SCOPING REPORT

COAL MINING RIGHT APPLICATION ON THE FARMS BERENICE 548MS, CELINE 547MS, PORTION 1 DOORVAARDT 355MS, REMAINDER DOORVAARDT 355MS, MATSURI 358MS, LONGFORD 354MS AND GEZELSCHAP 395MS LOCATED IN MAKHADO, LIMPOPO

BY UNIVERSAL COAL DEVELOPMENT II (PTY) LTD


Reference Number: LP 30/5/1/2/2 (10131) MR
LP 30/5/1/2/3/2/1 (10131) EM

Compiled By:

JOMELA Consulting (Pty) Ltd

Date: 13 September 2016
<table>
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<th>Report Title:</th>
<th>Draft Scoping Report for a Coal Mining Right Application on the Farms Berenice 548MS, Celine 547MS, Portion 1 Doorvaardt 355MS, Remainder Doorvaardt 355MS, Matsuri 358MS, Longford 354MS and Gezelschap 395MS</th>
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<td>Draft Report for I&amp;AP review</td>
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<tr>
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<td>DATE</td>
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<td>13 September 2016</td>
</tr>
<tr>
<td>REVISION 002</td>
<td>14 October 2016</td>
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# DETAILS OF APPLICANT AND EAP

## Table 1: Applicant Details

<table>
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<th>NAME OF APPLICANT</th>
<th>Universal Coal Development II (Pty) Ltd</th>
</tr>
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<td>Brooklyn Square</td>
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<td>PHYSICAL ADDRESS:</td>
<td>467 Fehrsen Street</td>
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<td></td>
<td>Cnr Muckleneuk Str, Brooklyn</td>
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<td></td>
<td>Pretoria</td>
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## Contact Person and correspondence address

Table 2: EAP Details

<table>
<thead>
<tr>
<th>Company:</th>
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<tbody>
<tr>
<td>Company Reg. No.:</td>
<td>2013/023450/07</td>
</tr>
<tr>
<td>Postal Address:</td>
<td>Postnet Box 215</td>
</tr>
<tr>
<td></td>
<td>Private Bag X1</td>
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<tr>
<td></td>
<td>Woodhill</td>
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<td>Gauteng</td>
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<tr>
<td>Contact Persons:</td>
<td>Yvonne Gutoona</td>
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<td>Nhlanhla Khosa</td>
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<td><a href="mailto:support@jomela.co.za">support@jomela.co.za</a></td>
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<td></td>
<td><a href="mailto:admin@jomela.co.za">admin@jomela.co.za</a></td>
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<tr>
<td>Website</td>
<td><a href="http://www.jomela.co.za">www.jomela.co.za</a></td>
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EXECUTIVE SUMMARY

Universal Coal Development II (Pty) Ltd has appointed Jomela Consulting (Pty) Ltd, an independent consulting company, to conduct an Environmental Impact Assessment (EIA) to evaluate the potential environmental and social impacts of the proposed project. The applicant intends to establish an opencast coal mining operation, located in the Limpopo Province of South Africa, some 120 kilometres (km) to the north of Polokwane and to the east of the settlement of Alldays. The Project may be reached via an all-weather gravel road that branches off from the tar road, the R584, between Alldays and Waterpoort. The Project Area is approximately (~) 50 km by road from Alldays and about 30 km by road from Waterpoort. The nearest sizeable town is Makhado (Louis Trichardt) some 80 km by road to the southeast. The nearest accessible railway siding is at Waterpoort, ~ 30 km southeast.

The farms covered by the Berenice Project is **7761.0950 hectares** (ha) in extent, is held under a Prospecting Right (PR) (No. LP30/5/1/1/2/376PR); granted to Bono Lithihi Investment Group (Pty) Ltd who is in partnership with Universal Coal Development II (Pty) Ltd. The boreholes drilled in the Prospecting Area indicate that the area of interest lies on the farms Berenice 548 MS, Celine 547 MS, Doorvaart 355 MS, Matsuri 358 MS and Longford 345 MS, with no coal on the farm Gezekschap 395 MS.

Berenice has a JORC compliant coal resource of 1.35Bt (gross tonnes in situ) of which 424.91Mt are measured, 800.92Mt indicated and 124.29Mt inferred. Concept Study on the project completed by DRA in Q1/2012 – confirmed that the project is viable and can support a sustainable 10 million tonne per annum (run of mine) operation with a life of mine (open cast) well in excess of 25 years, producing both primary soft coking and secondary thermal coal products.

The Berenice Project is within the ‘B-block’ of the Mopane sector of the Soutpansberg coalfield. Here the coal-bearing strata are deposited in a half-graben within the basement (Limpopo Mobile Belt) bedrock, fault-bounded toward the northwest and sub-outcropping towards the southeast. The Karoo sediments continue in a narrow strip towards the east, running south of Mopane and eventually into the Tshipise area.

In terms of the National Environmental Management Act (NEMA), in addition to the mining right application submitted to the DMR an Environmental Authorisation needs to be applied for. This will include the mining area and any associated surface infrastructure. This application will follow the Scoping and Environmental Impact Assessment process in terms of the National Environmental Management ACT (NEMA): EIA Regulations 2014.
An application for Environmental Authorisation in term of Section 16 of the NEMA EIA 2014 regulations was initially submitted to the DMR on 4th of December 2015 and subsequently accepted on the 8th of December 2015. This application lapsed due to failure to meet the public consultation timeframes as not all specialist reports where made available for at least 30 days to interested and affected parties. A new application was submitted on the 2nd of September 2016 in terms of NEMA and MPRDA for the mining right plus environmental authorisation.

According to the EIA Regulations, Interested and Affected Parties (I&APs) must have the opportunity to comment on the proposed project and verify that all the issues raised during the Scoping Phase have been recorded. This is the main purpose of the Scoping Report (SR), will be available for public review for 30 days from the period 13th September 2016 to the 13th of October 2016.

Comments received during this phase will be considered and addressed in the Environmental Impact Assessment (EIA/EMPr) which will be submitted to the competent authority Department of Minerals (DMR) for approval.

AN EIA CONSISTS OF THE FOLLOWING PHASES

<table>
<thead>
<tr>
<th>Scoping Phase</th>
<th>Impact Assessment Phase</th>
<th>Environmental Impact Report and EMPr</th>
<th>Decision-making Phase</th>
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<td>To identify issues, to focus the EIA</td>
<td>Detailed studies of potential impacts, positive and negative</td>
<td>Consolidate findings of impact assessment studies</td>
<td>Proponent and authorities use EIA findings to decide if project goes ahead</td>
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**Purpose of this Report**

This report addresses the requirements for Scoping Phase and the Plan of Study (PoS) for the Environmental Authorisation Process as outlined in the NEMA regulations and the MPRDA regulations. The aim of this SR is to:

- Provide information to the authorities as well as interested and affected parties (I&APs) on the proposed project;
- Provide information regarding alternatives that are being considered;
- Indicate how I&APs have been and are still being afforded the opportunity to contribute to the project, verify that the issues raised during the scoping phase are incorporated in the impact assessment phase of the environmental authorization process;
Describe the baseline receiving environment;

Define the Terms of Reference (ToR) for specialist studies to be undertaken in the Impact Assessment Phase of the EIA; and

Present the findings of the Scoping Phase in a manner that facilitates input by the I&AP’s and decision-making by the relevant authorities.

The Process

As part of the project, the environmental authorizations and licenses required to start the mining need to be obtained. In order to do so, a Scoping and Environmental Impact Assessment Process (S&EIR) is being undertaken in line with the provisions of the National Environmental Management Act (EIA regulations of 04 December 2014). The S&EIR process and specialist studies to be undertaken will also support the applications for the required licenses and environmental authorizations.

The EIA findings are used by the applicant and authorities to obtain an objective view of the potential environmental, social and cultural impacts that could arise during the mining of the proposed area.

Measures for the avoidance or mitigation of negative impacts will be proposed and positive impacts will be enhanced. The outcome of the first phase of the S&EIR is the Scoping Report, which provides the basis for undertaking the Impact Assessment Phase of the project.

The process is summarized in the illustration below:
Environmental Baseline and Potential Impacts

The mining right area has been identified within the B-Block of the Mopane sector of the Soutpansberg Coalfield and this assessment is aimed at identifying the general environmental sensitivities across the mining right application area. This will involve desktop plus specialist studies that where conducted and draws extensively on information contained in these studies. In order to assess these potential impacts the following baseline information will be assessed:

- Air quality impact assessment;
- Hydrological assessment (Surface water);
- Geohydrological Assessment;
- Ecological Assessment;
- Soil and land Capability;
- Social Impact Assessment;
- Visual Impact Assessment;
- Noise Assessment;
- Traffic Impact; and
- Heritage Impact assessment

The following key environmental issues – potential negative impacts and potential benefits – have been identified:

- Ecology - Introduction of invader species; and the loss of freshwater resources and riparian habitat (although, where feasible and ecologically viable, these areas will not be mined);
- Botany - Potential loss of vegetation, habitat and endemic species;
- Soils, land use and land capability – Potential loss of agricultural potential;
- Terrestrial fauna – potential impact on faunal habitats;
- Surface and ground water – Potential impact on water quality and flows;
- Visual and Sense of Place – Visual impacts associated with mining infrastructure, landscape alteration and vegetation loss;
- Socio-economic – Job security, continued investment in local economy and negative impacts associated with mine closure; and
- Heritage – Potential impacts on sites of archaeological or palaeontological significance.
Way Forward

The way forward recommended by this study is as follows:

- Make the Scoping Report available for public comment for a period of 30 calendar days;
- Polishing and updating the specialist studies conducted so far incorporating comments from I&AP’s;
- Making these studies available for review to all I&AP’s;
- Requests for comments and issues raised during the previous EIA/EMP consultation period on the draft report to enable incorporation and make changes to the report and make it available for at least 60 days during the EIA phase;
- Submit the Scoping Report to the competent authority for permission to undertake the Impact Assessment Phase of the project;
- Upon approval of the Scoping Report, all I&APs are to be notified of the conditions of the Department of Mineral Resources for proceeding with the Impact Assessment Phase of the project; and
- Execute the Plan of Study for Impact Assessment during the Impact Assessment Phase of the project.
TABLE OF CONTENTS

1 PROJECT INFORMATION -------------------------------------------------17
  1.1 Introduction .............................................................................. 17
  1.2 Purpose of the report ............................................................... 18
  1.3 Assumptions and Limitations ..................................................... 18
  1.4 Description of the property ...................................................... 19
  1.5 Project Locality ........................................................................ 19

2 DESCRIPTION OF THE SCOPE OF THE PROPOSED OVERALL ACTIVITY -------23
  2.1 Description of the activities to be undertaken ................................ 25
  2.2 Mining Right: Activities and infrastructure .................................. 26
    2.2.1 Processing Plant ................................................................. 28
    2.2.2 Infrastructure .................................................................... 33
    2.2.3 Roads ................................................................................. 34
    2.2.4 Water Supply ...................................................................... 35
    2.2.5 Surface Infrastructure ......................................................... 37
    2.2.6 Sewage Reticulation and Sewage Treatment ........................ 38
    2.2.7 Conveyors ......................................................................... 38
    2.2.8 Terraces .............................................................................. 39
    2.2.9 Foundations ......................................................................... 39
    2.2.10 Civil Works ......................................................................... 39
    2.2.11 Buildings ........................................................................... 39
    2.2.12 Substations ....................................................................... 40

2.3 Minerals applied for: ................................................................. 42

3 POLICY AND LEGISLATIVE CONTEXT ..............................................43
  3.1.1 The South African Constitution ............................................... 43
  3.1.2 National Environmental Management Act ............................. 44
  3.1.3 Mineral and Petroleum Resources Development Act ............. 46
  3.1.4 National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004) .......................... 47
  3.1.5 National Forest Act, 1998 (Act 84 of 1998) ............................ 48
  3.1.6 National Environmental Management: Air Quality Act (Act No 39 of 2004) ................................ 48
  3.1.7 Conservation of Agricultural Resources Act (Act 43 of 1983) .......................... 49
  3.1.8 National Environmental Management: Waste Act (Act 59 of 2008) ................................ 49
  3.1.9 Occupational Health and Safety Act (Act 85 of 1993) .............. 50
  3.1.10 National Heritage Resources Act ........................................... 51
3.2 Provincial Legislative Framework ................................................................. 56
  3.2.1 Applicable Legislation and Approvals Required ........................................ 57

4 PROJECT ALTERNATIVES ............................................................................. 59
  4.1 Feasible alternatives .................................................................................. 60
    4.1.1 Location .................................................................................................. 60
    4.1.2 Activity .................................................................................................. 60
    4.1.3 Design .................................................................................................... 60
    4.1.4 Technological ........................................................................................ 61
    4.1.5 Operational Aspects ............................................................................. 62
    4.1.6 No Project Alternative ......................................................................... 62
    4.1.7 Need and desirability of the proposed activities. ................................. 62

5 PUBLIC PARTICIPATION (REFER TO THE CONSULTATION REPORT) .............. 65
  5.1 Public Participation Process Followed to Date .............................................. 65
    5.1.1 I&AP and Stakeholder identification, registration and the creation of an electronic database ................................................................. 65
    5.1.2 Consultation and correspondence with I&AP’s and Stakeholders and the addressing of their comments (continuous). ........................................ 66
    5.1.3 Release of the revised and amended Scoping Report to I&AP’s and stakeholders for review and comment. ....................................................... 67

6 BASELINE RECEIVING ENVIRONMENT .................................................... 69
  6.1 Regional Setting ......................................................................................... 69
  6.2 Baseline Environmental attributes associated with the sites ...................... 72
    6.2.1 Climate .................................................................................................. 72
    6.2.2 Geology ................................................................................................ 77
    6.2.3 Soils ....................................................................................................... 80
    6.2.4 Biodiversity .......................................................................................... 84
    6.2.5 Topography ........................................................................................... 87
    6.2.6 Surface water ....................................................................................... 116
    6.2.7 Groundwater ......................................................................................... 118
    6.2.8 Groundwater supply potential ............................................................... 123
    6.2.9 Heritage ............................................................................................... 124
    6.2.10 Socio economic .................................................................................. 127

7 ENVIRONMENTAL IMPACT ASSESSMENT ................................................... 130
7.1 Assessment Criteria

7.1.1 Extent

7.1.2 Duration

7.1.3 Intensity

7.1.4 Probability

7.1.5 Mitigation

7.2 Determination of significance – Without Mitigation

7.3 Determination of significance – With Mitigation

7.3.1 Assessment weighting

7.3.2 Ranking, Weighting and Scaling

7.3.3 Identifying the Potential Impacts without Mitigation (WOM)

7.3.4 Identifying the Potential Impacts with Measures (WM)

7.3.5 Impacts identified

7.3.6 The positive and negative impacts that the proposed activity (in terms of the initial site layout) and alternatives will have on the environment and the community that may be affected.

7.3.7 The possible mitigation measures that could be applied and the level of risk.

7.3.8 Final Site Layout Plan

7.4 Plan of study for the Environmental Impact Assessment process

7.4.1 Description of the aspects to be assessed as part of the environmental impact assessment process

Specialist Studies (Refer to Appendices)

7.4.2 Description of aspects to be assessed by specialists

7.4.3 Proposed method of assessing the environmental aspects including the proposed method of assessing alternatives

7.4.4 The stages at which the competent authority will be consulted

8 PUBLIC PARTICIPATION DURING THE EIA PHASE

8.1 Particulars of the public participation process with regard to the Impact Assessment process that will be conducted

8.2 Details of the engagement process to be followed

8.3 Description of the information to be provided to Interested and Affected Parties

8.4 Description of the tasks that will be undertaken during the environmental impact assessment process

9 MITIGATION MEASURES

9.1 Measures to avoid, reverse, mitigate, or manage identified impacts and to determine the extent of the residual risks that need to be managed and monitored

9.2 Other Information required by the competent Authority
9.2.1 Impact on the socio-economic conditions of any directly affected person. 159
9.2.2 Impact on any national estate referred to in section 3(2) of the National Heritage Resources Act. 159
9.2.3 Potential Cumulative impact and mitigation measures 159

10 RECOMMENDATIONS 160

10.1 Undertaking Regarding Correctness of Information 161

11 REFERENCES 162

LIST OF FIGURES
FIGURE 1: PROJECT LOCALITY 20
FIGURE 2: GOOGLE MAP OF THE PROPOSED BERENICE COAL MINING AREA 21
FIGURE 3: MINING RIGHT APPLICATION AREA - REGULATION 2.2 MAP 22
FIGURE 4: MINE INFRASTRUCTURE 27
FIGURE 5: WASHING PLANT LAYOUT 29
FIGURE 6: SATELLITE PICTURE "HIGH POWER" ESKOM INFRASTRUCTURE 41
FIGURE 7: PLANT LAYOUT 61
FIGURE 8: LOCATION OF THE LIMPOPO PROVINCE OF SOUTH AFRICA 70
FIGURE 9: LOCATION OF MAHADO MUNICIPALITY IN THE LIMPOPO PROVINCE 71
FIGURE 10: ARIDITY ZONES 73
FIGURE 11: TEMPERATURE: MAXIMUM SUMMER 74
FIGURE 12: TEMPERATURE: MINIMUM SUMMER 74
FIGURE 13: TEMPERATURE: MAXIMUM WINTER 75
FIGURE 14: RAINFALL: ANNUAL MEAN 75
FIGURE 15: MOISTURE AVAILABILITY 76
FIGURE 16: EVAPORATION 76
FIGURE 17: SECTORS OF THE SOUTPANSBERG/VENDA-PARFURI COALFIELDS 78
FIGURE 18: LOCAL GEOLOGY MAP 79
FIGURE 19: SOIL OF THE STUDY AREA 81
FIGURE 20: AGRICULTURE POTENTIAL 82
FIGURE 21: STRUCTURALLY FAVOURABLE SOILS 83
FIGURE 22: SOIL ASSOCIATION 83
FIGURE 23: POTENTIAL SHIFTING SANDS 83
FIGURE 24: VEGETATION MAP OF THE STUDY SITE 85
FIGURE 25: SENSITIVITY MAP OF THE STUDY SITE 87
FIGURE 26: SAMPLING POINTS FOR FAUNA 104
FIGURE 27: APPROXIMATE EXTENT OF AREA INCLUDED (WHITE SQUARE) WHEN Generating THE LIST OF BIRDS POTENTIALLY OCCURRING AT THE SITE OF THE PROPOSED MINE 106
FIGURE 28: TOPOGRAPHY OF THE STUDY AREA 115
FIGURE 29: SOTER LANDFORMS 116
FIGURE 30: QUATERNARY CATCHMENT 117
FIGURE 31: HYDROLOGY OF THE STUDY SITE AND SURROUNDS AS PER EXISTING SPATIAL LAYERS 118
FIGURE 32: SAMPLED BOREHOLES 120
FIGURE 33: PIEZOMETRIC SURFACE MAP OF THE PROJECT AREA 123
FIGURE 34: LOCATION OF THE RECORDED CULTURAL HERITAGE SITES WITHIN THE SURVEY AREA 125
FIGURE 35: DETAIL OF THE LOCATION OF HERITAGE SITES IN THE SOUTHERN SECTION OF THE SURVEY AREA ............................................................................................................. 126
FIGURE 36: DETAIL OF THE LOCATION OF HERITAGE SITES IN THE NORTHERN SECTION OF THE SURVEY AREA ............................................................................................................. 126
FIGURE 37: DESCRIPTION OF BIOPHYSICAL ASSESSMENT PARAMETERS WITH ITS RESPECTIVE WEIGHTING .................................................................................................................. 134

LIST OF TABLES
TABLE 1: APPLICANT DETAILS ......................................................................................... 3
TABLE 2: EAP DETAILS .................................................................................................... 3
TABLE 3: PROVINCIAL LEGISLATION, POLICIES AND GUIDELINES CONSIDERED ........ 56
TABLE 4: THE FOLLOWING TWELVE VEGETATION MAPPING UNITS WERE IDENTIFIED WITHIN THE STUDY AREA: ........................................................................................................ 84
TABLE 5: PLANT SPECIES OF CONSERVATION CONCERN ............................................... 103
TABLE 6: MAMMAL DIVERSITY- THE SPECIES OBSERVED OR DEDUCED TO OCCUPY THE SITE ........ 107
TABLE 7: RED-LISTED MAMMALS WHOSE POSSIBLE PRESENCE AT THE SITE OF THE PROPOSED COAL MINE WAS EVALUATED DURING THE ASSESSMENT PROCESS ........................................... 113
TABLE 8: SUMMARY OF THE SLUG TESTING PROGRAMME ........................................ 119
TABLE 9: LIST OF POTENTIAL IMPACTS ......................................................................... 141
TABLE 10: MITIGATION MEASURES .................................................................................. 157
TABLE 11: CUMULATIVE IMPACTS AND MITIGATION MEASURES ................................. 159
## LIST OF ABBREVIATIONS

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<thead>
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<th>Abbreviation</th>
<th>Description</th>
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<tr>
<td>AIA</td>
<td>Archaeological Impact Assessment</td>
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<td>Association of Southern African Professional Archaeologists</td>
</tr>
<tr>
<td>BID</td>
<td>Background Information Document</td>
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<td>CA</td>
<td>Competent Authority</td>
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<td>DEA</td>
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<td>DWS</td>
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GLOSSARY OF TERMS

Anthropogenic: Change induced by human intervention.

Applicant: Any person who applies for an authorisation to undertake an activity or undertake an Environmental Process in terms of the Environmental Impact Assessment (EIA) Regulations – National Environmental Management Act (EIA regulations of 04 December 2014) as contemplated in the scheduled activities listed in Government Notice (GN) No 983, 984 and 985.

Archaeological resources: This includes:
- material remains resulting from human activity which are in a state of disuse and are in or on land and which are older than 100 years including artefacts, human and hominid remains and artificial features and structures;
- rock art, being any form of painting, engraving or other graphic representation on a fixed rock surface or loose rock or stone, which was executed by human agency and which is older than 100 years, including any area within 10m of such representation;
- wrecks, being any vessel or aircraft, or any part thereof which was wrecked in South Africa, whether on land, in the internal waters, the territorial waters of the republic as defined in the Maritimes Zones Act, and any cargo, debris or artefacts found or associated therewith, which is older than 60 years or which South African Heritage Resources Agency (SAHRA) considers to be worthy of conservation; features, structures and artefacts associated with military history which are older than 75 years and the site on which they are found.

Biodiversity: The variety of life in an area, including the number of different species, the genetic wealth within each species, and the natural areas where they are found.

Cultural significance: This means aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance.

Cumulative Impact: In relation to an activity, cumulative impact means the impact of an activity that in itself may not be significant, but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area.

Environment: All physical, chemical and biological factors and conditions that influence an object.
**Environmental Impact Assessment:** In relation to an application, to which Scoping must be applied, means the process of collecting, organising, analysing, interpreting and communicating information that is relevant to the consideration of the application.

**Environmental Impact Assessment Report:** In-depth assessment of impacts associated with a proposed development. This forms the second phase of an EIA and follows on the Scoping Report (SR).

**Heritage resources:** This means any place or object of cultural significance. See also archaeological resources above.

**Precipitation:** Any form of water, such as rain, snow, sleet, or hail that falls to the earth's surface.

**Red Data species:** All those species included in the categories of endangered, vulnerable or rare, as defined by the International Union for the Conservation of Nature and Natural Resources.

**Riparian:** The area of land adjacent to a stream or river that is influenced by stream induced or related processes.
1 PROJECT INFORMATION

1.1 Introduction

Universal Coal Development II (Pty) Ltd has appointed Jomela Consulting (Pty) Ltd, an independent consulting company, to conduct an Environmental Impact Assessment (EIA) to evaluate the potential environmental and social impacts of the proposed project. The applicant intends to establish an opencast coal mining operation, located in the Limpopo Province of South Africa, some 120 kilometres (km) to the north of Polokwane and to the east of the settlement of Alldays. The Project may be reached via an all-weather gravel road that branches off from the tar road, the R584, between Alldays and Waterpoort. The Project Area is approximately (~) 50 km by road from Alldays and about 30 km by road from Waterpoort. The nearest sizeable town is Makhado (Louis Trichardt) some 80 km by road to the southeast. The nearest accessible railway siding is at Waterpoort, ~ 30 km southeast.

The farms covered by the Berenice Project is 7,761.095 hectares (ha) in extent, is held under a Prospecting Right (PR) (No. LP30/5/1/1/2/376PR); granted to Bono Lithihi Investment Group (Pty) Ltd who is in partnership with Universal Coal Development II (Pty) Ltd. The boreholes drilled in the Prospecting Area indicate that the area of interest lies on the farms Berenice 548 MS, Celine 547 MS, Doorvaart 355 MS, Matsuri 358 MS and Longford 345 MS, with no coal on the farm Gezekschap 395 MS.

The Berenice Project is within the ‘B-block’ of the Mopane sector of the Soutpansberg coalfield. Here the coal-bearing strata are deposited in a half-graben within the basement (Limpopo Mobile Belt) bedrock, fault-bounded toward the northwest and sub-outcropping towards the southeast. The Karoo sediments continue in a narrow strip towards the east, running south of Mopane and eventually into the Tshipise area.

The report has been designed to meet the requirements for conducting an Environmental Impact Assessment (EIA) and Environmental Management Programme (EMPR) as stipulated in the Regulations contained in both the Mineral and Petroleum Resources Development Act (Act No. 28 of 2002-MPRDA) and National Environmental Management Act (EIA regulations of 4 Dec 2014) respectively.

An application for Environmental Authorisation in term of Section 16 of the NEMA EIA 2014 regulations was submitted to the DMR on the 2nd of September 2016 and is pending but due to the legislated scoping timeframes the report has to be sent out to I&AP’s.

According to the EIA Regulations, Interested and Affected Parties (I&APs) must have the opportunity to comment on the proposed project and verify that all the issues raised during the Scoping Phase have
been recorded. This is the main purpose of the Scoping Report (SR), which is available for public review and comment for a 30 day period from the 13\textsuperscript{th} of September to the 13\textsuperscript{th} of October 2016.

Comments received during this phase will be considered and addressed in the Environmental Impact Assessment (EIA/EMPr) which will be submitted to the competent authority Department of Minerals (DMR) for approval.

The National Water Act 36 of 1998 (NWA) specifies certain activities that require registration or licensing from the Department of Water Affairs (DWA). Given the nature of the receiving environment and the occurrence of certain freshwater features the mine will require a Water Use Licence (WUL). The EIA and a separate Technical Motivation Report are required to inform the decision to issue a Water Use Licence. This application will be made concurrently with the current EIA process, including stakeholder engagement.

