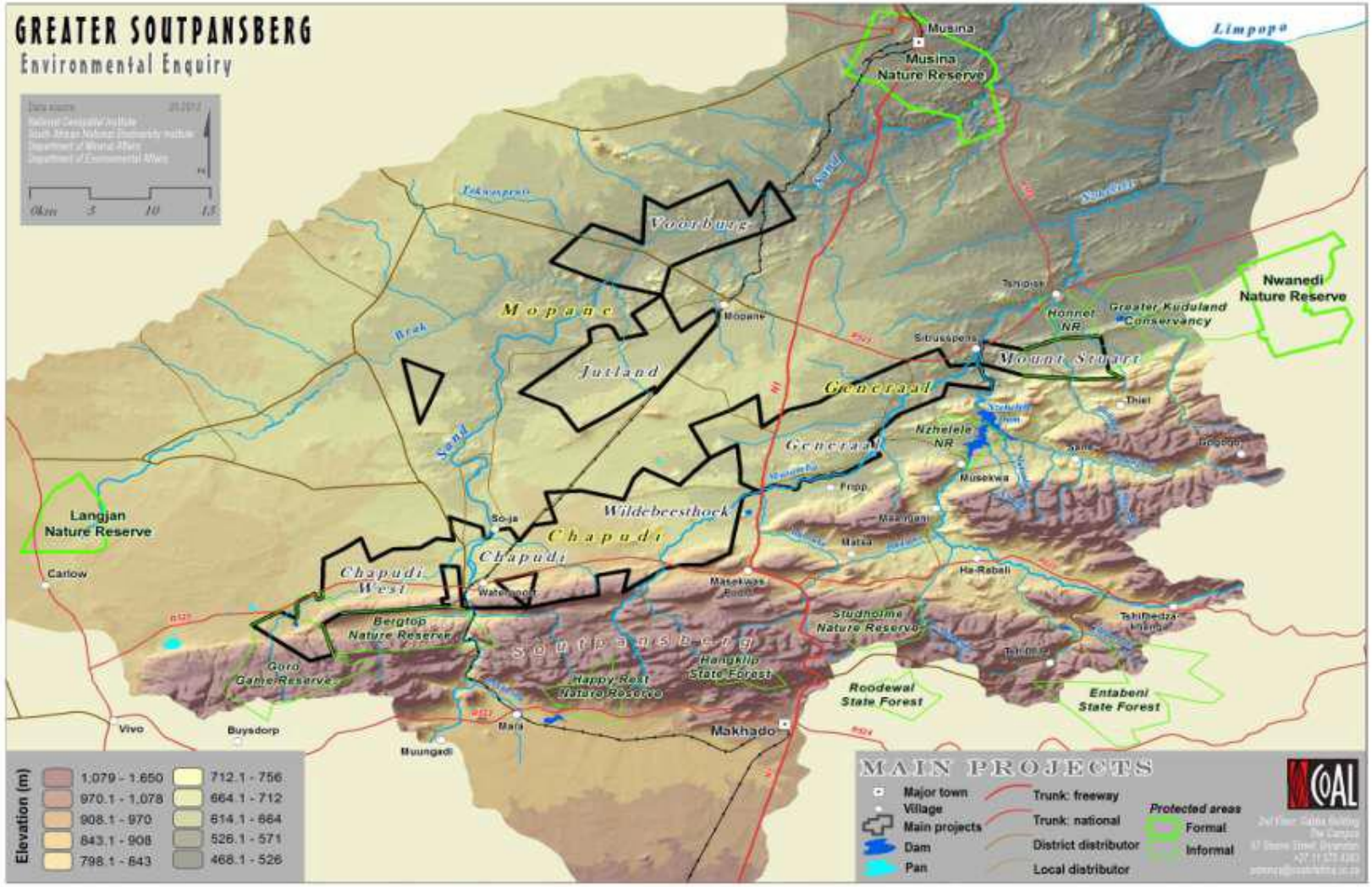
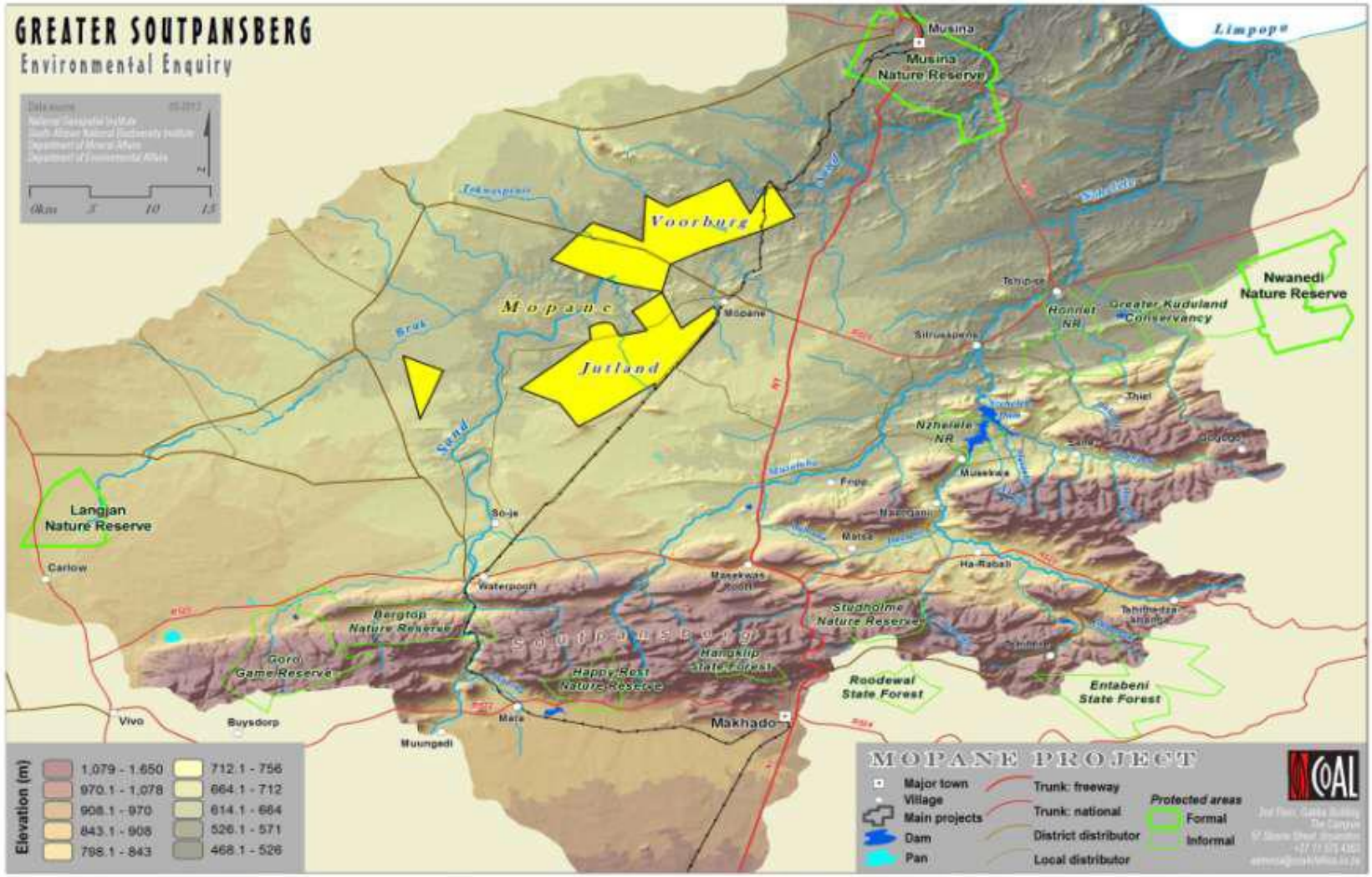
  - Economic Cost Benefit Analysis, incorporating possible negative impacts to the local economic activities, natural environment, social structures and rehabilitation costs, as identified by the other project studies.
  - Macro-Economic Impacts of the Mining Project, estimating the projected impacts on Gross Domestic Product, Employment, Payments to Households, Capital Formation, Payments to Fiscus and the Impact on the Balance of Payments.

Map 1: Map Showing the Locality of the GSP Project Area



Source: Courtesy of Coal of Africa Limited

Map 2: Location of Voorburg and Jutland Sections



Source: Courtesy of Coal of Africa Limited

1.1 Brief Description of the Project[7]

Initially three mining layout options were developed of which one (Huntleigh Siding Load out) was not further considered as it did not offer the same benefits as the other option. Of the remaining two options, namely, Option 1: Jutland and Voorburg Sections operating as two separate entities and Option 2: a combined mining operation, with the two mining pits sharing common facilities each with independent infrastructure and coal beneficiation plants, Option 2 was decided upon due to the advantages offered.

Surface properties included in the NOMR Ancaster 501MS (RE, Ptns 1, 2 and 3), Banff 502MS (All), Bellevue 534MS (Verdun) (Ptn 13-15&19), Bierman 559MS (All), Cavan 508MS (RE, Ptns 1 and 2), Cohen 591MS (All), Delft 499MS (RE, Ptns 1 and 2), Du Toit 563MS (RE), Erasmus 529MS (RE and Ptn 11), Faure 562MS (All), Goosen 530MS (All), Grootpraat 564MS (All), Hermanus 533MS (All), Jutland 536MS (All), Kitchener 504MS (All), Krige 495MS (All), Mons 557MS (All), Otto 650MS (now Honeymoon 610MS) (RE), Pretorius 531MS (RE and Ptn 1), Schalk 542MS (All), Stubbs 558MS (All), Ursa Minor 551MS (All), Vera 815MS (Ptns 1, 3 to 9, RE of Ptn 10, 13 to 24, 26, 27, 29, 30, 35 to 41, 44 to 46, 48 to 52 and 54), Verdun 535MS (RE) and Voorburg 503MS (All).

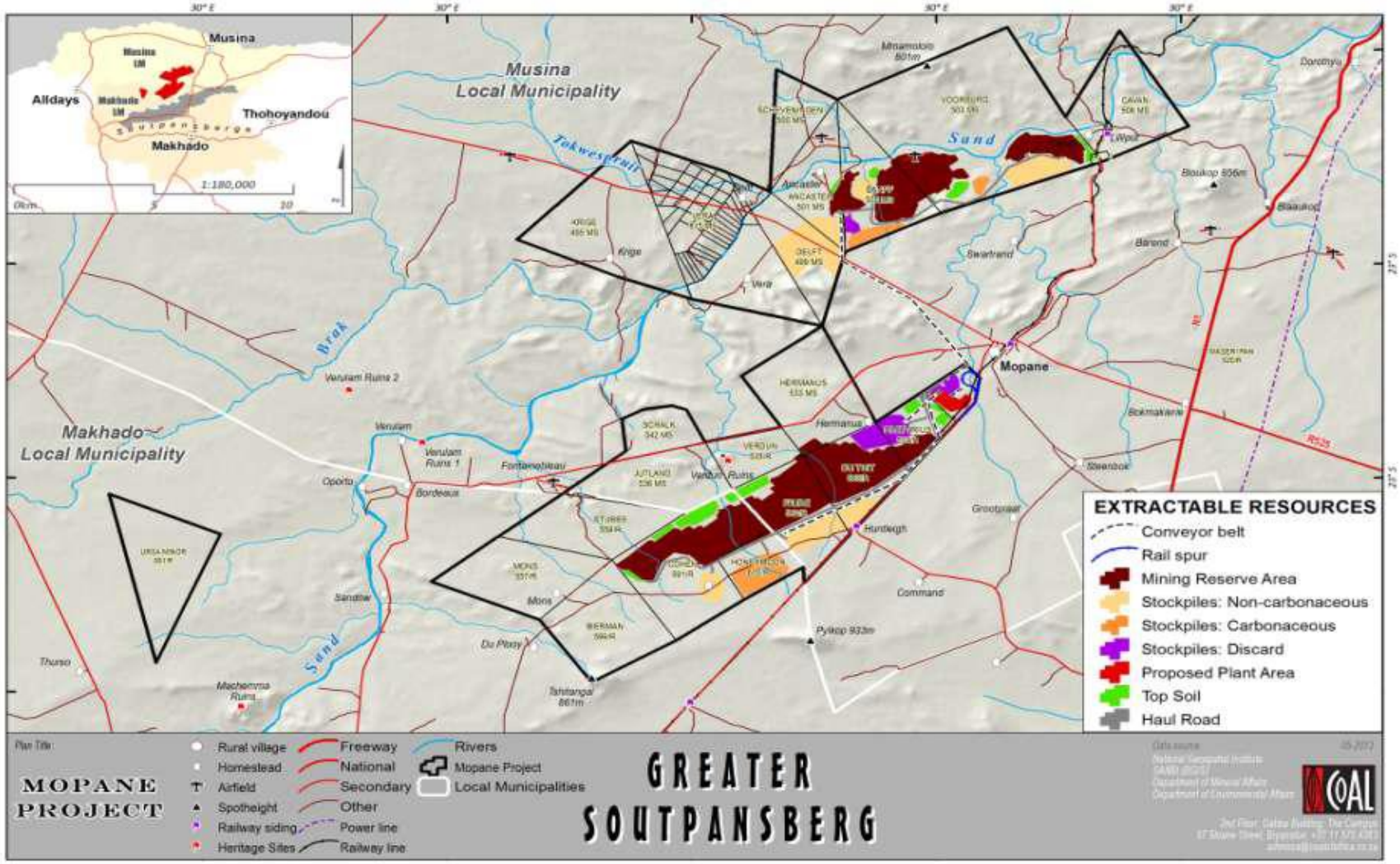
For the combined option a second washing plant module, to process the Voorburg coal, will be placed next to the Jutland plant from where product will be transferred to the RLT close by. Two options were considered for the transport of product from Voorburg to Jutland i.e. by rail or by conveyor. Due to the advantages the conveyor option was chosen.

Production at the Voorburg Section will commence in late 2019 and build up to 4 Mtpa RoM (2.5 Mtpa product) by 2020. Due to rail logistics constraints, mining at the Voorburg Section continues for ±33 years to exhaustion of the resource. It is expected that additional rail capacity will become available after 2030, allowing for an increase in coal production. Mine development at the Jutland Section will therefore commence in 2030 with first production in 2032. The total life of the Mopane Project is in excess of 50 years.

Map 3 shows the mining and infrastructure layout for the Mopane Project.

[7] Source: Greater Soutpansberg - Mopane Project – Scoping Report dated June 2013.

Map 3: Mining and Infrastructure Layout for Mopane Project



Source: Courtesy of Coal of Africa Limited.

1.2 Coal Transport Infrastructure

1.2.1 Access Roads

Access to the Mopane Project Infrastructure Hub is by way of the N1 towards Musina, turning west onto the D525 approximately 7 km to Mopane Railway Station. The main entrance to the Jutland Section is approximately 3 km south from Mopane Railway Station adjacent to the gravel road along the railway line. The D525 Provincial Road is a surfaced road which will be upgraded should it be necessary to carry the required future traffic loads. The existing access road to the mine infrastructure from Mopane Railway Station is gravel but will be surfaced during the mining development. The access to Voorburg Section is along the R525 approximately 7 km north west of Mopane Railway Station.

1.2.2 Mining Roads

Haul roads link the west, central and the east sides of the Jutland and Voorburg Sections, the stockpile areas and the infrastructure areas on the east and west sides of the mining pits respectively. Haul roads have been planned to be 30m wide with gravel surfaces to meet the requirements of the hauling fleet. Service roads will be constructed gravel roads and provide ease of access to remote areas for light mining vehicles. These roads are separate from the haul roads in order to separate light mine traffic from the heavy traffic (haul trucks) as a site safety measure.

1.3 Bulk Power Supply

Eskom is accordingly establishing additional Distribution and Transmission assets to cater for load north of the Soutpansberg, including the Bokmakirie Distribution station and the 4x250 MVA 400/132 kV Nzhelele Main Transmission Station (MTS).

The proposed network solution meets the 10 year Distribution load requirements in the Tabor and Spencer network area and it is also informed by the 20 year Transmission and Distribution load forecast in meeting the Transmission 20 year plan.

For the Mopane Project, electrical supply will be taken from the 132kV network and transformed to 11kV. The exact supply configuration is yet to be determined and the least environmental impact solution will be followed. The direct supply from Nzhelele / Bokmakirie 400/132kV MTS to both Voorburg (20MVA/132/11kV) and Jutland (10MVA/132/11kV) Sections has been identified as the preferred option.

1.4 Bulk Water and Electricity Provision

The water requirement estimate for the Mopane Project indicates that a maximum of 7 600 m^3/day of water is required at the mining peak in 2032.

The water supply to the mine will come from the following sources:

- Groundwater (boreholes and seepage into the mining pits;
- Storm water run-off impounded on site; and
- An external water source piped to site.

Storm water run-off on site is seasonal and, although it will be utilised, it is not a constant water supply and has therefore not been included in the water-supply chain.

The following options are all considered by the mining company and up to date no final decision has been made on the preferred option.

Table 1: Different Water Supply Options Investigated by CoAL (2013 prices)

Options	Estimated Costs Rand
Further irrigation buyouts from Nzhelele Dam - 7.4Ml/d	299 552 000
Irrigation buyouts from Sand River - 7.4Ml/d	185 132 750
Limpopo River surplus from Musina LM - 7.4Ml/d	341 044 000
Sewage effluent from Musina - 7.4Ml/d	354 959 000
New allocation from Limpopo River - 7.4Ml/d	387 659 250
Groundwater from disused copper mine - 7.4Ml/d	270 204 000
Sewage effluent release from Makhado with pipeline - 7.4Ml/d	483 736 000
Sewage effluent release from Makhado into Sand river - 7.4Ml/d	234 151 500
Surplus allocation from Vele Mine - 7.4Ml/d	375 009 250

Electricity 132/11kV substations will be established for the both Voorburg and Jutland Sections in 2017 consisting of 132kV overhead lines, 132/11kV yard, 2x5MVA/132/11kV transformers, associated switchgear and equipment, control room, distributed mini-substations and MCC's.

1.5 Logistics

The primary domestic destination for coking coal is located at ArcelorMittal, Vanderbijl Park. The intent is to export 0.5 Mtpa of coking coal, and transport 1.1 Mtpa to ArcelorMittal. Up to 3.1 Mtpa of middlings will be railed to either the domestic customer or to the Port of Maputo for export. The primary domestic location for middling's coal is Eskom's Tutuka, Majuba, Camden and Grootvlei Power Stations in Mpumalanga Province.

Mopane Project is close to the railway line running southwards from Beitbridge/Musina and is an important link to the main hub of the Transnet Freight Rail (TFR) network connecting at Pyramid South, near Pretoria. An important junction occurs at Groenbult, where a connecting line joins the Hoedspruit–Kaapmuiden–Komatipoort export channel avoiding the Pretoria complex. From Pyramid South links are available to Richards Bay Coal Terminal (RBCT), Maputo or Durban. The export route through Mozambique to the Port of Maputo is in the process of being upgraded for the planned increase in volumes. Through agreements reached to expand the port facility as well as on-going negotiations with Transnet Freight Rail, the Port of Maputo is the export port of destination. These upgrades have been driven by the current tonnage being railed from the Vele Mine.

Following detailed evaluation, it was determined that the preferred option for coal despatch is a RLT on the farm Pretorius 531 MS connected by a balloon railway siding to a point between Huntleigh and Mopane for the rail loop and siding. Factors influencing this conclusion include the low long term operational cost for coal transport from plant to port, lower environmental impact and the lessening of community impact (lower road traffic, congestion and pollution). The elimination of a loading site at Huntleigh or Mopane by placing the loading site at farm Pretorius 531 MS removes a

single-point impact of considerable significance. A rail link provides a seamless transition from the loading siding to a direct link to TFR mainline network at a point between Mopane and Huntleigh.

The Mopane RLT facility has been designed to allow flexibility for future increases in train lengths up to a maximum of 100 CCL wagons, with added flexibility to handle CCL Jumbo type wagons which are planned to be the standard wagon deployed on the TFR network for coal (although limited to a 60 ton payload to match the 20 ton axle load provisions). This wagon type is compatible for Eskom tipplers.

1.6 Closure Planning and Rehabilitation

A detail Mine Rehabilitation Plan has been developed for the Mopane Project which includes the following:

- Materials Placement Plan to ensure a free draining landform;
- Topsoil Management Plan; and
- Reclamation (Re-vegetation) Plan.

The sustainable utilisation of natural resources within the mining area is also addressed.

2 Approach and Methodology

In determining the economic impact of the proposed Mopane mining operation, the economic impact on a wider scale, namely the Limpopo Province and the RSA, was considered together with the possible impact on the current economic activities in and surrounding the proposed mining area.

At present a certain land use pattern has developed in the project area, the area has changed from a predominantly beef producing (cattle farming) area to game farming with the related activities. Some irrigation activities are part of the production mix. Three economic evaluation methodologies have been applied to contribute to the final decision on the mining application.

- Possible impact on local economic activities. A macro-economic approach was used to determine the magnitude of the present economic activities and the possible impact of the planned mining activities.
- Economic Viability. A Cost Benefit Analysis (CBA) approach to determine medium to long term economic viability.
- A Social Accounting Matrix (SAM) approach to estimate the macro-economic impact on the National Economy and the Limpopo Provincial Economy.

2.1 Situational Analysis

All the economic sectors in the immediate vicinity of the proposed mining activities, as well as for the Limpopo Province as a whole, have been included in the analyses. Various stakeholders raised concerns regarding the sustainability of mining development in relation to agricultural and other economic sector activities in the proposed mining area. The long-term sustainable impact was measured in terms of mainly two alternative land use options:

- If the mine is not developed. Therefore, current activities continue, over the projected lifetime of a typical mine, without optimisation or expansion of the land.
- If the mine development goes ahead. The lifetime of the mine was applied in all calculations. Rehabilitated land, after mining, cannot necessarily be utilised for the same products and if utilised the same yields might not necessarily be attained.

The impact, before, during and after the mine's establishment on the economy, was calculated *versus* the non-mining alternative. Focus was primarily on the properties directly affected, but also to a decreasing degree on neighbouring properties, due to possible negative environmental impacts, such as air and ground water pollution, noise and visual impacts. The impact of the project on the agricultural sector was calculated, namely whether it may decrease products produced.

2.2 Assumptions and Projections

Due to the large number of properties where field workers were denied access, the necessary current land use calculations for such farming enterprises were based on assumptions made for the possible crops cultivated, or beef production according to the land carrying capacity and/or game reared for trophy or biltong hunting with or without accommodation facilities. The required information was, as far as possible, acquired by studying Google Earth images dated January 2009 and data of neighbouring farms acquired.

2.3 Objective

The objective of the study is to determine the economic and socio-economic impacts of both the construction and operation of the coal mining processes to be conducted by CoAL, on the micro and macro-economy and the economic viability of the mining development. The study reflects the total direct and indirect macro-economic impacts in quantified terms for the 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 segments of the project. In addition, quantification is made of the 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 (construction of the mine) is based on the particular capital investment in the Limpopo Province.
- The impact of the everyday operation of the mine.
- The transportation of coal from the mine to ArcelorMittal SA – Vanderbijl Park and/or Port of Maputo by rail.
- Medium to long term economic viability of the mining project.

The results of the study focus on the contribution, negative or positive, that CoAL is expected to make towards the economy in terms of:

- Gross Domestic Product (GDP).
- Employment opportunities.
- Effective capital utilisation (investment).

In order to measure all of the economic implications associated with the construction and operational phases of the project, a partial general macro-economic equilibrium calculation was applied to determine the nature and magnitude of the macro-economic impacts of the project, based on two Social Accounting Matrices (SAMs) developed by Conningarth Economists, namely:

- The national SAM for the South African economy; and
- The regional SAM for the Limpopo Province.

A detailed description of these SAMs is provided in Appendix A and the magnitude of linkages in Appendix C.

2.4 Cost Benefit Analysis

A Cost-Benefit Analysis (CBA) forms part of the macro-economic impact analysis and focuses on the positive and negative economic impacts in order to put all direct and secondary impacts of the project into perspective for effective decision making purposes. .

The theoretical foundations of CBA are: benefits are defined as increases in human wellbeing (utility) and costs are defined as reduction in human wellbeing. For a project of policy to qualify on cost-benefit grounds, its social benefits must exceed its social costs. “Society” is simply the sum of individuals. The geographical boundary for a CBA is usually the nation, but can be readily extended to wider limits. See Appendix B for more detail about the theoretical context of a CBA.

