Mutsho Power Project

Proposed development of the Mutsho Power Project and Associated Infrastructure on a site near Makhado (Louis Trichardt), Limpopo Province

Environmental Management Programme (EMPr)

April 2018

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PROJECT DETAILS

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DEFINITIONS AND TERMINOLOGY

Accelerated soil erosion: Soil erosion induced by human activities and ultimately leading to irreversible degradation of the ecosystem and loss of ecosystem functionality.

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.

Archaeological material: Remains resulting from human activities which are in a state of disuse and are in or on land and which are older than 100 years, including artefacts, human and hominid remains and artificial features and structures.

Commence: The start of any physical activity, including site preparation and any other activity on site furtherance of a listed activity or specified activity, but does not include any activity required for the purposes of an investigation or feasibility study as long as such investigation or feasibility study does not constitute a listed activity or specified activity.

Commercial Operation Date (COD): The date after which all testing and commissioning has been completed and is the initiation date to which the seller can start producing electricity for sale (i.e. when the project has been substantially completed).

Commissioning: Commissioning commences once construction is completed. Commissioning covers all activities including testing after all components of the power station are installed.

Construction: Construction means the building, erection or establishment of a facility, structure or infrastructure that is necessary for the undertaking of a listed or specified activity. Construction begins with any activity which requires Environmental Authorisation.

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

Decommissioning: To take out of active service permanently or dismantle partly or wholly, or closure of a facility to the extent that it cannot be readily re-commissioned. This usually occurs at the end of the life of a facility.

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.

Drainage: A drainage line is a lower category or order of watercourse that does not have a clearly defined bed or bank. It carries water only during or immediately after periods of heavy rainfall i.e. non-perennial, and riparian vegetation may or may not be present.

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.

Endemic: An "endemic" is a species that grows in a particular area (is endemic to that region) and has a restricted distribution. It is only found in a particular place. Whether something is endemic or not depends on the geographical boundaries of the area in question and the area can be defined at different scales.

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 Assessment Practitioner (EAP): An individual responsible for the planning, management and coordinating of environmental management plan or any other appropriate environmental instruments introduced by legislation.

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

Environmental Impact Assessment (EIA): 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 Programme (EMPr): A management plan that organises and co-ordinates mitigation, rehabilitation and monitoring measures in order to guide the implementation of a proposal and its on-going maintenance after implementation.

Fossil: Mineralised bones of animals, shellfish, plants and marine animals. A trace fossil is the track or footprint of a fossil animal that is preserved in stone or consolidated sediment.

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).

Hazardous waste: Any waste that contains organic or inorganic elements or compounds that may, owing to the inherent physical, chemical or toxicological characteristics of that waste, have a detrimental impact on health and the environment (Van der Linde and Feris, 2010;pg 185).

Incident: An undesired event which may result in a significant environmental impact but can be managed through internal response.

Indigenous: All biological organisms that occurred naturally within the study area prior to 1800.

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 (I&AP): 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.

Method statement: Method statement is a written submission to the ECO and the site manager (or engineer) by the EPC Contractor in collaboration with his/her EO.

Perennial and non-perennial: Perennial systems contain flow or standing water for all or a large proportion of any given year, while non-perennial systems are episodic or ephemeral and thus contains flows for short periods, such as a few hours or days in the case of drainage lines.

Pollution: A change in the environment caused by substances (radio-active or other waves, noise, odours, dust or heat emitted from any activity, including the storage or treatment or waste or substances.

Pre-construction: The period prior to the commencement of construction, which may include activities which do not require Environmental Authorisation (e.g. geotechnical surveys).

Riparian: The area of land adjacent to a stream or river that is influenced by stream-induced or related processes. Riparian areas which are saturated or flooded for prolonged periods would be considered wetlands and could be described as riparian wetlands. However, some riparian areas are not wetlands (e.g. an area where alluvium is periodically deposited by a stream during floods but which is well drained).

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.

Waste: Any substance, material or object, that is unwanted, rejected, abandoned, discarded or disposed of, or required to be discarded or disposed of, by the holder of that substance, material or object, whether or not such substance, material or object can be re-used, recycled or recovered and includes all wastes as defined in Schedule 3 of NEM:WA; or any other substance, material or object that is not included in Schedule 3 of NEM:WA that may be defined as a waste by that is identified as waste by the Minister of Environmental Affairs (by notice in the Gazette). Any waste or portion of waste, referred to in the section above, ceases to be a waste:

(i) Once an application for its re-use, recycling or recovery has been approved or, after such approval, once it is, or has been re-used, recycled or recovered;
(ii) Where approval is not required, once a waste is, or has been re-used, recycled or recovered;
(iii) Where the Minister of Environmental Affairs has, in terms of Section 74 of NEM:WA, exempted any waste or a portion of waste generated by a particular process from the definition of waste; or
(iv) Where the Minister of Environmental Affairs has, in the prescribed manner, excluded any waste stream or a portion of a waste stream from the definition of waste.

Watercourse: As per the National Water Act means –

(a) A river or spring;
(b) A natural channel in which water flows regularly or intermittently;
(c) A wetland, lake or dam into which, or from which, water flows; and
(d) Any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse, and a reference to a watercourse includes, where relevant, its bed and banks

Wetlands: Land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which under normal circumstances supports or would support vegetation typically adapted to life in saturated soil (National Water Act, No. 36 of 1998); land where an excess of water is the dominant factor determining the nature of the soil development and the types of plants and animals living at the soil surface (Cowardin et al., 1979).

ACRONYMS

AEL	Atmospheric Emission License
AQMP	Air Quality Management Plan
BGIS	Biodiversity Geographic Information System
CBA	Critical Biodiversity Area
DAFF	Department of Agricultural, Forestry and Fisheries (National)
DEA	Department of Environmental Affairs (National)
DWS	Department of Water and Sanitation
CBIPPPP	Coal Baseload Independent Power Producer Procurement Programme
CFB	Circulating Fluidised Bed
CH_4	Methane
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CoAL	Coal of Africa Limited
CR	Critically Endangered
DM	District Municipality
DoE	Department of Energy
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EMF	Environmental Management Framework
EMP	Environmental Management Plan
EMPr	Environmental Management Programme
EN	Endangered
EP	Equator Principles
ESA	Ecological Support Area
GHG	Greenhouse Gas
HRA	Health Risk Assessment
IBA	Important Bird Area
IDP	Integrated Development Plan
IEM	Integrated Environmental Management
IEP	Integrated Energy Plan
IFC	International Finance Corporation
IPP	Independent Power Producer
IRP	Integrated Resource Plan
IUCN	International Union for Conservation of Nature
I&AP	Interested and Affected Party
km	Kilometre
kWh	Kilowatt hour
LC	Least Concern
LM	Local Municipality
m	Metre
m^2	Square meters
m^3	Cubic meters
MCM	MC Mining (Ltd)

MES	Minimum Emission Standards
mg/m^3	Milligrams per cubic meter
MW	Megawatts
N_2O	Nitrous Oxides
NAAQS	National Ambient Air Quality Standards
NDP	National Development Plan
NEMA	National Environmental Management Act (No. 107 of 1998)
NEM:AQA	National Environmental Management: Air Quality Act (No. 39 of 2004)
NEM:BA	National Environmental Management: Biodiversity Act (No. 10 of 2004)
NEM:WA	National Environmental Management: Waste Act (No. 59 of 2008)
NFA	National Forests Act (No. 84 of 1998)
NFEPA	National Freshwater Ecosystem Priority Area
NHRA	National Heritage Resources Act (No. 25 of 1999)
NO	Nitrogen Oxide
NO_2	Nitrogen Dioxide
NO_x	Oxides of Nitrogen ($NO_x = NO + NO_2$)
NT	Near Threatened
NWA	National Water Act (No. 36 of 1998)
PA	Protected Area
PC	Pulverised Coal
PM	Particulate Matter
PM_{10}	Particulate Matter with a diameter less than 10 microns
$PM_{2.5}$	Particulate Matter with a diameter less than 2.5 microns
PoSEIA	Plan of Study for EIA
PS	Performance Standard
SABAP	South African Bird Atlas Project
SAHRA	South African Heritage Resources Agency
SAHRIS	South African Heritage Resources Information System
SAIAB	South African Institute for Aquatic Biodiversity
SANBI	South African National Biodiversity Institute
SANParks	South African National Parks
SDF	Spatial Development Framework
SEZ	Special Economic Zone
SO_2	Sulphur Dioxide
TOPS	Threatened or Protected Species
$\mu g/m^3$	Micrograms per cubic meter
UNESCO	United Nations Educational, Scientific and Cultural Organisation
VOC	Volatile Organic Compound
VU	Vulnerable
WB	World Bank
WML	Waste Management License
WRC	Water Research Commission
WUL	Water Use License
WWF	World Wide Fund for Nature

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CHAPTER 1 PROJECT DETAILS

Mutsho Power proposes the development of the Mutsho Power Project and associated infrastructure on a site near Makhado (Louis Trichardt) in Limpopo Province. The Mutsho Power Project comprises a new 600MW coal-fired power station, which once developed is intended to form part of the Department of Energy's (DoE's) Coal Baseload Independent Power Producer (IPP) Procurement Programme (CBIPPPP).

The project site is located approximately 43km south-west of Musina, approximately 41km north of Makhado (Louis Trichardt), and approximately 7km south of Mopane. The area under investigation is approximately 2 161ha in extent and comprises 2 agricultural properties, namely the Farm Du Toit 563 belonging to Mr. Souis Hendrie Van Der Walt; and the remainder of the Farm Vrienden 589 belonging to Fumaria Property Holdings (Pty) Ltd, a Special Purpose Vehicle (SPV) which is wholly owned by MC Mining Ltd (MCM). A minimum development footprint 350ha in extent is required, and will be suitably located within the greater project site so as to avoid areas of sensitivity which have been identified onsite.

Coal required for the project will be sourced from MCM's Makhado Project to be developed approximately 20km south-east of the project site. MCM's Makhado Project comprises a new coal mine (i.e. the Makhado Colliery) to be located north of the Soutpansberg Mountains in the Makhado Local Municipality of Vhembe District. It has been estimated that the Makhado Project has 344.8Mt mineable tonnes of coal in situ (MTIS), and once developed is expected to produce coal for domestic and/or export markets. The Makhado Colliery is estimated to operate for 16 years at full capacity (supplying approximately 2.3 million tons hard coking coal and 3.2 million tons thermal coal per annum). In 2017 MCM announced that it would initiate mining via the Makhado Lite Project. This will result in decreased volumes being mined initially, which will extend the life of the colliery. Additional life extension is further possible through the use of adjacent pits and surrounding coal fields as part of the GSP Project. The Mutsho Power Project will have a lifespan of approximately 30 years and will utilise approximately 2 million tons of coal per annum. Should the Mutsho Power Project be selected as a preferred bidder under the CBIPPPP, a coal supply agreement would need to be entered into which satisfies the power station project's financing and CBIPPPP requirements. The Makhado Project is anticipated to commence operation in mid-2018.

Coal will be transported to site either via a new 22km railway loop proposed for development between the Makhado Colliery and existing Huntleigh railway siding, or via road transport. The proposed new railway loop forms part of the Makhado Colliery development, and is therefore excluded from the current scope of work. In the event that coal is transported via the proposed new railway loop a railway spur would need to be developed onsite for the offloading of coal and other raw materials (i.e. limestone).

The Mutsho Power Project will have a generation capacity of up to 600MW and will comprise 2 x boilers (suitably rated at approximately 300MW each), 2 x steam turbine generators (STGs), a flue / smoke stack, an ash dump, packaged Water Treatment Plant (WTP) and storage or discard ponds and vessels, an ash dump run-off dam, main plant run-off dam, raw water storage dam, strategic and working coal stockpiles and lime supply. The project will make use of direct or indirect dry cooling systems; dry ash disposal methods; and will be developed as a Zero Liquid Effluent Discharge (ZLED) facility.

The key project components proposed as part of the Mutsho Power Project are summarised in **Table 1.1**:

Table 1.1: Key Project Components.

	600MW SC CFB Plant
Power island consisting of:	» 2 x 300MW Supercritical (SC) Circulating Fluidised Bed (CFB) boilers.
	» Electrostatic Precipitator (ESP)
	» Flue / smoke stack up to 150m in height.
	» Direct dry-cooling (air-cooling) systems.
	» Balance of plant components (including steam turbines and generators etc.).
Raw materials storage and handling:	» Coal and Limestone / Lime Rail Spur and / or Road off-loading systems.
	» Upgrading or establishment of a rail siding.
	» Coal crusher and raw material handling equipment.
	» Strategic and working coal stockpile.
	» Limestone or Lime storage and handling area.
Ash handling and disposal:	» Ash dump (dry-ashing is proposed in order to reduce the project's water requirements in alignment with the recommendations of the National Development Plan (NDP) and Integrated Energy Plan (IEP)).
Water infrastructure:	» Raw water storage dam (up to 5ha).
	» Water supply pipelines and booster stations.
	» Pollution control / run-off dams (up to 2.5ha each).
	» Packaged Water treatment plant (WTP).
	» Wastewater treatment plant (WWTP).
	» Storm water management systems.
Electrical infrastructure:	» HV Yard and substation components with HV overhead transmission lines connecting to Eskom infrastructure.
Associated infrastructure:	» Control room, office / administration, workshop, storage and logistics buildings.
	» On-site critical staff accommodation required during construction (up to 1.5ha).
	» Temporary site office, laydown and assembly areas, and batching plant (up to 5ha in total).
	» Upgrading of external roads and establishment of internal access roads.
	» Security fencing and lighting, and access control with guardhouse.
Services required:	» Refuse Material Disposal – During construction all refuse material generated by the proposed development will be collected by a contractor to be disposed of off-site at a licensed waste disposal facility. Solid wastes and sludge arising during operation will be collected, and transported to the ash dump. Chemical wastes will be collected and stored separately in a safe manner, and will be transported off-site via road where they will be disposed of according to the local and national standards.
	» Sanitation – During construction, all sewage waste will be collected by a contractor to be disposed of at a licensed waste disposal site. During operation, 2 x 5m³/h buried sanitary sewage treatment systems will be provided for discharge from staff showers, flushing, toilets, canteen, etc. The sanitary sewage will be treated by secondary biological contact oxidation process, filtered, disinfected, and flow into clean water basin for reuse.
	» Water – Between 800 000m³/a and 1.2 million m³/a of water is required during the construction phase, while approximately 1 million m³/a is required to support the operation of the project. A number of bulk water supply options are currently being investigated for the project. The most promising of these include: * Transfer of treated effluent from the Makhado Rietvly Wastewater Treatment Works (WWTW) * Transfer from dams in Zimbabwe (alternative to above). * Direct abstraction from the Limpopo River.

» Electricity – A power supply will be required during both construction and operation of the project. It is anticipated that electricity required to support the construction will be provided by the Musina Local Municipality.

1.1 Activities and Components Associated with the Power Station

1.1.1 Overview of the Detailed Design and Construction Phase

The detailed design and construction phase is expected to take approximately 4 to 5 years to complete. It is anticipated that the following activities would be included and form part of the detailed design and construction phase:

» Conducting onsite technical surveys, including:

Geotechnical surveys, hydrological surveys, logistics surveys, site surveys, surveys confirming the power station footprint, survey of the proposed substation/switchyard, and surveys of the proposed raw bulk water pipeline(s) and power line servitude (to be assessed under separate applications for authorisation).

» Obtaining additional licenses and permits required for the project.
» Coordinating with relevant regulatory departments and agencies regarding proposed construction activities.
» Upgrading access roads to the site, and establishment of an onsite road access network.
» Upgrading or establishment of a railway siding.
» Detailed design, procurement and fabrication activities.
» Site preparation activities, including:

Clearing of vegetation, stripping of topsoil (and associated stockpiling of topsoil for use in backfilling and / or spreading on site), conducting earthworks / terracing, and excavation for foundations.

» Early establishment of stormwater run-off dams to contribute towards onsite water management during the construction phase.
» Civil and structural works.
» Mechanical, piping, ducting, electrical, controls, and instrumentation works.
» Establishment of infrastructure such as office buildings, water supply pipelines, and power line.
» Establishment of the ash dump.
» Establishment of an onsite concrete batching plant. The proposed batching plant will have a capacity of 300 t/h.

As far as is practical and relevant disturbed areas will be rehabilitated as construction is completed within an area and construction equipment demobilised. All disturbed areas not required for operation will be fully rehabilitated following completion of construction.

1.1.2 Overview of the Operation Phase

Prior to the operation of the project, operational establishment, training, testing, and trials will be undertaken to ensure the complete operational readiness of the plant and Operations and Maintenance (O&M) personnel. The project has been designed for a 30-year life cycle, which is equivalent to the term of agreement contained in the Power Purchase Agreement (PPA) to be entered into between preferred bidders and Eskom under the CBIPPPP.

During its operations, the project will operate as a baseload power plant with an annual average availability of 90%. The project would therefore operate for 24 hours a day and 7 days a week, excluding periods of planned shutdown for maintenance purposes. Staff will work in shifts, with two to three shifts per day, starting at 00:00, 08:00, and 16:00 respectively; and approximately 80 to 100 personnel required per shift. A total of two buses will be utilised to transport personnel to site.

1.1.3 Overview of the Decommissioning and Rehabilitation Phase

Once the project has reached the end of its economic life (equivalent to a minimum of 30 years with the opportunity for extension or amendment up to 50 years), equipment will be decommissioned. Decommissioning activities will involve the disassembly of production units and ancillary infrastructure, the demolishing of buildings, the removal of hazardous waste, and the rehabilitation of the ash dump and project site. The following decommissioning activities are expected to occur:

- At the end of the project's life cycle, operational access roads are expected to be in good condition as a result of ongoing maintenance during operation, and therefore suitable for the transit of decommissioning equipment (i.e. heavy cranes, special trucks, etc.).
- Laydown areas will be prepared as required. In this regard vegetation may require stripping and topsoil may be stockpiled for use in rehabilitation.
- All waste materials will be removed for reuse, or disposal through authorised waste management service providers.
- All lubricants and chemical products stored at the site will be removed. These products may be sold or removed by an authorised waste management service provider for appropriate disposal.
- Reusable elements not classified as waste will be used.
- Concrete structures and buildings (including foundations) will be demolished and rubble will be disposed of at appropriate facilities, unless otherwise required for an alternative use in line with the decommissioning and closure plan.

Following decommissioning and removal of all project material from site, disturbed areas will be rehabilitated to a state reflective of anticipated future use. Where possible, rehabilitation will be conducted concurrently with decommissioning.

The following rehabilitation activities are expected to occur:

- The existing profiles of affected land will be improved and stabilised, thereby creating profiles that are compatible with the topography of the area.
- Ripping of compacted soils will be done prior to adding topsoil, which will be done by mechanical means. Topsoil and/or subsoil with which to facilitate rehabilitation will be moved and stockpiled during the construction phase of development. Where additional amounts of topsoil and/or subsoil are required, potential areas of land for the extraction of topsoil or subsoil will be identified.
- Vegetation will be re-established on site. Plant species used during site rehabilitation will as far as reasonably possible match those species naturally occurring in the area.

Following the completion of rehabilitation activities on site, a period of maintenance and aftercare will be required to ensure that the rehabilitation measures were successful.

The following aftercare and maintenance activities are expected to occur:

» Control and removal of alien/invasive species.
» Replacement of unhealthy plants and altering vegetation composition.
» Implementation of erosion controls (if required).
» Support irrigation (if required).

1.2 Findings of the Environmental Impact Assessment (EIA)

Environmental impacts associated with the construction and operation of the power station and associated infrastructure relate to:

» Impacts on ecology.
» Impacts on air quality.
» Impacts on climate change.
» Impacts on hydrology and geohydrology.
» Impacts on soil, land use and agricultural potential.
» Impacts on heritage and archaeology.
» Impacts on palaeontology.
» Noise impacts.
» Visual impacts.
» Socio-economic impacts.
» Traffic impacts
» Cumulative impacts.

The findings of the specialist studies undertaken within the EIA to assess both the benefits and potential negative impacts anticipated as a result of the proposed project conclude that:

» The majority of impacts associated with the construction and operation of the Mutsho Power Project and associated infrastructure are expected to be of Medium to Low significance with the implementation of appropriate mitigation measures. The project is therefore considered to be acceptable from an environmental permitting perspective.
» High sensitivity areas were identified within the preferred project development area (refer to **Figure 1.1**).
» No environmental fatal flaws were identified to be associated with the proposed project.
» The significance levels of the majority of identified negative impacts can be minimised by implementing the recommended mitigation measures.