1.2 Purpose of the report

In terms of relevant legislation, the applicant may not commence prior to a suite of authorisations. This document is the Scoping Report, the purpose of which is to provide stakeholders with the preliminary results of the Scoping Phase of the study and with an opportunity to verify that all issues have been identified and, if not, provides an opportunity for stakeholders to raise them and for them to be captured and considered in the EIA process.

1.3 Assumptions and Limitations

As is standard practice, this Scoping Report is based on a number of assumptions and is subject to certain limitations. These are as follows:

- It is assumed that information provided by the applicant, EAP and specialists(if any) is accurate;
- A more detailed project description will be presented in the Impact Assessment Phase; and
- Detailed assessment of the potential positive and negative environmental impacts of the proposed development will only be undertaken during the Impact Assessment Phase.

Notwithstanding the above, Jomela is confident that these assumptions and limitations do not compromise the overall findings of this report.
1.4 Description of the property

The proposed coal mining right application will be 7761.095 hectares on the farms Berenice 548MS, Celine 547MS, Doorvaardt 355MS, Matsuri 358MS, Longford 354MS and Gezelschap 395MS. Access to the proposed site will be obtained through an existing access road through agricultural land. The Project Area is located in an area which is relatively flat lying with the incision of the Brak River Valley towards the north of the area, at a surface elevation of 690 metres (m) to 735 m above sea level.

No human settlements are situated within the planned opencast mining area. The land is currently mainly used for game farming.

1.5 Project Locality

| Farm Name:                               | Full extent of Berenice 548MS |
|                                         | Full extent of Celine 547MS   |
|                                         | Portion 1 Doorvaardt 355MS    |
|                                         | Remainder Doorvaardt 355MS    |
|                                         | Full extent of Matsuri 358MS  |
|                                         | Full extent of Longford 354MS |
|                                         | Full extent of Gezelschap 395MS |
| Application area (Ha)                   | 7761.095 ha                   |
| Magisterial district:                   | Makhado Local Municipality in the Vhembe District Municipality, Limpopo Province |
| Distance and direction from nearest town| The Project Area is ~ 50 km by road from Alldays and 30 km by road from Waterpoort. The nearest sizeable town is Makhado some 80 km by road to the southeast. |
| 21 digit Surveyor General Code for each farm portion | T0MS000000000548000000 |
|                                         | T0MS000000000547000000 |
|                                         | T0MS000000000355000000 |
|                                         | T0MS000000000358000000 |
|                                         | T0MS000000000354000000 |
|                                         | T0MS000000000395000000 |

Map showing the proposed Berenice Coal Project
Figure 1: Project Locality
Figure 2: Google Map of the proposed Berenice Coal Mining area
Figure 3: Mining Right Application Area - Regulation 2.2 Map
## 2 DESCRIPTION OF THE SCOPE OF THE PROPOSED OVERALL ACTIVITY

### i) Listed and specified activities

<table>
<thead>
<tr>
<th>NAME OF ACTIVITY</th>
<th>AERIAL EXTENT OF THE ACTIVITY</th>
<th>LISTED ACTIVITY (MARK WITH AN X WHERE APPLICABLE OR AFFECTED)</th>
<th>APPLICABLE LISTING NOTICE (GNR 983, 984, 985)</th>
<th>WASTE MANAGEMENT AUTHORIZATION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GNR 983 Listing Notice 1: Activities requiring an environmental authorisation subject to a Basic Assessment</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The development of facilities or infrastructure for the transmission and distribution of electricity- (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts; Relevance: A power distribution switch yard will be constructed (substation).</td>
<td>2HA</td>
<td>X</td>
<td>GNR 983 Listing Notice 1: Activity 11</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>The development of – (ii) channels exceeding 100 square metres in size (iv) dams where the dam including infrastructure and water surface area, exceeds 100 square meters (vi) bulk storm water outlet structures exceeding 100 square metres in size; (xii) Infrastructure or structures with a physical footprint of 100 square meters or more. <strong>Relevance: A pollution control dams will be constructed.</strong></td>
<td>20ha</td>
<td>X</td>
<td>GNR 983 Listing Notice 1: Activity 12</td>
</tr>
<tr>
<td></td>
<td>The development of a road where no reserve exists where the road is wider than 8 meters, but excluding roads which are identified and included in activity 27 in listing Notice 2 of 2014. <strong>Relevance: Access roads will be upgraded and mine haul roads constructed.</strong></td>
<td>20km</td>
<td>X</td>
<td>GNR 983 Listing Notice 1: Activity 24</td>
</tr>
<tr>
<td></td>
<td>The clearance of an area of 1 hectare of more, but less than 20 hectares of indigenous vegetation. <strong>Relevance: the area applied for is 20 hectare consisting of indigenous vegetation.</strong></td>
<td>20ha</td>
<td>X</td>
<td>GNR 983 Listing Notice 1: Activity 27</td>
</tr>
<tr>
<td><strong>GNR 984 Listing Notice 2: Activities requiring an environmental authorisation subject to a Scoping and Environmental Impact Assessment</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The development of facilities or infrastructure, for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of more than 500 cubic metres. <strong>Relevance: Hydrocarbon fuels (e.g. diesel and grease) will be stored on site for fuelling of vehicles.</strong></td>
<td>1000m³</td>
<td>X</td>
<td>GNR 984 Listing 2: Activity 21</td>
<td>N/A</td>
</tr>
<tr>
<td>The development and related operation of facilities or infrastructure for the bulk transportation of dangerous goods- (iii) in solid form, outside an industrial complex, using funiculars or conveyors with a throughput capacity of more than 50 tons day. <strong>Relevance: Conveyors transporting coal</strong></td>
<td>10HA</td>
<td>X</td>
<td>GNR 984 Listing 2: Activity 7</td>
<td>N/A</td>
</tr>
</tbody>
</table>
The clearance of an area of 20 hectares or more of indigenous vegetation  

**Relevance: clearing of mining area**

<table>
<thead>
<tr>
<th>Area Description</th>
<th>Size (ha)</th>
<th>Applicable</th>
<th>GNR 984 Listing 2: Activity 16</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any activity including the operation of that activity which requires a mining right as contemplated in section 22 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), including associated infrastructure, structures and earthworks, directly related to the extraction of a mineral resource.</td>
<td>5,791.30</td>
<td>X</td>
<td>GNR 984 Listing 2: Activity 16</td>
<td>N/A</td>
</tr>
<tr>
<td>Relevance: Mining activity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Any activity including the operation of that activity associated with the primary processing of a mineral resource including winning, reduction, extraction, classifying, concentrating, crushing, screening and washing</td>
<td>5,791.30</td>
<td>X</td>
<td>GNR 984 Listing 2: Activity 17</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Applicable</td>
<td></td>
</tr>
</tbody>
</table>

**GNR 983 Listing Notice 3: Activities requiring an environmental authorisation subject to a Basic Assessment**

<table>
<thead>
<tr>
<th>Activity ID</th>
<th>Relevance</th>
<th>Relevant Areas</th>
<th>Area Size (ha)</th>
<th>GNR 985 Listing Notice 3: Activity</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>The development of a road wider than 4 metres with a reserve less than 13,5 metres. (a)</td>
<td>In Limpopo where: (ff) Core areas in biosphere reserves;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Relevance: The project lies within the Vhembe Biosphere</strong></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>The development of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres. (e) In Limpopo: i. All areas.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Relevance: Storage of fuels and other dangerous goods</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The clearance of an area of 300 square metres or more of indigenous vegetation in Limpopo where: iv. On land, where, at the time of the coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent zoning.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relevance: The application area is zoned for agriculture and currently being used for eco gam hunting.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The development of-(xii) infrastructure or structures with a physical footprint of 10 square metres or more in Limpopo; (a) within a watercourse (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse; (gg) Core areas in biosphere reserves;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
2.1 Description of the activities to be undertaken

Description of Mining Method

The mining method will be a standard truck and shovel application where the topsoil is removed and
stored. Thereafter; softs will be removed and stored at the designated material stockpiles. Drilling and
blasting of the hard materials (hards) will then take place. Following the blasting process, material will
be dozed into the void following the coaling operation. A conservative estimate of 15 % dozer gain has
been in the calculations.

The remainder of the hard material will be loaded, trucked out of the pit, and dumped over the highwall
into the void created by the mining operation. Coaling will then commence and the process repeated
on a strip-by-strip basis. Material (apart from the topsoil) will then be rolled-over into the void created
by the removal of the coal in the previous bench, with the hard overburden and interburden forming
the base. This is followed by the soft overburden, levelled, and finally topsoil will be placed and seeded.

Initially, topsoil and hards will be placed in dedicated positions in the centre, just north of the Block
OC1, as close as possible to the final void positions, in order to eliminate excessive handling during
the closure phase of the mine. Rollover of overburden material will be implemented after the first strip
has been mined. Rehabilitation will form an integral part of the mining process and final rehabilitated
land will not be further than four mining strips behind the mining face.

Drilling and blasting activities will be required for hard material. Waste material will be handled by
excavators and small-articulated trucks, as well as dozers. Where practical, throw blasting will be
utilised to minimise loading and hauling requirements of hard material. Blast gain is entirely dependent
on the competency of the overburden. Where the overburden consists mainly of soft material, throw
blast gain is minimal. When it is classified as competent overburden, throw blast gain increases to as
much as 20 % of the blasted material. Approximately 15 % of the overburden will be moved by dozer-
push method to the waste side of the pit.

Establishing the backfill dumps as quickly as possible will minimise haul distances and ensure the
waste fleets are kept to a minimum. Mine planning will sequence waste drilling, blasting, and removal
to provide a continuous source of coal from the respective coal seams for beneficiation purposes.
2.2 Mining Right: Activities and infrastructure

All the required mine infrastructure for the Project Area will be established on the LP30/5/1/1/2/376PR Prospecting Right area granted to Bono Lithihi.

The mining reserve consists of four economically mineable opencast blocks. These blocks are named OC 1, OC 2, OC 3 and OC4. Mining will commence in OC 1 that will be mined for 20 years. This will be followed by mining OC 2 and OC 3 consecutively and then OC 4.

The mining reserves will be mined by utilising truck and shovel opencast method of mining due to the reserves being shallow. One box cut, located in the south and with an east to west orientation, has been designed in the mine layout for OC 1, with two proposed waste dump sites. This design has ensured that the hauling of overburden material over excessive distances, even during the start-up period, will be largely minimised. Rollover of overburden material will be implemented after the first strip has been mined. Drilling and blasting will be undertaken for hard material. Rehabilitation will form an integral part of the mining process.

A second box cut will be established in OC 2 in Year 20 of the Project. This box cut will be located in the south with an east to west orientation.

The selected positions of both the box cuts were based on the optimal relation between strip ratio and product yield.
Figure 4: Mine Infrastructure
2.2.1 Processing Plant

The market for the coal from the mine works program is to supply a high Volatile soft coking coal product for Export and an Eskom 21.5 MJ/kg product. The coal from the MWP area will be beneficiated to provide a consistent 12.0 % to 15.0 % Ash Export coking coal product and a 21.5 MJ/kg Eskom product.

The target market for the coal is firstly for Export and secondly for Eskom. The coal will be beneficiated through a double-stage dense medium washing plant and the anticipated cost for the washing process is ZAR 24.76 per ROMt and the discard costs will be ZAR 5.44 per ROMt, based on a build-own-operate-transfer (BOOT) contract.

Due to the amount of material that has to be treated, about 10 Million tonnes per annum (Mtpa), the processing section of the plant will be split into two identical modules. The design of the dense media separation (DMS) section for each module will be based on modular concepts for simplicity and ease of operation. The sections are designed to provide sufficient capacity for 10 Mtpa of ROM coal.

2.2.1.1 Raw Coal Section

ROM coal will be tipped directly into an 850 millimetres (mm) static grizzly screen and the underflow will feed into a 150-tonne feed bin. From there, the ROM coal will be fed via a vibrating grizzly feed to the crushing circuit. A ROM stockpile area will be created next to the feed bin that will only be utilised when the feeding bin is out of commission.

The first stage of the crushing circuit includes a jaw crusher and rotary-breaker in series, designed to reduce the ROM top size from 850 mm down to 80 mm and remove any stone material larger than 80 mm.
Figure 5: Washing Plant Layout
From here, the partially crushed ROM coal is fed to a closed circuit crushing and screening system to crush the coal to (minus) - 50 mm using one double roll crusher. The screened - 50 mm ROM product is conveyed directly to the DMS plant without passing through the crusher.

The – 50 mm de-stoned raw coal is discharged onto the plant feed stockpile tripper conveyor that distributes it along the 25,000-tonne live stockpile. The coal is withdrawn from the stockpile by variable speed vibrating feeders that feed onto the processing plant feed conveyor at a controllable rate up to a peak of 1,600 tonnes per hour (tph).

The conveyor discharges into the bifurcated plant feed bin that allows the material to be split into two streams feeding the two plant modules. The bin design and discharge arrangement ensures that each module receives feed material that is relatively similar in terms of particle size. Material is withdrawn from the bin at a controlled rate by means of a variable speed vibrating feeder operating in a closed loop with a mass meter on the module feed conveyor.

An automated belt sampler is incorporated on the surge bin feed conveyor to provide a representative sample of the raw feed for metallurgical control.

2.2.1.2 Raw Coal Section

The feed to each module is received by a feed preparation screen consisting of a feed pulping chute at the feed-end and rows of sprays to remove adhering fines. The screen produces a - 50 mm (plus) + 1 mm solids stream as feed to the DMS circuit and a – 1 mm + 0 mm slurry stream as feed to the fines circuit.

2.2.1.3 Dense Medium Separation Plant (DMS)

A two-stage DMS circuit is provided to produce the coking and thermal coal products from the coarse feed generated as oversize from the module feed preparation screen. The solids are split into two equal streams at the discharge end of the screen before dropping to individual mixing boxes. The mixing boxes are used to allow appropriate mixing of the feed solids with magnetite medium from the circulating medium tank.
The magnetite medium slurry is used as transport medium for the feed solids to the cyclone and is used as separating medium in the cyclone. The RD of the magnetite medium slurry is a key parameter in the separation process and this is monitored and controlled, using an automatic density control system. The first stage of the DMS circuit, which is referred to as the high gravity stage, is operated at a higher medium density (typically 1.65 and above) to remove most of the waste material as sinks. The floats from high gravity stage reports to a crusher that crushes the material down to – 25 mm to improve the liberation of the coking coal before reporting to the secondary low gravity DMS stage. The sinks solids from the high gravity DMS report onto the plant discard conveyor.

The low gravity DMS is operated at a lower medium density of ~ 1.40 to produce the coking product as cyclone floats and the secondary product as cyclone sinks. All streams from the cyclones pass over their dedicated drain and rinse screens for medium recovery before the coal solids leave the system. The sinks solids from the low gravity DMS report onto the secondary product (thermal) conveyor and the low gravity DMS floats report onto the coking product conveyor.

The circuit also consists of a medium densification system that works hand-in-hand with the density control system. The densifying system increases the medium density by removing water from the medium while the density control system drops the medium density to the required level by injection a controlled quantity of water into the medium. There is also a dilute medium system that handles the dilute magnetite slurry streams resulting from the high- and low gravity drain and rinse screens after rinsing off the magnetite from the coal solids. The magnetite recovered from the dilute medium system is sent back to the high- and low gravity circulating medium circuits for reuse.

**2.2.1.4 Fines Circuit**

The - 1 mm feed preparation screen underflow slurry is pumped to a set of classification cyclones for the removal of the - 0.15 mm slimes material. The - 0.15 mm slimes leave the cyclone with the overflow stream that gravitates to the flotation feed tank, which feeds the flotation circuit.

The - 1.0 + 0.15 mm cyclone underflow material is gravitated to a feed header tank where dilution water is added via an automatic control valve to maintain a steady level in the tank and to ensure the correct feed to the spiral plant.
The spiral plant product is pumped to a dewatering cyclone that produces a dense product stream as underflow. The underflow stream gravitates to a high frequency vibrating screen for dewatering. The discard is also dewatered using a combination of a dewatering cyclone and a high frequency dewatering screen. The dewatered solids from the product dewatering screen report onto the coking product conveyor, and the solids from the discard screen report onto the plant discard conveyor. The overflow streams from the dewatering cyclones are gravitated to the flotation feed tank for more coking coal recovery through the float circuit.

2.2.1.5 Flotation Circuit

The slimes and ultra-fines from the fines circuit are pumped from the flotation feed tank to the float cells. Prior to feeding the cells, the stream is dosed with reagents (frother and collector) to make it possible to recover the coking coal in the stream as part of the froth that is produced by the cells. The reagents are dosed at metered rates to control the product quality and yield.

Flotation concentrate from the cell gravitates to a froth breaking pump and is pumped to the concentrate filter feed tank. The filter cakes from the filter are collected by a reversible conveyor that can either discharge directly onto the plant product conveyor or to a stockpile for storage and drying before rehandling. Provision is made for the filter cake to be refed to the coking product conveyor using a reload conveyor with an integrated hopper and a FEL. Filtrate is collected in a tank and pumped to the tailings thickener.

The flotation tailings stream gravitates to the flotation tailings tank where it is pumped to the tail thickener. The thickener produces a clarified water stream collected as overflow and thickened solids slurry collected as underflow. The overflow is collected in the process water tank and reused in the process. The underflow is pumped from the thickener cone to a tails filter that generates solid cakes. The tails filter cake is collected by a reversible conveyor that can either discharge directly onto the plant discard conveyor or onto a stockpile pad for storage and drying before rehandling. Provision is made for the filter cake to be refed to the plant discard conveyor using a reload conveyor with an integrated hopper and a FEL. Filtrate is collected in a tank and pumped to the tailings thickener.

Raw water for cloth wash is provided for periodic cleaning of the product and discard filter cloths.


2.2.1.6 Services

A bulk magnetite-makeup facility is provided to service the two DMS modules. Magnetite tipped in 30-tonne loads from rear tipper trucks is sluiced with monitor guns to a vertical spindle pump and transferred to a magnetic separator. The recovered magnetite gravitates to a holding tank and kept in circulation, while the effluent recycles to the monitor guns. Over-dense slurry is dosed to the DMS modules via a splitter, as required.

An automated powder flocculent makeup and dosing system is provided to supply hydrated flocculent to the tailings thickener. Two additional flocculent makeup and dosing systems are provided for the product and tailings filters.

Two oil free compressors (a duty and a standby) that come with built-in driers, provide instrument air and process air to all modules. This is done via the instrument air receiver and the process air receiver, respectively. The instrument air first passes through a filter before reporting to the receiver to ensure high quality air for the instruments.

Potable quality water is provided for all pumps and equipment that require gland sealing.

2.2.1.7 Efficiency of the Process

The plant will be operated to process a minimum of 10 Mtpa of ROM coal and is expected to achieve an average total yield of 55.5 % for the Export and Eskom fractions. Regular sampling will be conducted to ensure that the plant is operating at the correct parameters to optimise the yield.

2.2.2 Infrastructure

2.2.2.1 General Design Philosophy

This study report section contains a concept level design philosophy for the civil infrastructure for the Berenice project. The latest edition of the applicable South African Standards and Standard Building Regulations establish the minimum requirements for design, materials and construction unless otherwise noted in this document.
In the absence of an applicable South African Standard, the latest edition of British Standards and 
Standard Code of Practice shall govern the quality of design, materials and construction, except where 
otherwise indicated.

2.2.2.2 Contractors lay down area and Site Establishment

Each potential contractor is provided with a laydown area, water and electrical connection. The 
provision of utilities, offices and warehousing will be temporary and supplied by each individual 
contractor.

2.2.3 Roads

2.2.3.1 Access Road

A new main access road is to be constructed from the existing R523 road; this will be a 7.4m wide 
surfaced road with stormwater earth channels and mitre drains to protect the road structure from flood 
damage. A detailed structural pavement design, taking into account current and future traffic loading, 
will be completed during the prefeasibility phase.

Intersections will be properly designed to provide safe entry and exit into the mining complex. 
Approvals from the provincial roads author will be obtained for this access point.

2.2.3.2 Internal Mining Complex Roads

The internal roads will be 6m wide surfaced roads with semi mountable kerbs and non-mountable 
kerbs on both sides of the road as required. A detailed structural pavement design, taking into account 
current and future traffic loading, will be completed during the detail design phase.

These roads will be equipped with all the required stormwater systems and structures to prevent any 
possible flooding.

2.2.3.3 Haul Roads

Dedicated Haul roads for the rigid dump trucks will be 32 m wide with safety berms ether side. The 
road pavement structure and geometric design will be based on the largest vehicle to be used in
operations. Dust from these roads will be controlled by applying road binders and regular watering with water tankers.

Storm water drainage and culverts are designed to protect the road structure itself, and to divert the water to natural water courses where possible.

2.2.3.4 **Pit bound Light Delivery Vehicle Roads**

A 6m wide gravel dedicated mine vehicle (LDV) roadway on the side with a safety berm between the mine vehicle roadway and the haul road will be constructed.

Dust from these roads will be controlled by applying road binders and regular watering with water tankers.

Storm water drainage and culverts are designed to protect the road structure itself, and to divert the water to natural water courses where possible.

2.2.3.5 **Rail Line extension**

A rail line extension has been proposed as an alternative to transport the coal from the Berenice site to Waterpoort Station. Due to the potential impacts outside the mining right farms the feasibility of this option will be investigated further and if chosen will have its own accompanying EIA.

2.2.4 **Water Supply**

Berenice Mine indicated that they require a volume of 3M l/day to ensure an effective and efficient mining operation. This portion of the report proposes a best practice approach to acquire all information necessary to complete a hydrogeological investigation that investigates the sustainability of water resource in the local aquifers.

2.2.4.1 **Staff Water Requirements:**

Water requirements for use by the mine staff is calculated at 200 litres (L) per person per day. The water supply capacity therefore has to be 42.6 kilolitres (kL) per day. Boreholes will be established to supply water for staff requirements. A small water treatment plant will be built at the mine to produce potable water from the borehole water.
2.2.4.2 **Industrial Water Requirements:**

Bulk water supply has the potential to be one of the biggest non-commercial influences on the viability of the Project. No bulk water supply currently exists in the vicinity of the site. Investigations have suggested that regional district municipalities do not have provision for future bulk-supply development. Therefore, ground water will be extracted from well fields established in the area, as this method of water supply seems to be the most viable for the Project. The feasibility of this option will be reviewed further during the Water Use licence application.

The washing plant fresh water consumption, required as make-up water, has been estimated to be between 3,000 cubic metres (m$^3$) to 4,500 m$^3$ per day. The plant will be equipped with a filter press and thickener to clarify the plant water for re-use. The plant will make maximum use of recycled water. Effluent from the plant will be pumped to the process water tank for re-use.

2.2.4.3 **Surface Run-Off Water:**

Run-off water collected from disturbed areas will be collected and stored in holding ponds located near the pits. The water will be routed to the holding area, utilising a series of diversion berms. Collected water will be used for the mining and treatment processes.

All water generated by the mining activities will be stored in a high-density polyethylene-lined (HDPE) pollution control dam (PCD) and re-used in the beneficiation plant as well as for dust-control purposes on the haul roads.

2.2.4.4 **Mine Closure:**

It is predicted that the pit will start decanting post closure and allowance has been made in the capital and operating costs for a water treatment plant. Any water that decants from the rehabilitated mining pits will be treated in the water treatment plant prior to release into a natural watercourse.

2.2.4.5 **Water Treatment Plant**

The location of the water treatment plant has not been determined at this point, as it is considered that water treatment will only be required towards the end of the life of mine (LOM).
2.2.5 Surface Infrastructure

2.2.5.1 Brake Test Ramp
A brake test ramp has been included to test the braking capabilities of vehicles into the pit. The gradient of the brake test ramp will be similar to the maximum gradient experienced at the opencast pit. There will be a dedicated parking area for the rigid dump trucks with safety berms and the vehicles will be approached from the rear in the parking area. The brake test ramp is located at the exit of the parking area to ensure the brakes are functional immediately after start up.

2.2.5.2 Storm and Polluted Water Management:
Storm water cut – off drains and deflection berms will be designed and constructed on site, according to site topographic conditions. The principal of separation of clean and dirty water systems will be adhered to, and where possible and practical, storm water runoff will be routed around the site, and away from potential contamination areas. Clean water drains and berms will be redirected towards the natural watercourses in the area. Clean water drains are earth lined (velocities permitting).

Areas such as workshops, fuel storage bays, conveyor routes, discard dumps, wash down areas, stockpiles and the tip areas are regarded as contaminated/polluted. These areas will have a network of concrete lined drains and pipe culverts that will gravitate towards a pollution control dam. All inflows will be routed through a silt trap and oil separation system to ensure dam capacity is not compromised through sediment deposition.

The pollution control dam (dirty water dam) will be HDPE lined and sized to accommodate a 1:100 year storm period with an 800mm freeboard. The full design capacity of the dam will be maintained at all times, with zero allowance for environmental flows at or below the design storm intensity. Water contained within the dam subsequent to a rainfall event will be used to augment mine water. And emphasis will be placed on maximum recovery and reuse of all water (where practical and permissible).

2.2.5.3 Security Fencing – Perimeter
2.4 m high galvanised high security fencing will be used as perimeter fencing. One point of access will be provided, this makes access control easier.
2.2.5.4 Security Fencing – Infrastructure Complex

Electrical medium security fencing will be used in and around the shaft complex area.

2.2.5.5 Bus Terminal

Bus shelter and sufficient turning areas with separate disembarking and embarking areas provided at the terminal.

2.2.5.6 Parking Area

Sufficient Parking for visitors, office personnel and mine vehicles. Covered parking will be available for office personnel. The parking layout is structured to allow for future expansion requirements. The cost of the future expansion is not included in the capital estimate.

2.2.6 Sewage Reticulation and Sewage Treatment

Sewage treatment is carried out to comply with health requirements and to maximise water recovery. Reticulation is designed to take advantage of the fall of the topography and thus avoid pumping wherever possible. Sewage from the mining complex area is collected in the sewage network and flows by gravity to the treatment plant. The sewer network will comprise of 110mm and 160 mm diameter pipes with manholes spaced at maximum of 100m intervals on straight sections as well as at all bends and junctions. Manholes will be of the precast concrete ring type.

2.2.6.1 The Sewage Treatment Plant is a packaged plant.

The plant has been designed according to the following parameters:

- Average Daily Flow: 60m3/day (400PE@150L/person/day)
- Peak Factor: 3 (assumed)
- Influent: Typical Domestic Raw Sewage (350mg/L BOD)
- Treated Effluent: DWEA General Limits
- Stormwater Infiltration: 15% of total daily flow is added

2.2.7 Conveyors

The conveyor will be totally enclosed with security fencing. Armco or similar safety barriers will separate the service road from conveyors, where required.
2.2.8 Terraces
Terraces will be built at the mine to accommodate the surface buildings, transfer structures, etc. Because of the lack of geotechnical information we assumed that terraces will be constructed using a combination of in situ and commercial materials.

