ENVIRONMENTAL IMPACT ASSESSMENT/ ENVIRONMENTAL MANAGEMENT PROGRAMME AMENDMENT PROCESS

EIA/EMP REPORT
COAL SILO, COAL CONVEYOR AND ASSOCIATED INFRASTRUCTURE BETWEEN GROOTEGELUK COAL MINE AND MEDUPI POWER STATION, LIMPOPO PROVINCE
MINING RIGHT REFERENCE NO: 5/3/2/50

Submitted to:
Department of Mineral Resources, Limpopo Province

JUNE 2010

Prepared for:
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POWERING POSSIBILITY

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PROJECT DETAILS

Mining Right Reference No.	:	5/3/2/50
Title	:	Environmental Impact Assessment/ Environmental Management Programme Amendment Process Environmental Impact Assessment and Environmental Management Programme Coal Silo, Coal Conveyor and Associated Infrastructure between Grootegeluk Coal Mine and Medupi Power Station, Limpopo Province
Authors	:	Savannah Environmental (Pty) Ltd Jo-Anne Thomas
Specialists	:	Bathusi Environmental Consultants Johnny van Schalkwyk
Client	:	Eskom Holdings Limited on behalf of EXXARO
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PURPOSE OF THE EIA & EMP REPORT

In order to adequately provide for the growing electricity demand within South Africa, Eskom Holdings Limited is in the process of constructing a new coal-fired power station southwest of the existing Matimba Power Station in the Lephalale area. This power station is to be known as the Medupi Power Station and will have a maximum installed capacity of 4 800 MegaWatts (MW).

Coal to fuel the Medupi Power Station will be provided to Eskom from the Grootegeluk Coal Mine by Exxaro Resources (Pty) Ltd. The Grootegeluk Coal Mine is an existing mine (Mining Right Reference No.: 5/3/2/50) located in the Limpopo Province approximately 21 km west of the town Lephalale on the farms Grootegeluk 459 LQ, Hierontrent 630 LQ, Leeuwdrift 312 LQ, Enkelbult 462 LQ, Daarby 485 LQ and Turfvlakte 463 LQ (refer to Figure 1.1).

In order for Grootegeluk mine to supply coal to the new Medupi Power Station, the following will be constructed by Eskom:

» A coal silo at the mine.
» A coal feed conveyor belt between the mine and the power station. This conveyor will cross the Farm Turfvlakte for which Exxaro hold the prospecting and mining rights.
» An access road to be utilised during construction and operation of the coal silo and conveyor.

In terms of the Minerals and Petroleum Resources Development Act (MPRDA; Act No. 28 of 2002) and National Environmental Management Act (NEMA; Act No. 107 of 1998), Exxaro is required to undertake an Environmental Impact Assessment (EIA) process to amend the mine's current approved Environmental Management Programme (EMP) to include the coal silo, coal conveyor and access road. The EIA undertaken for the power station included an assessment of the coal conveyor. This study will therefore be used as the basis for the EMP amendment process required to be undertaken in accordance with the MPRDA.

The first phase of an EIA was the Scoping Phase, during which issues associated with the proposed development were identified and evaluated to highlight the significant issues that may require further investigation and assessment in the EIA. The purpose of this EIA and EMP Report provides an assessment of these potential impacts as well as recommends management measures for the mitigation of these impacts.

This EIA and EMProgramme Report consists of the following sections:

Part 1: Background to the Project

» **Chapter 1** provides background to the proposed project and the EIA process
» **Chapter 2** provides an overview of the proposed project
» **Chapter 3** outlines the EIA process which was followed for the proposed project

Part 2: Environmental Impact Assessment

» **Chapter 4** provides a description of the environment which may be potentially affected by the proposed project
» **Chapter 5** provides an assessment of the potential impacts associated with the proposed project, including recommendations for mitigation of potentially significant impacts and an impact statement regarding the proposed project

Part 3: Environmental Management Programme

» **Chapter 6** presents the Environmental Management Programme, including details of the planned monitoring and environmental management for the construction and operation of the conveyor and associated infrastructure

Appendices:

Includes technical and supporting documentation, including specialist reports undertaken for the EIA and EMP.

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APPENDICES

ABBREVIATIONS AND ACRONYMS

DEA	National Department of Environmental Affairs
DEAT	Department of Environmental Affairs and Tourism
DMR	Department of Mineral Rights
DWA	Department of Water Affairs
EIA	Environmental Impact Assessment
EMP	Environmental Management Programme
LEDET	Limpopo Department of Economic Development, Environment and Tourism
LIHRA	Limpopo Heritage Resources Agency
MPRDA	Minerals and Petroleum Resources Development Act (Act No. 28 of 2002)
MW	MegaWatts
NEMA	National Environmental Management Act (Act No 107 of 1998)
RoD	Record of Decision
SAHRA	South African Heritage Resources Agency

DEFINITIONS AND TERMINOLOGY

Alternatives: Alternatives are different means of meeting the general purpose and need of a proposed activity. Alternatives may include location or site alternatives, activity alternatives, process or technology alternatives, temporal alternatives or the 'do nothing' alternative.

Cumulative impacts: Impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities (e.g. discharges of nutrients and heated water to a river that combine to cause algal bloom and subsequent loss of dissolved oxygen that is greater than the additive impacts of each pollutant). Cumulative impacts can occur from the collective impacts of individual minor actions over a period of time and can include both direct and indirect impacts.

Direct impacts: Impacts that are caused directly by the activity and generally occur at the same time and at the place of the activity (e.g. noise generated by blasting operations on the site of the activity). These impacts are usually associated with the construction, operation or maintenance of an activity and are generally obvious and quantifiable.

Do nothing alternative: The 'do nothing' alternative is the option of not undertaking the proposed activity or any of its alternatives. The 'do nothing' alternative also provides the baseline against which the impacts of other alternatives should be compared.

Endangered species: Taxa in danger of extinction and whose survival is unlikely if the causal factors continue operating. Included here are taxa whose numbers of individuals have been reduced to a critical level or whose habitats have been so drastically reduced that they are deemed to be in immediate danger of extinction.

Environment: the surroundings within which humans 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.

Environmental Impact: An action or series of actions that have an effect on the environment.

Environmental impact assessment: Environmental Impact Assessment (EIA), as defined in the NEMA EIA Regulations and 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 that application.

Environmental management: Ensuring that environmental concerns are included in all stages of development, so that development is sustainable and does not exceed the carrying capacity of the environment.

Environmental management plan: An operational plan that organises and co-ordinates mitigation, rehabilitation and monitoring measures in order to guide the implementation of a proposal and its ongoing maintenance after implementation.

Heritage: That which is inherited and forms part of the National Estate (Historical places, objects, fossils as defined by the National Heritage Resources Act of 2000).

Indirect impacts: Indirect or induced changes that may occur as a result of the activity (e.g. the reduction of water in a stream that supply water to a reservoir that supply water to the activity). These types of impacts include all the potential impacts that do not manifest immediately when the activity is undertaken or which occur at a different place as a result of the activity.

Interested and Affected Party: Individuals or groups concerned with or affected by an activity and its consequences. These include the authorities, local communities, investors, work force, consumers, environmental interest groups and the general public.

Rare species: Taxa with small world populations that are not at present Endangered or Vulnerable, but are at risk as some unexpected threat could easily cause a critical decline. These taxa are usually localised within restricted geographical areas or habitats or are thinly scattered over a more extensive range. This category was termed Critically Rare by Hall and Veldhuis (1985) to distinguish it from the more generally used word "rare".

Red data species: Species listed in terms of the International Union for Conservation of Nature and Natural Resources (IUCN) Red List of Threatened Species, and/or in terms of the South African Red Data list. In terms of the South African Red Data list, species are classified as being extinct, endangered, vulnerable, rare, indeterminate, insufficiently known or not threatened (see other definitions within this glossary).

Significant impact: An impact that by its magnitude, duration, intensity or probability of occurrence may have a notable effect on one or more aspects of the environment.

PART 1: BACKGROUND TO THE PROJECT

INTRODUCTION CHAPTER 1

In order to adequately provide for the growing electricity demand within South Africa, Eskom Holdings Limited is in the process of constructing a new coal-fired power station southwest of the existing Matimba Power Station in the Lephalale area. This power station is to be known as the Medupi Power Station and will have a maximum installed capacity of 4 800 MegaWatts (MW).

Coal to fuel the Medupi Power Station will be provided to Eskom from the Grootegeluk Coal Mine by Exxaro Resources (Pty) Ltd. The Grootegeluk Coal Mine is an existing mine (Mining Right Reference No.: 5/3/2/50) located in the Limpopo Province approximately 21 km west of the town Lephalale on the farms Grootegeluk 459 LQ, Hierontrent 630 LQ, Leeuwdrift 312 LQ, Enkelbult 462 LQ, Daarby 485 LQ and Turfvlakte 463 LQ (refer to Figure 1.1).

In order for Grootegeluk mine to supply coal to the new Medupi Power Station, the following will be constructed by Eskom:

» A coal silo at the mine.
» A coal feed conveyor belt between the coal silo (which is on mine property) and the power station. This conveyor will cross the Farm Turfvlakte for which Exxaro hold the prospecting and mining rights.
» An access road to be utilised during construction and operation of the coal silo and conveyor.

In terms of the Minerals and Petroleum Resources Development Act (MPRDA; Act No. 28 of 2002) and National Environmental Management Act (NEMA; Act No. 107 of 1998), Exxaro is required to undertake an Environmental Impact Assessment (EIA) process to amend the mine's current approved Environmental Management Programme (EMP) to include the coal silo, coal conveyor and access road. The EIA undertaken for the power station included an assessment of the coal conveyor. This study will therefore be used as the basis for the EMP amendment process required to be undertaken in accordance with the MPRDA.

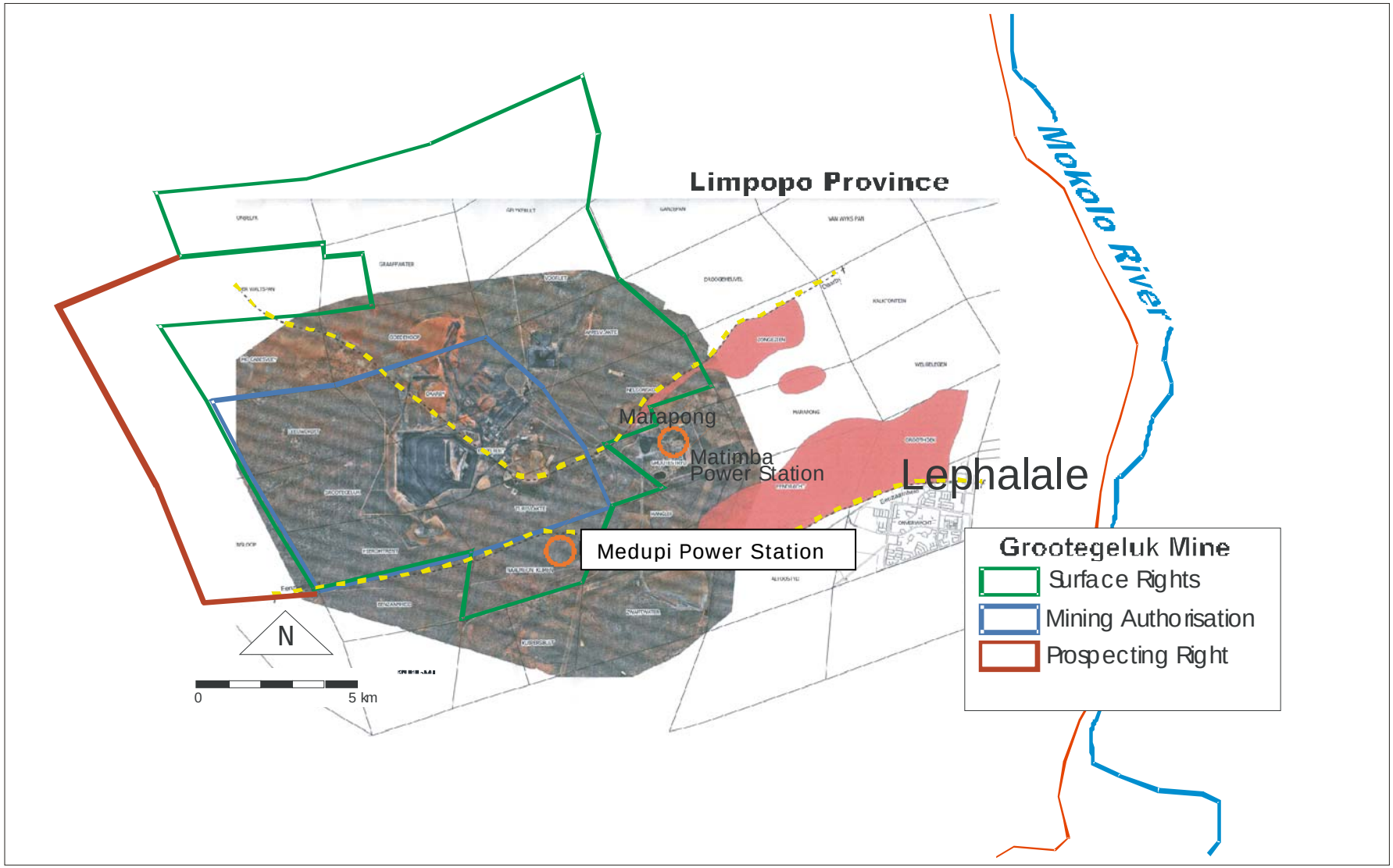

Figure 1.1: Locality of Grootegeluk Mine (Aerial View) indicating the mining rights granted to Exxaro Resources (Pty) Ltd (Source: Synergistics, 2006)

The first phase of an EIA is the Scoping Phase, during which issues and concerns of various stakeholder groups are identified and evaluated to highlight the significant issues that may require further investigation and assessment in the EIA. A Draft Scoping Report was submitted to the Department of Mineral Resources (DMR) in May 2010. An EIA for the proposed coal conveyor and associated infrastructure has been undertaken and this Environmental Management Programme (EMP) details the findings of this EIA and recommends mitigation and management measures which must be implemented during the construction and operation of this infrastructure in order to minimise impacts on the environment.

1.1. The Need for the Proposed Project

In order for Exxaro to provide coal to Medupi Power Station, Eskom need to construct a coal silo at the mine, a coal conveyor between the mine and the power station and associated access roads. This infrastructure is critical to ensure that Grootegeluk Coal is able to provide the Medupi Power Station with sufficient coal to begin commercial operation on the first unit in 2012. The delay of the construction of this infrastructure will in essence delay the start of operations of the Medupi Power Station. Based on the current electricity constraints that are faced within the country, the power station being synchronised to the grid on time is of significant strategic importance to South Africa.

1.2. Legal Requirement for an Environmental Impact Assessment

Before the proposed project may proceed, an amendment to the mine's existing Environmental Management Programme (EMP) must be compiled and approved by the Department of Mineral Resources (DMR) in accordance with the requirements of the MPRDA (Act No. 28 of 2002). In order to amend the EMP, an EIA is required to be undertaken.

An Environmental Impact Assessment (EIA) (DEAT reference number 12/12/20/695) was undertaken for the power station and associated infrastructure, and a final EIA Report was submitted to the Department of Environmental Affairs and Tourism (DEAT) in May 2006. A Record of Decision (RoD) for the construction and operation of the Medupi Power Station was issued on 21 September 2006 (DEAT reference number 12/12/20/695; refer to Appendix A). This RoD provided authorisation for the power station together with the required ancillary infrastructure. This ancillary infrastructure included, *inter alia*, the required coal conveyor belt between the mine and the power station, and authorised the route which this was proposed to follow. All required infrastructure as part of the conveyor system was also authorised through this process. Therefore, Eskom have obtained all the required authorisations in terms

of the National Environmental Management Act (NEMA; Act 107 of 1998) listed activities.

1.2.1. Regulating Authorities

The DMR will be the decision-making authority for the EIA and EMP amendment process, which is being undertaken in terms of the MPRDA. This Scoping Report will be submitted to the DMR and forms part of the EIA process to amend the Grootegeluk Coal Mine's approved EMP.

In the spirit of cooperative governance, the DMR will consult with the following government departments as part of its decision-making process:

» Limpopo Department of Economic Development, Environment and Tourism (LEDET)
» Department of Water Affairs (DWA)
» Department of Environmental Affairs (DEA)
» Department of Agriculture
» Department of Rural Development and Land Reform
» South African Heritage Resources Agency (SAHRA)
» Limpopo Heritage Agency (LIHRA)
» Lephalale Local Municipality

1.3. Details of Savannah Environmental's Expertise to carry out the Scoping Process

Savannah Environmental was contracted by Eskom Holdings Limited (as an agent to Exxaro Resources (Pty) Ltd) as an **independent consultant** to undertake an EIA for the proposed project, as required by the MPRDA and NEMA EIA Regulations. Neither Savannah Environmental, nor any of its specialist sub-consultants on this project are subsidiaries of or affiliated to Eskom Holdings Limited or Exxaro Resources (Pty) Ltd. Furthermore, Savannah Environmental does not have any interests in secondary developments that may arise out of the authorisation of the proposed project.

The Savannah Environmental staff has acquired considerable experience in environmental assessment and environmental management over the last 10 years, and have been actively involved in undertaking environmental studies for a wide variety of projects throughout South Africa. Strong competencies have been developed in project management of environmental EIA processes, as well as strategic environmental assessment and compliance advice, and the identification of environmental management solutions and mitigation/risk minimising measures.

Jo-Anne Thomas, the principle author of this Scoping Report, is a registered Professional Natural Scientists (in the practice of environmental science) with the South African Council for Natural Scientific Professions. She has gained extensive knowledge and experience in the assessment of environmental impacts through their involvement in EIA processes over the past ten (10) years. She has undertaken various environmental impact assessments in compliance with the requirements of NEMA and the MPRDA.

In order to adequately identify and assess potential environmental impacts, Savannah Environmental has appointed specialist consultants to conduct specialist studies, as required, for inclusion in the impact assessment phase. Details of these specialist consultants are included in Chapter 3.

1.4. Objectives of the Environmental Impact Assessment and Environmental Management Programme

The Scoping Phase of the EIA and EMP process identified potential issues associated with the proposed project, and defined the extent of the studies required within the EIA Phase. This report addresses the EIA/EMP Phase requirements as outlined by the MPRDA. Requirements in terms of NEMA have already been addressed in a previous process (as detailed above).