2.5 Macro-Economic Impact Analysis

According to the general economic equilibrium analysis, the impacts of the project's developments can only be evaluated meaningfully if such impacts are assessed against the background of its total effect (direct and indirect) on certain economic objectives. The updated and benchmarked 2006 Limpopo Provincial SAM tables were used as a modelling input to quantify the relevant economic impacts. Thus, both the investment and operational activities of the project were analysed in terms of its impacts.

The macro-economic impact analysis can be regarded as an extension of the more narrowly defined financial cost-benefit analysis, at the macro level and not at the project level, demonstrating the efficiency of utilising scarce capital and other economic resources. The macro-economic analysis is therefore used in conjunction with the micro project CBA to provide an indication of the project's use of scarce resources relative to the main economic objectives contained in the economic development plan.

The macro-economic aggregates covered in the study are the following:

- Employment levels (jobs).
- Value added to the economy (or gross Limpopo Province product).
- Aggregate wages and salaries.
- Fiscal impacts.

Each of these measures reflects a particular dimension of improvement or impact in the economic well-being of the area's households.

There are different types of impacts that occur over time. In the initial construction phase, labour and materials will be used. After completion, on-going employment and other long-term impacts will result, as set out below.

- **Total Employment Levels,** reflecting the number of additional employment opportunities created by economic growth. This is the most popular measure of economic impact because it is easy to comprehend. However, employment opportunity counts do not necessarily reflect the quality/nature of the employment opportunities, nor salary levels. Therefore levels of employment, i.e. skilled/unskilled could also be assessed where necessary.
- **Value Added**, which is normally equivalent to Gross Domestic Product or Gross Regional Product, and a broader measure of the full income effect.
- **Aggregate Wages and Salaries** in the area increase as pay levels rise and/or additional employees are hired. Either or both of these conditions can occur as a result of growth in business revenues. As long as nearly all of those affected employees live in the study area, this is a reasonable measure of the personal income benefit impact of a project.

It is also important to note that economic impacts also lead to financial impacts, which are changes in government revenues and expenditures. Economic impacts on total business sales, wealth creation or personal income, can affect municipal and other government revenues by expanding or

contracting the tax base. Impacts on employment and associated population levels can affect municipal and other government expenditures by changing demand for public services.

This on-going process of macro-economic impact analysis focuses on aspects stressing linkages between the project and the surrounding economy. Environmental externalities may affect other economic sectors and are, therefore, included in the techniques of macro-economic impact assessment. **This is necessary to assist in determining whether the project will enhance net societal welfare.**

This necessitates the analysis of impacts on different sectors or groups that make up society. At a broad level, investigating impacts on overall economic welfare requires considering the efficiency, equity and sustainability of the project. It is important that all three of these aspects are considered in order to provide adequate information to decision makers:

- The principle of **efficiency** raises the issue of whether the nature and form of the project would constitute the efficient use of resources.
- The **equity** principle requires the consideration of whether the project results in outcomes that can be considered fair/equitable in socio-economic terms. Investigating the distribution of impacts is required to clearly indicate who is impacted upon, in what way and for what period.
- **Sustainability** relates to the consideration of whether the project is likely to be financially viable over the medium to long term and whether it will be economically sustainable. Risks to the long-term success of the project, including factors such as changing interest and exchange rates, therefore, become important aspects for assessment.

3 Data and Data Sources

3.1 CoAL of Africa

The data regarding the total tonnage, mining period and construction input prices was sourced from Coal of Africa Limited. Coal of Africa used a specific coking quality coal price for analysis purposes, Conningarth investigated the pricing system and took a position on future exchange rate movement and used a slightly different price structure in the analysis. In the analysis it was accepted that 66% of the production will be taken up by ArcelorMittal in Vanderbijl Park and that 34% will be exported via Mozambique.

Coal had a separate coking coal market study done by Wood Mackenzie; the report forecasted the following price scenario for the next number of years based on the different coking quality coal.

Table 2: Price Scenario as followed in the CBA compared with the Makhado prices

	2012 US$	2013 US$	2014 US$	2015 US$	2020 US$	2025 US$	2030 US$
SSCC[8] benchmark (NSW)	147.16	117.69	119.85	125.12	145.50	171.75	178.60
Makhado (HCC)[9]	203.70	166.11	170.96	178.48	188.18	222.13	227.95

The table shows that they expect the price over time will increase in constant terms; we accepted these figures for the base scenario as they are in line with other predictions found on the internet.

The second issue is the possible movement of the South African Rand exchange rate, we accepted for the base scenario an annual weakening of 1.67% against the US dollar as forecasted in the Manuel for Cost Benefit Analysis[10].

The Eskom destined coal is priced according to the average 2012 price of R349 per ton FOR with a 10% annual escalation for the first number of years as announced by Eskom and then a constant price.

As per data received from CoAL a projected volume was sold to Eskom.

3.1.1 Relevant Mining Data

The relevant construction and operational phase data used in the analysis was provided to Conningarth by CoAL, the application of the data in the CBA and Macro-Economic Impact models is the responsibility of Conningarth.

3.1.1.1 Construction Phase

The final data received regarding the cost and construction period for the construction phase of the Voorburg section is reflected in Table 2.

[8] SSCC – Semi – soft coking coal
[9] HCC – Hard coking coal
[10] WRC Report No. TT 305/07 – A Manuel for Cost Benefit Analysis in South Africa with specific reference to Water Resource Development - August 2007.

Table 3: Voorburg Colliery proposed Construction Schedule and Values (constant 2013 prices)

Year	2015	2016	2017	2018	2019	2020	2021	Total
Construction schedule	0%	0%	16%	38%	14%	10%	22%	100%
Upfront Capex	136.75	136.75	136.75					410.25
Capital Construction costs			572.79	1 360.37	501.19	357.99	787.58	3 579.93
All figures are Rand million								

The final data received regarding the cost and construction period for the construction phase of the Jutland section is reflected in Table 3.

Table 4: Jutland Colliery proposed Construction Schedule and Values (constant 2013 prices)

Year	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	Total
Construction schedule							16%	38%	14%	10%	22%	100%
Upfront Capex	78.4	78.4	78.4	78.4	78.4	78.4	0.0	0.0	0.0	0.0	0.0	470.3
Capital Construction costsd							583.7	1 386.3	510.7	364.8	802.6	3 648.1

3.1.1.2 Operational Phase

The data received regarding the production tonnage, cost and employment numbers for the operational phase is reflected in Table 2. The projected price in the base scenario is based on the estimation made by Conningarth Economists.

Table 5: Operational Phase

	Voorburg Colliery per Annum	Jutland & Voorburg Colliery Per Annum
1. Maximum estimated tons of coking coal produced per annum	1.8MT	2.5 MT
2 Maximum estimated tons of Eskom coal per annum	3.1 MT	4.54 MT
3. Estimated average production cost –per saleable ton(Coking & Eskom)	R670	R/ton
4. Estimated rail cost – ArcelorMittal and Eskom is FOR while the export is FOB (price including port costs)	R283 FOB	R/ton
5. Expected average coal price		
- Coke Quality -base price – projected 2014/15 price	R1 432[11]	R/ton
6.Expected production period of the mine	33 years	28 years
Total number of employment on mine – operational phase	917	850
9. Estimated Rehabilitation prices average	R500 000	R./ha

Note: All prices are 2013

3.1.1.3 Production

The estimated build-up in the production of coke quality coal over the expected life span of the mine is reflected in Table 5. It is projected that production will start in year five, counting from the year the initial planning started.

[11] Source: Conningarth Estimation

Table 6: Projected Production Figures for the Life of the Mine

Year	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Tonnage Produced	-	-	-	-	-	-	2.64	2.50	2.50	2.50	2.50	2.50

Year	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
Tonnage Produced	2.50	2.50	2.49	2.48	2.49	2.50	2.48	4.10	4.26	3.95	4.47	4.75

Year	2037	2038	2039	2040	2041	2042
Tonnage Produced	5.31	4.99	4.90	4.98	4.99	4.92

3.2 Musina/Makhado Municipal Areas Situational Analysis[12]

The proposed Mopane Project straddles the Musina and Makhado Local Municipalities (LM) in the Vhembe District. A greater part of the proposed Mopane Project is located in the Musina LM. Musina LM has a relatively small local economy; the main driver in the municipal economy is clearly mining, which contributed almost 40% to the total value of production in 2011 (at current prices). The primary commodity is diamonds, although coal is in the process of making a significant contribution. By comparison, the mining sector contributes 9.3% to the production value of the Vhembe District economy, 30% to the provincial economy and 9.8% to the national economy. The trade sector, transport and government activities are growing rapidly. This growth is being driven by the local mining sector and by trading activities, including consumption expenditure from residents of neighbouring countries. The construction sector is also growing, but off a low base. Growth in the finance sector is more a reflection of the imputed value of land, rather than an increase in actual financial transactions. The agriculture sector, which has a long tradition of considerable significance, is shrinking in relative and in absolute terms.

The Makhado local economy, with a value of production of close to R13 billion, is almost three times larger than that of Musina. Government is the driver of this local economy, mostly because of the public sector needs of the very large population, which includes education, public health, safety and security, as well as local government services.

The finance sector is significant, largely due to the imputed rent estimates of extensive tracts of land that command very high prices.

The third largest sector is trade and catering. Makhado town provides a service function for a large hinterland that stretches beyond its borders. Attractive landscapes have also provided opportunities to create accommodation and catering product offerings.

Agriculture is restrained by the shortage of ample water resources. Agricultural activities are focused on the Vera agricultural holdings, and neighbouring areas. Most of the NOMR Application area is utilised for game or livestock grazing.

Mining has in the past never been an important sector in the Makhado local economy, but this is in the process of changing due to the vast coal deposits in the area.

[12] Source: Greater Soutpansberg Mopane Project Scoping Report dd June 2013.

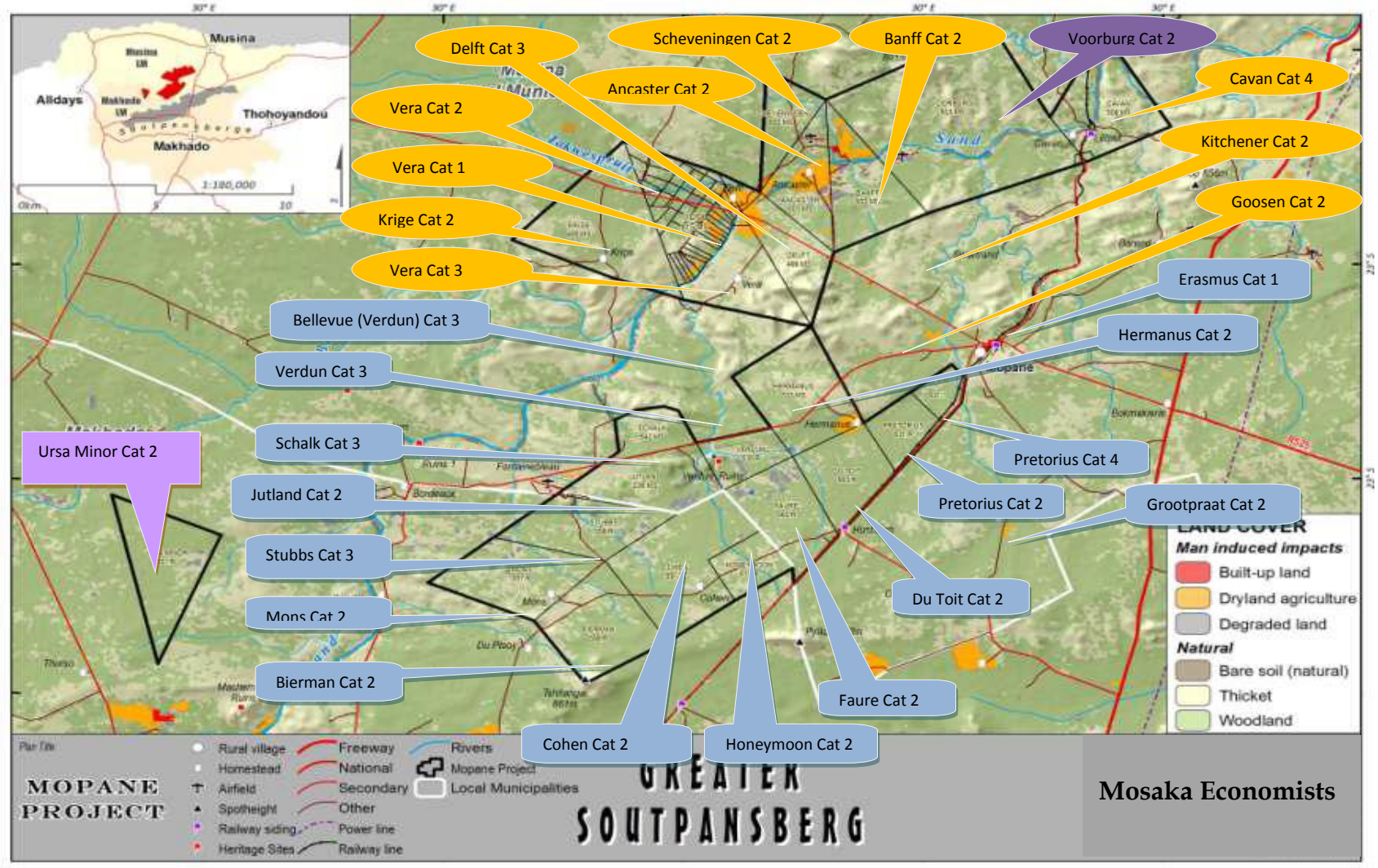
Both the Musina and Makhado LMs currently administer mainly agricultural communities. The rural economic sector in the proposed mining area is dominated by game farming (hunting and eco-tourism) and irrigation.

The Trade, Accommodation and Catering sector is the biggest employer in both municipalities. Agriculture is also a major employer, especially in Musina LM.

Beef farming has over time been overtaken by game as the major land use activity and is presently less than 5%. Game farming supports the value added components of eco-tourism and also stimulates the hunting industry.

3.2.1 Approach

For easy reference see map below of farms (adapted by Mosaka from the original map provided by CoAl) and Appendix E showing the different catgories.



Map 4: Mining and Infrastructure Layout for Mopane Project

For analytical purposes the farming activities in both the Voorburg and Jutland Sections were divided into five categories, namely:

- Category 1 land use: These farms include portions of the original farm Vera 815MS consisting of numerous plots with approximately 160 ha cleared land and 30 ha of irrigated land. These farms, including the farms of the Jutland section, cover roughly 1 184 ha. The following farming practices were included in this group:
  - Cultivation of irrigation crops as the main source of income; and/or
  - Cattle only; and/or
  - Cattle farms together with irrigation crops.
- Category 2 land use. These farms cover approximately 21 358 ha and have game fencing. The following farming practices were included in this group:
  - Game farming with lodge/chalet accommodation facilities for both trophy and biltong hunters; and/or
  - Game farms with accommodation and irrigation crops; and/or
  - Game farms with accommodation and cattle; and/or
  - Game farms with accommodation with both cattle and irrigation crops.
- Category 3 land use. These farms cover approximately 3 495 ha and have game fencing. Approximately 15% of the land is utilised for beef farming and 85% for game farming. The following farming practices were included in this group:
  - Farms with game but without accommodation facilities for either trophy/biltong hunters; and/or
  - Farms with game but without accommodation facilities for either trophy/biltong hunters but also stocking cattle; and/or
  - Farms without accommodation facilities for either trophy/biltong hunters with irrigation crop production.
- Category 4 land use. The following land was included in this group:
  - Land not used for agricultural production purposes, such as schools, government property or Transnet property.
- Category 5 land use. The following land was included in this group:
  - Land currently used for mining purposes.

See Appendix E for the properties included in the different land use categories.

Table 7: Estimated Present Land Use in the Project Area[13]

	Cattle hectares	Game hectares	Irrigation[14] hectares	Total hectares
Category 1 Farms	1 047	83	30	1 160
Category 2 Farms	470	20 755	73	21 298
Category 3 Farms	234	3 211	46	3 491
Total	**1 751**	**24 049**	**149**	**25 949**

[13] Source: Conningarth Research
[14] Source: -

In the table above the irrigation hectares represents the physical hectares.

The dominating land use activity in all three of the areas is game farming representing approximately 90% of the total area. A number of years ago beef farming was dominant but has now been replaced by game farming.

3.2.1.1 Land Use Assumptions

For the farms listed below land use information could not be obtained due to access of field workers being denied or other reasons. These farms were grouped into the categories mentioned based on assumptions made after studying Google Earth images and data of neighbouring farms which was collected.

Voorburg Section

Farms below were grouped as Category 2 land use land use assuming that these farms had game only with accommodation facilities for hunters.

- Ancaster 501MS (RE;
- Krige 495MS (All);
- Scheveningen 500MS (All); and
- Voorburg 503MS (All).

The farms Delft 499MS (Ptns 1 and 2) was assumed to have game but with no hunting accommodation for hunters and grouped Category 3 land use. It was further assumed that the farm Delft 499MS (RE) straddles the Sand River as crop irrigation was present.

Jutland Section

It was assumed that this farm is grouped as a Category 1 land use land use was a cattle farm with irrigated citrus and dry land crops. The school and Mopane station is on this land.

- Erasmus 529 (RE)

Farms below were grouped as Category 2 land use assuming that these farms had game with accommodation facilities for hunters.

- Bierman 599MS (All);
- Cohen 591MS (All);
- Du Toit 563MS (RE);
- Faure 562MS (All);
- Otto 650MS (RE) - now Honeymoon 610MS;
- Mons 557MS (All);
- Pretorius 531MS (RE);
- Pretorius (Ptn 1); and
- Schalk 542MS (All).

Farms below were grouped as Category 3 land use assuming that these farms stocked game without accommodation facilities for hunters.

- Stubbs 558MS (All); and
- Verdun 535MS (RE).

Ursa Minor

It was assumed that the farm listed below was a game farm with accommodation facilities for hunters and thus grouped as a Category 2 land use farms.

- Ursa Minor 551MS (All).

Due to the fact that a 100% survey of the area could not be made, the following assumptions regarding farm sizes and the cattle and game numbers and species per farm was made.

3.2.1.1.1 Farm Sizes

Farm sizes of which the hectares were not obtained from the landowner was measured with the help of Google Earth. When comparing the actual farm sizes obtained from landowners and that measured by means of Google Earth, a variation of approximately 7% was noted. Therefore farm sizes only measured by means of Google Earth were adjusted with 7%.

3.2.1.1.2 Cattle and Game Numbers and Species per Farming Unit

As both the cattle and game numbers, together with the game species for every farm in the study area could not be obtained due to the fact that contact could not be made with all the involved landowners or the fact that the landowner was reluctant to divulge the information, therefore cattle and game numbers together with the species present were projected in accordance with the neighbouring farms of which the data and also the land size was available.

The accepted grazing norm for the area together with the "Animal Unit" (AU) namely 16ha/AU was used to estimate cattle and game numbers, which were then converted to animal numbers.

3.2.1.1.3 Allocation of Game Sold to Trophy Hunters and Biltong Hunters or Caught for Auction

The assumption was made that all game farms are fully stocked to carrying capacity. In order to determine the percentage of game sold to trophy hunters and biltong hunters or caught to be sold at auctions or to direct buyers, some of the landowners were requested to give an estimate for their specific businesses and the average of these allocations was applied to the area. The allocation used in the analysis is[15]:

- Male animals 22% trophy hunting, 54% biltong hunting and 24% live game sales;
- Female animals 14% trophy hunting, 61% biltong hunting and 25% live game sales.

The percentages differ per animal group; the numbers reflected above are the average of all the game off take.

3.2.1.2 Site Visits

Representatives of Mosaka Economic Consultants cc did not physically visit the farms within the NOMR area, but submitted a questionnaire to Naledi Development Restructured (Pty) Ltd to be completed by their representatives who visited the farms involved and obtained the required information according to the questionnaire.

[15] Source: Conningarth Estimation

Although a farming unit may be classified as being mainly a cattle farm, all the cattle farms also stock some game and allow hunting by means of concessions made to professional hunters. Some farms, classified as game farms also have small herds of cattle.

The following sub-divisions of commercial farming enterprises in the study area were applied:

- Cattle farming.
- Game farming.
  - Live game sales.
  - Trophy hunting.
  - Biltong hunting.
- Hunting supporting services.
  - Professional hunter.
  - Skinner and tracker.
  - Transport.
  - Taxidermist
  - Game Catching
  - Other.
- Accommodation.
  - Hunting.
  - Eco – Tourim – visitors not related to hunting activities.
- Irrigation

3.2.1.3 Cattle Farming

As mentioned cattle (beef) farming has over the time been overtaken by game as the major land use activity. Other than the inconvenience and disruption of prospecting (access to and the presence on premises for drilling), traffic and road surface deterioration by the proposed mining activity will have little negative impact on the industry, a positive point may be the expected labour population increase and resulting higher demand for beef. The monetary value of the present beef farming has been calculated using a macro-economic approach based on a carrying capacity (grazing norm) of 16 hectares per AU with an average annual growth of 130kg per AU per annum as basis and 17 hectares per AU for the communal farming areas. Average 2013 beef prices were used and the results are presented in the following table.

Table 8: Beef Farming in the Project Area[16] (2012/2013 prices)

	Category 1	Category 2	Category 3	Total
Number of AU (Commercial)	86	247	18	351
Number of Animals (Commercial)	132	365	23	520
Annual Turnover (Commercial) (R.mil.)	R0.32	R0.57	R0.03	R0.92

The table indicates that the annual turnover of the commercial beef in the Category 1 group is about R0.32 million, in the Category 2 group it is about R0.57 million and in the Category 3 group it is R0.03 million.

[16] Source: Conningarth Research.

3.2.1.4 Game Farming

The game farming industry is very active in the area with large investments being made in acquiring and breeding trophy and rare animals and providing accommodation facilities.

In the study area there are farms which cater for all the needs of the industry and there are game farms that only stock the game and do not cater for the other supplementary needs of the industry such as professional hunters, trackers, skinners, accommodation, etc. This has resulted in safari organisers negotiating with such landowners to reserve certain game species to be hunted. This is referred to as concession hunting. The landowner has no responsibility to the hunters and also has no amenities to support the hunters.

A game farm as an independent enterprise can present a "one stop" hunting venture by providing the hunting supporting services, the game and the accommodation for both the hunters and non-hunters. Such an enterprise may also have acquired hunting concessions from game farms in the area for specific game species not stocked or available on the farm where the supporting services and accommodation infrastructure is located. Also, a game farm (or cattle farm) may have no supporting services or accommodation infrastructure available and only sell game by allowing hunting concessions. In some cases no hunting takes place on the farm as the game is caught and sold at auctions or to private individuals.

For purposes of this study the breeding of game and the eventual marketing of the animals are divided in to three groups:

- Sale of live animals at either game auctions or through private transactions (the supporting service of game catching is included);
- Trophy hunting, predominantly foreign tourists, and
- Biltong hunting, predominantly South African groups.

Game hunting includes both rifle and bow hunting.

As the numbers per sale activity varies from game specie to specie the price also differs for the different outlet activities. It was therefore necessary to use a number of assumptions, which not necessarily applies to all the farms or game producers. We also accept that this approach is open to criticism, but with the available data collected this approach gives acceptable results.

The grazing norm applied is 12 ha/AU. The different AU to game number conversion rates are presented in the following table.

Table 9: Estimated Game Representation Used in the Project Area plus the Sex Ratio and Annual Growth Rate

Specie	Conversion Rate[17]	Animal Representation[18]	Number of Females per Male[19]	Annual Growth Rate[20]
	Number/AU	Percentage	Numbers	Percentage
Blesbuck	4.50	2.73%	10	30%
Bushbuck	7.50	0.71%	6	20%
Blou Wildebeest	2.40	11.03%	10	25%
Buffalo	1.00	1.20%	15	20%
Eland	1.00	5.92%	15	20%
Gemsbok	2.20	9.11%	10	25%
Giraffe	0.70	1.75%	13	15%
Impala	7.00	39.38%	10	35%
Kudu	2.20	16.56%	7	20%
Nyala	3.30	1.31%	10	20%
Hartebeest (Red)	2.00	2.19%	10	20%
Sable Antelope (Swartwitpens)	1.67	1.15%	12	20%
Roan Antelope (Bastergemsbok)	1.56	0.95%	10	20%
Tsessebe (Basterhartbees)	2.63	0.57%	10	20%
Reedbuck, Klipspringer, Duiker, Steenbuck	7.70	2.08%	4	20%
Warthog	5.00	1.86%	10	20%
Waterbuck	2.40	0.63%	10	20%
Zebra	1.60	0.87%	6	25%
Average	3.29	100.00%		

The presence of rhinoceros and other big five animals, except buffalos, have been ignored. The selection of specific animal species and percentage representation is the interpretation of Conningarth based on the survey results.