2.2.9 Foundations
Should fill material for foundations, terraces and roads be required, dump rock screened over a grizzly to remove oversize material, will be used as a fill to replace the poor quality in-situ material. For larger structures that are found to require more substantial backfill material for their founding, consideration will be given and using mass concrete as a backfill material may also be used.

2.2.10 Civil Works
2.2.10.1 Mini Subs
The mini sub structures consist of an open plinth with a bund arrangement.

2.2.10.2 Conveyors
The civil work will comprise of restricted earthworks, bases, plinths and cast in items for the conveyor structure.

2.2.10.3 Transfer Points
Should it be required, the civil work at the transfer towers will consist of bases, plinths, cast in items and bund walls to keep any coal that falls of at the transfer inside the transfer tower area.

2.2.11 Buildings
2.2.11.1 Change House
The change house will accommodate a total of 500 people and because of the 24/7 hour operation a four shift rotation system will be used. The philosophy used is one of clean and dirty flow separation. The change house split caters for both male and female as well as for officials and skilled labour. Lockers design caters for a split between personal clothing and PPE.
2.2.11.2 Workshop
A Workshop with dedicated areas for rigid dump trucks, dragline buckets and mine vehicles will be constructed at the mining complex area. This will be an open-sided, steel portal building with overhead travelling crane(s).

2.2.11.3 Store
The storage building is a steel structure with sheet cladding and roofing. Three separate small store facilities will be provided for Oxy, Paint and Gas Stores. Fenced Open storage areas will be provided for store yard, solid waste and cable yard. A concrete hard stand has been included for the solid waste yard. A separate hard stand slab is included specifically for the loading and offloading of large machinery such as rigid dump trucks.

2.2.11.4 Offices
The offices will comprise of face brickwork construction. This building shall include the control room, green rooms, boardrooms, offices, kitchen, small change house for visitors and senior management, ablution facilities for male and female as well as disabled facilities.

2.2.11.5 Gate House
The Gate house will consist of a main security room with a reception hatch, search room, ablution facilities and turnstiles.

2.2.11.6 Diesel and Wash bays
A diesel and wash bay is provided for refuelling and washing of vehicles and equipment.

2.2.12 Substations
Bulk power supply will be delivered via two dedicated Overhead Power lines to the Indoor Sub-Station. Based on the position of the resources, there is no suitable Eskom infrastructure in the immediate vicinity to the site. A high-level review was undertaken to establish where there is current ‘large power’ infrastructure. It was found that Louis Trichardt (Makhado) would be the nearest town to draw electricity from.
Eskom’s Limpopo division were engaged to establish various scenarios for the power supply to the site. There is an option to tie into the existing national grid at 132 kilovolts (kV) or 88 kV high voltage level at the existing Eskom substations. The power would be conveyed to the sites by single overhead lines.

The reticulation concept for the site would comprise the following:

- A continuous connected supply from the national grid, generated, and controlled by Eskom at a ‘Notified Maximum Demand’ level; and
- ‘Onsite automated standby’ power supply generators that would be sufficient to maintain operation of critical machines, emergency plant operations, and essential lighting and security requirements of the mine site.

Eskom supply distribution at Berenice will consist of a switching yard that will be constructed at the site and will comprise of the following:
- A 132/ 88 kV supply line connected to the national network, terminated in a distribution yard constructed on Universal Coal property.
- Envisaged one by 15 megavolt amperes (MVA) 132/ 88 kV to 11 kV transformers will be connected to the 132/ 88 kV yard distribution network at the site.
- The 11 kV terminals from the respective transformers will be connected to an 11 kV distribution network via the site main intake substation that will supply power to the site.

An Intake Substation will be constructed adjacent to the Eskom yard that will house the incoming supply and distribution switchgear supplying the various major plant sections. This substation will also house the power supply ‘maximum demand’ and kilowatt hour (kWhr) metering, surge protection instrumentation, and power factor correction (PFC) equipment.

An earlier power supply point for the early development operations will be required. A containerised substation would be erected to satisfy the supply and distribution requirement. The equipment installed would be repositioned into the main incomer substation when constructed.

### 2.3 Minerals applied for:

Coal
3 POLICY AND LEGISLATIVE CONTEXT

3.1.1 The South African Constitution

This section provides an overview of the legislative requirements applicable to this project and it includes the Acts, guidelines and policies considered in the compilation of this report. The legislative motivation for this project is underpinned by the Constitution of South Africa, 1996 (Act No. 108 of 1996), which states that:

The State must, in compliance with Section 7(2) of the Constitution, respect, protect, promote and fulfil the rights enshrined in the Bill of Rights, which is the cornerstone of democracy in South Africa. Section 24 of the Constitution:

24. Environment

-Everyone has the right-

\( (a) \) to an environment that is not harmful to their health or well-being; and

\( (b) \) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that-

\( (i) \) prevent pollution and ecological degradation;

\( (ii) \) promote conservation; and

\( (iii) \) secure ecologically sustainable development and use of natural resources while promoting a justifiable economic and social development.

Section 24 of the Constitution of South Africa (Act No. 108 of 1996) requires that all activities that may significantly affect the environment and require authorisation by law must be assessed prior to approval. In addition, it provides for the Minister of Environmental Affairs or the relevant provincial Ministers to identify:

- new activities that require approval;
- areas within which activities require approval; and
- existing activities that should be assessed and reported on.
Section 28(1) of the Constitution of South Africa (Act No. 108 of 1996) states that: “every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring”.

If such pollution or degradation cannot be prevented then appropriate measures must be taken to minimise or rectify such pollution or degradation. These measures may include:

- Assessing the impact on the environment;
- Informing and educating employees about the environmental risks of their work and ways of minimising these risks;
- Ceasing, modifying or controlling actions which cause pollution/degradation;
- Containing pollutants or preventing movement of pollutants;
- Eliminating the source of pollution or degradation; and
- Remediying the effects of the pollution or degradation.

**Applicability:** Public participation process and consultation at every stage of the EIA phase. A public participation process will followed and consultations will be done regarding the proposed project. An EMP and awareness plan will be designed according to the issues raised during this process.

### 3.1.2 National Environmental Management Act

The NEMA Act under sections 24(2), 24(5), 24D and 44, read with section 47A (1) (b) of National Environmental Management Act (107/1998): Environmental Impact Assessment Regulations, 2014, is regarded as one of the important pieces of general environmental legislation as it provides a framework for environmental law reform. The main objective of this act is to ensure that ecosystem services and biodiversity are protected and maintained for sustainable development. Furthermore, Section 28 (1) of the NEMA requires that “every person who causes has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring”.

NEMA strives to regulate national environmental management policy and is focussed primarily on co-operative governance, public participation and sustainable development. NEMA makes provisions for co-operative environmental governance by establishing principles for decision making on matters affecting the environment, institutions that will promote co-operative governance and procedures for
co-ordinating environmental functions exercised by Organs of State and to provide for matters connected therewith.

A scoping report must contain the information that is necessary for a proper understanding of the process, informing all preferred alternatives, including location alternatives, the scope of the assessment, and the consultation process to be undertaken through the environmental impact assessment process, and must include-

(a) details of-
   
   I. the EAP who prepared the report; and
   II. the expertise of the EAP, including a curriculum vitae;

(b) the location of the activity, including-
   
   I. the 21 digit Surveyor General code of each cadastral land parcel;
   II. where available, the physical address and farm name;
   III. where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;

(c) a plan which locates the proposed activity or activities applied for at an appropriate scale, or, if it is-
   
   I. a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or
   II. on land where the property has not been defined, the coordinates within which the activity is to be undertaken;

(d) a description of the scope of the proposed activity, including-
   
   I. all listed and specified activities triggered;
   II. a description of the activities to be undertaken, including associated structures and infrastructure;

(e) a description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process;

(f) a motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location;

(h) a full description of the process followed to reach the proposed preferred activity, site and location within the site, including-
   
   I. details of all the alternatives considered;
II. details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;

III. a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them;

IV. the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;

V. the impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts-
   a) can be reversed;
   b) may cause irreplaceable loss of resources; and
   c) can be avoided, managed or mitigated;

VI. the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives;

VII. positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;

VIII. the possible mitigation measures that could be applied and level of residual risk;

IX. the outcome of the site selection matrix;

X. if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such and

XI. a concluding statement indicating the preferred alternatives, including preferred location of the activity;

Applicability: Baseline environmental information of the project area will be assessed. Mitigation measures and recommendations where provided according to best practice standards. This scoping report complies with the requirements of the NEMA act.

3.1.3 Mineral and Petroleum Resources Development Act

The MPRDA makes provision, for persons to apply for a mining right. A mining right granted in terms of the MPRDA is a limited real right in respect of the type of resources and the land to which the right relates. The holder of a mining right is entitled to the rights referred to in the MPRDA or any other law.

The applicant requires a mining right and environmental authorisation from the DMR. Acceptance of the application by DMR only permits the applicant to continue with the necessary process and does not constitute authorisation. The acceptance details the outstanding requirements for the application, which includes:

(a) the submission of an EMP; and
(b) notification and consultation with IAPs, including land owners or lawful occupiers of land, on which the proposed mining is to be conducted;

c) Details on how the applicant will substantially and meaningfully expand opportunities for historically disadvantaged persons.

**Applicability: A mining right was lodged with the DMR**

### 3.1.4 National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004)

The overarching aim of the National Environmental Management: Biodiversity Act, 2004 (NEMBA), within the framework of NEMA, is to provide for:

- The management and conservation of biological diversity within South Africa as well as for the components of such biological diversity;
- The use of indigenous biological resources in a sustainable manner and
- The fair and equitable sharing among stakeholders of benefits arising from bio-prospecting involving indigenous biological resources.

As part of its implementation strategy of NEMBA, the National Spatial Biodiversity Assessment was developed. This assessment classifies areas as worthy of protection based on its biophysical characteristics, which are ranked according to priority levels. The approach used for biodiversity planning is systematic and entails the following three key principles:

- The need to conserve a representative sample of biodiversity pattern, such as species and habitats (the principle of representation);
- The need to conserve the ecological and evolutionary processes that allow biodiversity to persist over time (the principle of persistence); and
- The need to set quantitative biodiversity targets that quantifies the degree of conservation required for each biodiversity feature in order to maintain functioning landscapes and seascapes.

Furthermore, the South African National Biodiversity Institute (SANBI) was established by the NEMBA, its purpose being (inter alia) to report on the status of the country’s biodiversity and the conservation
status of all listed threatened or protected species and ecosystems. NEMBA provides for a range of measures to protect ecosystems and for the protection of species that are threatened or in need of protection to ensure their survival in the wild, including a prohibition on carrying out a “restricted activity” involving a specimen of a listed threatened or protected species without a permit issued in terms of Chapter 8 of the Act. Lists of critically endangered, endangered, vulnerable and protected species have been published and a permit system for listed species has been established.

It is also appropriate to undertake an Ecological (Fauna and Flora) Impact Assessment for developments in an area that is considered ecologically sensitive and which requires environmental authorisation in terms of NEMA, with such assessment taking place during the Scoping or EIA phase. The Applicant is therefore required to take appropriate reasonable measures to limit the impacts on biodiversity, to obtain permits if required.

3.1.5 National Forest Act, 1998 (Act 84 of 1998)

The purposes of National Forest Act, 1998 (act 84 of 1998) (NFA) includes *inter alia*:

(c) provide special measures for the protection of certain forests and trees:

(d) promote the sustainable use of forests for environmental, economic, educational, recreational, cultural, health and spiritual purposes.

**Applicability:** A flora and fauna study has been done (refer to Appendix 4 and 5) to determine the tree species in the project area and specify if there are any endangered species. A permit for the removal / destruction of protected trees will be applied for with the relevant department in terms of Section 15 of the NFA.

3.1.6 National Environmental Management: Air Quality Act (Act No 39 of 2004)

Section 28 (1) of NEMA places a general duty of care on any person who causes pollution, to take reasonable measures to prevent such pollution from occurring. The objective of the National Environmental Management: Air Quality Act, 2004 (NEM:AQA) is to regulate air quality in order to protect, restore and enhance the quality of air in the Republic, taking into account the need for...
sustainable development. Furthermore, the provision of national norms and standards regulating air quality monitoring, management and the control by all spheres of government determine that specific air quality measures should be adhered to. Dust created during the construction and operational phases of the proposed Berenice Coal Mine could influence air quality and thus make this legislation relevant to this development. Air quality management and mitigation measures during the mining phase will be considered to be a measure to exercise this duty of care, since it aim to minimise volumes of dust emissions emanating from the operational activities.

An air emission license will not be required for the mine but air quality monitoring will be implemented. **Refer to Appendix 3 for the Baseline Air Quality Assessment.**

### 3.1.7 Conservation of Agricultural Resources Act (Act 43 of 1983)

The aim of the Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983) (CARA) is to provide for control over the utilisation of the natural agricultural resources of the Republic in order to promote the conservation of the soil, the water sources and the vegetation and the combating of weeds and invader plants and for matters connected therewith. The EIA phase of the project will take into account the requirements of CARA as well as determine the potential direct and indirect impacts on agricultural resources as a result of the proposed mining development.

**A soil and land capability study has been done refer to Appendix 7**

### 3.1.8 National Environmental Management: Waste Act (Act 59 of 2008)

The National Environmental Management: Waste Act, 2008 (Act 59 of 2008) (NEM:WA) and Waste Classification and Management Regulations, 2003 (GNR: 634 – 635): To reform the law regulating waste management in order to protect health and the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development; to provide for institutional arrangements and planning matters; to provide for national norms and standards for regulating the management of waste by all spheres of government; to provide for specific waste management activities; to provide for the remediation of contaminated land; to provide for the national waste information system; to provide for compliance and enforcement; and to provide for matters connected therewith.
The operational activities associated with the proposed mining program shall be in accordance with the requirements of National Environmental Management: Waste Act, 2008 (Act 59 of 2008) (NEM:WA) and Waste Classification and Management Regulations, 2003 (GNR: 634 – 635). Berenice Coal Mine will manages its waste in a legally compliant manner, tailings – will be returned to the pit as backfill and is excluded from NEM:WA). Waste classification and an Integrated Water and Waste Management Plan will be compiled as part of the Water use licence and will be made available for public review during the EIA phase.

3.1.9 Occupational Health and Safety Act (Act 85 of 1993)

The aim of the Occupational Health and Safety Act, 1993 (act 85 of 1993) (OHSA) is to provide for the health and safety of persons at work and for the health and safety of persons in connection with the use of plant and machinery; the protection of persons other than persons at work against hazards to health and safety arising out of or in connection with the activities of persons at work; to establish an advisory council for occupational health and safety as well as to provide for matters connected therewith.

Section 8 which deals with the general duties of employers and their employees states that:

1) “Every employer shall provide and maintain, as far as is reasonably practicable, a working environment that is safe and without risk to the health of the employees.”

2) “Without derogating from the generality of an employer’s duties under subsection (1), the matters to which those duties refer include in particular:

   a. The provision and maintenance of systems of work, plant and machinery that, as far as reasonably practicable, are safe and without risk to health;

   b. Taking such steps as may be reasonably practicable to eliminate or mitigate any hazard or potential hazard to the safety and health of employees;

   c. Making arrangement for ensuring as far as reasonably practicable, the safety and absence of risks to health in connection with the production, processing, use, handling, storage and transport of articles or substances;
d. Establishing, as far as reasonably practicable, what hazards to the health or safety of persons are attached to any work which is performed, any article or substance which is produced, processed, used, handled, stored or transported and any plant or machinery which is used in his business, and he shall, as far as reasonably practicable, further establish what precautionary measures should be taken with respect to such work, article, substance, plant or machinery in order to protect the health and safety of persons, and he shall provide the necessary means to apply such precautionary measures;

e. Providing such information, instruction, training and supervision as may be necessary to ensure, as far as reasonably practicable, the health and safety of employees;

f. As far as reasonably practicable, not permitting any employee to do any work or to produce, process, use, handle, store, or transport any article or substance or to operate any plant or machinery, unless precautionary measures contemplated in paragraph (b) and (d), or any precautionary measures which may be prescribed, have been taken;

g. Taking all necessary measures to ensure that the requirements of this act are complied with by every person in his employment or on the premises under his control where plant and machinery is used;

h. Enforcing such measures as may be necessary in the interest of health and safety;

i. Ensuring that work is performed and that plant and machinery is used under the general supervision of a person trained to understand the hazards associated with it and who has the authority to ensure that precautionary measures taken by the employer are implemented and

j. Causing any employees to be informed regarding the scope of their authority as contemplated in section 37(1)(b)."

3.1.10 National Heritage Resources Act

National Heritage Resource Act, 1999 (Act No. 25 of 1999)

The proposed Berenice Coal Mine project must comply with the requirements stipulated in the National Heritage Resources Act, 1999 (Act 25 of 1998) (NHRA). The NHRA legislates the necessity for cultural and Heritage Impact Assessment (HIA) in areas earmarked for development, which exceed 0.5 ha or linear development exceeding 300 metres in length. The Act makes provision for the potential
destruction to existing sites, pending the archaeologist’s recommendations through permitting procedures. Permits are administered by the South African Heritage Resources Agency (SAHRA).

Section 38(1) of NHRA, subject to the provisions of subsections (7), (8) and (9), requires that any person who intends to undertake a development categorised as:

(a) The construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;

(b) The construction of a bridge or similar structure exceeding 50m in length;

(c) Any development or other activity which will change the character of a site-

(i) Exceeding 5 000 m² in extent; or

(ii) Involving three or more existing erven or subdivisions thereof; or

(iii) Involving three or more erven or divisions thereof which have been consolidated within the past five years; or

(iv) The costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;

(d) The re-zoning of a site exceeding 10 000 m² in extent; or

(e) Any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority, must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development.

Archaeological impact assessments (AIAs) are often commissioned as part of the heritage component of an EIA and are required under Section 38(1) of the NHRA of 1999, Section 38(8) of the NEMA and the MPRDA.

The process of archaeological assessment usually takes the form of:

1. A scoping or initial pre-assessment phase where the archaeologist and developer’s representative establish the scope of the project and terms of reference for the project;
2. A Phase 1 AIA;
3. A Phase 2 archaeological mitigation proposal; and
4. A Phase 3 heritage site management plan.

**Phase 1: Archaeological Impact Assessment (refer to Appendix 6 for the Heritage Impact Assessment).**

A Phase 1 AIA generally involves the identification and assessment of sites during a field survey of a portion of land that is going to be affected by a potentially destructive or landscape altering activity. The locations of the sites are recorded and the sites are described and characterised. The archaeologist assesses the significance of the sites and the potential impact of the development on the sites and makes recommendations. It is essential that the report supply the heritage authority with sufficient information about the sites to assess, with confidence, whether or not it has any objection to a development, indicate the conditions upon which such development might proceed and assess which sites require permits for destruction, which sites require mitigation and what measures should be put in place to protect sites that should be conserved.

Minimum standards for reports, site documentation and descriptions are clearly set out by the SAHRA and supported by the Association of Southern African Professional Archaeologists (ASAPA). The sustainable conservation of archaeological material (*in situ*) is always the best option for any sites that are deemed to be of importance. The report needs to indicate which sites these are, explain why they are significant and recommend management measures. In certain kinds of developments which involve massive intervention (mining, dam construction, etc.), it is not possible to reach a conservation solution other than to develop a programme of mitigation which is likely to involve the total or partial “rescue” of archaeological material and its indefinite storage in a place of safety.

**Phase 2: Archaeological Mitigation Proposal**

If the Phase 1 report finds that certain archaeological sites in a development area are of low significance, it is possible to seek permission from the heritage authority for their destruction. The final decision is then taken by the heritage resources authority, which should give a permit or a formal letter of permission, or in the case of an EIA issue a comment allowing destruction.
Phase 2 archaeological projects are primarily based on salvage or mitigation excavations preceding development that will destroy or impact on a site. This may involve collecting of artefacts from the surface, excavation of representative samples of the artefact material to allow characterisation of the site and the collection of suitable materials for dating the sites. The purpose is to obtain a general idea of the age, significance and meaning of the site that is to be lost and to store a sample that can be consulted at a later date for research purposes. Phase 2 excavations should be done under a permit issued by SAHRA, or other appropriate heritage agency, to the appointed archaeologist. Permit conditions are prescribed by SAHRA, or other appropriate heritage agencies. Conditions may include as minimum requirements reporting back strategies to SAHRA, or other appropriate heritage agencies and/or deposition of excavated material at an accredited repository.

Should further material be discovered during the course of development, this must be reported to the archaeologist or to the heritage resources authority and it may be necessary to give the archaeologist time to rescue and document the findings. In situations where the area is considered archaeologically sensitive the developer will be asked to have an archaeologist monitor earth-moving activities.

**Phase 3: Management plan for conservation and planning, site museums and displays**

On occasion Phase 2 may require a Phase 3 program involving one of the following:

- The modification of the site;
- The incorporation of the site into the development itself as a site museum;
- A special conservation area; or
- A display.

Alternatively, it is often possible to re-locate or plan the development in such a way as to conserve the archaeological site or any other special heritage significance the area may have. For example in a wilderness or open space areas where such sites are of public interest, the development of interpretative material is recommended since it adds value to the development. Permission for the development to proceed can be given only once the heritage resources authority is satisfied that measures are in place to ensure that the archaeological sites will not be damaged by the impact of the development or that they have been adequately recorded and sampled. Careful planning can minimise the impact of archaeological surveys on development projects by selecting options that
cause the least amount of inconvenience and delay. The process as explained above allows the rescue and preservation of information relating to our past heritage for future generations. It balances the requirements of developers and the conservation and protection of our cultural heritage as required of SAHRA and the provincial heritage resources authorities.


The National Water Act, 1998 (Act 36 of 1998) (NWA) aims to provide management of the national water resources to achieve sustainable use of water for the benefit of all water users. This requires that the quality of water resources is protected as well as integrated management of water resources with the delegation of powers to institutions at the regional or catchment level.

The purpose of the NWA is to ensure that the nation’s water resources are protected, used, developed, conserved, managed and controlled in ways, which take into account:

- Meeting the basic human needs of present and future generations;
- Promoting equitable access to water;
- Redressing the results of past racial discrimination;
- Promoting the efficient, sustainable and beneficial use of water in the public interest;
- Facilitating social and economic development;
- Providing for growing demand for water use;
- Protecting aquatic and associated ecosystems and their biological diversity;
- Reducing and preventing pollution and degradation of water resources;
- Meeting international obligations and
- Managing floods and droughts.

Section 21 of the National Water Act, 1998 (No. 36 of 1998) (NWA) lists water uses for which a Water Use License (WUL) must be obtained. Uses with potential relevance to the proposed mining include:

Section 21 (a) Taking of water from a water resource (surface or groundwater).

Section 21 (b) Storing of water (not containing waste).

Section 21 (c) Impeding or diverting the flow of water in a water course.
Section 21 (e) Engaging in a controlled activity:

Section 21 (g) disposing of waste in a manner which may detrimentally impact on a water resource

Section 21 (i) altering the beds, banks, course or characteristics of a water course.

The Department of Water and Sanitation (DWS) has published various General Authorizations (GA) in terms of Section39 of the NWA which, replace the need for a water user to apply for a license in terms of the NWA for specific activities. The GAs have been revised and amended at different times.

The GAs set out specific conditions under which a water use may occur without a license and also specify the conditions or thresholds at which a user must register the use with the DWA.

Due to the nature of the activities a water use license will be required and initiation of the WULA process is underway.

Other Applicable National legislations

- Hazardous Substances Act, 1973 (Act No. 15 of 1973);
- Roads Ordinance Amendment Act, 1998 (Act No. 17 of 1998);
- South African National Roads Agency Limited and National Roads Act, 1998 (Act No. 7 of 1998);

3.2 Provincial Legislative Framework

Table 3: Provincial legislation, policies and guidelines considered

<table>
<thead>
<tr>
<th>TITLE OF LEGISLATION, POLICY OR GUIDELINE</th>
<th>APPLICABILITY TO THIS PROJECT</th>
<th>ADMINISTERING AUTHORITY</th>
<th>DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEA&amp;DP and DEA Guidelines on Public Participation</td>
<td>Used as a guide to inform of the public participation process.</td>
<td>Department of Environmental Affairs and Development Planning</td>
<td>2012</td>
</tr>
<tr>
<td>DEA&amp;DP and DEA Guidelines on Alternatives</td>
<td>Used as a guide to inform on the use and presentation of alternatives in the EIA process.</td>
<td>Department of Environmental Affairs</td>
<td>2014</td>
</tr>
</tbody>
</table>

56
### 3.2.1 Applicable Legislation and Approvals Required

The proposed Berenice Coal mining project requires the following main approvals before the project may commence:


- Approval of an environmental management programme, in terms of the **Mineral and Petroleum Resources Development Act** (No 28 of 2002) (MPRDA), by the Department of Mineral Resources.

In addition to the main legal approvals, the following approvals will be required:

- The South African Heritage Resources Agency needs to approve a heritage assessment, to be conducted as part of the overall EIA process, in terms of the **National Heritage Resources Act** (No 25 of 1999). Permits will be required for the destruction or removal of any heritage resources affected by the development.

- Should protected species be affected, permits will have to be obtained for their removal, relocation or destruction. This is in terms of the **National Environmental Management: Biodiversity Act** (No 10 of 2004).

Other applicable legislation includes:

- **Conservation of Agricultural Resources Act** (No 43 of 1983).
- Environment Conservation Act (No 73 of 1989).
- National Forests Act (No 84 of 1998).
- National Veld and Forest Fire Act (No 10 1998).
4 PROJECT ALTERNATIVES

According to the Western Cape Department of Environmental Affairs & Development Planning (WC DEADP). Guideline on alternatives: EIA Guideline and Information Document Series (2011) feasible and reasonable alternatives have to be identified for a development as required by the NEMA EIA Regulations and applicable to EIA. Each alternative is to be accompanied by a description and comparative assessment of the advantages and disadvantages that such development and activities will pose on the environment and socio-economy. When no feasible and/or reasonable alternatives could be identified and investigated in terms of a comparative assessment during the Scoping phase, the EIAR will then not contain a section with alternative. Alternatives forms a vital part of the initial assessment process through the consideration of modifications in order to prevent and/or mitigate environmental impacts associated with a particular development. Alternatives are to be amended when the development’s scope of work is amended. It is vital that original as well as amended alternative identification, investigation and assessment together with the generation and consideration of modifications and changes to the development and activities are documented.