The aim of this Report is to:

» Provide information to the authorities on the proposed project.
» Provide information regarding alternatives that have been considered.
» Describe the baseline receiving environment.
» Indicate potential impacts on the environment from the proposed activity, and describe mitigation measures to minimise such impacts.
» Present the findings of the EIA in a manner that facilitates decision-making by the relevant authorities.
» Present the proposed Environmental Management Plan to mitigate the expected impacts.

The release of a draft EIA and EMP Report provides stakeholders with an opportunity to verify that the issues they have raised through the EIA process have been captured and adequately considered. The final EMProgramme will aim to provide the regulating authorities (DME and DEDEA) with sufficient information to make an informed decision regarding the proposed project.

1.5. Outline of the Scoping Report

This EIA and EMProgramme Report consists of the following sections:

Part 1: Background to the Project

» **Chapter 1** provides background to the proposed project and the EIA process
» **Chapter 2** provides an overview of the proposed project
» **Chapter 3** outlines the EIA process which was followed for the proposed project

Part 2: Environmental Impact Assessment

» **Chapter 4** provides a description of the environment which may be potentially affected by the proposed project
» **Chapter 5** provides an assessment of the potential impacts associated with the proposed project, including recommendations for mitigation of potentially significant impacts and an impact statement regarding the proposed project

Part 3: Environmental Management Programme

» **Chapter 6** presents the Environmental Management Programme, including details of the planned monitoring and environmental management for the construction and operation of the conveyor and associated infrastructure

Appendices:

Includes technical and supporting documentation, including specialist reports undertaken for the EIA and EMP.

PROJECT DESCRIPTION AND MOTIVATION CHAPTER 2

2.1. Background to the Proposed Project

Exxaro Resources (Pty) Ltd owns and operates the Grootegeluk Coal Mine, which is located in the Limpopo Province approximately 21 km west of the town Lephalale on the farms Grootegeluk 459 LQ, Hierontrent 630 LQ, Leeuwdrift 312 LQ, Enkelbult 462 LQ, Daarby 485 LQ and Turfvlakte 463 LQ. Mining at Grootegeluk Mine occurs between the Eenzaamheid fault in the south and the Daarby fault in the north (refer to Figure 2.1). Mining activities at the Grootegeluk Coal Mine are undertaken in accordance with the specifications of the existing Environmental Management Programme for the mine approved as part of the Mining Right (Mining Right Reference No.: 5/3/2/50).

The mining activities at Grootegeluk, represents typical open pit coal mining operations that commenced 29 years ago. The mine uses conventional truck-and-shovel mining methods and mining is conducted using a large fleet of conventional earth moving equipment. Although the economically exploitable, saleable coal reserves exceed 50 years, the mine's planning is based on a 40 year Life-of Mine Plan. The mining area, consisting of 6 adjoining farms, amounts to a total of 6528.540 hectares (ha). The mining operations cover a surface area of approximately 706 ha and the current depth of mining in the open pit is 135 m (Exxaro, 2010).

The mine currently produces 18.6 mtpa of thermal and semi-soft coking coal and provides jobs for approximately 1800 permanent employees and some 300 people employed by contractors. The mine has estimated minable coal reserves of 811mt and a total measured resource of 426 mt. The mine provides approximately 15,3 mtpa of coal to Eskom's Matimba Power station. Matimba is the largest direct dry-cooled power station in the world and has a power output of approximately 24000 GWh per annum (Exxaro, 2010).

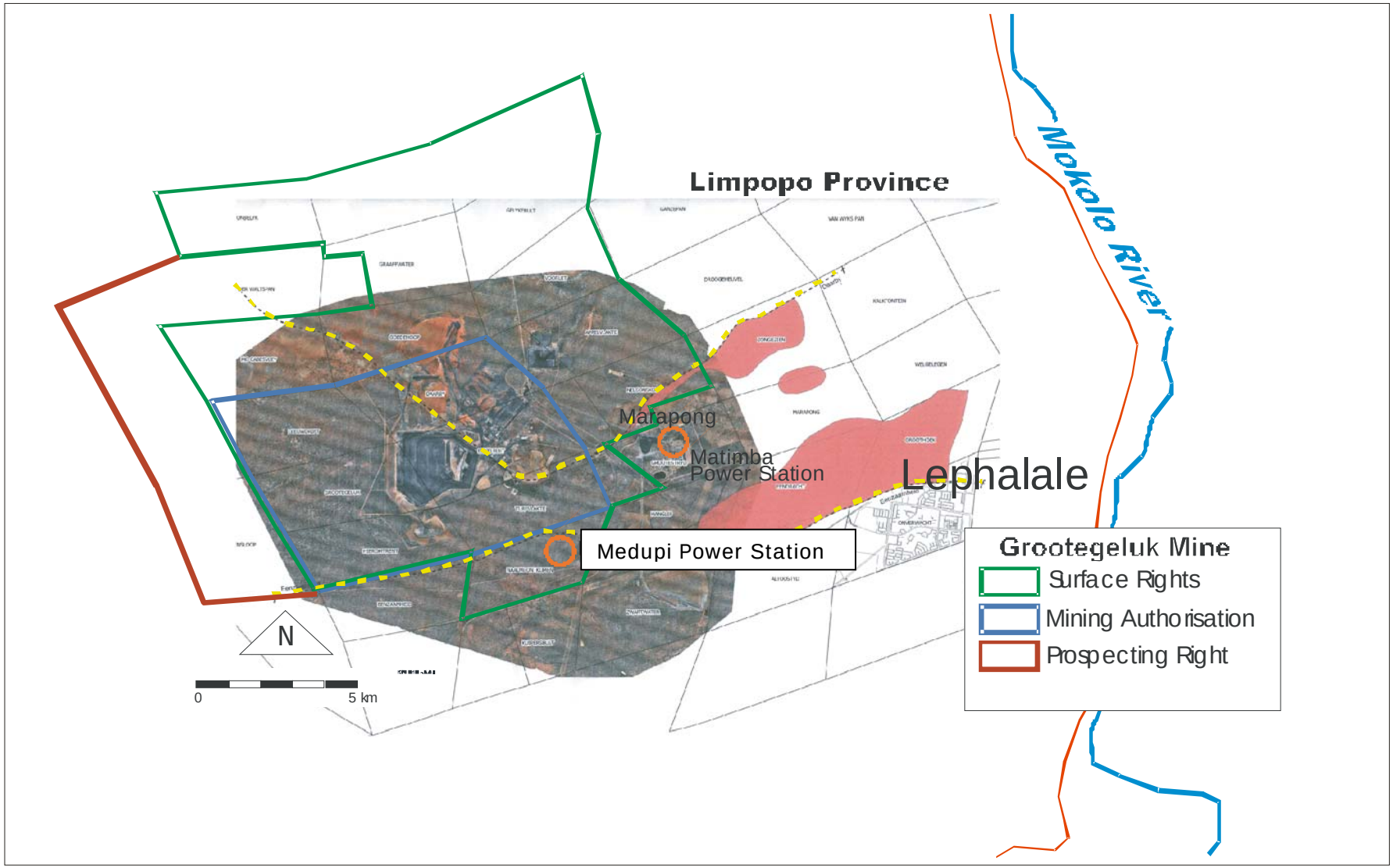

Figure 2.1: Locality of Grootegeluk Mine (Aerial View) indicating the mining rights granted to Exxaro Resources (Pty) Ltd (Source: Synergistics, 2006)

2.2. Project Overview and Motivation

In order to adequately provide for the growing electricity demand within South Africa, Eskom Holdings Limited is in the process of constructing a new coal-fired power station approximately 4 km south of the mine on the farm Naauwontkomen 509 LQ. In order for Grootegeluk mine to supply coal to the new Medupi Power Station, the following will be constructed by Eskom:

» A coal silo at the mine.
» A coal feed conveyor belt between the mine and the power station. This conveyor will cross the Farm Turfvlakte for which Exxaro hold the prospecting and mining rights.
» An access road to be utilised during construction and operation of the coal silo and conveyor.

Temporary traffic control measures will be implemented in order to ensure safe movement of traffic during the construction period.

Technical drawings of the above infrastructure are included in Appendix B.

2.2. Description of the Project

2.2.1. Coal Supply Conveyor

The coal handling system shall be designed to operate effectively and efficiently.

Eskom will provide a 10 000t silo at or near the Grootgeluk Mine premises into which the mine conveyor will discharge coal. The interface point between the Grootgeluk Mine and Eskom shall be the point at the top of the silo where the mine conveyor discharges the coal. The coal handling system shall include a Sampling and Assessing Plant together with two mass meters (payment scales) on the incline mine conveyor feeding the silo. This area shall be fenced off and proper access control shall be implemented.

Eskom will withdraw coal from the bottom of the silo by means of two under-silo belt feeders (US1A and US1B). The under-silo belt feeders shall feed the coal onto overland conveyor (OV1) which shall subsequently feed the coal onto overland conveyor OV2. The overland conveyors (OV1 and OV2) shall extend from the location of the silo to the coal stockyard of the Medupi Power Station in two single straight flights spanning a total distance of approximately 5.4km. OV2 shall discharge coal onto the stockpile stacking conveyor (SYS1) or the stockpile stacking/bypass link conveyor (SY1) through a moving head

Major components of the works include:

» Under-silo hoppers
» Under-silo belt feeder (US1A)
» Under-silo belt feeder (US1B)
» Overland Conveyor (OV1)
» Overland Conveyor (OV2)

2.2.2. Road Access

In the construction of the coal conveyor, the existing road access to the mine will be affected. A bridge will be built over the coal conveyor belt to ensure that the access to the mine is not affected. During the construction of the bridge over the conveyor belt, a temporary road will be built to allow for access to the mine.

2.2.3. Coal Silo

A part of the conveyor system, the associated infrastructure included a coal silo, which would be in the existing mining area and act as a transfer facility between the mine and Eskom. With the use of the western alignment, the coal silo would be constructed on Exxaro-owned property, as indicated on Figure 2.2 (also refer to technical drawings included within Appendix B).

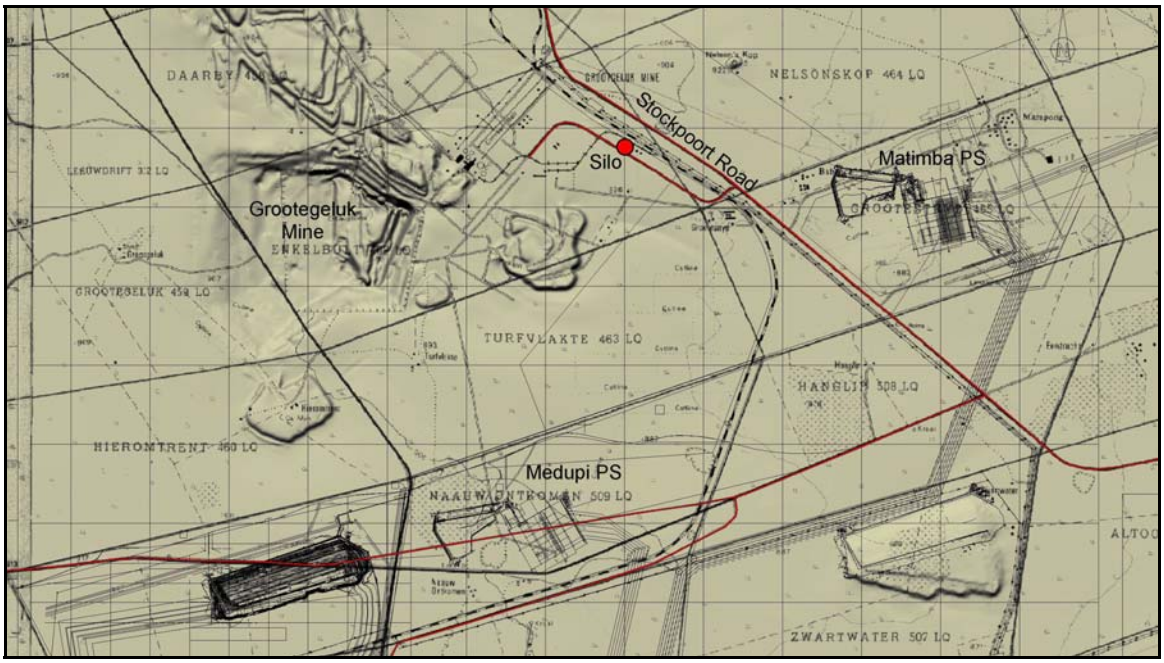

Figure 2.2: Location of the proposed Medupi coal silo (indicated with red dot) in relation to the Grootegeluk mine and the Matimba and Medupi power stations (Note: each grid block represents an area of 1km x 1km)

The coal silo will have a transfer capacity of 10 000 tons. It will be approximately 58 m in height and 20 m in diameter at its widest point. The coal from the mine is conveyed from the process plant and blending beds to the "Assize" building where the coal is weighed for payment purposes. Coal is then conveyed to the coal silo for transfer to Eskom.

Eskom's conveyor system has a carrying capacity of 4 000 tons/hour. Eskom would draw the coal from the bottom of the silo through belt feeders onto the coal overland conveyor which would convey coal to the power station. This silo is a transfer point and forms part of the conveyor belt ancillary infrastructure. It is not anticipated that coal would be resident in the silo for periods of longer than 2 hours.

2.3. Description of Alternatives Considered

2.3.1. Alternative Conveyor Alignments

An Environmental Impact Assessment (EIA) (DEA reference number 12/12/20/695) was undertaken for the power station and associated infrastructure. A number of alternative development sites for the Medupi Power Station and associated infrastructure were identified and assessed through this process (Bohlweki Environmental, 2006). As part of the assessment of infrastructure associated with the power station, alternative alignments for the coal conveyor and associated access road were considered between the nominated preferred site for the power station and the Grootegeluk Mine (refer to Figure 2.3):

» *An eastern alignment:* which runs from the Exxaro Grootegeluk coal mine in a south-easterly direction along the existing railway line, turning southwards towards the farm Naauwontkomen 509 LQ. This alignment is approximately 7,5 km in length.
» *A western alignment:* which follows a shorter, straighter alignment cutting through the farms Enkelbult and Turfvlakte (both owned by Exxaro who has prospecting and mining rights on these properties) in a southerly direction towards the farm Naauwontkomen 509 LQ. This alignment is approximately 4,5 km in length.

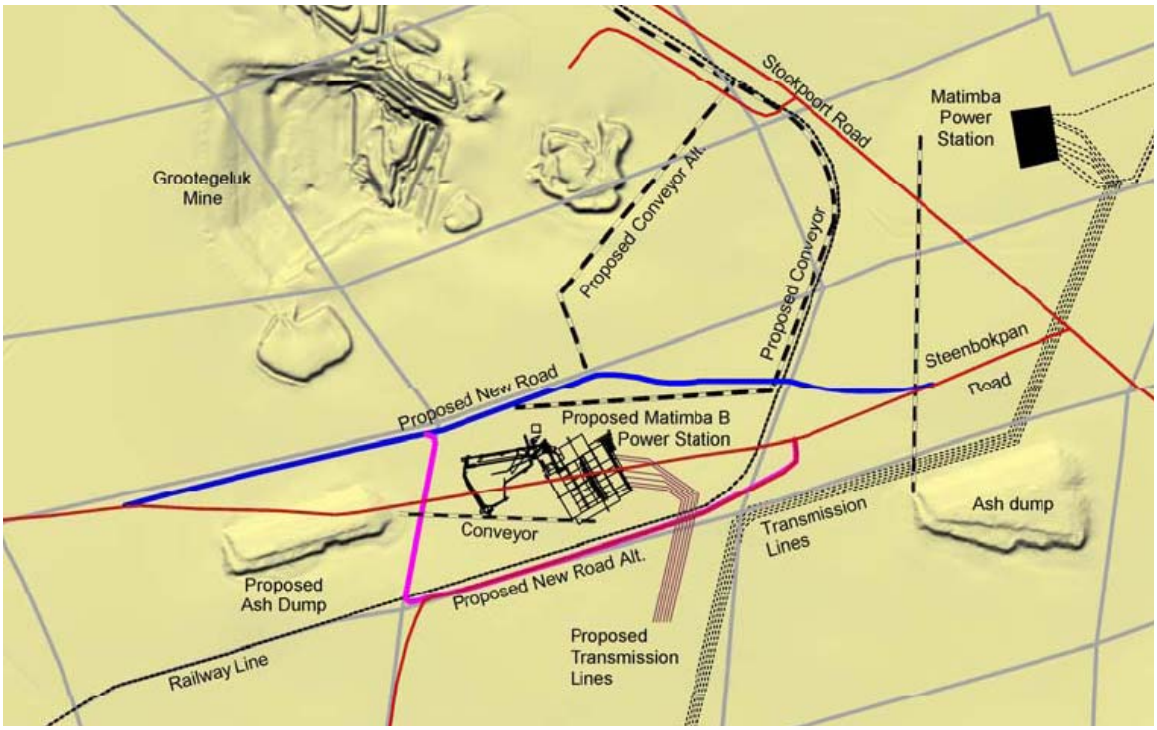

Figure 2.3: Map indicating the eastern and western alignment conveyor routes as assessed in the EIA process (2006)

Although both routes were found to be environmentally acceptable through the EIA, the EIA Report recommended the eastern alignment as the preferred alignment primarily due to the fact that it follows the existing linear infrastructure in the area (i.e. the railway line), and therefore allowed for the consolidation of new and existing infrastructure of a similar nature. An additional consideration was that Exxaro (then known as Kumba Resources) had indicated that their future mining plan could possibly include mining of coal and sorbent on Farm Turfvlakte 463 LQ up to the Eenzaamheid Fault, inferring that any development that could impact negatively on this mineable area (such as the proposed conveyor belt route along the western alignment) should be avoided. The western alignment was therefore not considered to be preferred from a technical perspective, as Eskom would then be required to relocate this conveyor in the event that the coal mining operations reach the earmarked area.

A Record of Decision (RoD) for the construction and operation of the Medupi Power Station was issued on 21 September 2006 (DEAT reference number 12/12/20/695). This RoD provided authorisation for the power station together with the required ancillary infrastructure. This ancillary infrastructure included, *inter alia*, the required coal conveyor belt between the mine and the power station, and authorised the route which this was proposed to follow. In this regard, the **eastern alignment** proposed for the coal conveyor was authorised as this was the route recommended in the EIA Report. All required infrastructure as part of the conveyor system was also authorised through this process.