Applying the above to the number of Animal Units (AUs) and then converting it to animal numbers the following numbers is available for trading or hunting purposes.

Table 10: Number of AU and Game Available for Sale or Hunting purposes

	Category 1	Category 2	Category 3	Total
Number of AU	5	1 729	53	1 787
Number of Animals	29	9 802	234	10 065
Annual Growth	17	3 212	71	3 124

A decision was then made on the numbers of animals sold live, the number hunted as trophy animals and the number hunted for biltong. It was firstly decided that some of the species are too expensive for the "biltong" market and was allocated to the live sales and trophy hunting section, the animals treated this way are:

[17] Department of Agriculture.
[18] Conningarth Research and Interpretation.
[19] The SA Financial Sector Forum – HB Falkena: Profit and Honour in Game Ranching (2003).
[20] Ditto.

- Buffalo;
- Giraffe; and
- Sable Antelope.

Of the male animals of the above group, 45% were mostly allocated to trophy hunting, 27% were allocated to live sales and 28% to biltong hunting; in the case of the females 34% to trophy, 30% were allocated to live sales and 36% to biltong hunting.

For the rest of the animals an analysis was performed in terms of the number of animals per specie that was sold and feedback on the preferences of biltong hunters and information received from professional hunters on the preferences of trophy hunters.

The prices of trophy game were sourced from Greater Kuduland Safaris - Rifle Hunters Price List 2012 (Trophy), the pricelist presents the prices in US$ which was converted by Conningarth to Rand using an exchange rate of R8.4:1US$, eliminating decimals.

Table 11: Different Outlet Prices for Game as Used in the Calculations (2013 prices)

	Male Off take - Average Prices			Female Off take - Average Prices		
	Game Sales	**Trophy**	**Biltong**	**Game**	**Trophy**	**Biltong**
Blesbuck	1 615	2 800	2 900	1 064	2 800	2 500
Bushbuck	2 557	6 300	-	-	6 300	-
Blou Wildebeest	2 231	6 300	3 216	3 460	6 300	2 538
Buffalo	400 000	85 000	-	400 000	85 000	-
Eland	5 673	11 200	9 300	6 000	6 000	6 000
Gemsbok	4 834	7 000	4 250	4 834	6 000	3 150
Giraffe	13 750	14 700	7 000	13 750	14 700	8 000
Impala	761	2 275	1 122	1 300	700	720
Kudu	2 397	9 800	4 000	3 000	2 100	2 700
Nyala	6 100	13 650	1 122	6 100	13 650	720
Hartebeest (Red)	4 000	9 100	-	4 000	9 100	-
Sable Antelope (Swartwitpens)	135 000	52 500	-	147 500	52 500	-
Roan Antelope	120 000	70 000	-	100 000	70 000	-
Tsessebe (Basterhartbees)	12 000	19 600	-	12 000	19 600	-
Reedbuck, Klipspringer, Duiker,	1 020	6 860	4 500	1 020	6 860	4 500
Warthog	1 000	2 800	900	1 000	2 800	900
Waterbuck	4 132	11 900	6 000	4 334	11 900	4 000
Zebra	5 000	11 900	6 000	15 000	11 900	6 000

Using the above approach the estimated game farming annual turnover, live sales and hunting is presented in the following table.

Table 12: Annual Turnover

	Category 1	Category 2	Category 3	Total
Annual Turnover (R.mil.)	R0.07	R5.32	R0.18	R5.57

3.2.1.5 Hunting, Accommodation and Eco-tourism

With the game farming industry rapidly increasing in the area, large investments have been made to establish new luxury accommodation or upgrading existing accommodation for the trophy hunting fraternity, simultaneously accommodating the eco-tourism segment.

The two types of hunters hunting in the area are divided into the so-called trophy hunters and biltong hunters.

The trophy hunters are mostly foreigners who are looking for specific game species for which they are prepared to pay a very high price. They are mostly not interested in the meat of the hunted animals. They, however, support a number of supplementary activities grouped together and referred to as "Supporting Services".

Supporting services (usually included in the daily rates and package purchased) comprise the transport from the airport of arrival to the hunting camp and for the duration of the hunting expeditions, the services of a professional hunter, trackers and skinners, use of facilities such as cold room and salt, the field preparation of trophies, caping of trophies, laundry, accommodation and all refreshments.

Taxidermy, shipping of trophies and dipping and packing of trophies is for the account of the hunter and is not included in the daily rates and package quoted, although assistance is offered to deliver the trophy to the taxidermist.

3.2.1.5.1 Accommodation

- Trophy hunter accommodation

  The hunting camps and lodges used for trophy hunters and non-hunters (observers) accompanying the hunters and tourists range from very comfortable to luxurious with all modern amenities always available.

- Biltong hunter accommodation

  The biltong hunters decide, according to their budget, what accommodation is preferred. The average biltong hunter requires only basic accommodation with limited personal amenities such as sleeping quarters (single or shared), shower and facilities to prepare meals/coffee/tea (braai) all self-catering.

During the farm visits, telephone surveys, and internet search an estimation of the number of available beds, tariffs and bed occupation was made. The trophy hunter group presented a special problem because included in their daily tariffs are not only the accommodation fee, but also the services of a professional hunter, skinners, trackers and vehicles. It is an all-inclusive package which

also includes the transfer from the OR Tambo airport and only excludes the price of the animal and the taxidermy services.

The following table presents the number of beds and occupation rate.

After analysing the data obtained the accommodation turnover in the area was estimated and is presented in the following table.

Table 13: Annual Accommodation Turn Over in the Project Area (2011 prices)

Categories	Eco-tourism	Hunting	Total
	Rand mil.	*Rand mil*	*Rand mil*
Category 1	0.00	0.00	0.00
Category 2	7.74	15.47	23.21
Category 3	0.00	0.00	0.00
Total	**R7.74**	**R15.47**	**R23.21**

The total estimated accommodation turnover in the project area is R24.89 million.

3.2.1.5.2 Hunting Supporting Services

The professional hunter operates independently and is contracted by the hunting organiser for a specific safari. The professional hunter often resides in the Gauteng area and meets the hunting party at the airport on arrival. From arrival he/she will accompany the hunting party to the game farm with either his/her own transport or transport supplied by the hunting organiser or hired helicopter.

The trackers and skinners are the responsibility of the hunting organiser and are separately hired by the organiser for the specific safari. They do the field preparation of trophies and the caping of trophies. It could also be that the tracker(s) and skinners are in the full employment of the hunting organiser.

All transport and amenities on the game farm is the responsibility of the hunting organiser. Transport to visit local sights, souvenir hunting and entertainment is also supplied at additional cost.

The facilities such as cold room and salt, the field preparation of trophies, caping of trophies is provided by the hunting organiser. The arrangement and responsibility for taxidermy, the shipping of the trophies and the dipping and packing of trophies is the hunter's, although advice is given and assistance is offered to deliver the trophy to the taxidermist.

A hunting trophy is an item prepared from the carcass of a game animal killed by a hunter and kept as a souvenir of the successful hunting expedition. Often the heads or entire bodies are processed by a taxidermist, although sometimes other body parts such as teeth, tusks or horns are used as the trophies.

The cost of hunting services was calculated separately from the money spent on taxidermist services. The taxidermy fees were obtained from the internet and the number of animals treated determined from discussions with individuals in the industry.

In the following table the support services and taxidermist costs are presented.

Table 14: Annual Value of Support Services and Taxidermy Costs (2011 prices)

	Support Services Rand mil.	Taxidermy Rand mil.	Total Rand mil.
Category 1	0.00	0.00	0.00
Category 2	6.42	1.91	8.33
Category 3	0.03	0.58	0.61
Total	**6.45**	**2.49**	**8.94**

The table shows that the estimated value of the support services is R6.45 and the taxidermy costs are around R1.91 million for the project area.

3.2.1.6 Irrigation

A number of irrigation areas were identified with the crops produced. In the following table the irrigation areas per crop are presented, the physical as well as the crop hectares.

Table 15: Irrigation Crop Areas[21]

Crops	Category 1 Farms hectares		Category 2 Farms hectares		Category 3 Farms hectares		Total hectares	
	Physical Area	Crop [22]Area	Physical Area	Crop Area	Physical Area	Crop Area	Physical Area	Crop Area
Winter and summer vegetables	7	14	20	40	26	52	**53**	**106**
Lucerne and Pastures	18	18	51	51			**69**	**69**
Tomatoes	5	5					**5**	**5**
Citrus			2	2			**2**	**2**
Tobacco					20	20	**20**	**20**
	30	**37**	**73**	**93**	**46**	**72**	**149**	**202**

A number of assumptions were used:

- In the case of vegetables it was assumed that a double cropping practice is used and that the same area is used for winter and summer vegetables.
- Cabbages were used as the representative winter crop and pumpkins as the summer crop.
- In the case of lucerne and pastures it was accepted that the crop is sold as a cash crop.
- The crop yields were accepted to be commercially viable yields.

Enterprise budgets compiled for the Land Bank and Development Bank during 2012 were updated to 2013 values and applied to arrive at the total irrigation value per category.

[21] Source: Physical Hectares – WSM Leshika
[22] Source: Crop Hectares – Conningarth Research

Table 16: Enterprise Budgets (2013 Values)

Current Situation (per hectare)	Tomatoes	Brassicas (Winter)	Cucurbits (Summer)	Lucerne	Tobacco	Citrus
Gross Income	**R 262 500**	**R 128 000**	**R 56 100**	**R 31 433**	**R 103 085**	**R 115 508**
Variable Costs	**R 183 331**	**R 56 017**	**R 32 040**	**R 20 588**	**R 82 449**	**R 72 262**
-Marketing Costs	*R 32 813*	*R 7 047*	*R 7 013*	*R 0*	*R 0*	R 760
-Pre Harvest Cost	*R 0*				*R 0*	
- *Irrigation labour*	*R 0*					
- *Other pre-harvest costs*	*R 74 965*	*R 37 545*	*R 12 726*	*R 12 799*	*R 40 681*	R 27 351
-Harvest Cost	*R 75 553*	*R 11 425*	*R 12 302*	*R 7 789*	*R 41 768*	R 44 151
Interest on Working Capital	***R 2 375***	***R 1 690***	***R 704***	***R 1 569***	***R 1 831***	**R 766**
Gross Margin	**R 76 794**	**R 70 293**	**R 23 356**	**R 9 276**	**R 18 805**	**R 42 480**
Fixed Costs	**R 4 199**	**R 3 594**	**R 2 910**	**R 4 636**	**R 3 204**	**R 6 867**
-Depreciation	R 0					
- *Irrigation equipment*						
- *Other*	*R 2 106.8*	*R 2 041*	*R 1 758*	*R 1 659*	*R 1 698*	R 2 510
-Labour	*R 354.00*	*R 184*	*R 115*	*R 1 357*	*R 300*	R 640
-Insurance	*R 321.98*	*R 311*	*R 269*	*R 449*	*R 268*	R 540
-Repairs & Maintenance	*R 604.20*	*R 596*	*R 511*	*R 846*	*R 535*	R 1 215
-Administration Costs	*R 508.80*	*R 184*	*R 85*	*R 89*	*R 240*	R 920
-Fuel & Electricity	*R 247.80*	*R 223*	*R 117*	*R 210*	*R 110*	R 630
-Sundry	*R 55.12*	*R 55*	*R 55*	*R 25*	*R 52*	R 412
Net Farm Income	**R 72 596**	**R 66 700**	**R 20 446**	**R 4 641**	**R 15 601**	**R 35 613**

In the following table the estimated value of the irrigation activities per category is presented.

Table 17: Estimated Value of the Irrigation Activities (2013 prices)

Farm Category	Value Rand million
Category 1	3.16
Category 2	5.55
Category 3	6.85
Total	**15.56**

The table shows that the annual estimated value of the irrigation activities is R65.7 million.

3.2.1.7 Summary: Current Activities

In the next table the total estimated annual value of the current activities in the project area is presented.

Table 18: Annual Turn Over of the Activities in the Project Area (2013 prices)

	Annual Income	Annual Income	Annual Income	Annual Income
	Rand Million	Rand Million	Rand Million	Rand Million
	Category 1	Category 2	Category 3	Total
Beef Farming	0.32	0.57	0.05	0.94
Game Farming - Animals(Turn Over)	**0.07**	**5.32**	**0.19**	**5.58**
- *Game Sales*	0.07	0.52	-	0.59
- *Trophy Hunting*	0.00	2.86	0.09	2.95
- *Biltong Hunting*	0.00	1.94	0.10	2.04
Hunting				
- Professional Hunting Services (including game catching)	0.00	6.42	0.03	6.45
- *Taxidermy*	0.00	1.91	0.58	2.49
- *Accommodation*	0.00	15.47	-	15.47
Total	**0.00**	**23.80**	**0.61**	**24.41**
Eco-Tourism	0.00	7.74	0	7.74
Irrigation	3.16	5.55	6.85	15.56
Grand Total	**3.55**	**42.96**	**7.69**	**54.21**

The total estimated annual value of the economic activities in the project area is estimated at R54.21 million, with the game and related activities the largest contributor namely R27.99 million.

4 Current Activities – Macro-Economic Parameters

In this section the baseline activities are converted to macro-economic parameters, in a later section a risk profile is established for all three the identified areas, the risk is then converted to macro-economic parameters and presented as such.

4.1 Approach

A Macro-Economic Impact Model (MEIM) is used, based on the Limpopo Social Accounting Matrix (SAM) which has been converted to an econometric model to be used in the project area. The MEIM was adapted to accommodate each of the identified project areas and was then populated with the baseline data.

The magnitude of the current activities in the project area has been calculated according to the methods as explained. In the following sections the current economic activities are expressed in terms of the following macro-economic parameters:

- Gross Domestic Product (GDP) – Direct and Indirect/Induced Impacts;
- Employment – Direct and Indirect/Induced Impacts;
- Payments to Households – Low Income and Medium/High Income.

The impact on GDP reflects the magnitude of the values added to the coal mining industry from activities within the industry. Value added is made up of three elements, namely:

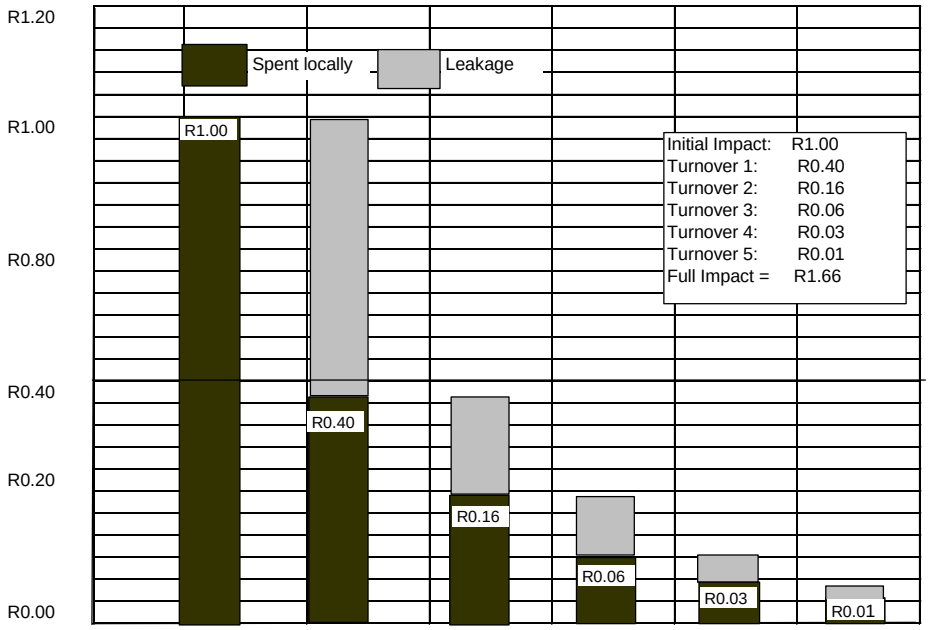
- Remuneration of employees,
- Gross operating surplus (which includes profit and depreciation), and
- Net indirect taxes.

The possible impacts of the proposed coal mine on the current economic activities was estimated and converted to the macro-economic parameters to show the impacts.

The Limpopo Social Accounting Matrix (SAM) was used to synthesise appropriate multipliers to be used in the Macro-Economic Impact Model (MEIM) to calculate the macro-economic impact of the different activities.

All economic models incorporate a number of “multipliers” which form the nucleus of the modelling system. The nature and extent of the impact of a change in a specific economic quantity, e.g. exports, on that of another economic quantity or quantities, e.g. production output or employment, is determined by a “multiplier”. A multiplier summarises the total impact that can be expected from a change in a given economic activity. For illustrative purposes the graph below shows the multiplier concept used in assessing the change in economic activity.

Graph 1: Multipliers and Turnover



In this example, R1 is received into the local economy of the area from sales beyond the local borders. Of this, 40 cents is spent for goods and services within the region. The economic sectors and individuals who receive the 40 cents spend 16 cents within the local area. Of the 16 cents, only six cents is spent locally, and so on. The total amount of money received by local firms and residents as a result of the initial R1 in added exported earnings is R1.66. Therefore, the multiplier is R1.66.

The change in economic activity resulting from the change in one factor of production, such as water resources, is measured by different multipliers. Four multipliers are commonly used to assess the impacts of an initial increase in production resulting from an increase in sales, usually called final demand in multiplier analysis. The four multipliers are: (1) output, (2) employment; (3) income; and (4) value added.

Sectorial multipliers are calculated using information contained in the applicable Provincial Social Accounting Matrix (SAM) and the National SAM as well as data obtained from the South African Reserve Bank and Statistics South Africa. These inverse matrices capture all the direct and indirect relationships among the inputs and outputs of the various entities included in the applicable provincial SAM.

Direct GDP, labour and capital multipliers for each sector are calculated using the following formula:

$$\text{GDP multiplier} = \frac{\text{Value Added}}{\text{Production}}$$

$$\text{Labour multiplier} = \frac{\text{Employment}}{\text{Production}}$$

$$\text{Capital multiplier} = \frac{\text{Capital stock}}{\text{Production}}$$

These multipliers were incorporated into the MEIM and used to calculate the macro-economic impacts. By using a SAM for the applicable region, the above multipliers can be calculated. The multipliers that were used in this study to determine the economic impacts are as follows:

- Economic growth, i.e. the impact on GDP.
- Employment creation, i.e. the impact on labour requirements.
- Income distribution, i.e. the impact on low income, poor households and total households.

A breakdown of the different effects of the agricultural sector multipliers used in this study is as follows:

- Direct Impacts: the effects occurring directly in the agriculture sector:
- Indirect Impacts: those effects occurring in the different economic sectors that link backwards to agriculture due to the supply of intermediate inputs, e.g., fertilisers, seeds, hunting professional services, transport, etc.
- Induced Impacts: the chain reaction triggered by the salaries and profits (less retained earnings) that are ploughed back into the economy in the form of private consumption expenditure.
- Total Impacts: Represents the direct, indirect and induced summed effect.

4.2 Risk Assessment

Risk is a combination of the probability, or frequency of occurrence of a hazard and the magnitude of the consequence of the occurrence (Nel 2002). Risk estimation (RE) is concerned with the outcome, or consequences of an intention, taking account of the probability of occurrence and can be expressed as P (probability) x S (severity) = RE. Risk evaluation is concerned with determining significance of the estimated risks and also includes the element of risk perception. Risk assessment combines risk estimation and risk evaluation (Nel 2002).

The risk assessment methodology that will be used during the EIA Phase to estimate the risk and determine the impact significance is tabled below.

In developing a possible impact scenario for the construction and operation on the local economic activities, it was necessary to differentiate the activities and to again estimate it within the three identified sub-areas as the possible impacts differ for the three areas.

A risk profile was developed for each of the areas making provision for a weight allocated to a specific intrusion caused by the mining activity. A percentage impact is then allocated to each economic activity, which is then multiplied with the weight; the answer is converted to percentage impact. The percentage impact is then applied to the estimated annual turnover to arrive at the negative impact to be caused by the mining activity.

Mathematically the process can be explained as follows:

[Mining weights] x [Estimated Percentage Impact] = [Impact] ►converted to monetary values.

The weights allocated to the different identified infringements in respect of the Category 1 farmers areas are shown in the table below. For each of the other two categories a separate model was developed.

Table 19: Category 1 Risk Factors considered

Infringement	Activity	Sub -Activity
Noise	***Beef and other Livestock Farming***	*Commercial*
		Community
	Game Farming	*Game (breeding)*
		Live Sales
		Trophy Hunting
		Biltong Hunting
	Tourism & Accommodation	*Eco - tourists*
		Hunters
	Irrigation	*Citrus*
		Other Crops
	Community	*Life Style*
	Environment (birds & plants)	
	Sub-total	*7*
Dust	***Beef and other Livestock Farming***	*Commercial*
		Community
	Game Farming	*Game (breeding)*
		Live Sales
		Trophy Hunting
		Biltong Hunting
	Tourism & Accommodation	*Eco - tourists*
		Hunters
	Irrigation	*Citrus*
		Other Crops
	Community	*Life Style*
	Environment (birds & plants)	
	Sub-total	*14.00*
Blasting	***Beef and other Livestock Farming***	*Commercial*
		Community
	Game Farming	*Game (breeding)*
		Live Sales
		Trophy Hunting
		Biltong Hunting
	Tourism & Accommodation	*Eco - tourists*
		Hunters
	Irrigation	*Citrus*
		Other Crops
	Community	*Life Style*
	Environment (birds & plants)	
	Sub-total	*7.00*
Social, Crime and other impacts	***Beef and other Livestock Farming***	*Commercial*
		Community
	Game Farming	*Game (breeding)*
		Live Sales
		Trophy Hunting
		Biltong Hunting
	Tourism & Accommodation	*Eco - tourists*
		Hunters

	Irrigation	*Citrus*
		Other Crops
	Community	*Life Style*
	Environment (birds & plants)	
	Sub-total	*12.00*
Destroying the sense of place -Visual	***Beef and other Livestock Farming***	*Commercial*
		Community
	Game Farming	*Game (breeding)*
		Live Sales
		Trophy Hunting
		Biltong Hunting
	Tourism & Accommodation	*Eco - tourists*
		Hunters
	Irrigation	*Citrus*
		Other Crops
	Community	*Life Style*
	Environment (birds & plants)	
	Sub-total	*10.00*
Underground water - contamination and water levels	***Beef and other Livestock Farming***	*Commercial*
		Community
	Game Farming	*Game (breeding)*
		Live Sales
		Trophy Hunting
		Biltong Hunting
	Tourism & Accommodation	*Eco - tourists*
		Hunters
	Irrigation	*Citrus*
		Other Crops
	Community	*Life Style*
	Environment	
	Sub-total	*33.00*
Surface water - contamination and run-off	***Beef and other Livestock Farming***	*Commercial*
		Community
	Game Farming	*Game (breeding)*
		Live Sales
		Trophy Hunting
		Biltong Hunting
	Tourism & Accommodation	*Eco - tourists*
		Hunters
	Irrigation	*Citrus*
		Other Crops
	Community	*Life Style*
	Environment	
	Sub-total	*17.00*
	Total	**100**

4.3 Baseline Parameters and Risk Induced Parameters

The macro-economic parameters used are the Gross Domestic Product (GDP) and employment opportunity which is calculated for each of the different identified activities. It is expressed as Direct, Indirect/Induced and Total. Employment opportunities are used as many of the hunting activities are only practised for 9 to 10 months of the year, this approach has as a result the fact that the number of people involved is more than the number of opportunities.

4.3.1 Mopane Category 1

The following table presents the activities expressed in macro-economic parameters.