The EIA Regulations (2014) defines alternatives as the different means of meeting the general purpose and requirements of the activity, which may include alternatives to:

a) The property on which or location where it is proposed to undertake the activity;
b) The type of activity to be undertaken;
c) The design or layout of the activity;
d) The technology to be used in the activity

e) The operational aspects of the activity and 
f) The option of not implementing the activity.

Although an array of alternatives could be investigated for each project, such alternatives will not necessarily be applicable to each project and/or project phase. However there must always be strived to seek alternatives that maximises efficient and sustainable resource utilisation and minimise environmental impacts.
4.1 Feasible alternatives

The alternative land use for the project area is grazing and conservation/tourism which is economically sustainable. However, in the development of the impact assessment and environmental management programme, the following alternatives have been considered:

4.1.1 Location

No alternatives have been investigated in terms of location due to the geological formation of the area which lies within the so-called B-Block of the Mopane sector of the Soutpansberg Coalfield. Here the coal-bearing strata are deposited in a half-graben within the basement (Limpopo Mobile Belt) bedrock, fault-bounded toward the northwest and sub-outcropping towards the southeast. The geological structure has been interpreted based on borehole intersections, both historical and from Universal Coal’s first phase drilling programme, and with reference to the published surface geological map. Should the proposed mining site be relocated to another location the applicant will not be able to utilise the resource potential.

4.1.2 Activity

Due to the shallow depth and thickness of the coal seams, the strip ratios for surface mining are regarded as favourable. The Berenice Project will therefore be an opencast mine operated by a selected opencast mining contractor. The mining strip ratios for the Berenice Mine Project are favourable. This allows for the design of an opencast operation utilising conventional truck and shovel mining methods.

4.1.3 Design

Plant Design

The design of the dense media separation (DMS) section for each module will be based on modular concepts for simplicity and ease of operation. The sections are designed to provide sufficient capacity for 10 Mtpa of ROM coal. In terms of engineering integrity, all designs will be prepared to the relevant South African National Standards (SANS), with sign-off completed by a Professional Engineer with the appropriate accreditation.
The plant will be operated to process a minimum of 10 Mtpa of ROM coal and is expected to achieve an average total yield of 55.5% for the Export and Eskom fractions. Regular sampling will be conducted to ensure that the plant is operating at the correct parameters to optimise the yield.

**Figure 7: Plant Layout**

4.1.4 Technological

**Recycling:**

The mining project will in its operational phase implement recycling policies and measures for optimal utilisation of resources and minimisation of waste generation.

**Water:**

Water utilisation will be maximised through recycling of dirty water within the process operations.

**Energy:**
Fuel types will be investigated as well as energy conserving measures will be implemented i.e. mining times will be during the day to save on using lights in the evening. Where solar energy can be utilised it will be implemented.

4.1.5 Operational Aspects

Berenice Coal Mine intends to make use of standard mining methods that enable safe mining which has the having the lowest risk of causing health risks or environmental degradation.

The ROM coal will washed in a two stage dense medium washing plant. The first stage will be a high gravity wash at a medium RD of 1.8. During this stage, all the non-coal material is removed as discard. The float material of the high gravity-stage is fed into the second stage that is a low gravity wash at a medium RD of 1.4. During this stage, the float material is the primary soft coking coal product and the sink material is the secondary thermal product.

Hourly product analysis will ensure corrective measures can be implemented if the quality of the primary or secondary product is out of specification. This will ensure the correct qualities are achieved for both products for every production shift.

4.1.6 No Project Alternative

Not undertaking the proposed mining activity will prevent disturbances and potential impacts to the natural environment and agricultural activities as described in this assessment. These impacts are mostly limited in extent and duration, but some are potentially high risk while they occur.

Not undertaking the mining activity will lead to sterilisation of resources as well as the potential socio economic benefits that will arise with this opportunity.

4.1.7 Need and desirability of the proposed activities.

Mining is of great importance to the South African economy. South Africa has one of the world’s largest coal reserves. Eskom currently relies on coal fired power stations to produce approximately 95% of the electricity generated in South Africa and until such time as alternative energy generation options can be implemented on a sufficiently large scale, Eskom is totally dependent on coal mining. The market for coal products is increasingly defined by generally accepted local and international standard quality products for which physical and financial markets exist for trading these standard coal products. In the South African market, the most common coal product quality standard is known as ‘API4’, which
refers to a particular South African produced, thermal coal product with its point of delivery free on board ocean vessel (FOB) Richards Bay Coal Terminal (RBCT).

The Berenice secondary product is defined by the combination of its high Ash (30 % air-dried (ad)) and medium Volatile Matter content (28 % ad).

This quality of coal finds application in the following industry sectors:

- South African power generation (Eskom and other local coal independent power producers (IPPs))

- Indian coal-fired power generation

- Cement production

- Production of liquid synthetic fuels – synfuel (e.g. Sasol)

- Sponge Iron (predominantly in India)

With the exception of Sponge Iron, where coal is used as a metallurgical product, all the other applications are thermal in nature. The coal is sought after and priced primarily for its energy content, which is quantitatively described by the Gross CV parameter.

Notwithstanding the potential application as a metallurgical coal in Sponge Iron production, the Berenice secondary coal product is best described as a thermal coal where it is more likely to find application. This is due to the location of the Berenice resource in South Africa (majority of the world’s Sponge Iron production is located in India) and the significantly smaller volumes of coal that is consumed by the Sponge Iron industry compared to power generation, cement, and synfuels.

Mitigation measures are aimed at lessening negative consequences of the proposed mining operation. The mitigation measures include designs and management practises that will be embarked on, to prevent the identified impacts on the social, cultural and environmental aspects. For each significance identified, mitigation measures were specified. These mitigation measures are described in more detail in the environmental management programme.

Opportunities that exist within mining are as follows:
• Constant demand on the market for commodities;
• Establishment of a permanent working group between the Municipality and the mine managers responsible from developing local economic development initiative;
• Encourage local SMME’s and entrepreneurs to take advantage of procurement;
• Develop a database of available labour and skills to encourage the employment of local people;
• Provide skills training and support programmes;
• Instigate mining procurement opportunities in consultation with the mines, develop a database of such opportunities and ensure that this information is made available to local businesses and communities.

For these to be achievable, investment and skills development, technology and infrastructure, as well as broadening of the supplier base, will need to be addressed. Due to the increased mechanisation of mining activities, there has been an overall jobless growth within this sector. Rand volatility of late has not made things easier. The lack of diversification within the industry has led to a mainly commodity export driven industry.
5 PUBLIC PARTICIPATION (Refer to the Consultation report)

5.1 Public Participation Process Followed to Date

This section of the report provides an overview of the tasks undertaken for the PPP to date. All PPP undertaken is in accordance with the requirements of the EIA Regulations (2014). It further provides an outline of the next steps in the PPP and makes recommendations for tasks to be undertaken during the environmental assessment phase of the environmental authorisation process.

Land owners where identified through a search conducted via online search engines accessing the Title Deed office database. In addition to land owners, other relevant organisations where identified and notified of the application. This includes municipal and State departments with jurisdiction in the area and Non-governmental Organisations (NGOs) with an interest.

The PPP tasks conducted for the proposed project to date include:

1. Identification of key Interested and Affected Parties (affected and adjacent landowners) and other stakeholders (organs of state and other parties);

2. Formal notification of the application to key Interested and Affected Parties (all adjacent landowners) and other stakeholders;

3. Consultation and correspondence with I&APs and Stakeholders and the addressing of their comments; and


I&AP and Stakeholder identification, registration and the creation of an electronic database

Public Participation is the involvement of all parties who are either potentially interested and or affected by the proposed development. The principle objective of public participation is to inform and enrich decision-making. This is also its key role in this Environmental Impact Assessment (EIA) process.

Interested and Affected parties (I&Aps) representing the following sectors of society has been identified:

- National, provincial and local government;
- Agriculture, including local landowners;
Community Based Organisations;  
Non-Governmental Organisations;  
Water bodies;  
Tourism;  
Industry and mining;  
Commerce; and  
Other stakeholders.

5.1.1 Formal notification of the application to key Interested and Affected Parties (adjacent landowners) and other stakeholders

The project was announced as follows:

1. **Newspaper advertisement**

Publication of media advertisement was placed on the 7th of January 2016 in the Polokwane Observer announcing the Open Day and availability of the Scoping Report. The adverts also encouraged I&AP’s to submit their comments to Jomela.

**Update on Consultation:**

Furthermore adverts where placed as follows:
- 12 February 2016_Limpopo Mirror  
- 12 February 2016_Zoutpansberger

The advert announced the public meetings as follows:

* Tshirolwe Community Hall Extension 1 (Musanda), Ndzhelele at 11a.m on the 20th of February 2016  
* Waterpoort Farmers Association (Farm Secrabje 470MS) at 11a.m on the 19th of March 2016

Communication with Mr Rudolf Otto representing the Waterpoort farmers’ association was done on several occasion. The initial meeting had been set up for the 20th of February but then changed to the 5th of March by Mr Otto according to discussions he had with the other I&AP’s.

Unfortunately after the advert had been sent for print Mr Otto advised Jomela of the change in dates from the 5th of March to the 19th of March.

Requests to meet with the TShivhula CPA had been sent and after telephonic communications with Mr Lovemore Tshivhula a date had been set for the 19th of February. Before the meeting commenced we got a directive from the CPA to communicate with their lawyer Mr Paul
Ramamana. Communication from Mr Ramamana was received on the 19th of February 2016 cancelling the meeting that had been set for the 20th with the Tshivhula Community.

EIA phase adverts where published in the Limpopo mirror and Zoutpansberger on the 29th of July 2016 with the proposed meeting to be held on the 27th of August 2016.

2. Site notice placement
In order to inform surrounding communities and adjacent landowners of the proposed development, site notices were erected on site and at visible locations close to the site. Additional notices were placed at the Local municipalities and libraries.

3. Written notification
I&AP’s and other key stakeholders were notified of the status of the project on the 13th of September 2016 and the scoping report will be sent to all registered I&AP’s for a 30 day commenting period from the 13th of September to the 13th of October 2016.

4. Public Meeting
To date three meetings have been held with interested and affected parties and a fina meeting will be held during the EIA phase after the final EIA report has been made available for review.

5.1.2 Consultation and correspondence with I&AP’s and Stakeholders and the addressing of their comments (continuous).

Requests for documentation and registration as I&AP’s have been received. A final public consultation report with minutes has been compiled.

5.1.3 Release of the revised and amended Scoping Report to I&AP’s and stakeholders for review and comment.
This draft scoping report will be sent to all registered I&AP’s for a 30 day commenting period from the 13th of September to the 13th of October 2016

Additional electronic and or hard copies will be made available to interested and affected parties and stakeholders who request for them. Hardcopies of the report will also be submitted to all organs of state and relevant authorities.

5.2 Next Phases of the Public Participation Process
All comments and responses received and sent throughout the entire process will be updated and included in the comments and responses report which will be submitted to the Department of Mineral Resources. Note that this PPP Report shall be updated at each phase as required.
6 BASELINE RECEIVING ENVIRONMENT

6.1 Regional Setting

Limpopo Province is South Africa's northernmost province which shares borders with Mozambique, Zimbabwe and Botswana, making it the ideal entrance to Africa. Named after the great Limpopo River that flows along its northern border, this province is rich in wildlife, spectacular scenery and a wealth of historical and cultural treasures.

The province contains much of the Waterberg Biosphere, a designated Biosphere Reserve. The Waterberg Biosphere, a massif of approximately 15,000 km² shaped by hundreds of millions of years of riverine erosion to yield diverse bluff and butte landforms. The Waterberg ecosystem can be characterised as a dry deciduous forest or Bushveld. Within the Waterberg, archaeological finds date to the Stone Age. Nearby are early evolutionary finds related to the origin of humans.

Industry

Limpopo's rich mineral deposits include platinum group metals, iron ore, chromium high- and middle-grade coking coal, diamonds, antimony, phosphate and copper, as well as mineral reserves such as gold, emeralds, scheelite, magnetite, vermiculite, silicon and mica. Base commodities such as black granite, corundum and feldspar are also found. Mining contributes to more than a fifth of the provincial economy.

The province is a typical developing area, exporting primary products and importing manufactured goods and services. It has a high potential for development, with resources such as tourism, rain-fed agriculture, minerals and abundant labour offering excellent investment opportunities.

Agriculture

The bushveld is cattle country, where extensive ranching operations are often supplemented by controlled hunting. About 80% of South Africa's hunting industry is found in Limpopo. Sunflowers, cotton, maize and peanuts are cultivated in the Bela-Bela and Modimolle areas. Modimolle is also known for its table-grape crops. Tropical fruit, such as bananas, litchis, pineapples, mangoes and pawpaws, as well as a variety of nuts, are grown in the Tzaneen and Makhado areas. Tzaneen is also at the centre of extensive tea and coffee plantations.

Limpopo, known as the "garden of South Africa" produces about the majority of South Africa's mangoes, papayas, avocados and tomatoes. As well as thousands of tons of potatoes, the province also produces tea, citrus, bananas, and litchis in abundance. Extensive forestry plantations are also found in the region, including hardwood for furniture manufacture.
In addition to commercial agriculture, subsistence farming is the mainstay of a large section of the rural population.

Figure 8: Location of the Limpopo Province of South Africa.

Limpopo Province is divided into five municipal districts, subdivided in 24 local municipalities:
Makhado Local Municipality is one of four local municipalities in the Vhembe District. It borders with Musina in the north, Thulamela in the east, Molemole in the west (Capricorn District) and Giyani in the south (Mopani District). The Municipality of Makhado is located in the northern parts of Limpopo Province. Its territory covers an area of 8567.38 km².

It is connected to major cities in Gauteng Province via the N1, which is an important asset for the further development of the area and to connect it with outside markets. The Trans-Limpopo
Corridor proceeds through the Municipality and follows the N1 from Polokwane in the south through Makhado into Musina and Zimbabwe in the north.

The proximity to the N1 highway and districts roads such as R521, R523 and R522 which connects the municipality to African and national markets, productive fresh produce farms, good climatic conditions, availability of a rail network, gives the area a competitive advantage.

6.2 Baseline Environmental attributes associated with the sites

Key aspects of the baseline environment that are likely to impact on the scope of the impact assessment and management measures that are implemented as well as project decisions regarding alternatives are listed below.

6.2.1 Climate

Limpopo Province is situated in a dry savannah sub region, characterized by open grasslands with scattered trees and bushes. Visible manifestations of underlying geology, contributing to slope and the formation of landscapes, comprising the visible features of an area of land, including the physical elements of landforms such as mountains, ridges, hills, plains and water bodies. The southern limit of the MRA area is underlain by the hard and resistant quartzites and conglomerates of the Soutpansberg Group and this give rise to prominent east-west striking mountains and valleys. The Soutpansberg mountain range is a major regional topographic feature and it extends in an east-west direction for a distance of approximately 130 km. The regional climate is strongly influenced by the east-west orientated mountain range which represents an effective barrier between the south-easterly maritime climate influences from the Indian Ocean and the continental climate influences (predominantly the Inter-Tropical Convergence Zone and the Congo Air Mass) coming from the north.

The climate for the municipal area ranges between 18 degrees Celsius in the mountainous areas to 28 degrees Celsius in the rest of the area, with an average of 25.5 degrees Celsius. Maximum temperatures occur during the month of January while the minimum temperatures occur in July.

Across the globe, environmental stresses and major changes in climate conditions are influencing the lives and livelihoods of ordinary people and communities everywhere. The average monthly temperature and relative humidity for the Berenice Coal Project area for the period are presented in figures below. The project is located in a semi-arid zone characterised with high temperatures and low rainfall.
Summer temperatures of the project area range from 29.3 °C to over 31 °C with minimum winter temperature >17 °C.
Figure 11: Temperature: Maximum Summer

Figure 12: Temperature: Minimum Summer
The main period for rainfall is January to February with an annual rainfall of 450mm in the low-lying plains to 2300mm in the Soutpansberg. The general average rainfall for the Municipal area ranges between 450mm to 800mm. The areas north of the Soutpansberg have less rainfall than the lower western foothills and central and eastern high lying areas of the mountain itself. In conclusion, higher rainfall occurs on the higher lying areas of the Soutpansberg and foothills of the mountain.
Due to high temperatures the project area lies within a high evaporation climate.
6.2.2 Geology

Regional Geology

This coalfield is characterised by intensive faulting. Dislocations both parallel to strike and at a high angle thereto are common and sub-divide the coalfield into numerous irregular-sized blocks. Displacements vary between 20 m and 200 m. Syn-depositional faulting has to some degree controlled the size of individual coal ‘blocks’ and has affected coal distribution significantly. The result is the tendency for coal quality and thickness to vary markedly from place to place, due to varying local depositional environments.

The thickest coal zone in this region is to be found some distance to the east of Waterpoort, comprising up to nine composite seams separated by carbonaceous mudstone, over a stratigraphic interval of about 40 m. The coal rank increases progressively eastwards across the coalfield.

The coal zones in this area are developed within the Ecca Group in strata that may be broadly correlated to the Mikambeni and Madzaringwe Formations from the area near Makhado towards the southeast. The Mikambeni and Madzaringwe Formations are the local representatives of the Vryheid and Volksrust Formations of the Main Karoo Basin. These formations consist principally of fine-grained sediments such as siltstone, mudstone, and shale and a number of zones/seams of coal.

The first major sandstone package in the sequence is that of the Fripp Formation that unconformably overlies the Ecca Mudstones and generally forms a useful stratigraphic marker. The Fripp sandstone tends to be laterally persistent and is typically 30 m thick. This sandstone package is reasonably resistant to erosion and may be found as outcrop. Above the Fripp Formation, the Solitude Formation of the Beaufort Group occurs in the deeper areas and comprises mostly siltstone and red mudstone/shale.

The Ecca Group strata are underlain by varying thicknesses of the Tshidzi Formation (Dwyka Group) comprising a glacial sequence of tillite, diamictite, etc., representing the encroachment of the Karoo Supergroup over the pre-Karoo basement.

The Karoo Sequence rocks in the Soutpansberg Coalfield overlie the Limpopo Mobile Belt and Soutpansberg-age rocks and dip at 2 ° to 20 ° northwards, terminating against east to west trending strike faults forming the northern margins of the coalfield.
Regionally, the nature of the coal deposits ranges from multi-seam, coal-mudstone associations (coal zones), about 40 m thick in the west, with seven discrete coal zones (Mabelebele Sector and Waterpoort area). There are two separate seams in the east (Parfuri Sector and Tshikondeni area), where an upper seam of ~ 3 m thickness and a lower seam of about 2 m thick occur, separated by ~ 100 m of sediments.

**Figure 17:** Sectors of the Soutpansberg/ Venda-Parfuri Coalfields

Local Geology

The Berenice Project is located northwest of Waterpoort, within the B-Block of the Mopane sector of the Soutpansberg Coalfield. Here the coal-bearing strata are deposited in a half-graben within the basement (Limpopo Mobile Belt) bedrock, fault-bounded toward the northwest and sub-outcropping towards the southeast. The full Karoo Sequence is present in the Berenice area with the coal-rich Ecca Formation underlain by tillite and diamictite of the Tshidzi Formation (Dwyka Group) and overlain by the sandstone package of the Fripp Formations. In the deeper parts of the basin, the Fripp Formation is overlain by siltstones and red mudstone/ shales of the Beaufort Group.

The coal deposits of this locality consist of bright coal/ carbonaceous mudstone associations, forming a series of composite coal ‘zones’. Three coal zones can be identified and are named from top to bottom:

- Upper Coal Zone
- Middle (Main) Coal Zone
- Lower Coal Zone

The Upper and Main Coal Zones consist mostly of interlaminated to interbedded mudstone, coal, and shale, while the Lower Zone, where developed, tends to be formed of a number of relatively thin coal beds or seams separated by non-carbonaceous or carbonaceous partings.
The Main Coal Zone, where preserved from weathering and erosion, is persistently well-developed and contains a number of sub-zones comprising plies with a significant proportion of bright coal.

The Upper Coal Zone comprises between two and five plies, and appears to be more variable in terms of thickness and is seemingly absent in some localities.

The upper portion of this Zone generally contains a slightly greater proportion of coal to the lower section and in some areas 'shaling-out' of plies is indicated.

The Lower Coal Zone appears to be only significantly developed towards the west of the exploration area and is seemingly absent in general in the east.

The coal zones were split into a number of coal plies representing the main coal sub-zone units and intra-zone partings. The 'plies' are designated as follows:

- Upper: S01 (S01A/S01B)
- Main: S02, P03, S04, P05, S06, P07, S08, S09, P10, S11, P11, S12, P13, S14, S15, S16
- Lower: S18

**Figure 18:** Local geology map
6.2.3 Soils

Most of the area is underlain by rocks of the Archaean Beit Bridge Complex, with gneisses and meta-sediments in a structurally complex area. Substrates vary from deep red sandy soil, to lighter-coloured soil imbedded with limestone calcareous rock and gravel, to alluvial soil along the Brak River.

The project area land types include Mispah, Glenrosa, Hutton and Clovelly soils, all having grazing land capabilities, with the Mispah and Hutton soils tending towards wilderness status when shallow and rocky; detailed soil surveys indicated deep and shallow rocky Mispah soils, with wilderness/grazing land capabilities respectively.

1. **Fc574: Glenrosa and/or Mispah forms** (other soils may occur).
   - Lime generally present in the entire landscape. Parent material is: basalt of the Letaba formation in the Lebombo group - Karoo sequence. leucogneiss, amphibolite, metapelite of the Malala drift group.
   - Soil depth: 450mm - 750mm.
   - Profile available water (PAW) content is between 21 - 40 mm indicating very low potential soils.

2. **Ae305: Hutton 30/31/32**
   - Red-yellow apedal, freely drained soils. Red, high base status > 300 mm deep (no dunes).
   - Parent material is: mainly sand of the quaternary system.
   - Soil depth: >750mm.
   - Profile available water (PAW) content is between 41 - 60 mm, indicating low potential soils.

3. **Ah89: Hutton + Clovelly 36**
   - Red-yellow apedal, freely drained soils.
   - Red and yellow colours, high base status, usually < 15% clay.
   - A small part of the Berenice falls within this class.
   - Parent material is: Beit bridge complex, Malala drift formation; leucogneiss, metaquartzite, and amphibolite; marble, gneiss; metaquartzite and amphibolite.
   - Soil depth: 450mm - 750mm.
   - Profile available water (PAW) content is between 41 - 60 mm, indicating low potential soils.

4. **Ae303 Hutton 34/35**
   - Red, structure less,
   - Soil depth: 400mm - 6000mm.
   - Sandy soils on rock
Figure 19: Soil of the Study Area
6.2.3.1 Land Capability

The proposed mining area has a low to moderate agricultural land use capability. This is largely due to the combination of land use stressors associated with soil structures and the general regional climate. Land in Class V; (d) grazing of natural pastures or, at the same level, woodland.

Figure 20: Agriculture Potential
Figure 21: Structurally favourable soils

Figure 22: Soil Association

Figure 23: Potential Shifting Sands
6.2.4 Biodiversity

Veld Description

The proposed Berenice Opencast Coal Mine site is located on approximately 7761 hectares of Dry Sweet Bushveld in the Waterpoort District between the Soutpansberg Mountain Range and the Limpopo River.

6.2.4.1 Flora

The plains directly north of the Soutpansberg were mapped as Arid Sweet Bushveld veld type (Veld Type 14), and specifically as Adansonia – Mixed Thornveld as described by Acocks (1988). According to Low & Rebelo (1996) the site is within Sweet Bushveld (Vegetation Type 10). Mucina and Rutherford (2006) erroneously mapped this savanna vegetation as Musina Mopane Bushveld (Mostert, Bredenkamp & Mostert 2009), as this vegetation is more closely related to the Limpopo Sweet Bushveld (SVcb 19) of Rutherford & Mucina (2006).

According to Mucina and Rutherford (2006) the vegetation of this entire area is mapped as Musina Mopane Bushveld, however, the vegetation survey on the site indicates that the vegetation rather represents Arid Sweet Bushveld (Also see paragraph above). This is particularly indicated by the prominence of Senegalia mellifera, Senegalia erubescens and Vachellia tortilis and Vachellia grandicornuta.

Table 4: The following twelve vegetation mapping units were identified within the study area:

<table>
<thead>
<tr>
<th>Mapping units / Plant Community</th>
<th>Sensitivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Mixed Thornveld</td>
<td>Medium-Low</td>
</tr>
<tr>
<td>2. Open Shrubveld</td>
<td>Medium-Low</td>
</tr>
<tr>
<td>3. Open Calcareous Areas</td>
<td>Medium-Low</td>
</tr>
<tr>
<td>4. Dense Calcareous Areas</td>
<td>Medium</td>
</tr>
<tr>
<td>5. Vegetation on Hills</td>
<td>Medium-High</td>
</tr>
<tr>
<td>6. Dense Terminalia prunioides Bush on red sand</td>
<td>Medium</td>
</tr>
<tr>
<td>7. Open Thornveld on Brak River Floodplains</td>
<td>High</td>
</tr>
<tr>
<td>8. Mixed Bushveld on yellow sand</td>
<td>Medium-High</td>
</tr>
<tr>
<td>9. Mixed Mopaneveld</td>
<td>Medium-Low</td>
</tr>
<tr>
<td>10. Old Fields</td>
<td>Low</td>
</tr>
<tr>
<td>11. Pan</td>
<td>High</td>
</tr>
<tr>
<td>12. Brak River Riparian Vegetation</td>
<td>High</td>
</tr>
</tbody>
</table>
Figure 24: Vegetation map of the study site
Most plant communities were in a good condition, representing natural, close to pristine vegetation. The result of the sensitivity assessment indicates that the Brak River and associated Floodplains and Pan (all wetlands) are considered to be highly sensitive. The Dense Calcareous Areas and Dense *Terminalia prunioides* Bush have medium sensitivity. The sensitivity of the Mixed Bushveld on yellow sand was rated as Medium-High. The other plant communities identified were rated between Medium-Low and Low. This is mainly due to differences in plant species composition and plant species richness, which is a result of habitat differences and the regional importance of the vegetation.

Several Nationally Protected tree (National Forests Act 1998) or NEMBA plant species (Government Notice No. 2007, National Environmental Management: Biodiversity Act, 2004) were recorded from within the study area. These include:

- *Adansonia digitata*
- *Balanites maughanii*
- *Boscia albitrunca*
- *Combretum imberbe*
- *Sclerocarya birrea*

*Boscia albitrunca* (Sheppard tree, Witgat, Matoppie) is particularly widespread and many individuals (probably hundreds) occur on the study site. The other species listed above are fairly rare and only few individuals were noted.