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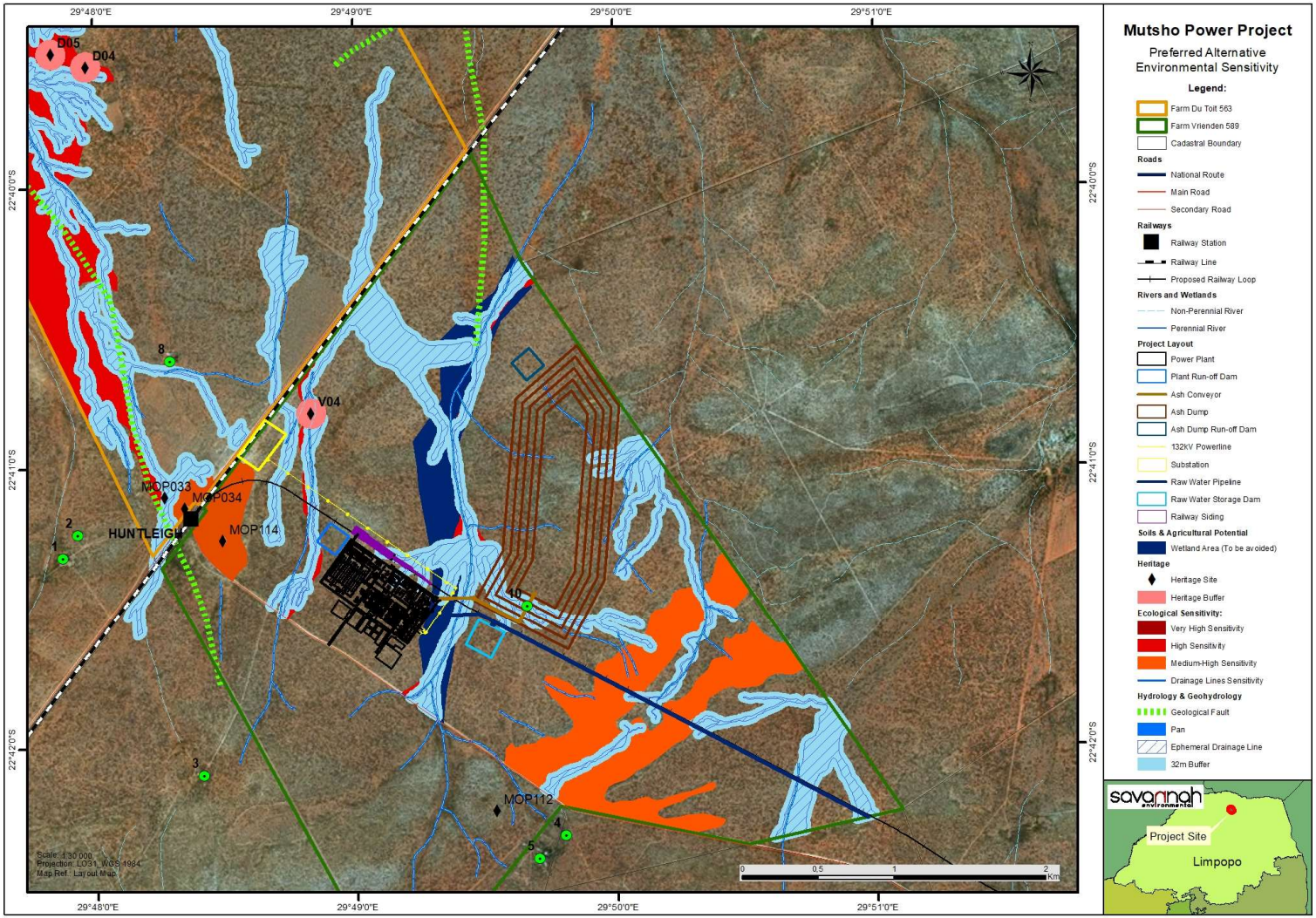

Figure 1.1: Environmental Sensitivity Map for the Mutsho Power Project near Makhado (Louis Trichardt), Limpopo Province.

CHAPTER 2 PURPOSE AND OBJECTIVES OF THE EMPR

An Environmental Management Programme (EMPr) is defined as:

"A*n environmental management tool used to ensure that undue or reasonably avoidable adverse impacts associated with the planning, construction, operation and decommissioning of a project are avoided or mitigated, and that the positive benefits of the projects are enhanced*."[1]

The objective of this EMPr is to provide consistent information and guidance for implementing the management and monitoring measures established in the permitting process and help achieve environmental policy goals. The purpose of an EMPr is to ensure continuous improvement of environmental performance, reducing negative impacts and enhancing positive effects during the construction and operation of the facility. An effective EMPr is concerned with both the immediate outcome as well as the long-term impacts of the project.

The EMPr provides specific environmental guidance for the construction and operation phases of a project, and is intended to manage and mitigate construction and operation activities so that unnecessary or preventable environmental impacts do not result. These impacts range from those incurred during start up (i.e. site clearing and site establishment), during the construction activities themselves (i.e. erosion, noise, dust, and visual impacts), during site rehabilitation (i.e. soil stabilisation, re-vegetation), during operation, and during decommissioning (i.e. similar to construction phase activities).

This EMPr has been compiled for the detailed design, construction, operation, and decommissioning of the Mutsho Power Project and associated infrastructure. This EMPr is applicable to all employees and Contractors employed during the pre-construction, construction, and operation and maintenance phases of the project. The document must be adhered to, and updated as relevant throughout the project life cycle.

This EMPr has been compiled in accordance with the 2014 EIA Regulations (GNR 326) and will be further developed in terms of specific requirements listed in any authorisations issued for the project. The EMPr 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 on-site implementation of these specifications (i.e. on-site contextualisation is provided through the inclusion of various monitoring and implementation tools).

This EMPr has the following objectives:

» Outline mitigation measures and environmental specifications which are required to be implemented for the planning, construction and rehabilitation, operation, and decommissioning phases of the project in order to manage and minimise the extent of potential environmental impacts associated with the facility.

[1] Provincial Government Northern Cape, Department of Environmental Affairs and Development Planning: *Guideline for Environmental Management Plans*. 2005

- Ensure that none of the project phases result in undue or reasonably avoidable adverse environmental impacts, and ensure that any potential environmental benefits associated with the project are enhanced.
- Identify entities responsible for the implementation of measures, and outline functions and responsibilities.
- Propose mechanisms and frequency for monitoring compliance, and preventing long-term or permanent environmental degradation.
- Facilitate appropriate and proactive responses to unforeseen events or changes in project implementation that was not considered in the EIA process.

The management and mitigation measures identified within the EIA process are systematically addressed in this EMPr, and ensure the minimisation of adverse environmental impacts to an acceptable level.

The Developer must ensure that the implementation of the project complies with the requirements of all environmental authorisations, permits, and obligations emanating from relevant environmental legislation. This obligation is partly met through the development and implementation of this EMPr and through its integration into the contract documentation. As this EMPr forms part of the EIA process being conducted for the Mutsho Power Project, it is important that it be read in conjunction with the Scoping and EIA Reports compiled for the project. This will contextualise the EMPr and enable a thorough understanding of its role and purpose in the integrated environmental management process. Should there be a conflict of interpretation between this EMPr and the Environmental Authorisation (EA), the stipulations in the EA shall prevail over that of the EMPr, unless otherwise agreed by the relevant competent authorities in writing. Similarly, any provisions in legislation overrule any provisions or interpretations within this EMPr.

This EMPr shall be binding on all parties involved in the pre-construction, construction, and operational phases of the project, and shall be enforceable at all levels of contract and operational management within the project. The document will be adhered to, and updated as relevant throughout the project life cycle. Any amendments to the EMPr must be undertaken in accordance with the relevant legislative requirements at the time, and appropriate records thereof maintained.

CHAPTER 3 KEY LEGISLATION APPLICABLE TO THE DEVELOPMENT

The following legislation and guidelines have informed the scope and content of this EMPr:

- National Environmental Management Act (No. 107 of 1998) (NEMA).
  - The 2014 EIA Regulations (GNR 326).
- National Environmental Management: Waste Act (No. 59 of 2008) (NEM:WA)
  - List of Waste Management Activities (GNR 921).
- National Environmental Management: Air Quality Act (No. 39 of 2004) (NEM:AQA).
  - List of Activities resulting in Atmospheric Emissions (GNR 893).
- National Water Act (No. 36 of 1998) (NWA).
  - Regulations Regarding the Procedural Requirements for Water Use License Application and Appeals (GNR 267)
- Limpopo Environmental Management Act (No. 07 of 2003) (LEMA).
- The Equator Principles III (June, 2013)
- International Finance Corporation (IFC) Performance Standards on Environmental and Social Sustainability (January 2012)

Several other Acts, standards, or guidelines have also informed the project process and the scope of issues addressed and assessed in the EIA Report. A review of legislative requirements applicable to the proposed project is provided in the table that follows.

Table 3.1: Relevant legislative permitting requirements applicable to the Mutsho Power Project.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
National Legislation			
Constitution of the Republic of South Africa (No. 108 of 1996)	In terms of Section 24, the State has an obligation to give effect to the environmental right. The environmental right states that: "*Everyone has the right –* » *To an environment that is not harmful to their health or well-being; and* » *To have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that:* ∗ *Prevent pollution and ecological degradation;* ∗ *Promote conservation; and* ∗ *Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development*."	Applicable to all authorities	There are no permitting requirements associated with this Act. The application of the Environmental Right however implies that environmental impacts associated with proposed developments are considered separately and cumulatively. It is also important to note that the "right to an environment clause" includes the notion that justifiable economic and social development should be promoted, through the use of natural resources and ecologically sustainable development.
National Environmental Management Act (No. 107 of 1998) (NEMA)	The EIA Regulations have been promulgated in terms of Chapter 5 of NEMA. Listed 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 assessed and reported on to the competent authority charged by NEMA with granting of the relevant environmental authorisation. In terms of the Listing Notices (GNR 327, 325 and 324), a full Scoping and EIA Process is required to be undertaken for the proposed project.	DEA – Competent Authority Limpopo DEDET – Commenting Authority	The listed activities triggered by the proposed project have been identified and assessed in the EIA process being undertaken (i.e. Scoping and EIA). This EIA Report will be submitted to the competent and commenting authority in support of the application for EA.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
National Environmental Management Act (No. 107 of 1998) (NEMA)	In terms of the Duty of Care Provision in S28(1) the Project Developer must ensure that reasonable measures are taken throughout the life cycle of the project to ensure that any pollution or degradation of the environment associated with the project is avoided, stopped or minimised. In terms of NEMA, it has become the legal duty of a Project Developer to consider a project holistically, and to consider the cumulative effect of a variety of impacts.	DEA Limpopo DEDET	While no permitting or licensing requirements arise directly by virtue of the proposed project, this section has found application during the EIA Phase through the consideration of potential impacts (cumulative, direct, and indirect). It will continue to apply throughout the life cycle of the project.
Environment Conservation Act (No. 73 of 1989) (ECA)	National Noise Control Regulations (GNR 154 dated 10 January 1992)	DEA Limpopo DEDET Local Authorities	Noise impacts are expected to be associated with the construction and operation phases of the project and are not likely to present a significant intrusion to the local community. There is therefore no requirement for a noise permit in terms of the legislation.
National Water Act (No. 36 of 1998) (NWA)	Water uses under Section 21 of the NWA must be licensed, unless such water use falls into one of the categories listed in Section 22 of the Act or falls under the General Authorisation (GA) (in which instance the registration of the water use is required). Consumptive water uses may include the storage of water, irrigation, and disposing of water and waste – Sections 21 (b), (e), (f), (g), and (h). Non-consumptive water uses may include impeding or diverting of flow in a water course, and altering the bed, banks or course – Section 21 (c) and (i).	DWS	The following Section 21 water uses have been identified for the proposed project, in terms of which an Integrated Water Use License (IWUL) is likely to be required: Section 21(b) – Storing of water. Section 21(c) – Impeding or diverting the flow of water in a watercourse. Section 21(e) – Engaging in a controlled activity identified as such in Section 37(1) or declared under Section 38(1).

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
			Section 21(f) – Disposing of waste in a manner which may detrimentally impact on a water resource. Section 21 (g) – Disposing of waste in a manner which may detrimentally impact on a water resource. Section 21 (h) – Disposing in any manner of water which contains waste from, or which has been heated in, any industrial or power generation process. Section 21 (i) – Altering the bed, banks. course or characteristics of a watercourse.
Minerals and Petroleum Resources Development Act (No. 28 of 2002) (MPRDA)	A mining permit or mining right may be required where a mineral in question is to be mined (e.g. materials from a borrow pit) in accordance with the provisions of the MPRDA. Section 53 Department of Mineral Resources: Approval from the Department of Mineral Resources (DMR) is required to use land surface contrary to the objects of the Act in terms of Section 53 of the MPRDA. In terms of the Act approval from the Minister of Mineral Resources is required to ensure that proposed activities do not sterilise a mineral resource that might occur on site.	DMR	As no borrow pits are expected to be required for the construction of the facility, no mining permit or right is required to be obtained. A Section 53 application is expected to be required to be submitted to the DMR for the proposed development area.
National Environmental Management: Air Quality Act (No. 39 of 2004) (NEM:AQA)	Section 21 provides for Listed activities requiring an Atmospheric Emissions License (AEL).	DEA	Solid fuel combustion installations using solid fuel for electricity generation are Listed Activities (Category 1: Sub-category 1.1) in term of Section 21 of

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	Minimum Emission Standards (MES) are set for Listed Activities. The MES are defined for existing and new plants in GNR 893 of 22 November 2013. Measures in respect of dust control (Section 32) and National Dust Control Regulations of November 2013. Measures to control noise (Section 34) - no regulations promulgated yet. NEM:AQA provides that an Air Quality Officer may require any person to submit an Atmospheric Impact Report if there is reasonable suspicion that the person has failed to comply with the Act.		NEM:AQA. Therefore an AEL must be obtained for the project. Measures in respect of dust control (Section 32) and the National Dust Control Regulations of November 2013 must also be adhered to.
National Heritage Resources Act (No. 25 of 1999) (NHRA)	Section 7 of the NHRA stipulates assessment criteria and categories of heritage resources according to their significance. Section 35 of the NHRA provides for the protection of all archaeological and palaeontological sites, and meteorites. Section 36 of the NHRA provides for the conservation and care of cemeteries and graves by SAHRA where this is not the responsibility of any other authority. Section 38 of the NHRA lists activities which require Developers or any person who intends to undertake a listed activity to notify the responsible heritage resources authority and furnish it with details regarding the location, nature, and extent of the proposed development.	SAHRA	An HIA has been undertaken as part of the EIA Process to identify heritage sites (refer to **Appendix I** of the EIA Report). Should a heritage resource be impacted upon, a permit may be required from SAHRA.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	Section 44 of the NHRA requires the compilation of a Conservation Management Plan as well as a permit from SAHRA for the presentation of archaeological sites as part of tourism attraction.		
National Environmental Management: Biodiversity Act (No. 10 of 2004) (NEM:BA)	Section 53 of NEM:BA provides for the MEC/Minister to identify any process or activity in such a listed ecosystem as a threatening process. Three government notices have been published in terms of Section 56(1) of NEM:BA, i.e. GNR 150 (Commencement of Threatened or Protected Species (TOPS) Regulations, 2007), GNR 151 (Lists of critically endangered, vulnerable and protected species) and GNR 152 (Threatened or Protected Species Regulations). It provides for listing threatened or protected ecosystems, in one of four categories: critically endangered (CR), endangered (EN), vulnerable (VU) or protected. The first national list of threatened terrestrial ecosystems has been gazetted, together with supporting information on the listing process including the purpose and rationale for listing ecosystems, the criteria used to identify listed ecosystems, the implications of listing ecosystems, and summary statistics and national maps of listed ecosystems (National Environmental Management: Biodiversity Act: National list of ecosystems that are threatened and in need of protection, (G 34809, GNR 1002), 9 December 2011). NEM:BA also regulates alien and invader species.	DEA Limpopo DEDET	Under NEM:BA, a permit would be required for any activity which is of a nature that may negatively impact on the survival of a listed protected species. An independent ecological specialist study has been undertaken as part of the EIA Phase (refer to **Appendix D** of the EIA Report). As such the potentially occurrence of critically endangered, endangered, vulnerable, and protected species and the potential for them to be affected has been considered.
Conservation of Agricultural Resources Act (No. 43 of 1983) (CARA)	Section 5 provides for the prohibition of the spreading of weeds.	DAFF	CARA will find application throughout the life cycle of the project. In this regard, soil erosion prevention and soil

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	Regulation 15 of GNR 1048 published under CARA provides for the classification of categories of weeds and invader plants, and restrictions in terms of where these species may occur. Regulation 15E of GNR 1048 published under CARA provides requirement and methods to implement control measures for alien and invasive plant species.		conservation strategies must be developed and implemented. In addition, a weed control and management plan must be implemented. The permission of agricultural authorities will be required if the Project requires the draining of vleis, marshes or water sponges on land outside urban areas. However this is not anticipated to be required for the project.
National Forests Act (No. 84 of 1998) (NFA)	According to this Act, the Minister may declare a tree, group of trees, woodland or a species of trees as protected. The prohibitions provide that "no person may cut, damage, disturb, destroy or remove any protected tree, or collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a licence granted by the Minister".	DAFF	A licence is required for the removal of protected trees. The presence of protected trees on site has been assessed as part of the independent ecological specialist study undertaken as part of the EIA process (refer to **Appendix D** of the EIA Report)
National Veld and Forest Fire Act (No. 101 of 1998) (NVFFA)	In terms of Section 21 of this Act the applicant must ensure that firebreaks are wide and long enough to have a reasonable chance of preventing fire from spreading, not causing erosion, and is reasonably free of inflammable material. In terms of Section 17 of the Act, the applicant must have such equipment, protective clothing, and trained personnel for extinguishing fires.	DAFF	While no permitting or licensing requirements arise from this legislation, this Act will be applicable during the construction and operational phase of the project.
Hazardous Substances Act (No. 15 of 1973) (HAS)	This Act regulates the control of substances that may cause injury, or ill health, or death due to their toxic, corrosive, irritant, strongly sensitising or inflammable nature or the generation of pressure thereby in certain instances and for	Department of Health	It is necessary to identify and list all Group I, II, III, and IV hazardous substances that may be on site and in what operational context they are used,

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	the control of certain electronic products. To provide for the rating of such substances or products in relation to the degree of danger; to provide for the prohibition and control of the importation, manufacture, sale, use, operation, modification, disposal or dumping of such substances and products. » Group I and II: Any substance or mixture of a substance that might by reason of its toxic, corrosive etc., nature or because it generates pressure through decomposition, heat or other means, cause extreme risk of injury etc., can be declared as Group I or Group II substance » Group IV: any electronic product; and » Group V: any radioactive material. The use, conveyance, or storage of any hazardous substance (such as distillate fuel) is prohibited without an appropriate license being in force.		stored or handled. If applicable, a license is required to be obtained from the Department of Health (DoH).
National Environmental Management: Waste Act (No. 59 of 2008) (NEM:WA)	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 – » Adding other waste management activities to the list. » Removing waste management activities from the list. » Making other changes to the particulars on the list. In terms of the Regulations published in terms of this Act (GNR 912), a Basic Assessment or Environmental Impact Assessment is required to be undertaken for identified listed activities.	DEA – hazardous waste Limpopo DEDET – general waste	A WML is required for the disposal of waste to land (ash) and for the construction of the ash disposal facility associated with the power station. In terms of NEM:WA Amendment Act, ash is classified as hazardous waste. General waste handling, storage and disposal during construction and operation is required to be undertaken. The DWAF Waste Management Series: Minimum Requirements for the Handling, Classification and Disposal of

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	Any person who stores waste must at least take steps, unless otherwise provided by this Act, to ensure that: » 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. » Adequate measures are taken to prevent accidental spillage or leaking. » The waste cannot be blown away. » Nuisances such as odour, visual impacts and breeding of vectors do not arise; and » Pollution of the environment and harm to health are prevented.		Hazardous Waste will also need to be considered.
National Road Traffic Act (No. 93 of 1996) (NRTA)	The technical recommendations for highways (TRH 11): "Draft Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads" outline the rules and conditions which apply to the transport of abnormal loads and vehicles on public roads and the detailed procedures to be followed in applying for exemption permits are described and discussed. Legal axle load limits and the restrictions imposed on abnormally heavy loads are discussed in relation to the damaging effect on road pavements, bridges, and culverts. The general conditions, limitations, and escort requirements for abnormally dimensioned loads and vehicles are also discussed and reference is made to speed restrictions, power/mass ratio, mass distribution, and general operating conditions for abnormal loads and vehicles. Provision is also made for the granting of permits for all other exemptions	SANRAL – national roads Limpopo DoT	An abnormal load/vehicle permit may be required to transport the various components to site for construction. These include route clearances and permits will be required for vehicles carrying abnormally heavy or abnormally dimensioned loads. Transport vehicles exceeding the dimensional limitations (length) of 22m. Depending on the trailer configuration and height when loaded, some of the power station components may not meet specified dimensional limitations (height and width).

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	from the requirements of the National Road Traffic Act and the relevant Regulations.		

CHAPTER 4 STRUCTURE OF THIS EMPR

The first two chapters provide background to the EMPr and the proposed project, while the chapters which follow consider the following:

» Pre-Construction (Planning and Design) activities.
» Construction activities.
» Operation activities.
» Decommissioning activities.

These chapters set out the procedures necessary for the Project Developer to minimise environmental impacts and achieve environmental compliance. For each of the phases of implementation, an over-arching environmental **goal** is stated. In order to meet this goal, a number of **objectives** are listed. The EMPr has been structured in table format in order to show the links between the goals for each phase and their associated objectives, activities/risk sources, mitigation actions, monitoring requirements and performance indicators. A specific EMPr table has been established for each environmental objective. The information provided within the EMPr table for each objective is illustrated below:

OBJECTIVE:	***Description of the objective, which is necessary to meet the overall goals; which take into account the findings of the EIA specialist studies.***

Project Component/s	» List of project components affecting the objective.
Potential Impact	» Description of potential environmental impact if objective is not met.
Activity/Risk Source	» Description of activities which could affect achieving objective.
Mitigation: Target/Objective	» Description of the target and/or desired outcomes of mitigation.

Mitigation: Action/Control	**Responsibility**	**Timeframe**
List specific action(s) required to meet the mitigation target/objective described above.	Who is responsible for the measures?	Period for implementation.

Performance Indicator	Description of key indicator(s) that track progress/indicate the effectiveness of the EMPr.
Monitoring	Mechanisms for monitoring compliance; the key monitoring actions required to check whether the objectives are being achieved, taking into consideration responsibility, frequency, methods, and reporting.

The objectives and EMPr tables are required to be reviewed and possibly modified whenever changes, such as the following, occur:

» Planned activities change (i.e. in terms of the components and/or layout of the facility).
» Modification to, or addition to, environmental objectives and targets.
» Relevant legal or other requirements are changed or introduced which may not have been applicable previously.
» Significant progress has been made on achieving an objective or target such that it should be re-examined to determine if it is still relevant or if it should be modified.

Any amendments to the EMPr must be undertaken in accordance with the relevant legislative requirements at the time.

4.1 Project Team

This draft EMPr was compiled by:

» **Jo-Anne Thomas** is a Director at Savannah Environmental (Pty) Ltd. Jo-Anne has a Master of Science Degree in Botany (M.Sc. Botany) from the University of the Witwatersrand, and is registered as a Professional Natural Scientist (400024/2000) with the South African Council for Natural Scientific Professions (SACNASP). She has 19 years of experience in the field of environmental assessment and management, and the management of large environmental assessment and management projects. During this time she has managed and coordinated a multitude of large-scale infrastructure EIAs, and is also well versed in the management and leadership of teams of specialist sub-consultants, and dynamic stakeholders. Jo-Anne has been responsible for providing technical input for projects in the environmental management field, specialising in Strategic Environmental Advice, Environmental Impact Assessment (EIA) studies, environmental permitting, Public Participation, Environmental Management Plans (EMPs) and Programmes (EMPrs), environmental policy, strategy and guideline formulation, and Integrated Environmental Management (IEM); with a key focus on the integration of specialist environmental studies and findings into larger engineering-based projects, strategic assessment, and providing practical and achievable environmental management solutions and mitigation measures. Her responsibilities for environmental studies include project management; review and manipulation of data; identification and assessment of potential negative environmental impacts and benefits; review of specialist studies; and the identification of mitigation measures, and the compilation of reports for environmental studies in accordance with all relevant environmental legislation.