Table 20: Category 1 - Current Situation Expressed as Macro-Economic Parameters (2013 prices)

	Gross Domestic Product			Employment			Payments to Households		
	Direct R mil.	Indirect/ Induced R mil.	Total mil.	Direct Number	Indirect/ Induced Number	Total Number	Total R mil.	High/ Medium R mil.	Low R mil.
Irrigation	1.52	1.79	3.31	20	8	28	1.25	0.99	0.26
Beef Farming	0.21	0.15	0.36	1	2	3	0.08	0.06	0.02
Game Farming	0.06	0.03	0.09	0	0	0	0.02	0.01	0.01
Hunting	0.04	0.04	0.08	0	0	0	0.04	0.03	0.01
Taxidermy, Game catching, etc.	0.00	0.00	0.00	0	0	0	0.00	0.00	0.00
Accomodation	-	-	-	0	0	0	-		
Total	**1.83**	**2.01**	**3.84**	**21**	**10**	**31**	**1.39**	**1.09**	**0.30**

The table above reflects that all the activities support 21 direct and 10 indirect and induced employment opportunities. Irrigation provides the majority of the direct employment, namely 20

As far as direct GDP is concerned irrigation creates R1.83 million per annum.

In the following table the identified risks are presented as a percentage.

Table 21: Category 1 - Percentage Change Expressed as Macro-Economic Parameters (2013 prices)

	Gross Domestic Product			Employment			Payments to Households		
	Direct R mil.	Indirect/ Induced R mil.	Total R mil.	Direct Number	Indirect / Induced Number	Total Number	Total R mil.	High/ Medium R mil.	Low R mil.
Irrigation	-38.3%	-38.3%	-38.3%	-38.3%	-39.4%	-38.1%	-38.3%	-38.3%	-38.3%
Beef Farming	-37.1%	-37.1%	-37.1%	-100.0%	-50.0%	-49.6%	-37.1%	-37.1%	-37.1%
Game Farming	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Hunting	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Taxidermy, Game catching, etc.	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Accomodation	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Total	**-39.0%**	**-36.5%**	**-37.8%**	**-39.0%**	**-34.7%**	**-38.1%**	**-36.3%**	**-36.4%**	**--36.1%**

The percentage change in employment opportunities as shown in the table above will come to -39% direct and -34.7% indirect and induced employment opportunities. The total percentage change in employment will be -38.1%.

As far as direct GDP is concerned percentage change for irrigation will be –38.3% per annum.

The following table presents the macro-economic parameters after the estimated risk factors were applied.

Table 22: Category 1 - New Situation Expressed as Macro-Economic Parameters (2013 prices)

	Gross Domestic Product			Employment			Payments to Households		
	Direct R mil.	Indirect/ Induced R mil.	Total R mil.	Direct Number	Indirect/ Induced Number	Total Number	Total R mil.	High/ Medium R mil.	Low R mil.
Irrigation	0.94	1.10	2.04	12	5	17	0.77	0.61	0.16
Beef Farming	0.13	0.09	0.22	0	1	1	0.05	0.04	0.01
Game Farming	0.06	0.03	0.09	0	0	0	0.02	0.01	0.01
Hunting	0.04	0.04	0.08	0	1	0	0.04	0.03	0.01
Taxidermy, Game catching, etc.	0.00	0.00	0.00	0	1	1	0.00	0.00	0.00
Accomodation	-			0	0	0			
Total	**1.16**	**1.26**	**2.43**	**12**	**8**	**18**	**0.88**	**0.69**	**0.19**

According to the table above the balance of the activities will support 12 direct and 8 indirect and induced employment opportunities. The total employment will be 18.

As far as direct GDP is concerned irrigation will create R1.16 million per annum.

In the following table the projected negative impact of the proposed mining activity are presented.

Table 23: Category 1 - Change Expressed as Macro-Economic Parameters (2013 prices)

	Gross Domestic Product			Employment			Payments to Households		
	Direct R mil.	Indirect/ Induced R mil.	Total R mil.	Direct Number	Indirect/ Induced Number	Total Number	Total R mil.	High/ Medium R mil.	Low R mil.
Irrigation	-0.58	-0.68	-1.26	-8	-3	-11	-0.48	-0.38	-0.10
Beef Farming	-0.08	-0.05	-0.13	-1	-1	-2	-0.03	-0.02	-0.01
Game Farming		-		0	0	0			
Hunting				0	1	0			
Taxidermy, Gamecatching, etc.				0	1	0			
Accomodation				0	0	0			
Total	**-0.66**	**-0.73**	**-1.39**	**-9**	**-4**	**-13**	**-0.51**	**-0.40**	**-0.11**

The change in employment opportunities as shown in the table above will be -9 direct and 4 indirect and induced employment opportunities. The total change in employment will be -13.

As far as the direct GDP is concerned irrigation will be reduced by R0.66 million per annum.

4.3.2 Mopane Category 2

The following table presents the activities expressed in macro-economic parameters.

Table 24: Category 2 - Current Situation Expressed as Macro-Economic Parameters (2013 prices)

	Gross Domestic Product			Employment			Payments to Households		
	Direct R mil.	Indirect/ Induced R mil.	Total R mil.	Direct Number	Indirect/ Induced Number	Total Number	Total R mil.	High/Medium R mil.	Low R mil.
Irrigation	2.91	3.30	6.21	33	18	51	2.13	1.63	0.50
Beef Farming	0.16	0.06	0.22	0	0	1	0.03	0.02	0.01
Game Farming	1.65	3.01	4.66	17	31	47	1.85	1.84	0.008
Hunting	2.99	2.92	5.91	16	12	28	2.77	1.88	0.89
Taxidermy, Game catching, etc.	4.59	4.63	9.22	25	18	43	2.92	2.16	0.75
Accomodation	10.53	12.29	22.82	70	51	121	11.91	8.05	3.86
Total	**22.85**	**26.20**	**49.05**	**161**	**130**	**292**	**21.61**	**15.59**	**6.02**

The table above reflects that all the activities support 161 direct and 130 indirect and induced employment opportunities. The accommodation sector contributing 70 direct employment opportunities is the largest employment creator.

As far as direct GDP is concerned accommodation and tourism create R10.53 million.

In the following table the identified risks are presented as a percentage.

Table 25: Category 2 - Percentage Change Expressed as Macro-Economic Parameters (2013 prices)

	Gross Domestic Product			Employment			Payments to Households		
	Direct R mil.	Indirect/ Induced R mil.	Total R mil.	Direct Number	Indirect/ Induced Number	Total Number	Total R mil.	High/ Medium R mil.	Low R mil.
Irrigation	-40.6%	-40.6%	-40.6%	-40.6%	-42.3%	-40.6%	-41.7%	-42.1%	-40.6%
Beef Farming	-34.3%	-34.3%	-34.3%	-34.3%	0.0%	-34.3%	-34.3%	-34.3%	-34.3%
Game Farming	-7.1%	-37.4%	-26.7%	-40.9%	-41.9%	-40.1%	-38.5%	-38.5%	-34.3%
Hunting	-64.4%	-64.4%	-64.4%	-65.8%	-66.7%	-64.4%	-64.4%	-64.4%	-64.4%
Taxidermy, Game catching, etc.	-64.4%	-64.4%	-64.4%	-64.4%	-65.5%	-63.9%	-64.4%	-64.4%	-64.4%
Accomodation	-59.5%	-59.5%	-59.5%	-59.5%	-60.0%	-59.5%	-59.5%	-59.5%	-59.5%
Total	**-56.9%**	**-57.0%**	**-57.0%**	**-59.4%**	**-55.9%**	**-57.7%**	**-58.0%**	**-57.5%**	**-59.2%**

The percentage change in the employment opportunities as shown in the table above will be -59.2% direct and -55.9% indirect and induced employment opportunities. The percentage change of direct employment for hunting and related professional services will be -65%, with the accommodation sector at -59.5% direct employment opportunities.

As far as direct GDP is concerned the percentage change for accommodation and tourism will come to -59.5% million followed by hunting and professional services with -64.4% per annum.

The following table presents the macro-economic parameters after the estimated risk factors were applied.

Table 26: Category 2 - New Situation Expressed as Macro-Economic Parameters (2013 prices)

	Gross Domestic Product			Employment			Payments to Households		
	Direct R mil.	Indirect/ Induced R mil.	Total R mil.	Direct Number	Indirect/ Induced Number	Total Number	Total R mil.	High/ Medium R mil.	Low R mil.
Irrigation	1.73	1.96	3.69	19	10	30	1.23	0.93	0.30
Beef Farming	0.11	0.04	0.14	0	0	0	0.02	0.01	0.00
Game Farming	1.54	1.88	3.42	10	18	28	1.14	1.13	0.005
Hunting	1.07	1.04	2.11	6	4	10	0.99	0.67	0.32
Taxidermy, Game catching, etc.	1.64	1.65	3.29	9	6	15	1.04	0.77	0.27
Accomodation	4.27	4.98	9.25	28	21	49	4.82	3.26	1.56
Total	**10.34**	**11.55**	**21.89**	**72**	**59**	**133**	**9.24**	**6.78**	**2.46**

According to the table above the balance of activities will support 72 direct and 59 indirect and induced employment opportunities. Accommodation provides the majority of the direct employment, namely 28.

As far as direct GDP is concerned accommodation and tourism creates R4.27 million followed by hunting and professional services with R2.71 million per annum.

In the following table the projected negative impact of the proposed mining activity are presented.

Table 27: Category 2 - Change Expressed as Macro-Economic Parameters (2013 prices)

	Gross Domestic Product			Employment			Payments to Households		
	Direct R mil.	Indirect/ Induced R mil.	Total R mil.	Direct Number	Indirect/ Induced Number	Total Number	Total R mil.	High/ Medium R mil.	Low R mil.
Irrigation	-1.18	-1.34	-2.52	-13	-8	-21	-0.91	-0.70	-0.20
Beef Farming	-0.06	-0.02	-0.08	0	0	0	-0.01	-0.01	-0.00
Game Farming	-0.12	-1.13	-1.24	-7	-13	-19	-0.71	-0.71	-0.00
Hunting	-1.92	-1.88	-3.81	-11	-8	-18	-1.79	-1.21	-0.58
Taxidermy, Game catching, etc.	-2.96	-2.98	-5.94	-16	-12	-27	-1.88	-1.39	-0.48
Accomodation	-6.27	-7.31	-13.57	-41	-30	-72	-7.08	-4.79	-2.29
Total	**-12.50**	**-14.65**	**-27.16**	**-90**	**-71**	**-158**	**-12.37**	**-8.81**	**-3.56**

The change in employment opportunities as shown in the table above will be 90 direct and 71 indirect and induced employment opportunities.

As far as direct GDP is concerned the accommodation and tourism change will be R6.27 million and hunting and professional services with R4.88 million per annum.

4.3.3 Mopane Category 3

The following table presents the activities expressed in macro-economic parameters.

Table 28: Category 3 - Current Situation Expressed as Macro-Economic Parameters (2013 prices)

	Gross Domestic Product			Employment			Payments to Households		
	Direct R mil.	Indirect/ Induced R mil.	Total R mil.	Direct Number	Indirect/ Induced Number	Total Number	Total R mil.	High/ Medium R mil.	Low R mil.
Irrigation	3.90	3.56	7.46	69	16	85	2.44	1.90	0.54
Beef Farming	0.04	0.02	0.06	1	0	1	0.01	0.01	0.00
Game Farming	0.65	0.30	0.95	3	2	5	0.14	0.10	0.04
Hunting	0.10	0.10	0.20	1	1	2	0.10	0.07	0.03
Taxidermy, Game catching, etc.	0.34	0.34	0.68	2	1	3	0.21	0.16	0.05
Accomodation	-	-	-	0	0	0	-	-	-
Total	**5.03**	**4.32**	**9.35**	**76**	**20**	**96**	**2.90**	**2.24**	**0.66**

The table above reflects that all the activities support 76 direct and 20 indirect and induced employment opportunities. Irrigation provides the majority of the direct employment, namely 69.

As far as direct GDP is concerned irrigation creates R3.90 million per annum.

In the following table the identified risks are presented as a percentage.

Table 29: Category 3 - Percentage Change Expressed as Macro-Economic Parameters (2013 prices)

	Gross Domestic Product			Employment			Payments to Households		
	Direct R mil.	Indirect/ Induced R mil.	Total R mil.	Direct Number	Indirect/ Induced Number	Total Number	Total R mil.	High/ Medium R mil.	Low R mil.
Irrigation	-44.5%	-44.5%	-44.5%	-44.5%	-43.8%	-44.5%	-44.5%	-44.5%	-44.5%
Beef Farming	-30.4%	-30.4%	-30.4%	0.0%	0.0%	0.0%	-30.4%	-30.4%	-30.4%
Game Farming	-22.9%	-27.7%	-24.4%	-31.0%	0.0%	-20.0%	-28.0%	-28.0%	-28.3%
Hunting	-36.7%	-36.7%	-36.7%	-9.8%	-100.0%	-36.7%	-36.7%	-36.7%	-36.7%
Taxidermy, Game catching, etc.	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Accomodation	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Total	**-38.5%**	**-39.6%**	**-39.0%**	**-40.9%**	**-40.0%**	**-40.4%**	**-40.1%**	**-40.3%**	**-39.5%**

The percentage change in the employment opportunities as shown in the table above will be -40.9% direct and -40.0% indirect and induced employment opportunities. Direct employment for irrigation will come to -44.5%, with hunting at -36.7% direct employment opportunities.

As far as direct GDP is concerned the percentage change for irrigation will come to -44.5% followed by hunting with -9.8% per annum.

The following table presents the macro-economic parameters after the estimated risk factors were applied.

Table 30: Category 3 - New Situation Expressed as Macro-Economic Parameters (2013 prices)

	Gross Domestic Product			Employment			Payments to Households		
	Direct R mil.	Indirect/ Induced R mil.	Total R mil.	Direct Number	Indirect/ Induced Number	Total Number	Total R mil.	High/ Medium R mil.	Low R mil.
Irrigation	2.17	1.98	4.15	38	9	47	1.36	1.06	0.30
Beef Farming	0.03	0.01	0.04	1	0	1	0.01	0.01	0.00
Game Farming	0.50	0.21	0.71	2	2	4	0.10	0.07	0.03
Hunting	0.07	0.06	0.13	1	0	1	0.06	0.04	0.02
Taxidermy, Game catching, etc.	0.34	0.34	0.68	2	1	3	0.21	0.16	0.05
Accomodation				0	0	0			
Total	**3.11**	**2.60**	**5.71**	**44**	**12**	**56**	**1.74**	**1.34**	**0.40**

According to the table above the balance of activities will support 44 direct and 12 indirect and induced employment opportunities. Hunting and the related professional services will provide 35 direct employment opportunities.

As far as direct GDP is concerned, irrigation will create R2.17 million, followed by game farming with R0.50 million per annum.

In the following table the projected negative impact of the proposed mining activity are presented.

Table 31: Category 3 - Change Expressed as Macro-Economic Parameters (2013 prices)

	Gross Domestic Product			Employment			Payments to Households		
	Direct R mil.	Indirect/ Induced R mil.	Total R mil.	Direct Number	Indirect/ Induced Number	Total Number	Total R mil.	High/ Medium R mil.	Low R mil.
Irrigation	-1.74	-1.58	-3.32	-31	-7	-38	-1.09	-0.85	-0.24
Beef Farming	-0.01	-0.01	-0.02	0	0	0	-0.00	-0.00	-0.00
Game Farming	-0.15	-0.08	-0.23	-1	0	-1	-0.04	-0.03	-0.01
Hunting	-0.04	-0.04	-0.08	0	-1	-1	-0.04	-0.02	-0.02
Taxidermy, Game catching, etc.	-	-	-	0	0	0	-	-	-
Accomodation	-	-	-	0	0	0	-	-	-
Total	**-1.94**	**-1.71**	**-3.65**	**-32**	**-8**	**-40**	**-1.17**	**-0.90**	**-0.27**

The change in employment opportunities as shown in the table above will be -32 direct and -8 indirect and induced employment opportunities. Direct employment for irrigation will be reduced by -31, with the game farming -1 direct employment opportunities.

As far as direct GDP is concerned the irrigation change will be –R1.7 million.

4.3.4 Total Impact

Table 32: Total Impact - Current Situation Expressed as Macro-Economic Parameters (2013 prices)

	Gross Domestic Product			Employment			Payments to Households		
	Direct R mil.	Indirect/ Induced R mil.	Total R mil.	Direct Number	Indirect/ Induced Number	Total Number	Total R mil.	High/ Medium R mil.	Low R mil.
Irrigation	8.33	8.64	16.98	122	42	164	5.82	4.52	1.30
Beef Farming	0.41	0.22	0.63	2	2	4	0.12	0.09	0.03
Game Farming	2.36	3.33	5.69	20	33	53	2.01	1.96	0.05
Hunting	3.13	3.06	6.20	17	13	30	2.91	1.97	0.94
Taxidermy, Game catching, etc.	4.93	4.97	9.90	27	19	46	3.13	2.32	0.81
Accomodation	10.53	12.29	22.82	70	51	121	11.91	8.05	3.86
Total	**29.70**	**32.52**	**62.22**	**257**	**160**	**417**	**25.89**	**18.91**	**6.98**

The table above reflects that the total impact of all the activities support 257 direct and 160 indirect and induced employment opportunities. Irrigation provides the majority of the direct employment, namely 122.

As far as direct GDP is concerned irrigation creates R8.33 million per annum. It in the interpretation of GDP it is necessary that it be evaluated in terms of its value added per hectare namely R1 150 per hectare for the direct GDP. This includes the Gross Operating Surplus, renumeration of employees and Net Indirect Taxes.

In the following table the identified risks are presented as a percentage.

Table 33: Total Impact - Percentage Change Expressed as Macro-Economic Parameters (2013 prices)

	Gross Domestic Product			Employment			Payments to Households		
	Direct R mil.	Indirect/ Induced R mil.	Total R mil.	Direct Number	Indirect/ Induced Number	Total Number	Total R mil.	High/ Medium R mil.	Low R mil.
Irrigation	-40.4%	-40.5%	-40.5%	-40.4%	-41.5%	-40.7%	-40.8%	-40.9%	-40.6%
Beef Farming	-35.3%	-35.8%	-35.5%	-44.3%	-50.0%	-47.0%	-35.8%	-35.8%	-35.8%
Game Farming	-12.6%	-33.7%	-25.9%	-39.5%	-39.4%	-39.4%	-34.1%	-34.9%	-14.6%
Hunting	-62.6%	-62.6%	-62.6%	-62.5%	-61.5%	-62.2%	-62.6%	-62.6%	-62.6%
Taxidermy, Game catching, etc.	-62.8%	-62.8%	-62.8%	-62.8%	-62.5%	-62.8%	-62.8%	-62.8%	-62.8%
Accomodation	-59.5%	-59.5%	-59.5%	-59.5%	-60.0%	-59.6%	-59.5%	-59.5%	-59.5%
Total	**-52.0%**	**-52.7%**	**-52.4%**	**-52.2%**	**-51.6%**	**-52.0%**	**-53.7%**	**-53.0%**	**-55.5%**

The percentage change in the employment opportunities as shown in the table above will be 52.2% direct and 51.6% indirect and induced employment opportunities. Direct employment for irrigation will come down by 40.4% and accommodation and tourism 59.5% direct employment opportunities.

As far as direct GDP is concerned the percentage change for irrigation will come to 40.4% and hunting with 63% per annum.

The following table presents the macro-economic parameters after the estimated risk factors were applied.

Table 34: Total Impact - New Situation Expressed as Macro-Economic Parameters (2013 prices)

	Gross Domestic Product			Employment			Payments to Households		
	Direct R mil.	Indirect/ Induced R mil.	Total R mil.	Direct Number	Indirect/ Induced Number	Total Number	Total R mil.	High/ Medium R mil.	Low R mil.
Irrigation	4.83	5.04	9.87	70	24	94	3.35	2.60	0.76
Beef Farming	0.26	0.14	0.41	1	1	2	0.07	0.05	0.02
Game Farming	2.09	2.12	4.21	12	20	32	1.26	1.22	0.04
Hunting	1.17	1.15	2.32	7	5	12	1.09	0.74	0.35
Taxidermy, Game catching, etc.	1.98	1.99	3.97	11	8	19	1.26	0.93	0.32
Accomodation	4.27	4.98	9.25	28	21	49	4.82	3.26	1.56
Total	**14.61**	**15.42**	**30.02**	**129**	**79**	**208**	**11.85**	**8.80**	**3.05**

According to the table above the total impact of the balance of activities will support 129 direct and 79 indirect and induced employment opportunities. Irrigation will provide 70 direct employment opportunities.

As far as direct GDP is concerned, irrigation will create R4.83 million, followed by accommodation en tourism with R4.27 million per annum.

In the following table the projected negative impact of the proposed mining activity is presented.

Table 35: Total Impact - Change Expressed as Macro-Economic Parameters (2013 prices)

	Gross Domestic Product			Employment			Payments to Households		
	Direct R mil.	Indirect/ Induced R mil.	Total R mil.	Direct Number	Indirect/ Induced Number	Total Number	Total R mil.	High/ Medium R mil.	Low R mil.
Irrigation	-3.50	-3.61	-7.11	-52	-18	-70	-2.47	-1.93	-0.54
Beef Farming	-0.14	-0.08	-0.22	-1	-1	-2	-0.04	-0.03	-0.01
Game Farming	-0.27	-1.21	-1.47	-8	-13	-21	-0.75	-0.74	-0.01
Hunting	-1.96	-1.92	-3.88	-10	-8	-18	-1.82	-1.23	-0.59
Taxidermy, Game catching, etc.	-2.96	-2.98	-5.94	-16	-11	-27	-1.88	-1.39	-0.48
Accomodation	-6.27	-7.31	-13.57	-41	-30	-71	-7.08	-4.79	-2.29
Total	**-15.09**	**-17.10**	**-32.19**	**-128**	**-81**	**-209**	**-14.04**	**-10.11**	**-3.93**

The change in employment opportunities as shown in the table above will be 128 direct and 81 indirect and induced employment opportunities. Direct employment for irrigation will be reduced by 52, with the accommodation and tourism 41 direct employment opportunities.

As far as direct GDP is concerned the irrigation change will be R3.50 million and accommodation and tourism with R6.27 million per annum.

4.3.5 Projected Income Loss

In the following table the estimated income loss to different economic activities based on the assumptions as discussed are presented. The value of the environmental loss is based on the projected loss of animals and plant diversity and is calculated by using the eco-tourism and hunting as proxy.

Table 36: Estimated Annual Income Loss (2013 prices)

	Category 1 Farms Rand million	Category 2 Farms Rand million	Category 3 Farms Rand million	Total Rand million
Beef & Livestock Farming	R -0.12	R -0.19	R -0.02	R -0.33
Game Farming & Hunting	R 0.00	R -2.18	R -0.06	R -2.23
Professional and Taxidermist Services	R 0.00	R -5.36	R -0.22	R -5.58
Accommodation (Tourists & Hunting)	R 0.00	R -13.80	R 0.00	R -13.80
Irrigation	R -1.21	R -2.26	R -3.05	R -6.51
Environmental Impact	R -0.07	R -12.98	R -0.06	R -13.10
Total	**R -1.39**	**R -36.77**	**R -3.40**	**R -41.56**

The Category 2 farms stand to lose the most with an R36.77 million loss, followed by the Category 3 farms with an R3.4 million loss per annum.

5 Cost Benefit Analysis: Justification of the Greater Soutpansberg Project – Mopane

5.1 Objective of the Cost Benefit Analysis

The principles underlying the Standard Cost Benefit Analysis (CBA) are applied to evaluate the financial and economic viability of the Overvaal Colliery Mine Project, taking into consideration all negative and positive costs (impacts) of the mining activities.

The CBA approach provides a logical framework by means of which development projects can be objectively evaluated and, as such, serves as an aid in the decision-making process. (A more detailed explanation of the CBA can be found in Appendix E).

5.2 Cost Benefit Analysis Methodology

A CBA comprises two distinct portions, a financial CBA component and an economic CBA component. The financial CBA component is based on market and nominal prices, whilst the economic CBA component is based on shadow/economic and constant prices. The use of shadow/economic prices is necessary in order to reflect more realistic values of scarce economic resources. Market prices often do not give a true representation of the scarcity values of resources, owing to interference in market price setting such as government tax regulation and artificial adjustments to, for example, fossil fuels prices, electricity tariffs and minimum wage levels.

Within the CBA framework, various impacts have been calculated for each year of the project period.