Subsequent to the submission of the EIA Report and authorisation of the Medupi Power Station, Exxaro indicated to Eskom that they would now permit Eskom to construct and operate a coal conveyor along the proposed western alignment over the potentially 'mineable area' on the Farm Turfvlakte. As the western alignment option would be preferred from a technical and economic perspective, an application for amendment to the RoD was submitted to DEAT in May 2008. An amendment to the RoD in this regard was issued by DEAT in August 2008 (refer to Appendix A). The coal conveyor and associated access road will therefore be constructed along this western alignment. The coal silo will be constructed at the

2.3.2. No-go Alternative

If the coal silo, coal conveyor and associated access road are not constructed, an alternative means of delivering the coal to the power station will need to be investigated by Eskom Holdings Limited and Exxaro Resource (Pty) Ltd. This could result in significant cost implications and/or a delay in the commissioning of the Medupi Power Station which is of National strategic importance to South Africa. This alternative is therefore not considered to be a feasible alternative.

STUDY APPROACH AND METHODOLOGY CHAPTER 3

As the planned conveyor, temporary road deviation and coal silo are located on mine property, Exxaro is required to undertake an Environmental Impact Assessment (EIA) process to amend the mine's current approved Environmental Management Programme (EMP) to include this infrastructure. This process is required in terms of the Minerals and Petroleum Resources Development Act (MPRDA; Act No. 28 of 2002) and National Environmental Management Act (NEMA; Act No. 107 of 1998).

An EIA process refers to that process which involves the identification of and assessment of direct, indirect and cumulative environmental impacts associated with a proposed project. The EIA process comprises two phases: a **Scoping Phase** and an **EIA Phase**. In terms of the MPRDA, the EIA Report must be incorporated into an **Environmental Management Programme** (EMP). This legislated EIA process culminates in the submission of the EMP (in terms of the MPRDA) to the competent authority for decision-making. The **MPRDA process** is illustrated below:

The EIA undertaken for the Medupi Power Station included an assessment of all associated infrastructure, including the coal supply conveyor and coal silo. This EIA fulfils the legal requirements in terms of the National Environmental Management Act (NEMA, Act No 107 of 1998). Through consultation with the Department of Mineral Resources (DMR), it has been agreed that this study can form the basis for the EMP amendment process required to be undertaken in accordance with the MPRDA. In this regard, no additional public consultation was required to be undertaken. The public consultation process completed as part of the EIA for the Medupi Power Station and supporting documentation is included within the Draft Scoping Report submitted to the relevant authorities in May 2010.

3.1. Phase 1: Scoping Study

Scoping is the first phase of the EIA process (to inform the EMP). The Scoping Phase of the EIA aimed at identifying potential issues associated with the proposed project, and defining the extent of studies required within the EIA.

The draft Scoping Report compiled was submitted to the DMR in May 2010. This report was made available by the DMR to relevant authorities for comment. As the public were afforded the opportunity to comment on the proposed coal conveyor infrastructure as part of the EIA process for the Medupi Power Station, it was agreed by the DMR that no public review of the draft scoping report was required.

3.2. Phase 2: Environmental Impact Assessment and Environmental Management Plan

Through the Scoping Study, a number of issues requiring further study for all components of the project were highlighted. These issues have been assessed in detail within the EIA phase of the process (refer to Part 2 of this report). The EIA Phase aims to achieve the following:

» Provide an overall assessment of the social and biophysical environments likely to be affected by the proposed project.
» Assess potential direct, indirect and cumulative impacts associated with the proposed coal conveyor infrastructure.
» Identify and recommend appropriate mitigation and management measures for potentially significant environmental impacts associated with the proposed project.

The EIA assesses potential environmental impacts and benefits (direct, indirect and cumulative impacts) associated with all phases of the project including design, construction and operation, and aims to provide the regulating authorities with sufficient information to make an informed decision regarding the proposed project. The EIA for the proposed project is contained within Part 2 of this report.

3.2.1. Assessment of Issues Identified through the Scoping Process

The specialist investigations to be conducted during the Impact Assessment phase of this project will consist of the following studies:

Specialist Study	Specialist Consultant
Ecological Assessment	Riaan Robbeson of Bathusi Environmental Consultants
Heritage Assessment	Johnny van Schalkwyk

These detailed studies will include the following tasks:

» Review of existing information
» Field survey of the proposed development footprint
» Assessment of potential impacts
» Compilation of assessment report

The findings of these studies will be reflected in the Environmental Impact Assessment Report. Existing information on potential construction impacts will be included in the Draft Environmental Impact Report, and used for the evaluation of potential impacts identified during scoping.

3.2.2. Methodology for the Assessment of Impacts

Direct, indirect and cumulative impacts of the above issues, as well as all other issues identified will be assessed in terms of the following criteria:

» The **nature**, which shall include a description of what causes the effect, what will be affected and how it will be affected.
» Spatial **extent of the impact**, quantifying the spatial effect of impacts; whether the impact will be local (limited to the immediate area) or regional (having a far-ranging effect).
  1 Limited to the site and its immediate surroundings;
  2 Local/ Municipal extending only as far as the local community or urban area;
  3 Provincial/Regional;
  4 National i.e. South Africa; or
  5 Across International borders.
» **Duration of the impact** - determines the expected duration of the impact in terms of years.
  1 Immediate (less than 1 year);
  2 Short term (1-5 years);
  3 Medium term (5-15 years);
  4 Long term (the impact will cease after the operational life span of the project); or
  5 Permanent (no mitigation measures of natural process will reduce the impact after construction).
» **Magnitude of the Impact** - Quantified between the scales of small (will have no effect on the environment) and very high (will result in complete destruction of patterns and permanent cessation of processes).
  0 None (where the aspect will have no impact on the environment);
  1 Minor (where the impact affects the environment in such a way that natural, cultural and social functions and processes are not affected);

2 Low (where the impact affects the environment in such a way that natural, cultural and social functions and processes are slightly affected);
3 Moderate (where the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way);
4 High (where natural, cultural or social functions or processes are altered to the extent that it will temporarily cease), or
5 Very high / don't know (where natural, cultural or social functions or processes are altered to the extent that it will permanently cease).

» **Reversibility of the Impact**
1 Reversible (regenerates naturally);
3 Recoverable (requires human input); or
5 Irreversible

» **Consequence of the Impact:** Derived from the following formula:
Consequence = Severity + Reversibility + Duration + Spatial Scale

» **Probability of Occurrence**. Describes the likelihood of the impact actually occurring.
0 None (impact will not occur);
1 Improbable (the possibility of the impact materialising is very low as a result of design, historic experience or implementation of adequate mitigation measures);
2 Low probability (there is a possibility that the impact will occur);
3 Medium probability (the impact may occur);
4 High probability (it is most likely that the impact will occur); or
5 Definite / do not know (the impact will occur regardless of the implementation of any prevention or corrective actions or it the specialist does not know what the probability will be based on too little published information).

» **Significance of the Impact**. Based on a synthesis of the information contained in the points above and can be described as low, medium or high. Significance is determined using the following formula:
Significance of environmental impact = Consequence X Probability
* More than 60 significance points indicate HIGH environmental significance;
* Between 30 and 60 significance points indicate MODERATE environmental significance; and
* Less than 30 points indicate LOW environmental significance.

» **Status of the Impact**
* Negative effect (i.e. at a cost to the environment);
* Positive effect (i.e. at a benefit to the environment); or
* Neutral effect on the environment.

Recommendations for mitigation will be made and significance ratings before and after mitigation will be indicated.

3.2.3. Public Consultation

Through consultation with the Department of Mineral Resources (DMR), it has been agreed that this study can form the basis for the EMP amendment process required to be undertaken in accordance with the MPRDA. In this regard, no additional public consultation was required to be undertaken. The public consultation process completed as part of the EIA for the Medupi Power Station and **supporting documentation is included within the Draft Scoping Report submitted to the relevant authorities in May 2010**.

3.3. Phase 3: Environmental Management Programme

Management of existing environmental impacts at Grootegeluk Mine is covered under the existing (updated) Grootegeluk Mine EMPR as approved by DME in early 2006, as well as the Grootegeluk Medupi Extension addendum approved in 2007. Management of many of the impacts associated with the construction and operation of the proposed coal conveyor infrastructure is already addressed in this existing EMPR.

The environmental management programme for the coal conveyor infrastructure does not repeat management measures already covered in the existing EMPR, but provides cross references to applicable sections of the existing EMPR, where applicable. Only NEW management measures required for the proposed project are described in Part 3 of this report.

3.4. Regulatory and Legal Context

3.4.1. Legislation and Guidelines that have informed the preparation of this EIA/EMP

The scope and content of this EIA/EMP Report has primarily been informed by the following legislation and guidelines:

- Minerals and Petroleum Resources Development Act (MPRDA), Act No 28 of 2002);
- National Environmental Management Act (NEMA), Act No 107 of 1998;
- EIA Regulations, published under Chapter 5 of NEMA (GN R385, GN R 386 and GN R387 in Government Gazette 28753 of 21 April 2006);
- Guidelines published in terms of the NEMA EIA Regulations, in particular:
  - Guideline 3: General Guide to Environmental Impact Assessment Regulations, 2006 (DEAT, June 2006);
  - Guideline 4: Public Participation in support of the Environmental Impact Assessment Regulations, 2006 (DEAT, May 2006);

* Guideline 5: Assessment of alternatives and impacts in support of the Environmental Impact Assessment Regulations, 2006 (DEAT, June 2006);

Several other Acts, standards or guidelines have also informed the scope of issues to be addressed in the EIA (particularly in terms of the scope and methodology of specialist studies). These are summarised in Table 3.1.

3.4.2. Regulatory Hierarchy

At National and Provincial Level, the main regulatory agencies are:

» *Department of Mineral Rights:* In terms of the MPRDA, this department is responsible for the regulation of mining within South Africa in terms of the MPRDA. The DMR is the competent decision-making authority for this project. In the spirit of co-operative governance, the DMR will consult with other commenting authorities before making a decision. These would include Department of Environmental Affairs (DEA), Limpopo Department of Economic Development, Environment and Tourism (LEDET), Department of Water Affairs (DWA), Department of Agriculture, Department of Rural Development and Land Reform, and Lephalale Local Municipality.

» *The South African Heritage Resources Agency (SAHRA):* The National Heritage Resources Act (Act No 25 of 1999) provides legislative protection for listed or proclaimed heritage sites, such as archaeological sites, heritage sites and cultural sites (including graves). A permit is required to be obtained from SAHRA for the disturbance or destruction of any such site.

» *Limpopo Heritage Agency (LIHRA):* The provincial heritage authority for Limpopo Province.

Table 3.1: List of applicable legislation and compliance requirements required for the proposed coal conveyor infrastructure

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
National Legislation			
Minerals and Petroleum Resources Development Act (Act No 28 of 2002)	In terms of Section 39 and Regulation 51, an Environmental Management Programme (EMP) must be compiled for the proposed project. As an EMP already exists for the mine, an amendment to this EMP must be submitted to include the proposed new infrastructure.	Department of Minerals and Energy	An **Environmental Impact Assessment (EIA)** and an **Environmental Management Plan (EMP)** must be compiled as part of this EMP. Both parts must be submitted to the DME for review and decision-making. An EIA for the proposed coal conveyor and associated infrastructure has been undertaken (refer to Part 2 of this report), and appropriate management measures have been identified and detailed within the EMP (refer to Part 3 of this report).
National Environmental Management Act (Act No 107 of 1998)	EIA Regulations have been promulgated in terms of Chapter 5. Activities which may not commence without an environmental authorisation are identified within these Regulations. In terms of Section 24(1) of NEMA, the potential impact on the environment associated with these listed activities must be considered, investigated, assessed and reported on to the competent authority (the decision-maker) charged by NEMA with granting of the relevant environmental authorisation. In terms of GN 387 of 21 April 2006, a scoping and EIA process is required to be undertaken	National Department of Environmental Affairs – lead authority. Limpopo Department of Economic Development and Environmental Affairs – commenting authority.	An Environmental Impact Assessment (EIA) (DEAT reference number 12/12/20/695) was undertaken for the power station and associated infrastructure, and a final EIA Report was submitted to the Department of Environmental Affairs and Tourism (DEAT) in May 2006. A Record of Decision (RoD) for the construction and operation of the Medupi Power Station was issued on 21 September 2006 (DEAT reference number 12/12/20/695). This RoD provided authorisation for the power station

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
	for the proposed project		together with the required ancillary infrastructure. This ancillary infrastructure included, inter alia, the required coal conveyor belt between the mine and the power station, and authorised the route which this was proposed to follow. All required infrastructure as part of the conveyor system was also authorised through this process. Therefore, Eskom have obtained all the required authorisations in terms of the National Environmental Management Act (NEMA; Act 107 of 1998) listed activities.
National Environmental Management Act (Act No 107 of 1998)	In terms of the Duty of Care provision in S28(1) Eskom (as the project proponent on behalf of Exxaro Resources) must ensure that reasonable measures are taken throughout the life cycle of this project to ensure that any pollution or degradation of the environment associated with this project is avoided, stopped or minimised. In terms of NEMA, it has become the legal duty of a project proponent to consider a project holistically, and to consider the cumulative effect of a variety of impacts.	Department of Environmental Affairs and Tourism (as regulator of NEMA).	While **no permitting or licensing requirements** arise directly by this section of the Act, it will find application during the EIA phase and will continue to apply throughout the life cycle of the project.
National Heritage Resources Act (Act No 25 of 1999)	Section 38 states that Heritage Impact Assessments (HIAs) are required for certain kinds of development including » the construction of a road, power line, pipeline, canal or other similar linear development or barrier exceeding	South African Heritage Resources Agency (SAHRA) Limpopo Heritage Resources Agency (LIHRA)	An **HIA** was required to be undertaken for the proposed coal conveyor exceeds 300 m in length. A heritage impact assessment was undertaken as part of the EIA for the Medupi Power Station and associated infrastructure. In order

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
	300 m in length; » any development or other activity which will change the character of a site exceeding 5 000 m^2 in extent. The relevant Heritage Resources Authority must be notified of developments such as linear developments (such as roads and power lines), bridges exceeding 50 m, or any development or other activity which will change the character of a site exceeding 5 000 m^2; or the re-zoning of a site exceeding 10 000 m^2 in extent. This notification must be provided in the early stages of initiating that development, and details regarding the location, nature and extent of the proposed development must be provided. Stand alone HIAs are not required where an EIA is carried out as long as the EIA contains an adequate HIA component that fulfils the provisions of Section 38. In such cases only those components not addressed by the EIA should be covered by the heritage component.		to confirm potential impacts associated with the proposed coal conveyor infrastructure, a heritage study was completed as part of this EIA process (refer to Appendix C).
National Environmental Management: Biodiversity Act (Act No 10 of 2004)	In terms of Section 57, the Minister of Environmental Affairs and Tourism has published a list of critically endangered, endangered, vulnerable and protected species in GNR 151 in Government Gazette 29657 of 23 February 2007 and the regulations associated therewith in GNR 152 in GG29657 of 23 February 2007, which came into effect on 1 June 2007.	National Department of Environmental Affairs and Tourism	**Specialist flora and fauna studies** are required to be undertaken as part of the EIA process. Specialist studies in this regard were undertaken as part of the EIA for the Medupi Power Station and associated infrastructure. In order to confirm potential impacts associated with the proposed coal conveyor infrastructure, a biodiversity study was

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
	In terms of GNR 152 of 23 February 2007: Regulations relating to listed threatened and protected species, the relevant specialists must be employed during the EIA phase of the project to incorporate the legal provisions as well as the regulations associated with listed threatened and protected species (GNR 152) into specialist reports in order to identify permitting requirements at an early stage of the EIA phase.		completed as part of this EIA process (refer to Appendix D). **Permits** may be required to be obtained should these plants be **disturbed or destroyed** by the proposed project.
Conservation of Agricultural Resources Act (Act No 43 of 1983)	Regulation 15 of GNR1048 provides for the declaration of weeds and invader plants, and these are set out in Table 3 of GNR1048. Weeds are described as Category 1 plants, while invader plants are described as Category 2 and Category 3 plants. These regulations provide that Category 1, 2 and 3 plants must not occur on land and that such plants must be controlled by the methods set out in Regulation 15E.	Department of Agriculture	While **no permitting or licensing requirements** arise from this legislation, this Act will find application during the EIA phase and will continue to apply throughout the life cycle of the project. In this regard, soil erosion prevention and soil conservation strategies would need to be developed and implemented. In addition, a weed control and management plan would need to be implemented for the project area.
National Veld and Forest Fire Act (Act No 101 of 1998)	In terms of Section 12 Exxaro Resources would be obliged to burn firebreaks to ensure that should a veldfire occur on the property, that same does not spread to adjoining land. In terms of Section 13 Exxaro Resources must ensure that the firebreak is wide enough and long enough to have a reasonable chance of preventing a veldfire from spreading; not causing erosion; and is reasonably free of	Department of Water Affairs and Forestry	While **no permitting or licensing requirements** arise from this legislation, this Act would find application during the operational phase of the project.

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
	inflammable material. In terms of Section 17, Exxaro Resources must have such equipment, protective clothing and trained personnel for extinguishing fires as are prescribed or in the absence of prescribed requirements, reasonably required in the circumstances.		
National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)	» The Minister may by notice in the *Gazette* publish a list of waste management activities that have, or are likely to have, a detrimental effect on the environment. » The Minister may amend the list by— *(a)* adding other waste management activities to the list; *(b)* removing waste management activities from the list; or *(c)* making other changes to the particulars on the list. » Any person who stores waste must at least take steps, unless otherwise provided by this Act, to ensure that *(a)* the containers in which any waste is stored, are intact and not corroded or in any other way rendered unlit for the safe storage of waste; *(b)* adequate measures are taken to prevent accidental spillage or leaking; *(c)* the waste cannot be blown away; *(d)* nuisances such as odour, visual impacts and breeding of vectors do not arise; and	National Department of Water and Environmental Affairs	As no waste disposal site is to be associated with the proposed project, **no permit** is required in this regard. Waste handling, storage and disposal during construction and operation is required to be undertaken in accordance with the requirements of this Act, as detailed in the EMP (refer to Appendix N).