No important invasive woody plant species were recorded within the relevant study site, though some herbaceous weeds do occur along the Brak River. The development of the proposed Berenice opencast coal mine will result in definite negative impacts on vegetation and flora. The pan Matsuri is also regarded as ecologically highly sensitive, though this is a very small and isolated wetland system that can be destroyed without much vegetation ecological consequences.
Figure 25: Sensitivity map of the study site
6.2.4.1.1 Mixed Thornveld

This Thornveld (Figure 24) is mainly restricted to the eastern part of the study site. The Mixed Thornveld is found on red, somewhat clayey soil with no rocks on the soil surface. Prominent woody species that were recorded here include Boscia foetida, Boscia albitrunca and Lycium bosciifolium. Although the herbaceous layer has a very low cover, species such as Cenchrus ciliaris and Urochloa mosambicensis were conspicuously present. Forbs were found only scattered with very low cover (see Image 1).

Image 1: The Mixed Thornveld on the site

The following plant species were recorded from this plant community:

- **Trees and shrubs, dwarf shrubs**
  - *Boscia albitrunca*  
  - *Boscia foetida*  
  - *Commiphora marlothii*  
  - *Commiphora tenuipetiolata*  
  - *Dichrostachys cinerea*  
  - *Grewia bicolor*  
  - *Lycium bosciifolium*  
  - *Mundulea sericea*  
  - *commiphora marlothii*  
  - *Commiphora tenuipetiolata*  
  - *Dichrostachys cinerea*  
  - *Grewia bicolor*  
  - *Lycium bosciifolium*  
  - *Mundulea sericea*  

- **Grasses and sedges**
  - *Aristida congesta barbicollis*  
  - *Eragrostis superba*  
  - *Heteropogon contortus*  
  - *Panicum coloratum*  
  - *Urochloa mosambicensis*  

- **Forbs**
Abutilon austro-africanum
Hibiscus micranthus
Ipomoea sinensis
Jatropha zeyheri
Melhania acuminata
Plectroniella armata
Senna italica
Solanum tettense
Waltheria indica
Discussion
This Thornveld has medium plant species richness, but no protected tree species or red data species occur. The grass layer is poorly developed and bare, due to periodic drought.

6.2.4.1.2 Open Shrubveld

This plant community occurs scattered over the study site and represents open areas with a sparse herbaceous layer and much bare soil (Image 2). The most prominent tree species are Boscia albitrunca, Boscia foetida and Vachellia tortilis. The herbaceous layer was quite dry, with the grass Urochloa mosambicensis and the forb Plectroniella armata scattered about.

Image 2: An example of Open Shrubveld

The following plant species were recorded in this plant community:

- Trees, Shrubs and Dwarf shrubs
  - Boscia albitrunca
  - Boscia foetida
  - Senegalia mellifera
  - Vachellia grandicornuta
  - Vachellia tortilis
- Grasses and sedges
  - Schmidtia pappophoroides
  - Urochloa mosambicensis
- Forbs
Ocimum americanum
Waltheria indica
Plectroniella armata

Discussion
This is an area that is quite bare.

- **Open Calcareous Areas**
  Calcareous areas occur widespread and scattered over the study site. Some of these areas are quite open with sparse vegetation, though other areas are covered with dense *Terminalia prunioides* Bush. Trees and shrubs occur sparsely on the open calcareous areas, while the herbaceous layer is poorly developed. The denser bush areas are however, rather related to the *Terminalia prunioides* Bush (Image 3)

![](image)

**Image 3: Example of Open Calcareous Areas.**

The dominant woody plants of this landscape are *Boscia foetida*, *Vachellia grandicornuta*, *Senegalia senegal* var *senegal*, *Lycium bosciifolium* and *Sesamothamnus lugardii*.

The herbaceous layer is scanty, with much calcareous rock covering the soil surface. The most conspicuous grass species are *Schmidtia pappophoroides* and *Urochloa mosambicensis* while forbs include *Plectroniella armata* and *Sericorema remotiflora*.

The following plant species were recorded in this plant community:

- **Trees and Shrubs**
  - Boscia albitrunca
  - Boscia foetida
  - Catophractes alexandri
  - Ehretia rigida
  - Lycium bosciifolium
  - Maerua juncea
  - Salvadora australis
  - Senegalia senegal senegal
  - Sesamothamnus lugardii
  - Vachellia grandicornuta
  - Vachellia tortilis
  - Zygophyllum sp

- **Grasses and sedges**
  - Schmidtia pappophoroides
  - Urochloa mosambicensis

- **Calcareous areas**
  - Open Calcareous Areas
  - Dense bush areas related to Terminalia prunioides Bush

- **Herbaceous layer**
  - Scanty with calcareous rock covering soil surface

- **Dominant woody plants**
  - Boscia foetida, Vachellia grandicornuta, Senegalia senegal, Lycium bosciifolium, Sesamothamnus lugardii

- **Herbaceous layer species**
  - Schmidtia pappophoroides, Urochloa mosambicensis, Plectroniella armata, Sericorema remotiflora
Forbs

Geigeria burkei
Plectroniella armata
Sericorema remotiflora
Solanum tettense

Discussion

This is very dry, bare area with only few plant species, though probably good habitat for specific fauna.

6.2.4.1.3 Dense Calcareous Areas

Areas where the soil is underlain with limestone and white-coloured calcareous limestone rocks and gravel occur widespread over the entire study area. The vegetation is dense bush, covering 50-70%, often clumped into bush groups, but individual trees also occur. *Terminalia prunioides* is mostly the dominant tree species (Image 4).

The following plant species were recorded in this plant community:

- **Trees, Shrubs and Dwarf shrubs**
  - Adansonia digitata
  - Albizia anthelmintica
  - Balanites maughami
  - Boscia albitrunca
  - Combretum apiculatum
  - Commiphora africana
  - Commiphora pyracanthoides
  - Commiphora mollis
  - Dichrostachys cinerea
  - Grewia bicolor
  - Grewia flava
  - Grewia flavescens
  - Grewia inaequilatera
  - Lycium bosciifolium
  - Salvadoria australis
  - Senegalia mellifera
  - Senegalia senegal var leiarchis
  - Sesamothamnus lugardi
  - Terminalia prunioides
  - Vachellia grandicorna
  - Vachellia tortilis

- **Grasses and sedges**
  - Schmidtia pappophoroides
  - Urochloa mosambicensis

- **Forbs**
  - Plectroniella armata
  - Hibiscus micranthus
  - Kalanchoe paniculata
  - Solanum lichtensteinii
  - Sphedamnocarpus sp
  - Waltheria indica

Discussion
Several woody species occur in this vegetation, with three tree species being nationally protected. Due to the dense bush, the herbaceous layer is poorly developed, but more species may occur under the bush.

Image 4: A collage of Dense Calcareous Bush

6.2.4.1.4 Vegetation on small Hills
There are limited, low hills present in the study area, namely a small hill on Bernice and a hill on the southern boundary of Matsuri and Longford. Hills often represent special habitats for various plant and faunal species, and heritage sites often occur on these types of hills. The hills are therefore considered to have high conservation value.

The hills are normally covered with dense bush, with *Terminalia prunioides* prominent, though several woody species are present. The herbaceous layer is poorly developed.

Image 5: The dense bush on the hills
The most prominent species include:

- **Trees and Shrubs**
  - Albizia anthelmintica
  - Balanites maughamii
  - Boscia foetida
  - Combretum apiculatum
  - Commiphora africana
  - Commiphora mollis
  - Croton gratissimus
  - Dichrostachys cinerea
  - Dombeya rotundifolia
  - Ehretia rigida
  - Grewia bicolor
  - Grewia flavescens
  - Lycium cinereum
  - Maerua parvifolia
  - Senegalia erubescens
  - Senegalia mellifera
  - Vachellia tortilis
  - Vachellia grandicornuta
  - Sesamothamnus lugardi

- **Grasses and Sedges**
  - Enneapogon cenchroides
  - Eragrostis superba
  - Melinis repens
  - Panicum coloratum
  - Cenchrus ciliaris
  - Panicum maximum
  - Schmidtia pappophoroides
  - Stipagrostis uniplumis

- **Forbs**
  - Plectroniella armata
  - Hibiscus micrantha
  - Sphedamnocarpus sp
  - Kyphocarpa angustifolia
  - Pavonia burchellii

**Discussion**

Rocky hills represent habitat for specific plant and fauna species and are considered to have high conservation value.

6.2.4.1.5  **Dense Terminalia prunioides Bush on red sand**

This plant community is restricted to red sandy to sandy loam soils that occur scattered over the entire study area. The woody vegetation is quite dense, and the herbaceous layer is covered with grass but may locally be scanty with bare soil. (Image 6). The most prominent woody species include *Terminalia prunioides* but several other woody species are present, particularly *Combretum apiculatum* and *Commiphora* species.
Species recorded in this vegetation include:

- **Trees and Shrubs**
  - Boscia albitrunca
  - Boscia foetida
  - Combretum apiculatum
  - Commiphora africana
  - Commiphora marlothii
  - Commiphora mollis
  - Commiphora pyracanthoides
  - Dichrostachys cinerea
  - Grewia bicolor
  - Grewia flava
  - Grewia hexamita
  - Grewia retinervis
  - Maerua parvifolia
  - Senegalia mellifera
  - Senegalia rostrata subsp. leiorachis
  - Sesamothamnus lugardi
  - Terminalia prunioides
  - Vachellia tortilis

- **Grasses and Sedges**
  - Eragrostis lehmanniana
  - Tragus berteronianus

- **Forbs**
  - Hermannia boraginiflora
  - Indigofera flavicans
  - Hermannia glanduligera
  - Kyphocarpa angustifolia
  - Hibiscus micrantha
  - Sericorema remotiflora

Image 6: A collage of photos of Dense *Terminalia prunioides* Bush on red sand
Discussion
This vegetation occurs widespread in the area. Of concern is the presence of the protected tree *Boscia albitrunca* and the several *Commiphora* species.

6.2.4.1.6 Open Thornveld along Brak River
Limited flood plain vegetation occurs, especially along the north-eastern parts of the Brak River. This vegetation is open thornveld, dominated by *Vachellia tortilis* and a fairly well developed grass layer, though this is often grazed by game species.

The most prominent species include:
- **Trees and Shrubs**
  - *Boscia albitrunca*  
  - *Boscia foetida*  
  - *Cadaba aphylla*  
  - *Grewia bicolor*  
  - *Lycium bosciiolium*  
  - *Senegalia mellifera*  
  - *Terminalia prunioides*  
  - *Vachellia grandicornuta*  
  - *Vachellia tortilis*  
- **Grasses and Sedges**
  - *Eragrostis superba*  
  - *Panicum coloratum*  
  - *Tragus berteronianus*  
  - *Urochloa mossambicense*  
- **Forbs**
  - *Indigofera sp*  
  - *Geigeria burkei*  
  - *Kyphocarpa angustifolia*  
  - *Pavonia burchellii*  

Image 7: Open Thornveld on Brak River Floodplains

Discussion
This vegetation is restricted to flood plains along the Brak River, and as such considered to have a High sensitivity.

6.2.4.1.7 Mixed Bushveld on yellow sand
A small patch of this vegetation occurs on the Farm Doorvaart at about 22°44’01.5”S; 29°28’11.1”E (not on vegetation map). This is where an individual of the protected baobab, *Adansonia digitata* was recorded. This vegetation occurs on deep yellow sand. The vegetation is mixed bushveld with species such as *Combretum apiculatum*, *Senegalia erubescens* and *Commiphora* species.

**Image 8: Mixed Bushveld on yellow sand**

Species recorded in this vegetation include:

<table>
<thead>
<tr>
<th>Plants</th>
<th>Trees and Shrubs</th>
<th>Grasses and Sedges</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Adansonia digitata</em></td>
<td><em>P</em></td>
<td><em>Eragrostis lehmanniana</em></td>
</tr>
<tr>
<td><em>Boscia albitrunca</em></td>
<td><em>P</em></td>
<td><em>Tragus berteronianus</em></td>
</tr>
<tr>
<td><em>Boscia foetida</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Combretum apiculatum</em></td>
<td><em>Grewia bicolor</em></td>
<td><em>Hermannia boraginiflora</em></td>
</tr>
<tr>
<td><em>Commiphora mollis</em></td>
<td><em>Grewia flavescens</em></td>
<td><em>Hermannia glanduligera</em></td>
</tr>
<tr>
<td><em>Commiphora pyracanthoides</em></td>
<td><em>Grewia retinervis</em></td>
<td><em>Hibiscus micrantha</em></td>
</tr>
<tr>
<td><em>Dichrostachys cinerea</em></td>
<td><em>Senegalia erubescens</em></td>
<td><em>Kyphocarpa angustifolia</em></td>
</tr>
</tbody>
</table>

**Forbs**

- *Hermannia boraginiflora*
- *Hermannia glanduligera*
**Discussion**

This vegetation has a limited distribution on the study site and contains the nationally protected trees *Adansonia digitata* and *Boscia albitrunca*. It is therefore regarded to have medium-High conservation value. Also of concern is the presence of several *Commiphora* species.

6.2.4.1.8  Mixed Mopaneveld

The Mixed Mopaneveld is limited to the eastern corner of the Farm Berenice, and is absent from the rest of the study site. In this area *Colophospermum mopane* is dominant (Figure 12), though several other plant species are also present.

The following plant species were recorded in this plant community:

<table>
<thead>
<tr>
<th>Trees and Shrubs</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Boscia foetida</em></td>
<td><em>Maerua angolense</em></td>
</tr>
<tr>
<td><em>Cissus cornifolia</em></td>
<td><em>Maerua parvifolia</em></td>
</tr>
<tr>
<td><em>Colophospermum mopane</em></td>
<td><em>Ozoroa paniculosa</em></td>
</tr>
<tr>
<td><em>Dalbergia melanoxylon</em></td>
<td><em>Sclerocarya birrea</em></td>
</tr>
<tr>
<td><em>Dichrostachys cinerea</em></td>
<td><em>Terminalia prunoides</em></td>
</tr>
<tr>
<td><em>Flueggea virola</em></td>
<td><em>Terminalia sericea</em></td>
</tr>
<tr>
<td><em>Grewia bicolor</em></td>
<td><em>Vachellia tortilis</em></td>
</tr>
<tr>
<td><em>Grewia vilosa</em></td>
<td><em>Ximenia americana</em></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Grasses and sedges</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Aristida adscensionis</em></td>
<td><em>Pogonarthria squarrosa</em></td>
</tr>
<tr>
<td><em>Aristida congesta barbicollis</em></td>
<td><em>Schmidtia pappophoroides</em></td>
</tr>
<tr>
<td><em>Eragrostis lehmanniana</em></td>
<td><em>Stipagrostis uniplumis</em></td>
</tr>
<tr>
<td><em>Heteropogon contortus</em></td>
<td><em>Themea triandra</em></td>
</tr>
<tr>
<td><em>Melinis repens</em></td>
<td><em>Urochloa mosambicensis</em></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Forbs</th>
<th></th>
</tr>
</thead>
</table>
Abutilon angulatum
Blepharis spinosa
Evolvulus alsinoides
Hermbstaedtia odorata
Hibiscus calyphyllus
Hibiscus micranthus
Indigofera sp
Leucas glabrata
Ocimum americanum
Pavonia sp
Sida dregei
Solanum kwebense
Waltheria indica
Xenostegia tridentate

Image 9: Mixed Mopaneveld

Discussion
In general this vegetation is not rare and not threatened, except that it is often prone to droughts and then often overgrazed. There is concern on the presence of a few individuals of *Sclerocarya birrea*, which is a protected tree. A permit from the provincial department of Forestry is needed to

6.2.4.1.9 Old Fields
Limited Old Field occur within the study area. These are located on Doorvaart, Longford, Matsuri and Gezelschap. These old field were long ago cultivated, and are now covered with secondary bushveld, dominated by *Vachellia tortilis* and *Dichrostachys cinerea*, while the herbaceous layer is often scanty with few species, such as *Urochloa mosambicensis*, *Geigeria burkei* and *Commicarpus* sp..

Discussion
These areas have low conservation value, though in the context of game farming they have some value as an additional habitat type and grazing.

Image 10: An Old Field

6.2.4.1.10 Pan
A single small pan occurs on the Farm Longford. There is a bird hide at the pan. The pan is located within Dense Calcareous Area, but *Vachellia tortilis* is dominant on the pan fringe. The pan area has medium-High conservation value.
Image 11: The Pan. Note the dominance of Vachellia tortilis

6.2.4.1.11 Brak River vegetation
The Brak River is a dry, seasonal river that has flowing water only seasonally, during higher rainfall years. However, great floods may occur occasionally. Flood plains do occur at some localities (plant community described above), especially in the eastern part of the River, usually directly outside the riparian on the banks of the River (Figure 24).

The most abundant large trees include Combretum imberbe, Ziziphus mucronata, Senegalia nigrescens and Grewia bicolor (Image 12), while some grass species such as Panicum coloratum, Panicum maximum, Cenchrus ciliaris and Urochloa mossanbicensis are abundantly present. Conspicuous forbs that were noted include weeds e.g. Flaveria bidentis and Datura stramonium.

The following plant species were recorded:

- **Trees and Shrubs**
  - Colophospermum mopane
  - Combretum apiculatum
  - Combretum imberbe
  - Dichrostachys cinerea
  - Ehretia amoena
  - Gardenia volkensii
  - Grewia hexamita
  - Gymnosporia senegalensis
  - Lycium cinereum
  - Mundulea sericea
  - Senegalia nigrescens
  - Vachellia grandicornuta
  - Vachellia tortilis
  - Ziziphus mucronata
Grasses and sedges

- Bothriochloa radicans
- Cenchrus ciliaris
- Eragrostis lehmanniana
- Melinis repens
- Panicum coloratum
- Panicum maximum
- Urochloa mosambicensis

Forbs

- Datura stramonium
- Flaveria bidentis
- Heliotropium steudneri
- Hermbstaedtia odorata
- Hibiscus calyphyllus
- Justicia flava
- Vernonia sp
- Waltheria indica
- Xanthium strumarium

Image 12: The Brak River
Discussion
The River is considered to be ecologically sensitive. All river system in South Africa are protected by the National Water Act.

6.2.4.1.12 Species of Conservation Concern
A list of Species of Conservation Concern for the grids 2229CB, 2229CD and 2229 DA was obtained from the database on the SANBI (POSA 2016) website. Threatened species are those that are facing high risk of extinction, indicated by the categories Critically Endangered (CE), Endangered (EN) and Vulnerable (VU). Species of Conservation Concern include the Threatened Species, but additionally have the categories Near Threatened (NT), Data Deficient (DD), Critically Rare (CR), Rare (R) and Declining (D). This is in accordance with the new Red List for South African Plants (Raimondo et al. 2009).

The following plant species of conservation concern were previously recorded from the grids 2229CB, 2229CD and 2229 DA, as listed by SANBI.

Table 5: plant species of conservation concern

<table>
<thead>
<tr>
<th>Family</th>
<th>Species</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acanthaceae</td>
<td><em>Justicia montis-salinarum</em> A.Meeuse</td>
<td>Rare</td>
</tr>
<tr>
<td>Apocynaceae</td>
<td><em>Ceropegia cimiciodora</em> Oberm.</td>
<td>VU</td>
</tr>
<tr>
<td>Myrothamnaceae</td>
<td><em>Myrothamnus flabellifolius</em> Welw.</td>
<td>DDT</td>
</tr>
</tbody>
</table>

*None of these species were found within the study area, they occur on the Soutpansberg Mountains.

6.2.4.1.13 Protected species
Several Nationally Protected tree (National Forests Act 1998) or NEMBA plant species (Government Notice No. 2007, National Environmental Management: Biodiversity Act, 2004) were recorded from within the study area. These include:

*Adansonia digitata*
*Balanites maughanii*
*Boscia albitrunca*
*Combretum imberbe*
*Sclerocarya birrea*

*Boscia albitrunca* (Sheppard tree, Witgat, Matoppie) is particularly widespread and many individuals (probably hundreds) occur on the study site. The other species listed above are fairly rare and only few individuals were noted.
6.2.4.2 Fauna
The study determined that a variety of mammals inhabit the proposed project as a result of the undisturbed conditions that predominate especially on top of the hills. The species richness of vertebrates is close to the historical state for this area. Some of the game species have been re-introduced and dynamically managed; only elephants and lions have not been re-introduced. It is concluded that no less than 437 species of vertebrates are resident or vagrants to the site (111 mammal species, 225 birds and 101 reptiles and amphibians). Of these 71 species (16%) are Red Listed, and therefore of significant conservation concern.

![Figure 26: Sampling Points for fauna](image)

The project site is indeed diversified, but within the broad context of a savannah. To augment descriptions of the presence, variation and characteristics of the various habitats, 19 sampling sites were randomly selected and assessed (for more information refer to the Fauna Assessment report).

6.2.4.2.1 Mammals:
During the visit the site was surveyed and assessed for the potential occurrence of Red Data and/or wetland-associated species such as Juliana’s golden mole (*Neamblosomus juliana*), Highveld golden mole (*Amblysomus septentrionalis*), Rough-haired golden mole (*Chrysospalax villosus*), African marsh
rat (*Dasymys incomtus*), Angoni vlei rat (*Otomys angoniensis*), Vlei rat (*Otomys irroratus*), White-tailed rat (*Mystromys albicaudatus*), a member of shrews such as the Forest shrew (*Myosorex varius*), Southern African hedgehog (*Atelerix frontalis*), *a number of bats such as the* Short-eared trident bat (*Cloeotis percivali*), African clawless otter (*Aonyx capensis*), Spotted-necked otter (*Lutra maculicollis*), Marsh mongoose (*Atilax paludinosus*), Brown hyena (*Parahyaena brunnea*), etc.

6.2.4.2.2 Birds:
A desktop study was undertaken in which bird species that potentially occur at the site and in the surrounding areas were identified using data from the first and second South African Bird Atlas Projects (SABAP 1 and 2). SABAP 2 data are based on records for pentads (i.e., 5’ X 5’), where SABAP 1 data were based on quarter-degree grid cells (i.e., 15’ X 15’). A list of species potentially occurring at the site was developed using data for all the SABAP 2 pentads within which the project is located, plus surrounding pentads (Figure 1). The pentads at the four corners of this region are: NW: 2235_2920; NE: 2235_2935; SE: 2250_2935; SW: 2250_2920. The area considered during the desktop study is thus much larger than the area likely to be affected by the project (Figure 27). This approach is adopted to ensure that all species potentially occurring at the site, whether resident, nomadic, or migratory, are identified. Red-listed species were identified using the most recent (2015) edition of the Red Data Book for South Africa, Lesotho and Swaziland (Taylor et al. 2015).
Figure 27: Approximate extent of area included (white square) when generating the list of birds potentially occurring at the site of the proposed mine.

6.2.4.2.3 Herpetofauna:

6.2.4.2.4 Habitat
Arboreal habitat is predominant and offers numerous opportunities for tree-living vertebrates, such as for nesting, roosting sites, perches, nourishment and sanctuary. A wide variety of savannah trees are recorded and documented in the floral overview within the auspices of this assignment. Some of the trees are Red Listed (baobab, Sheppard trees, marula trees and lead-wood) and will require special attention given their statutory conservation status. By-and-large the horizon of the woodland is that of scrub or thicket with a height of < 3 meters and varies in density from sparse to almost impenetrably dense. In spite of the drought during the 2015-16 rainfall season, this habitat-type does not show signs of ecological stress and, given the present land-use practice it is in fact in a pristine conservation state.
The terrestrial major habitat type is equally extensive and is represented in a two-dimensional aspect by surface conditions. The soils are generally deep, fertile and red and could be either sandy or compacted as result of clay content. At places calcareous rubble is found on the surface. Termitaria are present throughout the study site: these structures are important components of a terrestrial habitat since they provide nourishment for specialized mammals such as aardvarks and aardwolves, and also refuge for creatures such as pygmy mice and dwarf shrews. As result of the drought during the 2015-16 summer, basal cover is currently sparse and largely restricted to weedy plants and sour grass. The conservation status of this habitat type is rated as high even though it is presently experiencing an ecological bottle-neck on account of drought conditions.

The undulating plains are here-and-there crested by low rocky ridges (randjies). These provide adequate habitat for specialist rupiculous vertebrates such as dassies, red rock rabbits, Namaqua rock rats and elephant shrews. The conservation status of this habitat type is rated as above-average in spite of the recent drought.

Wetland habitat is poorly developed and is represented by the seasonal Brak River, a few drainage lines and a few artificial watering points for game. The river’s riparian zone is poorly developed and is only lush during and after rains.

No deep caves suitable for cave-dwelling bats were recorded, although deep rock crevices may provide adequate roosting opportunities for some cave-dwelling bats. It is furthermore possible that man-made structures such as houses and sheds are used by bats.