The impacts for each year of the project are discounted to present values, using an appropriate discount rate. The financial CBA is conducted in current prices (with the assumption that the SA inflation rate over the longer period will be less than 6%) and a real yield on capital of 5% giving a discount rate of 11% per annum, reflecting the cost of capital. The economic CBA is done in constant prices and discounted by a social discount rate of 8% per annum.

The CBA methodology has been chosen to indicate whether the project in question is feasible or not. Within the framework, the estimated cost of the project is compared by means of a ratio (Benefit Cost Ratio) to the estimated benefits of the project. In order for a project to be considered financially and economically viable, this ratio must have a value greater than 1 in order to indicate that benefits outweigh costs.

Additional viability indicators provided are Net Present Value (NPV) and Internal Rate of Return (IRR). A more detailed discussion on the interpretation of each indicator is included in the results section of each of the two CBA components.

5.3 General Overview

The CBA clearly distinguishes between cost and benefit aspects of the project.

Costs: Within the CBA framework, the costs related to the project can be separated into three distinct components:

- capital expenditure;
- operational expenditure; and

- External cost impacts (externalities).

This breakdown mirrors the more widely-defined macro-economic impact, a discussion of which follows in Appendix A.

Capital expenditure is made up of:

- Investment in the colliery mine infrastructure itself (the largest capital expenditure component);
- Expenditure on the construction of transport infrastructure;
- Expenditure on the development of structures to supply water to the mine.

Operational expenditure includes:

- Railway maintenance cost and operational costs,
- Water Supply - Maintenance and Operation costs,
- Processing costs, and
- Coal Transport and port costs.

The benefits of the project are in the form of revenue generated from the sale of the extracted coal to domestic markets, in lieu of imported coking quality coal or revenue from exporting of the coal.

5.4 Assumptions Underlying the CBA

5.4.1 Costs Relating to the Project

The assumptions that were used in relation to the costs for both the financial and economic CBA are briefly discussed below.

5.4.1.1 Capital Expenditure:

The Mopane project consist of two separate mines (collieries) that are separately phased and developed in the same area nearly 20 years apart. All capital expenditure is assumed to occur over a two five year construction periods with a three year early planning period namely 2015, 2016 and 2017. The Voorburg construction period is estimated to be from 2017 to 2021. The Voorburg life of mine (LOM) production period runs from 2019 to at least 2042, 24 years, during which period the coal resources at the project location should be exhausted.

The Jutland construction is planned to start in 2030 to 2034.

The estimated Capital expenditure as provided by CoAL is provided in the table below:

Table 37: Projected Capital Expenditure for the Proposed Voorburg and Jutland Collieries (constant 2013 prices)

	Voorburg			Jutland		
	Financial Costs	Shadow Price Factor	Economic Costs	Financial Costs	Shadow Price Factor	Economic Costs
	R Millions		R Millions	R Millions		R Millions
Upfront Capex	**410.25**		**483.61**	**470.25**		**680.94**
Exploration	200.00	0.9896	197.92	300.00	0.9896	296.88
Bulk Sample	60.25	0.9837	196.74	60.25	0.9837	295.10
Land Acquisition	30.00	0.9837	59.27	30.00	0.9837	59.27
Consultants & Other	120.00	0.9896	29.69	80.00	0.9896	29.69
Capital Construction costs	**3 579.93**		**3 452.21**	**3 648.12**		**2 988.59**
Exploration	74.11	0.9896	73.34	74.34	0.9896	73.57
Bulk Services	406.54	0.9323	379.02	281.13	0.9323	262.10
Mine Infrastructure	626.33	0.9855	617.25	648.16	0.9855	638.77
Surface Mining East Pit	371.68	0.9323	346.52	410.65	0.9323	382.85
Surface Mining Central Pit	405.66	0.9323	378.20	329.73	0.9323	307.41
Surface Mining West Pit	221.01	0.9323	206.04	429.50	0.9323	400.42
ROM Handling	296.46	0.9837	291.62	296.46	0.9837	291.62
Plant	641.00	0.9857	631.85	641.00	0.9857	631.85
Product Handling	111.70	0.9837	109.88	111.70	0.9837	109.88
Overheads	381.96	0.9837	375.73	381.96	0.9837	375.73
Discard Dump	43.48	0.9837	42.77	43.48	0.9837	42.77

From the above it appears that expressed in 2013 constant prices the estimated capita for the Voorburg colliery is estimated at R3 579.9 million with the upfront spending estimated at R410.25 million. In the case of the Jutland colliery the estimated capital is R3 648 million with R470 25 capital upfront.

In the following table the construction schedule and associated amounts for the Voorburg colliery is presented.

Table 38: Voorburg Colliery Proposed Construction Schedule and Values (constant 2013 prices)

Year	2015	2016	2017	2018	2019	2020	2021	Total
Construction schedule	0%	0%	16%	38%	14%	10%	22%	100%
Upfront Capex	136.75	136.75	136.75					410.25
Capital Construction costs			572.79	1 360.37	501.19	357.99	787.58	3 579.93
Note: All figures are Rand million								

The above table show that it is planned that the upfront Capex will be spent in three equal amounts followed by the construction costs.

In the following table the construction schedule and associated amounts for the Jutland colliery is presented.

Table 39: Jutland Colliery Proposed Construction Schedule and Values (constant 2013 prices)

Year	202	202	202	202	202	202	2030	2031	2032	2033	2034	Total
Construction schedule							16%	38%	14%	10%	22%	100%
Upfront Capex	78.4	78.4	78.4	78.4	78.4	78.4	0.0	0.0	0.0	0.0	0.0	470.3
Capital Construction							583.	1386.	510.	364.	802.	3
Note; All figures are Rand million												

The above table show that it is planned that the upfront Capex will be spent in four equal amounts followed by the construction costs.

5.4.1.1.1 Operational Expenditure

In the following table the projected mining costs used in the model is presented as received from mining consultants.

Table 40: Estimated Operational Mining Cost (constant 2012 prices)

Item	Cost per year Rand	Rate Rand/ton
Parting Mining		**25.26**
Coal Mining		**9.77**
Diesel		**10.50**
Exploration & Drilling	3 000 000	
Head Office	3 000 000.00	
Mining Contractor	8 400 000.00	
Other Fixed	5 100 000.00	
Owners Team	9 000 000.00	
Processing		**40.00**
Rehabilitation		**500 000 (Rand/ha)**
Siding		**5.40**
Soft Overburden including waste mining		**25.26**
Survey	1 680 000.00	
Topsoil Stripping		**0**
Port		90.00
Rail Export		294.00

As the cost is expressed as a value per ROM ton, if converted to product tons the amount is R185.46.

The following transport costs where used in the calculations as presented in the table above:

- Loading Cost – R5.4 per saleable ton.
- Rail transport from Siding to Maputo – R294 per ton.
- Port Costs – R90 per ton.

The estimated maintenance costs expressed as a percentage used in the CBA model is presented in the following table.

Table 41: Projected Maintenance Costs

	Voorburg Rand million	Jutland Rand million	Classification	Maintenance %	Voorburg Rand Million	Jutland Rand million
Exploration	74.1	74.3	Civil	0.50%	0.37	0.37
Bulk Services	406.5	281.1	Civil	0.50%	2.03	1.41
Mine Infrastructure	626.3	648.2	Mechanical	5.00%	31.32	32.41
Surface Mining East Pit	371.7	410.7	Civil	0.50%	1.86	2.05
Surface Mining Central	405.7	329.7	Civil	0.50%	2.03	1.65
Surface Mining West Pit	221.0	429.5	Civil	0.50%	1.11	2.15
ROM Handling	296.5	296.5	Mechanical	1.00%	2.96	2.96
Plant	641.0	641.0	Engineering	5.00%	32.05	32.05
Product Handling	111.7	111.7	Mechanical	1.00%	1.12	1.12
Overheads	382.0	382.0		0.00%	0.00	0.00
Discard Dump	43.5	43.5		0.00%	0.00	0.00
Total					**74.84**	**76.17**

At full production the amount of R74.84 million is allocated as maintenance per annum in the Voorburg colliery and R76.17 million as maintenance in the Jutland colliery.

5.4.1.2 Externalities

A number of externalities have been identified which have been costed and were included in the model. The following have been included:

- Current Local Economic Activities. These costs have been estimated in a separate section and are included in the appropriate model. The costs to the farming livestock, game and irrigation practises are discussed in detail in a previous section and the estimated annual loss in turnover by the three categories of farms were investigated and added together and an amount of R58.17 million per annum was added to the CBA as a cost to the system.
- Rehabilitation and Environmental Costs. The amount of R500 000 per hectare were used as the rehabilitation costs. A value of R32.72 million was estimated and included as the environmental cost item. It must be emphasised that this amount can change as the rest of the project reports become available.
- Mine Closure: A statuary amount of R206 million was used over time in constant prices has been used as a cost item.

5.4.2 Social Costs

As no social cost has yet been provided the item is not included in the analysis.

5.4.3 Benefits Relating to the Project

The benefits associated with the project are the revenue resulting from the sale of the coal to Eskom and the coal exported. Two issues are important in this instance namely the quantity of coal produced the tons as provided by the mining report has been used for the base calculation.

Two price structures is present in this case namely the Eskom price and the export price. The Eskom price is determined during a negotiation process and is at present calculated using the Giga Joules

output per ton at R12.13 per Giga Joule. The Voorburg coal price is estimated at R283/ton in 2019 prices and the Jutland coal at R327 per ton in constant prices from the year of production. The financial prices are expressed using assumptions about inflation; the constant prices make provision for real price increases over time. Therefore, the difference in the R283 and R327 Rand per ton price is as a result of the real price increase of about 0.92% per annum based on an analysis of the coal market. It is obvious; however, that these prices will depend on the quality of the coal supplied and is at present based on the provided giga joules output of the coal.

As far as the export price is concerned two factors play a role namely international demand which again is influenced by the health of the world wide economy and the relative strength of the Rand versus the US$. The following serves as an example of this issue. International prices are quoted in US dollars and the exchange rate has a direct influence on the Rand price. For a base price of $147 per ton and an exchange rate of R9.50 to the US$ was the Rand price is R1 396. Both the international price as quoted in US$ and the exchange rate influences the Rand price of the export section of the production. Sensitivity analyses were run on a number of price scenarios and are reported on separately.

5.5 Results

5.5.1 Financial Cost Benefit Analysis

The table below reflects the summarised results of the Financial CBA. As previously discussed, the analysis has been done in nominal terms at a 6% SA inflation rate, and using a financial discount rate of 11% per annum. The long-term discount rate of 11% is in line with a real interest rate of 5%. However it was necessary to change certain item inflation rates because of certain externalities applicable to specific items.

The following detailed rates were used.

Table 42: Inflation Rates used in the Financial CBA Model

Cost Item	Inflation Rate[23]
Coal Price	6%
Capital	6%
Mining Costs - Including Labour and Electricity	8.5%
Maintenance Costs	6%
Transport Costs	7.5%
Disbenefits	6%

As construction capital is utilised over a number of years the constant prices had to adapted, using the Reserve Bank upper limit.

Mining costs includes labour and electricity and it was necessary to make provision for a higher rate, the same apply to the transport costs.

[23]Source: Conningarth Projections

The CBA results based obtained from the Mosaka models bsed on the assumptions as discussed for the total mining project are presented in the table below.

Table 43: Results of the Financial CBA (Current prices)

	CBA Results		
	NPV	***IRR***	***BCR***
Financial CBA Results	Rand Million	%	number
Indicators	4 656	18.9	1.89

Results are interpreted as follows:

- The Net Present Value (NPV) of an investment compares the present value of the benefits from an investment with the present value of all costs. In order for a project to be considered viable, a positive NPV is required as this indicates that the overall benefits outweigh the overall costs of the project over time. The NPV above shows that the net benefit accrued is positive with an amount of R 4 656 million.
- The Benefit Cost Ratio (BCR) is a ratio of the present value of benefits relative to the present value of costs. A project should only be considered viable if the BCR is greater than 1. The BCR of the 1.85 that for each Rand invested in the project there is an expected return of between R1 and R1.89.
- The Internal Rate of Return (IRR) is the discount rate at which present values of both benefits and costs are equal. Projects should have and IRR greater than the discount rate to be considered viable. In this case the IRR is 18.9% which is almost two times above the discount rate.
- The NPV, BCR and IRR all confirm the financial viability of the project.

5.5.2 Economic Cost Benefit Analysis

The economic CBA is conducted in terms of the economic values of costs and benefits. For this purpose, the shadow prices are used in order to reflect the real cost of using scarce economic resources in the production processes, as discussed in the Methodology. Constant 2012 prices are used and a Social Discount Rate of 8% is applied.

Table 44: Results of the Economic CBA (Economic prices)

	CBA Results		
	NPV	***IRR***	***BCR***
Economic CBA Results	Rand Million	%	number
Indicators	R2 272	14.3	1.64

The results show the following features:

- When considering the economic CBA, results similar to those in the Financial CBA are depicted. The discount rate used for the economic CBA is 8% per annum and figures are not adjusted for inflationary effects. The NPV of R2 272million a very positive net gain.
- The BCR of 1.60 shows that returns of 1.64 are expected for each Rand invested in the project.

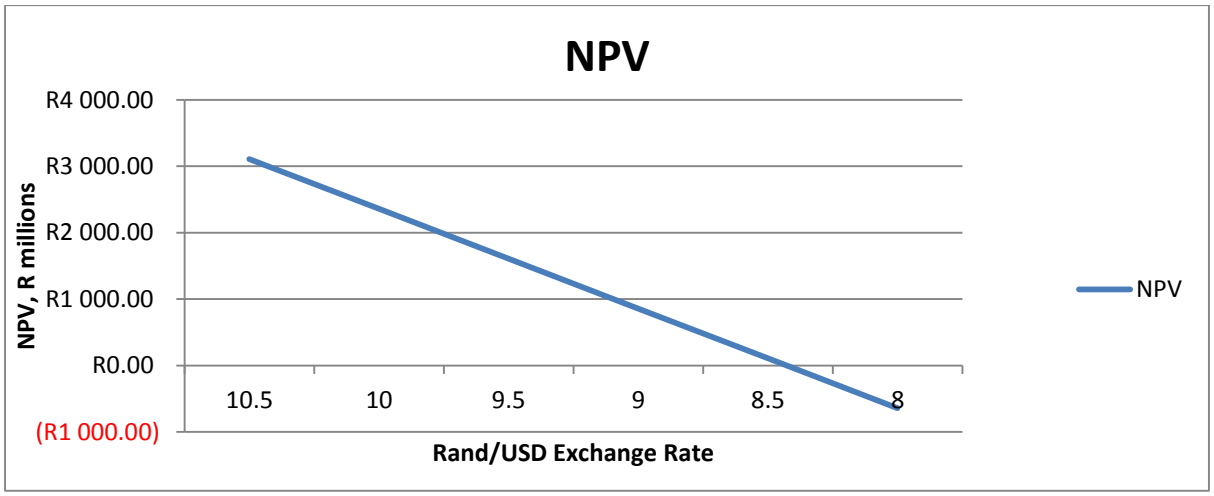
- The IRR of 14.3% is almost two and a half times the social discount rate of 8%.
- The NPV, BCR and IRR all confirm economic viability of the mining project.

5.5.3 Sensitivity Analysis

A sensitivity analysis was performed on a number of price options, specifically the export price as expressed in US$ terms and the possible movements in the exchange rate.

The following options were considered namely a 10% drop in US$ prices and a remarkable strengthening of the Rand against the dollar. In the following graph the NPV of a $147 per ton international price with a strengthening Rand is presented.

Graph 2: The Net Present Value for an International Coal Price at different Exchange Rates



The graph indicates that with a $147 per ton international price and an exchange rate above R8.5 to the US$ the NPV remains positive. It must be kept in mind that less than two years ago the international price was around $207 per ton and the exchange rate R7 to the US$, giving a rand price of nearly R1 450 per ton.

All international price projections indicate a strengthening of the international price over time. We are there for convinced that the economic viability of the project is strong and the project is feasible.

5.5.4 Conclusion

For the purposes of this report, a CBA was applied in order to consider the viability of the Overvaal Colliery project.

In conducting the CBA, the various stakeholders, who will be either positively or negatively impacted by the project, have been identified. The various impacts have been calculated for each year over the period that was used to evaluate the project, and then discounted to present values, using appropriate discount rates. The financial CBA has been done in nominal prices and discounted by a rate reflecting the cost of capital of 11%. The economic CBA has been done in constant prices and discounted by a social discount rate of 8%.

It thus appears that the project is overall economically viable using a CBA approach.

6 Macro-Economic Impact Analysis: National, Regional and Local Impacts of the Proposed Greater Soutpansberg Project - Mopane

6.1 Objective

The objective of this section is to present the macro and socio-economic impacts that emanate from both the construction and operational phases of the capital investment project under consideration. The Cost Benefit Analysis (CBA) preceded the macro-economic impact analysis and the information requirements for the CBA will serve as a major data source needed to initiate the macro-economic modelling system that quantifies the impacts.

The macro-economic impact analysis was conducted at a national, regional/provincial and local level. However, the main focus of the analysis is the Limpopo Province and the Makhado and Musina Local Municipality areas, in particular. The impact analysis is based on the contribution that the project is expected to make towards the national, provincial and local economies in terms of the following macroeconomic aggregates:

- Gross Domestic Product (Economic Growth);
- Employment Creation:
  - Skilled Labourers;
  - Semi-Skilled Labourers; and
  - Unskilled Labourers.
- Capital Utilisation (Investment);
- Household Income (Poverty Alleviation in terms of Low Income Households);
- Fiscal Impacts; and
- Balance of Payments.

The macro-economic impact analysis was so structured to reflect the average annual production output over the project period of 30 years. Furthermore these macro-economic impacts also reflect the ultimate or total outcome, i.e. through the direct, indirect and induced linkages of the construction and operational parts of the project in question.

6.2 Methodology

6.2.1 Overview of the Macro-Economic Impact Analysis

As indicated previously in the report, the main purpose of this chapter of the study is to estimate the impact of the proposed Mopane colliery on the South African economy as well as to give an indication of the impact it will have on the provincial economy of Limpopo and the local economy of Musina and Makhado Local Municipalities. *It is important to note that the National and Provincial macro-economic impact results are shown in a separate format for the construction and operational phases*. For purposes of the impact analysis Conningarth Economists has compiled and updated Social Accounting Matrixes (SAMs) for the South African and Limpopo economies which formed the basis of the impact model – *viz* – a general equilibrium model. This model will quantify the direct, indirect and induced impacts over time.

The compilation of the updated South African and Limpopo SAMs was part of a major initiative by the Development Bank of Southern Africa (DBSA), Department of Provincial and Local Government (DPLG), StatsSA and the South African Reserve Bank (SARB) to compile nine comparable provincial SAMs that have all been updated to 2006 prices and have been benchmarked with the new South African SAM of 2006. The Limpopo SAM was finalized in October 2009, and was overseen by an expert group of people from the Limpopo Province, chaired by the Limpopo Economic Development Department.

The benchmarking exercise was necessary to ensure that all control totals add up to the National Account figures as reflected in the SARB Quarterly Bulletin – June 2008 and the relevant figures reflected in the StatsSA publications, especially P0144 that reflects the 2006 Supply and Use Matrix.

The provincial SAMs compiled by Conningarth Economists were converted into user-friendly macro-economic impact models which can be used by each province to calculate the economic impact of "interventions" by way of programmes and projects on the economy of the relevant province.

The model makes use of Excel spread sheets and is driven by a set of "Macros" which are used to eliminate the need to repeat the steps in a simple task over and over. For a specific project or say a policy intervention, the model provides the size of the macro-economic impacts, the values of which are then also used to calculate key economic performance or efficiency indicators at national, provincial and local government level. Such key macro-economic performance indicators can be produced for both the construction and operational phases of a specific project.

It is also important to highlight the fact that the macro-economic impact model is robust enough to cater for varying degrees of input data qualities and availability. For instance, if the impacts are required at local government level, the model lends itself well to adjusting relevant provincial coefficients to realistically portray the situation at lower levels.

6.2.2 The Social Accounting Matrix

In layman's terms a Social Accounting Matrix (SAM) also represents a mathematical matrix depicting the linkages that exist in financial terms between all the major 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 also reflects the inter-sectorial linkages that are present in an economy. The development of the SAM also provides a logical framework within the context of the National Accounts in which the activities of especially households are accentuated and distinguished prominently. The households are indeed the basic economic unit where significant decisions are taken affecting economic variables, such as consumption expenditure and personal saving. By combining households into homogenic groups in the SAM, makes it possible to study how the economic welfare of these groups is affected by changes in the economy.

To summarise, the SAM serves a dual purpose. Firstly, it is a reflection of the magnitude of financial linkages that exist between the major 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. A more detailed technical description of the SAM and its analytical attributes are provided in Appendix A.

By applying the general tenets of the general equilibrium economic model to the SAM structure, the so-called direct, indirect and induced effects emanating from the various levels of value adding at all levels i.e. primary (including mining), manufacturing, commercial services etc. are quantified.

The direct impact that occurs, for example, in the mining industry, is measured through changes in production/turnover, payment of remuneration to employees and profit generation. The indirect impacts refer to impacts on industries that provide raw material inputs to the mining industry and other backward linkages. The induced effect or income effect refers to a further round of economic activity that takes place in the economy because of additional consumer spending as a result of the additional salaries and wages that occur throughout the economy. The impact analysis will be based on the standard economic aggregates.

6.3 Data Sources and Assumptions

Modelling the macro-economic impact of the construction and operational phases of the Mopane Project requires certain detailed information regarding these two phases of the project. However complicating the issue is the two sections of the project namely the Voorburg and Jutland collieries, which will be developed a number of years apart. The construction data used in the analysis is the capital cost for an average year during the construction period, interpreting the results means that for the two separate four construction periods is the estimated annual impact.

The same applies to the operational phase as the Voorburg colliery is in production a number of years before the Jutland colliery start with production. The results are presented are for an average Voorburg production year and combined production year.

When evaluating the construction and operational phases the model requires information on the new mine such as costs of buildings, machinery and equipment, etc. This type of data as well as the planned outputs of the mine, etc. are discussed in detail in the appropriate section. There are, however, also externalities linked to the operation of the mine, such as the negative impact on agriculture and positive impacts on government spending. The possible magnitude of these externalities is discussed in detail in the previous chapters.

Examples of the type of inputs the model requires are given in Appendix F.

6.4 Macro-Economic Impact Results on the South African Economy

6.4.1 Summary of Results

The macro-economic impact assessments contained in this study cover the totals of the construction phase over the construction phase period of two four year periods and the average annual operational phase totals for the Voorburg years of production and then the Voorburg and Jutland production combined. The entire results section is reflected in a construction phase and/or in an operational phase, respectively. The results that follow reflect the impact arising from the main components involved with the construction and operation of the coal mine, transportation and water supply.

In the two tables below the impact on the National Economy is presented for the construction period and the operational period.

Table 45: The Annualised Macro-economic Average Impact of the Construction Phase of the Voorburg and Jutland Colliers on the South African Economy (2013 prices)

	Construction Impact: *National*			
	2. Mining			
	Direct impact	Indirect impact	Induced impact	Total impact
Impact on Gross Domestic Product (GDP)	338	368	490	**1 196**
Impact on capital formation	491	607	912	**2 009**
Impact on employment [person years]	2 518	983	1 334	**4 834**
Skilled impact on employment [person years]	468	229	323	**1 020**
Semi-skilled impact on employment [person	1 166	415	554	**2 135**
Unskilled impact on employment [person years]	884	338	457	**1 679**
Impact on Households				**809**
Low Income Households				**126**
Medium Income Households				**156**
High Income Households				**527**
Fiscal Impact				**364**
National Government				334
Provincial Government				4.1
Local Government				25.3
Impact on the Balance of Payments				**-789**
Note: All Rand values reflected are expressed in Rand Millions				

The above table presents the macro-economic results per annum during the construction phase.