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
	(e) pollution of the environment and harm to health are prevented		

PART 2:

ENVIRONMENTAL IMPACT ASSESSMENT

DESCRIPTION OF THE AFFECTED ENVIRONMENT CHAPTER 4

This section of the EIA/EMP Report provides background to the current environmental and social setting of the Grootegeluk Coal Mine operations, as well as a description of the environment that may be affected by the proposed coal silo, coal conveyor and access road. This information is provided in order to assist the reader in understanding the possible effects of the proposed project on the environment. Aspects of the biophysical, social and economic environment that could be affected by, or could affect, the proposed development have been described. This information has been sourced largely from the existing EMPR and associated amendments for the mine, field surveys and other existing information available for the area, and aims to provide the overall context within which this EIA is being conducted. More detailed site-specific information is provided in the specialist reports contained in Appendix C and D.

4.1. Location and Land Use

The Grootegeluk Coal Mine is an existing mine located in the Limpopo Province approximately 21 km west of the town Lephalale on the farms Grootegeluk 459 LQ, Hierontrent 630 LQ, Leeuwdrift 312 LQ, Enkelbult 462 LQ, Daarby 485 LQ and Turfvlakte 463 LQ.

The coal conveyor and associated temporary access road would be constructed between the Medupi Power Station (currently being constructed by Eskom on the farm Naauwontkomen 509 LQ located approximately 4 km to the south of the mine) and the mine, across the farm Turfvlakte 463 LQ on which Exxaro hold mining and prospecting rights. The coal silo would be constructed on Exxaro-owned property within the existing mining area.

4.2. Geology

Grootegeluk Mine is exploiting coal from the Waterberg coalfield. The Waterberg coalfield strikes approximately 88 km from east to west and 40 km north-south in the Limpopo Province of South Africa and extends westwards into Botswana. The coalfield is fault-bounded along its southern and northern boundaries and forms a graben structure. The Karoo sequence in the area has been faulted by two major faults with displacements greater than 250 m, namely the Daarby fault in the

north and the Eenzaamheid fault in the south. The Eenzaamheid fault forms the southern boundary, with rocks belonging to the Waterberg Group occurring south of this fault, while the northern boundary is delineated by the Zoetfontein fault with Archaean granites outcropping north of the fault. The coalfield is further subdivided by the Daarby fault that delineates a shallower, opencast mineable western part of the coalfield and a deep north-eastern part. The Zoetfontein fault was tectonically active before and during Karoo deposition, while the Eenzaamheid and Daarby faults are younger than the Karoo sequence (Exxaro, 2009).

The original sedimentary basin in which the coal was formed extended further south than the present southern boundary (Eenzaamheid fault). Sedimentation occurred in a shallow east-west trough and the general direction of transport was ENE-WSW. Karoo sediments were deposited on the Waterberg Group in the southern portion of the coalfield, while in the north, north of the Zoetfontein fault, they were deposited on Achaean rocks. The paleo floor in the eastern portion consists of granite and basic rocks of the Bushveld Igneous Complex. Relatively few dolerite dykes outcrop in the south-eastern portion of the coalfield and to date no sills have been intersected in any exploration borehole (Exxaro, 2009).

More detailed information is available within the revised and updated EMPR, dated September 2004 and from the mine. (Golder, 2009).

4.3. Topography and Drainage

The ENPAT database indicates that the study area does not comprise any area where significant slopes are present; land type information furthermore indicates that slopes in the region generally vary between 0 and 3%. This was also confirmed during the site investigation. The general topography is described as ‘Plains’, defined an area formed from the deposition of alluvium usually adjacent to a river that periodically overflows.

The topography around the mine varies from 900 to 922 m above sea level. The area is generally featureless except for elevation differences caused by Nelsonskop (922 m) in the north and the Waterberg range (3600 m) in the south. General topographical drainage appears to be in an east-north-easterly direction towards the Mogol River and consists primarily of dry sandy gullies such as “Sandloopspruit”. The Mogol River is approximately 810 m above sea level, while the mine is approximately 900 m above sea level. This results in an almost negligible gradient of 90:21000 m or 0.0043 %.

No natural drainage channels occur on the mine area, except for Sandloopspruit which is located approximately 1 km north of the mine’s slimes dams. Due to the flat topography, highly permeable sands and the absence of any surface water

drainage courses, the mine has no direct impact on the surface hydrology of the Mogol Catchment (Exxaro, 2009).

4.4. Climate

The mine lies in the summer rainfall region of the Bushveld between the Matlabas and Mokolo Rivers. The area has a Bushveld climate with warm summers and moderate, dry winters. The area is one of summer rainfall with an average rainfall of ± 466 mm per annum, falling mainly between November and April. The summer temperatures range from 11°C to 40°C with an average temperature of 26°C. The average winter temperature is 14°C, but varies from 0 C to 28°C. The prevailing wind direction for the region is from the north east (Exxaro, 2009)

4.4.1. Mean monthly and annual rainfall

Rainfall has been monitored and the information collated by Grootegeluk Mine since the 1980's. The rainfall information is available within the revised and updated EMPR, dated September 2004 and from the mine. In summary, the annual average rainfall at the mine is 441.3 mm.

4.4.2. Mean monthly maximum and minimum temperatures

Temperatures vary between a minimum of 11°C and a maximum of 40°C during the summer and a minimum of 0°C and a maximum of 28°C during the winter in the study area. The mean monthly maximum and minimum temperatures are available within the revised and updated EMPR, dated September 2004 and from the mine.

4.4.3. Mean monthly wind direction and speed

The prevailing winds are north-easterly, with an average speed of 6.7 km/h. Storm winds are rare, although the speed increases during August and September.

4.4.4. Mean evaporation

Evaporation during the summer is approximately 14 mm/day and humidity is low. These figures are for clean water and should be verified and reduced for water of high salinity.

4.5. Surface Water

The mine is located within the Mokolo River catchment area. Natural surface water drainage appears to be in an east-north-easterly direction towards the

Mokolo River and consists of primary dry sandy gullies such as the Sandloopspruit. No clearly defined natural watercourses (channels) occur within the mine land use area (Exxaro, 2009).

Surface water is found only after a rainfall event. Due to the relatively flat topography and sandy soil cover, most of the rainwater seeps into the groundwater aquifer. As previously stated there are no natural watercourses or well-defined drainage channels on or around the expansion project site. The nearest watercourse is the Sandloop Spruit, which is located approximately 1.0 km north of the slimes dams on the boundary between the farms Applevlakte 448 LQ and Vooruit 449 LQ. As such, the expansion project falls outside the 1 in 100 year flood line (Synergistics, 2006).

4.6. Groundwater

Groundwater potential in the area is generally limited due to low permeability, storage and transmissivity. Boreholes tend to have low sustainable yields and borehole depths are variable, with levels that do not necessarily mimic the flat topography as a result of different piezometeric pressures, confined aquifers, artificial recharge and geological structures (Bohlweki, 2006). A hydrocensus that was conducted during compilation of the Grootegeluk Mine IWULA indicated that groundwater in the area is mainly used for domestic supply, limited watering of gardens and for livestock and game watering and that sufficient quantities cannot be pumped for crop irrigation purposes since the borehole yields from the regional aquifers are relatively low (Exxaro, 2009).

The geological faults, including Daarby and Eenzaamheid, act as impermeable and semi impermeable barriers for groundwater flow and divide the groundwater resource into separate compartments. Indications are that the faults act as preferential flow paths for groundwater within the compartments and thus also for potential contaminants.

Existing sources of groundwater contamination at Grootegeluk Mine include the slimes dams, process discard facility, slimes dams, the open pit, coal stockpile areas, and the unlined Olifantskop dam. Based on existing groundwater modelling, the pollution plume does not extend outside land owned by Exxaro Coal, with exception of an area to the south-east of the mining authorisation area.

It is estimated that the average pre-mining groundwater table was ~20 to 30 m below surface. A cone of depression has formed around the mining pit due to abstraction of water to keep the pit dry. The cone extends for ~8.0 km from the exposed pit faces because of groundwater seepage towards the pit and the subsequent abstraction from the pit to enable dry mining conditions.

In the area to the north of the Daarby fault, groundwater mounding has occurred because of artificial recharge from unlined water storage dams, slimes dams, water spills in and around the processing complex, as well as from stormwater ponding around the mining waste and process discard facilities. Based on existing groundwater modelling, the areas of groundwater depression (south) and mounding (north) do not extend outside land owned by Exxaro Coal (Synergistics, 2006).

Several boreholes have been drilled at Grootegeluk Mine. Some of these are equipped with pumps for extraction of groundwater to lower the elevated water table found to the north of the Daarby fault.

4.7. Waste Management

Grootegeluk Mine has developed an Integrated Mine Water and Waste Management Plan (IWWMP) that forms part of the Integrated Water Use Licence Application. The IWWMP was documented in the report: "Grootegeluk Mine, Integrated Water and Waste Management Plan", dated February 2005, with reference number KC/GG/01/2005. It is the purpose of the IWWMP to, amongst others:

» Include a detailed description of the existing mine water and waste management system implemented at the current mining operation;
» Present the design requirements and implementation proposals to ensure an integrated water management plan for Grootegeluk Mine that will allow the mine to be compliant with the requirements of DWAF as contained in Regulation GN 704, dated 1999 and the policy of the DWAF as described in the draft Best Practice Guidelines through a phased approach;
» Indicate how the four step water management hierarchy propagated by DWAF is incorporated into the mine's water management system;
» Manage the mine's water circuit according to a holistic approach where the best practicable environmental option is the ultimate goal;
» Form a partnership with DWAF that is based on cooperation and shared objectives;
» Minimise the mine's long-term environmental liabilities; and
» Form part of the IWULA compiled for the purpose of obtaining an approved Integrated Water Use License that reflects the mine's commitment to sound water management practices.

4.8. Ecology (Fauna and Flora)

4.8.1. Regional Vegetation

The study area is situated within the Limpopo Sweet Bushveld vegetation type. This vegetation type, although poorly protected (0.6%) in formal conservation areas, is largely untransformed (± 94.9%) and is therefore considered to be Least Threatened.

4.8.2. Site specific Flora

Two main land cover categories are represented within the study site, namely mining areas and natural woodland. The major form of land transformation in the region is the result of mining (opencast coal mining), with limited agriculture and urban areas. Natural woodland areas are presently in a relative undisturbed status

The SANBI database indicates the presence of 317 plant species within the 2327DA ¼ degree grid in which the study area is located. A total of 72 plant species were identified during the site investigation. The physiognomy is typical of a woodland area that is dominated by the shrub and tree stratum. The diversity of plant species within the study area is represented by 28 plant families, dominated by Poaceae, Mimosaceae and Combretaceae.

SANBI records for the region indicate the presence of 3 Red Data flora species. None of these species were observed during the site investigations and available habitat in the study area are not considered suitable for these particularly species. The protected trees *Acacia erioloba* (Camel Thorn) and *Combretum imberbe* (Leadwood) are present throughout the region; a particular dense stand of *Acacia erioloba* is present in the Closed *Acacia erioloba* Woodland unit. It is also considered highly likely that *Boscia albitrunca* (Shepard's Tree) and Marula (*Sclerocarya birrea*) are present in the area, although not noted during the field surveys.

4.8.3. Site Specific Fauna

The Grootegeluk Mine boundary area is located within a group of eighteen farms enclosed by game fences. Watering places have been installed, which has improved the condition of the game. Ferroland Wildlife Management manages this surface area with their focus on wildlife conservation. Game numbers and species have risen and animals have seemingly become used to the mining and related activities to a certain extent.

Commonly occurring species still found in Grootegeluk Mine's surroundings include Kudu, Impala, Warthog, Steenbuck and a few predators such as the African lynx and Red jackal. To date, no endangered or rare species have been identified (Exxaro, 2009).

Species recorded in the study area during the field survey include:

» A total of 13 of the butterflies listed for the 2327DA Q-grid were observed in the study area. No red data species are known from this specific Q-grid;
» A total of 17 frog species are listed for the 2327DA Q-grid, including one Red Data species, *Pyxicephalus adspersus* (NT), which is estimated to have a moderate-low probability of occurring in the study area. Four species have a moderate-low probability of occurring, 5 species a moderate and 6 species a high probability;
» A total of 18 reptile species are listed for the 2327DA Q-grid (no Red Data species). One species was confirmed in the study area. A high likelihood of occurring in the study area is estimated for the remaining 17 reptile species;
» A total of 394 bird species are listed for the 2327DA Q-grid, including 30 Red Data species including 16 Near Threatened, 13 Vulnerable and one Endangered (*Ephippiorhynchus senegalensis*). Twenty-three bird species were observed during the site investigation; and
» A total of 68 mammal species is listed for the 2327D Q-grid A, including 15 Red Data species. Thirteen species were confirmed during the site visit.

4.9. Sensitive Environments

There are no unique ecosystems, habitats for plant and animal life, wetlands, or conservation or eco-tourism activities that will be impacted on by the development. There are no sensitive environments, as defined in terms of Section 23 of the Environment Conservation Act 73 of 1989 on or around the two project sites.

4.10. Soil and Land Capability

4.10.1. Soil

The soils in the area are sandy, with 70 to 90 % of sand in the top layer to 50 to 90 % in the sub layer. The clay content ranges from 5 to 25 % in the top layer and 5 to 45 % in the sub layer. This content puts the top layer in the sandy to sandy-clay-loam texture and the sub layer in the sandy to sandy-clay texture. Silt content is low in all the soils.

A mixture of yellow-brown apedal soils and red apedal soils characterise the area around Grootegeluk Mine (Red Earth, 2004). These soils are highly permeable.

Water filters through the soil very fast, washing out nutrients and making these soils unsuitable for cultivation.

The yellow-brown apedal soils are well to moderately drained shallow to very deep (0.4 m to >1.8m). They are the most dominant soil type area and generally occur in flat to gently sloping midslope to crest positions. The red apedal soils are relatively well drained soils with intermediate to very deep depths (0.3 m to >1.8 majority) (Synergistics, 2006).

4.10.2. Pre-mining Land Capability

The surrounding land is used mainly for cattle and game farming. The different uses and capabilities of the surrounding and adjacent land have been included in the revised and updated EMPR, dated September 2004. The objective of Grootegeluk Mine, with regard to the final land capability, is to restore the land in such a way as to enable it to support wildlife management on a sustainable basis. (Synergistics, 2006)

4.11. Social Environment

The study area is situated approximately 20 km west of Lephalale in the Limpopo Province. The study area is situated in the area under the jurisdiction of Lephalale Local Municipality (NP362), which forms part of the Waterberg District Municipality (DC36). The Lephalale Local Municipality covers an area of 19 605 km^2, and consists of 11 wards. Table 4.2 below indicates the most recent employment data at Grootegeluk Coal mine (Exxaro, 2009).

Table 4.2: Summary of the recent employment composition at Grootegeluk Coal Mine

Total Employees	**1813**
Total African Employees	1216
Total Coloured Employees	6
Total Indian Employees	2
Total Black Employees	1224 (67.51 %)
Total White Employees	619
Total Female Employees	147 (8.11 %)
Disabled Employees	16 (0.88 %)

The proposed new projects will employ approximately 60 additional people during construction.

4.11.1. Population Density

Before the onset of the mining and related activities at Grootegluk Mine, a decrease of the population was a general occurrence in the region due to droughts, uneconomical units, and a shortage of infrastructure and work possibilities. A number of farms were not utilised, and uninhabited. Children completing their school education at local schools went elsewhere to seek work opportunities.

Currently, Lephalale, Onverwacht and Marapong form some of the larger towns in the region with an estimated population of more than 250,000. These towns are surrounded mainly by farms, as well as the Grootegeluk Mine and Matimba power station (Exxaro, 2009).

4.11.2. Major economic activities

Cattle farming were the major economic activity before the mining and related activities started in this region. Currently, the existing mine offers a great number of job opportunities to local as well as other labour. The power station and other secondary businesses and industries, offering additional job opportunities, commenced after the mining activities in the region were initiated. An increase in game farming in the surrounding areas over the past years is also notable (Exxaro, 2009).

4.11.3. Unemployment

Due to the decrease in the population in the region associated with droughts, a shortage of infrastructure and work opportunities, the unemployment rate before mining and related activities commenced was very high. Many farms were not utilised and were uninhabited, as previously described.

Despite the large number of job opportunities offered by the mine, the power station and other secondary businesses and industries, the surrounding areas still represent a part of the country with a very high unemployment rate, as is the case for most of the Limpopo Province (Exxaro, 2009).

4.11.4. Housing

Prior to the commencement of the Grootegeluk mining and related activities, only a few proclaimed stands were available in the study area for residential homes. At that time no industrial areas existed. Most employees working within Lephalale had to shuttle to the then so-called homelands such as Mokorong, Lebowa and Lephalale.

Since then, formal private housing has become available in Lephalale, Onverwacht and Marapong. The mine is phasing out the system whereby the mine provides housing to employees and is implementing schemes that encourage private home ownership amongst its employees.

The mine also initiated a project in collaboration with the Lephalale Municipality whereby a formal industrial property area was commissioned (Exxaro, 2009).

4.11.5. Social infrastructure

Before mining activities started, Lephalale had one primary and one secondary school. The schools had hostels to cater for the children that lived on the farms in the region. Recreational facilities were absent and only the bare essential necessities were able from a few businesses. The infrastructure was controlled by an external City Council. Government institutions such as the Police Station and Magistrates Office also existed.

Since mining and related activities commenced, additional schools, including several primary schools and a secondary school came into being. Grootegeluk Mine built and operated a hospital in the town Marapong, which is now operating as a private hospital.

The mine also established recreational facilities, for example a golf course, tennis courts, soccer, rugby and athletic sports fields (Exxaro, 2009).

4.11.6. Water supply

Currently, the main external source of water supply to the mine is from the Mokolo Dam. Raw water is treated at the Zeeland water treatment works for domestic water consumption. Grootegeluk Mine currently also supplies raw water to other bulk raw water users such as Eskom's Matimba power station, and the Lephalale Municipality. The water quantity of water used is currently still sanctioned under the water licence exemption until such time as the IWULA is approved by DWA (Exxaro, 2009).

4.11.7. Electricity

Before mining activities commenced, electricity used in the study area had to be self-generated. Electricity is now provided through the Eskom network to the Lephalale Municipality and the mine (Exxaro, 2009).

4.12. Noise

Existing noise levels in the broader region is generally low with a typical rural noise climate. I&APs see the existing Grootegeluk Mine operations and Matimba Power Station as noise nuisances. Other contributors include the conveyors transporting coal and ash, the brick works on the farm Hangklip, the railway line and traffic.