Table 6: Mammal diversity- The species observed or deduced to occupy the site

<table>
<thead>
<tr>
<th>SCIENTIFIC NAME</th>
<th>ENGLISH NAME</th>
<th>Habitat</th>
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</thead>
<tbody>
<tr>
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<td>Family Macroscelididae</td>
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<tr>
<td>DD*  *Elephantulus brachyrhynchus</td>
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<td>*Elephantulus intufi</td>
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<td>*Elephantulus myurus</td>
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<td>Rhabdomys pumilio</td>
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<td>*</td>
<td>Mastomys coucha</td>
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<tr>
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<tr>
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</tr>
<tr>
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<td>Chacma baboon</td>
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<tr>
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<tr>
<td>* Chaerephon pumila</td>
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<tr>
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<td>Rusty pipistrelle</td>
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<td>? Neoromicia nanus</td>
<td>Banana bat</td>
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<tr>
<td>* Neoromicia capensis</td>
<td>Cape serotine bat</td>
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<td>Atilax paludinosus</td>
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<td>Wetl.</td>
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</tr>
<tr>
<td><strong>Family Rhinocerotidae</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>√</strong></td>
<td>Ceratotherium simum</td>
<td>White rhinoceros</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Terr.</td>
</tr>
<tr>
<td><strong>Order Suiformes</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SCIENTIFIC NAME</td>
<td>ENGLISH NAME</td>
<td>Habitat</td>
</tr>
<tr>
<td>-----------------</td>
<td>--------------</td>
<td>---------</td>
</tr>
<tr>
<td><strong>Family Suidae</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>√ Potamochoerus larvatus</td>
<td>Bushpig</td>
<td>Terr.</td>
</tr>
<tr>
<td>√ Phacochoerus africanus</td>
<td>Common warthog</td>
<td>Terr.</td>
</tr>
<tr>
<td><strong>Order Ruminanta</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Family Giraffidae</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>√ Giraffa camelopardalis</td>
<td>Giraffe</td>
<td>Terr.</td>
</tr>
<tr>
<td><strong>Family Bovidae</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>√ Syncerus caffer</td>
<td>African buffalo</td>
<td>Terr.</td>
</tr>
<tr>
<td>√ Tragelaphus strepsiceros</td>
<td>Kudu</td>
<td>Terr.</td>
</tr>
<tr>
<td>√ Tragelaphus angasii</td>
<td>Nyla</td>
<td>Terr.</td>
</tr>
<tr>
<td>√ Tragelaphus scriptus</td>
<td>Bushbuck</td>
<td>Terr.</td>
</tr>
<tr>
<td>√ Tragelaphus oryx</td>
<td>Eland</td>
<td>Terr.</td>
</tr>
<tr>
<td>√ Connochaetes taurinus</td>
<td>Blue wildebeest</td>
<td>Terr.</td>
</tr>
<tr>
<td>√ Alcelaphus buselaphus</td>
<td>Red hartebeest</td>
<td>Terr.</td>
</tr>
<tr>
<td>√ Oryx gazella</td>
<td>Gemsbok</td>
<td>Terr.</td>
</tr>
<tr>
<td>√ Sylvicapra grimmia</td>
<td>Common duiker</td>
<td>Terr.</td>
</tr>
<tr>
<td>√ Redunca arundinum</td>
<td>Southern reedbuck</td>
<td>Terr.</td>
</tr>
<tr>
<td>√ Redunca fulvorufa</td>
<td>Mountain reedbuck</td>
<td>Terr.</td>
</tr>
<tr>
<td>√ Kobus ellipsiprymnus</td>
<td>Waterbuck</td>
<td>Terr.</td>
</tr>
<tr>
<td>√ Raphicerus campestris</td>
<td>Steenbok</td>
<td>Terr.</td>
</tr>
<tr>
<td>NT Raphicerus sharpeii</td>
<td>Sharpe’s grysbok</td>
<td>Terr.</td>
</tr>
<tr>
<td>√ Aepyceros melampus</td>
<td>Impala</td>
<td>Terr.</td>
</tr>
</tbody>
</table>

√ Definitely there or have a high probability to occur;
* Medium probability to occur based on ecological and distributional parameters;
? Low probability to occur based on ecological and distributional parameters.

Red Data species rankings as defined in Friedmann and Daly’s S.A. Red Data Book / IUCN (World Conservation Union) (2004) are indicated in the first column: CR= Critically Endangered, En = Endangered, Vu = Vulnerable, LR/cd = Lower risk conservation dependent, LR/nt = Lower Risk near threatened, DD = Data Deficient. All other species are deemed of Least Concern. The fourth column depicts the best-fit habitat preference of a species; Terr. = Terrestrial, Arbor. = Arboreal, Wetl. = Wetland.
/ moisture dependent, Rup. = Rupiculous.

6.2.4.2.5 Red Listed Mammal Species Identified:
Table 7. Red-listed mammals whose possible presence at the site of the proposed coal mine was evaluated during the assessment process.

<table>
<thead>
<tr>
<th>SCIENTIFIC NAME</th>
<th>ENGLISH NAME</th>
<th>CITES</th>
<th>NEMBA</th>
<th>LEMA</th>
<th>Likelihood of occurrence</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Elephantulus brachyrhynchus</em></td>
<td>Short-snouted elephant shrew</td>
<td>DD</td>
<td></td>
<td></td>
<td>Definitely</td>
</tr>
<tr>
<td><em>Orycteropus afer</em></td>
<td>Aardvark</td>
<td></td>
<td>Spec.Pr.</td>
<td></td>
<td>Definitely</td>
</tr>
<tr>
<td><em>Pronolagus randensis</em></td>
<td>Jameson’s red rock rabbit</td>
<td></td>
<td>Pr.</td>
<td></td>
<td>Definitely</td>
</tr>
<tr>
<td><em>Graphiurus platyops</em></td>
<td>Rock dormouse</td>
<td>DD</td>
<td></td>
<td></td>
<td>Likely</td>
</tr>
<tr>
<td><em>Lemniscomys rosalia</em></td>
<td>Single-striped grass mouse</td>
<td>DD</td>
<td></td>
<td></td>
<td>Definitely</td>
</tr>
<tr>
<td><em>Gerbilliscus leucogaster</em></td>
<td>Bushveld gerbil</td>
<td>DD</td>
<td></td>
<td></td>
<td>Definitely</td>
</tr>
<tr>
<td><em>Galgano moholi</em></td>
<td>South African galago</td>
<td></td>
<td>Pr.</td>
<td></td>
<td>Definitely</td>
</tr>
<tr>
<td><em>Suncus lixus</em></td>
<td>Greater dwarf shrew</td>
<td>DD</td>
<td></td>
<td></td>
<td>Possibly</td>
</tr>
<tr>
<td><em>Suncus infinitesimus</em></td>
<td>Least dwarf shrew</td>
<td>DD</td>
<td></td>
<td></td>
<td>Possibly</td>
</tr>
<tr>
<td><em>Crocidura marciens</em></td>
<td>Swamp musk shrew</td>
<td>DD</td>
<td></td>
<td></td>
<td>Possibly</td>
</tr>
<tr>
<td><em>Crocidura fuscomurina</em></td>
<td>Tiny musk shrew</td>
<td>DD</td>
<td></td>
<td></td>
<td>Unlikely</td>
</tr>
<tr>
<td><em>Crocidura maquassiensis</em></td>
<td>Maquassie musk shrew</td>
<td>DD</td>
<td></td>
<td></td>
<td>Unlikely</td>
</tr>
<tr>
<td><em>Crocidura cyanea</em></td>
<td>Reddish-grey musk shrew</td>
<td>DD</td>
<td></td>
<td></td>
<td>Definitely</td>
</tr>
<tr>
<td><em>Crocidura silacea</em></td>
<td>Lesser grey-brown musk shrew</td>
<td>DD</td>
<td></td>
<td></td>
<td>Possibly</td>
</tr>
<tr>
<td><em>Crocidura hirta</em></td>
<td>Lesser red musk shrew</td>
<td>DD</td>
<td></td>
<td></td>
<td>Definitely</td>
</tr>
<tr>
<td><em>Atelerix frontalis</em></td>
<td>Southern African hedgehog</td>
<td>NT</td>
<td>Pr.</td>
<td></td>
<td>Definitely</td>
</tr>
<tr>
<td><em>Miniopterus schreibersii</em></td>
<td>Schreibers’ long-fingered bat</td>
<td>NT</td>
<td></td>
<td></td>
<td>Unlikely</td>
</tr>
<tr>
<td><em>Pipistrellus rusticus</em></td>
<td>Rusty pipistrelle</td>
<td>NT</td>
<td></td>
<td></td>
<td>Possibly</td>
</tr>
<tr>
<td><em>Myotis welwitschii</em></td>
<td>Welwitsch’s hairy bat</td>
<td>NT</td>
<td></td>
<td></td>
<td>Unlikely</td>
</tr>
<tr>
<td><em>Pipistrellus rusticus</em></td>
<td>Rusty bat</td>
<td>NT</td>
<td></td>
<td></td>
<td>Possibly</td>
</tr>
<tr>
<td>SCIENTIFIC NAME</td>
<td>ENGLISH NAME</td>
<td>CITES</td>
<td>NEMBA</td>
<td>LEMA</td>
<td>Likelihood of occurrence</td>
</tr>
<tr>
<td>---------------------</td>
<td>-----------------------------</td>
<td>-------</td>
<td>-------</td>
<td>------</td>
<td>-------------------------</td>
</tr>
<tr>
<td>Rhinolophus clivosus</td>
<td>Geoffroy’s horseshoe bat</td>
<td>NT</td>
<td></td>
<td></td>
<td>Possibly</td>
</tr>
<tr>
<td>Rhinolophus darlingi</td>
<td>Darling’s horseshoe bat</td>
<td>NT</td>
<td></td>
<td></td>
<td>Possibly</td>
</tr>
<tr>
<td>Rhinolophus blasii</td>
<td>Blasius’s horseshoe bat</td>
<td>Vu</td>
<td></td>
<td></td>
<td>Unlikely</td>
</tr>
<tr>
<td>Hipposideros caffer</td>
<td>Sundevall’s roundleaf bat</td>
<td>DD</td>
<td></td>
<td></td>
<td>Possibly</td>
</tr>
<tr>
<td>Manis temminckii</td>
<td>Ground pangolin</td>
<td>Vu</td>
<td>Vu.</td>
<td>Spec.Pr.</td>
<td>Definitely</td>
</tr>
<tr>
<td>Proteles cristatus</td>
<td>Aardwolf</td>
<td></td>
<td>Pr.</td>
<td></td>
<td>Definitely</td>
</tr>
<tr>
<td>Parahyaena brunnea</td>
<td>Brown hyena</td>
<td>NT</td>
<td>Pr.</td>
<td>Pr.</td>
<td>Definitely</td>
</tr>
<tr>
<td>Crocuta crocuta</td>
<td>Spotted hyena</td>
<td>NT</td>
<td>Pr.</td>
<td>Pr.</td>
<td>Definitely</td>
</tr>
<tr>
<td>Acinonyx jubatus</td>
<td>Cheetah</td>
<td>Vu</td>
<td>Vu.</td>
<td>Pr.</td>
<td>Definitely</td>
</tr>
<tr>
<td>Panthera pardus</td>
<td>Leopard</td>
<td>Vu.</td>
<td>Pr.</td>
<td></td>
<td>Definitely</td>
</tr>
<tr>
<td>Leptailurus serval</td>
<td>Serval</td>
<td>NT</td>
<td>Pr.</td>
<td></td>
<td>Definitely</td>
</tr>
<tr>
<td>Civettictis civetta</td>
<td>African civet</td>
<td></td>
<td>Pr.</td>
<td></td>
<td>Possibly</td>
</tr>
<tr>
<td>Otocyon megalotis</td>
<td>Bat-eared fox</td>
<td></td>
<td>Pr.</td>
<td></td>
<td>Definitely</td>
</tr>
<tr>
<td>Mellivora capensis</td>
<td>Honey badger</td>
<td></td>
<td>Pr.</td>
<td>Pr.</td>
<td>Definitely</td>
</tr>
<tr>
<td>Poecilogale albinucha</td>
<td>African weasel</td>
<td>DD</td>
<td></td>
<td></td>
<td>Possibly</td>
</tr>
<tr>
<td>Ceratotherium simum</td>
<td>White rhinoceros</td>
<td>Pr.</td>
<td></td>
<td>Spec.Pr.</td>
<td>Definitely</td>
</tr>
<tr>
<td>Giraffa camelopardalis</td>
<td>Giraffe</td>
<td></td>
<td>Pr.</td>
<td></td>
<td>Definitely</td>
</tr>
<tr>
<td>Syncerus caffer</td>
<td>African buffalo</td>
<td></td>
<td>Pr.</td>
<td></td>
<td>Definitely</td>
</tr>
<tr>
<td>Redunca arundinum</td>
<td>Southern reedbuck</td>
<td></td>
<td>Pr.</td>
<td></td>
<td>Definitely</td>
</tr>
<tr>
<td>Redunca fulvorufa</td>
<td>Mountain reedbuck</td>
<td></td>
<td>Pr.</td>
<td></td>
<td>Definitely</td>
</tr>
<tr>
<td>Raphicerus sharpei</td>
<td>Sharpe’s grysbok</td>
<td>NT</td>
<td>Pr.</td>
<td></td>
<td>Definitely</td>
</tr>
</tbody>
</table>

1Current IUCN Red List Status for South Africa, Lesotho and Swaziland (Friedman and Daly (editors) 2004). NT = Near Threatened; VU = Vulnerable; EN = Endangered; CR = Critically Endangered

2Indicates species listed as Protected (“PR”) or Vulnerable (“Vu”) in the National Environmental Management: Biodiversity Act, 2004 list of Threatened or Protected Species (2004 version)

3Indicates species listed as Specially Protected (Spec.Pr.) or Protected (Pr.) in Limpopo Environmental
Management Act (Act 7 of 2003).

4Definite occurrences based on sight records as well as reported by the owners and guides.

6.2.5 Topography

The topography of the greater Makhado area is shown in Figure 15: Topography hereunder and this shows that large areas of the municipal area is characterised by a mountainous makeup but the proposed site is relatively flat. It should also be noted that although settlements are mostly located on slopes less than 9% (1:10), many of the urbanized areas (settlements) are located between the mountainous areas with slopes between 9%-25%, in other words slopes between 1:10 to 1:4.

Figure 28: Topography of the Study Area
The Project Area is located in an area which is relatively flat lying with the incision of the Brak River Valley towards the north of the area, at a surface elevation of 690 metres (m) to 735 m above sea level.

![Figure 29: Soter Landforms](image)

6.2.6 Surface water

Surface water spatial layers and the site visit reflected the absence of wetlands within the study site. The Brak River and multiple tributaries run through the northern sections of the study site in the farms Berenice, Celine, Longford and Matsuri. The Brak River is a tributary of the Sand River and is seasonal/non-perennial, flowing only during periods of high rainfall. The river can fill up quickly during heavy rains, and there may be a sudden torrent of water after a thunderstorm begins upstream. These flash floods will be considered in the impact assessment.
A small pan occurs on the Longford farm. In order to limit the impact on the hydrology of the area, the current assessment finds that a minimum buffer of 100 m from the edge of the river boundaries should be respected.

Figure 30: Quaternary Catchment

The Berenice project is located mostly in the quaternary catchment A72B and to a much lesser extent in the A71J. The drainage system in the area is defined by the non-perennial Brak River in the quaternary catchment A72B and the perennial Sand River (A71J) in the north-easterly direction. The Brak River flows in the north-easterly direction, north of the planned mine pits and mine infrastructures.
6.2.7 Groundwater

While several boreholes were drilled within and around the Berenice project area, several comprehensive regional hydrogeological investigations of the groundwater potential in the western parts of the project area were carried out by Department of Water and Sanitation (DWS) between 1982 and 1989 (Golder, 2012). The studies were aimed at identifying additional water resources for the Alldays area and the detailed report was compiled by Fayazi and Orpen in 1989.

The information published on the 1:500 000 hydrogeological map – 2127 Messina (2002), indicate that the regional Geohydrological attributes of the area are clearly a function of the geological host matrix distribution. The groundwater in the area primarily occurs within the fractured and weathered zones or in joints and fractures of the competent arenaceous rocks, related to tensional and compressional stresses and offloading. Groundwater also occurs along the sedimentary contacts. The borehole yield potential of the Ecca Group (Pe) and differential Ecca and Clarens Formation (Pe-Trc) is classified as b3 in the 1:500
000 hydrogeological map, indicating that an average borehole yield in the group ranges between 0.5 and 2.0 l/s.

6.2.7.1.1 Hydraulic testing
Hydraulic tests were undertaken to determine the in-situ hydraulic parameters of the hydrostratigraphic units underlying the area. The hydraulic test was comprised of the test pumping of existing boreholes and slug testing of the exploration core boreholes. These tests were undertaken by Golder in 2012.

6.2.7.1.2 Slug test in the exploration core boreholes
The slug test involved positive displacement of water by injecting a known volume of water into the identified exploration and using the rate at which the water levels returns to its undisturbed state to determine the hydraulic conductivity. The hydraulic conductivity values were determined using the Bouwer and Rice (1976) method.

Slug tests were performed on open exploration core boreholes with a nominal inside diameter of 150 mm. A total 14 exploration core boreholes and one monitoring borehole (H18-1522) were tested and their details are presented in Table 1 together with the estimated hydraulic conductivity (k).

Table 8: Summary of the slug testing programme

<table>
<thead>
<tr>
<th>Site ID</th>
<th>GPS Coordinates WGS 84</th>
<th>Depth (mbgl)</th>
<th>Water level (mbgl)</th>
<th>Est. hydraulic Conductivity (m/d)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Latitude</td>
<td>Longitude</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BGAC-6</td>
<td>22.72335</td>
<td>29.51875</td>
<td>106</td>
<td>45.1</td>
</tr>
<tr>
<td>BGAC-7</td>
<td>22.73469</td>
<td>29.49068</td>
<td>71</td>
<td>45.9</td>
</tr>
<tr>
<td>BGAC-8</td>
<td>22.73755</td>
<td>29.46358</td>
<td>60</td>
<td>33.4</td>
</tr>
<tr>
<td>BGAC-9</td>
<td>22.73761</td>
<td>29.46354</td>
<td>69.1</td>
<td>33.5</td>
</tr>
<tr>
<td>BGAC-10</td>
<td>22.72035</td>
<td>29.48618</td>
<td>66</td>
<td>44</td>
</tr>
<tr>
<td>BGAC-11</td>
<td>22.72082</td>
<td>29.46679</td>
<td>-</td>
<td>26.3</td>
</tr>
<tr>
<td>BGAC-12</td>
<td>22.72716</td>
<td>29.47307</td>
<td>-</td>
<td>29.4</td>
</tr>
<tr>
<td>BGAC-13</td>
<td>22.68617</td>
<td>29.51700</td>
<td>-</td>
<td>32.7</td>
</tr>
<tr>
<td>BGAC-14</td>
<td>22.69107</td>
<td>29.53883</td>
<td>-</td>
<td>32.7</td>
</tr>
<tr>
<td>BGAC-15</td>
<td>22.67328</td>
<td>29.53076</td>
<td>-</td>
<td>18.8</td>
</tr>
<tr>
<td>BGAC-16</td>
<td>22.73403</td>
<td>29.45369</td>
<td>91.6</td>
<td>20.4</td>
</tr>
<tr>
<td>BGAC-17</td>
<td>22.72931</td>
<td>29.50428</td>
<td>-</td>
<td>24.1</td>
</tr>
<tr>
<td>BGAC-19</td>
<td>22.70953</td>
<td>29.54431</td>
<td>-</td>
<td>47.4</td>
</tr>
<tr>
<td>BGAC-21</td>
<td>22.71692</td>
<td>29.53894</td>
<td>-</td>
<td>39</td>
</tr>
<tr>
<td>H18-1522</td>
<td>22.72976</td>
<td>29.53827</td>
<td>-</td>
<td>55.9</td>
</tr>
</tbody>
</table>

The hydraulic conductivity of the tested areas ranges between 0.00025 and 1.38 m/d indicating a low to very high permeability (Table above). Corehole BGAC-19 was drilled through a very high permeability
zone with an estimated hydraulic conductivity of 1.38 m/d. Core boreholes, BGAC-9 and BGAC-10, were drilled through a moderate permeable zone with estimated hydraulic conductivities of 0.11 and 0.14 m/d, respectively. The moderate to high hydraulic conductivities in core boreholes, BGAC-19, BGAC-9 and BGAC-10, indicate the high permeability of the fractured bedrock aquifer system and the less permeable weathered aquifer system. The low to very low hydraulic conductivities reported in other tested core boreholes suggest that the bedrock matrix is absence or the fracturing is less or very tight.

Figure 32: Sampled Boreholes

No consistent groundwater monitoring is being undertaken in the area, currently. No samples were collected and analysed in the area prior to the hydrogeological investigations by Golder in 2012. Therefore, the baseline groundwater quality is based on data obtained from water samples collected from the existing groundwater supply boreholes by Golder (2012) and Naledzi (2016). A total of 21 boreholes were sampled by Golder in 2012. Naledzi only sampled eight boreholes which were in use and pumping during the site visit. The samples were submitted to UIS Laboratories in Pretoria and Capricorn Veterinary Laboratories for analysis. The analytical results for the samples collected by Naledzi were still pending during the compilation of this report, therefore, only Golder water quality data was used to define the baseline groundwater quality in the area.
The groundwater quality information for the Berenice Coal Project was compiled to characterise the groundwater condition in the area before mining begins. The water quality gathered in this study will form part of the baseline water quality condition to be used as reference in assessing possible groundwater contamination emanating from mining activities in the future. Note the water quality presented here is a ‘snap shot’ and variability of the water quality should be established prior to mining.

6.2.7.2 Aquifers
Golder (2012) analysed the pump testing data and geological settings of the area to determine the occurrence of groundwater and to assess the types of aquifer systems that occur in the area. This analysis revealed that there are two dominant aquifer types that occur in the area, the secondary fractured aquifer system and secondary intergranular and fractured aquifer systems associated with the geological formations. The analysis of core logs revealed that the aquifer system in the area can be divided into three aquifer systems as follows.

6.2.7.3 Shallow weathered aquifer system
This is the predominant aquifer system present within the project area and is laterally extensive, occurring in the shallow weathered zone and weathering related fractured zone. This aquifer extends across the entire extent of the project area and ranges between 5 and 26 mbgl. This is a minor aquifer system and water drains through into the underlying aquifer systems. It is unconfined to semi-confined in nature and highly susceptible to surface induced activities and impacts.

6.2.7.4 Secondary intergranular and fractured aquifer system
This is the predominant and major aquifer system in the area. This aquifer system is laterally extensive occurring between the shallow weathered aquifer system and the underlying fractured aquifer system. The aquifer system is comprised of fractured zone overlain by varying thicknesses of weathered saturated materials. The groundwater storage and flow is controlled by the fractures that again act as conduits during abstraction and vertical recharge from intergranular zone.

6.2.7.5 Secondary fractured aquifer system
The localized fractured aquifers systems are restricted to the contact zones between the fault zone and contacts between the sedimentary sequences. Although these aquifer systems may be high yielding, they have limited storage capacity and recharge. Most of groundwater in the fractured aquifer system is
drained laterally from the storage within the overlying shallow weathered and intergranular and fractured aquifer systems.

### 6.2.7.6 Groundwater levels and flow

No consistent groundwater monitoring is being undertaken in the area and no water level data was available for the area until Golder conducted a hydrogeological investigation in 2012. The project baseline groundwater level is based on data obtained from:

- Water levels as measured in the existing boreholes and core boreholes by Golder 2012;
- Water levels as measured in the existing boreholes and core boreholes by Naledzi 2016.

The groundwater elevation in the Berenice Coal Project area ranges between 667 and 700 mamsl with an average of 680 mamsl. The depth to the groundwater level is generally increasing with an increase in distance from the Brak River, therefore, the groundwater flow directions is towards the River, suggesting that Brak is a gaining stream.

To assess the groundwater flow systems in the area, the water elevations were plotted against topography elevations. Two distinct sets of water elevations were identified from the collected data, the shallow weathered aquifer system characterised by water levels shallower than 26 mbgl and a ‘deeper system’ with water level deeper than 26 mbgl.

The figure below shows the correlation between groundwater and topography elevations in the shallow weathered system. There is a good correlation between topography and groundwater elevations in the shallow aquifer system, suggesting unconfined aquifer conditions and the groundwater mimics the topography.
6.2.8 Groundwater supply potential

Universal Coal appointed Golder in 2012 and Naledzi in 2016 to undertake a preliminary hydrogeological investigation aimed at assessing the groundwater supply potential from the existing boreholes within the project area. Apart from the groundwater supply option, Universal coal also requested Golder to assess the surface water supply options. The indicated water demand for the planned mining operation was estimated at 3 to 5 Ml/day.

The groundwater potential, to supply the mine with its process water and domestic use, was evaluated from the pumping tests completed by Golder in 2012. The study concluded that the groundwater resources within the Brak River – Berenice Groundwater Management Unit should be considered as a viable water supply option for the planned mine operations. The study also indicated that an estimated volume of 1.1 Ml/day should be developed within the Berenice project area. To meet the estimated water demand for the mine operations, additional groundwater sources should be developed along the Waterpoort – Alldays road (referred as T2 by Golder).
6.2.9 Heritage

In terms of section 38 of the National Heritage Resources Act, 1999 (Act no. 25 of 1999), a comprehensive heritage impact assessment (HIA) investigation in accordance with the provisions of Sections 38(1) and 38(3) of the said act and focuses on the survey results from a cultural heritage survey. The HIA study was undertaken in order to establish if any localities of heritage significance were present on the property.

6.2.9.1 Baseline heritage
Generally very little is known about the archaeological sites in the specific region of the study area. Although several hill-top Venda settlements are known further to the east, no such sites were recorded during the survey. In addition, although several surface scatters of Later Stone Age (LSA) and Middle Stone Age (MSA) artefacts were noted no substantial manufacturing/knapping sites with at least a low density concentration, were recorded in the survey area.

During the survey a Late Iron Age cattle kraal outpost was recorded (Site 9) which is probably associated with other Venda settlements in the region. A total of 4 historical farm workers house complexes were noted (Sites 1, 8, 12 and 15). Site 3 is a water furrow that was used to irrigate the agricultural lands. Also note that a total of three farmhouse complexes were recorded (Sites 5, 10 and 11) but they are probably not older than 60 years and/or do not have any cultural significance (also see Site 4, which is associated infrastructure). The trading outpost is one of the more significant sites recorded during the survey (Site 13), moreover there is also the possibility that at least another four graves may be associated with the site. A total of four grave sites were also recorded (Sites 2, 6, 7 and 14) (for more details see the HIA specialist report).

Please note that no Stone Age settlements, structures, features, assemblages or artefacts concentrations were recorded during the survey. Also, due to the nature of the topography and openness of the region no rock art sites were recorded.

6.2.9.2 Observations
A total of 15 sites were recorded ranging from a Late Iron Age cattle outpost (Site 9), several farm worker house complexes (Sites 1, 8, 12 and 15), four individual grave and graveyard sites (Sites 2, 6, 7 and 14), a historic trade store (Site 13) situated along an existing ox wagon trade route and to the more recent farmhouse complexes and associated infrastructure (Sites 4, 10 and 11).
Figure 34: location of the recorded cultural heritage sites within the survey area
Figure 35: Detail of the location of heritage sites in the southern section of the survey area

Figure 36: Detail of the location of heritage sites in the northern section of the survey area

As a result please note the following recommendations:

• A destruction permit will have to be applied for from SAHRA for the farm worker house complexes (Sites 1, 8, 12 and 15);
• The site of the historic trade store (Site 13) and Late Iron Age cattle kraal settlement (Site 9) will have to be surveyed and mapped (Phase 2); then an application submitted for a destruction permit from SAHRA;
• The individual graves and graveyards (Sites 2, 6, 7 and 14) will require a Phase 2 investigation (exhumation and reburial).

Overall, the site was given a Grade III (B) field rating, and as such it is recommended that the burial must be fenced off and that a site management plan is to be implemented. From the heritage point should the
right be granted a go ahead, the aforementioned recommendations are adhered to by the developer during the construction phase of the project.