» **Sarah Watson** is an Environmental Consultant at Savannah Environmental. Sarah has a Bachelor of Social Science Honours Degree in Geography and Environmental Management (B.Soc.Sci. Honours G.E.M.) from the University of KwaZulu-Natal (UKZN). She has 8 years of experience as an Environmental Consultant in the field of Environmental Impact Assessment and Environmental Management. Sarah has experience conducting environmental assessment processes for a range of projects in the telecommunications, residential, industrial, bulk infrastructure, rural development, and energy sectors.

Specialists involved in the preparation of management measures include:

Specialist Name	Specialist Area of Expertise	Specialist Company
Riaan Robbeson, Dewald Kamffer, and Lukas Niemand	Ecology, flora, fauna and avifauna	Bathusi Environmental Consulting (BEC)
Mark Zunckel, and Atham Raghunandan	Air Quality	uMoya-Nilu Consulting (Pty) Ltd
Robbie Louw, Harmke Immink, and Sarah Goodbrand	Climate Change	Promethium Carbon
Byron Bester, Kathryn Roy, Kieren Bremner, Mashudu Rafundisani, Robel Gebrekristos, Ayabonga Mpelwane, Andre van Coller, and Brett Coutts	Hydrology and Geohydrology	Digby Wells
Garry Paterson and Lebea Maribeng	Soils, Land Use and Agricultural Potential	Agricultural Research Council (ARC)
Kathryn Smuts	Archaeology and Heritage	Cedar Tower Services

Specialist Name	Specialist Area of Expertise	Specialist Company
Elize Butler	Palaeontology	Banzai Environmental (Pty) Ltd
Morné de Jager	Noise	Enviro Acoustic Research CC
Jonathan Marshall	Visual	Environmental Planning and Design CC
Elena Broughton and Ndivhuwo Malemagoba	Socio-economics	Urban-Econ Development Economists
Stephen Fautley	Traffic	Techso

Savannah Environmental's team have been actively involved in undertaking environmental studies over the past 12 years, for a wide variety of projects throughout South Africa, including those associated with electricity generation and infrastructure development; and therefore have extensive knowledge and experience in EIAs and environmental management, having managed and drafted EMPrs for numerous other power generation projects throughout South Africa. CV's for the EAPs are included in **Appendix A**.

CHAPTER 5 ROLES AND RESPONSIBILITIES

5.1 Roles and Responsibilities for the Construction Phase of the Mutsho Power Project

As the Project Developer, Mutsho Power (Pty) Ltd must ensure that the implementation of the Mutsho Power Project and associated infrastructure complies with the requirements of any and all environmental authorisations and permits, and obligations emanating from other relevant environmental legislation. This obligation is partly met through the development and implementation of the EMPr, and its integration into contract documentation. Mutsho Power (Pty) Ltd will retain various key roles and responsibilities during the construction of the Mutsho Power Project, as outlined below.

Specific responsibilities of the Owner's Representatives; Environmental Control Officer (ECO) and Engineering, Procurement, and Construction (EPC) Contractor for the construction phase of this project are as detailed below.

The **Project Manager (PM)** will:

- Ensure all specifications and legal constraints specifically with regards to the environment are highlighted to the Contractors so that they are made aware of these.
- Ensure that its Contractors are made aware of all stipulations within the EMPr.
- Ensure that the EMPr is correctly implemented throughout the project lifecycle by means of site inspections and meetings. Records of this will be documented as part of the site meeting minutes.
- Be fully conversant with the Environmental Impact Assessment (EIA) for the project, the EMPr, the conditions of the Environmental Authorisation (EA), and all relevant environmental legislation.

The **Site Manager** (On-site Representative) will:

- Be fully knowledgeable with the contents of the EIA.
- Be fully knowledgeable with the contents and conditions of the EA (once issued).
- Be fully knowledgeable with the contents of the EMPr.
- Be fully knowledgeable with the contents of all relevant environmental legislation, and ensure compliance therewith.
- Be fully knowledgeable with the contents of all relevant licences and permits issued for the project.
- Have overall responsibility of the EMPr and its implementation.
- Conduct audits to ensure compliance with the EMPr.
- Ensure there is communication with the PM, ECO(s) and relevant discipline Engineers on matters concerning the environment.
- Ensure that no actions are taken which will harm or may indirectly cause harm to the environment, and take steps to prevent pollution on the site.
- Confine activities to the demarcated construction site.

An independent **Environmental Control Officer (ECO)** must be appointed by the Project Developer prior to the commencement of any authorised activities. The ECO will be responsible for monitoring, reviewing and verifying compliance by the Contractor with the environmental specifications of the EMPr and the conditions of the EA.

The ECO will:

- Be fully knowledgeable of the contents of the EIA.
- Be fully knowledgeable of the contents of the conditions of the EA (once issued).
- Be fully knowledgeable of the contents of the EMPr.
- Be fully knowledgeable of the contents of all relevant environmental legislation, and ensure compliance therewith.
- Be fully knowledgeable with the contents of all relevant licences and permits issued for the project.
- Ensure that the contents of the EMPr are communicated to the Contractors site staff and that the Site Manager and Contractors are constantly made aware of the contents through ongoing discussion.
- Ensure that compliance with the EMPr is monitored through regular and comprehensive inspection of the site and surrounding areas.
- Ensure that the Site Manager has input into the review and acceptance of construction methods and method statements.
- Ensure that activities on site comply with all relevant environmental legislation.
- Ensure that a removal is ordered of any person(s) and/or equipment responsible for any contravention of the specifications of the EMPr.
- Ensure that any non-compliance or remedial measures that need to be applied are reported.
- Keep records of all activities on site, problems identified, transgressions noted and a task schedule of tasks undertaken by the ECO.
- Independently report to the Department of Environmental Affairs (DEA) in terms of compliance with the specifications of the EMPr and conditions of the EA (once issued).
- Keep records of all reports submitted to DEA.

The ECO shall remain employed until all rehabilitation measures, as required for implementation due to construction damage, are completed and the site is handed over for operation.

Contractors and Service Providers: All Contractors (including sub-contractors and staff) and service providers are ultimately responsible for:

- Ensuring adherence to the environmental management specifications.
- Ensuring that Method Statements are submitted to the Site Manager for approval before any work is undertaken. Any lack of adherence to this will be considered as non-compliance to the specifications of the EMPr.
- Ensuring that any instructions issued by the Site Manager on the advice of the ECO are adhered to.
- Ensuring that a report is tabled at each site meeting, which documents all incidents that have occurred during the period before the site meeting.
- Ensuring that a register is kept in the site office, which lists all transgressions issued by the ECO.
- Ensuring that a register of all public complaints is maintained.
- Ensuring that all employees, including those of sub-contractors receive training before the commencement of construction in order that they can constructively contribute towards the successful implementation of the EMPr (i.e. ensure their staff are appropriately trained as to the environmental obligations).

Contractor's Environmental Representative: The Contractor's Environmental Representative (CER), employed by the Contractor, is responsible for managing the day-to-day on-site implementation of this EMPr, and for the compilation of regular (usually weekly) Monitoring Reports. In addition, the CER must act

as liaison and advisor on all environmental and related issues and ensure that any complaints received from the public are duly recorded and forwarded to the Site Manager and Contractor.

The CER must:

» Be well versed in environmental matters.
» Understand the relevant environmental legislation and processes.
» Understand the hierarchy of Environmental Compliance Reporting, and the implications of Non-Compliance.
» Know the background of the project and understand the implementation programme.
» Be able to resolve conflicts and make recommendations on site in terms of the requirements of this Specification.
» Keep accurate and detailed records of all EMPr-related activities on site.

5.2 Roles and Responsibilities for the Operation Phase of the Mutsho Power Project

Formal responsibilities are necessary to ensure that key procedures are executed. Specific responsibilities of the Mutsho Power Project Operations Manager (OM), and Environmental Manager (EM) for the operation phase of this project are detailed below.

The **Power Station Manager** will:
» Ensure that adequate resources (human, financial, technology) are made available and appropriately managed for the successful implementation of the operational EMPr.
» Conduct annual reviews of the EMPr to evaluate its effectiveness.
» Take appropriate action as a result of findings and recommendations in management reviews and audits.
» Provide forums to communicate matters regarding environmental management.

The **Environmental Manager** will:
» Develop and Implement an Environmental Management System (EMS) for the power station and associated infrastructure.
» Manage and report on the facility's environmental performance.
» Maintain a register of all known environmental impacts and manage the monitoring thereof.
» Conduct internal environmental audits and co-ordinate external environmental audits.
» Liaise with statutory bodies such as the National DEA and Provincial Limpopo DEDET on environmental performance and other issues.
» Conduct environmental training and awareness for the employees who operate and maintain the power station and associated infrastructure.
» Compile environmental policies and procedures.
» Liaise with Interested and Affected Parties (I&APs) on environmental issues of common concern.
» Track and control the lodging of any complaints regarding environmental matters.

CHAPTER 6 MANAGEMENT PROGRAMME: PRE-CONSTRUCTION

6.1 Goal for Pre-Construction Activities

Overall Goal for Pre-Construction: Undertake the pre-construction phase (planning and design) of the Mutsho Power Project in a way that:

» Ensures that the design of the Mutsho Power Project and associated infrastructure responds to identified environmental constraints and opportunities.
» Ensures that pre-construction activities are undertaken in accordance with all relevant legislative requirements.
» Ensures that adequate regard has been taken of any landowner concerns and that these are appropriately addressed through design and planning (where appropriate).
» Ensures that the best environmental options are selected for the project.
» Enables construction activities to be undertaken without significant disruption to other land uses in the area.

6.2 Objectives

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

OBJECTIVE 1: To ensure that the design of the facility responds to the identified environmental constraints and opportunities

Project component/s	Project components affecting the objective include all infrastructure including: » Power station » Access roads » Substation » Ash dump » Strategic coal stockpile » Wastewater treatment and management facilities
Potential Impact	» Design fails to respond optimally to the identified environmental considerations
Activities/risk sources	» Positioning of infrastructure for the power station
Mitigation: Target/Objective	» To ensure that the design of the facility responds to the identified environmental constraints and opportunities

Mitigation: Action/control	Responsibility	Timeframe
1. Plan and conduct pre-construction activities in an environmentally acceptable manner.	Project Developer	Pre-construction

Mitigation: Action/control	Responsibility	Timeframe
2. Consider design-level mitigation measures recommended in the EIA Report and specialist studies.	Project Developer	Design
3. Conduct an ecological walk through survey (considering flora, fauna, avifauna, and wetlands) for the power station and all associated infrastructure once final designs are available. Results of this survey must guide permitting requirements for the removal of protected trees such as *Adansonia digitata* L. (Baobab), *Boscia albitrunca* (Burch.) Gilg & Gilg-Ben. (Shepard's tree), *Combretum imberbe Wawra* (Leadwood), *Sclerocarya birrea* (A.Rich.) *Hochst. subsp. caffra* (Sond.) *Kokwaro* (Marula) from the project site.	Suitably qualified person / specialist appointed by The Project Developer	Planning Phase (prior to construction/ during the detail design phase)
4. Conduct a heritage walk through survey for the power station and all associated infrastructure once final designs are available. Any heritage sites recorded during this survey could be mitigated by micro adjustments of the layout.	Suitably qualified person / specialist appointed by The Project Developer	Planning Phase
5. Develop a Biodiversity Monitoring Programme for implementation during construction and operation.	Suitably qualified person / specialist appointed by The Project Developer	Planning Phase
6. Compile a Fire Management Plan for implementation during construction and operation. A basic Emergency Response Plan is included in **Appendix B**.	Suitably qualified person / specialist appointed by The Project Developer	Planning Phase
7. Develop a Capture and Relocation Programme for faunal species for implementation during the construction phase.	Suitably qualified person / specialist appointed by The Project Developer	Planning Phase
8. Develop an Alien Invasive Plant (AIP) Management Plan for implementation during construction and operation. A basic Alien Invasive Plant (AIP) Management Plan is included in **Appendix C**.	Suitably qualified person / specialist appointed by The Project Developer	Planning Phase
9. Develop suitable procedures in the event of encountering potentially dangerous animals on the site for implementation during the construction phase.	Suitably qualified person / specialist appointed by The Project Developer	Planning Phase
10. Develop a Rehabilitation Programme that makes use of locally endemic species. A basic Rehabilitation Plan is included in **Appendix D**.	Suitably qualified person / specialist appointed by The Project Developer	Planning Phase
11. Develop a detailed Stormwater Management Plan for the stormwater and water pollution control facilities such as the main plant and ash dump run-off dams and storm water drainage system. As a minimum, pollution control infrastructure is to be designed in accordance with GNR 704 specifications.	Suitably qualified person / specialist appointed by The Project Developer	Planning Phase
12. Develop an Integrated Water Resource Management Plan (IWRMP) for implementation during construction and operation.	Suitably qualified person / specialist appointed by The Project Developer	Planning Phase

Mitigation: Action/control	Responsibility	Timeframe
13. Develop a Traffic Management Plan for the construction and operational phases of the power station. A basic Traffic Management Plan is included in **Appendix F**.	Suitably qualified person / specialist appointed by The Project Developer	Planning Phase
14. Diversion of external surface water: A system of storm water drains must be designed for implementation to ensure that all water that falls outside the coal stockpile and ash dump areas is diverted. Provision must be made for the maximum precipitation to be expected over a 24 hour period with a probability of 1:100 hundred years. A freeboard of at least 0.8m must be provided throughout the system above the predicted maximum water level.	Project Developer	Design
15. Develop a Surface Water Monitoring Programme to monitor impacts on water quality for the operation phase of the project. A basic Hydrology and Geohydrology Monitoring Procedure is included in **Appendix G**.	Suitably qualified person / specialist appointed by The Project Developer	Planning Phase
16. Develop a Zero Liquid Effluent Discharge (ZLED) policy for the operation phase of the project.	Project Developer	Planning Phase
17. Develop a Groundwater Monitoring Programme to establish a database of plume movement trends, and to aid the eventual decommissioning and rehabilitation for the operation phase of the project. A basic Hydrology and Geohydrology Monitoring Procedure is included in **Appendix G**.	Suitably qualified person / specialist appointed by The Project Developer	Planning Phase
18. Develop an Air Quality Management Plan (AQMP) for the operational phase of the project which must include an emission control and reduction strategy.	Suitably qualified person / specialist appointed by The Project Developer	Planning Phase
19. The stack height which is considered most appropriate to promote the most effective dilution and dispersion of pollutants, ensuring the lowest possible ground level concentrations should be implemented.	Project Developer	Design
20. Plan for consolidating infrastructure as far as possible and make use of already disturbed areas rather than pristine sites, wherever possible.	Project Developer	Planning Phase
21. Where applicable permits for transportation of abnormal loads on public roads must be obtained prior to commencement of construction.	Project Developer	Planning Phase
22. The coal stockpile and ash dump must be lined with an impervious liner capable of containing all contaminants which may impact on the surrounding environment (as per GNR 636)	Project Developer	Planning Phase
23. Section 21 water uses are to be licensed for appropriate regulation and control. An Integrated Water Use License (IWUL) must be obtained prior to any listed water use commencing onsite.	Project Developer	Planning Phase
24. Avoid no-go areas identified during the EIA process.	Project Developer	Planning Phase
25. Design the power station such that there is opportunity to introduce alternative fuel sources (such as biomass) in future.	Project Developer	Design Phase

Mitigation: Action/control	Responsibility	Timeframe
26. During the design and prior to construction the Developer must meet with local communities and authorities to determine their concerns and take into consideration any mitigating proposals.	Project Developer	Planning Phase
27. Perform a skills audit to determine the potential skills that could be sourced from the local area	Project Developer	Planning Phase
28. Develop an apprenticeship programme to build onto existing, or develop new skills of construction workers, especially those coming from local communities.	Project Developer	Planning Phase
29. Submit the final layout to DEA for approval prior to commencement of construction. The layout must indicate all areas where infrastructure is planned as well as temporary areas of disturbance during the construction phase (i.e. laydown areas, etc.).	Project Developer	Pre-construction

Performance Indicator	» Design and layouts etc. respond to the mitigation measures and recommendations contained within the EIA Report and supporting independent specialist studies.
Monitoring	» Ensure that the design implemented meets the objectives and mitigation measures contained within the EIA Report through review of the design by the Project Manager and Environmental Control Officer (ECO) prior to the commencement of construction.

OBJECTIVE 2: Limit / manage impacts on conservation important plants and protected tree species within the project area / adjacent areas

Project component/s	» Any infrastructure development that will cause loss of natural habitat where protected tree species and / or conservation important plants occur
Potential Impact	» Uncontrolled loss of protected species from remaining areas of natural habitat, legal compliance with permitting requirements, exacerbated losses of plant species of conservation concern, with specific reference to large *Adansonia* individuals
Activities/risk sources	» Site preparation, land clearance, construction activities, operational activities
Mitigation: Target/Objective	» Limit the impact on protected and conservation important plant species. Prevent impacts on protected and conservation important plants in remaining areas of natural habitat, remove suitable sample sizes of target species

Mitigation: Action/control	Responsibility	Timeframe
1. Ensure that a comprehensive walkthrough of the site is conducted prior to commencement of activities to identify and count all protected plants that occur within the footprint	Construction Contractors, Environmental Team, Environmental Officer, Botanists	Prior to site preparation activities, permitting requirements
2. Ensure compliance in terms of the NFA and LEMA requirements pertaining to removal, damage or destruction of protected and/ or conservation important plants and trees	Construction Contractors, Environmental Team, Environmental Officer, Botanists	Prior to site preparation activities, permitting requirements

Mitigation: Action/control	Responsibility	Timeframe
3. Identify tree species that can be retained in position on the site to aid with landscaping and conservation of the species	Construction Contractors, Environmental Team, Environmental Officer, Botanists	Prior to site preparation activities
4. Identify individuals that would be suitable for rescue and relocation purposes to aid with landscaping and conservation	Construction Contractors, Environmental Team, Environmental Officer, Botanists	Prior to site preparation activities, construction phase, rehabilitation and revegetation

Performance Indicator	» No significant loss of protected trees and conservation important plants in natural habitat surrounding the site and infrastructure, approved permits for the removal and/ or destruction of certain species » The presence of protected trees within the project area that are used for aesthetic, rehabilitation purposes
Monitoring	» Density counts of protected trees within adjacent areas of natural habitat, continued monitoring of conservation important plants in the natural environment

OBJECTIVE 3: Limit / manage the loss of natural vegetation (physical modifications, removal, damage) and local depletion of plant taxa, reduction of phytodiversity

Project component/s	» Any infrastructure development that will cause loss of natural habitat, land clearance
Potential Impact	» Uncontrolled loss of natural habitat that would result in a reduction of local phytodiversity
Activities/risk sources	» Site preparation, land clearance, construction activities, operational activities
Mitigation: Target/Objective	» Allow for remaining areas of natural habitat to function ecologically effective within the environment of industrial development, clear and defined boundaries

Mitigation: Action/control	Responsibility	Timeframe
1. Identify a selection of suitable management areas in collaboration with specialists and appointed environmental personnel that will address requirements and objectives, including the consideration of areas of significant impact on biodiversity attributes	Developer, environmentalists, ecologists, project environmental team	Prior to site preparation activities
2. Propose and select a range of management areas that will suffice in the objectives of a diversity programme and where conservation efforts will yield positive results	Construction Contractors, Environmental Team, Environmental Officer	Prior to site preparation activities
3. Develop and implement a fire management programme, and grazing strategies for remaining areas of natural vegetation	Construction Contractors, Environmental Team, Environmental Officer	Prior to site preparation activities, construction phase, rehabilitation and revegetation

Mitigation: Action/control	Responsibility	Timeframe
4. Select a range of fixed points where periodic monitoring efforts will accurately assess and illustrate results of intervention/ conservation programmes	Construction Contractors, Environmental Team, Environmental Officer	Prior to site preparation activities
5. The implementation of periodic monitoring programme should be aimed at assessing and guiding management activities to the benefit of the environment	Construction Contractors, Environmental Team, Environmental Officer	Prior to site preparation activities, construction phase, rehabilitation and revegetation
6. Contribute information gained during the intervention process to relevant role-players and regional conservation efforts	Construction Contractors, Environmental Team, Environmental Officer	Prior to site preparation activities, construction phase, rehabilitation and revegetation

Performance Indicator	» No significant loss of phytodiversity on a local or regional scale, the implementation of a conservation strategy that will benefit local and regional conservation efforts » Effective ecological functionality of remaining areas of natural vegetation within an environment of industrial development
Monitoring	» Annual monitoring of phytodiversity in affected and surrounding areas of natural habitat as part of a bio monitoring programme

OBJECTIVE 4: To prevent / mitigate the loss of phytodiversity, associated with sensitive, conservation important habitat types or ecosystems of restricted abundance

Project component/s	» All activities that will result in decimation of natural habitat, accidental or unforeseen impacts on neighbouring natural habitat
Potential Impact	» Uncontrolled and accidental deterioration of natural terrestrial woodland habitat
Activities/risk sources	» Site preparation, land clearance, construction activities, operational activities
Mitigation: Target/Objective	» Limit the direct impacts on areas of natural vegetation

Mitigation: Action/control	Responsibility	Timeframe
1. Identify a selection of suitable management areas in collaboration with specialists and conservation panel that will address requirements and objectives, including the consideration of areas of significant impact on biodiversity attributes	Developer, environmentalists, ecologists, project environmental team	Prior to site preparation activities
2. Propose and select a range of management areas that will suffice in the objectives of a diversity programme and where conservation efforts will yield positive results	Construction Contractors, Environmental Team, Environmental Officer	Prior to site preparation activities

Performance Indicator	» No significant loss of sensitive landscapes or ecological types on a local or regional scale, no significant changes to phytodiversity attributes, the implementation of a conservation strategy that will benefit local and regional conservation efforts » Effective ecological functionality of remaining areas of natural vegetation within an environment of industrial development
Monitoring	» Annual monitoring of sensitive landscapes in affected and surrounding areas of natural habitat as part of a bio monitoring programme