Both the proposed areas are surrounded by farms owned by Exxaro Coal and there are no sensitive receptors within 4.0 km of the proposed coal supply conveyor.

4.13. Heritage

Only a few sites of cultural or historical significance are known to occur in the region. These occur where there are rock outcrops, especially close to rivers (Bohlweki, 2006). There are no surface water or topographical features (e.g. hills, outcrops or rock shelters), that would have drawn people to settle on or around the mining are.

No archaeological or heritage sites have been identified within the Grootegeluk mining authorisation area (Grootegeluk Mine EMPR, 2004). No heritage sites were recorded within the proposed conveyor servitude during the site survey.

4.14. Visual aspects

Grootegeluk Mine is located in an industrial environment, surrounded by various other abandoned mines and Eskom coal fired power stations. Although the mine is in a remote area, the mine waste dumps and other structures of Grootegeluk Mine are visible from the two main roads to Steenbokpan and Stockpoort.

The Grootegeluk Mine site is not visible from scenic views, or tourist routes. The proposed coal silo and coal conveyor and associated access road are situated well within the boundaries of the Grootegeluk mine, with no farms located in close proximity to the project area. Therefore, the additional infrastructure will not add to the already incurred visual impact on the surrounding environment.

ASSESSMENT OF IMPACTS ASSOCIATED WITH THE PROPOSED COAL SUPPLY INFRASTRUCTURE CHAPTER 5

This section of the report provides an assessment of potentially significant environmental impacts associated with the proposed coal supply infrastructure between the Grootegeluk Coal Mine and Medupi Power Station. In addition, recommendations are made regarding measures for the management of the impacts for inclusion in the Environmental Management Plan (refer to Part 3).

5.1. Potential Impacts Associated with the Proposed Coal Supply Infrastructure as Identified through the Scoping Study

It is anticipated that the construction and operation of the proposed coal silo and conveyor would impact on the surrounding environment. Potential impacts identified through this scoping study include:

» ***Construction phase:***
- Impacts on sensitive vegetation and habitats
- Impacts on protected tree species
- Loss of species of special concern
- Impacts on heritage sites
- Intrusion impacts, including dust, noise and visual impacts
- Water resource contamination, erosion and soil degradation

» ***Operation Phase:***
- Visual impacts
- Noise impacts

Due to the location of the coal silo and coal supply conveyor within the existing mining area, it is not expected that the construction or operation of these two facilities will have a significant impact on aesthetics, groundwater, geo-hydrology, air quality or noise within the current mining area. Therefore, these issues will not be assessed in further detail.

Potential impacts which may arise as a result of the proposed development include **impacts on ecology** and **impacts on heritage sites**. These issues are assessed and rated in this section of the impact assessment, and appropriate mitigation measures recommended.

5.2. Assessment of Potential Impacts on Ecology

No impacts were identified that could lead to any beneficial impact on the ecological environment of the study area since the proposed development is largely destructive.

Direct impacts, such as habitat destruction and modifications, are regarded immediate, long-term and of high significance. These impacts are mostly measurable and fairly easy to assess as the effects thereof is immediately visible and can be determined to an acceptable level of certainty. In contrast, the effect of indirect impacts is not immediately evident and can consequently not be measured immediately. A measure of estimation is therefore necessary in order to evaluate these impacts. Lastly, impacts of a cumulative nature places direct and indirect impacts of this projects into a regional and national context, particularly in view of similar or resultant developments and activities.

Potential direct, indirect and cumulative impacts of significance which could be associated with the proposed development include:

» Direct impacts:
  * Destruction of protected tree species;
  * Direct impacts on threatened fauna species;
» Indirect Impacts:
  * Floristic species changes within the servitudes;
  * Faunal interactions with structures, servitudes and personnel; and
  * Impacts on surrounding habitat/ species;
» Cumulative Impacts:
  * Increase in local and regional fragmentation/ isolation of habitat; and
  * Increase in environmental degradation.

The assessment of these impacts is provided in the tables which follow.

Nature: Destruction of Protected Tree Species

Tree species included in the National List of Declared Protected trees (as promulgated by the National Forests Act, 1998 (No 84 of 1998)) are present throughout the study area and impacts will be unavoidable, stemming from physical habitat disturbance. As a result of the distribution patterns of most of these species and their abundance in the study area, the level of impact on these species (in terms of conservation status) is not as severe as in the case of Red Data flora species. However, localised areas were identified that constitute important stands of certain species and the significance of impacts are likely to be high in these particular areas.

	Without Mitigation	**With Mitigation**
Extent	Provincial/Regional (3)	Local (2)
Duration	Permanent (5)	Long-term (4)
Magnitude	High (4)	High (4)

Reversibility	Irreversible (5)	Recoverable (requires human input) (3)
Consequence	17	13
Probability	Definite (5)	High probability (4)
Significance	**High (85)**	**High (52)**
Status	Negative	Negative
Irreplaceable loss of resources?	Yes, destruction of protected trees	
Can impacts be mitigated	Yes/ moderate	
Mitigation	Utilisation of existing lines of degradation, replanting of individuals	
Cumulative Impacts	Environmental degradation, regional impacts on protected tree species	
Residual Impacts	Loss of habitat suitable for protected tree species	

Nature: Direct Impacts on Threatened Fauna Species

Direct threats to threatened fauna species is regarded low in probability, mainly as a result of the ability of fauna species to migrate away from areas where impacts occur. Probably the only exception to this statement will be in the event where extremely localised habitat that are occupied by threatened fauna species are impacted by construction and operational activities to the extent that the habitat no longer satisfy the habitat requirements of the particular species, or where an increase in the isolation and fragmentation factors renders the remaining habitat inadequate. It should also be noted that most of the threatened fauna species potentially occurring in the study area have relatively wide habitat preferences and ample suitable habitat is presently available throughout the study area. To place this aspect into context it is estimated that habitat loss and transformation resulting from non-invasive and often overlooked impacts, such as overgrazing, infestation by invasive shrubs and selective hunting probably are likely to contribute more to impacts on most threatened fauna species than this type of linear development.

	Without Mitigation	**With Mitigation**
Extent	National (4)	National (4)
Duration	Long-term (4)	Long-term (4)
Magnitude	High (4)	High (4)
Reversibility	Recoverable (requires human input) (3)	Reversible (regenerates naturally) (1)
Consequence	15	13
Probability	Low probability (2)	Improbable (1)
Significance	**Moderate (30)**	**Low (13)**
Status	Negative	Negative
Irreplaceable loss of resources?	Yes	
Can impacts be mitigated	Yes	
Mitigation	Allowance for adequate movement	
Cumulative Impacts	Regional destruction of habitat suitable for RD species, increased habitat fragmentation & isolation	
Residual Impacts	Decreased habitat available for RD species	

Nature: Floristic Species Changes within the Servitudes

This impact is regarded an indirect impact. The transformation of particularly woodland habitat during the construction process will inevitably result in the establishment of habitat types that are not considered representative of the region. As a result of the severity of habitat manipulation, servitudes are frequently invaded by species not normally associated with the region (exotic and invasive species). In addition, many species that are not necessarily abundant in the region will increase in abundance as a result of more favourable habitat conditions being created as a result of habitat manipulation activities (encroacher species). This effect is more pronounced in the floristic component, but changed habitat conditions in the servitude will inevitably imply changes in the faunal component that occupies the habitat, albeit on local scale.

If left unmitigated, this risk will result in decreased habitat, increased competition and lower numbers of endemic biota, the genetic pool of species might eventually be influenced by the introduction of non-endemic species. Different faunal assemblages and plant communities have developed separate gene structures as a result of habitat selection and geographical separation and the introduction of individuals of the same species that might be genetically dissimilar to the endemic species might lead to different genetic selection structures, eventually affecting the genetic structure of current populations and assemblages.

	Without Mitigation	**With Mitigation**
Extent	Limited to the site and its immediate surroundings (1)	Limited to the site and its immediate surroundings (1)
Duration	Long-term (4)	Short term (2)
Magnitude	Moderate (3)	Low (2)
Reversibility	Recoverable (requires human input) (3)	Recoverable (requires human input) (3)
Consequence	11	8
Probability	High probability (4)	Medium probability (3)
Significance	**Moderate (44)**	**Low (24)**
Status	Negative	Negative
Irreplaceable loss of resources?	No	
Can impacts be mitigated	Yes/ high	
Mitigation	Implementation of monitoring programme, maintenance, prevention of infestation	
Cumulative Impacts	Limited impact on status of regional vegetation	
Residual Impacts	Transformation of natural habitat	

Nature: Faunal Interactions with Structures, Servitudes & Personnel

It should be noted that animals generally avoid contact with human structures, but do grow accustomed to structures after a period. While the structures are usually visible as a result of clearance around tower footprints, injuries and death of animals do occur sporadically as a result of accidental contact. Large mammals are mostly prone to this type of impact. In particular, primate species such as baboons and monkeys are known to

climb pole and fence structures. Continuous movement of the conveyor furthermore implies a constant threat to animal species that might become trapped or entangled.

The presence of personnel within the servitude during construction and operational periods will inevitably result in some contact with animals. While most of the larger animal species are likely to move away from human contact, dangerous encounters with snakes, scorpions and possibly larger predators always remain a possibility. Similarly, the presence of humans within areas of natural habitat could potentially result in killing of animals by means of snaring, poaching, road kills, poisoning, trapping, etc.

	Without Mitigation	**With Mitigation**
Extent	Limited to the site and its immediate surroundings (1)	Limited to the site and its immediate surroundings (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	High (4)	Moderate (3)
Reversibility	Recoverable (requires human input) (3)	Recoverable (requires human input) (3)
Consequence	12	11
Probability	Definite (5)	Medium probability (3)
Significance	**High (60)**	**Moderate (33)**
Status	Negative	Negative
Irreplaceable loss of resources?	No	
Can impacts be mitigated	Yes/ moderate	
Mitigation	Allowance for adequate movement for animals	
Cumulative Impacts	Habitat isolation & fragmentation	
Residual Impacts	Transformation of natural habitat	

Nature: Impacts on Surrounding Habitat/ Species

Surrounding areas and species present in the direct vicinity of the study area could be affected by indirect impacts resulting from construction and operation activities. This indirect impact could potentially include all of the above impacts, depending on the sensitivity and status of surrounding habitat and species as well as the extent of impact activities.

	Without Mitigation	**With Mitigation**
Extent	Limited to the site and its immediate surroundings (1)	Limited to the site and its immediate surroundings (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Moderate (3)	Low (2)
Reversibility	Recoverable (requires human input) (3)	Recoverable (requires human input) (3)
Consequence	11	10
Probability	Medium probability (3)	Low probability (2)
Significance	**Moderate (33)**	**Low (20)**
Status	Negative	Negative

Irreplaceable loss of resources?	No
Can impacts be mitigated	Yes/ moderate
Mitigation	Implementation of monitoring programme, maintenance, prevent spread of impacts
Cumulative Impacts	Limited impact on regional vegetation type
Residual Impacts	Transformation of natural habitat

Nature: Increase in Local & Regional Fragmentation / Isolation of Habitat

Uninterrupted habitat is a precious commodity for in modern times, particularly in areas that are characterised by moderate and high levels of transformation. The loss of natural habitat, even small areas, implies that biological attributes have permanently lost that ability of occupying that space, effectively meaning that a higher premium is placed on available food, water and habitat resources in the immediate surrounds. This, in some instances might mean that the viable population of plants or animals in a region will decrease proportionally with the loss of habitat, eventually decreasing beyond a viable population size.

The danger in this type of cumulative impact is that effects are not known, or is not visible; with immediate effect and normally when these effects become visible they are beyond repair. Linear types of developments affect the migratory success of animals in particular.

Habitat fragmentation and isolation are generally not increased significantly when linear developments are placed adjacent to existing lines of transformation, such as roads or railways. In contrast, linear developments within areas of previously unfragmented habitat will result in significant cumulative habitat fragmentation and isolation impacts.

	Without Mitigation	**With Mitigation**
Extent	Local (2)	Local (2)
Duration	Long-term (4)	Long-term (4)
Magnitude	Moderate (3)	Low (2)
Reversibility	Recoverable (requires human input) (3)	Recoverable (requires human input) (3)
Consequence	12	11
Probability	Definite (5)	Medium probability (3)
Significance	**High (60)**	**Moderate (33)**
Status	Negative	Negative
Irreplaceable loss of resources?	Yes	
Can impacts be mitigated	Yes/ moderate	
Mitigation	Detailed rehabilitation after cessation of impact, implementation of monitoring programme, maintenance, prevent spread of impacts	
Cumulative Impacts	Increase in regional fragmentation & isolation of natural habitat	
Residual Impacts	Transformation of natural habitat	

Nature: Increase in Environmental Degradation

Cumulative impacts associated with this type of development will lead to initial, incremental or augmentation of existing types of environmental degradation, including impacts on the air, soil and water present within available habitat. Pollution of these elements might not always be immediately visible or readily quantifiable, but incremental or fractional increases might rise to levels where biological attributes could be affected adversely on a local or regional scale. In most cases are these effects are not bound and is dispersed, or diluted over an area that is much larger than the actual footprint of the causal factor.

Similarly, developments in untransformed and pristine areas are usually not characterised by severe environmental degradation of the general surrounds; these impacts are usually most prevalent in areas where continuous and long-term impacts have been experienced.

	Without Mitigation	**With Mitigation**
Extent	Limited to the site and its immediate surroundings (1)	Limited to the site and its immediate surroundings (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Low (2)	Low (2)
Reversibility	Recoverable (requires human input) (3)	Recoverable (requires human input) (3)
Consequence	10	10
Probability	Definite (5)	Medium probability (3)
Significance	**Moderate (50)**	**Moderate (30)**
Status	Negative	Negative
Irreplaceable loss of resources?	No	
Can impacts be mitigated	Yes/ moderate	
Mitigation	Implementation of monitoring programme, maintenance, prevent spread of impacts	
Cumulative Impacts	Cumulative increase of degradation, in association with other development in region	
Residual Impacts	Localised areas of degradation/ transformation	

5.2.1. Conclusions and Recommendations

The significance of impacts associated with the proposed development on sensitive biodiversity attributes within the servitude is regarded high as a result of the destructive nature of the development. Although the extent of the impact is relatively localised and small in extent, and relative insignificant when compared to other nearby developments, the cumulative effect of habitat loss is regarded significant. Impacts on protected tree species are regarded significant, particularly since an exceptionally high density is present within one of the ecological habitat types. While this species is distributed throughout the region, this high density of individuals is regarded an important attribute. This impact

can be mitigated to some extent, but the overall impact is still regarded moderately significant.

Direct and indirect impacts on fauna species within the remainder of the natural environment is regarded highly significant. While it is possible to mitigate these impacts to some extent, the level of impact will still remain significant, also contributing to increasing levels of habitat loss, fragmentation and isolation.

The significance of impacts of a moderate status can effective be minimised by the implementation of generic and site specific mitigation measures. Mitigation measures should include the exclusion of sensitive areas from the proposed development and the implementation of generic mitigation measures to prevent surface disturbances during the construction phase. These areas should ideally be included in the development as natural open spaces while additional areas should be included as corridors for the movement of biota between areas of sensitivity.

The implementation of a bio-monitoring programme is recommended that should address issues of alien and invasive plant species control and general maintenance. With the successful implementation of mitigation measures the significance of this impact is considered low.

5.3. Assessment of Potential Impacts on Heritage Sites

As no heritage sites occur in the study area, there would be no impact resulting from the proposed development. Therefore, from a heritage point of view it is recommended that the proposed development can continue. However, it is recommended that should any archaeological sites or graves be exposed during construction work, these should immediately be reported to a heritage practitioner so that an investigation and evaluation of the finds can be made.

PART 3:

ENVIRONMENTAL MANAGEMENT PROGRAMME

ENVIRONMENTAL MANAGEMENT PROGRAMME: PROPOSED COAL SUPPLY INFRASTRUCTURE CHAPTER 6

An Environmental Management Programme (EMP) provides a link between the impacts predicted and mitigation measures recommended within the Environmental Impact Assessment, and the implementation and operational activities of a project. As the establishment and operation of the proposed coal supply infrastructure can have an impact on the environment, it is imperative that these activities are managed and mitigated so that unnecessary or preventable environmental impacts do not result. The primary objective of the EMP is to detail actions required to address the impacts identified in the EIA (as detailed in Section 5) during the establishment, operation and rehabilitation of the proposed infrastructure. The EMP provides an elaboration of how to implement the mitigation measures documented in the EIA.

6.1. Current Environmental Management at Grootegeluk Mine

Environmental impacts at Grootegeluk Mine are managed according to the updated Grootegeluk Mine EMPR as approved by DME early in 2006 as well as through various procedures that form part of the Grootegeluk Mine Environmental Management System (EMS). Management of many of the impacts associated with the construction and operation of the proposed coal supply infrastructure is already addressed in this existing EMPR.

The environmental management programme for the coal supply infrastructure does not repeat management measures already covered in the existing EMPR, but provides cross references to applicable sections of the existing EMPR, where applicable. Only NEW management measures required for the proposed project are described in this section of the report.

6.2. Aim of the Environmental Management Programme

The aim of the EMP is to help ensure continuous improvement of environmental performance, reducing negative impacts and enhance positive effects during the establishment and operation of the proposed infrastructure. An effective EMP is concerned with both the immediate outcome as well as the long-term impacts of the project. The overall objectives are therefore:

» To outline mitigation measures, and environmental specifications which are required to be implemented for the planning, establishment, rehabilitation and operation/maintenance phases of the project in order to minimise and manage the extent of environmental impacts.
» To ensure that the establishment and operation phases of the coal supply infrastructure do not result in undue or reasonably avoidable adverse environmental impacts, and ensure that any potential environmental benefits are enhanced.
» To identify entities who will be responsible for the implementation of the measures and outline functions and responsibilities.
» To propose mechanisms for monitoring compliance, and preventing long-term or permanent environmental degradation.
» To facilitate appropriate and proactive response to unforeseen events or changes in project implementation that were not considered in the EIA process.

6.3. Structure of the EMP

The EMP has been developed as a set of environmental specifications (i.e. principles of environmental management) which are appropriately contextualised to provide clear guidance in terms of the implementation of these specifications within the study area. The various actions that are required to be implemented to ensure that the environmental objectives are met are detailed in the EMP. The actions are aimed at mitigating and managing environmental impacts throughout the life cycle of the proposed project. The management actions are stated in a manner that ensures that they can be audited during the performance assessment programme.