Table 46: The Annualised Macro-economic Impact of the Operational Phase of the Voorburg Colliery on the South African Economy (2013 prices)

	Operational Impact: *National*			
	2. Mining			
	Direct impact	Indirect impact	Induced impact	Total impact
Impact on Gross Domestic Product	1 481	571	1 516	**3 567**
Impact on capital formation	1 431	1 333	2 817	**5 581**
Total impact on employment [job opportunities]	917	1 562	4 188	**6 667**
Skilled impact on employment [job opportunities]	147	348	1 003	**1 498**
Semi-skilled impact on employment [job	605	645	1 740	**2 991**
Unskilled impact on employment [job	165	569	1 445	**2 179**
Impact on Households				**2 494**
Low Income Households				**415**
Medium Income Households				**1 025**
High Income Households				**1 200**
Fiscal Impact				**980**
National Government				905
Provincial Government				11
Local Government				64
Impact on the Balance of Payments				**1 525**
Note: All Rand values reflected are expressed in Rand Millions				

Table 47: The Annualised Macro-economic Impact of the Operational Phase of the Voorburg and Jutland Colliers on the South African Economy (2013 prices)

	Operational Impact: *National*			
	2. Mining			
	Direct impact	**Indirect impact**	**Induced impact**	**Total impact**
Impact on Gross Domestic Product	2 732	1 053	2 796	**6 580**
Impact on capital formation	1 431	2 460	5 197	**9 087**
Total impact on employment [job opportunities]	1 486	2 882	7 726	**12 093**
Skilled impact on employment [job opportunities]	238	643	1 850	**2 731**
Semi-skilled impact on employment [job opportunities]	980	1 190	3 210	**5 381**
Unskilled impact on employment [job opportunities]	267	1 049	2 666	**3 982**
Impact on Households				**4 601**
Low Income Households				**765**
Medium Income Households				**1 890**
High Income Households				**2 213**
Fiscal Impact				**1 808**
National Government				1 670
Provincial Government				19
Local Government				119
Impact on the Balance of Payments				**2 813**
Note: All Rand values reflected are expressed in Rand Millions				

6.4.2 Impact on Gross Domestic Product (GDP)

GDP is a good indicator of economic growth and welfare as it represents, among other criteria, remuneration of employees and gross operating surplus (profits) as components of value added at all the levels of the economy.

According to Table 44 the total GDP of the construction phase impact on the RSA's GDP, is estimated to amount to approximately R1 196 million (in constant, 2013 prices) annual impact over the construction period, of which the direct impact is estimated at R338 million.

Similarly, Table 45 reflects the total average annual GDP, during the Voorburg operational phase, impact on the RSA's GDP, which is estimated to amount to approximately R3 567million (in constant, 2013 prices), of which the direct impact is estimated at R1 481 million and accounting for nearly half (41.5%) when compared to the total GDP. This emphasises the importance of the so-called multiplier effects which the mine will have on the South African economy.

Similarly, Table 46 reflects the total average annual GDP, during the Voorburg and Jutland operational phase, impact on the RSA's GDP, which is estimated to amount to approximately R6 580 million (in constant, 2013 prices), of which the direct impact is estimated at R2 732 million and accounting for nearly half (41.5%) when compared to the total GDP. This emphasises the importance of the so-called multiplier effects which the mine will have on the South African economy.

From these figures, it can already be assumed, that the ultimate benefit of the bulk of salaries and wages paid out, directly and indirectly, in the course of constructing and operating the project will not accrue within Limpopo, but will filter through to the other provinces in SA.

6.4.3 Impact on Capital Investments

Productive capital assets are required to support or generate any given amount of economic activity (i.e. GDP). These capital assets, together with labour and entrepreneurship, form the core productive factors needed for production. Obviously the effectiveness and efficiency with which these factors are combined will determine the overall level of productivity and profitability of such assets. The former will in turn depend on a whole array of factors, of which the appropriate technology and skills content of the labour force are important. The above Table 44 indicates the following: construction phase capital stock that needs to be employed (utilised) nationally to sustain this project amounts to R2 009 million, of which, R491 million is attributed directly to the Voorburg Colliery annually during construction.

During the operational phase of the Voorburg Colliery the total annual capital necessary to sustain the mining activity is presented in Table 45 and amounts to R5 581 million. During the combined production period the annual capital necessary to sustain mining activity is presented in Table 46 and amounts to R9 087 million.

6.4.4 Impact on Employment Creation

In evaluating the employment numbers it is important to take into consideration the fact that these numbers are based on the econometric multipliers and that the difference between direct, indirect and induced opportunities should be applied.

During the construction phase the annual impact on total[24] employment amounts to 4 834 employment opportunities that will only be sustained over the construction period. Of this number, the annual labour compliment of 2 518 during the construction phase is associated directly with the project.

The Voorburg operational phase impact on employment amounts to 6 667 employment opportunities that will be sustained on an annualised basis over the lifespan of the mine in the province. Of this number, 917 employment opportunities are associated directly with the project, the rest is indirect and induced opportunities created at various sectors of the economy.

The Voorburg and Jutland combined operational phase impact on employment amounts to 12 093 employment opportunities that will be sustained on an annualised basis over the combined production period the mine in the province. Of this number, 1 486 employment opportunities are associated directly with the project, the rest is indirect and induced opportunities created at various sectors of the economy.

It is important to keep in mind that all the employment created in the Limpopo province is new.

[24] Total – Direct, Indirect and Induced employment opportunities.

6.4.5 Impact on Households

One of the crucial aspects of any macro-economic assessment is determining the personal income distribution characteristics thereof, especially with regard to how low income households will be impacted. In this section the extent to which low-income households will be positively affected by the spin offs created by the total development project is under scrutiny.

The impact on low-income households is presented in the three (2) tables above. From Table 44 it is evident that the construction phase impact on low-income households will be R126 million per annum which translates to 16% of the total impact on households' income.

The operational phase impact on low income households is given in Table 45 for the Voorburg colliery production. . From this table it is evident that the operational phase impact on low income households will be R415 million per annum which translates to ±17% of the total (direct, indirect and induced) operational phase impacts on household income.

6.4.6 Impact on Balance of Payments

It is estimated that the positive impact on the Balance of Payments will amount to approximately R1 525 million per annum for the operational phase for the Voorburg colliery. The methodology used in this particular calculation is elementary, but does at least indicate whether a notable positive or negative impact on the Balance of Payments can be expected.

6.4.7 Fiscal Impact

According to Table 45, total government revenue during the Voorburg production is expected to increase on an average annual basis of approximately R980 million. The combined government revenue for the period when the two collieries are in production simultaneously is estimated to be around R1 808 million annually. The main tax revenues are from direct tax and indirect tax, where direct tax consists mainly of personal income tax and company tax. Examples of indirect taxes are value added tax (VAT) and customs and excise tax. The increase in VAT is the result of additional household spending made possible by the increase in household incomes as a result of the project being implemented.

The increase in annual state revenue as a result of the construction and operation of the identified project could provide the means to increase government expenditure on social services. Using the latest information on the functional distribution of government spending on social services an estimate is made of how the state can expand its services in this regard.

6.4.8 Economic Efficiency Criteria

The macro-economic impacts discussed above provide an indication of the contribution that the coal mine will make to economic and socio-economic goals and objectives. However, it is also necessary to further interpret these impacts in order to determine whether or not the project represents an 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 GDP and job creation, relative to averages for South Africa.

In order to do 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 whether the capital employed in these projects and the contribution towards economic growth and job creation could in fact be regarded as effective and efficient. 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's performance is the more important of the two. However, if employment creation is given priority, particularly in the short term, then the Labour/Capital ratio is the more important one to use in evaluating the project's efficiency.

The efficiency/effectiveness criteria measured for the project is provided in the table below. This table also reflects the averages for the South African economy and for the mining sector.

Table 48: Economic Effectiveness Criteria of the Overvaal Colliery Compared to the South African Economy

	GDP/Capital	Labour/Capital	Low Income/Total Income
Project Efficiency Criteria	0.72	1.35	16.6%
Mining and quarrying	0.45	2.18	18.7%
Total National Economy	**0.45**	**2.94**	**16.2%**

A comparison of the coal mines GDP/Capital ratio with the average for the total South African economy indicates that for every R1 million of capital invested in the coal mine, it generates an overall GDP ratio of 0.72 compared to the average for the national economy of 0.45. This suggests that the coal mine utilises capital more effectively than other sectors in the national economy.

When a similar comparison of the Labour/Capital ratio is made, the coal mine will generate fewer jobs i.e. 1.35 jobs created for every R1 million invested in this project, in comparison with the national average of 2.94 jobs created, but in comparison with the mining sector average of 2.18 jobs created, the project is also falling short..

In terms of the income portion that is distributed to the low income households during the operational phase it is above the national average of 16.2% at 16.6%.

6.5 Macro-Economic Impact Results on the Limpopo Provincial Economy

6.5.1 Summary of Results

The following macro-economic impact table reflects the total construction phase and the average annual totals for the operational phase for the period the 12 year period on the Province of Limpopo. The components measured incorporate the construction and operation of the mine, transport and water supply of the project.

Table 49: The Annualised Macro-economic Average Impact of the Construction Phase of the Voorburg and Jutland Collieries on the Limpopo Provincial Economy (2013 prices)

	Construction Impact: *Provincial*			
	2. Mining			
	Direct impact	Indirect impact	Induced impact	Total impact
Impact on Gross Domestic Product (GDP)	184	40	46	**270**
Impact on capital formation	296	99	126	**521**
Impact on employment [person years]	1 628	118	241	**1 987**
Skilled impact on employment [person years]	259	25	39	**324**
Semi-skilled impact on employment [person years]	722	52	100	**874**
Unskilled impact on employment [person years]	647	41	102	**790**
Impact on Households				**143**
Low Income Households				**46**
Medium Income Households				**24**
High Income Households				**74**
Fiscal Impact				**60**
National Government				58
Provincial Government				0.6
Local Government				2.0
Impact on the Balance of Payments				**-1 325**
Note: All Rand values reflected are expressed in Rand Millions				

Table 50: The Annualised Macro-economic Impact of the Operational Phase of the Voorburg and Jutland Collieries on the Province of Limpopo Provincial Economy (2013 prices)

	Operational Impact: *Provincial*			
	2. Mining			
	Direct impact	Indirect impact	Induced impact	Total impact
Impact on Gross Domestic Product	1 518	254	301	**2 073**
Impact on capital formation	1 431	843	827	**3 101**
Total impact on employment [job opportunities]	917	661	1 163	**2 741**
Skilled impact on employment [job opportunities]	147	126	225	**498**
Semi-skilled impact on employment [job	605	275	478	**1 358**
Unskilled impact on employment [job	165	259	460	**885**
Impact on Households				**1 083**
Low Income Households				**325**
Medium Income Households				**213**
High Income Households				**545**
Fiscal Impact				**417**
National Government				399
Provincial Government				5.0
Local Government				12.6
Impact on the Balance of Payments				**562**
Note: All Rand values reflected are expressed in Rand Millions				

6.5.2 Impact on GDP

According to Table 28 the construction phase total GDP impact on GDP for Limpopo Province, is approximately R270 million (in constant, 2013 prices), of which the direct impact on GDP is estimated at R184 million.

According to Table 49, the operational phase the total average impact on GDP for Limpopo Province, is approximately R2 073 million on an annualised basis (in constant, 2013 prices), of which the direct impact on GDP is estimated at R1 518 million.

6.5.3 Impact on Employment Creation

The construction phase impact on total employment amounts to 1 987 employment opportunities per annum that will be sustained over the construction period. Of this number, 1 628 employment opportunities are associated directly with the project.

The operational phase impact on employment amounts to 2 471 employment opportunities that will be sustained on an annualised basis over the lifespan of the mine. Of this number, 917 employment opportunities are associated directly with the project.

6.5.4 Impact on Households

The operational phase impact on low-income households is given in Table 49. From this table it is evident that the operational phase impact on low-income households will be R325 million per annum which translates to ±30 % of the total (direct, indirect and induced) operational phase impact on household income.

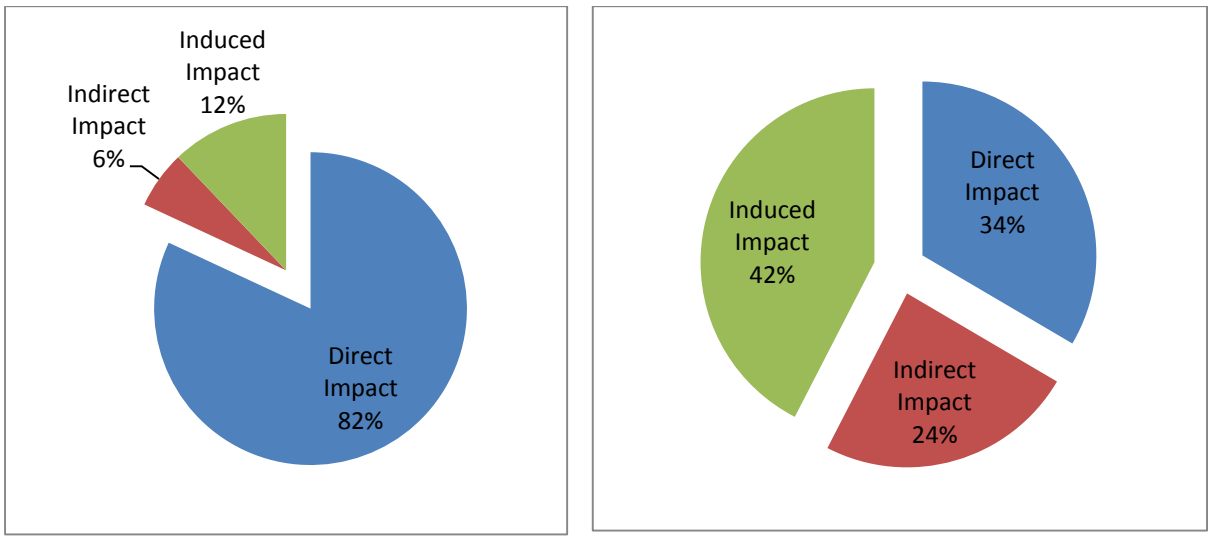
6.5.5 Magnitude of Linkages (Direct, Indirect and Induced Effects)

As indicated before, the SAM – based model measures the sum of the direct, indirect and induced effects that will emanate from the project under consideration. The direct effect of employment, for example, refers to the number of persons that will on an annual basis be directly linked to either the construction and/or the operation of the relevant project. In the same vein, the indirect effect on employment is measured as the number of employment opportunities that will be created in other sectors because of their supporting roles to sustain the increased investment and operational activities emanating from the project. The induced effect of employment refers to the number of employment opportunities created due to the increase in spending power that is flowing from the remuneration of workers employed at all the levels described above.

Below are the graphs representing the direct, indirect and induced impacts on employment for the Limpopo Province. The direct effect in terms of construction phase employment accounts for more than the indirect and induced effects combined. The operational phase employment is reflected differently to the construction phase employment due to this particular project under investigation being very labour intensive during the construction phase with less employment required on the direct effect level in the operational phase.

Graph 3: Macro-economic Impact in terms of the Employment on the Construction and Operational Phases for the Province of Limpopo

Construction Phase **Operational Phase**

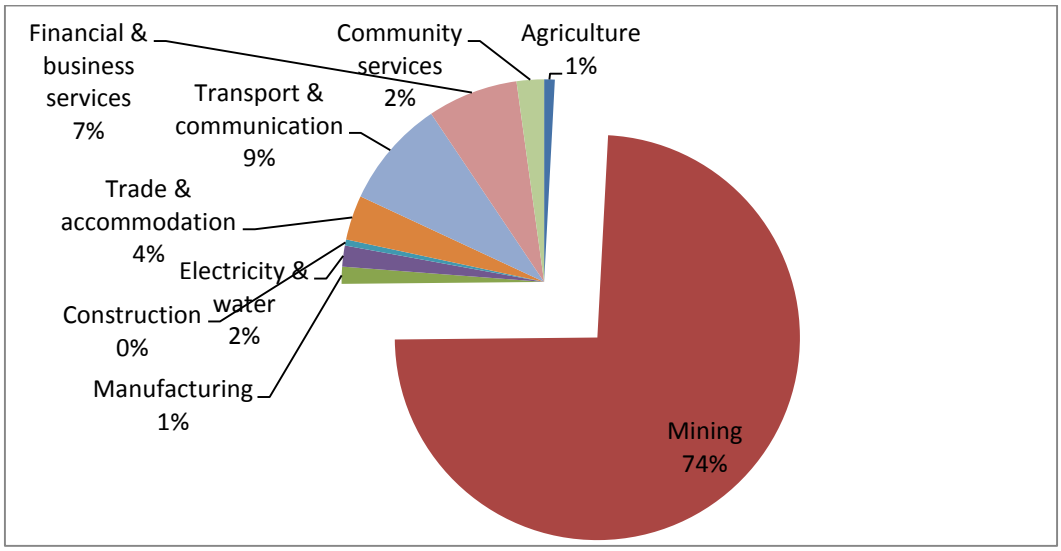


Construction graph indicate that 82% of the employment created will be on site compared to the 34% in the case of the operational phase, which is an indication that a considerable leakage will take place.

6.5.5.1 Sectorial Impact

It is important to note that the total impact of the project concerned in Limpopo takes place across a wider spectrum of sectors than those in which the investments initially take place. In the graph below the GDP is divided according to the nine (9) main sectors of the Limpopo Provincial economy. From this it can be seen that the total effect is more profound in the mining sector which is quite understandable because the capital development project *per se* is classified to fall in the mining sector.

Graph 4: Sectorial GDP Impact on the Limpopo Province (percentages)



7 Conclusion

Comparison of the Local Economic Activities Baseline and estimated Negative Impact with the estimated impact of the proposed mine (2013 prices).

Baseline Local Economic Activities and Impact of Mining							
	Mining Operational Phase – Annual Impact Current Activities						
		Baseline	*Impact*			Base Line	Impact
Gross Domestic Product Rand million	*Direct*	*29.70*	*-15.09*	*Employment*	*Direct*	257	-128
	Indirect/Induced	*32.52*	*-17.10*		*Indirect/Induced*	160	-81
	Total	*62.22*	*-32.19*		*Total*	417	-209
		Mining Operational Phase – Annual Impact Limpopo Province					
Gross Domestic Product Rand million	*Direct*	1 518		*Employment*	*Direct*	917	
	Indirect/Induced	555			*Indirect/Induced*	1 824	
	Total	2 073			*Total*	2 741	

From the above table it appears that the current local economic activities in the defined project area contribute R62.22 million in total GDP and sustain 417 total employment opportunities of which 257 are direct. The mine activity will cost the local economic activities R32.19 million in GDP and 209 employment opportunities, of which 128 will be direct, in the project area.

The mine will offer 917 direct employment opportunities compensating for the loss 600 jobs in the project area. It is however in the rest of the Limpopo province where the mine will create many more jobs than the current activities namely 1 824 versus 160.

From the above and the rest of the analysis it appears that the proposed mining project will be an economic viable entity which will add value to the Limpopo province. This will however take place at the expense of some of the current local economic activities, especially the game with ecology included, however, proper mitigation and even compensation must be part of the final solution. The investment the owner has made to a property can be negatively impacted if the hunting and accommodation facilities on the property are not fully utilised because of a down turn in visitors resulting from the mining activities.

The possible threat of underground and surface water contamination to the irrigators is of utmost importance and possible mitigation will have to be in place.

Probably the two most important benefits to the national economy are:

- The annual impact on the “Fiscus” with an annual tax contribution of R1 808 million expressed in 2013 prices, which at present represents the salary package of roughly 5 000 teachers or 5 200 nursing staff, if the government were to apply it for that purpose.
- The second impact is the favourable annual impact on the “Balance of Payments “amounting to R2 813 million, if expressed in 2013 prices.

From the above and the rest of the analysis it appears that the proposed mining project will be an economic viable entity which will add value to the Limpopo province. However, it will take place at the expense of the local economic activities, specifically those in the irrigation, the game and

ecology sectors and proper mitigation and even compensation must be part of the final solution. The investment the owner has made to the property can be negatively impacted if the hunting and accommodation facilities on the property is not fully utilised because of a down turn in visitors resulting

As stated, this will be a permanent impact and it will be necessary for the mining company to negotiate a proper mitigation programme.

8 Sources

The following sources were consulted:

1. CoAL of Africa Limited Greater Soutpansberg Mopane Project Scoping Report June 2013.
2. Van Der Merwe P. and Saayman, M.; Managing Game Farms from a Tourism Perspective – Published by the Institute for Tourism and Leisure Studies, North West University (2004).
3. Falkena HB; The SA Financial Sector Forum - Profit and Honour in Game Ranching (2003).
4. Game and Cattle farming in the Soutpansberg – Verbal and electronic communication with farmers in the study area.
5. Taxidermy – Waterberg Taxidermy see http://www.waterbergtaxidermy.co.za Price List.
6. Wild en Jag dated July 2013 – "An Economic Outlook: The Wildlife Industry", by Bernard Groenewald and Richard York.
7. Wood Mackenzie -2012 – CoAL of Africa – Coking Coal Market Study

9 APPENDIX A: THE SOCIAL ACCOUNTING MATRIX (SAM)

A Social Accounting Matrix (SAM) is a comprehensive, economy-wide database, which contains information on the flow of resources that take 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.

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 presents 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.

Like the traditional Input-Output Table, the SAM reflects the inter-sectorial linkages in terms of sales and purchases of goods and services, as well as the remuneration of production factors that forms the essence of any economy's functioning. What is also of importance is that a SAM reflects the economic related activities of households in some detail. Households are responsible for decisions that have a direct and indirect effect on important economic variables such as private consumption expenditures and savings. These economic aggregates are important drivers of the economic growth processes and ultimately the creation of employment opportunities and wealth. Private consumption expenditure, for example, comprises approximately 60 percent of total gross final domestic spending in the economy. By combining households into meaningful categories, such as a range of income levels, the impact on these households' welfare of a changing economic environment is made possible by the SAM.

It is clear from the above that because of the intrinsic characteristics of the SAM, once compiled, it renders itself as a useful tool for analytical purposes. Especially, based on the mathematical traits of the matrix notations that describe its structure, a SAM can be transformed into a powerful econometric tool/model. For example, the model can be used to quantify the probable impact on the economy of a new infrastructural project such as a new power station – both the construction phase and the operational phase will be modelled.

Thus apart from serving as an extension to a country's National Accounts, the SAM in its model form opens up many opportunities for the economic analyst to conduct rigorous policy and other impact analyses for the purpose of ensuring optimal benefit to the stakeholders concerned.

Application(s) of the SAM

The development of the SAM is very significant as it provides a framework within the context of the International System of National Accounts (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 macro-economic modelling tools for evaluating the impact of different economic decisions and/or economic development programmes.

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. The SAM, because of its finer disaggregation of private household expenditure into relatively homogenous socio-economic categories that are recognisable for policy purposes, has been used to explore issues related to income distribution.

The SAM's main contribution in the field of economic policy planning and impact analysis is divided into two categories:

As a Primary Source of Economic Information

As 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 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 macro-econometric 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.
- Conduct 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, VAT, etc.).

To summarise, 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.

10 APPENDIX B: COST BENEFIT ANALYSIS

Introduction

The CBA method provides a logical framework for evaluating development programmes, and can serve as an aid in decision-making processes. The following is a brief overview of the theory underlying the CBA method.

The theoretical foundations of CBA are: benefits are defined as increases in human wellbeing (utility) and costs are defined as reduction in human wellbeing. For a project of policy to qualify on cost-benefit grounds, its social benefits must exceed its social costs. "Society" is simply the sum of individuals. The geographical boundary for a CBA is usually the nation, but can be readily extended to wider limits.

Basic Aggregation Rules

There are two basic aggregation rules. Firstly, aggregating benefits across different social groups or nations involves summing willingness to pay for benefits, its willingness to accept compensation for losses (WTP and WTA, respectively), regardless of the circumstances of the beneficiaries or losers. A second aggregation rule requires that higher weights be given to benefits and costs accruing to disadvantages or low income groups. One rationale for the second rule is that marginal utilities or income will vary, being higher for the low income group.

The notions of WTP and WTA are firmly grounded in the theory of welfare economics and correspond to the notions of compensation and equivalent variations. WTP and WTA should not, according to past theory, diverge very much. In practice they appear to diverge, often substantially, and with WTA > WTP. Hence, the choice of WTP or WTA may be of importance when conducting a CBA.

Discounting

Aggregating over time involves discounting. Expressing future benefits and costs in present value is known as discounting. Inflation can result in future benefits and costs appearing to be higher than is really the case. Inflation should be netted out to secure constant price estimates.