OBJECTIVE 5: ***To control and prevent a decrease in habitat quality of surrounding areas due to peripheral impacts such as spillages, litter, increased erosion, contaminants, etc., also including Impacts on habitat types that are associated with plants of conservation importance (decreased habitat quality of surrounding areas due to peripheral impacts such as spillages, litter, increased erosion, contaminants, etc.)***

Project component/s	» Construction and development within a natural environment, also where natural environment of surrounding and adjacent areas will be affected through peripheral and uncontrolled impacts
Potential Impact	» Deterioration of adjacent natural habitat, spillages, contamination, exacerbation and infestation of weeds, encroacher and invasive species
Activities/risk sources	» Site preparation, construction activities, operational activities
Mitigation: Target/Objective	» Ensure the conservation / preservation of natural habitat within adjacent areas, limit construction and operational impacts to footprints

Mitigation: Action/control	Responsibility	Timeframe
1. Implement suitable buffer zones around development footprints that will assist in preventing uncontrolled spread of impacts into adjacent areas of natural habitat	Developer, environmentalists, ecologists, project environmental team, EO	Planning, site preparation and construction phase
2. Establish best-practice guidelines that will guide all operational activities within management areas, including aspects such as land clearance, roads and maintenance, movement and personnel presence, operational activities, waste management, etc.	Developer, environmentalists, ecologists, project environmental team, EO	Planning and site preparation phases

Performance Indicator	» No visible or subjective changes to surrounding areas of natural habitat » Absence of invasive and encroacher species in surrounding areas of natural habitat » Effective ecological functionality of remaining areas of natural vegetation within an environment of industrial development
Monitoring	» Annual monitoring of adjacent and surrounding vegetation as part of a bio monitoring programme

OBJECTIVE 6: ***To sustain the existing / improve on the existing quality and ecological functionality (including fire, erosion) of surrounding areas and natural habitat***

Project component/s	» Construction and development within a natural environment, also where natural environment and ecological functionality of surrounding and adjacent areas will be affected through development and operational aspects
Potential Impact	» Deterioration of adjacent natural habitat, changes to local ecological functionality and quality
Activities/risk sources	» Site preparation, construction activities, operational activities
Mitigation: Target/Objective	» Ensure the conservation / preservation of natural habitat and ecological functionality within adjacent areas, limit construction and operational impacts to footprints

Mitigation: Action/control	Responsibility	Timeframe
1. Identify activities and project components that are likely to cause degradation of surrounding natural habitat	Construction Contractors, Environmental Team, Environmental Officer	Prior to site preparation activities
2. Compile Standard Operating Procedures to deal with the prevention, timely identification and rehabilitation of adverse environmental events and occurrences within areas of ecological importance	Construction Contractors, Environmental Team, Environmental Officer	Planning, site preparation and construction phases
3. Compile and implement a biodiversity monitoring programme that aims to evaluate changes to the natural environment that would affect ecological functionality	Construction Contractors, Environmental Team, Environmental Officer	Planning, site preparation and construction phases

Performance Indicator	» Persistence of ecological functionality of remaining areas of natural habitat within surrounds of the development footprint, operational areas » Retaining phytodiversity, ecological functionality. Also, in collaboration with faunal avifaunal attributes
Monitoring	» Development and implementation of bio monitoring programme

OBJECTIVE 7: Prevent exacerbation of conservation levels, including ecological types and animals, plants, sensitive landscapes, etc.

Project component/s	» All development activities that will cause sterilisation and / or degradation of natural habitat
Potential Impact	» Loss of natural habitat that will result in threats to ecological types, species conservation and habitat preservation
Activities/risk sources	» Site preparation, construction activities, operational activities
Mitigation: Target/Objective	» Ensure the effective preservation of species and habitat on a local and regional scale

Mitigation: Action/control	Responsibility	Timeframe
1. Develop a suitable intervention / conservation strategy that will identify, include potential target species, habitat types, etc., on a local and regional scale	Construction Contractors, Environmental Team,	Prior to site preparation activities

Mitigation: Action/control	Responsibility	Timeframe
	Environmental Control Officer	
2. Contribute to a work group that will include all relevant role players to meet conservation target objectives	Construction Contractors, Environmental Team, Environmental Control Officer	Prior to site preparation activities
3. Develop site-specific intervention strategies that will contribute to the status, diversity and preservation of selected sensitive landscapes and macro-habitat types	Construction Contractors, Environmental Team, Environmental Control Officer	Prior to site preparation activities

Performance Indicator	» Continued persistence of natural, representative habitat on a local and regional scale » Avoidance of raised threat levels to species and ecological types
Monitoring	» Development and implementation of bio monitoring programme

Recommended Botanical Monitoring Programmes

To ensure the accurate gathering of data, the following techniques and guidelines (*inter alia*) should be followed:

» Fixed point monitoring should be applied as the preferred method of monitoring.
» All data gathered should be measurable (qualitative and quantitative).
» Monitoring report should be repeatable and temporally and spatially comparable.
» Data gathered should be an accurate representation of the PES of the study area, as well as the habitat units represented by each monitoring site.
» Data, when compared to previous sets, should show spatial and temporal trends.
» General habitat unit overviews should also be undertaken to augment quantitative data.

As part of the proposed Botanical Monitoring Programme, the following aspects are recommended for inclusion into the monitoring programme:

» Temporal Monitoring of development related impacts.
» Floristic diversity and compositional monitoring.
» Floristic species richness monitoring.
» Compositional monitoring within affected areas.
» Conservation important plant monitoring programme.
» Plants with ethno-botanical properties monitoring programme.
» Alien and invasive plant monitoring.
» Structural and compositional monitoring for burning regime.
» Structural and compositional monitoring for stocking rates / grazing potential.
» Structural and compositional monitoring.
» Land change / habitat loss and transformation monitoring programme.

The exact nature of a biological monitoring programme is subject to inputs from various role players; a representative workgroup should be established to determine the nature and detail of the relevant bio-monitoring protocol.

OBJECTIVE 8: Limit / manage impacts on fauna species of conservation importance

Project component/s	» Any infrastructure development that will cause loss of natural habitat where conservation important species are likely to occur or activities that could cause the disturbance of populations or individuals of these species
Potential Impact	» Loss of habitat suitable for populations of conservation important species or direct impacts and losses of populations or individuals of these species
Activities/risk sources	» Site preparation, construction activities, operational activities
Mitigation: Target/Objective	» Limit the impact on conservation important animals, prevent impacts on these animals in remaining areas of natural habitat

Mitigation: Action/control	Responsibility	Timeframe
1. Compile a list of conservation important animals that are known to occur in the region	Construction Contractors, Environmental Team, Environmental Officer	Prior to site preparation activities
2. Compile Standard Operational Procedures for the effective handling, capture, release and / or relocation of these animals, should they be threatened by construction / operational activities	Construction Contractors, Environmental Team, Environmental Officer	Prior to site preparation activities
3. Adapt operational activities to prevent direct impacts on these animals, including personnel presence in areas of natural habitat and vehicular movements / speeds	Construction Contractors, Environmental Team, Environmental Officer	Prior to site preparation activities

Performance Indicator	» No significant losses of conservation important animals as a result of construction or operational activities » The persistence of individuals and populations of protected animals in natural habitat surrounding the development
Monitoring	» Yearly monitoring of presence / abundance of conservation important animals as part of bio monitoring programme

OBJECTIVE 9: Limit / manage the loss of natural vegetation (physical modifications, removal, damage) and local depletion of plant taxa, reduction of phytodiversity

Project component/s	» Any infrastructure development that will cause loss of natural habitat
Potential Impact	» Uncontrolled loss of natural habitat that would result in a reduction of local phytodiversity
Activities/risk sources	» Site preparation, construction activities, operational activities

Mitigation: Target/Objective	» Allow for remaining areas of natural habitat to function ecologically effective within the environment of industrial development

Mitigation: Action/control	Responsibility	Timeframe
1. Identify a selection of suitable management areas in collaboration with specialists and conservation panel that will address requirements and objectives, including the consideration of areas of significant impact on biodiversity attributes	Developer, environmentalists, ecologists, project environmental team	Prior to site preparation activities
2. Propose and select a range of management areas that will suffice in the objectives of a diversity programme and where conservation efforts will yield positive results	Construction Contractors, Environmental Team, Environmental Officer	Prior to site preparation activities
3. Select a range of fixed points where periodic monitoring efforts will accurately assess and illustrate results of intervention/ conservation programmes	Construction Contractors, Environmental Team, Environmental Officer	Prior to site preparation activities

Performance Indicator	» No significant loss of faunal diversity on a local or regional scale, the implementation of a conservation strategy that will benefit local and regional conservation efforts » Effective ecological functionality of remaining areas of natural habitat within an environment of industrial development
Monitoring	» Annual monitoring of faunal diversity in affected and surrounding areas of natural habitat as part of biodiversity monitoring programme

OBJECTIVE 10: Facilitate effective displacement of animals from the development site, prevent continuous impacts on animals surrounding the development

Project component/s	» All activities that will result in decimation of natural habitat occupied by animal species, activities that are likely to result in deaths of animals, activities that might attract animals to development/ construction sites
Potential Impact	» Uncontrolled/ accidental death of animals that occupy natural habitat within the development site or temporarily occupy parts of the site/ infrastructures
Activities/risk sources	» Site preparation, construction activities, operational activities
Mitigation: Target/Objective	» Limit the direct impacts on animals occupying natural habitat where development will take place, limit the presence/ occurrence of animals within construction/ operational areas, effect removal and relocation to suitable areas

Mitigation: Action/control	Responsibility	Timeframe
1. Identify animals present within the development footprint, with particular reference to spiders, snakes, scorpions, large mammals, etc.	EO, appointed specialist	Prior to site preparation activities
2. Compile and implement a capture and relocation programme prior to construction phase	EO, appointed specialist	Prior to site preparation activities

Performance Indicator	» No significant losses of animals, successful relocation and release of animals captured on site » Continued presence of a high diversity of animals in immediate surrounds
Monitoring	» Development and implementation of bio monitoring programme

OBJECTIVE 11: Minimise human-animal conflict situations

Project component/s	» The presence of personnel within a development area that is occasionally occupied by opportunistic species, the presence of personnel remaining areas of natural habitat occupied by animals
Potential Impact	» Uncontrolled/ accidental death of animals caused by uninformed and/or deliberate actions of personnel
Activities/risk sources	» Site preparation, construction activities, operational activities
Mitigation: Target/Objective	» Limit adverse human-animal conflict opportunities, promote high awareness of personnel with accurate and constructive information

Mitigation: Action/control	Responsibility	Timeframe
1. Identify target species likely to result in conflict situations, such as snakes, spiders, bats, owls, rodents, feral cats & dogs, etc.	EO, appointed specialist	Prior to site preparation activities
2. Compile and implement a capture and relocation programme	EO, appointed specialist	Prior to site preparation activities

Performance Indicator	» No significant losses of animals, successful relocation and release of animals captured on site » Absence of snares from site fences and trapping of animals » Continued presence of a high diversity of animals in immediate surrounds
Monitoring	» Development and implementation of bio monitoring programme

OBJECTIVE 12: Limit the effect of construction and operational activities in surrounding areas of natural habitat

Project component/s	» Any infrastructure development or activity that could result in adverse impacts on adjacent areas of natural habitat
Potential Impact	» Infestation of adjacent areas of natural habitat by alien and invasive plants, degradation and/ or contamination of natural habitat, uncontrolled spread of impacts from development site
Activities/risk sources	» Site preparation, construction activities, operational activities
Mitigation: Target/Objective	» Prevent impacts from speeding into adjacent areas of natural habitat, prevent degradation of surrounding habitat

Mitigation: Action/control	Responsibility	Timeframe
1. Identify activities and project components that are likely to cause degradation of surrounding natural habitat	Construction Contractors,	Prior to site preparation activities

Mitigation: Action/control	Responsibility	Timeframe
	Environmental Team, Environmental Officer	
2. Compile and implement an Alien and Invasive management programme, with particular reference to access roads, power lines, conveyor sections, and development boundaries	Construction Contractors, Environmental Team, Environmental Officer	Prior to site preparation activities

Performance Indicator	» Absence of alien and invasive plants from the development site as well as surrounding natural habitat, effective preventative and rehabilitation procedures during construction and operational phases » Absence of litter and effluent from roads, development footprint, minimal dust during construction activities
Monitoring	» Development and implementation of bio monitoring programme

OBJECTIVE 13: Prevent disruptions on the movement patterns of animals within the surrounding region

Project component/s	» Construction and development within a natural environment, also where natural environment and ecological functionality of surrounding and adjacent areas will be affected through development and operational aspects
Potential Impact	» Disruption of migration patterns that will lead to depletion of faunal diversity
Activities/risk sources	» Site preparation, construction activities, operational activities
Mitigation: Target/Objective	» To maintain existing habitat diversity and patterns that will sustain migration patterns of a high faunal diversity

Mitigation: Action/control	Responsibility	Timeframe
1. Identify and delineate areas that are important for animal migration patterns, i.e., watering holes, atypical habitat, etc. and provide for the preservation and enhancement (management) of these areas	Construction Contractors, Environmental Team, Environmental Officer, Ecologist	Prior to site preparation activities
2. Identify habitat that can be retained within the development footprint in order to aid with effective migration patterns	Construction Contractors, Environmental Team, Environmental Officer, Ecologist	Planning, site preparation and construction phases
3. Allow for the development / management of 'stepping stones' within the larger region through effective ecological management of remaining habitat	Construction Contractors, Environmental Team, Environmental Officer, Ecologist	Planning, site preparation and construction phases

Performance Indicator	» High diversity of fauna species, including disciplines of mammals, avifauna, invertebrates and herpetofauna » Seasonal variation of diversity
Monitoring	» Annual diversity monitoring protocol

OBJECTIVE 14: Ensure the preservation and enhancement of important bird habitat within remaining natural habitats that provide habitat for conservation important species and significant congregations of bird species

Project component/s	» Any infrastructure development that will cause loss of natural habitat or deterioration of natural habitat where conservation important birds and bird congregations occur
Potential Impact	» Loss of habitat associated with conservation important birds and important bird congregations
Activities/risk sources	» Site preparation, construction activities, operational activities
Mitigation: Target/Objective	» Ensure the preservation and enhancement of important bird habitat within remaining natural habitat that provide habitat for conservation important species and significant congregations of bird species

Mitigation: Action/control	Responsibility	Timeframe
1. Identify and delineate areas that are suitable for important birds and bird congregations and provide for the preservation and enhancement (management) of these areas	Environmental Team, Environmental Officer, Ecologists, Avifaunal specialists	Prior to site preparation activities
2. Identify habitat that can be retained within the development footprint in order to aid with preservation of diversity	Environmental Team, Environmental Officer, Ecologists, Avifaunal specialists	Prior to site preparation activities
3. Identify individuals that would be suitable for rescue and relocation purposes to aid with landscaping and conservation	Environmental Team, Environmental Officer, Ecologists, Avifaunal specialists	Prior to site preparation activities

Performance Indicator	» Retain avifaunal diversity in remaining areas of natural habitat, with specific reference to conservation important species » High avifaunal diversity, presence of diverse bird congregations
Monitoring	» Annual diversity assessments, presence/ absence monitoring

OBJECTIVE 15: Limit / manage impacts on bird species of conservation importance

Project component/s	» Any infrastructure development that will cause loss of natural habitat where conservation important species are likely to occur or activities that could cause the disturbance of populations or individuals of these species
Potential Impact	» Loss of habitat suitable for populations of conservation important species or direct impacts and losses of populations or individuals of these species
Activities/risk sources	» Site preparation, construction activities, operational activities
Mitigation: Target/Objective	» Limit the impact on conservation important animals and birds, prevent impacts on these animals and birds in remaining areas of natural habitat

Mitigation: Action/control	Responsibility	Timeframe
1. Compile a list of conservation important birds that are known to occur in the region	Construction Contractors, Environmental Team, Environmental Officer	Prior to site preparation activities
2. Compile Standard Operational Procedures to deal with these birds, should they be threatened by construction/ operational activities and/or identification/marking and barricading of active nesting and roosting sites of iconic/charismatic bird species (e.g. raptors) storks or bustards when encountered	Construction Contractors, Environmental Team, Environmental Officer	Prior to site preparation activities
3. Adapt operational activities to prevent direct impacts on birds, including personnel presence in areas of natural habitat and vehicular movements/ speeds	Construction Contractors, Environmental Team, Environmental Officer	Prior to site preparation activities

Performance Indicator	» No significant loss of conservation important bird breeding/roosting sites (e.g. successful breeding and rearing of fledglings during breeding activities) as a result of construction or operational activities » The persistence of individuals and populations of protected or conservation important animals and birds in natural habitat surrounding the development
Monitoring	» Yearly monitoring of presence / abundance of conservation important birds as part of biomonitoring programme

OBJECTIVE 16: Facilitate effective displacement of animals and birds from the development site, prevent continuous impacts on animals and birds surrounding the development

Project component/s	» All activities that will result in decimation of natural habitat occupied by animal species, activities that are likely to result in deaths of animals, activities that might attract animals to development/ construction sites
Potential Impact	» Uncontrolled/ accidental death or displacement of animals and birds that occupy natural habitat within the development site or temporarily occupy parts of the site/ infrastructures
Activities/risk sources	» Site preparation, construction activities, operational activities
Mitigation: Target/Objective	» Limit the direct impacts on animals and birds occupying natural habitat where development will take place, limit the presence/ occurrence of animals and birds within construction/ operational areas, effect removal and relocation to suitable areas

Mitigation: Action/control	Responsibility	Timeframe
1. Identify animals and birds present within the development footprint, with particular reference to spiders, snakes, scorpions, large mammals, etc. and roosting and breeding sites of large birds of prey, bustards and storks	Environmental Officer, appointed specialist	Prior to site preparation activities
2. Compile and implement a capture and relocation programme prior to construction phase and/ or implement	Environmental Officer, appointed specialist	Prior to site preparation activities

Mitigation: Action/control	Responsibility	Timeframe
buffer areas to active nesting and roosting sites of storks, birds of prey (including vultures) and bustards		

Performance Indicator	» No significant losses of animals, successful relocation and release of animals captured on site and successful breeding and rearing of fledgling during breeding activities) » Continued presence of a high diversity of animals and birds in immediate surrounds
Monitoring	» Development and implementation of biomonitoring programme

OBJECTIVE 17: Minimize human-animal conflict situations

Project component/s	» The presence of personnel within a development area that is occasionally occupied by opportunistic species, the presence of personnel remaining areas of natural habitat occupied by animals
Potential Impact	» Uncontrolled/ accidental death of animals caused by uninformed and/or deliberate actions of personnel
Activities/risk sources	» Site preparation, construction activities, operational activities
Mitigation: Target/Objective	» Limit adverse human-animal conflict opportunities, promote high awareness of personnel with accurate and constructive information

Mitigation: Action/control	Responsibility	Timeframe
1. Identify target species likely to result in conflict situations	Environmental Officer, appointed specialist	Prior to site preparation activities
2. Compile and implement a capture and relocation programme	Environmental Officer, appointed specialist	Prior to site preparation activities

Performance Indicator	» No significant losses of birds, successful relocation and release of animals captured on site » Absence of snares from site fences and trapping of animals » Continued presence of a high diversity of birds in immediate surrounds
Monitoring	» Development and implementation of biomonitoring programme

OBJECTIVE 18: Minimize bird mortalities caused by collision / electrocution by power line / electrical infrastructure

Project component/s	» Power line infrastructure development that will cause potential bird mortalities
Potential Impact	» Bird collision by earth wires and overhead cabling infrastructure and electrocution caused by bird strikes and streamers
Activities/risk sources	» Site preparation, construction activities, operational activities
Mitigation: Target/Objective	» Minimize the impact on passing bird species prevent and mortalities to threatened and near threatened bird species

Mitigation: Action/control	Responsibility	Timeframe
1. Ensure that a walkthrough of the proposed power line alignment conducted prior to commencement of activities in order to identify areas of high mortality/electrocution risk	Environmental Officer, appointed specialist	Prior to site preparation activities
2. Identify areas along power line alignment in need of marking with BFD and/or re-alignment	Environmental Officer, appointed specialist	Prior to site preparation activities

Performance Indicator	» No evidence of bird mortalities » The presence of foraging/roosting and breeding threatened and near threatened bird species on the study site
Monitoring	» Regular (twice per year) monitoring of entire alignment for dead birds or evidence of bird mortalities

OBJECTIVE 19: Limit the visual impact of the project

Project component/s	» Industrial Structures including the stacks, power generation units and conveyors
Potential Impact	» Further industrialisation of the landscape as viewed by sensitive receptors.
Activities/risk sources	» The nature of these elements will contrast with rural characteristics and will be highly obvious as new industrial development.
Mitigation: Target/Objective	» Plan to maintain the height of structures as low as possible. » Minimise disturbance of the surrounding landscape and maintain existing vegetation around the development. » Plan to deposit ash on the ash dump from north to south and rehabilitate the northern face of the dump at the earliest opportunity. » Plan lighting to minimise visible light. » Plan the substation to include a minimum 30m plantable distance between the road reserve and sub station. Undertake screen planting within the 30m wide area.

Mitigation: Action/control	Responsibility	Timeframe
1. Plan the development to minimise visibility by minimising structure heights as far as possible.	Developer	Planning phase
2. Plan to deposit ash on the ash dump from north to south and rehabilitate the northern face of the ash dump at the earliest opportunity.	Developer / Contractor	Planning, Operation phases
3. Ensure that colours used particularly for larger elements within the development do not draw attention to the development particularly when viewed from a distance.	Developer	Planning phase
4. Plan and implement lighting to minimise visible light at night.	Developer / Contractor	Planning. Construction, Operation phases

Performance Indicator	» Vegetation presence and density. » Presence of unnecessary infrastructure. » Visibility of the power station.

Monitoring	» Evaluate the effectiveness of colours and surface finishes to visually recede from selected viewpoints in the Upland LCA. It should be possible to compare results with other existing power stations. » Evaluate health and effectiveness of vegetation to provide necessary screening before, during and after construction and annually thereafter. » Evaluate vegetation growth and reinstatement during decommissioning and for five years thereafter. » Take regular time-line photographic evidence (Responsibility: ECO and ELO). » Prepare regular reports.