6.4. Project Responsibilities

6.4.1. Grootegeluk's Responsibility for EMP implementation

Responsibility for implementation of the Construction EMP for the coal supply infrastructure rests with Eskom as they will be responsible for this construction process.

1. The following will be the responsibility of the project management team, i.e. the Medupi Environmental Manager in conjunction with the Medupi Environmental Control Officer (ECO) and the contractors ECO:

    1.1. Ensure that all environmental activities delegated to contractors operating on site are implemented.
    1.2. Ensure that all conditions of the EMP are implemented.

1.3. Resolve any conflicts that may arise regarding implementation of the EMP.

2. Eskom will ensure that all contracting companies tendering for work, receive a copy of the EMP and understand their responsibility to operate within the framework of the measures defined in the EMP. When adjudicating tenders Eskom will ensure that contractors have made appropriate allowance for management of environmental matters.
3. Eskom will ensure that, on appointment, all contracting companies operating on the site receive a copy of the EMP and understand their responsibility to operate within the framework of the measures defined in the EMP.
4. Eskom will ensure that all contractors will undergo a SHEQ induction on site which will include environmental and social issues and awareness training to build capacity of staff regarding management of the environment. Such induction and awareness training must also clearly identify to all contractors and their staff any sensitive areas on and near the site, which are no go areas.
5. Eskom will ensure that the responsibility for implementing and adhering to the conditions of the EMP will form part of the conditions of appointment of all contractors.
6. The Medupi Environmental Manager in conjunction with the Medupi ECO and the contractors ECO will brief contractors about any no development / no go areas. These may include:
   * Neighbouring farms.
   * Manketti reserve.
   * Any other areas as pointed out by the Medupi Environmental Manager in conjunction with the Medupi ECO and the contractors ECO.
7. The Medupi Environmental Manager in conjunction with the Medupi ECO and the contractors ECO will ensure that all environmental incident or breach of the conditions of the EMP are reported to the Environmental Manager within 8 hours of occurrence of such event; as well as that the incident is recorded on the mine's incident management system.
8. Should any significant incidents occur it will immediately be reported to the SHEQ Department as well as the Medupi Environmental Manager. The Medupi Environmental Manager will then notify the controlling authority within 48 hours of occurrence of such an incident, should the environmental incident constitute a breach of any legislation, permit or license condition.

6.4.2. Responsibilities of Contractors during Construction

1. All contracting companies will receive a copy of the EMP at time of tender. Each contractor is to familiarise himself with the environmental management framework for the site and ensure that contracting prices allow for environmental management costs.

2. The EMP will be appended to the construction contract and the appointed contractor will be legally and contractually bound to adhere to the prescriptions of the construction EMP. It is the responsibility of the contractor to ensure that all of their staff are aware of the measures applicable to their area of work on site.
3. It is the responsibility of the contractor to bring to the attention of the Medupi Environmental Manager, the Medupi ECO and the contractors ECO any environmental incident or breach of the conditions of the EMP, within 8 hours of occurrence of such event.

6.4.3. Eskom's Responsibility for EMP implementation during operation

Eskom shall implement an Environmental Management System (EMS) in order to ensure that Eskom:

» takes all reasonable steps to avoid and, where it is unavoidable, minimise pollution and degradation of the environment; and
» is aware of and monitors compliance with all applicable environmental legislation.

All operational activities must be undertaken in accordance with the approved Operational Procedure which is to be compiled.

6.5. Emergency Procedures

Emergency procedures indicate the actions to be taken in the case of an environmental emergency. An environmental emergency refers to an event that could result in a pollution incident or damage to the biophysical or social environment including surrounding habitats or land use. The coal supply infrastructure will operate according to Eskom emergency procedures. Environmental emergency procedures required as a result of the proposed project activities have been detailed below.

6.5.1. Spillage of a Fuel, Oil, Lubricant or any Other Chemical Substance

The following are to be included as key criteria of the emergency procedure:

» Material safety data (MSD) sheets are to be obtained for any hazardous chemicals stored on site. These should be kept in close proximity to where the chemicals are stored on-site, and must contain sufficient information on environmental risks and clean-up measures.
» Spill kits are to be purchased and kept on site in close proximity to fuel/oil/lubricant storage areas. These should include a bucket, absorbent material (sand or commercial product such as Peatsorb) and a spade.

» A suitable product for the treatment of soils contaminated with hydrocarbons is to be obtained and kept on-site.

In the event of a chemical spill taking place on site, the following actions should take place:

» Close, seal or otherwise prevent further spillage from the source.
» Take reasonable steps to contain the spilled product. This may include the construction of earth berms. Attention should be given to the protection of watercourses and drainage lines.
» Notify the Medupi Environmental Manager, the Medupi ECO and the contractors ECO of the spill.
» Lift and remove as much of the spilled material as practical.
» In the case of a hydrocarbon spill, add an absorbent material to remove the remaining material.
» In the case of any other chemical spill, handle and remove the material in accordance with the MSD requirements.
» Place all spilled material and absorbent material used in clean-up in a container for disposal as hazardous waste.
» In the case of a hydrocarbon spill, treat any contaminated soil in the footprint area with a suitable product for the in situ remediation of such spills.
» The incident is to be reported as part of the incident reporting procedure. The cause is to be investigated and measures put in place to prevent such an incident from re-occurring.

6.5.2. Emergency Procedures in the Event of Fire

A 3m wide fire break outside of either side of the coal conveyor servitude will be cleared by Eskom during the construction of the conveyor. The fire break areas will be maintained by Exxaro Resources.

The following are to be included as key criteria of the emergency procedure in the event of a fire:

» Attempt to extinguish or contain the fire using beaters, a water cart or any other fire extinguishing media.
» Contact details of neighbouring landowners are to be kept on hand at the mine site.
» The making of fires for cooking, warmth or any other purposes, except in the demarcated cooking area, is to be prohibited.

In the event of a fire starting on site, the following steps are to be implemented:

» Attempt to extinguish or contain the fire, using beaters, extinguishers and/or local water source stored for such purposes. Elicit help of all appropriately trained staff members in the area if necessary.
» If the fire cannot be extinguished or contained using these measures, the Medupi Environmental Manager is to be contacted and notified of the location and extent of fire.
» All flammable substances in the path of the fire are to be removed.
» Notify the emergency services of the fire and elicit assistance in fighting the fire.
» Contact neighbouring landowners who have property in the path of the fire.
» The incident is to be reported as part of the incident reporting procedure. The cause is to be investigated and measures put in place to prevent such an incident from re-occurring.

6.6. Environmental Management during Planning and Design

6.6.1. Goal for Planning and Design

Overall Goal for Planning and Design: Undertake the planning and design phase of the coal supply infrastructure in a way that:

» Ensures that the design of the project components responds to the identified environmental constraints and opportunities.
» Ensures that the best practicable environmental options are selected for all components of the project.
» Enables the required construction activities to be undertaken without significant disruption to other land uses in the area.

6.6.2. Objectives for Planning and Design

In order to meet this goal, the following objectives have been identified, together with necessary actions and monitoring requirements.

OBJECTIVE: To ensure that the design of the project responds to the identified environmental constraints and opportunities

Project component/s	Project components affecting the objective: » Coal conveyor » access roads
Potential Impact	» Design fails to respond optimally to the environmental considerations » conveyor route design that degrades the environment

	unnecessarily, particularly with respect to loss of indigenous flora and erosion
Activities / risk sources	» Alignment of coal conveyor and positioning of access roads within the approved conveyor servitude
Mitigation: Target / Objective	» To ensure that the design of the project components respond to the identified environmental constraints and opportunities » To ensure selection of best practicable environmental option for alignment for the coal conveyor and access road

Mitigation: Action / control	Responsibility	Timeframe
As far as possible, align coal supply conveyor make optimal use of existing lines of degradation through sensitive environments.	Eskom	Design Phase
Conduct a final walkthrough prior to commencement of construction activities. Responsibilities should be ensuring absence of Red Data species from construction sites, identification of localised areas of significance	Ecological specialist consultant Medupi Environmental Manager; Medupi ECO	Planning & Design Phase
Include planning and design level mitigation measures recommended by the ecological specialist following the walk-though survey.	Engineering Design Consultant	Design Phase
Balance technical and financial considerations against environmental constraints and opportunities in finalising the design of key elements.	Eskom	Tender Design & Design Phase
A fire management plan as well as an emergency management plan should be developed.	Eskom	Planning & Design Phase

Performance Indicator	» Design meets objectives and does not degrade the environment. » Design and layouts respond to the mitigation measures and recommendations in the EIA report and recommendations of the specialist walk-though survey. » Final surveyed route alignment minimises any negative environmental impacts and maximises any benefits.
Monitoring	» Ensure that the design implemented meets the objectives and mitigation measures in the EIA report through review of the design by the Medupi Environmental Manager and the Medupi ECO prior to the commencement of construction.

6.7. Environmental Management during Construction

It is anticipated that the construction of the proposed coal silo and conveyor would impact on the surrounding environment. Potential impacts identified include:

» Impacts on sensitive vegetation and habitats
» Impacts on protected tree species
» Loss of species of special concern
» Impacts on heritage sites
» Intrusion impacts, including dust, noise and visual impacts
» Water resource contamination, erosion and soil degradation

6.7.1. Overall Goal for Construction

Overall Goal for Construction: Undertake the construction phase of the coal supply infrastructure in a way that:

» Ensures that construction activities are properly managed in respect of environmental aspects and impacts.
» Enables the construction activities to be undertaken without significant disruption to other land uses in the area, in particular with regard to effects on local residents, farming practices, road use and noise impacts.
» Minimises the impact on the vegetation, fauna and habitats within the area.
» Minimises the impact on the archaeological and historical value of the area, and where possible adds to the archaeological record of this area.

6.7.2. Objectives for Construction

In order to meet the goals, the following objectives have been identified, together with necessary actions and monitoring requirements.

OBJECTIVE: Environmentally sensitive site establishment

Construction equipment may need to be stored at an appropriate location on site for the duration of the construction period.

Project component/s	Project components affecting the objective: » Coal conveyor » Coal silo » access roads
Potential Impact	» Damage to protected / endangered vegetation » Damage to and/or loss of topsoil » Compacting of ground » Impacts on the surrounding environment due to inadequate storage of equipment, materials and disposal of waste
Activities/risk sources	» Bush clearing and levelling of equipment storage area/s » Access to and from the equipment storage area/s

Mitigation: Target/Objective	» To minimise impacts on the social and biophysical environment. » To limit equipment storage to within the demarcated site

Mitigation: Action/control	Responsibility	Timeframe
The exact siting of the construction equipment camp shall be negotiated with Exxaro, and must take cognisance of any sensitive areas identified by the EIA studies. The location of this construction equipment camp shall be identified together with the Medupi Environmental Manager in conjunction with the Medupi ECO and the contractors ECO, and approved by the Project Engineer.	Contractor	Pre-construction
Minimise bush clearing and levelling for equipment storage areas.	Contractor	Erection: during site establishment Maintenance: for duration of Contract
Avoid the removal of protected tree species for equipment storage areas.	Contractor	Erection: during site establishment Maintenance: for duration of Contract
Minimise the possibility of erosion due to removal of vegetation.	Contractor	Erection: during site establishment Maintenance: for duration of Contract
Establish the necessary ablution facilities with chemical toilets. Provide adequate sanitary facilities and ablutions for construction workers (1 toilet per every 15 workers) at appropriate locations on site.	Contractor	Erection: during site establishment Maintenance: for duration of Contract
Supply adequate waste collection bins at construction equipment camps and on site where construction is being undertaken.	Contractor	Erection: during site establishment Maintenance: for duration of Contract

Performance Indicator	» No visible erosion scars once construction in an area is completed. » No claims regarding damage leading to litigation due to unauthorised removal of vegetation. » Permits for the removal of or damage to protected tree species. » No damage to wetland or riverine areas.
Monitoring	» Regular audits of the construction camps and areas of construction in the project development area. » An incident reporting system (which is in line with Eskom's requirements in this regard) should be used to record non-conformances to the EMP.

OBJECTIVE: Securing of the site

Care should be taken that the construction activities do not pose any safety risks to the animals and the public. All unattended open excavations shall be adequately demarcated and/or fenced (fencing shall consist of a minimum of three strands of wire wrapped with danger tape). Adequate protective measures must be implemented to prevent unauthorised access to the working area and the access routes.

Project component/s	Project components affecting the objective: » Coal supply conveyor » Coal silo » Access roads
Potential Impact	» Hazards to animals and public » Security of materials and equipment
Activities/risk sources	» Open excavations (foundations)
Mitigation: Target/Objective	» To secure the site against unauthorised entry » To protect members of the public/landowners/residents

Mitigation: Action/control	Responsibility	Timeframe
Secure site, working areas and excavations in an appropriate manner, as agreed with the SHE Representative and ECO.	Contractor	Erection: during site establishment Maintenance: for duration of Contract
Where necessary to control access, fence and secure the area.	Contractor	Erection: during site establishment Maintenance: for duration of Contract
Fence and secure Contractor's equipment camp.	Contractor	Erection: during site establishment Maintenance: for duration of Contract
The construction sites should be fenced off to avoid any unauthorised individuals entering the site.	Contractor	During of construction

Performance Indicator	» Site is secure and there is no unauthorised entry. » No members of the public or animals injured.
Monitoring	» Regular visual inspection of fence for signs of deterioration/forced access. » An incident reporting system (which is in line with Eskom's requirements in this regard) should be used to record non-

	conformances to the EMP.

OBJECTIVE: Protection of sensitive areas, vegetation and faunal habitats

Potential direct, indirect and cumulative impacts of significance which could be associated with the proposed development include:

» Direct impacts:
  * Destruction of protected tree species;
  * Direct impacts on threatened fauna species;
» Indirect Impacts:
  * Floristic species changes within the servitudes;
  * Faunal interactions with structures, servitudes and personnel; and
  * Impacts on surrounding habitat/ species;
» Cumulative Impacts:
  * Increase in local and regional fragmentation/ isolation of habitat; and
  * Increase in environmental degradation.

The significance of impacts associated with the proposed development on sensitive biodiversity attributes within the servitude is regarded high as a result of the destructive nature of the development. Although the extent of the impact is relatively localised and small in extent, and relative insignificant when compared to other nearby developments, the cumulative effect of habitat loss is regarded significant. Impacts on protected tree species are regarded significant, particularly since an exceptionally high density is present within one of the ecological habitat types. While this species is distributed throughout the region, this high density of individuals is regarded an important attribute. This impact can be mitigated to some extent, but the overall impact is still regarded moderately significant.

Direct and indirect impacts on fauna species within the remainder of the natural environment is regarded highly significant. While it is possible to mitigate these impacts to some extent, the level of impact will still remain significant, also contributing to increasing levels of habitat loss, fragmentation and isolation.

The significance of impacts of a moderate status can effective be minimised by the implementation of generic and site specific mitigation measures.

Project component/s	List of project components affecting the objective: » Coal supply conveyor » Coal silo » Access roads
Potential Impact	» Localised loss of sensitive or protected plant species » Disturbance and/or destruction of sensitive terrestrial habitats » Disturbance to plant communities and habitats
Activity/risk source	» Clearing of coal conveyor servitude and access roads » Traffic to and from site during all phases of construction (i.e. from surveying to rehabilitation of an area). » Site preparation and earthworks » Excavation of foundations » Mobile construction equipment » Dumping or damage by construction equipment outside of demarcated construction areas.
Mitigation: Target/Objective	» To retain natural vegetation as far as possible. » To minimise footprints of disturbance of vegetation/habitats in the study area

Mitigation: Action/control	Responsibility	Timeframe
Conduct a final walkthrough prior to commencement of construction activities in order to ensure absence of Red Data species from construction sites and identification of localised areas of significance.	Specialist consultant Medupi Environmental Manager Medupi ECO Contractors ECO	Pre-construction
Locate and mark all Protected tree species that will be affected within the final alignment. Where feasible, protected tree species should be removed and replanted, or maintained in a temporary nursery for rehabilitation purposes.	Specialist consultant Medupi Environmental Manager Medupi ECO Contractors ECO	Pre-construction
Obtain necessary and required approval for damage/ removal/ cutting/ pruning of Protected tree species from Department of Forestry, as per National Forests Act (Act No. 84 of 1998) under Government Notice GN 1012 of 2004 and GN 767 of 2005	Contractor/ Eskom	Pre-construction
Areas to be cleared shall be clearly marked in the field to eliminate unnecessary clearing.	Contractor in consultation with Specialist	Pre-construction
The extent of clearing and disturbance to the indigenous vegetation shall be kept to a minimum so that the impact on flora and fauna habitats is restricted.	Contractor	Site establishment & duration of contract

Mitigation: Action/control	Responsibility	Timeframe
During construction, unnecessary disturbance to habitats shall be strictly controlled. Avoiding any sensitive habitats with construction vehicles and equipment during construction must be ensured.	Contractor in consultation with Specialist	Duration of contract
Utilise existing access roads as far as possible.	Contractor	Duration of contract
Identify areas that will be suitable for new access roads, ensuring proper upgrade/ construction/ maintenance in order to limit erosion, proliferation of weeds, etc.	Contractor	Duration of contract
As far as practical, limit construction, maintenance and inspection activities to dry periods in order to curb occurrence/ augmentation of erosion in areas of existing erosion, destabilizing of substrate in wetlands/ riparian zones, etc	Contractor	Duration of contract
A site rehabilitation programme shall be formulated following the specialist walk-though survey, and must be implemented as soon as possible after construction is completed in an area.	Contractor in consultation with Specialist	Duration of contract
Remove invasive and alien vegetation, particularly in vicinity of riparian zones transformed areas where alien and invasive trees are known to occur.	Contractor Medupi Environmental Manager Medupi ECO Contractors ECO	Construction phase
Prevent impacts on any surface water as a result of hazardous materials, contamination, unnecessary crossing by vehicles or personnel, extraction, drinking or other human uses, construction and maintenance activities	Contractor Medupi Environmental Manager Medupi ECO Contractors ECO	Construction phase
Develop emergency maintenance operational plan to deal with any event of contamination, pollution or spillages, particularly in riparian areas	Eskom, Contractor	Construction phase
Prevent open fires, provide demarcated fire-safe zones, facilities and fire control measures	Eskom, Contractor	Construction phase
Compile and implement environmental monitoring programme, the aim of which should be preventing construction related impacts, ensuring long-term success of rehabilitation and prevention of environmental degradation.	Eskom	Construction phase

Performance Indicator	» No disturbance outside of designated work areas. » Minimised clearing of existing/natural vegetation. » Limited impacts on areas of identified and demarcated sensitive habitats/vegetation.
Monitoring	» Observation and monitoring of vegetation clearing activities by ECO throughout construction phase. » Supervision of all clearing and earthworks. » An incident reporting system must be used to record non-conformances to the EMP.