Costs and benefits that are immediately incurred are judged differently by the community from costs and benefits that materialize over a period of time. Usually a community would prefer receiving a benefit today rather than reaping the benefits in the future, while deferred costs are more attractive than immediate payment. Therefore, the money value of costs and benefits over time cannot simply be added together, and the time preference of the community has to be taken into account through the use of a weighting process. This is done by calculating the net present value by discounting future cash-flows at a rate that reflects the value of a benefit or cost over time, known as the social discount rate. In other words, at what real interest rate will the community be prepared to forego immediate benefits in exchange for longer term benefits?

Suppose b0, b1, b2, …, bn

are the project benefits in years 0, 1, 2, …, n and c0, c1, c2, …, cn are the costs in years 0, 1, 2, …, n, respectively, and I is the social discount rate, then the present value of the benefits is given by

b_0÷〖(1+i)〗^0 + b_1÷〖(1+i)〗^1 + … +b_n÷〖(1+i)〗^n

And the present value of the costs are given by

c_0÷〖(1+i)〗^0 + c_1÷〖(1+i)〗^1 + … +c_n÷〖(1+i)〗^n

These present values are then used to calculate various assessment criteria, while assisting in the evaluation of each development sphere. These criteria are:

- Net Present Value (NPV).
- Internal Rate of Return (IRR).
- Benefit Cost Ratio (BCR).

Net Present Value (NPV)

The difference between the benefits and costs (the net benefits) in the specific year is discounted to the present by using the social discount rate. The discounted sum of all these net benefits over the economic project life is defined as the NPV. In terms of terminology set out above:

NPV= ∑▒b_j ÷〖(1+i)〗^j-∑▒c_j ÷〖(1+i)〗^j

The criteria for the acceptance of a project are that the NPV must be positive; in other words, funds will be voted for a project only if the analysis produces a positive net present value. Where a choice has to be made between mutually exclusive projects, the project with the highest present value will be chosen since it maximizes the net benefits to the community.

Internal Rate of Return (IRR)

The IRR is the discount rate at which the present value of costs and benefits are equal. It is therefore the value of the discount rate, r, which satisfies the following criteria:

∑▒b_j ÷〖(1+r)〗^j-∑▒c_j ÷〖(1+r)〗^(j)=0

Only projects with an IRR higher than the social discount rate, which forms a limit, will be considered for funding. The IRR must be handled carefully, because there are situations in which mathematical solution of the above equation is not unique. This happens when the stream of net benefits over the assessment period changes its sign (positive or negative) more than once.

Benefit Cost Ration (BCR)

The discounted BCR is the ratio of the present value of the benefits to the present value of the costs, i.e.

BCR={∑▒b_j ÷(1+r)^j }÷{∑▒c_j ÷(1+r)^(j)}

A project will be considered for funding if the BCR is greater than 1.

Appropriate Discount Rate

When considering an appropriate discount rate, note must be taken of the various points of departure in the economic literature as well as of the rates applied in other countries and by international development institutions.

The points of departure described in the literature can be broadly divided into three schools of thought, namely those who argue that the discount rate should be equal to the marginal return on capital (opportunity cost of capital), those whose arguments rests on long-term real interest rate (cost of funding to the State), and those who advocate a social time preference rate.

The first two schools take an economic view, whilst the third school adopts a multiple-goal approach which includes social aims. There is no consensus which method should be used to determine the social discount rate that would apply for a specific country. Therefore, a relative pragmatic approach takes the following factors into account:

- The discount rate should not be influenced by business cycle conditions and policy, since the preferences that find expression in this rate are aimed at the extension of the long-term welfare structure.
- A low discount rate generally favours projects with a higher capital cost and low future current costs, while the opposite applies to high discount rates. Since labour costs are part of current expenditure, a high discount rate favours the employment of labour in the future. If the real social discount rate is lower than the real implicit discount rate in the private sector, then investment by the public sector will be encouraged at the expense of investment by the private sector. The larger the gap between the two discount rates, the stronger the effect.

Financial Discount Rate

In the case of public projects, where CBA is being performed for financial purposes, calculations are done at either current price, where inflation is taken into consideration or at constant/real prices, where inflation is excluded.

In terms of the financial analysis, the discount rate used is equal to the market rate, or weighted marginal cost of capital, plus uncertainty and a risk premium. It should be noted that if the calculation is being done in constant/real prices, the discount rate used should be in real terms. For instance, if the discount rate in current prices is 10% and the prospect for inflation over the project appraisal is 5%, the real discount rate is approximately 5%. It can be calculated as follows:

$((1.10 \div 1.05)-1) \times 100 = 4.76\%$

Therefore the real discount rate is not exactly 5% but 4.76%.

Due to the fact that projections are made over a long period into the future, and the fact that the future inflation rate is dependent on various economic factors (e.g. worldwide shocks such as oil price, etc.), it is generally difficult to estimate long-term price movements. In this study, the Consultants have used a real discount rate of 5%, and an inflation rate of 6%. Using the methodology described above, this yields a nominal discount rate of 11%.

Economic Discount Rate

Although the calculation of the social time preference rate (STPR) is very difficult to determine, this has not stopped some analysts attempting empirical estimates. According to Kirkpatrick and Weiss (1996) "… such estimates are normally in the 1 percent to 5 percent range, since per capita consumption growth will rarely exceed 3 percent annually, and the conventional estimates of the elasticity of the marginal utility of consumption are typically between 1.0 and 1.5." Walshe and Dafferen calculated that the STPR is slightly in excess of the potential growth rate of an economy.

The study uses an economic discount rate of 8%, which is standard to most studies of this nature.

Market *versus* Shadow Prices

As indicated above, the CBA can be conducted in financial (market) as well as economic (shadow) prices. Market prices are those perceived prices at which products and services are traded in the market place, irrespective of the level of interference in the market, e.g. the market wage rate of labour, the price of 2kg of maize meal, the price of 1 kilowatt-hour of electricity, etc. In theory, market prices are mainly manifestations of consumers' willingness to pay.

Shadow prices (economic prices) are regarded as the opportunity costs of products and services when the market price, for whatever reasons, does not reflect these costs in full. Examples are the shadow wages of labour, where minimum wages are fixed at levels higher than market prices; shadow price for fuel, where taxes and subsidies are excluded; and shadow exchange rates are pegged and/or some kind of exchange control is still in place. The shadow price is therefore nominal (market) price, adjusted for the effect of interventions or other factors that are causing the market not to perform its natural role.

In practice, shadow prices should only be use when the market price of products and services do not reflect their scarcity value or economic contributions. In cases where market prices give an indication of the scarcity of products and services, market prices are used not only for financial analysis, but also for economic analysis.

Financial and Economic Cost Benefit Analysis

The private and public sectors evaluate projects very differently. The private sector is mostly interested in the profitability of a project and the return on capital that will be achieved. In doing so, the private sector makes use of market prices (i.e. the prices that would be paid in the open market for inputs, labour, etc.) when determining the value of direct project-related costs and financial benefits. Furthermore, a financial CBA evaluated the project using market-determined interest and return rates that reflect the cost of private funds, uncertainties and risk.

In contrast, evaluating a public sector project involves determining a broader range of costs and benefits that will affect the community. Furthermore, when calculating the value of costs and benefits, economic analysis re-evaluates the project by making use of prices that reflect the relative economic scarcity/value of inputs and outputs. As such, in the public sector it is necessary to evaluate and weigh the wider benefits emanating from a project against the capital expenditure and costs associated with a project, using discount and return rates that reflect the time preferences of the community, known as the social discount rate.

The table below summarises the main differences between a financial and economic CBA.

Table 51: Comparison of Financial and Economic Costs Benefit Analysis

Attributes	Economic CBA	Financial CBA
Perspective	The broader community	Project shareholders/capital providers
Goal	The most effective application of scarce resources	Maximization of net value
Discount Rate	Social discount rate	Market determined weighted cost of capital
Unit of Valuation	Opportunity costs	Market prices
Scope	All aspects necessary for a rational, economic decision	Limited to aspects that affect profits
Benefits	Additional goods, services, income and/or cost saving	Profit and financial return on capital employed
Costs	Opportunity costs of goods and services foregone	Financial payments and depreciation calculated according to generally accepted accounting principles

11 APPENDIX C: MAGNITUDE OF LINKAGES AND DEFINITION OF MACRO-ECONOMIC AGGREGATES

Formally, economists distinguish between direct, indirect and induced economic effects. Indirect and induced effects are sometimes collectively called secondary effects. The total economic impact is the sum of direct, indirect and induced effects within a region. Any of these impacts may be measured in terms of gross output or sales, income, employment or value added.

Direct Impacts

The direct impacts refer to the effect of the activities that take place in the mining and electricity industries. It refers to the income and expenditure that is associated with the everyday operation of each of the components of the relevant industry. For instance if the mining component is taken as an example the direct impacts refer to the total production/turnover of the mine; the intermediate goods bought by the mine; the salaries and wages paid by the mine; the profits generated by the mine.

Indirect Impacts

The indirect impacts refer to economic activities that arise in the sectors that provide inputs to the mining and electricity industries' components and other backward linked industries. For example, if the electricity sector uses steel, the indirect impacts refer to the activity (paying of salaries and wages; and profit generation) that occurs in the steel sector as well as the sectors that provide materials to the steel sector.

Induced Impacts

Induced impacts refer, inter alia, to the economic impacts that result from the payment of salaries and wages to people who are (directly) employed at the various consecutive stages of beneficiation of the mining and electricity industries. In additional the induced impact also includes the salaries and wages paid by businesses operating in the sectors indirectly linked to these industries 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 sectors of the economy that then have to raise their productions in tandem with the demand for their products and services.

These induced impacts can then be expressed in terms of their contributions to GDP, employment creation and investment or other useful macro-economic variables.

Added together, the direct, indirect and induced impacts provide the total impact that these industries will have on the South African and Limpopo economies.

Definitions of Macro-Economic Aggregates

Impact analysis will be based on a number of standard economic parameters and the results will be presented under the following headings:

- Impact on Gross Domestic Product (GDP).
- Impact on Capital Utilisation.
- Impact on Employment Creation.

- Skilled labourers.
- Semi-skilled labourers.
- Unskilled labourers.
- Impact on Households Income (Income distribution).
- Impact on Balance of Payments, as a result of Imports and Exports.

The following is a brief overview of the definition of each of these economic parameters.

Impact on Gross Domestic Product (GDP)

The impact on GDP reflects the magnitude of the values added to the coal mining industry from activities within the industry. Value added is made up of three elements, namely:

- Remuneration of employees,
- Gross operating surplus (which includes profit and depreciation), and
- Net indirect taxes.

Impact on Capital Utilisation

For an economy to operate at a specific level of activity, investment in capital assets (i.e. buildings, machinery, equipment, etc.) is needed. Capital, together with labour and entrepreneurship, are the basic factors needed for production in an economy.

The effectiveness and efficiency with which these factors are combined influence the overall level of productivity/profitability processes, bearing in mind that productivity is affected by an array of factors of which appropriate technology and skill level of the labour force are two important elements.

Impact on Employment Creation

Labour is a key element of the production process. The study will determine the number of new employment opportunities that will be created by investment in the coal mining industry. These employment opportunities will be broken down into those created directly by a particular project and those indirectly created and induced throughout the broader economy. Furthermore, a distinction will be made between skilled, semi-skilled and unskilled labourers.

Impact on Household Income

One of the elements of the additional value added (i.e. GDP) which will result from the proposed expansion is remuneration of employees, which, in turn, affects households income.

The SAM measures the magnitude of changes that will occur to both household income and spending/savings pattern. As such, the study will highlight the impact of the coal mining industry on the low income households as this can be used as an indicator of the extent to which the coal mining industry contributed to poverty alleviation throughout the economy.

Impact on the Current Account of the Balance of Payments

The coal mining industry will have direct, indirect and induced impacts on the exports and imports of goods and services that will take place across all of the various economic sectors that are affected by the coal mining industry. Imports consist of direct and indirect material imports, as well as goods consumed by households that are imported as a result of the induced impact.

Input Data Required Conducting the Macro-Economic Impact Analysis

Modelling the macro-economic impact of the construction and operational phases of the total development project requires detailed information regarding these two phases of the project. The relevant "building blocks: containing the required data and information are given and discussed below.

Construction Phase

The information required to model the macro-economic impact of the construction phase of a project relate to the nature and costs of the capital assets that are actually created. The following standard breakdown of the asset types is used:

- Civil engineering costs:
  - Earth works (site clearance, foundations, etc.).
  - Structures (bridges, dams and other structures built mainly from concrete).
  - Roads (freeways, other arterials and streets).
- Building and construction costs:
  - Residential buildings (houses, etc.).
  - Non-residential buildings (factories, offices, shopping centres, etc.).
- Machinery and other equipment costs:
  - Mechanical equipment.
  - Electrical and electronic equipment.
  - Research, design, architecture and development costs.
  - Furniture.
  - Rubber products.
  - Structural metal products.
  - Other fabricated metal products.
  - Manufacturing of transport equipment.
  - Other manufacturing and recycling.
- Water related construction costs:
  - Bulk water (dams).
  - Reservoirs.
  - Pump stations (water and sewerage).
  - Bulk pipelines (water and sewerage).
  - Treatment works (water and sewerage).
  - Reticulation (water and sewerage).
  - Storm water.
  - Parks and recreation.

Operational Phase

In order to quantify the macro-economic impact of the operational component of a project, the following information is required by the model:

- Production/turnover, divided between:
- Sales/turnover destined for domestic consumption; and
- Export sales.

Production/Operation Costs, Broken Down Into:

- Intermediate input costs, i.e. all materials and services necessary for the production process broken down by industries from which inputs are sources (classified according to the Standard Industrial Classification (SIC) code system),
- Remuneration of staff, broken down by skill levels (i.e. skilled, semi-skilled and unskilled workers), and
- Gross operating surplus (i.e. remuneration of capital).

The table below gives an example of the exogenous vector for Water – Water Supply. These figures are used as the inputs for the operational phase of the model, but are only used as an example to give the reader more clarity on the input requirements for such a model.

12 APPENDIX D: RISK PROFILE

12.1 Risk Profile – Category 1 Farms

	Infringement	Weight
Mining and Transport Operations	*Noise*	7.00
	Dust	14.00
	Blasting	7.00
Community, etc.	*Social, Crime and Other*	12.00
	Sense of Place - Visual	10.00
Water	*Ground Water*	33.00
	Surface Water	17.00
		100.00

Infringement	Activity	Sub -Activity	Extend	Duration	Magnitude	Probability
Noise	*Beef and other Livestock Farming*	*Commercial*	*1*	*2*	*2*	2
		Community				-
	Game Farming	*Game (breeding)*	*1*	*2*	*2*	-
		Live Sales	*1*	*1*	*2*	-
		Trophy Hunting	*3*	*3*	*7*	-
		Biltong Hunting	*1*	*1*	*5*	-
	Tourism & Accommodation	*Eco - tourists*	*2*	*4*	*7*	3
		Hunters	*2*	*4*	*7*	-
	Irrigation	*Citrus*				-
		Other Crops	*1*	*1*	*1*	1
	Community	*Life Style*	*0*	*0*	*0*	-
	Environment (birds & plants)		*2*	*4*	*2*	3
	Sub-total	*7*				
Dust	*Beef and other Livestock Farming*	*Commercial*	*1*	*5*	*4*	5
		Community				-
	Game Farming	*Game (breeding)*	*3*	*5*	*4*	-
		Live Sales	*3*	*5*	*4*	-
		Trophy Hunting	*3*	*5*	*9*	-
		Biltong Hunting	*3*	*5*	*8*	-
	Tourism & Accommodation	*Eco - tourists*	*3*	*5*	*8*	4
		Hunters	*3*	*5*	*7*	-
	Irrigation	*Citrus*				-
		Other Crops	*4*	*5*	*8*	4
	Community	*Life Style*				
	Environment (birds & plants)		*3*	*5*	*6*	4
	Sub-total	*14.00*				
Blasting	*Beef and other Livestock Farming*	*Commercial*	*1*	*2*	*4*	1
		Community				-
	Game Farming	*Game (breeding)*	*1*	*2*	*4*	-
		Live Sales	*1*	*1*	*2*	-
		Trophy Hunting	*2*	*3*	*8*	-

		Biltong Hunting	*2*	*3*	*6*	-
	Tourism & Accommodation	*Eco - tourists*	*1*	*3*	*8*	4
		Hunters	*1*	*3*	*7*	-
	Irrigation	*Citrus*				-
		Other Crops	*1*	*1*	*1*	1
	Community	*Life Style*				
	Environment (birds & plants)		*1*	*2*	*2*	4
	Sub-total	*7.00*				
Social, Crime and other impacts	***Beef and other Livestock Farming***	*Commercial*	*2*	*5*	*6*	3
		Community				-
	Game Farming	*Game (breeding)*	*2*	*5*	*6*	-
		Live Sales	*1*	*1*	*2*	-
		Trophy Hunting	*3*	*5*	*8*	-
		Biltong Hunting	*3*	*5*	*8*	-
	Tourism & Accommodation	*Eco - tourists*	*3*	*5*	*8*	5
		Hunters	*3*	*5*	*8*	-
	Irrigation	*Citrus*				-
		Other Crops	*2*	*4*	*3*	5
	Community	*Life Style*				-
	Environment (birds & plants)		*1*	*1*	*4*	3
	Sub-total	*12.00*				
Destroying the sense of place - Visual	***Beef and other Livestock Farming***	*Commercial*	*1*	*1*	*2*	4
		Community				-
	Game Farming	*Game (breeding)*	*1*	*1*	*2*	-
		Live Sales	*1*	*1*	*2*	-
		Trophy Hunting	*5*	*5*	*10*	-
		Biltong Hunting	*5*	*4*	*8*	-
	Tourism & Accommodation	*Eco - tourists*	*5*	*4*	*10*	5
		Hunters	*5*	*4*	*10*	-
	Irrigation	*Citrus*				-
		Other Crops	*1*	*1*	*1*	1
	Community	*Life Style*				
	Environment (birds & plants)		*3*	*5*	*10*	5
	Sub-total	*10.00*				
Underground water - contamination and water levels	***Beef and other Livestock Farming***	*Commercial*	*3*	*5*	*4*	4
		Community				-
	Game Farming	*Game (breeding)*	*3*	*5*	*4*	-
		Live Sales	*3*	*5*	*4*	-
		Trophy Hunting	*4*	*5*	*8*	-
		Biltong Hunting	*4*	*5*	*8*	-
	Tourism & Accommodation	*Eco - tourists*	*3*	*5*	*8*	5
		Hunters	*3*	*5*	*8*	-
	Irrigation	*Citrus*				-
		Other Crops	*4*	*5*	*10*	5
	Community	*Life Style*				
	Environment		*3*	*5*	*8*	5
	Sub-total	*33.00*				
Surface water -	***Beef and other Livestock***	*Commercial*	*1*	*5*	*4*	4
		Community				0

contamination and run-off	***Game Farming***	*Game (breeding)*	*1*	*5*	*6*	-
		Live Sales	*1*	*5*	*2*	-
		Trophy Hunting	*4*	*5*	*7*	-
		Biltong Hunting	*4*	*5*	*5*	-
	Tourism & Accommodation	*Eco - tourists*	*3*	*5*	*7*	4
		Hunters	*3*	*5*	*6*	-
	Irrigation	*Citrus*				-
		Other Crops	*3*	*5*	*10*	5
	Community	*Life Style*				-
	Environment		*2*	*5*	*8*	5
	Sub-total	*17.00*				

12.2 Risk Profile – Category 2 Farms

	Infringement	Weight
Mining and Transport Operations	***Noise***	7.00
	Dust	14.00
	Blasting	7.00
Community, etc.	***Social, Crime and Other***	12.00
	Sense of Place - Visual	10.00
Water	***Ground Water***	33.00
	Surface Water	17.00
		100.00

Infringement	Activity	Sub -Activity	Extend	Duration	Magnitude	Probability
Noise	***Beef and other Livestock Farming***	*Commercial*	*1*	*2*	*1*	2
		Community				-
	Game Farming	*Game (breeding)*	*1*	*2*	*1*	2
		Live Sales	*1*	*1*	*1*	2
		Trophy Hunting	*3*	*3*	*6*	5
		Biltong Hunting	*1*	*1*	*4*	3
	Tourism & Accommodation	*Eco - tourists*	*2*	*4*	*7*	5
		Hunters	*2*	*4*	*6*	3
	Irrigation	*Citrus*				-
		Other Crops	*1*	*1*	*1*	1
	Community	*Life Style*				-
	Environment (birds & plants)		*2*	*4*	*2*	3
	Sub-total	*7*				
Dust	***Beef and other Livestock Farming***	*Commercial*	*1*	*5*	*2*	5
		Community				-
	Game Farming	*Game (breeding)*	*3*	*5*	*2*	5
		Live Sales	*3*	*5*	*2*	3
		Trophy Hunting	*3*	*5*	*7*	5
		Biltong Hunting	*3*	*5*	*5*	4
	Tourism & Accommodation	*Eco - tourists*	*3*	*5*	*8*	5
		Hunters	*3*	*5*	*6*	4
	Irrigation	*Citrus*				-
		Other Crops	*3*	*5*	*8*	4
	Community	*Life Style*				
	Environment (birds & plants)		*3*	*5*	*6*	4
	Sub-total	*14.00*				
Blasting	***Beef and other Livestock Farming***	*Commercial*	*1*	*1*	*2*	1
		Community				-
	Game Farming	*Game (breeding)*	*1*	*1*	*2*	3
		Live Sales	*1*	*1*	*2*	3
		Trophy Hunting	*2*	*3*	*6*	4
		Biltong Hunting	*2*	*3*	*4*	3

	Tourism & Accommodation	*Eco - tourists*	*1*	*3*	*7*	4
		Hunters	*1*	*3*	*5*	4
	Irrigation	*Citrus*				-
		Other Crops	*1*	*1*	*1*	2
	Community	*Life Style*				
	Environment (birds & plants)		*1*	*2*	*2*	4
	Sub-total	*7.00*				
Social, Crime and other impacts	***Beef and other Livestock Farming***	*Commercial*	*2*	*3*	*5*	3
		Community				-
	Game Farming	*Game (breeding)*	*2*	*3*	*4*	3
		Live Sales	*1*	*1*	*2*	1
		Trophy Hunting	*3*	*5*	*6*	5
		Biltong Hunting	*3*	*5*	*6*	3
	Tourism & Accommodation	*Eco - tourists*	*3*	*5*	*8*	4
		Hunters	*3*	*5*	*5*	4
	Irrigation	*Citrus*				-
		Other Crops	*3*	*3*	*6*	3
	Community	*Life Style*				-
	Environment (birds & plants)		*1*	*1*	*4*	3
	Sub-total	*12.00*				
Destroying the sense of place - Visual	***Beef and other Livestock Farming***	*Commercial*	*1*	*1*	*1*	4
		Community				-
	Game Farming	*Game (breeding)*	*1*	*1*	*1*	4
		Live Sales	*1*	*1*	*1*	3
		Trophy Hunting	*5*	*5*	*5*	5
		Biltong Hunting	*5*	*4*	*3*	3
	Tourism & Accommodation	*Eco - tourists*	*5*	*4*	*10*	5
		Hunters	*5*	*4*	*7*	4
	Irrigation	*Citrus*				-
		Other Crops	*1*	*1*	*1*	1
	Community	*Life Style*				
	Environment (birds & plants)		*3*	*5*	*6*	5
	Sub-total	*10.00*				
Underground water - contamination and water levels	***Beef and other Livestock Farming***	*Commercial*	*3*	*5*	*6*	4
		Community				-
	Game Farming	*Game (breeding)*	*3*	*5*	*6*	4
		Live Sales	*3*	*5*	*3*	3
		Trophy Hunting	*4*	*5*	*6*	4
		Biltong Hunting	*4*	*5*	*5*	3
	Tourism & Accommodation	*Eco - tourists*	*3*	*5*	*8*	4
		Hunters	*3*	*5*	*6*	3
	Irrigation	*Citrus*				-
		Other Crops	*3*	*4*	*8*	5
	Community	*Life Style*				
	Environment		*3*	*5*	*6*	5
	Sub-total	*33.00*				
Surface water - contamination and run-off	***Beef and other Livestock Farming***	*Commercial*	*1*	*5*	*3*	3
		Community				0
	Game Farming	*Game (breeding)*	*1*	*5*	*6*	3