6.2.10 Socio economic

The total population of Makhado has increased by about from 495 261 to 516 031 in 2011 (Based on the 2011 census outcome). The number of households have increased from 108 978 to 134 889 households (Census 2011) with about 225 059 registered voters. Females constitute 54% (279,326) of the population compared to males who constitute 46% (236,759) of Makhado population. In terms of the population groups, Black Africans comprises the majority of the population with 97.30% followed by Whites at 2%, Asians/Indians 0.35% and Coloured 0.21%. Makhado has a population growth of 0.43 per annum.

The population growth statistics for the local municipality are presented in the graph below.

![Population Growth](chart1.png)

*Chart 1: Population Growth*

The population has a youthful age structure and the immediate significance of this young age structure is that the population will grow rapidly in future and this implies a future high growth rate in the labour
force. At present, the local economy is unable to provide sufficient employment opportunities to meet the needs of the economically active population. A youthful population structure also implies a relatively higher dependency ratio.

Education

In 2011, approximately 11% of the population over 20 years of age had attained some form of primary education. At least 19% of people have had no schooling, 22% people have a Grade 12 education, and 9% people have attained a higher education. This analysis reveals that the population in Makhado is most heavily weighted towards high school education.

Economic Profile

Makhado has the second biggest economy in Vhembe District. The sector, which contributed the most to the GVA in Makhado Municipality, is the Community Services (33%) followed by the Finance Sector (26%) and Trade Sector (15%). This shows the same trend as in the Limpopo Province where Mining is by far the largest contributor to the GVA. The contribution of Agriculture to the GVA has grown more on Provincial and District level than on National level. The mining sector has grown on National level as well as on District level while the manufacturing sector has grown slightly less on regional level.

Community service and trade sectors are the predominant employers within the study area, responsible for just over 27% and 19% of the active work force respectively. Agriculture is the third largest employer absorbing around 17% followed by the construction sector (8%), finance (5%), transport (5%), manufacturing (5%), and mining (1%).

Employment Status

The Municipality has an Economically Active Population (EAP) of 124,473 which represent about 24.12% of the entire population of Makhado. In recent years, in common with the provincial and district economies, the Municipality has experienced an increase in overall employment levels. The total number of employed people is 78,768 (63%) of the EAP and the total number of unemployed persons is 45,705 (36.7%) of the EAP. The unemployment rate in Makhado has decreased by 8.2% in recent years (from 44.9% in 1996 to 36.70% in 2011). The unemployment rate for Limpopo as a whole has also decreased by 6.1% in the same period (from 45.1% to 39%).
The unemployment rate amongst the youths (15-34 years) has also declined from 62.30% in 2001 to 49.60% in 2011, but it remains very high.

*Source: Census 2011, Statistics South Africa (2012)

Chart 2: Employment Levels
7 ENVIRONMENTAL IMPACT ASSESSMENT

7.1 Assessment Criteria
The assessment of the impacts will be conducted according to a synthesis of criteria required by the integrated environmental management procedure.

7.1.1 Extent
The physical and spatial scale of the impact is classified as:

a) Footprint
   The impacted area extends only as far as the activity, such as footprint occurring within the total site area.

b) Site
   The impact could affect the whole, or a significant portion of the site.

c) Regional
   The impact could affect the area including the neighbouring properties, the transport routes and the adjoining towns.

d) National
   The impact could have an effect that expands throughout the country (South Africa).

e) International
   Where the impact has international ramifications that extent beyond the boundaries of South Africa.

7.1.2 Duration
The lifetime of the impact, that is measured in relation to the lifetime of the proposed development.

a) Short term
   The impact would either disappear with mitigation or will be mitigated through natural processes in a period shorter than that of the construction phase.

b) Short to Medium term
   The impact will be relevant through to the end of the construction phase.

c) Medium term
The impact will last up to the end of the development phases, where after it will be entirely negated.

d) Long term
The impact will continue or last for the entire operational lifetime of the development, but will be mitigated by direct human action or by natural processes thereafter.

e) Permanent
This is the only class of impact, which will be non-transitory. Mitigation either by man or natural process will not occur in such a way or in such a time span that the impact can be considered transient,

7.1.3 Intensity

The intensity of the impact is considered by examining whether the impact is destructive or benign, whether it destroys the impacted environment, alters its functioning, or slightly alters the environment itself. The intensity is rated as:

a) Low
The impact alters the affected environment in such a way that the natural processes or functions are not affected.

b) Medium
The affected environment is altered, but functions and processes continue, albeit in a modified way.

c) High
Function or process of the affected environment is disturbed to the extent where it temporarily or permanently ceases.

7.1.4 Probability

This describes the likelihood of the impacts actually occurring. The impact may occur for any length during the life cycle of the activity, and not at any given time. The classes are rated as follows:

a) Impossible
The possibility of the impact occurring is none, due either to the circumstances, design or experience. The chance of this impact occurring is zero (0%).
b) Possible
The possibility of the impact occurring is very low, due either to the circumstances, design or experience. The chances of this impact occurring is defined as 25%.

c) Likely
There is a possibility that the impact will occur to the extent that provisions must therefore be made. The chances of this impact occurring is defined as 50%.

d) Highly likely
It is most likely that the impacts will occur at some stage of the development. Plans must be drawn up before carrying out the activity. The chances of this impact occurring is defined as 75%.

e) Definite
The impacts will take place regardless of any provisional plans, and or mitigation actions or contingency plans to contain the effect can be relied on. The chance of this impact occurring is defined as 100%.

7.1.5 Mitigation
The impacts that are generated by the development can be minimised if measures are implemented in order to reduce the impacts. The mitigation measures ensure that the development considers the environment and the predicted impacts in order to minimise impacts and achieve sustainable development.

7.2 Determination of significance – Without Mitigation
Significance is determined through a synthesis of impacts as described in the above paragraphs. It provides an indication of the importance of the impact in terms of both tangible and intangible characteristics. The significance of the impact “without mitigation” is the prime determinant of the nature and degree of mitigation required. Where the impact is positive, significance is noted as “positive”. Significance is rated on the following scale:

a) No significance
The impact is not substantial and does not require any mitigation action.

b) Low
The impact is of little importance, but may require limited mitigation.

c) Medium
The impact is of importance and is therefore considered to have a negative impact. Mitigation is required to reduce the negative impacts to acceptable levels.

d) High
The impact is of major importance. Failure to mitigate, with the objective of reducing the impact to acceptable levels, could render the entire development option or entire project proposal unacceptable. Mitigation is therefore essential.

7.3 Determination of significance – With Mitigation

Determination of significance refers to the foreseeable significance of the impact after the successful implementation of the necessary mitigation measures. Significance with mitigation is rated on the following scale:

a) No significance
The impact will be mitigated to the point where it is regarded as insubstantial.

b) Low
The impact will be mitigated to the point where it is of limited importance.

c) Low to Medium
The impact is of importance however, through the implementation of the correct mitigation measures such potential impacts can be reduced to acceptable levels.

d) Medium
Notwithstanding the successful implementation of the mitigation measures, to reduce the negative impacts to acceptable levels, the negative impact will remain of significance. However, taken within the overall context of the project, the persistent impact does not constitute a fatal flaw.

e) Medium to High
The impact is of major importance but through the implementation of the correct mitigation measures, the negative impacts will be reduced to acceptable levels.

f) High
The impact is of major importance. Mitigation of the impact is not possible on a cost-effective basis. The impact is regarded as high importance and taken within the overall context of the project, is regarded as a fatal flaw. An impact regarded as high significance, after mitigation could render the entire development option or entire project proposal unacceptable.
7.3.1 Assessment weighting

Each aspect within the impact description was assigned a series of quantitative criteria. Such criteria are likely to differ during the different stages of the project’s life cycle. In order to establish a defined base upon which it becomes feasible to make an informed decision, it is necessary to weigh and rank all criteria.

7.3.2 Ranking, Weighting and Scaling

For each impact under scrutiny, a scale weighting Factor is attached to each respective impact (refer to Figure 37: Description of biophysical assessment parameters with its respective weighting). The purpose of assigning such weight serve to highlight those aspects considered most critical to the various stakeholders and ensure that each specialist’s element of bias is taken into account. The weighting factor also provides a means whereby the impact assessor can successfully deal with the complexities that exist between the different impacts and associated aspects criteria.

Simply, such a weighting factor is indicative of the importance of the impact in terms of the potential effect that it could have on the surrounding environment. Therefore, the aspects considered to have a relatively high value will score a relatively higher weighting than that which is of lower importance.

<table>
<thead>
<tr>
<th>Extent</th>
<th>Duration</th>
<th>Intensity</th>
<th>Probability</th>
<th>Weighting Factor (WF)</th>
<th>Significance Rating (SR)</th>
<th>Mitigation Efficiency (ME)</th>
<th>Significance Following Mitigation (SM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site</td>
<td></td>
<td></td>
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<tr>
<td>Regional</td>
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<tr>
<td>National</td>
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</tr>
</tbody>
</table>

Figure 37: Description of biophysical assessment parameters with its respective weighting

7.3.3 Identifying the Potential Impacts without Mitigation (WOM)

Following the assignment of the necessary weights to the respective aspects, criteria are summed and multiplied by their assigned weightings, resulting in a value for each impact (prior to the implementation of mitigation measures).

Equation 1:

Significance Rating (WOM) = (Extent + Intensity + Duration + Probability) x Weighting Factor
7.3.4 Identifying the Potential Impacts with Measures (WM)

In order to gain a comprehensive understanding of the overall significance of the impact, after implementation of the mitigation measures, it was necessary to re-evaluate the impact.

a) Mitigation Efficiency (ME)

The most effective means of deriving a quantitative value of mitigated impacts is to assign each significance rating value (WOM) a mitigation effectiveness (ME) rating. The allocation of such a rating is a measure of the efficiency and effectiveness, as identified through professional experience and empirical evidence of how effectively the proposed mitigation measures will manage the impact.

Thus, the lower the assigned value the greater the effectiveness of the proposed mitigation measures and subsequently, the lower the impacts with mitigation.

Equation 2:

\[
\text{Significance Rating (WM)} = \text{Significance Rating (WOM)} \times \text{Mitigation Efficiency}
\]

Or

\[
\text{WM} = \text{WOM} \times \text{ME}
\]

b) Significance Following Mitigation (SFM)

The significance of the impact after the mitigation measures are taken into consideration. The efficiency of the mitigation measure determines the significance of the impact. The level of impact is therefore seen in its entirety with all considerations taken into account.

7.3.5 Impacts identified

A number of negative impacts on the bio-physical environment will result from disturbances during mining. The significance of any potential impact is largely limited by the small physical size and short duration of the mining, but also by the sensitivity of the receiving environment or receptor(s).

Potential impacts resulting from the proposed project were identified using input from the following:

- Views of I&APs;
- Specialist Studies
- Existing information;
• Site visit with the project team and
• Legal and policy requirements that need to be fulfilled for the proposed project

The following potential impacts were identified:
• Ground and surface water contamination;
• Geology, soil and land capability;
• Socio-economic issues;
• Waste products;
• Floral and faunal displacement;
• Dust and noise impacts;
• Traffic; and
• Identified heritage sites.

The primary environmental impacts associated with coal mining detailed in this report are related to: loss of soil, dust emissions, produced water, and surface water contamination. Wetlands and watercourses of the region are important and valuable because of the large volume and high quality of the surface water they generate and the habitat they provide, amongst others. Mining poses risks to these resources through contamination, sediment loads, water consumption (dewatering) and vegetation loss. The impact is largely mitigated by operational practices (drip trays, bunds, and container water storage units) and responsive management (safe waste storage and disposal, spill response). Restricting mining activities to further than 100 m from all watercourses largely eliminates the risk. Vehicles should not enter or cross water courses except on established roads.

All produced water must be stored in impervious containers until its quality is determined by laboratory analysis. In portions of the mining area where mining occurred testing the surface water and groundwater during prior and during mining will set monitoring parameters of the activities. The best practicable environmental option for the management of produced water can only be determined once its quality is known. Produced water may only be utilised for activities for which the quality is suitable (as defined by the DWAF Water Use Guidelines and SANS 241). If unsuited for use or release then the produced water will need to be treated or disposed of. With these management measures in place no significant impacts are anticipated. The volume of water produced and stored on surface must remain within the limits of the DWS GAs or a WUL must be obtained.
Mining activity will preclude the current land use for the duration of the mining and testing period. Any use of land for mining activities will be done through an Access Agreement negotiated between the mining right holder and the land owner/occupier. Each land owner will have a direct say in where the mining site is placed on their land. Thus conflicting land uses and activities that disturb key agricultural activities can largely be avoided. Where the mining activities prevent productive agriculture or land use from taking place, the owner must be compensated appropriately.

Localised compaction and soil erosion is highly likely due to heavy vehicle movement. Small scale and isolated spillages of hydrocarbons or chemicals will occur but can generally be prevented or treated in-situ with a suitable remediation product.

Wear and tear or accidental damage to private infrastructure could result. The use of any existing infrastructure or placement of new infrastructure will be through an access agreement negotiated between the mining right holder and the land owner/occupier. Thus the land owner will have a direct say in which infrastructure is used. If there are any damages Berenice Mine will be responsible for effecting satisfactory repairs for any damages.

Sensitive sites will be identified by the National Protected Area Expansion Strategy (NPAES), Threatened Ecosystems, Provincial Biodiversity Conservation Plan and Birdlife’s Important Bird Areas programme. Land use transformation is one of the key risks to the grassland habitat and has significant influence on the habitat quality, occurrence of species of conservation concern and ecosystem services provided. Mining will result in the disturbances to vegetation and could affect habitat quality. The scale of physical disturbances to the land surface is expected to be medium to high given the nature of the type of mining. No mining may take place within protected areas as defined in terms of the NEMPAA and in indigenous vegetation in areas of potential high biodiversity sensitivity.

The EMP defines the categories of biodiversity sensitivity in which mining may not be undertaken. Every potential site must be subjected to an Environmental Site Assessment by an independent Environmental Scientist.

Public access the mining area must be prevented and must be secure and provisioned with warning signage in appropriate languages. Open excavations must be fenced. Livestock must not be allowed to gain entry to the mine site or any of the mining equipment or materials. All gates on a property must be kept in the status as agreed with the land owner and livestock must not be allowed to escape.
Safety and security on farms is an acknowledged concern. Additional access points to farms and unfamiliar persons in the district could increase the risks. Access for mining must not be allowed to compromise safety and security. Mining personnel may only access farms in terms of an access agreement negotiated with the land owner/occupier. Where appropriate the access points to a farm must be fitted with locks. Mining personnel must report unknown persons on the property to the land owner.

Veld fires and resulting damages to assets are a high risk as the area has high fuel loads and experiences windy conditions. With planning, risks assessments, site management and emergency procedures in place the risk can be greatly reduced can be prevented. Specific measures may be required at each mining block site and these must be set out in the EMP.

Mining activities will provide employment opportunities and some stimulation of the local economy through the purchase of supplies and equipment. The applicant must, wherever possible, source the materials and equipment needed to operate the mining equipment and sustain the personnel locally. The employment and training of local persons, particularly HDIs, even for short-term jobs, should be prioritised by Berenice Mine and all of their sub-contractors.

**Impact statement**

The following key issues and potential impacts (direct and cumulative), have been identified during the Scoping phase, which will together with potential cumulative impacts, be assessed during the Environmental Impact Assessment phase of the project and appropriate mitigation measures to reduce the identified impacts will be proposed.

**Potential Direct Impacts identified**

<table>
<thead>
<tr>
<th>IMPACT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SURFACE WATER</strong></td>
</tr>
<tr>
<td>Alteration of the characteristics of a water resource</td>
</tr>
<tr>
<td>Hydrological modification on storm water flow and watercourses.</td>
</tr>
<tr>
<td>Deterioration of water quality</td>
</tr>
<tr>
<td>The impact on ground and surface water by migration of contaminated water from the construction and operational phases.</td>
</tr>
<tr>
<td>Impacts on surface water during the construction and operational phases.</td>
</tr>
<tr>
<td><strong>GROUNDWATER</strong></td>
</tr>
<tr>
<td>Impact on dewatering of the groundwater aquifer due to mining activities- Mining</td>
</tr>
<tr>
<td>IMPACT</td>
</tr>
<tr>
<td>--------</td>
</tr>
<tr>
<td>IMPACT</td>
</tr>
<tr>
<td>IMPACT</td>
</tr>
<tr>
<td>AIR QUALITY</td>
</tr>
<tr>
<td>SOIL, GEOLOGY AND MINERAL RESOURCE</td>
</tr>
<tr>
<td>SOIL, GEOLOGY AND MINERAL RESOURCE</td>
</tr>
<tr>
<td>SOIL, GEOLOGY AND MINERAL RESOURCE</td>
</tr>
<tr>
<td>TOPOGRAPHY</td>
</tr>
<tr>
<td>ECOLOGICAL</td>
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<tr>
<td>ECOLOGICAL</td>
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<tr>
<td>ECOLOGICAL</td>
</tr>
<tr>
<td>VISUAL</td>
</tr>
<tr>
<td>SOCIO-ECONOMIC</td>
</tr>
<tr>
<td>HERITAGE</td>
</tr>
</tbody>
</table>
### Potential Cumulative Impacts identified

<table>
<thead>
<tr>
<th>IMPACT</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TRAFFIC</strong></td>
<td>Increased traffic volumes within the mine and surrounding communities. (medium)</td>
</tr>
<tr>
<td><strong>AIR QUALITY</strong></td>
<td>Decrease in air quality in the immediate surroundings of the mining site (high)</td>
</tr>
<tr>
<td><strong>HYDROLOGICAL</strong></td>
<td>Cumulative loss of surface water functionality as a result of an increase in pollutants.</td>
</tr>
<tr>
<td></td>
<td>Cumulative impact of hydrological modifications</td>
</tr>
<tr>
<td><strong>ECOLOGICAL</strong></td>
<td>Cumulative destruction of sensitive habitat.</td>
</tr>
<tr>
<td></td>
<td>Cumulative impact of faunal habitat and displacement.</td>
</tr>
<tr>
<td></td>
<td>Cumulative impact on natural migratory routes and faunal dispersal patterns.</td>
</tr>
<tr>
<td><strong>VISUAL</strong></td>
<td>Cumulative impact of visual disturbances</td>
</tr>
<tr>
<td><strong>NOISE, VIBRATION AND SHOCK</strong></td>
<td>Cumulative impact of construction and operational noise as well as noise due to mining heavy vehicle movement</td>
</tr>
<tr>
<td></td>
<td>Cumulative impact of vibration and shocks.</td>
</tr>
<tr>
<td><strong>SOCIO-ECONOMICAL</strong></td>
<td>Postivie - Cumulative impact of development on the surrounding communities.</td>
</tr>
</tbody>
</table>
IMPACT

Positive - Cumulative impact of development on the economic environment.

Positive - Cumulative impact of the employment opportunities provided.

This section provides a list of potential impacts on environmental aspects separately in respect of each of the main project actions / activities and processes. The potential impacts are presented for each of the project phases in tabular format.

**Table 9: List of Potential Impacts**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Phase</th>
<th>Potential impacts (unmitigated)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site preparation</td>
<td>Construction</td>
<td>Physical destruction and disturbance of biodiversity</td>
</tr>
<tr>
<td></td>
<td>Operation</td>
<td>Air pollution</td>
</tr>
<tr>
<td></td>
<td>Decommissioning</td>
<td>Disturbing noise</td>
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<tr>
<td></td>
<td></td>
<td>Visual impacts</td>
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<tr>
<td></td>
<td></td>
<td>Loss of soil resources and land capability</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pollution of surface water resources</td>
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<tr>
<td></td>
<td></td>
<td>Contamination of groundwater</td>
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<td></td>
<td></td>
<td>Dewatering impacts</td>
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<tr>
<td></td>
<td></td>
<td>Air pollution</td>
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<tr>
<td></td>
<td></td>
<td>Disturbing noise</td>
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<td></td>
<td></td>
<td>Visual impacts</td>
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<tr>
<td>Mining</td>
<td>Operation</td>
<td>Loss of soil resources and land capability</td>
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<tr>
<td></td>
<td></td>
<td>Physical destruction and disturbance of biodiversity</td>
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<tr>
<td></td>
<td></td>
<td>Pollution of surface water resources</td>
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<td>Contamination of groundwater</td>
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<td>Dewatering impacts</td>
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<td>Air pollution</td>
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<td></td>
<td></td>
<td>Disturbing noise</td>
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<tr>
<td></td>
<td></td>
<td>Visual impacts</td>
</tr>
<tr>
<td>Water supply and use</td>
<td>Construction</td>
<td>Hazardous excavations during mining phase</td>
</tr>
<tr>
<td></td>
<td>Operation</td>
<td>Loss of soil resources and land capability</td>
</tr>
<tr>
<td></td>
<td>Decommissioning</td>
<td>Disturbance of biodiversity</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pollution of surface water resources</td>
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<tr>
<td></td>
<td></td>
<td>Alteration of natural drainage patterns</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Contamination of groundwater</td>
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<td></td>
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<td>Air pollution</td>
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<td>Visual impacts</td>
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<tr>
<td>Dirty water</td>
<td>Construction</td>
<td>Hazardous excavations during mining phase</td>
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<tr>
<td></td>
<td></td>
<td>Loss of soil resources and land capability</td>
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<tr>
<td></td>
<td></td>
<td>Disturbance of biodiversity</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pollution of surface water resources</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Alteration of natural drainage patterns</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Contamination of groundwater</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Air pollution</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Visual impacts</td>
</tr>
<tr>
<td>Management</td>
<td>Operation</td>
<td>Decommissioning</td>
</tr>
<tr>
<td>------------</td>
<td>-----------</td>
<td>-----------------</td>
</tr>
<tr>
<td>Collection, storage of dirty water for re-use, recycling</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Transport systems</th>
<th>Construction</th>
<th>Operation</th>
<th>Decommissioning</th>
<th>Loss of soil resources and land capability</th>
<th>Disturbance of biodiversity</th>
<th>Pollution of surface water resources</th>
<th>Alteration of natural drainage patterns</th>
<th>Contamination of groundwater</th>
<th>Disturbing noise</th>
<th>Traffic impacts</th>
<th>Visual impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use of access points, road transport to and from site for employees and supplies, movement within site boundary</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Site / contract management</th>
<th>Construction</th>
<th>Operation</th>
<th>Decommissioning</th>
<th>Closure</th>
<th>Management of the site plays a significant role in all identified impacts</th>
<th>Loss of soil resources and land capability</th>
<th>Disturbance of biodiversity</th>
<th>Pollution of surface water resources</th>
<th>Alteration of natural drainage patterns</th>
<th>Contamination of groundwater</th>
<th>Disturbing noise</th>
<th>Traffic impacts</th>
<th>Visual impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appointment of workers/contractors, site management (monitoring, inspections, maintenance, security, access control), awareness training, emergency response, implementing and maintaining programmes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rehabilitation</th>
<th>Construction</th>
<th>Operation</th>
<th>Decommissioning</th>
<th>Closure</th>
<th>Loss of soil resources and land capability</th>
<th>Disturbance of biodiversity</th>
<th>Pollution of surface water resources</th>
<th>Alteration of natural drainage patterns</th>
<th>Contamination of groundwater</th>
<th>Air pollution</th>
<th>Disturbing noise</th>
<th>Visual impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Replacing soil, slope stabilization, landscaping, revegetation, restoration</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Maintenance and aftercare</th>
<th>Construction</th>
<th>Operation</th>
<th>Decommissioning</th>
<th>Closure</th>
<th>Loss of soil resources and land capability</th>
<th>Disturbance of biodiversity</th>
<th>Pollution of surface water resources</th>
<th>Air pollution</th>
<th>Visual impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inspection and maintenance of remaining facilities and rehabilitated areas</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
7.3.6  The positive and negative impacts that the proposed activity (in terms of the initial site layout) and alternatives will have on the environment and the community that may be affected.

During the EIA phase all potential negative and potential impact will be identified, ranked and mitigation measures will be prescribed.

7.3.7  The possible mitigation measures that could be applied and the level of risk.

During the EIA phase all possible impacts will be assessed and an EMP outlining the risk and mitigation measures will be compiled.

7.3.8  Final Site Layout Plan

The Final Layout Plan will be provided in the EIA/EMP after public consultation.

7.4  Plan of study for the Environmental Impact Assessment process

A plan of study for undertaking the environmental impact assessment process to be undertaken will include:

- a description of the alternatives to be considered and assessed within the preferred site, including the option of not proceeding with the activity;
- a description of the aspects to be assessed as part of the environmental impact assessment process;
- aspects to be assessed by specialists;
- a description of the proposed method of assessing the environmental aspects, including a description of the proposed method of assessing the environmental aspects including aspects to be assessed by specialists;
- a description of the proposed method of assessing duration and significance;
- An indication of the stages at which the competent authority will be consulted;
- particulars of the public participation process that will be conducted during the environmental impact assessment process; and
• a description of the tasks that will be undertaken as part of the environmental impact assessment process;

• Identify suitable measures to avoid, reverse, mitigate or manage identified impacts and to determine the extent of the residual risks that need to be managed and monitored.

The EIA phase will comprise of the following activities:

• Stakeholder Engagement;

• Assessing of Alternatives;

• Baseline and consideration of potential Specialist Studies;

• Identification of potential impacts

• Impact Assessment;

• Identification and Description of mitigation measures; and

• Reporting and decision-making.

7.4.1 Description of the aspects to be assessed as part of the environmental impact assessment process

The authorization process to be followed has been designed to meet the requirements of the MPRDA (Act 28 of 2002) and National Environmental Management Act (107/1998): Environmental Impact Assessment Regulations, 2014. The authorization process will include:

• Scoping Phase;

• Stakeholder Notification;

• Authority Consultation;

• Capturing of Issues and Concerns;

• Compilation of a Stakeholder Database;

• Identification of Potentially Significant Impacts;

• Identification of Potentially Sensitive Environmental Aspects;

• Identification of additional Specialist Studies;

• Compilation of a Scoping Report (this document), including:

• Plan of Study for EIA/EMP Amendment.

• Issues Report; and

• Stakeholder Review of Documentation;
- Submission and approval of Scoping Report by relevant authorities.
- Impact Assessment Phase:
  - Undertake necessary specialist studies;
  - Assessment of environmental impacts;
  - Compilation of management plans;
  - Compilation of an EMP Report;
  - Stakeholder document review and comment;
  - Submission of final report for decision-making.

The EMP Report will include a description of the proposed project, a list of identified environmental aspects that will potentially be impacted upon by the mining project, an Impact Assessment for these aspects, and an Environmental Management Programme for the mitigation and management of the identified impacts.