OBJECTIVE: Protection of sites of heritage value

Although no sites of heritage significance have been identified in the proposed development area, excavations for foundations may expose archaeological artefacts.

Project component/s	List of project components affecting the objective: » Coal supply conveyor » Coal silo » Access roads
Potential Impact	» Heritage objects or archaeological artefacts found during construction are inappropriately managed or destroyed
Activity/risk source	» Site preparation and earthworks » Excavation of foundations » Construction equipment movement on site
Mitigation: Target/Objective	» To ensure that any heritage and archaeological objects found on site are recorded and/or treated appropriately and in accordance with the relevant legislation

Mitigation: Action/control	Responsibility	Timeframe
Familiarise all staff and contractors with procedures for dealing with heritage objects/sites if uncovered during construction.	ECO/specialist	Pre-construction
Project employees and any contract staff should maintain, at all times, a high level of awareness of the possibility of discovering heritage sites.	Eskom/Contractor	Duration of contract
If a heritage object is found, work in that area shall be stopped immediately, and appropriate specialists brought in to assess to site, notify the administering authority of the item/site, and undertake due/required processes.	Eskom/Contractor in consultation with Specialist	Duration of contract

Performance Indicator	» All heritage items located are dealt with as per the legislative guidelines.
Monitoring	» Due care taken during earthworks and disturbance of land by all staff and any heritage objects found reported and appropriate permits obtained from SAHRA prior to the disturbance or destruction of heritage sites. » An incident reporting system should be used to record non-conformances to the EMP.

OBJECTIVE: Appropriate management of topsoil

Topsoil will be required to be stripped in areas affected by construction activities, including the coal supply conveyor servitude, coal silo and establishment of access roads (where required).

Project component/s	List of project components affecting the objective: » Coal supply conveyor » Coal silo » Access roads
Potential Impact	» Loss of topsoil
Activity/risk source	» Site preparation and earthworks » Clearance of coal conveyor servitude » Excavation for foundations » Construction of access roads
Mitigation: Target/Objective	» To minimise disturbance to topsoil » Appropriately remove and store topsoil in such a way to ensure effective use of this topsoil in subsequent rehabilitation of disturbed areas

Mitigation: Action/control	Responsibility	Timeframe
Areas to be cleared shall be clearly marked to eliminate the potential for unnecessary clearing of topsoil.	Contractor	Pre-construction
Construction activities shall be restricted to demarcated areas so that impact on soils is restricted.	Contractor	Site establishment & duration of contract
Remove and store topsoil separately in areas where excavation/ degradation takes place. Topsoil should be used for rehabilitation purposes in order to facilitate regrowth of species that occur naturally in the area	Contractor	Duration of contract

Mitigation: Action/control	Responsibility	Timeframe
Areas for the storage of topsoil should be identified and demarcated by the Medupi Environmental Manager in conjunction with the Medupi ECO and the contractors ECO	Contractor Medupi Environmental Manager Medupi ECO Contractors ECO	Duration of contract
Excavated topsoil shall be stockpiled separately from subsoil and adequately protected against erosion until replaced during rehabilitation. As far as possible, topsoil should not be stored for longer than 3 months.	Contractor	Site establishment & duration of contract
The maximum topsoil stockpile height should not exceed 2m in order to preserve micro-organisms within the topsoil, which can be lost due to compaction and lack of oxygen.	Contractor	Duration of contract

Performance Indicator	» No disturbance outside of designated work areas. » Minimise loss of topsoil.
Monitoring	» Observation and monitoring of topsoil stripping and storage activities by ECO throughout construction phase. » Supervision of all clearing and earthworks. » An incident reporting system should be used to record non-conformances to the EMP.

OBJECTIVE: Appropriate Handling and Storage of Equipment and Materials

Construction equipment and materials will be required to be stored on site. The appropriate handling of storage of these materials and equipment is important in order to minimise impacts on the surrounding environment.

Project component/s	Project components affecting the objective: » Coal supply conveyor » Coal silo » Access roads
Potential Impact	» Hazards to the natural environment, community members and the general public » Security of materials and equipment
Activities/risk sources	» Transport, storage and handling of potentially hazardous materials » Storage and maintenance of construction equipment

Mitigation: Target / Objective	» To ensure environmental best practice in terms of the transport, storage and handling of construction materials and equipment » To ensure that the transport, storage and handling of chemicals and hydrocarbons on-site does not cause pollution to the environment or harm to persons » To ensure that the storage and maintenance of machinery on-site does not cause pollution of the environment or harm to persons

Mitigation: Action / control	Responsibility	Timeframe
All construction equipment shall be stored within the formal construction equipment camp	Contractor	Duration of contract
Routine servicing and maintenance of vehicles will not take place on-site (except for emergency situations or large cranes which cannot be moved off-site). If repairs of vehicles must take place outside of designated areas, an appropriate drip tray will be used to contain any fuel or oils.	Contractor	Duration of contract
All stored fuels must be maintained within a bund and on a sealed surface.	Contractor	Duration of contract
Only designated areas must be used for storage of construction materials, soil stockpiles, machinery and other equipment	Contractor	Duration of contract
Specific areas shall be designated for cement batching plants (if required). The cement batching plant must be contained within a bunded area. Sufficient drainage for these plants must be in place to ensure that soils do not become contaminated.	Contractor	Duration of contract
Concrete and chemicals must be mixed on plastic linings and provisions should be made to contain spillages or overflows into the soil.	Contractor	Duration of contract
Any storage tanks containing hazardous materials must be placed in bunded containment areas with sealed surfaces. The bund walls must be high enough to contain 110% of the total volume of the stored hazardous material.	Contractor	Duration of contract
Any hazardous substances must be stored away from any water body.	Contractor	Duration of contract
Workshop areas shall be monitored for oil and fuel spills and such spills shall be cleaned and remediated to the satisfaction of the ECO. The Contractor shall be in possession of an emergency spill kit that must be complete and	Contractor Medupi Environmental Manager Medupi ECO	Duration of contract

Mitigation: Action/control	Responsibility	Timeframe
available at all times on site.	Contractors ECO	
Hazardous waste handling and spill response training shall be included for staff and contractors as part of site induction.	Contractor Medupi Environmental Manager Medupi ECO Contractors ECO	Duration of contract
Corrective action must be undertaken immediately if a complaint is made, or potential/actual leak or spill of polluting substance identified. This includes stopping the contaminant from further escaping, cleaning up the affected environment as much as practically possible and implementing preventive measures.	Contractor	Duration of contract
Spill response procedures must include removal/ disposal of potentially contaminated water and soil.	Contractor	Duration of contract
Any contaminated/polluted soil removed from the site must be disposed of at a licensed hazardous waste disposal facility.	Contractor	Duration of contract
Oily water from bunds at the substation shall be removed from site by licensed contractors.	Contractor	Duration of contract
Spilled cement or concrete must be cleaned up as soon as possible and disposed of at a suitably licensed waste disposal site.	Contractor	Duration of contract
Any storage and disposal permits/approvals which may be required shall be obtained, and the conditions attached to such permits and approvals shall be compiled with.	Contractor	Duration of contract
Transport of all hazardous substances shall be in accordance with the relevant legislation and regulations.	Contractor	Duration of contract
Once construction has been completed on site and all excess material has been removed, the storage area must be appropriately rehabilitated. If the area has been badly damaged, re-seeding shall be done and fencing in of the area shall be considered if livestock will subsequently have access to such an area.	Contractor	Completion of construction

Performance Indicator	» Construction equipment and materials are appropriately stored. » No impacts on the surrounding environment occur as a result of

	the inappropriate handling and storage of equipment and materials.
Monitoring	» Regular inspection of the construction equipment camp to ensure that appropriate handling and storage practices are in place. » Regular monitoring of the area surrounding the construction equipment camp to identify any impacts on the environment from this area. » A complaints register shall be maintained, in which any complaints from the community will be logged. Complaints shall be investigated and, if appropriate, acted upon. » An incident reporting system (which is in line with Eskom's requirements in this regard) should be used to record non-conformances to the EMP

OBJECTIVE: Appropriate handling and management of waste

The construction of the coal supply infrastructure will involve the generation of various wastes. In order to manage the wastes effectively, guidelines for the assessment, classification and management of wastes, along with industry principles for minimising construction wastes must be implemented.

The main wastes expected to be generated by the construction of the proposed infrastructure will include:

» general solid waste
» hazardous waste
» liquid waste (including grey water and sewage)

Project component/s	List of project components affecting the objective: » Coal supply conveyor » Coal silo » Access roads
Potential Impact	» Inefficient use of resources resulting in excessive waste generation » Litter or contamination of the site or water through poor waste management practices
Activity/risk source	» Construction wastes » Hydrocarbon use and storage » Spoil material from excavation, earthworks and site preparation
Mitigation: Target/Objective	» To comply with waste management guidelines » To minimise production of waste

	» To ensure appropriate waste storage and disposal » To avoid environmental harm from waste disposal

Mitigation: Action/control	Responsibility	Timeframe
Construction contractors shall provide specific detailed waste management plans to deal with all waste streams.	Contractor	Pre-construction
Supply appropriate numbers of waste collection bins on site.	Contractor	Erection: during site establishment Maintenance: for duration of Contract within a particular area
Specific areas shall be designated on-site for the temporary management of various waste streams, i.e. general refuse, construction waste, and contaminated waste. Location of such areas must seek to minimise the potential for impact on the surrounding environment, including prevention of contaminated runoff, seepage and vermin control.	Contractor	Duration of contract
Hazardous and non-hazardous waste shall be separated at source. Separate waste collection bins must be provided for this purpose. These bins must be clearly marked and appropriately covered.	Contractor	Erection: during site establishment Maintenance: for duration of Contract within a particular area
All solid waste collected shall be disposed of at a registered waste disposal site. A certificate of disposal shall be obtained and kept on file. The disposal of waste shall be in accordance with all relevant legislation. Under no circumstances may solid waste be burnt on site.	Contractor	Erection: during site establishment Maintenance: for duration of Contract within a particular area
Where a registered waste site is not available close to the construction site, a method statement shall be provided with regard to waste management.	Contractor	Site establishment
Where possible, construction and general wastes on-site shall be reused or recycled. Bins and skips shall be available on-site for collection, separation and storage of waste streams (such as wood, metals, general refuse etc). A recycling plan shall be developed in accordance with the requirements of the National Environmental Management: Waste Act and National Waste Management Strategy, and submitted for Eskom approval.	Contractor	Duration of contract

Mitigation: Action/control	Responsibility	Timeframe
Documentation (waste manifest) shall be maintained detailing the quantity, nature and fate of any regulated waste.	Contractor	Duration of contract
Regularly serviced chemical toilets facilities shall be used to ensure appropriate control of sewage.	Contractor	Duration of contract
No waste may be buried or burnt on site under any circumstances.	Contractor	Duration of contract

Performance Indicator	» No complaints received regarding waste on site or indiscriminate dumping » Internal site audits ensuring that waste segregation, recycling and reuse is occurring appropriately » Provision of all appropriate waste manifests for all waste streams
Monitoring	» Observation and supervision of waste management practices throughout construction phase » Waste documentation completed and maintained on site » A complaints register will be maintained, in which any complaints from the community will be logged. Complaints will be investigated and, if appropriate, acted upon » An incident reporting system will be used to record non-conformances to the EMP

OBJECTIVE: Ensure disciplined conduct of on-site contractors and workers

In order to minimise impacts on the surrounding environment, Contractors must be required to adopt a certain Code of Conduct and commit to restricting construction activities to areas within the development footprint. Contractors and their sub-contractors must be familiar with the conditions of the Environmental Authorisation (once issued), the EIA Report and this EMP, as well as the requirements of all relevant environmental legislation.

Project component/s	List of project components affecting the objective: » Coal supply conveyor » Coal silo » Access roads
Potential Impact	» Pollution/contamination of the environment » Disturbance to the environment
Activity/risk source	» Contractors are not aware of the requirements of the EMP, leading to unnecessary impacts on the surrounding environment

	» Worker conflict
Mitigation: Target/Objective	» To ensure appropriate management of actions by on-site personnel in order to minimise impacts to the surrounding environment

Mitigation: Action/control	Responsibility	Timeframe
The terms of this EMP will be included in all tender documentation and Contractors contracts.	Eskom	Tender process
Contractors will use chemical toilets/ablution facilities situated at designated areas of the site; no abluting will be permitted outside the designated area. These facilities will be regularly serviced by appropriate contractors.	Contractor (and sub-contractor/s)	Duration of contract
Cooking/meals will take place in a designated area; no firewood or kindling may be gathered from the site or surrounds.	Contractor (and sub-contractor/s)	Duration of contract
All litter will be deposited in a clearly marked, closed, animal-proof disposal bin in the construction area; particular attention needs to be paid to food waste.	Contractor (and sub-contractor/s)	Duration of contract
No one other than the Medupi Environmental Manager in conjunction with the Medupi ECO and the contractors ECO or personnel authorised, will disturb flora or fauna outside of the demarcated construction area/s.	Contractor (and sub-contractor/s)	Duration of contract
Contractors, Eskom personnel and temporary employees should behave fittingly at all times (e.g. no littering, not cause damage to properties, no unauthorised entry of properties, etc)	Contractor (and sub-contractor/s)	Duration of contract
Members of the construction team should be easily identifiable	Contractor (and sub-contractor/s)	Duration of contract
Animals disturbed during construction activities should not be harmed but should be allowed to move off to an undisturbed area of the site.	Contractor (and sub-contractor/s)	Duration of contract
Hunting of wild animals including setting up of snares should not be allowed	Contractor (and sub-contractor)	Duration of contract

Performance Indicator	» Compliance with specified conditions of EIA report and EMP » No complaints regarding contractor behaviour or habits
Monitoring	» Observation and supervision of Contractor practices throughout construction phase. » A complaints register will be maintained, in which any complaints from the community will be logged. Complaints will

	be investigated and, if appropriate, acted upon » An incident reporting system will be used to record non-conformances to the EMP

OBJECTIVE: To ensure all construction activities/practices/procedures are undertaken with the appropriate level of environmental awareness to minimise environmental risk, in line with the specifications of the EMP

The environmental specifications are required to be underpinned by a series of Method Statements, within which the Contractors and Service Providers are required to outline how any identified environmental risks will practically be mitigated and managed for the duration of the contract. That is, the Contractor will be required to describe how specified requirements will be achieved through the submission of written Method Statements to the Site Manager (and ECO).

A Method Statement is defined as "a written submission by the Contractor in response to the environmental specification or a request by the Project Manager/Site Manager, setting out the plant, materials, labour and method the Contractor proposes using to conduct an activity, in such detail that the Project Manager/Site Manager is able to assess whether the Contractor's proposal is in accordance with the Specifications and/or will produce results in accordance with the Specifications". The Method Statement must cover applicable details with regard to:

» Construction procedures
» Materials and equipment to be used
» Getting the equipment to and from site
» How the equipment/material will be moved while on-site
» How and where material will be stored
» The containment (or action to be taken if containment is not possible) of leaks or spills of any liquid or material that may occur
» Timing and location of activities
» Compliance/non-compliance with the Specifications, and
» Any other information deemed necessary by the Project Manager/Site Manager.

The Contractor may not commence the activity covered by the Method Statement until it has been approved, except in the case of emergency activities and then only with the consent of the Site Director. Approval of the Method Statement will not absolve the Contractor from their obligations or responsibilities in terms of their contract.

6.7.2. Environmental Awareness Training

OBJECTIVE: To ensure all personnel have the appropriate level of environmental awareness and competence to ensure continued environmental due diligence and on-going minimisation of environmental harm

To achieve effective environmental management, it is important that Contractors are aware of the responsibilities in terms of the relevant environmental legislation and the contents of this EMP. The Contractor is responsible for informing employees and sub-contractors of their environmental obligations in terms of the environmental specifications, and for ensuring that employees are adequately experienced and properly trained in order to execute the works in a manner that will minimise environmental impacts. The Contractors obligations in this regard include the following:

» Employees must have a basic understanding of the key environmental features of the development site and the surrounding environment.
» Ensuring that a copy of the EMP is readily available on-site, and that all site staff are aware of the location and have access to the document. Employees will be familiar with the requirements of the EMP and the environmental specifications as they apply to mine establishment.
» Ensuring that, prior to commencing any site works, all employees and sub-contractors have attended an Environmental Awareness Training course. The course must provide the site staff with an appreciation of the project's environmental requirements, and how they are to be implemented.
» Basic training in the identification of heritage sites/objects, and protected flora and fauna that may be encountered on the site.
» Awareness of any other environmental matters, which are deemed to be necessary by the ECO.
» Ensuring that employee information posters, outlining the environmental “do’s” and “don’ts” (as per the environmental awareness training course) are erected at prominent locations throughout the site.
» Records must be kept of those that have completed the relevant training.
» Refresher sessions must be held to ensure the contractor staff are aware of their environmental obligations.

6.7.3. Environmental Monitoring

OBJECTIVE: To monitor the performance of the control strategies employed against environmental objectives and standards

A monitoring programme must be in place not only to ensure conformance with the EMP, but also to monitor any environmental issues and impacts which have not been accounted for in the EMP that are, or could result in significant environmental impacts for which corrective action is required. The monitoring requirements as detailed under the objectives above must form part of the monitoring programme for the duration of the operation phase of the coal supply infrastructure. Where shortfalls or inadequacies in this programme are identified, this programme must be refined and updated.

Auditing and reporting procedures should include:

» Internal audits by contractors.
» Monthly audits by Medupi Environmental Team and Medupi ECO, bi-annual third party audits by an external consultant.
» Compilation of an audit report with a rating of the compliance with the EMP. This report must be submitted to the relevant authorities (i.e. DMR, DEA and LDEDET).