		Live Sales	*1*	*5*	*2*	3
		Trophy Hunting	*4*	*5*	*7*	4
		Biltong Hunting	*4*	*5*	*5*	3
	Tourism & Accommodation	*Eco - tourists*	*3*	*5*	*8*	5
		Hunters	*3*	*5*	*5*	4
	Irrigation	*Citrus*				-
		Other Crops	*3*	*4*	*6*	3
	Community	*Life Style*				-
	Environment		*2*	*5*	*8*	5
	Sub-total	*17.00*				

12.3 Risk Profile – Category 3 Farms

	Infringement	Weight
Mining and Transport Operations	***Noise***	7.00
	Dust	14.00
	Blasting	7.00
Community, etc.	***Social, Crime and Other***	12.00
	Sense of Place - Visual	10.00
Water	***Ground Water***	33.00
	Surface Water	17.00
		100.00

Infringement	Activity	Sub -Activity	Extend	Duration	Magnitude	Probability
Noise	***Beef and other Livestock Farming***	*Commercial*	*1*	*2*	*1*	2
		Community				-
	Game Farming	*Game (breeding)*	*1*	*2*	*1*	2
		Live Sales	*1*	*1*	*1*	2
		Trophy Hunting	*1*	*3*	*4*	2
		Biltong Hunting	*1*	*1*	*3*	2
	Tourism & Accommodation	*Eco - tourists*	*0*	*0*	*0*	-
		Hunters	*0*	*0*	*0*	-
	Irrigation	*Citrus*				-
		Other Crops	*1*	*1*	*1*	1
	Community	*Life Style*				-
	Environment (birds & plants)		*2*	*4*	*2*	3
	Sub-total	*7*				
Dust	***Beef and other Livestock Farming***	*Commercial*	*1*	*5*	*2*	5
		Community				-
	Game Farming	*Game (breeding)*	*3*	*5*	*2*	5
		Live Sales	*3*	*5*	*2*	3
		Trophy Hunting	*3*	*5*	*6*	4
		Biltong Hunting	*3*	*5*	*5*	4
	Tourism & Accommodation	*Eco - tourists*				
		Hunters				
	Irrigation	*Citrus*				-
		Other Crops	*3*	*4*	*7*	4
	Community	*Life Style*				
	Environment (birds & plants)		*3*	*5*	*6*	4
	Sub-total	*14.00*				
Blasting	***Beef and other Livestock Farming***	*Commercial*	*1*	*1*	*2*	1
		Community				-
	Game Farming	*Game (breeding)*	*1*	*1*	*2*	2
		Live Sales	*1*	*1*	*2*	2

		Trophy Hunting	*2*	*3*	*4*	3
		Biltong Hunting	*2*	*3*	*3*	2
	Tourism & Accommodation	*Eco - tourists*	*0*	*0*	*0*	-
		Hunters	*0*	*0*	*0*	-
	Irrigation	*Citrus*				-
		Other Crops	*1*	*1*	*1*	1
	Community	*Life Style*				
	Environment (birds & plants)		*1*	*2*	*2*	4
	Sub-total	*7.00*				
Social, Crime and other impacts	***Beef and other Livestock Farming***	*Commercial*	*2*	*3*	*5*	3
		Community				-
	Game Farming	*Game (breeding)*	*2*	*3*	*4*	3
		Live Sales	*1*	*1*	*2*	1
		Trophy Hunting	*3*	*5*	*6*	3
		Biltong Hunting	*3*	*5*	*6*	3
	Tourism & Accommodation	*Eco - tourists*	*0*	*0*	*0*	-
		Hunters	*0*	*0*	*0*	-
	Irrigation	*Citrus*				-
		Other Crops	*2*	*3*	*6*	3
	Community	*Life Style*				-
	Environment (birds & plants)		*1*	*1*	*4*	3
	Sub-total	*12.00*				
Destroying the sense of place - Visual	***Beef and other Livestock Farming***	*Commercial*	*1*	*1*	*1*	4
		Community				-
	Game Farming	*Game (breeding)*	*1*	*1*	*1*	2
		Live Sales	*1*	*1*	*1*	2
		Trophy Hunting	*5*	*5*	*5*	3
		Biltong Hunting	*5*	*4*	*3*	2
	Tourism & Accommodation	*Eco - tourists*				
		Hunters	*0*	*0*	*0*	-
	Irrigation	*Citrus*				-
		Other Crops	*1*	*1*	*1*	1
	Community	*Life Style*				
	Environment (birds & plants)		*3*	*5*	*6*	5
	Sub-total	*10.00*				
Underground water - contamination and water levels	***Beef and other Livestock Farming***	*Commercial*	*3*	*5*	*3*	4
		Community				-
	Game Farming	*Game (breeding)*	*3*	*5*	*3*	4
		Live Sales	*3*	*5*	*3*	3
		Trophy Hunting	*4*	*5*	*5*	3
		Biltong Hunting	*4*	*5*	*5*	3
	Tourism & Accommodation	*Eco - tourists*	*0*	*0*	*0*	-
		Hunters	*0*	*0*	*0*	-
	Irrigation	*Citrus*				-
		Other Crops	*4*	*5*	*8*	4
	Community	*Life Style*				
	Environment		*3*	*5*	*6*	5
	Sub-total	*33.00*				

Surface water - contamination and run-off	***Beef and other Livestock Farming***	*Commercial*	*1*	*5*	*3*	3
		Community				0
	Game Farming	*Game (breeding)*	*1*	*5*	*6*	2
		Live Sales	*1*	*5*	*2*	2
		Trophy Hunting	*4*	*5*	*5*	2
		Biltong Hunting	*4*	*5*	*3*	2
	Tourism & Accommodation	*Eco - tourists*	*0*	*0*	*0*	-
		Hunters	*0*	*0*	*0*	-
	Irrigation	*Citrus*				-
		Other Crops	*3*	*4*	*7*	4
	Community	*Life Style*				-
	Environment		*2*	*5*	*8*	5
	Sub-total	*17.00*				

13 APPENDIX E: GROUPING OF PROPERTIES IN THE DIFFERENT LAND USE CATEGORIES

Voorburg

- Category 1 farms:
  - Vera 815MS (Ptns 2, 4, 5, 6, 7, 8, 9, 26, 27, 35, 36, 37, 38, 40, 41, 44 to 49, 50, 52, 54, 55 and Vera 815MS (RE of Ptn 10)).
- Category 2 farms:
  - Ancaster 504MS (RE, Ptns 1, 2 and 3).
  - Scheveningen 500MS (All).
  - Banff 502MS (All).
  - Vera 815MS (Ptns 13, 16, 18 to 21, 23, 73, 85 to 92).
  - Krige 495MS (All).
  - Voorburg 503MS (All).
  - Kitchener 504MS (All).
  - Goosen (All and Ptn 1).
- Category 3 farms:
  - Delft 499MS (RE, Ptns 1 and 2).
  - Vera 815MS (Ptns 1 and 3)
- Category 4 farms:
  - Cavan 508MS – Government and Transnet.

Jutland

- Category 1 farms:
  - Erasmus 529MS (RE).
- Category 2 farms:
  - Bierman 559MS (All).
  - Cohen 591MS (All).
  - Du Toit 563MS (RE).
  - Faure 562MS (All).
  - Jutland 536MS (All).
  - Otto 650MS (RE) (now Honeymoon 610MS).
  - Mons 557MS (All).
  - Pretorius 531MS (Ptn 1).
  - Hermanus 533MS (All).
  - Grootpraat 564MS (All).
- Category 3 farms:
  - Schalk 542MS (All).
  - Stubbs 558MS (All).
  - Verdun 535MS (RE).
  - Bellevue 534MS (Verdun) (Ptns 13, 14, 15 & 19).
- Category 4 farms:
  - Pretorius 531MS (RE) – Government.
  - Erasmus 529MS (Ptn) - School.
  - Erasmus 529MS (Ptn) - Transnet Mopane Station.

- Transnet – Railway line.

Ursa Minor

- Category 2 farm:

Ursa Minor 551MS (All).

14 APPENDIX F: CURRICULUM VITAES OF PROPOSED PROFESSIONAL STAFF

MR WILLIAM MULLINS

PERSONAL DETAILS:

Date of Birth: 26 April 1949

Nationality: South African

Current Position: Economist - Agriculture Specialist

ACADEMIC QUALIFICATIONS:

1968: UED – University of Free State.

1967 BSc – University of Free State.

OTHER TRAINING:

Excel, MS Word and Power point.

LANGUAGE SKILLS:

Language	*Reading*	*Speaking*	*Writing*
English	Excellent	Excellent	Excellent
Afrikaans	Excellent	Excellent	Excellent

PROFESSIONAL CAREER:

William Mullins is originally trained as a mathematician and statistician and after a short spell in industry, became a teacher. In 1976, William took over the family farm in Southern KwaZulu Natal, where he farmed until joining by Mosaka Economic Consultants cc in 2000. During his time in farming William Mullins served a period as chairman of the Natal Agricultural Union and was a member of the Regional Development Committee of Region C (RDAC) and the National Regional Development Advisory Committee (NRDAC). He also served as a board member of the KwaZulu Development Corporation and its successor, the Ithala Development Corporation from 1993 to 2001. William was also a member of the KwaZulu Training Trust (KTT) and a board member of the Natal Parks Board.

In the early years of by Mosaka Economic Consultants cc, William worked on projects on a part-time basis and then, in 2000, he joined the organisation as the resident statistician. William's leadership qualities and ability to work with people makes him a natural choice as a project team leader. His extensive experience in the agricultural field means that he is involved in most projects in this field, as well as impact studies on rivers. William has also worked in specialist fields like the SKA Telescope study and impact studies for Eskom.

Some of William Mullins's most recent projects include:

- Macro-economic Impact Analysis and Cost Benefit Analysis of the Sekoko Coal Waterberg Project, 2011 [Sekoko Resources (Pty) Ltd.]
- Macro-economic Impact Analysis and Cost Benefit Analysis of the Proposed Vele Colliery near Musina, Limpopo 2010 [Naledi Development (Pty) Ltd.]
- Port Economic Decision Making Framework [eThekwini Municipality, 2007-2008].
- Environmental impact assessment for the proposed Gamma-Grass Ridge 765kV Transmission Power Lines (x2). [ESKOM Transmission, 2008].
- Integrated comprehensive study of the water resources of the Maputo River Basin [Plancenter Ltd, 2008].
- Comprehensive Determination of the Reserve for the Inkomati WMA [Water for Africa, 2007].
- CBA Analysis of Further Water Augmentation in the Komati and Extension and Updating of the Current Database of the Komati WMA [KNPSF/BIGEN, 2008].
- Feasibility Study of the Potential for Sustainable Water Resources Development in the Molopo-Nossob Watercourse [Iliso Consulting Pty Ltd, 2008].
- Impact study SKA/Meerkat [Imani Development (South Africa) Pty Ltd, 2008].
- Development of a Draft Water Allocation Plan to guide compulsory licensing in the Mhlatuze Catchment. [Iliso Consulting Pty Ltd, 2008].
- Environmental Impact Assessment and Environmental Management Programme for a Proposed Nuclear Power Station [Imani Development (South Africa) Pty Ltd, 2007].
- Socio-economic and ecological implications of water restrictions in the Letaba catchment [DWAF, 2009].

PROJECT EXPERIENCE OUTSIDE SOUTH AFRICA:

Country	Date from - Date to
Swaziland	1996, 2001, 2006-2007
Mozambique	2004-2006, 2008
Namibia	2002, 2004, 2008
Botswana	2008
South Africa	1996-2009

TEFELO MAJORO

PERSONAL DETAILS:

Date of Birth: 3 June 1981

Nationality: Lesotho

Current position: Economist at Mosaka Economic Consultants cc

ACADEMIC QUALIFICATIONS:

1999-2003: B. Com (Accounting); National University of Lesotho, Lesotho

2006-2009: MBA (Finance); Wuhan University of Technology, China

Current studies:ACCA (CA)

LANGUAGE SKILLS:

Sesotho	Read	Speak	Write
English	Read	Speak	Write

OTHER TRAINING:

MS Excel, MS Word and MS Power point.

PROFESSIONAL CAREER:

September 2010 – Present: Economist at by Mosaka Economic Consultants cc

January 2010 – July 2010: Qinfo Solutions: Business analyst.

April 2004 – July 2006: Educator at Lesotho High School.

Duties:

Responsible for various tasks ranging from consulting with clients to developing macro-economic models, macro-economic analyses, cost-benefit analyses and report writing and editing.

Extract on projects worked on at Mosaka Economic Consultants cc:

- Cost Benefit Analysis of either Developing Support Precinct 6 Land Commercially or Declaring it a Conservation Reserve (Dube Trade Port)
- Costs Benefit Analysis and Macro-economic Impact of the Richards Bay Industrial Development Zone (RBIDZ)
- Financial and Economic Costs Benefits Analysis of the 2010 FIFA Soccer World Cup in eThekwini (Golder Associates)

- Cost Benefit Analysis and Macro-economic Impact Analysis of the South African Sugar Industry (South African Sugar Association)
- Macro-economic Impact Analysis and Cost Benefit Analysis of the Sekoko Mine (Sekoko Resources (Pty) Ltd.)
- Financial and Economic Cost Benefit Analysis for implementing a 10 000 hectare sugar cane plantation in Mozambique (Burger and Du Plessis)
- Cost Benefit Analysis for Water Monitoring Programme (Department of Water Affairs)

JEAUNÉS VILJOEN

PERSONAL DETAILS:

Date of Birth: 6 May 1983

Nationality: South African

Current position: Senior Economist at Mosaka Economic Consultants cc

ACADEMIC QUALIFICATIONS:

2002-2006: BSc in Economic Science and Mathematics - University of the Witwatersrand

2006-2006: BEconSci (Honours) in Economic Science University of the Witwatersrand

LANGUAGE SKILLS:

Afrikaans	Read	Speak	Write
English	Read	Speak	Write

OTHER TRAINING:

MS Excel, MS Word, MS Power Point, Inforum Modelling, G7 and Eviews.

PROFESSIONAL CAREER:

2007 – Present: Mosaka Economists

Duties:

Economic analyses, economic policy as well as project evaluation, Input-Output Tables as well as Social Accounting Matrixes. Cost Benefit Analyses, Macro-economic Analyses and Econometric modelling.

Extract on projects worked on at Mosaka Economic Consultants cc:

- Economic Impacts Assessment of Roads and Adjacent Economic Activities (Namibia Road and Educational Infrastructure -2007).
- Feasibility Studies and Preparation of Tender Documents for Future Investments for the Athol Water Services Board (Nairobi Water and Sewerage Institutional Restructuring).
- Econometric Model to predict the effect that various water resource management scenarios would have on South Africa's Economic Development: K5/1570 (Water Research Commission).
- Town Proclamation of Koingnaas and Kleinzee: Programme Management Support. Conducting of an Econometric Sector analysis Study to determine the impact of all mining and proclamation activities on the local municipalities and economy - 2007 (Africon Engineering International (Pty) Ltd).

- Environment and Tourism in the Limpopo Province. A Desktop study on the Macroeconomic Impact Assessment of Industrial Clusters in the Limpopo Province. An Interim Study for the purposes of the Limpopo EXCO (The Department of Economic Development).
- Provincial Social Accounting Matrix for the Gauteng Province Training, November 2007 (Gauteng Province).
- Provincial Social Accounting Matrix for the KwaZulu-Natal Province Training, February 2008 (KwaZulu-Natal).
- Beira Feasibility Study: Storm water Drainage System Rehabilitation and Extension in Central and Northern Parts in the Beira Area (BKS).
- Development Impact of Projects Financed by DBSA (2006/2007) (DBSA).
- Updating of Provincial SAMs for 2006 (DBSA).
- Development and building of the Provincial Social Accounting Matrix for the KwaZulu-Natal Province for 2006 (DBSA).
- Development and building of the Provincial Social Accounting Matrix for the Western Cape Province for 2006 (DBSA).
- Stimulation of Economic Growth for Klerksdorp Airport. Cost Benefit Analysis and Macro-economic Impact Assessment of Klerksdorp Airport on surrounding area (City of Matlosana).
- The Macro-economic Impacts of the Water Allocation Reform Process in Nkomazi Region and Middle Crocodile and the Cost Benefit Analysis of the Water Augmentation Option (Komati/Ngwenya Private Sector Forum of Mpumalanga).
- Transnet Freight Demand Model Update (2008) (University of Stellenbosch).
- Environmental Impact Assessment and Environmental Management Programme for a Proposed Nuclear Power Station (Imani Development (South Africa) (Pty) Ltd).
- Macro-economic Assessment of the Envisaged Developments in the Vicinity of Lephalale and their impact on the Lephalale Local Municipality DBSA).
- Proposed Integrated and Continual Project Information Management System for the DBSA (DBSA).
- Comprehensive Design of the South African Renewable Energy Sectoral Business Case - 2009 (Department of Minerals and Energy (DME)).
- Nature and Magnitude of Benchmarking the Provincial SAMs against the National SAM. Development and building of Provincial Benchmarking model (DBSA).
- Development and building of the National Social Accounting Matrix for South Africa for 2006 (DBSA).
- Development and Updating of all nine provincial Social Accounting Matrices of South Africa for 2006 (DBSA).
- Development and Update of the eThekwini Metropolitan Social Accounting Matrix for 2006 (DBSA).
- Development Impact of Projects Financed by DBSA (2008/2009) (DBSA).
- Impact of the Wine Industry on the Western Cape and the Rest of South Africa for 2009 (DBSA).
- Projection of Fuel Imports and the Impact on the South African Economy from 2005-2020 (2010) (PetroSA).

- Macro-economic Impact Assessment of Eskom's Capital Investment Programme and Subsequent Economic Impacts on the South African Economy of Costs Incurred through Different Funding Options (2010) (DBSA).
- Development and Implementation of a Model to be used for Economic Impact Assessment of Specific SAISC projects (2010) (Southern African Institute of Steel Construction (SAISC)).
- Determine the Economic Footprint of Kumba in the Northern Cape and the Rest of South Africa (2011) (Kumba Iron Ore).
- Development and Implementation of Models to be used for Economic Impact Assessment of Regulatory Decisions taken by NERSA (2010/2011/2012) (National Energy Regulator of South Africa (NERSA)).
- Acquisition of Computerized SAM based User-Friendly Macro-Economic Impact Model, including Refocused Training as well as Mentoring, Coaching, Conceptualization and Evaluation of Projects initiated by the Department of Finance (2011) (Mpumalanga Provincial Government - Department of Finance).
- Valuation of the Farm: Gedeelte 1, Volspruit 326 KR Limpopo Province of Mr Flippie de Klerk according to the Discounted Future Net Income Method (2011) (Frans Fourie Professional Accountants).
- Analyzing the Economic Impact of the Financial Sector in General and that of Standard Bank in particular, on the South African Economy through a Financial SAM (2011) (Standard Bank).
- Data Compilation and Pilot Applications of the Nile Basin Decision Support System (2012) (Aurecon).
- Analyzing and Optimizing the Metal Industry as well as the Economic Impact of Implementing measures to reduce on-going job losses and plant closures in the Foundry and Scrap Metal Industries (2012/2013) (Employment Promotion Plan Phase III).
- Review and Update of Annual Report and Provincial Project Impact Models based on the Social Accounting Matrices (SAMs) (2012) (DBSA).
- Review and Update of Annual Report Models based on the Social Accounting Matrices (SAMs) for SADC (2012) (DBSA).
- Analyse the Landbank in terms of Agriculture Commodities (2012) (DBSA/Landbank).
- Economic Footprint of Kumba Iron Ore in Limpopo, the Northern Cape and South Africa in total Update of the 2011 Study and Impact of Future Projects (2012) (Kumba Iron Ore).
- South Africa's Greenhouse Gas Mitigation Potential Analysis (2012/2013) (CAMCO).
- Training in G7 and Inforum Modelling.

Publications

- Mullins, D., Viljoen, J. & Leeuwner, H. (2011). Forecast and Analysis of South Africa's Electricity Sector. 19th INFORUM World Conference, Hazyview, South Africa. ISBN 978-0-620-53149-8.
- Mullins, D., Viljoen, J. & Mosaka, D. (2012). Analysis of South Africa's Petroleum Sector. 20th INFORUM World Conference, Florence, Italy.

DANIEL SMITH HAMMAN

PERSONAL DETAILS:

Date of Birth: 08 August 1938

Nationality: South African

Current position: Research and Data Collection

ACADEMIC QUALIFICATIONS:

Date 1961 B.Mil (US)

LANGUAGE SKILLS:

English	Read	Speak	Write
Afrikaans	Read	Speak	Write
French	Read	Speak	

OTHER SKILLS:

MS Excel, MS Word and MS Power Point.

PROFESSIONAL CAREER:

1999-present: Mosaka Economic Consultants cc – Information research, data collection and assisting in various tasks surrounding report writing etc.

1997-2009: Merhast (Pty) Ltd. Co-Director - Facilitating the utilisation of the vast pool of knowledge and expertise available in the large number of prematurely retired Defence Force members.

1993-1998: Inter-State Defence and Security Committee (ISDSC) as Reserve Officer - Coordinator of the Inter-State Defence and Security Committee (ISDSC) of the Southern African Development Community (SADC) and was responsible for the inter-state co-operation programme, committee agendas, monitoring the execution of ministerial committee decisions and the arrangement of the various levels of committee meetings (secretariat, accommodation, logistics, transport, meeting venue, etc.) on ministerial and defence chiefs level.

1958-1993: South African Defence Force – Served in several posts, retired in 1993 as Deputy Chief of the Army.

Extract on projects worked on at Mosaka Economic Consultants cc:

- Macro-economic Impact Analysis and Cost Benefit Analysis of the Sekoko Coal Waterberg Project, 2011 [Sekoko Resources (Pty) Ltd.]
- Macro-economic Impact Analysis and Cost Benefit Analysis of the Proposed Vele Colliery near Musina, Limpopo 2010 [Naledi Development (Pty) Ltd.]

- Eskom Makopane Integration Project – Economic Impact Assessment – Savannah Environmental (Pty) Ltd.
- Proposed construction of the Invubu Theta Transmission Power line – Macro Economic Impact Assessment – Bembani Sustainability Training.
- Proposed Eskom Venus – Sigma Transmission Line – Macro Economic Impact Assessment – Eskom Holdings Ltd.
- Macro-economic Impact Assessment of the Proposed Vele Colliery near Musina, Limpopo.
- Mokolo and Crocodile River (West) Water Augmentation Project – Regional and Local Economic Impact Assessment of the Proposed Water Augmentation – Naledi Development Restructured.
- Intermediate Reserve Determination Study for the Surface and Groundwater Resources in the Mokolo Catchment, Limpopo Province – Socio Economic Present State Evaluation – Dept of Water Affairs.
- Millennium Development Goals needs assessment and costing exercise in Botswana – UNDP.
- Costing of the Lesotho Poverty Reduction Strategy Paper (PRSP) – UNDP.
- A Needs Assessment for Achieving the Millennium Development Goals (MDG) in Lesotho – World Bank.

PHINDILE NKOSI

PERSONAL DETAILS:

Date of Birth: 23 March 1987

Nationality: South African

Current position: Economist at Mosaka Economic Consultants cc

ACADEMIC QUALIFICATIONS:

2009-2010: BCom. Honours in Trade and Development; University of Johannesburg, South Africa

2007-2009: Bachelor of Economics & Econometrics; University of Johannesburg, South Africa

LANGUAGE SKILLS:

Zulu	Read	Speak	Write
English	Read	Speak	Write

OTHER TRAINING:

MS Excel, MS Word and MS Power Point

PROFESSIONAL CAREER:

January 2011 – Present: Economist at by Mosaka Economic Consultants cc

January 2010 – November 2010: Tutoring Economics at University of Johannesburg.

Duties:

Ms Nkosi is responsible for various tasks ranging from developing macroeconomic models, report writing and editing.

Extract on projects worked on at by Mosaka Economic Consultants cc:

- Development and Implementation of a Model to be used for Economic Impact Assessment of Regulatory Decisions taken by NERSA (NERSA)
- Growth and Intelligence Network 2012. The Sub-Saharan Africa Logistics Flow Project (Growth and Intelligence Network)
- Review and Update of Annual Report Models based on the Social Accounting Matrices (SAM's) for SADC (Development Bank of Southern Africa)