OBJECTIVE 20: Limit the visual impact of the ash dump

Project component/s	» Ash dump
Potential Impact	» Further industrialisation of the landscape as viewed by sensitive receptors.
Activities/risk sources	» This element has the potential to contrast with the natural landform and colours / texture of the surrounding landscape which will exacerbate impacts. » There is also potential for dust rising from the facility to draw attention to it.
Mitigation: Target/Objective	» Design the ash dump to blend as best as possible with the surrounding natural landform. » Minimise and reinstate vegetation loss from surrounding areas during construction. » Undertake effective dust control at the ashing facility during the operational phase. » Rehabilitate the ashing facility on a progressive basis during the operational phase and decommissioning. Deposit ash from north to south in order to help provide a screen when the development is viewed from the north

Mitigation: Action/control	Responsibility	Timeframe
1. Design the ash dump to ensure that it blends as best as possible with surrounding landform.	Developer / Contractor	Planning phase
2. Minimise and reinstate surrounding vegetation loss.	Developer / Contractor	Planning, Construction, Operation phases

Performance Indicator	» Natural appearance of the landform created by the ashing facility. » Vegetation cover on the ashing facility. » Ashing facility part screening development when viewed from the north. » Dust rising from the ashing facility.
Monitoring	» Evaluate vegetation growth and reinstatement during decommissioning and for five years thereafter. » Take regular time-line photographic evidence. » Responsibility: ECO and ELO. » Prepare regular reports.

OBJECTIVE 21: Limit the noise impact associated with the project

Project component/s	» Construction and operation of the project
Potential Impact	» Increased noise levels at potentially noise-sensitive receptors. » Changing ambient sound levels could change the acceptable land use capability.
Activities/risk sources	» Construction and operation of the project
Mitigation: Target/Objective	» Ensure that the change in ambient sound / rating levels as experienced by receptors is less than 5dBA. » Prevent the generation of nuisance noises.

Mitigation: Action/control	Responsibility	Timeframe
1. Locate the power station as far as possible from potential noise-sensitive receptors (locate noisiest activities or equipment further than 1 500m from NSD such as 03, 08 and 10).	Developer	Planning phase
2. Develop and implement an Environmental Awareness section in the Safety and Health Induction training programme.	Contractor	Prior to Construction commencing
3. Plan to use stockpiles and residue deposits to assist as acoustical screens.	Contractor	Prior to Construction commencing
4. Make use of smaller / quieter equipment when operating near receptors.	Contractor	Planning, Construction phase
5. Investigate the use of broadband reverse alarms instead of tonal reverse alarms on heavy vehicles operating on roads, around the project site and at stockpile areas. This option is highly recommended although it must be noted that reverse alarms are exempt from an acoustical assessment due to Government Notice R154 of 1992 (Noise Control Regulations) – Clause 7.(1) – "the emission of sound is for the purposes of warning people of a dangerous situation". It is important to note that this does not mean that the tonal reverse alarms must be removed, only that it be changed. Broadband reverse alarms have been shown to be more audible and safer for workers yet have a significantly lower environmental noise impact.	Developer / Contractor	Prior to Construction commencing
6. Relocating the access road further than 330m from NSD04, or, develop an acoustic screen (permanent or temporary - to be designed) between the N1 – Huntleigh access road and closest receptors (NSD04).	Developer / Contractor	Planning, Construction phase
7. Ensure that truck drivers participate in an environmental induction programme, highlighting the need to consider the local community (topics such as slower driving, minimal use of hooters, minimal use of air-brakes, and maintenance of haul trucks).	Contractor	Preconstruction, Construction phase
8. Develop and implement a quarterly noise monitoring programme at NSD03 and NSD04. This is because the area is very quiet and the proposed development will have a measurable impact on the ambient sound levels at the closest	Developer / Contractor	Preconstruction, Construction phase

Mitigation: Action/control	Responsibility	Timeframe
NSD. Noise measurements frequency can be changed as recommended by an acoustic consultant.		

Performance Indicator	» Ensure that the change in ambient sound levels or rating level as experienced by receptors is less than 5dBA at night. » Ensure that maximum noise levels at potentially sensitive receptors are less than 42dBA. » No noise complaints are registered.
Monitoring	» ECO to monitor any noise complaints lodged regarding the project. » Implementation of an Environmental Noise Management Plan » Ongoing monitoring.

OBJECTIVE 22: Stimulate and enhance production impacts, employment impacts and benefits to households in the country and specifically the local economy during the construction phase

Project Component/s	» Construction of the Power Station and associated infrastructure
Potential Impact	» Optimisation of local economic benefits
Activity/Risk Source	» Construction procurement practices
Mitigation: Target/Objective	» Increase the procurement of goods and services and create new employment opportunities within the local economy

Mitigation: Action/control	Responsibility	Timeframe
1. Engage with local municipality and local businesses to identify opportunities for local procurement	Project Developer	Pre-construction

Performance Indicator	» The Project Developer has engaged with local authorities and business organisations » Percentage of the expenditure spent on the project spent in the local communities versus the entire nation » Percentage of labour force employed from local community » Number of contracts signed between EPC Contractor and local construction companies and SMME's to supply goods and services directly used in the construction and support of site activities
Monitoring	» Checklists, quarterly reports, and annual reports

OBJECTIVE 23: Skills enhancement in the local economy

Project Component/s	» Construction of the Power Station and associated infrastructure
Potential Impact	» Moderate local expertise development
Activity/Risk Source	» Construction procurement practice employed by the EPC contractor
Mitigation: Target/Objective	» Ensure knowledge transfer and skills development of the local labour to maximise their employment opportunities in the project

Mitigation: Action/control	Responsibility	Timeframe
1. Facilitate the transfer of knowledge between experienced employees and the local staff	EPC contractor	Pre-construction and construction
2. Set up learnership and apprenticeship programmes to build onto existing or develop new skills of construction workers, especially those coming from the local communities	Project Developer, EPC Contractor	Pre-construction and construction
3. Perform a skills audit to determine the potential skills that could be sourced in the area	Project Developer	Pre-construction and construction

Performance Indicator	» Man-hours spent on skills and knowledge transfer to local labour » Number of learnerships and/or apprenticeships offered
Monitoring	» Quarterly reports and post-construction final report

OBJECTIVE 24: Reduce the pressure on local social and economic infrastructure during the construction phase

Project Component/s	» Construction of the Power Station and associated infrastructure
Potential Impact	» Dilapidation of local infrastructure, lack of deliverable capacity and decline in the quality of services offered
Activity/Risk Source	» Movement of vehicles » Influx of migrant workers and job seekers
Mitigation: Target/Objective	» Reduce the pressure on local social and economic infrastructure

Mitigation: Action/control	Responsibility	Timeframe
1. Provide public transport alternatives for construction workers	Project Developer, Government, and EPC Contractor	Pre-construction and Construction
2. Engage with local authorities and inform them of the development and discuss with them the ability of the municipality to meet the demands for social and basic services created by the migrant construction workers, as well as the pressure on local infrastructure exerted by the activities; and find solutions to these	Project Developer, Government, and EPC Contractor	Pre-construction and Construction

Performance Indicator	» Adequate signage and traffic calming mechanisms along delineated construction routes » Established relationship with Local Municipality and identification of areas of collaboration » Assistance provided to the Local Municipality with respect to the local infrastructure through the social responsibility programme » Upgraded local roads » Transportation provided to construction crews » Reduced incidents of accidents
Monitoring	» Checklists and annual report inclusive of other performance assessments

OBJECTIVE 25: To ensure effective communication mechanisms

On-going communication with affected and surrounding landowners and land users is important to maintain during the construction and operational phases of the project. Any issues and concerns raised should be addressed as far as possible in as short a timeframe as possible.

Project component/s	» Coal-fired power station
Potential Impact	» Impacts on affected and surrounding landowners and land uses
Activity/risk source	» Activities associated with construction » Activities associated with facility operation
Mitigation: Target/Objective	» Effective communication with affected and surrounding landowners and land users » Addressing of any issues and concerns raised as far as possible in as short a timeframe as possible

Mitigation: Action/control	**Responsibility**	**Timeframe**
1. Implement a grievance mechanism procedure for the public to be implemented during both the construction and operational phases of the facility. This procedure must include details of the contact person who will be receiving issues raised by Interested and Affected Parties (I&APs), and the process that will be followed to address issues. A basic Grievance Mechanism is included as **Appendix H**.	Developer/Owner EPC Contractor O&M Contractor	Pre-construction (construction procedure) Pre-operation (operation procedure)
2. Implement a transparent approach and open consultation with adjacent land users, prior and throughout the construction period in order to provide a platform where grievances or requests can be addressed before issues become contentious.	Developer/Owner EPC Contractor	Pre-construction (construction procedure) Pre-operation (operation procedure)
3. Before construction commences, representatives from the Local Municipality, community leaders, community-based organisations and the surrounding land users, must be informed of the details of the Contractors, size of the workforce and construction schedules.	Owner	Pre-construction

Performance Indicator	» Effective communication procedures in place.
Monitoring	» An incident reporting system must be used to record non-conformances with the EMPr.

CHAPTER 7 MANAGEMENT PROGRAMME: CONSTRUCTION

7.1 Overall Goal for Construction

Overall Goal for Construction: Undertake the construction phase of the Mutsho Power Project and associated 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.
» Minimises the impact on the environment to be affected by construction activities.

7.2 Objectives

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

OBJECTIVE 26: Site establishment and securing the site

Project component/s	Construction of all infrastructure including: » Power station » Access roads » Substation » Ash dump
Potential Impact	» Hazards to surrounding land users and the public » Security of materials » Substantially increased damage to adjacent sensitive vegetation, due largely to ignorance of these sensitive areas.
Activities/risk sources	» Open excavations (foundations and cable trenches) » Movement of construction vehicles in the area and on-site
Mitigation: Target/Objective	» To secure the site against unauthorised entry » To protect members of the public/land users/residents

Mitigation: Action/control	Responsibility	Timeframe
1. Develop and implement a Health, Safety and Environmental (HSE) Plan in accordance with the requirements of the Occupational Health and Safety Act (No. 85 of 1993) (OHSA), World Bank (WB) Equator Principles (EP), and IFC Performance Standards to guide all activities on projects sites during the site preparation, construction and operation	Contractor/EPC	Pre-construction
2. Secure the site, working areas and excavations in an appropriate manner.	Contractor	Construction: during site establishment. Maintenance: for duration of contract

Mitigation: Action/control	Responsibility	Timeframe
3. Where necessary, control access, fence and secure areas.	Contractor	Construction: during site establishment. Maintenance: for duration of contract
4. Fence and secure the Contractor's equipment camp.	Contractor	Construction: during site establishment. Maintenance: for duration of contract
5. Minimise vegetation clearance associated with site establishment activities.	Contractor	Site establishment
6. All development footprints for permanent and temporary infrastructure must be appropriately demarcated. There is to be no disturbance outside these demarcated areas.	Contractor	Construction: during site establishment. Maintenance: for duration of contract
7. 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	Construction: during site establishment. Maintenance: for duration of contract
8. Ablution or sanitary facilities must not be located within 100m from a 1:100 year flood line including water courses, wetlands or within a horizontal distance of less than 100m, whichever is applicable	Contractor	During site establishment, construction and maintenance.
9. Supply adequate waste collection bins on site where construction is being undertaken.	Contractor	Construction: during site establishment. Maintenance: for duration of contract within a particular area

Performance Indicator	» No unnecessary environmental impacts associated with site establishment » Site is secure and there is no unauthorised entry » No members of the public/land users injured
Monitoring	» An incident reporting system will be used to record non-conformances to the EMPr » ECO to monitor all construction areas on a continuous basis until all construction is completed; immediate report backs to site manager in terms of non-conformances recorded.

OBJECTIVE 27: Limit / manage impacts on conservation important plants and protected tree species within the project area / adjacent areas

Project component/s	» Any infrastructure development that will cause loss of natural habitat where protected tree species and / or conservation important plants occur
Potential Impact	» Uncontrolled loss of protected species from remaining areas of natural habitat, legal compliance with permitting requirements, exacerbated losses of plant species of conservation concern, with specific reference to large *Adansonia* individuals
Activities/risk sources	» Site preparation, land clearance, construction activities, operational activities

Mitigation: Target/Objective	» Limit the impact on protected and conservation important plant species. Prevent impacts on protected and conservation important plants in remaining areas of natural habitat, remove suitable sample sizes of target species

Mitigation: Action/control	Responsibility	Timeframe
1. Ensure all activities that result in destruction of natural habitat are contained within the authorized footprint and do not spread beyond the boundaries of the site	Construction Contractors, Environmental Team, Environmental Officer, Botanists	Site preparation, Construction Phase
2. Identify individuals that would be suitable for rescue and relocation purposes to aid with landscaping and conservation	Construction Contractors, Environmental Team, Environmental Officer, Botanists	Prior to site preparation activities, construction phase, rehabilitation and revegetation

Performance Indicator	» No significant loss of protected trees and conservation important plants in natural habitat surrounding the site and infrastructure, approved permits for the removal and/ or destruction of certain species » The presence of protected trees within the project area that are used for aesthetic, rehabilitation purposes
Monitoring	» Density counts of protected trees within adjacent areas of natural habitat, continued monitoring of conservation important plants in the natural environment

OBJECTIVE 28: Limit / manage the loss of natural vegetation (physical modifications, removal, damage) and local depletion of plant taxa, reduction of phytodiversity

Project component/s	» Any infrastructure development that will cause loss of natural habitat, land clearance
Potential Impact	» Uncontrolled loss of natural habitat that would result in a reduction of local phytodiversity
Activities/risk sources	» Site preparation, land clearance, construction activities, operational activities
Mitigation: Target/Objective	» Allow for remaining areas of natural habitat to function ecologically effective within the environment of industrial development, clear and defined boundaries

Mitigation: Action/control	Responsibility	Timeframe
1. Select a range of floristic diversity attributes that are considered important on a local and regional scale, attempting to align local conservation efforts with regional conservation plans, floristic diversity in management areas could be presented as performance indicators of intervention/ conservation, or rehabilitation efforts, ensure the continuance of a healthy, representative floristic composition and structure across the landscape	Construction Contractors, Environmental Team, Environmental Officer	Site preparation, Construction Phase
2. Develop and implement a fire management programme, and grazing strategies for remaining areas of natural vegetation	Construction Contractors,	Prior to site preparation activities, construction phase,

Mitigation: Action/control	Responsibility	Timeframe
	Environmental Team, Environmental Officer	rehabilitation and revegetation
3. The implementation of periodic monitoring programme should be aimed at assessing and guiding management activities to the benefit of the environment	Construction Contractors, Environmental Team, Environmental Officer	Prior to site preparation activities, construction phase, rehabilitation and revegetation
4. Contribute information gained during the intervention process to relevant role-players and regional conservation efforts	Construction Contractors, Environmental Team, Environmental Officer	Prior to site preparation activities, construction phase, rehabilitation and revegetation

Performance Indicator	» No significant loss of phytodiversity on a local or regional scale, the implementation of a conservation strategy that will benefit local and regional conservation efforts » Effective ecological functionality of remaining areas of natural vegetation within an environment of industrial development
Monitoring	» Annual monitoring of phytodiversity in affected and surrounding areas of natural habitat as part of a bio monitoring programme

OBJECTIVE 29: To prevent / mitigate the loss of phytodiversity, associated with sensitive, conservation important habitat types or ecosystems of restricted abundance

Project component/s	» All activities that will result in decimation of natural habitat, accidental or unforeseen impacts on neighbouring natural habitat
Potential Impact	» Uncontrolled and accidental deterioration of natural terrestrial woodland habitat
Activities/risk sources	» Site preparation, land clearance, construction activities, operational activities
Mitigation: Target/Objective	» Limit the direct impacts on areas of natural vegetation

Mitigation: Action/control	Responsibility	Timeframe
1. Select a range of habitat diversity attributes that are considered important on a local and regional scale, attempting to align local conservation efforts with regional conservation plans, habitat diversity in management areas could be presented as performance indicators of intervention/ conservation, or rehabilitation efforts, ensure the continuance of a healthy, representative floristic composition and structure across the landscape	Construction Contractors, Environmental Team, Environmental Officer	Site preparation, construction and operational phases
2. Select a range of fixed points where the application of periodic monitoring programmes will accurately assess and illustrate results of intervention / conservation programmes	Construction Contractors, Environmental Team, Environmental Officer	Site preparation, construction and operational phases
3. The implementation of periodic monitoring programme should be aimed at assessing and guiding management activities to the benefit of the environment	Construction Contractors,	Site preparation, construction and operational phases

Mitigation: Action/control	Responsibility	Timeframe
	Environmental Team, Environmental Officer	
4. Contribute information gained during the intervention process to relevant role-players and regional conservation efforts	Construction Contractors, Environmental Team, Environmental Officer	Site preparation, construction and operational phases

Performance Indicator	» No significant loss of sensitive landscapes or ecological types on a local or regional scale, no significant changes to phytodiversity attributes, the implementation of a conservation strategy that will benefit local and regional conservation efforts » Effective ecological functionality of remaining areas of natural vegetation within an environment of industrial development
Monitoring	» Annual monitoring of sensitive landscapes in affected and surrounding areas of natural habitat as part of a bio monitoring programme

OBJECTIVE 30: To control and prevent a decrease in habitat quality of surrounding areas due to peripheral impacts such as spillages, litter, increased erosion, contaminants, etc., also including Impacts on habitat types that are associated with plants of conservation importance (decreased habitat quality of surrounding areas due to peripheral impacts such as spillages, litter, increased erosion, contaminants, etc.)

Project component/s	» Construction and development within a natural environment, also where natural environment of surrounding and adjacent areas will be affected through peripheral and uncontrolled impacts
Potential Impact	» Deterioration of adjacent natural habitat, spillages, contamination, exacerbation and infestation of weeds, encroacher and invasive species
Activities/risk sources	» Site preparation, construction activities, operational activities
Mitigation: Target/Objective	» Ensure the conservation / preservation of natural habitat within adjacent areas, limit construction and operational impacts to footprints

Mitigation: Action/control	Responsibility	Timeframe
1. Identify activities and project components that are likely to cause degradation of surrounding natural habitat	Developer, environmentalists, ecologists, project environmental team, EO	Site preparation and clearance phase, construction and operational phases
2. Compile Standard Operating Procedures to deal with the prevention, timely identification and rehabilitation of adverse environmental events and occurrences	Developer, environmentalists, ecologists, project environmental team, EO	Site preparation and clearance phase, construction and operational phases
3. Implement suitable buffer zones around development footprints that will assist in preventing uncontrolled spread of impacts into adjacent areas of natural habitat	Developer, environmentalists, ecologists, project environmental team, EO	Planning, site preparation and construction phase

Mitigation: Action/control	Responsibility	Timeframe
4. Limit construction activities and personnel movement to development footprints	Developer, environmentalists, ecologists, project environmental team, EO	Site preparation and clearance phase, construction and operational phases
5. Establish best-practice guidelines that will guide all operational activities within management areas, including aspects such as land clearance, roads and maintenance, movement and personnel presence, operational activities, waste management, etc.	Developer, environmentalists, ecologists, project environmental team, EO	Planning and site preparation phases
6. Identify and develop suitable site restoration goals and activities that will contribute to conservation objectives (removal of litter, erosion control / restoration, rehabilitation, etc.)	Developer, environmentalists, ecologists, project environmental team, EO	Site preparation and clearance phase, construction and operational phases
7. Develop monitoring and feedback control mechanisms to identify and immediately remediate noted impacts outside control measures and boundaries	Developer, environmentalists, ecologists, project environmental team, EO	Construction and operational phases

Performance Indicator	» No visible or subjective changes to surrounding areas of natural habitat » Absence of invasive and encroacher species in surrounding areas of natural habitat » Effective ecological functionality of remaining areas of natural vegetation within an environment of industrial development
Monitoring	» Annual monitoring of adjacent and surrounding vegetation as part of a bio monitoring programme

OBJECTIVE 31: To sustain the existing / improve on the existing quality and ecological functionality (including fire, erosion) of surrounding areas and natural habitat

Project component/s	» Construction and development within a natural environment, also where natural environment and ecological functionality of surrounding and adjacent areas will be affected through development and operational aspects
Potential Impact	» Deterioration of adjacent natural habitat, changes to local ecological functionality and quality
Activities/risk sources	» Site preparation, construction activities, operational activities
Mitigation: Target/Objective	» Ensure the conservation / preservation of natural habitat and ecological functionality within adjacent areas, limit construction and operational impacts to footprints

Mitigation: Action/control	Responsibility	Timeframe
1. Identify areas where exceptional and / or ecological attributes of importance to the ecological functionality of the local area persists and retain these attributes as part of a conservation / preservation programme	Construction Contractors, Environmental Team, Environmental Officer	Site preparation, construction phase, operational phase

Mitigation: Action/control	Responsibility	Timeframe
2. Compile Standard Operating Procedures to deal with the prevention, timely identification and rehabilitation of adverse environmental events and occurrences within areas of ecological importance	Construction Contractors, Environmental Team, Environmental Officer	Planning, site preparation and construction phases
3. Compile and implement a biodiversity monitoring programme that aims to evaluate changes to the natural environment that would affect ecological functionality	Construction Contractors, Environmental Team, Environmental Officer	Planning, site preparation and construction phases

Performance Indicator	» Persistence of ecological functionality of remaining areas of natural habitat within surrounds of the development footprint, operational areas » Retaining phytodiversity, ecological functionality. Also, in collaboration with faunal avifaunal attributes
Monitoring	» Development and implementation of bio monitoring programme

OBJECTIVE 32: To limit the decrease in aesthetic appeal of the landscape resulting from the introduction of industrial components and infrastructure

Project component/s	» All development activities, land clearance, removal of natural vegetation, introduction of industrial components
Potential Impact	» Disfigurement of the natural environment beyond the development footprint
Activities/risk sources	» Site preparation, construction activities, operational activities/ environmental management
Mitigation: Target/Objective	» Retain aesthetic appeal of the landscape through revegetation, rehabilitation. Prevent significant disfigurement

Mitigation: Action/control	Responsibility	Timeframe
1. Avoid the creation of sterile landscapes, deterioration and / or structural changes to remaining areas of natural vegetation	Construction Contractors, Environmental Team, Environmental Officer	Site preparation, Construction Phase
2. Limit disturbance of natural habitat in surrounding areas	Construction Contractors, Environmental Team, Environmental Officer	Site preparation, Construction Phase, Operational Phase
3. Implement timely rehabilitation procedures subsequent to land clearing activities	Construction Contractors, Environmental Team, Environmental Officer	Construction Phase
4. Reintroduce large trees in proximity to development areas	Construction Contractors, Environmental Team, Environmental Officer	Site preparation, Construction Phase, Operational Phase

Mitigation: Action/control	Responsibility	Timeframe
5. Take cognisance of the visual impact assessment recommendations	Construction Contractors, Environmental Team, Environmental Officer	Site preparation, Construction Phase, Operational Phase

Performance Indicator	» Retain natural vegetation in areas adjacent to development footprints, representative of the regional ecological types » Obscuring industrial and infrastructure components for visual observation lines/ points » Implementation of effective rehabilitation / restoration programme
Monitoring	» Ongoing monitoring of area by Environmental Control Officer during construction and operational phases

OBJECTIVE 33: Control the persistence and occurrence of alien and invasive / encroacher plant species within natural habitat surrounding the development site

Project component/s	» All development activities that will cause sterilisation of natural habitat that becomes suitable for infestation by alien and invasive and encroacher plant species
Potential Impact	» Displacement of natural vegetation by alien and invasive plants, displacement of natural vegetation by locally endemic encroacher species
Activities/risk sources	» Site preparation, construction activities, operational activities/ environmental management
Mitigation: Target/Objective	» No alien and invasive / encroacher plants within the development area, or surrounding natural habitat

Mitigation: Action/control	Responsibility	Timeframe
1. Avoid the creation of sterile landscapes that are suitable for the infestation by alien and invasive plants	Construction Contractors, Environmental Team, Environmental Officer	Site preparation, Construction Phase
2. Limit disturbance of natural habitat	Construction Contractors, Environmental Team, Environmental Officer	Site preparation, Construction Phase, Operational Phase
3. Implement timely rehabilitation procedures subsequent to land clearing activities	Construction Contractors, Environmental Team, Environmental Officer	Construction Phase
4. Compile and implement ongoing monitoring programme to detect and quantify alien species as per the Conservation of Agricultural Resources Act	Construction Contractors, Environmental Team, Environmental Officer	Site preparation, Construction Phase, Operational Phase
5. Implement immediate eradication procedures	Construction Contractors, Environmental Team, Environmental Officer	Site preparation, Construction Phase, Operational Phase

Performance Indicator	» Absence of alien and invasive plants from the development site as well as surrounding natural habitat, effective preventative and rehabilitation procedures during construction and operational phases » Presence of natural vegetation that is representative of regional ecological types
Monitoring	» Ongoing monitoring of area by Environmental Control Officer during construction and operational phases » Annual audit of project area and immediate surrounds by qualified botanist for the duration of the construction phase and biennially for the duration of the project » Mapping, abundance, cover physical attributes of alien species. Results should be interpreted in term of risk posed to the environment.