The aim of the monitoring and auditing process would be to routinely monitor the implementation of the specified environmental specifications, in order to:

» Monitor and audit compliance with the prescriptive and procedural terms of the environmental specifications.
» Ensure adequate and appropriate interventions to address non-compliance.
» Ensure adequate and appropriate interventions to address environmental degradation.
» Provide a mechanism for the lodging and resolution of public complaints.
» Ensure appropriate and adequate record keeping related to environmental compliance.
» Determine the effectiveness of the environmental specifications and recommend the requisite changes and updates based on audit outcomes, in order to enhance the efficacy of environmental management on site.
» Aid communication and feedback to authorities and stakeholders.

The Medupi Environmental Manager in conjunction with the Medupi ECO and the contractors ECO will ensure compliance with the EMP, and to conduct monitoring activities. The Medupi Environmental Manager, Medupi ECO and the contractors

ECO must have the appropriate experience and qualifications to undertake the necessary tasks. The ECOs shall keep a photographic record of any damage to areas outside the demarcated site area. The date, time of damage, type of damage and reason for the damage shall be recorded in full to ensure the responsible party is held liable. The Contractor shall be held liable for all unnecessary damage to the environment. A register shall be kept of all complaints received. All complaints/claims must be handled immediately to ensure timeous rectification/ payment by the responsible party.

6.8. Environmental Management during Rehabilitation

6.8.1. Overall Goal for the Rehabilitation of Disturbed Areas

Overall Goal for the Rehabilitation of Disturbed Areas: Undertake the rehabilitation measures in a way that ensures rehabilitation of disturbed areas following the execution of the works, such that residual environmental impacts are remediated or curtailed. In order to meet this goal, the following objective, actions and monitoring requirements are relevant:

OBJECTIVE: To ensure rehabilitation of disturbed areas following the execution of the works, such that residual environmental impacts are remediated or curtailed

Areas requiring rehabilitation will include all areas disturbed during the construction phase and that are not required for the operation of the infrastructure. The main areas requiring rehabilitation will be the construction equipment camps, lay down areas adjacent to the servitude, and access roads not required for maintenance purposes.

Project component/s	List of project components affecting the objective: » Temporary access roads and lay down areas
Potential Impact	» Environmental integrity of development area undermined resulting in reduced visual aesthetics, erosion, compromised land capability and the requirement for on-going management intervention
Activity/risk source	» Temporary lay down areas outside of servitude » Temporary access roads/tracks » Other disturbed areas/footprints
Mitigation: Target/Objective	» To ensure and encourage site rehabilitation of disturbed areas » To ensure that the site is appropriately rehabilitated following the execution of the works, such that residual environmental impacts (including erosion) are remediated or curtailed

Mitigation: Action/control	Responsibility	Timeframe
A site rehabilitation programme shall be formulated following the specialist walk-though survey, and must be implemented as soon as possible after construction is completed in an area.	Contractor in consultation with Specialist	Duration of contract
Rehabilitate disturbed areas subsequent to construction activities, taking cognisance of factors such as topsoil replacement, removal of introduced materials, local environmental factors	Contractor	Construction, operational phases
Stockpiled topsoil shall be replaced in disturbed areas where rehabilitation is to be undertaken as a layer of appropriate thickness.	Eskom in consultation with rehabilitation specialist	Following completion of construction activities in an area
Ensure surface restoration and resloping in order to prevent erosion, taking cognisance of local contours and landscaping	Contractor Medupi Environmental Manager Medupi ECO Contractors ECO	Construction, operational phases
Implement an alien plant monitoring and control programme within the development area.	Contractor Medupi Environmental Manager Medupi ECO Contractors ECO	Construction, operational phases
Use only local indigenous species in the rehabilitation/ re-vegetation process.	Contractor Medupi Environmental Manager Medupi ECO Contractors ECO	Rehabilitation phase
All temporary facilities, equipment and waste materials shall be removed from site.	Contractor	Following execution of the works
Compacted areas that are no longer needed post-construction shall be ripped and scarified.	Eskom in consultation with rehabilitation specialist	Following completion of construction activities in an area

Performance Indicator	» Topsoil replaced on all areas and stabilised » Disturbed areas rehabilitated and acceptable plant cover achieved on rehabilitated sites

	» No alien/invasive species colonising disturbed areas » Closed site free of erosion and alien invasive plants
Monitoring	» On-going inspection of rehabilitated areas in order to determine effectiveness of rehabilitation measures implemented » On-going alien plant monitoring and removal should be undertaken on an annual basis

6.8.3. Financial Provision for Rehabilitation

» *Quantum*

The quantum of financial provision for immediate closure and end of mine life closure is will be provided to the DMR. It should be noted that, due to the nature of the Conveyor belt project it is projected to be in operation until life of mine closure, and therefore the provisions for immediate closure and end of mine life closure will thus be similar.

» *Method of Provision*

Provision for rehabilitation will be made to the Exxaro Environmental Rehabilitation Trust Fund (EERF) as part of the Grootegeluk Mine account. Contributions will be made, and DME will be informed about details of the contributions on the same basis as for the mine at present.

6.9. Environmental Management during Operation

Due to the location of the coal supply infrastructure within a mining area and in close proximity to the Medupi Power Station, no significant impacts have been identified to be associated with the operation of the infrastructure.

6.9.1. Overall Goal for Operation

Overall Goal for Operation: To ensure that the operation and maintenance of the coal supply conveyor does not have unforeseen impacts on the environment and to ensure that all impacts are monitored and the necessary corrective action taken in all cases. In order to address this goal, it is necessary to operate the infrastructure in a way that ensures that operation activities are properly managed in respect of environmental aspects and impacts.

In order to meet this goal, the following objectives have been identified, together with necessary actions and monitoring requirements.

OBJECTIVE: Appropriate handling and management of waste

The operation of the coal supply infrastructure will involve the generation of various wastes. In order to manage the wastes effectively, the following management measures must be implemented.

Project component/s	List of project components affecting the objective: » Operation of coal supply infrastructure
Potential Impact	» Inefficient use of resources resulting in excessive waste generation » Litter or contamination of the site or water through poor waste management practices
Activity/risk source	» General waste » Hydrocarbon use and storage » Used conveyor belts
Mitigation: Target/Objective	» To comply with waste management guidelines » To minimise production of waste » To ensure appropriate waste storage and disposal » To avoid environmental harm from waste disposal

Mitigation: Action/control	Responsibility	Timeframe
Eskom shall provide specific detailed waste management plans to deal with all waste streams.	Eskom	Operation
Hazardous and non-hazardous waste shall be separated at source. Separate waste collection bins must be provided for this purpose. These bins must be clearly marked and appropriately covered.	Eskom	Duration of operation phase
Specific areas shall be designated on-site for the temporary management of various waste streams, i.e. general refuse, construction waste, and contaminated waste. Location of such areas must seek to minimise the potential for impact on the surrounding environment, including prevention of contaminated runoff, seepage and vermin control.	Eskom	Duration of operation phase
Where possible, general wastes on-site shall be reused or recycled. Bins and skips shall be available on-site for collection, separation and storage of waste streams (such as wood, metals, general refuse etc). A recycling plan shall be developed in accordance with the requirements of the National Waste	Eskom	Duration of operation phase

Mitigation: Action/control	Responsibility	Timeframe
Management Strategy.		
Disposal of waste will be in accordance with relevant legislative requirements, including the use of licensed contractors.	Eskom	Duration of operation phase
All solid waste collected shall be disposed of at a registered waste disposal site. A certificate of disposal shall be obtained and kept on file. The disposal of waste shall be in accordance with all relevant legislation. Under no circumstances may solid waste be burnt on-site.	Eskom	Duration of operation phase
Where a registered waste site is not available close to the mine site, a method statement shall be provided with regard to waste management.	Eskom	Duration of operation phase
Documentation (waste manifest) shall be maintained detailing the quantity, nature and fate of any regulated waste.	Eskom	Duration of operation phase
Regularly serviced toilet facilities shall be used to ensure appropriate control of sewage.	Eskom	Duration of operation phase

Performance Indicator	» No complaints received regarding waste on-site or indiscriminate dumping » Internal site audits ensuring that waste segregation, recycling and reuse is occurring appropriately » Provision of all appropriate waste manifests for all waste streams
Monitoring	» Observation and supervision of waste management practices by environmental manager throughout operation phase » Waste documentation completed and maintained on-site » An incident reporting system will be used by the site environmental manager to record non-conformances to the EMP.

OBJECTIVE: Appropriate Handling and Storage of Equipment and Materials

Equipment and materials required for the operation of the infrastructure will be required to be stored and handled on-site. The appropriate handling of storage of these materials and equipment is important in order to minimise impacts on the surrounding environment.

Project	Project components affecting the objective:

component/s	» Operation equipment and materials storage areas
Potential Impact	» Hazards to the natural environment, landowners, community members and the general public » Security of materials and equipment
Activities/risk sources	» Storage and maintenance of operation equipment » Storage and handling of potentially hazardous materials
Mitigation: Target/Objective	» To ensure environmental best practice in terms of the storage and handling of mine operation materials and equipment » To ensure that the storage and handling of chemicals and hydrocarbons on-site does not cause pollution to the environment or harm to persons » To ensure that the storage and maintenance of machinery on-site does not cause pollution of the environment or harm to persons

Mitigation: Action/control	Responsibility	Timeframe
All operation equipment and materials shall be stored within designated equipment areas.	Eskom	Duration of operation phase
All stored fuels must be maintained within a bund and on a sealed surface.	Eskom	Duration of operation phase
Any storage tanks containing hazardous materials (including fuel) must be placed in bunded containment areas with sealed surfaces. The bund walls must be high enough to contain 110% of the total volume of the stored hazardous material.	Eskom	Duration of operation phase
Any hazardous substances must be stored away from any areas susceptible to pollution (e.g. water bodies).	Eskom	Duration of operation phase
Workshop areas shall be monitored for oil and fuel spills and such spills shall be cleaned and remediated to the satisfaction of the environmental manager. The environmental manager shall be in possession of an emergency spill kit that must be complete and available at all times on site.	Eskom	Duration of operation phase
Hazardous waste handling and spill response training shall be included for staff and contractors as part of site induction.	Eskom	Duration of operation phase
Spill response procedures must include removal/ disposal of potentially contaminated water and soil.	Eskom	Duration of operation phase
Any contaminated/polluted soil removed from the site must be disposed of at a licensed hazardous waste disposal facility.	Eskom	Duration of operation phase
Spillage of coal from the conveyor will be	Eskom	Duration of

Mitigation: Action/control	Responsibility	Timeframe
removed and disposed of and the affected area appropriately cleaned.		operation phase
Any storage and disposal permits/approvals which may be required shall be obtained, and the conditions attached to such permits and approvals shall be compiled with.	Eskom	Duration of operation phase
Transport of all hazardous substances shall be in accordance with the relevant legislation and regulations.	Eskom	Duration of operation phase

Performance Indicator	» Operation equipment and materials are appropriately stored. » No impacts on the surrounding environment occur as a result of the inappropriate handling and storage of equipment and materials.
Monitoring	» Regular inspection of the site by the environmental manager to ensure that appropriate handling and storage practices are in place. » A complaints register shall be maintained by the environmental manager, in which any complaints from the community will be logged. Complaints shall be investigated and, if appropriate, acted upon. » An incident reporting system should be used by the environmental manager to record non-conformances to the EMP.

OBJECTIVE: Control alien invasive plants

Continuous monitoring of the site is required in order to ensure that the area is not colonised by alien and invasive plant species.

Project component/s	Project components affecting the objective: » Any infrastructure or activity that will result in disturbance to natural areas
Potential Impact	Invasion of natural vegetation surrounding the site by declared weeds or invasive alien species
Activity/risk source	Disturbance of areas during mine operation
Mitigation: Target/Objective	No alien plants within the project area

Mitigation: Action/control	Responsibility	Timeframe
Establish an ongoing monitoring programme to	Eskom	Throughout

Mitigation: Action/control	Responsibility	Timeframe
detect and quantify any alien species that may become established and identify the problem species (as per Conservation of Agricultural Resources Act).		operation
Immediately control any alien plants that become established using registered control methods.		

Performance Indicator	No alien or invasive species within project area
Monitoring	Ongoing monitoring of area by mine environmental manager during mine operation.

6.9.2. Environmental Awareness Training

OBJECTIVE: To ensure all operation personnel have the appropriate level of environmental awareness and competence to ensure continued environmental due diligence and on-going minimisation of environmental harm

To achieve effective environmental management during the operation of the infrastructure, it is important that operation personnel are aware of the responsibilities in terms of the relevant environmental legislation and the contents of this EMP. Eskom is responsible for informing employees and sub-contractors of their environmental obligations in terms of the environmental specifications for operation, and for ensuring that employees are adequately experienced and properly trained in order to execute the works in a manner that will minimise environmental impacts. Eskom's obligations in this regard include the following:

» Employees must have a basic understanding of the key environmental features of the operation site and the surrounding environment.
» Ensuring that a copy of the EMP is readily available on-site, and that all site staff are aware of the location and have access to the document. Employees will be familiar with the requirements of the EMP and the environmental specifications for operation of the infrastructure.
» Ensuring that, prior to commencing any operation activities, all employees and sub-contractors have attended an Environmental Awareness Training course. The course must provide the site staff with an appreciation of the project's environmental requirements, and how they are to be implemented.

» Awareness of any other environmental matters, which are deemed to be necessary by the environmental manager.
» Records must be kept of those that have completed the relevant training.
» Refresher sessions must be held to ensure the contractor staff are aware of their environmental obligations.

6.9.3. Environmental Monitoring

Monitoring consists of various components as illustrated by the overall monitoring process (Figure 6.1). It must be recognised and understood that the successful development and implementation of an appropriate, accurate and reliable monitoring programme requires that a defined structured procedure be followed. Furthermore, it is important that this is done by a suitably qualified person.

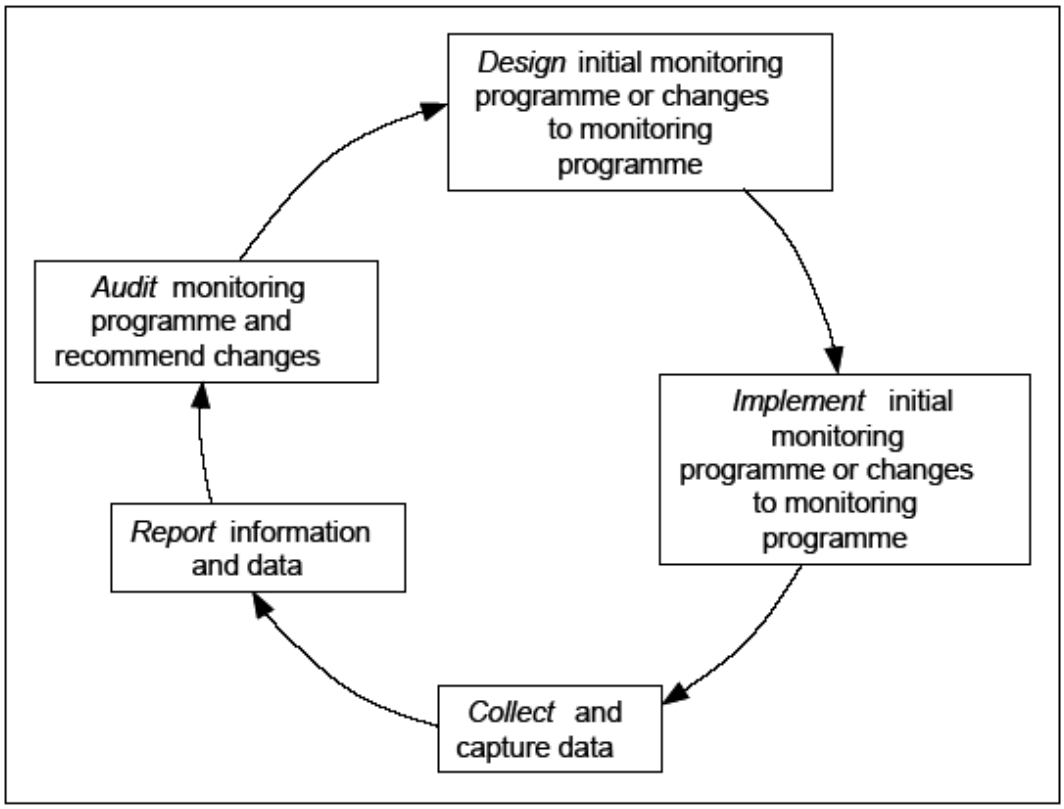

Figure 6.1: Monitoring process (source: DWAF, Best Practice Guideline G3)

OBJECTIVE: To monitor the performance of the control strategies employed against environmental objectives and standards

Regular monitoring of all the environmental management measures and components shall be carried out by Eskom in accordance with the requirements of Regulation 55 promulgated in terms of the MPRDA (Act No 28 of 2002) in order to

ensure that the provisions of this EMP are adhered to. A monitoring programme must be in place not only to ensure conformance with the EMP, but also to monitor any environmental issues and impacts which have not been accounted for in the EMP that are, or could result in significant environmental impacts for which corrective action is required. The monitoring requirements as detailed under the objectives above must form part of the monitoring programme for the duration of the operation phase of the coal supply infrastructure. Where shortfalls or inadequacies in this programme are identified, this programme must be refined and updated.

The Medupi ECO will report on a monthly basis, with a bi-annual 3rd party audit which reports to the EMC and DEA

The success of the provisions of this EMP will be reported on a monthly by the Medupi ECO and bi-annually by a third party, who will report to the Environmental Monitoring Committee, the DMR and DEA. Inspections and monitoring shall be carried out on both the implementation of the EMP and the impact on plant and animal life. The aim of the monitoring and auditing process would be to routinely monitor the implementation of the specified environmental specifications, in order to:

» Monitor and audit compliance with the prescriptive and procedural terms of the environmental specifications.
» Ensure adequate and appropriate interventions to address non-compliance
» Ensure adequate and appropriate interventions to address environmental degradation.
» Provide a mechanism for the lodging and resolution of public complaints.
» Ensure appropriate and adequate record keeping related to environmental compliance.
» Determine the effectiveness of the environmental specifications and recommend the requisite changes and updates based on audit outcomes, in order to enhance the efficacy of environmental management on site.
» Aid communication and feedback to authorities and stakeholders.

The environmental manager will ensure compliance with the EMP, and will be responsible for conducting monitoring activities during the operation of the infrastructure. The environmental manager must have the appropriate experience and qualifications to undertake the necessary tasks. A register shall be kept of all complaints received. All complaints/claims must be handled immediately to ensure timeous rectification/compensation by the responsible party.

REFERENCES CHAPTER 8

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