A plan of study for undertaking the environmental impact assessment process to be undertaken will include:

- a description of the alternatives to be considered and assessed within the preferred site, including the option of not proceeding with the activity;
- a description of the aspects to be assessed as part of the environmental impact assessment process;
- aspects assessed by specialists;
- a description of the proposed method of assessing the environmental aspects, including a description of the proposed method of assessing the environmental aspects including aspects to be assessed by specialists;
- a description of the proposed method of assessing duration and significance;
- An indication of the stages at which the competent authority will be consulted;
- particulars of the public participation process that will be conducted during the environmental impact assessment process; and
- a description of the tasks that will be undertaken as part of the environmental impact assessment process;
- Identify suitable measures to avoid, reverse, mitigate or manage identified impacts and to determine the extent of the residual risks that need to be managed and monitored.
Specialist Studies (Refer to Appendices)

In order to assess the environmental, social and cultural impacts of the proposed Berenice Mine, a number of specialist studies were commissioned. The findings of these studies will be incorporated into the Environmental Impact Assessment Report (EIR). The specialist studies consider the proposed structure and activities of the operations, as well as the associated risks to the receiving physical and socio-cultural environment.

The following aspects of the biophysical environment have been considered in the baseline studies:

- Surface Water and Groundwater;
- Floodlines;
- Noise;
- Air Quality;
- Vegetation and Fauna;
- Heritage and Archaeology;
- Traffic;
- Social Impact;
- Soil and land Capability;
- Visual Aspects.

These reports are available:

- via drop box link (https://www.dropbox.com/sh/dq24i49q79sfvxq/AADeCT4bAGMKzrzw-XNdFIm-a?dl=0); and
- on the SAHRA website.

7.4.2 Description of aspects to be assessed by specialists

- Air quality impact assessment;

Identification of existing sources of emissions in the region and the characterisation of existing ambient pollution concentrations is fundamental to the assessment of cumulative air impacts. A change in ambient air quality can result in a range of impacts, which in turn, may cause a disturbance to nearby receptors.

- Hydrological assessment;

Identification of catchment area, water sources impacting the project area as well as the potential impact of the mining activity on water quality.
Ecological Assessment;

Identification of flora and fauna and possible invasive species as part of the areas have been previously disturbed and agricultural activities were noted on the farms.

Social Impact Assessment;

The assessment of the possible socio-economic impact of the project area on the local and regional locality both negative and positive impacts are to be outlined.

Visual Impact Assessment;

Project-related activities have the potential to alter the landscape character of the site and surrounding area through the establishment of both temporary and permanent infrastructure. As a baseline, this section provides an understanding of the pre-mining visual character of the project area against which to measure potential change as a result of project infrastructure and activities.

Noise & Air Quality Impact;

Some of the noise generating activities associated with the project may cause an increase in ambient noise levels in and around the site. This may cause a disturbance to nearby receptors. As a baseline, this section provides a brief description of pre-mining conditions in the area from which to measure changes as a result of project-related noise.

Traffic Impact;

An increase in traffic on the existing roads and possible risks associated with the increased activities as well as the quality of the roads.

Heritage Impact assessment

Identification and Protection of Heritage and historical and land marks and mitigation measures if such artefacts are encountered during mining.

Soil and Land Capability

7.4.3 Proposed method of assessing the environmental aspects including the proposed method of assessing alternatives

Methodology for Assessing Environmental Issues and Alternatives
According to National Environmental Management Act (107/1998): Environmental Impact Assessment Regulations, 2014), the environment is described as the surrounding within which human exist and that are made up of:

(i) the land, water and atmosphere of the earth;
(ii) micro-organisms, plant and animal life;
(iii) any part or combination of (i) and (ii) and the interrelationships among and between them; and
(iv) the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.

**Impact Assessment Methodology**

(a) Nature of the impact

The NATURE of an impact can be defined as: “a *brief description of the impact being assessed, in terms of the proposed activity or project, including the socio-economic or environmental aspect affected by this impact*”.

(b) Extent of the impact

The EXTENT of an impact can be defined as: “a *brief description of the spatial influence of the impact or the area that will be affected by the impact*”.

<table>
<thead>
<tr>
<th>EXTENT</th>
<th>Footprint</th>
<th>Site</th>
<th>Local</th>
<th>Region</th>
<th>National</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spatial influence of impact</td>
<td>Only as far as the activity, such as footprint occurring within the total site area</td>
<td>Only the site and/or 500m radius from the site will be affected</td>
<td>Local area / district (neighbouring properties, transport routes and adjacent towns) is affected</td>
<td>Entire region / province is affected</td>
<td>Country is affected</td>
</tr>
</tbody>
</table>

(a) Magnitude of the impact
The MAGNITUDE of an impact can be defined as: “a brief description of the intensity or amplitude of the impact on socio-economic or environmental aspects”.

<table>
<thead>
<tr>
<th>MAGNITUDE</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zero</td>
<td>Natural and/or social functions and/or processes remain unaltered</td>
</tr>
<tr>
<td>Very low</td>
<td>Natural and/or social functions and/or processes are negligibly altered</td>
</tr>
<tr>
<td>Low</td>
<td>Natural and/or social functions and/or processes are slightly altered</td>
</tr>
<tr>
<td>Medium</td>
<td>Natural and/or social functions and/or processes are notably altered</td>
</tr>
<tr>
<td>High</td>
<td>Natural and/or social functions and/or processes severely altered</td>
</tr>
</tbody>
</table>

(b) Duration of the impact

The DURATION of an impact can be defined as: “a short description of the period of time the impact will have an effect on aspects”.

<table>
<thead>
<tr>
<th>DURATION</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short term</td>
<td>Construction phase up to 3 years after construction</td>
</tr>
<tr>
<td>Medium term</td>
<td>Up to 6 years after construction</td>
</tr>
<tr>
<td>Long term</td>
<td>More than 6 years after construction</td>
</tr>
</tbody>
</table>

(c) Probability of the impact occurring

The PROBABILITY of an impact can be defined as: “the estimated chance of the impact happening”.

<table>
<thead>
<tr>
<th>PROBABILITY</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unlikely</td>
<td>Unlikely to occur (0 – 25% probability of occurring)</td>
</tr>
<tr>
<td>Possible</td>
<td>May occur (26 – 50% chance of occurring)</td>
</tr>
<tr>
<td>Probable</td>
<td>Likely to occur (51 – 75% chance of occurring)</td>
</tr>
<tr>
<td>Definite</td>
<td>Will certainly occur (76-100% chance of occurring)</td>
</tr>
</tbody>
</table>

(d) Degree to which impact can be reversed
The REVERSABILITY of an impact can be defined as: “the ability of an impact to be changed from a state of affecting aspects to a state of not affecting aspects”.

<table>
<thead>
<tr>
<th>REVERSABILITY</th>
<th>Reversible</th>
<th>Irreversible</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impacts can be reversed through the implementation of mitigation measures</td>
<td>Impacts are permanent and can’t be reversed by the implementation of mitigation measures</td>
<td></td>
</tr>
</tbody>
</table>

(e) Degree to which impact may cause irreplaceable loss of resources

The IRREPLACEABILITY of an impact can be defined as: “the amount of resources that can (not) be replaced”.

<table>
<thead>
<tr>
<th>IRREPLACEABILITY</th>
<th>No loss</th>
<th>Low</th>
<th>Medium</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Irreplaceable loss of resources</td>
<td>No loss of any resources</td>
<td>Marginal loss of resources</td>
<td>Significant loss of resources</td>
<td>Complete loss of resources</td>
</tr>
</tbody>
</table>

(f) Degree to which the impact can be mitigated

The degree to which an impact can be MITIGATED can be defined as: “the effect of mitigation measures on the impact and its degree of effectiveness”.

<table>
<thead>
<tr>
<th>MITIGATION RATING</th>
<th>MITIGATED</th>
<th>High</th>
<th>Medium</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degree impact can be mitigated</td>
<td>Impact 100% mitigated</td>
<td>Impact &gt;50% mitigated</td>
<td>Impact &lt;50% mitigated</td>
<td></td>
</tr>
</tbody>
</table>

(g) Confidence rating
CONFIDENCE in the assessment of an impact can be defined as the: “level of certainty of the impact occurring”.

<table>
<thead>
<tr>
<th>CONFIDENCE RATING</th>
<th>CONFIDENCE</th>
<th>Unsure</th>
<th>Sure</th>
<th>Certain</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Amount of information on and/or understanding of the environmental factors the potentially influence the impact is <em>limited</em>.</td>
<td>Amount of information on and/or understanding of the environmental factors the potentially influence the impact is <em>reasonable and relatively sound</em>.</td>
<td>Amount of information on and/or understanding of the environmental factors the potentially influence the impact is <em>unlimited and sound</em>.</td>
</tr>
</tbody>
</table>

(h) Cumulative impacts

The effect of CUMULATIVE impacts can be described as:” the effect the combination of past, present and “reasonably foreseeable” future actions have on aspects”.

<table>
<thead>
<tr>
<th>CUMULATIVE RATING</th>
<th>CUMULATIVE EFFECTS</th>
<th>Low</th>
<th>Medium</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td><em>Minor cumulative effects</em></td>
<td><em>Moderate cumulative effects</em></td>
<td><em>Significant cumulative effects</em></td>
</tr>
</tbody>
</table>

7.4.4 The stages at which the competent authority will be consulted

The competent authority will be consulted during the

- Scoping phase
- Public Review of Documents
- EIA phase and release of the EMP
- Further Consultation after the EIA/EMP has been submitted if there are comments from I&AP’s
8 PUBLIC PARTICIPATION DURING THE EIA PHASE

8.1 Particulars of the public participation process with regard to the Impact Assessment process that will be conducted

Public participation is an essential and regulatory requirement for an environmental authorization process and is guided by Regulations promulgated under NEMA, specifically the EIA Regulations. NEMA EIA Regulations defines the “Public Participation Process” as a process in which potential interested and affected parties (I&APs) are given an opportunity to comment on, or raise issues relevant to, specific matters”.

The public participation process is designed to provide sufficient and accessible information to I&APs in an objective manner to assist them to:

**During the Scoping Phase:**

- Raise issues of concern and suggestions for enhanced benefits;
- Verify that their issues have been recorded;
- Assist in identifying reasonable alternatives; and
- Contribute relevant local information and traditional knowledge to the environmental assessment.

**During the Impact Assessment Phase:**

- Contribute relevant information and local and traditional knowledge to the environmental assessment;
- Verify that their issues have been considered in the environmental studies; and
- Comment on the findings of the environmental assessments.

The identified Interested and Affected Parties during the scoping phase will be made aware of the availability of the EIA report VIA

- A notification letter
- Emails and SMS
- Press advertisements
- Site Notices
➢ Public and Stakeholder Meetings
➢ The EIA will be made available for review to all IAPs for 30 days. All registered IAPs will be notified by email, fax, SMS, or post of the report’s availability. Hard copies of the draft report will be placed at:
➢ Public Libraries, Municipal Offices and other accessible places.

8.2 Details of the engagement process to be followed
• In addition to land owners, other relevant organisations will be identified and notified of the application. This includes municipal and State departments with jurisdiction in the area and Non-governmental Organisations (NGOs) with an interest.
• A notification letter with the details of the availability of the EIA will be distributed (by email, fax or post) to all land owners. All IAPs will be asked to distribute the documents to anyone who may be interested or affected by the project.
• Site Notices
• Public and Stakeholder Meetings
• Register of IAPs during the scoping report will be used to notify the availability of the EIA
• EIAR/EMP will be released for public review for at least 30 days each excluding public and school holidays.
• Hard copies of the draft report will be placed at: Public Libraries, Municipal Offices and other accessible places.
• A final Consultation report with stakeholder comments from each phase will be submitted.

Framework of a Stakeholder Engagement Plan

Regulations and requirements;
➢ Summary of previous engagement;
➢ Project stakeholders inclusive of an analysis and categorisation of all project stakeholders;
➢ Stakeholder engagement process inclusive of the regulatory process and separate engagement processes (i.e. with neighbouring facilities, or international NGOs);
➢ Timetable;
➢ Resources and responsibilities;
➢ Grievance mechanism;
➢ Key messages (code of conduct);
➢ Monitoring and reporting – i.e. comments and response tracking; and
➢ Management functions.
8.3 Description of the information to be provided to Interested and Affected Parties

Once the competent authority has approved the SR, the Impact Assessment Phase will commence. Stakeholders will receive notification of the start of the Impact Assessment Phase and opportunities for public review and comment.

Public participation during the Impact Assessment Phase revolves around a review of the findings of the EIA, presented in the Draft EIA Report. This report will be made available for public comment for a period of 30 days.

Stakeholders will be invited to comment on the Draft EIA Report and EMP in the following ways:

- By completing a comment sheet made available together with the report at the public places, and by submitting additional written comments, by email or fax, or by telephone, to the public participation office; and
- The Draft EIA Report and EMP Report and its accompanying Specialist Studies (if any) will be distributed for comment to public places in the project area, to everyone who requests a copy email.

The documents will contain a project location, map as well as detailed legislations triggered by the project and a project description as well as reference number of the project.

The scoping report will be made available to the public for review at public libraries. The scoping report will entail potential impacts, mitigation measures as well as specialist reports to be undertaken to supplement the background information of the proposed project.

8.4 Description of the tasks that will be undertaken during the environmental impact assessment process

The Environmental Impact Assessment Phase will include the following activities:

1) Reviewing necessary specialist studies;
2) Assessment of environmental impacts;
3) Compilation of management plans;
4) Compilation of an EMP Amendment Report;
5) Stakeholder document review and comment;
6) Submission of Scoping and EIA report for decision-making

The EIA report must contain:

- A description of the property on which the activity is to be undertaken and the location of the activity on the property;
- A description of the environment that may be affected by the activity and the manner in which the physical, biological, social, economic and cultural aspects of the environment may be affected by the proposed activity;
- Details of the public participation process conducted including:
  - Steps undertaken in accordance with the plan of study;
  - A list of persons, organisations and organs of state that were registered as interested and affected parties;
  - A summary of comments received from, and a summary of issues raised by registered interested and affected parties, the date of receipt of these comments and the response of the EAP to those comments; and
  - Copies of any representations and comments received from registered interested and affected parties;

- A description of the need and desirability of the proposed activity;
- A description of identified potential alternatives to the proposed activity, including advantages and disadvantages that the proposed activity or alternatives may have on the environment and the community that may be affected by the activity;
- An indication of the methodology used in determining the significance of potential environmental impacts;
- A description and comparative assessment of all alternatives identified during the environmental impact assessment process;
- A summary of the findings and recommendations of any specialist report or report on a specialized process;
- A description of all environmental issues that were identified during the environmental impact assessment process, an assessment of the significance of each issue and an indication of the extent to which the issue could be addressed by the adoption of mitigation measures;
➢ An assessment of each identified potentially significant impact, including:
  • Cumulative impacts;
  • The nature of the impact;
  • The extent and duration of the impact;
  • The probability of the impact occurring;
  • The degree to which the impact can be reversed;
  • The degree to which the impact may cause irreplaceable loss of resources; and
  • The degree to which the impact can be mitigated;
➢ A description of any assumptions, uncertainties and gaps in knowledge;
➢ A reasoned opinion as to whether the activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;
➢ An environmental impact statement which contains:
  • A summary of the key findings of the environmental impact assessment; and
  • A comparative assessment of the positive and negative implications of the proposed activity and identified alternatives;
A draft environmental management programme containing:
➢ Copies of any specialist reports and reports on specialised processes; and
➢ Any specific information that may be required by the competent authority
9 MITIGATION MEASURES

9.1 Measures to avoid, reverse, mitigate, or manage identified impacts and to determine the extent of the residual risks that need to be managed and monitored

Table 10: Mitigation Measures

<table>
<thead>
<tr>
<th>Potential Environmental Impacts &amp; Sources</th>
<th>Measures to prevent, mitigate, minimize or manage the impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CONSTRUCTION PHASE</strong></td>
<td></td>
</tr>
<tr>
<td>Activity: establishment/construction of camp site</td>
<td>Dust suppression measures such as spraying with water</td>
</tr>
<tr>
<td>Impact: <em>Air pollution</em> (dust, gaseous emissions)</td>
<td>Speed limits will be established and enforced</td>
</tr>
<tr>
<td>Source: Establishment of camp site, movement of vehicles.</td>
<td>Equipment and vehicles equipped with standard exhaust systems which minimize the amount of emissions</td>
</tr>
<tr>
<td>Activity: food preparation</td>
<td>Restrict open fires</td>
</tr>
<tr>
<td>Impact: <em>Destruction of fauna and flora</em></td>
<td>Prohibit hunting and poaching</td>
</tr>
<tr>
<td>Source: Open fires</td>
<td>Collection of firewood will be prohibited</td>
</tr>
<tr>
<td></td>
<td>Maintain firebreaks</td>
</tr>
<tr>
<td>Activity: maintenance of vehicles</td>
<td>Use oil trays</td>
</tr>
<tr>
<td>Impact: <em>Water pollution (surface water, groundwater)</em></td>
<td>Use modern vehicles in good working condition</td>
</tr>
<tr>
<td>Source: spillages from vehicles</td>
<td>Take vehicles to accredited workshop in town</td>
</tr>
<tr>
<td></td>
<td>Use absorbents to trap hydrocarbons</td>
</tr>
<tr>
<td>Activity: Disposal of Waste</td>
<td>Place waste receptacles at strategic points</td>
</tr>
<tr>
<td>Impact: <em>Land degradation, land-use and capability</em></td>
<td>Monitor housekeeping behaviour and insist on corrective action</td>
</tr>
<tr>
<td>Source: Poor waste management</td>
<td>Waste will be disposed off in approved site</td>
</tr>
<tr>
<td>Activity: establishment/construction of camp site</td>
<td>Employ locals who will be transported home after hours</td>
</tr>
<tr>
<td>Impact: <em>Safety and security</em></td>
<td>Make necessary arrangements with the landowner for security measures, access to site and other logistical matters</td>
</tr>
<tr>
<td>Source: Employees</td>
<td></td>
</tr>
<tr>
<td><strong>OPERATIONAL PHASE</strong></td>
<td></td>
</tr>
<tr>
<td>Activity: Preparation of mining area</td>
<td>Mined areas will be rehabilitated and re-vegetated</td>
</tr>
<tr>
<td>Impact: <em>Land degradation, land-use and capability</em></td>
<td>Debris will be removed and disposed off in approved site</td>
</tr>
<tr>
<td>Source: Poor waste management</td>
<td>Areas which do not form part of mining site will not be disturbed.</td>
</tr>
<tr>
<td>Activity: Disposal of Waste</td>
<td>Place waste receptacles at strategic points</td>
</tr>
<tr>
<td>Impact: <em>Land degradation, land-use and capability</em></td>
<td>Monitor housekeeping behaviour and insist on corrective action</td>
</tr>
<tr>
<td>Source: Poor waste management</td>
<td>Waste will be disposed off in approved site</td>
</tr>
<tr>
<td>Activity: mining and lubrication of equipment</td>
<td>Operate outside 100 m distance from stream or any water body</td>
</tr>
<tr>
<td>Impact: <em>water pollution</em> (surface water, groundwater)</td>
<td>Control and manage storm water</td>
</tr>
<tr>
<td>Activity</td>
<td>Impact</td>
</tr>
<tr>
<td>----------</td>
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</tr>
<tr>
<td>Vehicle movement during operational hours</td>
<td><strong>Ecological degradation</strong></td>
</tr>
<tr>
<td>Uncontrolled vehicle movement and poor rehabilitation</td>
<td></td>
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<tr>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Activity: Accidental spillages</td>
<td><strong>Land pollution</strong></td>
</tr>
<tr>
<td>Impact:</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Activity: Mining</td>
<td><strong>Noise</strong></td>
</tr>
<tr>
<td>Impact:</td>
<td></td>
</tr>
<tr>
<td>Activity: Establishment of tailings</td>
<td><strong>Land degradation</strong></td>
</tr>
<tr>
<td>Impact:</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Activity: Establishment of pads</td>
<td><strong>Destruction of fauna and flora</strong></td>
</tr>
<tr>
<td>Impact:</td>
<td></td>
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<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Activity: Bulk Excavation</td>
<td><strong>Land degradation</strong></td>
</tr>
<tr>
<td>Impact:</td>
<td></td>
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<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Activity: Bulk sample</td>
<td><strong>Land degradation</strong></td>
</tr>
<tr>
<td>Impact:</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Activity: establishment/construction of camp site</td>
<td><strong>Air pollution</strong> (dust, gaseous emissions)</td>
</tr>
<tr>
<td>Impact:</td>
<td></td>
</tr>
<tr>
<td>Activity: De-establishment / removal of infrastructure</td>
<td><strong>Noise</strong></td>
</tr>
</tbody>
</table>
- Employees will be equipped with ear plugs and other protective gear. All vehicles will be equipped with silencers and maintained in a roadworthy condition

9.2 Other Information required by the competent Authority

Additional consultation and studies might be requested by the relevant authorities.

9.2.1 Impact on the socio-economic conditions of any directly affected person.

The socio economic conditions will be identified and described in the Social Impact Assessment report. Preliminary it can be assumed that livelihoods of the adjacent landowners will be impacted by the infusion of capital into the area.

9.2.2 Impact on any national estate referred to in section 3(2) of the National Heritage Resources Act.

There are human settlements in the vicinity of the study area. Therefore it may be assumed that the potential of existence of heritage resources is high.

In terms of the National Heritage Resources Act, 1999 (Act no. 25 of 1999) an Archaeological Impact Assessment will undertaken in order to establish if any localities of heritage signficane are present on the property.

9.2.3 Potential Cumulative impact and mitigation measures

<table>
<thead>
<tr>
<th>TRIGGERS</th>
<th>POTENTIAL CUMULATIVE IMPACT</th>
<th>SIGNIFICANCE</th>
<th>MITIGATION AND MANAGEMENT MEASURES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use of hazardous substances</td>
<td>Contamination of water resources</td>
<td>Medium</td>
<td>Avoidance of hazardous substances Prevention of spillages</td>
</tr>
<tr>
<td>Impact</td>
<td>Mitigation</td>
<td>Level</td>
<td></td>
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<td>------------------------------------------</td>
<td>----------------------------------------------------------------------------</td>
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<td></td>
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<tr>
<td>Soil erosion</td>
<td>Proper house keeping</td>
<td>Low</td>
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<tr>
<td></td>
<td>Prevent soil erosion</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Concurrent rehabilitation</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Restriction on vehicular circulation</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Immediate rehabilitation of disturbed sites</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loss of sense of place and serenity</td>
<td>Reduction of land capability</td>
<td>Medium</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Reduction of land-use potential</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Restriction of noise and visual aspects</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Immediate rehabilitation of disturbed sites</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lack of supervision and site surveys</td>
<td>Loss of vegetation and land capability</td>
<td>Low</td>
<td></td>
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<tr>
<td></td>
<td>Use of existing roads and tracks. Limited vehicular movement</td>
<td></td>
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<tr>
<td></td>
<td>Prospect in one area at a time to systematically open up access to other areas for rotational grazing and other land uses</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Improper use of machinery and vehicles</td>
<td>Generation of dust, smog and noise</td>
<td>Moderate</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Maintenance of machinery and vehicles</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Operate within prescribed working hours</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perception of job opportunities</td>
<td>Conflict between project team and the local community</td>
<td>Moderate</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Employ local people, communicate the right messages about the project</td>
<td>Negligible</td>
<td></td>
</tr>
</tbody>
</table>

10 RECOMMENDATIONS

The EAP recommends that comments on the draft EIA/EMP report that were sent previously or planned to be sent be forwarded to Jomela so that we can make the necessary amendments and allow interested and affected parties to review the incorporation of these changes as there will be sufficient time to review the report for at least 60 days during the EIA.

Specialist reports are available on the drop box link (https://www.dropbox.com/sh/dq24i49q79sfvxq/AADeCT4bAGMKzmzw-XNdFlm-a?dl=0); and on the SAHRA website.
10.1 Undertaking Regarding Correctness of Information

DECLARATION OF INDEPENDENCE

I, Yvonne Gutoona, on behalf of Jomela Consulting (Pty) Ltd in my capacity as an environmental consultant, hereby declare that I:-

- Act as an independent consultant;
- Do not have any financial interest in the undertaking of this project, other than remuneration for the work performed in terms of the National Environmental Management Act EIA Regulations Amendment of December 2014;
- Have and will not have vested interest in the proposed activity nor will I engage myself in any conflicting interest associated with this project
- I undertake to disclose and provide to the competent authority any material or information at my disposal regarding this project as required in terms of National Environmental Management Act (EIA regulations of 04 December 2014);
- Based on the information provided to me by the client and in addition to information obtained during the course of this study, I have presented the results and conclusion with regard to this project to the best of my professional ability;

I Yvonne Gutoona herewith undertake that the information provided in the foregoing report is correct, and that the comments and inputs from stakeholders and Interested and Affected parties has been correctly recorded in the report.

Signature of the EAP
DATE: 13 September 2016

UNDERTAKING REGARDING LEVEL OF AGREEMENT

I Yvonne Gutoona herewith undertake that the information provided in the foregoing report is correct, and that the level of agreement with interested and Affected Parties and stakeholders has been correctly recorded and reported herein.

Signature of the EAP
DATE: 13 September 2016
11 REFERENCES


Department of Economic Development Environment and Tourism, OCTOBER 2013. PROVINCIAL AIR QUALITY MANAGEMENT PLAN


GJ Bredenkamp, 2016: The vegetation of the area of the proposed Berenice Opencast Coal Mine, Limpopo Province (Berenice flora assessment).

A. McKechnie, I.L. Rautenbach, G.J. Bredenkamp and J.C.P. van Wyk. 2016: Assessment Of Environmental Impacts On Vertebrate Biodiversity By The Intended Opencast Berenice Coal Mine, Limpopo Province
Masala Makhathulela, (Zenkcon Engineers), Sivhugwana Environmental Solutions. 2016: Traffic Impact Assessment For The Proposed Berenice Open Cast Coal Mine Project By Universal Coal Development li (Pty) Ltd


Specialist:

Appendix 3 - Berenice Air Quality Assessment
Appendix 4- Berenice Flora Assessment Report
Appendix 5- Berenice Faunal Assessment Report
Appendix 6- Berenice Heritage Impact Assessment
Appendix 7- Berenice Soil and Land Capability Assessment
Appendix 8- Berenice Traffic impact Assessment
Appendix 9- Berenice Baseline Noise
Appendix 10- Berenice Visual Impact Assessment
Appendix 11- Berenice Social Impact Assessment
Appendix 12- Berenice Wetlands Impact Assessment Draft Report
Appendix 13- Berenice Groundwater Assessment Draft Report
Appendix 14- Berenice Surface Water Assessment
Appendix 15- Floodlines