OBJECTIVE 34: Prevent the exploitation of natural resources due to increased human presence and resource requirements

Project component/s	» All development activities where natural habitat is accessible to personnel and or local population
Potential Impact	» Decline in abundance of protected and or naturally occurring plants and species in the remaining areas of natural habitat
Activities/risk sources	» Site preparation, construction activities, operational activities/ environmental management
Mitigation: Target/Objective	» Retain / improve current populations of target species

Mitigation: Action/control	Responsibility	Timeframe
1. Develop a suitable intervention / conservation strategy that will identify, include potential target species	Construction Contractors, Environmental Team, Environmental Officer	Site preparation, Construction Phase
2. Develop a monitoring approach that will inform on the presence and abundance of target species	Construction Contractors, Environmental Team, Environmental Officer	Site preparation, Construction Phase, Operational Phase
3. Establish a work group that will communicate with local muthi users, collectors to inform on the uses, abundance, harvesting of target species	Construction Contractors, Environmental Team, Environmental Officer	Construction Phase
4. Establish guidelines in terms of picking / harvesting of certain species within certain areas	Construction Contractors, Environmental Team, Environmental Officer	Site preparation, Construction Phase
5. Investigate the possibility of establishing nurseries that might provide/ supply the local demand of certain species	Construction Contractors, Environmental Team, Environmental Officer	Site preparation, Construction Phase
6. Conduct search and rescue operations within areas of development	Construction Contractors,	Site preparation, Construction Phase

Mitigation: Action/control	Responsibility	Timeframe
	Environmental Team, Environmental Officer	
7. Allow harvesting of certain species within areas where development will take place	Construction Contractors, Environmental Team, Environmental Officer	Site preparation, Construction Phase

Performance Indicator	» Continued persistence of target species within remaining areas of natural vegetation » Improved quality of natural habitat within remaining areas of natural vegetation
Monitoring	» Ongoing monitoring of area by Environmental Control Officer during construction and operational phases » Annual audit of project area and immediate surrounds by qualified botanist for the duration of the construction phase and biennially for the duration of the project. » Mapping, abundance, cover physical attributes of alien species. Results should be interpreted in term of risk posed to the environment.

OBJECTIVE 35: Limit deterioration of remaining areas of natural habitat, promote nodal type developments instead of the uncontrolled spread of infrastructure and development on a local and regional scale

Project component/s	» All development activities that will cause sterilisation of natural habitat
Potential Impact	» Uncontrolled spread of industrial and associated residential developments on a local and regional scale, uncontrolled loss of natural habitat, loss of aesthetic appeal
Activities/risk sources	» Site preparation, construction activities, operational activities / environmental management, future developments
Mitigation: Target/Objective	» Retain/ limit developments to small footprints, retain the natural character of the vegetation / ecology on a local and regional scale

Mitigation: Action/control	Responsibility	Timeframe
1. Avoid the creation of sterile landscapes that are suitable for the infestation by alien and invasive plants	Construction Contractors, Environmental Team, Environmental Officer	Site preparation, Construction Phase
2. Limit disturbance of natural habitat	Construction Contractors, Environmental Team, Environmental Officer	Site preparation, Construction Phase, Operational Phase
3. Develop suitable land use and intensity options for intervention / conservation sites	Construction Contractors, Environmental Team, Environmental Officer	Construction Phase
4. Establish a work group with local land users / developers / role players to collaborate in terms of conservation and preservation strategies in terms of future developments in the natural environment	Construction Contractors, Environmental Team, Environmental Officer	Site preparation, Construction Phase, Operational Phase

Mitigation: Action/control	Responsibility	Timeframe
5. Collaborate with relevant role players to establish a working group to monitor levels of development / habitat losses on a local and regional scale	Construction Contractors, Environmental Team, Environmental Officer	Site preparation, Construction Phase, Operational Phase

Performance Indicator	» Continued presence of ecologically effective natural habitat within a region characterised by industrial and residential development » Prevention of uncontrolled spread of developments across the landscape
Monitoring	» Ongoing monitoring of area by Environmental Control Officer during construction and operational phases » Biodiversity monitoring protocol in areas surrounding developments » Contribution to local and regional development programmes, land use monitoring, EMF, etc. through the Environmental Monitoring Committee that needs to entertain representatives from surrounding communities, development forums, etc.

OBJECTIVE 36: Prevent exacerbation of conservation levels, including ecological types and animals, plants, sensitive landscapes, etc.

Project component/s	» All development activities that will cause sterilisation and / or degradation of natural habitat
Potential Impact	» Loss of natural habitat that will result in threats to ecological types, species conservation and habitat preservation
Activities/risk sources	» Site preparation, construction activities, operational activities
Mitigation: Target/Objective	» Ensure the effective preservation of species and habitat on a local and regional scale

Mitigation: Action/control	Responsibility	Timeframe
1. Develop a monitoring approach that will inform on the persistence / conservation treat and status of species and habitat types	Construction Contractors, Environmental Team, Environmental Control Officer	Site preparation, Construction Phase

Performance Indicator	» Continued persistence of natural, representative habitat on a local and regional scale » Avoidance of raised threat levels to species and ecological types
Monitoring	» Development and implementation of bio monitoring programme

OBJECTIVE 37: Limit / manage impacts on fauna species of conservation importance

Project component/s	» Any infrastructure development that will cause loss of natural habitat where conservation important species are likely to occur or activities that could cause the disturbance of populations or individuals of these species

Potential Impact	» Loss of habitat suitable for populations of conservation important species or direct impacts and losses of populations or individuals of these species
Activities/risk sources	» Site preparation, construction activities, operational activities
Mitigation: Target/Objective	» Limit the impact on conservation important animals, prevent impacts on these animals in remaining areas of natural habitat

Mitigation: Action/control	Responsibility	Timeframe
1. Implement awareness programmes for all contractors and workers on site	Construction Contractors, Environmental Team, Environmental Officer	Site preparation, Construction Phase

Performance Indicator	» No significant losses of conservation important animals as a result of construction or operational activities » The persistence of individuals and populations of protected animals in natural habitat surrounding the development
Monitoring	» Yearly monitoring of presence / abundance of conservation important animals as part of bio monitoring programme

OBJECTIVE 38: Limit / manage the loss of natural vegetation (physical modifications, removal, damage) and local depletion of plant taxa, reduction of phytodiversity

Project component/s	» Any infrastructure development that will cause loss of natural habitat
Potential Impact	» Uncontrolled loss of natural habitat that would result in a reduction of local phytodiversity
Activities/risk sources	» Site preparation, construction activities, operational activities
Mitigation: Target/Objective	» Allow for remaining areas of natural habitat to function ecologically effective within the environment of industrial development

Mitigation: Action/control	Responsibility	Timeframe
1. Select a range of habitat diversity attributes that are considered important on a local and regional scale, attempting to align local conservation efforts with regional conservation plans, floristic diversity in management areas could be presented as performance indicators of intervention/ conservation, or rehabilitation efforts, ensure the continuance of a healthy, representative floristic composition and structure across the landscape	Construction Contractors, Environmental Team, Environmental Officer	Site preparation, Construction Phase

Performance Indicator	» No significant loss of faunal diversity on a local or regional scale, the implementation of a conservation strategy that will benefit local and regional conservation efforts » Effective ecological functionality of remaining areas of natural habitat within an environment of industrial development
Monitoring	» Annual monitoring of faunal diversity in affected and surrounding areas of natural habitat as part of biodiversity monitoring programme

OBJECTIVE 39: Facilitate effective displacement of animals from the development site, prevent continuous impacts on animals surrounding the development

Project component/s	» All activities that will result in decimation of natural habitat occupied by animal species, activities that are likely to result in deaths of animals, activities that might attract animals to development/ construction sites
Potential Impact	» Uncontrolled/ accidental death of animals that occupy natural habitat within the development site or temporarily occupy parts of the site/ infrastructures
Activities/risk sources	» Site preparation, construction activities, operational activities
Mitigation: Target/Objective	» Limit the direct impacts on animals occupying natural habitat where development will take place, limit the presence/ occurrence of animals within construction/ operational areas, effect removal and relocation to suitable areas

Mitigation: Action/control	Responsibility	Timeframe
1. Compile Standard Operating Procedures for the capture and relocation of animals during the construction phase	EO, appointed specialist	Site preparation, construction and operational phases

Performance Indicator	» No significant losses of animals, successful relocation and release of animals captured on site » Continued presence of a high diversity of animals in immediate surrounds
Monitoring	» Development and implementation of bio monitoring programme

OBJECTIVE 40: Minimise human-animal conflict situations

Project component/s	» The presence of personnel within a development area that is occasionally occupied by opportunistic species, the presence of personnel remaining areas of natural habitat occupied by animals
Potential Impact	» Uncontrolled/ accidental death of animals caused by uninformed and/or deliberate actions of personnel
Activities/risk sources	» Site preparation, construction activities, operational activities
Mitigation: Target/Objective	» Limit adverse human-animal conflict opportunities, promote high awareness of personnel with accurate and constructive information

Mitigation: Action/control	Responsibility	Timeframe
1. Compile Standard Operating Procedures for the capture and relocation of animals during the construction phase	EO, appointed specialist	Site preparation, construction and operational phases
2. Compile and implement awareness programmes to prevent accidental and/ uninformed killing of animals, with particular reference to snaring, traditional beliefs, capturing, introduction of pets, etc.	EO, appointed specialist	Site preparation, construction and operational phases

Performance Indicator	» No significant losses of animals, successful relocation and release of animals captured on site » Absence of snares from site fences and trapping of animals » Continued presence of a high diversity of animals in immediate surrounds
Monitoring	» Development and implementation of bio monitoring programme

OBJECTIVE 41: Limit the effect of construction and operational activities in surrounding areas of natural habitat

Project component/s	» Any infrastructure development or activity that could result in adverse impacts on adjacent areas of natural habitat
Potential Impact	» Infestation of adjacent areas of natural habitat by alien and invasive plants, degradation and/ or contamination of natural habitat, uncontrolled spread of impacts from development site
Activities/risk sources	» Site preparation, construction activities, operational activities
Mitigation: Target/Objective	» Prevent impacts from speeding into adjacent areas of natural habitat, prevent degradation of surrounding habitat

Mitigation: Action/control	Responsibility	Timeframe
1. Compile Standard Operating Procedures to deal with the prevention, timely identification and rehabilitation of adverse environmental events and occurrences	Construction Contractors, Environmental Team, Environmental Officer	Site preparation, Construction Phase

Performance Indicator	» Absence of alien and invasive plants from the development site as well as surrounding natural habitat, effective preventative and rehabilitation procedures during construction and operational phases » Absence of litter and effluent from roads, development footprint, minimal dust during construction activities
Monitoring	» Development and implementation of bio monitoring programme

OBJECTIVE 42: Prevent disruptions on the movement patterns of animals within the surrounding region

Project component/s	» Construction and development within a natural environment, also where natural environment and ecological functionality of surrounding and adjacent areas will be affected through development and operational aspects
Potential Impact	» Disruption of migration patterns that will lead to depletion of faunal diversity
Activities/risk sources	» Site preparation, construction activities, operational activities
Mitigation: Target/Objective	» To maintain existing habitat diversity and patterns that will sustain migration patterns of a high faunal diversity

Mitigation: Action/control	Responsibility	Timeframe
1. Ensure all activities that result in destruction of natural habitat are contained within the authorized footprint and do not spread beyond the boundaries of the site	Construction Contractors, Environmental Team, Environmental Officer, Ecologist	Site preparation, construction phase, operational phase
2. Identify habitat that can be retained within the development footprint in order to aid with effective migration patterns	Construction Contractors, Environmental Team, Environmental Officer, Ecologist	Planning, site preparation and construction phases
3. Allow for the development / management of 'stepping stones' within the larger region through effective ecological management of remaining habitat	Construction Contractors, Environmental Team, Environmental Officer, Ecologist	Planning, site preparation and construction phases

Performance Indicator	» High diversity of fauna species, including disciplines of mammals, avifauna, invertebrates and herpetofauna » Seasonal variation of diversity
Monitoring	» Annual diversity monitoring protocol

OBJECTIVE 43: Limit the effects of development within surrounding habitat

Project component/s	» All development activities that will cause sterilisation of natural habitat that becomes suitable for infestation by alien and invasive and encroacher plant species
Potential Impact	» Deterioration of remaining natural habitat adjacent to development footprints that will lead to depletion of faunal diversity
Activities/risk sources	» Site preparation, construction activities, operational activities/ environmental management
Mitigation: Target/Objective	» Prevent edge effects and habitat deterioration of adjacent areas of natural habitat

Mitigation: Action/control	Responsibility	Timeframe
1. Identify activities and project components that are likely to cause degradation of surrounding natural habitat	Construction Contractors, Environmental Team, Environmental Officer	Site preparation, Construction Phase
2. Identify areas where exceptional and/ or ecological attributes of importance to the ecological functionality of the local area persists and retain these attributes as part of a conservation / preservation programme	Construction Contractors, Environmental Team, Environmental Officer	Site preparation, Construction Phase, Operational Phase
3. Compile Standard Operating Procedures to deal with the prevention, timely identification and rehabilitation of adverse environmental events and occurrences within areas of ecological importance	Construction Contractors, Environmental Team, Environmental Officer	Construction Phase

Mitigation: Action/control	Responsibility	Timeframe
4. Compile and implement a biodiversity monitoring programme that aims to evaluate changes to the natural environment that would affect ecological functionality	Construction Contractors, Environmental Team, Environmental Officer	Site preparation, Construction Phase, Operational Phase
5. Identify activities and project components that are likely to cause degradation of surrounding natural habitat	Construction Contractors, Environmental Team, Environmental Officer	Site preparation, Construction Phase, Operational Phase

Performance Indicator	» High diversity of fauna species, including disciplines of mammals, avifauna, invertebrates and herpetofauna » Comparable habitat diversity and status to regional and local ecological types
Monitoring	» Biodiversity monitoring protocol

OBJECTIVE 44: Prevent cumulative depletion and degradation of remaining areas of natural habitat

Project component/s	» All development activities, land clearance, removal of natural vegetation, introduction of industrial components
Potential Impact	» Habitat loss and degradation larger than development footprint
Activities/risk sources	» Site preparation, construction activities, operational activities/ environmental management
Mitigation: Target/Objective	» Prevent edge effects and habitat deterioration of adjacent areas of natural habitat

Mitigation: Action/control	Responsibility	Timeframe
1. Avoid the creation of sterile landscapes and limit disturbance of remaining natural habitat	Construction Contractors, Environmental Team, Environmental Officer	Site preparation, Construction Phase, Operational Phase
2. Develop suitable land use and intensity options for intervention/ conservation sites	Construction Contractors, Environmental Team, Environmental Officer	Construction Phase

Performance Indicator	» Sustained high faunal diversity in adjacent natural habitat » Comparable habitat diversity and status to regional and local ecological types » Biodiversity monitoring protocol
Monitoring	» Annual biodiversity monitoring protocol

OBJECTIVE 45: Sustain the current population and species diversity

Project component/s	» All development activities where natural habitat is accessible to personnel and or local population

Potential Impact	» Depletion of faunal habitat and species diversity through degradation of remaining natural habitat |
Activities/risk sources	» Site preparation, construction activities, operational activities/ environmental management
Mitigation: Target/Objective	» To manage remaining natural habitat in ecological effective manner in order to sustain current population trends

Mitigation: Action/control	Responsibility	Timeframe
1. Compile a list of conservation important fauna species that are known to occur in the region	Construction Contractors, Environmental Team, Environmental Officer	Site preparation, Construction Phase, Operational Phase
2. Compile Standard Operational Procedures to deal with the effective capture and relocation of these animals, should they be threatened by construction/ operational activities	Construction Contractors, Environmental Team, Environmental Officer	Construction Phase
3. Adapt operational activities to prevent direct impacts on these animals, including personnel presence in areas of natural habitat and vehicular movements/ speeds	Construction Contractors, Environmental Team, Environmental Officer	Site preparation, Construction Phase

Performance Indicator	» Continued presence of a high diversity of animals in surrounding areas of natural habitat, including species of conservation concern
Monitoring	» Annual biodiversity monitoring protocol

OBJECTIVE 46: Ensure the preservation and enhancement of important bird habitat within remaining natural habitats that provide habitat for conservation important species and significant congregations of bird species

Project component/s	» Any infrastructure development that will cause loss of natural habitat or deterioration of natural habitat where conservation important birds and bird congregations occur
Potential Impact	» Loss of habitat associated with conservation important birds and important bird congregations
Activities/risk sources	» Site preparation, construction activities, operational activities
Mitigation: Target/Objective	» Ensure the preservation and enhancement of important bird habitat within remaining natural habitat that provide habitat for conservation important species and significant congregations of bird species

Mitigation: Action/control	Responsibility	Timeframe
1. Ensure all activities that result in destruction of natural habitat are contained within the authorized footprint and do not spread beyond the boundaries of the site	Environmental Team, Environmental Officer, Ecologists, Avifaunal specialists	Site preparation, Construction Phase

Performance Indicator	» Retain avifaunal diversity in remaining areas of natural habitat, with specific reference to conservation important species

	» High avifaunal diversity, presence of diverse bird congregations
Monitoring	» Annual diversity assessments, presence/ absence monitoring

OBJECTIVE 47: Limit / manage impacts on bird species of conservation importance

Project component/s	» Any infrastructure development that will cause loss of natural habitat where conservation important species are likely to occur or activities that could cause the disturbance of populations or individuals of these species
Potential Impact	» Loss of habitat suitable for populations of conservation important species or direct impacts and losses of populations or individuals of these species
Activities/risk sources	» Site preparation, construction activities, operational activities
Mitigation: Target/Objective	» Limit the impact on conservation important animals and birds, prevent impacts on these animals and birds in remaining areas of natural habitat

Mitigation: Action/control	Responsibility	Timeframe
1. Implement awareness programmes for all contractors and workers on site	Construction Contractors, Environmental Team, Environmental Officer	Site preparation, Construction Phase

Performance Indicator	» No significant loss of conservation important bird breeding/roosting sites (e.g. successful breeding and rearing of fledglings during breeding activities) as a result of construction or operational activities » The persistence of individuals and populations of protected or conservation important animals and birds in natural habitat surrounding the development
Monitoring	» Yearly monitoring of presence / abundance of conservation important birds as part of biomonitoring programme

OBJECTIVE 48: Facilitate effective displacement of animals and birds from the development site, prevent continuous impacts on animals and birds surrounding the development

Project component/s	» All activities that will result in decimation of natural habitat occupied by animal species, activities that are likely to result in deaths of animals, activities that might attract animals to development/ construction sites
Potential Impact	» Uncontrolled/ accidental death or displacement of animals and birds that occupy natural habitat within the development site or temporarily occupy parts of the site/ infrastructures
Activities/risk sources	» Site preparation, construction activities, operational activities
Mitigation: Target/Objective	» Limit the direct impacts on animals and birds occupying natural habitat where development will take place, limit the presence/ occurrence of animals and birds within construction/ operational areas, effect removal and relocation to suitable areas

Mitigation: Action/control	Responsibility	Timeframe
1. Compile Standard Operating Procedures for the capture and relocation of animals during the construction phase and the implementation of buffer areas to ensure the preservation of active roosting and breeding sites of birds of prey/storks/bustards	Environmental Officer, appointed specialist	Site preparation, construction and operational phases

Performance Indicator	» No significant losses of animals, successful relocation and release of animals captured on site and successful breeding and rearing of fledgling during breeding activities) » Continued presence of a high diversity of animals and birds in immediate surrounds
Monitoring	» Development and implementation of biomonitoring programme

OBJECTIVE 49: Minimize human-animal conflict situations

Project component/s	» The presence of personnel within a development area that is occasionally occupied by opportunistic species, the presence of personnel remaining areas of natural habitat occupied by animals
Potential Impact	» Uncontrolled/ accidental death of animals caused by uninformed and/or deliberate actions of personnel
Activities/risk sources	» Site preparation, construction activities, operational activities
Mitigation: Target/Objective	» Limit adverse human-animal conflict opportunities, promote high awareness of personnel with accurate and constructive information

Mitigation: Action/control	Responsibility	Timeframe
1. Compile Standard Operating Procedures for the capture and relocation of animals during the construction phase	Environmental Officer, appointed specialist	Site preparation, construction and operational phases
2. Compile and implement awareness programmes to prevent accidental and/ uninformed killing of birds with particular reference to snaring, traditional beliefs, capturing, introduction of pets, etc.	Environmental Officer, appointed specialist	Site preparation, construction and operational phases

Performance Indicator	» No significant losses of birds, successful relocation and release of animals captured on site » Absence of snares from site fences and trapping of animals » Continued presence of a high diversity of birds in immediate surrounds
Monitoring	» Development and implementation of biomonitoring programme

OBJECTIVE 50: Minimize bird mortalities caused by collision / electrocution by power line / electrical infrastructure

Project component/s	» Power line infrastructure development that will cause potential bird mortalities
Potential Impact	» Bird collision by earth wires and overhead cabling infrastructure and electrocution caused by bird strikes and streamers

Activities/risk sources	» Site preparation, construction activities, operational activities
Mitigation: Target/Objective	» Minimize the impact on passing bird species prevent and mortalities to threatened and near threatened bird species

Mitigation: Action/control	Responsibility	Timeframe
1. Ensure all activities that result in destruction of natural habitat are contained within the authorized footprint and do not spread beyond the boundaries of the site	Environmental Officer, appointed specialist	Site preparation, Construction Phase

Performance Indicator	» No evidence of bird mortalities » The presence of foraging/roosting and breeding threatened and near threatened bird species on the study site
Monitoring	» Regular (twice per year) monitoring of entire alignment for dead birds or evidence of bird mortalities

OBJECTIVE 51: Reduce dust generation

Project component/s	» Construction activities
Potential Impact	» Generation of dust which could result in a nuisance impact
Activities/risk sources	» Unpaved site roads and vehicle movement
Mitigation: Target/Objective	» Limit the spatial extent and magnitude of nuisance dust impacts

Mitigation: Action/control	Responsibility	Timeframe
1. Water / dampen site access roads.	Contractor	Twice daily for the duration of construction and decommissioning
2. Restrict vehicle access to the site.	Contractor	Ongoing for the duration of construction and decommissioning
3. Impose on-site speed restrictions	Contractor	Ongoing for the duration of construction and decommissioning

Performance Indicator	» Dust does not result in nuisance impacts on surrounding landowners and users. » Dust fallout does not exceed minimum emission standards » No complaints are received or grievances raised relating to dust generation
Monitoring	» Ongoing monitoring and reporting

OBJECTIVE 52: Minimisation of disturbance to and loss of topsoil

Topsoil conservation is an integral part of rehabilitation efforts and helps to maintain the productive capability and ecological functionality of rangelands.

Removal of topsoil should be done where:

» Areas will be excavated
» Areas will be severely compacted
» Areas will be buried with excavated material
» Areas will be permanently covered with altered surfaces

Topsoil must at all times be treated as a valuable natural resource, and may thus not be discarded or degraded. A basic Soil Management Plan is included as **Appendix I**.

Project Component/s	» Overland coal conveyor. » Raw materials loading and offloading, storage areas, and handling facilities. » Coal crusher. » Coal Storage/stockpiles » Power generation units. » Ash dump. » Water infrastructure including a raw water storage dam, ash dump run-off dam, wastewater treatment plant (WWTP) and stormwater runoff dams. » A substation/switching yard. » Office and maintenance areas and buildings » Access roads. » Offices and workshop areas for maintenance and storage. » Temporary laydown areas. » Internal access roads and fencing around the development area.
Potential Impact	» Loss of topsoil and natural resources and biological activity within the topsoil. » Loss of natural regeneration potential of soils. » Loss of agricultural potential of soils.
Activity/Risk Source	» Site preparation and earthworks. » Excavation of foundations and trenches. » Construction of site access road. » Stockpiling of topsoil, subsoil and spoil material.
Mitigation: Target/Objective	» To retain full biological activity and functionality of topsoil. » To retain desirable natural vegetation, where possible. » To minimise footprints of disturbance of vegetation/habitats. » Remove and store all topsoil from areas that are to be excavated; and use this topsoil in the subsequent rehabilitation of disturbed areas. » Minimise spoil material.

Mitigation: Action/Control	Responsibility	Timeframe
1. Areas to be cleared must be clearly marked on-site to eliminate the potential for unnecessary clearing.	Contractor in consultation with Specialist	Pre-construction
2. Construction activities must be restricted to demarcated areas so that the impact on topsoil is restricted.	Contractor, ECO to monitor	Before and during construction,

Mitigation: Action/Control	Responsibility	Timeframe
		and operation phase
3. Salvaging topsoil: » Topsoil must always be salvaged and stored separately from subsoil and lower-lying parent rock or other spoil material. ∗ Topsoil stripping removes up to 30cm or less of the upper soils. ∗ In cultivated areas, the depth of topsoil may increase and therefore needs to be confirmed with the landowner. » Prior to salvaging topsoil the depth, quality, and characteristics, of topsoil should be known for every management area. ∗ This will give an indication of the total volumes of topsoil that needs to be stored to enable the proper planning and placement of topsoil storage. ∗ Different types of topsoil – rocky soils and sands must be stored separately. » Topsoil should be removed (and stored) under dry conditions to avoid excessive compaction whenever topsoil will have to be stored for longer than 1 year.	Contractor, ECO to monitor	Before and during construction
4. Storing topsoil: » The viability of stored topsoil depends on moisture, temperature, oxygen, nutrients and time stored. » Rapid decomposition of organic material in warm, moist topsoil rapidly decreases microbial activity necessary for nutrient cycling, and reduces the amount of beneficial micro-organisms in the soil. » Stockpile location if not adjacent to a linear development: ∗ At least 200m from any wetland or watercourses. ∗ Ideally a disturbed but weed-free area. » Topsoil is typically stored in berms with a width of 150 – 200cm, and a maximum height of 100cm, preferably lower. ∗ Place berms along contours or perpendicular to the prevailing wind direction. ∗ Adhere to the following general rule: the larger the pile of topsoil storage needs to be, the shorter should be the time it is stored. » Topsoil handling should be reduced to stripping, piling (once), and re-application. Between the piling and reapplication, stored topsoil should not undergo any further handling except control of erosion and (alien) invasive vegetation. » Where topsoil can be reapplied within six months to one year after excavation, it will be useful to store the topsoil as close as possible to the area of excavation and re-application, e.g. next to cabling trenches. ∗ In such cases, use one side of the linear development for machinery and access only. ∗ Place topsoil on the other/far side of this development, followed by the subsoil (also on geotextile). ∗ If there will be a need for long-term storage of topsoil in specified stockpiles, this must be indicated in the design phase and accompanied by a detailed Topsoil Stockpile Management Plan.	Contractor, ECO to monitor	Before and during construction

Mitigation: Action/Control	Responsibility	Timeframe
» In cases where topsoil has to be stored for longer than 6 months or during the rainy season, soils should be kept as dry as possible and protected from erosion and degradation by: * Preventing puddling on or between heaps of topsoil. * Covering topsoil berms. * Preventing all forms of contamination or pollution. * Preventing any form of compaction. * Monitoring the establishment of all invasive vegetation and removing such if it appears. * Keeping slopes of topsoil at a maximal 2:1 ratio. * Monitoring and mitigating erosion where it appears. * Where topsoil needs to be stored in excess of one year, it is recommended to either cover the topsoil or allow an indigenous grass cover to grow on it – if this does not happen spontaneously, seeding should be considered.		
5. Reapplying topsoil: » Spoil materials and subsoil must be back-filled first, then covered with topsoil. » Generally, topsoil should be re-applied to a depth equal to or slightly greater than the topsoil horizon of a pre-selected undisturbed reference site. » The minimum depth of topsoil needed for revegetation to be successful is approximately 20cm. » If the amount of topsoil available is limited, a strategy must be compiled to optimise revegetation efforts with the topsoil available. » Reapplied topsoil should be landscaped in a way that creates a variable micro-topography of small ridges and valleys that run parallel to existing contours of the landscape. The valleys become catch-basins for seeds and act as run-on zones for rainfall, increasing moisture levels where the seeds are likely to be more concentrated. This greatly improves the success rate of revegetation efforts. » To stabilise reapplied topsoil and minimise raindrop impact and erosion: * Use organic material from cleared vegetation where possible. * Alternatively, suitable geotextiles or organic erosion mats can be used as necessary. » Continued monitoring will be necessary to detect any sign of erosion early enough to allow timeous mitigation.	Contractor, ECO to monitor	Before and during construction
6. Re-applied topsoil needs to be re-vegetated as soon as possible, following a Revegetation and Rehabilitation Plan.	Contractor, ECO to monitor	Before and during construction, monitored during the operation phase

Performance Indicator	» Minimal disturbance outside of designated work areas. » Topsoil appropriately stored, managed, and rehabilitated.

Monitoring	» Monitoring of appropriate methods of vegetation clearing and soil management activities by the ECO throughout the construction phase. » An incident reporting system will be used to record non-conformances to the EMPr. » Regular monitoring of topsoil after construction by the developer until such topsoil can be regarded as fully rehabilitated, stable and no longer prone to accelerated erosion.

OBJECTIVE 53: Prevention and early mitigation of all erosion and loss of topsoil and ecosystem integrity

Compacted and / or denuded and disturbed soils are usually prone to surface capping. Such capped soils are prone to ever increasing erosion, creating a dysfunctional landscape and ecosystem that rapidly loses soil, nutrients and seeds from the ecosystem.

Naturally occurring vegetation that historically covered the entire proposed development area not only protects the soil surface from direct raindrop impact, but high portion of biomass in the upper 20 – 50cm of the soil significantly increases rapid infiltration of rainwater, whilst also binding soil particles and thus preventing erosion. A highly disturbed or reduced vegetation layer will thus naturally be accompanied by higher runoff levels and accelerated erosion, especially during extreme weather events.

The measures below indicate the minimum mitigation that will be required for erosion and stormwater control. A basic Erosion Management Plan is included as **Appendix J**.

Project Component/s	» Overland coal conveyor. » Raw materials loading and offloading, storage areas, and handling facilities. » Coal crusher. » Coal Storage/stockpiles » Power generation units. » Ash dump. » Water infrastructure including a raw water storage dam, ash dump run-off dam, wastewater treatment plant (WWTP) and stormwater runoff dams. » A substation/switching yard. » Office and maintenance areas and buildings » Access roads. » Offices and workshop areas for maintenance and storage. » Temporary laydown areas. » Internal access roads and fencing around the development area.
Potential Impact	» Loss of topsoil and natural resources and biological activity within the topsoil. » Loss of natural regeneration potential of soils. » Loss of agricultural potential of soils. » Impacts within downstream wetlands and watercourses through siltation and change in chemistry and turbidity of the water.
Activity/Risk Source	» Rainfall and wind erosion of disturbed areas. » Excavation, stockpiling and compaction of soil. » Concentrated discharge of water from construction activity and new infrastructure. » Stormwater run-off from sealed, altered or bare surfaces. » Construction equipment and vehicle movement on site. » Cabling and road construction activities. » Roadside drainage ditches.

	» Premature abandonment of follow-up monitoring and adaptive management of rehabilitation.
Mitigation: Target/Objective	» To minimise erosion of soil from site during construction. » To minimise deposition of soil into drainage lines, wetlands and watercourses. » To minimise damage to vegetation by erosion or deposition. » To minimise damage to soil, animals and vegetation by construction activities. » No accelerated overland flow related surface erosion as a result of a loss of vegetation cover. » No reduction in the surface area of wetland areas as a result of the establishment of infrastructure. » Minimal loss of vegetation cover due to construction related activities. » No increase in runoff into drainage lines as a result of construction of project related infrastructure. » No increase in runoff into drainage lines as a result of road construction.

Mitigation: Action/Control	Responsibility	Timeframe
1. Identify and demarcate construction areas for general construction work and restrict construction activity to these areas. Prevent unnecessary destructive activity within construction areas (prevent over-excavations and double handling).	Contractor, ECO to control	Before and during construction
2. New access roads and other servitudes to be carefully planned and constructed to minimise the impacted area and prevent unnecessary excavation, placement, and compaction of soil. Special attention must be given to roads that cross drainage lines.	Contractor, ECO to control	Before and during construction
3. Rehabilitate disturbed areas as soon as construction in an area is completed as per the Rehabilitation Plan.	Contractor, ECO to control	Immediately after construction, and monitored during operation phase
4. General Erosion control measures: » Runoff control and attenuation can be achieved by using any or a combination of sand bags, logs, silt fences, stormwater channels and catch-pits, shade nets, geofabrics, seeding or mulching as needed on and around cleared and disturbed areas. * Ensure that all soil surfaces are protected by vegetation or a covering to avoid the surface being eroded by wind or water. » Ensure that heavy machinery does not compact areas that are not meant to be compacted as this will result in compacted hydrophobic, water repellent soils which increase the erosion potential of the area. » Prevent the concentration or flow of surface water or stormwater along roads and ensure measures to prevent erosion are in place prior to construction. » Stormwater and any runoff generated by hard impervious surfaces should be discharged into retention swales or areas with rock rip-rap. These areas should be grassed with indigenous vegetation. These energy dissipation structures should be placed in a manner that flows are managed prior to being discharged back into the natural water courses, thus not only preventing erosion, but also supporting the	Contractor, ECO to control	Construction and operation phase

Mitigation: Action/Control	Responsibility	Timeframe
maintenance of natural base flows within these systems, i.e. hydrological regime (water quantity and quality) is maintained. » Mitigate against potential siltation and sedimentation of nearby wetlands and watercourses using the above mentioned structures and ensure that no structures cause erosion. » Minimise and restrict site clearing to areas required for construction purposes only and restrict disturbance to adjacent undisturbed natural vegetation. » Vegetation clearing should occur in parallel with the construction progress to minimise erosion and/or run-off. Large tracts of bare soil will either cause dust pollution or quickly erode and then cause sedimentation in the lower portions of the catchment. » If the appointed EO/ECO notice that the wetland structures and morphology is being altered and transformed (e.g. erosion, channel expansion etc.) as a result of the development (e.g. alteration in surface runoff etc.) Wetland Specialists should be appointed to rehabilitate the wetland structure and morphology. » No grey ("dirty") water may be channelled into the wetlands and watercourses. » When implementing dust control measures, prevent over-wetting, saturation, and run-off that may cause erosion and sedimentation.		
5. Control depth of excavations and stability of cut faces/sidewalls.	Contractor, to be monitored by ECO	Site establishment and duration of contract
6. Compile a comprehensive Stormwater Management Method Statement, as part of the final design of the project and implement during construction and operation.	Developer, Contractor, to be monitored by ECO	Site establishment and duration of contract
7. All vehicles on site must be appropriate to access the site. No off-road driving is permitted unless authorised by the ECO.	Contractor, to be monitored by ECO	Pre-construction, Construction and operation
8. 4x4's or diff lock vehicles must be used in wet slippery conditions to reduce the erosion on the roads and the surrounding area.	Contractor, to be monitored by ECO	Pre-construction, Construction and operation

Performance Indicator	» Minimal level of soil erosion around the site. » Minimal level of increased siltation in drainage lines or wetland features. » Minimal level of soil degradation. » Acceptable state of excavations, as determined by EO and ECO. » Progressive return of disturbed and rehabilitated areas to the desired end state (Refer also to the Plant Rescue and Rehabilitation Plan).
Monitoring	» Fortnightly inspections of the site by the ECO. » Fortnightly inspections of sediment control devices by the ECO. » Fortnightly inspections of surroundings, including drainage lines and wetland features by the ECO.

	» Immediate reporting of ineffective sediment control systems. » An incident reporting system must record non-conformances according to the EMPr.

OBJECTIVE 54: Minimisation of disturbance to and loss of topsoil and ecosystem functionality

Immediately after clearing of vegetation, the soil surface must be inspected for signs of erosion and stabilised as soon as possible. After completion of construction, such erosion stabilisation should preferably be with a cover of vegetation. A perennial vegetation cover of at least 30%, preferably more, will be desirable (on all areas where vegetation is permissible).

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.

The aim of the first vegetation cover is to form a protective, relatively dense indigenous layer to slow runoff, increase moisture infiltration into the soil, and gradually change the soil nutrient status in order for it to be more favourable for other desirable indigenous vegetation to become established.

The first vegetation layer must be developed further until a desirable end state, as determined during the design phase and taking the original vegetation description as guideline, is established.

Project Component/s	» Temporary access roads and lay down areas, » Areas disturbed during construction phase which will not be affected/utilized during operational phase » Road shoulders and areas between constructed infrastructure and around hard surfaces » Any soil patches exposed due to erosion.
Potential Impact	» Within the footprint, a change of plant species composition with lower productivity and agricultural potential can be expected due to removal, disturbance and continued long-term shading of vegetation. » A largely reduced vegetation cover will render the ecosystem more prone to erosion and irreversible degradation. » Disturbance of indigenous vegetation creates opportunities for the establishment of invasive vegetation or creation of surfaces that do not support the permanent (re-) establishment of vegetation. » Loss of natural regeneration potential of soils. » Loss of agricultural potential of soils.
Activity/Risk Source	» Site preparation and earthworks. » Excavation of foundations and trenches. » Construction of site access road. » Temporary lay down areas » Temporary access roads/tracks. » Stockpiling of topsoil, subsoil and spoil material. » Other disturbed areas/footprints
Mitigation: Target/Objective	» Recreate a non-invasive, acceptable vegetation cover that will facilitate the establishment of desirable and/or indigenous species.

	» Prevent accelerated erosion of ecosystem degradation.

Mitigation: Action/Control	Responsibility	Timeframe
Rehabilitation of surface		
1. Prior to the application of topsoil: » Subsoil shall be shaped and trimmed to blend in with the surrounding landscape or used for erosion mitigation measures. » Ground surface or shaped subsoil shall be ripped or scarified with a mechanical ripper or by hand to a depth of 15 – 20cm. » Compacted soil shall be ripped to a depth greater than 25cm and the trimmed by hand to prevent re-compacting the soil. » Any foreign objects, concrete remnants, steel remnants or other objects introduced to the site during the construction process shall be cleared before ripping, or shaping and trimming of any landscapes to be rehabilitated takes place. » Shaping will be to roughly round off-cuts and fills and any other earthworks to stable forms, sympathetic to the natural surrounding landscapes.	Contractor, ECO to control	During and after construction
2. Application of topsoil: » Topsoil shall be spread evenly over the ripped or trimmed surface, if possible not deeper than the topsoil originally removed. » The final prepared surface shall not be smooth but furrowed to follow the natural contours of the land. » The final prepared surface shall be free of any pollution or any kind of contamination. » Care shall be taken to prevent the compaction of topsoil.	Contractor, ECO to control	During and after construction
3. Soil stabilisation: » Mulch, if available from shredded vegetation, shall be applied by hand to achieve a layer of uniform thickness. » Mulch shall be rotated into the upper 10cm layer of soil. * This operation shall not be attempted if the wind strength is such as to remove the mulch before it can be incorporated into the topsoil. » Measures shall be taken to protect all areas susceptible to erosion by installing temporary and permanent drainage work as soon as possible. * Where natural water flow-paths can be identified, subsurface drains or suitable surface drains and chutes need to be installed. » Additional measures shall be taken to prevent surface water from being concentrated in watercourses and from scouring slopes, banks or other areas. » Runnels or erosion channels developing shall be back-filled and restored to a proper condition. * Such measures shall be effected immediately before erosion develops at a large scale. » Where erosion cannot be remedied with available mulch or rocks, geojute or other geotextiles shall be used to curtail erosion.	Contractor, ECO to control	Construction phase Operation phase, followed up until desired end state is reached

Mitigation: Action/Control	Responsibility	Timeframe
4. Borrow-pits (if required) » Shall be shaped to have undulating, low-gradient slopes and surfaces that are rough and irregular, suitable for trapping sediments and facilitation of plant growth. » Upon completion of rehabilitation these reshaped and revegetated areas shall blend into the natural terrain.	Contractor, ECO to control	After construction
Revegetation		
5. Revegetation: » Revegetation of the final prepared area is expected to occur spontaneously to some degree where topsoil could be re-applied within 6 months. » Revegetation will be done according to an approved planting/landscaping plan according to the desirable end states and permissible vegetation.	Contractor, ECO to control	Construction phase Operation phase, followed up until desired end state is reached
6. Re-seeding » Revegetation can be increased where necessary by hand- seeding indigenous species. * Previously collected and stored seeds shall be sown evenly over the designated areas, and be covered by means of rakes or other hand tools. * Commercially available seed of grass species naturally occurring on site can be used as an alternative. » Re-seeding shall occur at the recommended time to take advantage of the growing season. » In the absence of sufficient follow-up rains after seeds started germinating, irrigation of the new vegetation cover until it is established shall become necessary to avoid loss of this vegetative cover and the associated seedbank.	Contractor, ECO to control	Construction phase Operation phase, followed up until desired end state is reached
7. Planting of species » The composition of the final acceptable vegetation will be based on the vegetation descriptions of the original ecological EIA investigation, and will include rescued plant material. » Geophytic plants shall be planted in groups or as features in selected areas. » During transplanting care shall be taken to limit or prevent damage to roots. » Plants should be watered immediately after transplanting to help bind soil particles to the roots (or soil-ball around rooted plants) and so facilitate the new growth and functioning of roots.	Contractor, ECO to control	Construction phase Operation phase, followed up until desired end state is reached
8. Traffic on revegetated areas » Designated tracks shall be created for pedestrian or vehicle traffic where necessary. » Disturbance of vegetation and topsoil must be kept to a practical minimum, no unauthorised off road driving will be allowed. » All livestock shall be excluded from newly revegetated areas, until vegetation is well established.	Contractor, ECO to control	Construction phase Operation phase

Mitigation: Action/Control	Responsibility	Timeframe
9. Establishment » The establishment and new growth of revegetated and replanted species shall be closely monitored. * Where necessary, reseeding or replanting will have to be done if no acceptable plant cover has been created.	Contractor, ECO to control	Construction phase and operation phase, followed up until desired end state is reached
Monitoring and follow-up treatments		
10. Monitor success of rehabilitation and revegetation and take remedial actions as needed according to the respective plan » Erosion shall be monitored at all times and measures taken as soon as detected. » Regular monitoring of invasive alien plants shall occur at regular intervals, especially during the rainy/growing season (between January and April) and measures taken as soon as possible. » Where necessary, reseeding or replanting will have to be done if no acceptable plant cover has been created.	ECO during construction, suitable designated person / contractor after that	Construction phase and operation. phase
11. Weeding » It can be anticipated that invasive species and weeds will germinate on rehabilitated soils. * AIPs needs to be hand-pulled before they are fully established and/or reaching a mature stage where they can regenerate. * Where invasive shrubs re-grow, they will have to be eradicated according to the Working for Water (WFW) specifications. * Regular monitoring should be done with an increase in monitoring during the growing season. A combination of mechanical and chemical eradication methods should be used to attempt to manage invasive species and the key to success is regular follow-up treatments. Fluroxypyr is a chemical that has been used to relative success in the past can be recommended.	Contractor	Construction phase Operation phase

Performance Indicator	» No activity in identified no-go areas. » Natural configuration of habitats as part of ecosystems or cultivated land is retained or recreated, thus ensuring a diverse but stable hydrology, substrate and general environment for species to be able to become established and persist. » The structural integrity and diversity of natural plant communities are recreated or maintained. » Indigenous biodiversity continually improves according to the pre-determined desirable end state. * This end state, if healthy, will be dynamic and able to recover by itself after occasional natural disturbances without returning to a degraded state. » Ecosystem function of natural landscapes and their associated vegetation is improved or maintained.
Monitoring	» Fortnightly inspections of the site by the ECO during construction. » An incident reporting system must record non-conformances to the EMPr.

	» Quarterly inspections and monitoring of the site by the ECO or personnel designated to the rehabilitation process until 80% of the desired plant species have become established. * These inspections should be according to the monitoring protocol set out in the rehabilitation plan. » Thereafter annual inspections according to the minimal monitoring protocol.

OBJECTIVE 55: Prevent / limit impacts on water quality as a result of siltation

Project component/s	Construction of all infrastructure including: » Power station » Access roads » Substation » Ash dump
Potential Impact	» Siltation of the water course leading to the deterioration in water quality
Activities/risk sources	» Site clearing, stripping of topsoil, conducting earthworks / terracing, and excavation for foundations etc.
Mitigation: Target/Objective	» No significant impacts on water quality as a result of siltation.

Mitigation: Action/control	Responsibility	Timeframe
1. Minimise and keep the construction footprint as small as possible.	Environmental Officer / Developer / Contractor	To be implemented throughout the duration of the construction phase
2. Revegetate the construction footprint as soon as possible.	Environmental Officer / Developer / Contractor	To be implemented throughout the duration of the construction phase
3. Storm water should be diverted from construction activities and managed in such a manner to disperse runoff and prevent the concentration of storm water flow.	Environmental Officer / Developer / Contractor	To be implemented throughout the duration of the construction phase
4. Construction should take place during the dry season to minimise runoff.	Environmental Officer / Developer / Contractor	To be implemented throughout the duration of the construction phase
5. Sequential removal of the vegetation (not all vegetation immediately).	Environmental Officer / Developer / Contractor	To be implemented throughout the duration of the construction phase

Performance Indicator	» Development on the project footprint only » No additional signs of erosion on site
Monitoring	» Frequent checks (e.g. Weekly) should be conducted to ensure mitigation measures are in place and the effectiveness will be verified through assessing the performance indicators

OBJECTIVE 56: Prevent / limit deterioration in water and habitat quality

Project component/s	» Site clearing, stripping of topsoil, conducting earthworks / terracing, and excavation for foundations etc.
Potential Impact	» Runoff containing pollutants and solid waste entering the surrounding watercourses cause deterioration in water and habitat quality
Activities/risk sources	» Hydrocarbons spills, general and hazardous material
Mitigation: Target/Objective	» No significant impacts on water and habitat quality.

Mitigation: Action/control	Responsibility	Timeframe
1. The management of general and other forms of waste must ensure collection and disposal into clearly marked skip bins that can be collected by approved contractors for disposal to the appropriate disposal sites.	Environmental Officer Developer / Contractor	To be implemented throughout the duration of the construction phase
2. The fuel storage facilities must be located on a hard standing area (paved or concrete surface that is impermeable), roofed and bunded in accordance with SANS1200 specifications. This will prevent mobilization of leaked hazardous substances.	Environmental Officer Developer / Contractor	To be implemented throughout the duration of the construction phase
3. An emergency spillage response plan and spill kits should be in place and accessible to the responsible monitoring team. The Material Safety Data Sheets (MSDS) should be kept on site during construction for reference to anytime in terms of handling, storage and disposal of materials.	Environmental Officer Developer / Contractor	To be implemented throughout the duration of the construction phase

Performance Indicator	» No signs of spillages on site » Maintenance of vehicles and machinery on a regular basis » Spillage kits put in place
Monitoring	» Frequent checks (e.g. Weekly) should be conducted to ensure mitigation measures are in place and the effectiveness will be verified through assessing the performance indicators

OBJECTIVE 57: Prevent lowering of the water table

Project component/s	» Site clearing, stripping of topsoil, conducting earthworks / terracing, and excavation for foundations etc.
Potential Impact	» Lowering of the watertable
Activities/risk sources	» Digging of foundations and instillation of liner
Mitigation: Target/Objective	» No significant impacts on the water table

Mitigation: Action/control	Responsibility	Timeframe
1. In areas where the foundation of structures is to be installed below the water level, dewatering of the aquifer to locally lower the watertable can be considered. The abstracted water can be utilised for dust suppression, vegetation or	Environmental Officer Developer / Contractor	To be implemented throughout the duration of the construction phase

Mitigation: Action/control	Responsibility	Timeframe
discharged to the storm water dams. However should all construction activities take place above the water table, there will be no impact to the groundwater.		
2. Installation of an appropriate liner at the ash dumps and coal stockpile.	Environmental Officer Developer / Contractor	To be implemented throughout the duration of the construction phase

Performance Indicator	» Development on the project footprint only
Monitoring	» Daily checks should be conducted to ensure mitigation measures are in place and the effectiveness will be verified through assessing the performance indicators

OBJECTIVE 58: Prevent / limit sedimentation of water systems

Project component/s	» Site clearing, stripping of topsoil, conducting earthworks / terracing, and excavation for foundations etc.
Potential Impact	» Sedimentation of downstream freshwater systems, resulting in impaired water quality
Activities/risk sources	» Construction and Operational related activities
Mitigation: Target/Objective	» No significant impacts on water resources.

Mitigation: Action/control	Responsibility	Timeframe
1. Mitigation measures should ensure that no loss of ecological integrity takes place for the wetlands or any of the other freshwater features both within the proposed project area, as well as in the surrounding wetlands and freshwater systems further downstream	Environmental Officer, Develop / Contractor	Throughout the operation from Construction to Post-Closure phase.

Performance Indicator	» Development on the project footprint only and operational phase checks
Monitoring	» Daily checks should be conducted to ensure mitigation measures are in place and the effectiveness will be verified through assessing the performance indicators

OBJECTIVE 59: Protection of sites of heritage value

Project component/s	Construction of all infrastructure including: » Power station » Access roads » Substation » Ash dump
Potential Impact	» Improper management of heritage resources resulting in their destruction, including Site V04, any buried heritage resources and the identified graves. » Loss of heritage resources
Activity/risk source	» Site preparation and earthworks

	» Foundations or plant equipment installation » Mobile construction equipment movement on site
Mitigation: Target/Objective	» To ensure that any significant heritage objects found on site are treated appropriately and in accordance with the relevant legislation » Effective guidance to ensure that impacts to significant heritage resources are mitigated

Mitigation: Action/control	**Responsibility**	**Timeframe**
1. Grave and burial areas must be identified and cordoned off prior to the commencement of development so that negative impact and vandalism is avoided.	Contractor	Pre-construction
2. Construction managers / foremen must be informed before construction starts on the possible types of heritage sites and cultural material they may encounter and the procedures to follow when they find sites.	Contractor	Pre-construction
3. If any heritage finds such as tool scatters, bone or artefact remains are exposed or noticed during construction, activities must be stopped and a qualified archaeologist must be contacted to assess the heritage find.	Archaeologist/suitably qualified person	As and when required
4. If a heritage object is found, work in that area must 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.	Archaeologist/suitably qualified person	As and when required
5. Develop a Heritage Chance Find Procedure prior to commencement of construction activities. A basic Chance Find Procedure is included as **Appendix K**.	Contractor	Pre-construction
6. Drafting a Conservation Management Plan (CMP) to mitigate impacts to significant heritage resources such as Site V04, any buried heritage resources as well as the identified graves	Heritage Consultant	Construction and Operation phases

Performance Indicator	» Minimal disturbance outside of designated work areas » All heritage items located are dealt with as per the legislative guidelines » Ongoing management of significant heritage resources through implementation of the CMP.
Monitoring	» Observation of excavation activities by ECO throughout construction phase » Monitoring/Inspection of all clearing and earthworks by ECO. » An incident reporting system will be used to record non-conformances to the EMPr. » SAHRA must ensure compliance with the provisions of the CMP

OBJECTIVE 60: Prevent the loss of Palaeontological Heritage

Project component/s	Damaging impacts on palaeontological heritage occur during the **construction** phase which will modify the existing topography. The proposed development of the 600 MW new coal-fired power plant and associated infrastructure on the farm Du Toit 563 and Vrienden 589 near Makhado, in the Limpopo Province include: » Power island comprising of: * Circulating Fluidised Bed (CFB) boiler technology.

	∗ Electrostatic Precipitator (ESP) / Bag filtration systems and Flue / smoke stacks. ∗ Direct or indirect air-cooling systems. ∗ Balance of plant components (incl. steam turbine and generator etc.). » Coal and Limestone / Lime Rail Spur and-or Road offloading Systems. » Upgrading or establishment of a rail siding. » Coal crusher. » Strategic and Working Coal stockpiles. » Limestone or Lime (hydrated or de-hydrated) storage and handling area. » Ash dump (dry-ashing has been assumed for the plant in order to reduce the project's water requirements, which is in alignment with the recommendations of the National Development Plan (NDP) and Integrated Energy Plan (IEP)). » Water infrastructure. This may include: ∗ Raw water storage dams. ∗ Water supply pipelines and booster stations. ∗ Pollution control dam/s. ∗ Water treatment plant (WTP). ∗ Wastewater treatment plant (WWTP). ∗ Storm water management systems. » HV Yard and substation components with HV overhead transmission lines connecting to the Eskom infrastructure. » Control room, office / administration, workshop, storage and logistics buildings. » Upgrading of external roads and establishment of internal access roads. » Security fencing and lighting.
Potential Impact	Destruct, destroy or permanently close-in fossils at or below the ground surface that are then no longer available for research
Activity/risk source	Activities associated with the construction of the 600 MW new coal-fired power plant and associated infrastructure
Mitigation: Target/Objective	Protection of identified fossils uncovered during the construction phase.

Mitigation: Action/control	**Responsibility**	**Timeframe**
1. Protection of identified fossils uncovered during the construction phase.	Environmental Officer/Palaeontology Specialist	Construction phase
2. Should fossil material exist within the development footprint any negative impact upon it could be mitigated by surveying, recording, describing and sampling of well-preserved fossils by a professional palaeontologist. This should take place after initial vegetation clearance has taken place.	Environmental Officer/Palaeontology Specialist	Construction phase
3. Excavation of fossil heritage will require a permit from SAHRA and the material must be housed in a permitted institution. In the event that an excavation is impossible or inappropriate the fossil or fossil locality could be protected and the site of any planned construction and infrastructure moved.	Environmental Officer/Palaeontology Specialist	Construction phase

Performance Indicator	» No impacts on valuable fossil resources

Monitoring	» None

OBJECTIVE 61: Control noise due to construction activities

Project component/s	Construction of all infrastructure including: » Power station » Access roads » Substation » Ash dump
Potential Impact	» Increased noise levels at potentially noise-sensitive receptors. » Changing ambient sound levels could change the acceptable land use capability. » Any construction activities taking place at night. » Potential noise impact of high significance at night (due to increased traffic at the receptors staying close to the N1 – Huntleigh access road; NSD04 and 05).
Activities/risk sources	Construction activities including: » Site clearing » Site establishment » Excavations » Grading / levelling of surfaces » Concrete works » Blasting (if required)
Mitigation: Target/Objective	» Ensure that the change in ambient sound / rating levels as experienced by receptors is less than 5dBA. » Prevent the generation of nuisance noises.

Mitigation: Action/control	Responsibility	Timeframe
1. Develop and implement an Environmental Awareness section in the Safety and Health Induction training programme.	Contractor	Prior to Construction commencing, Construction phase
2. Use stockpiles and residue deposits to assist as acoustical screens.	Contractor	Construction phase
3. Make use of smaller / quieter equipment when operating near receptors.	Contractor	Construction phase
4. Where possible, only construct during the day. If night-time construction activities are required, do not conduct these closer than 500m to any receptors (prevent a noise level exceeding 42dBA at receptors). Ensure that equipment is well maintained and fitted with the correct and appropriate noise abatement measures.	Developer / Contractor	Construction phase
5. Use available material to develop a berm (permanent or temporary) between construction activities and surrounding noise-sensitive receptors to break the line of sight as soon as possible. This berm should ideally be constructed during the daytime using minimal equipment. With correct implementation such a berm can significantly reduce noise levels at the surrounding receptors.	Contractor	Construction phase

Mitigation: Action/control	Responsibility	Timeframe
6. Relocating the access road further than 330m from NSD04, or, develop an acoustic screen (permanent or temporary - to be designed) between the N1 – Huntleigh access road and closest receptors (NSD04).	Developer / Contractor	Planning, Construction phase
7. Ensure that truck drivers participate in an environmental induction programme, highlighting the need to consider the local community (topics such as slower driving, minimal use of hooters, minimal use of air-brakes, and maintenance of haul trucks).	Contractor	Preconstruction, Construction phase
8. Develop and implement a quarterly noise monitoring programme at NSD03 and NSD04. This is because the area is very quiet and the proposed development will have a measurable impact on the ambient sound levels at the closest NSD. Noise measurements frequency can be changed as recommended by an acoustic consultant.	Developer / Contractor	Preconstruction, Construction phase

Performance Indicator	» Ensure that the change in ambient sound levels or rating level as experienced by receptors is less than 5dBA at night. » Ensure that maximum noise levels at potentially sensitive receptors are less than 42dBA. » No noise complaints are registered.
Monitoring	» ECO to monitor is any noise complaints is lodged with the Contractor. » Quarterly noise monitoring programme at NSD03 and NSD04

OBJECTIVE 62: Limit the visual impact of the project

Project component/s	» Industrial Structures including the stacks, power generation units and conveyors
Potential Impact	» Further industrialisation of the landscape as viewed by sensitive receptors.
Activities/risk sources	» The nature of these elements will contrast with rural characteristics and will be highly obvious as new industrial development.
Mitigation: Target/Objective	» Minimise disturbance and loss of vegetation. » Colouring of taller structures should be such that they are not made prominent and preferably visually recede. » Undertake rehabilitation of disturbed areas. » Undertake screen planting to soften views to adjacent road to the west and homesteads to the south west.

Mitigation: Action/control	Responsibility	Timeframe
1. Plan and implement lighting to minimise visible light at night.	Developer / Contractor	Planning. Construction, operation phases
2. Minimise and reinstate vegetation loss.	Contractor / ECO / ELO	Construction, Decommissioning phase

Performance Indicator	» Vegetation presence and density. » Presence of unnecessary infrastructure. » Visibility of the power station.
Monitoring	» Evaluate the effectiveness of colours and surface finishes to visually recede from selected viewpoints in the Upland LCA. It should be possible to compare results with other existing power stations. » Evaluate health and effectiveness of vegetation to provide necessary screening before, during and after construction and annually thereafter. » Evaluate vegetation growth and reinstatement during decommissioning and for five years thereafter. » Take regular time-line photographic evidence (Responsibility: ECO and ELO). » Prepare regular reports.

OBJECTIVE 63: Limit the visual impact of the ash dump

Project component/s	» Ash dump
Potential Impact	» Further industrialisation of the landscape as viewed by sensitive receptors.
Activities/risk sources	» This element has the potential to contrast with the natural landform and colours / texture of the surrounding landscape which will exacerbate impacts. » There is also potential for dust rising from the facility to draw attention to it.
Mitigation: Target/Objective	» Design the ash dump to blend as best as possible with the surrounding natural landform. » Minimise and reinstate vegetation loss from surrounding areas during construction. » Undertake effective dust control at the ashing facility during the operational phase. » Rehabilitate the ashing facility on a progressive basis during the operational phase and decommissioning. Deposit ash from north to south in order to help provide a screen when the development is viewed from the north

Mitigation: Action/control	Responsibility	Timeframe
1. Minimise and reinstate surrounding vegetation loss.	Developer / Contractor	Planning, Construction, Operation phases

Performance Indicator	» Natural appearance of the landform created by the ashing facility. » Vegetation cover on the ashing facility. » Ashing facility part screening development when viewed from the north. » Dust rising from the ashing facility.
Monitoring	» Evaluate vegetation growth and reinstatement during decommissioning and for five years thereafter. » Take regular time-line photographic evidence. » Responsibility: ECO and ELO. » Prepare regular reports.

OBJECTIVE 64: Stimulate and enhance production impacts, employment impacts and benefits to households in the country and specifically the local economy during the construction phase

Project Component/s	» Construction of the Power Station and associated infrastructure
Potential Impact	» Optimisation of local economic benefits
Activity/Risk Source	» Construction procurement practices
Mitigation: Target/Objective	» Increase the procurement of goods and services and create new employment opportunities within the local economy

Mitigation: Action/control	Responsibility	Timeframe
1. Prioritise the local labour when filling the available positions.	Project Developer	Construction
2. Sub-contract to local SMMEs where possible	EPC Contractor	Construction

Performance Indicator	» Percentage of the expenditure spent on the project spent in the local communities versus the entire nation » Percentage of labour force employed from local community » Number of contracts signed between EPC Contractor and local construction companies and SMME's to supply goods and services directly used in the construction and support of site activities
Monitoring	» Checklists, quarterly reports, and annual reports

OBJECTIVE 65: Skills enhancement in the local economy during the construction phase

Project Component/s	» Construction of the Power Station and associated infrastructure
Potential Impact	» Moderate local expertise development
Activity/Risk Source	» Construction procurement practice employed by the EPC contractor
Mitigation: Target/Objective	» Ensure knowledge transfer and skills development of the local labour to maximise their employment opportunities in the project

Mitigation: Action/control	Responsibility	Timeframe
1. Facilitate the transfer of knowledge between experienced employees and the local staff	EPC contractor	Pre-construction and construction
2. Set up learnership and apprenticeship programmes to build onto existing or develop new skills of construction workers, especially those coming from the local communities	Project Developer, EPC Contractor	Pre-construction and construction
3. Perform a skills audit to determine the potential skills that could be sourced in the area	Project Developer	Pre-construction and construction

Performance Indicator	» Man-hours spent on skills and knowledge transfer to local labour » Number of learnerships and/or apprenticeships offered
Monitoring	» Quarterly reports and post-construction final report

OBJECTIVE 66: Reduce the pressure on local social and economic infrastructure during the construction phase

Project Component/s	» Construction of the Power Station and associated infrastructure
Potential Impact	» Dilapidation of local infrastructure, lack of deliverable capacity and decline in the quality of services offered
Activity/Risk Source	» Movement of vehicles » Influx of migrant workers and job seekers
Mitigation: Target/Objective	» Reduce the pressure on local social and economic infrastructure

Mitigation: Action/control	Responsibility	Timeframe
1. Provide public transport alternatives for construction workers	Project Developer, Government, and EPC Contractor	Pre-construction and Construction
2. Engage with local authorities and inform them of the development and discuss with them the ability of the municipality to meet the demands for social and basic services created by the migrant construction workers, as well as the pressure on local infrastructure exerted by the activities; and find solutions to these	Project Developer, Government, and EPC Contractor	Pre-construction and Construction

Performance Indicator	» Adequate signage and traffic calming mechanisms along delineated construction routes » Established relationship with Local Municipality and identification of areas of collaboration » Assistance provided to the Local Municipality with respect to the local infrastructure through the social responsibility programme » Upgraded local roads » Transportation provided to construction crews » Reduced incidents of accidents
Monitoring	» Checklists and annual report inclusive of other performance assessments

OBJECTIVE 67: Limit / reduce traffic related impacts

Project component/s	» Section of N1 between Makhado and Musina. » Section of D777 between N1 and D744 near Mopane. » Section of gravel road D777 (between D744 and D1021). » Gravel road D1021 (complete road from N1 to D777).
Potential Impact	» Vehicles travelling on gravel roads (D1021 and D777) will result in dust carrying onto nearby farms, reduced sight distance for drivers and pedestrians, deterioration of gravel roads and increased risk of collision. » Increased risk of collision with pedestrians and cattle in Mopane. » Increased risk of accidents on the N1 with increase in vehicle numbers.

	» Poor level of service on D1021 approach to the N1, expected from around Year 2045 depending on rate of increase in traffic volumes on the N1. » Increased number of heavy vehicles on the N1 would impact on the road pavement, requiring more regular maintenance.
Activity/risk source	» Transportation of components to site » Construction vehicles utilising public roads » Increased number of vehicles (light and heavy) on N1 and D777, D744 and D1021.
Mitigation: Target/Objective	» Reduce traffic impact by ensuring safe traffic flow and reducing the likelihood of crashes.

Mitigation: Action/control	Responsibility	Timeframe
1. Hard surface gravel roads serving the Power Plant (i.e. D777 and D1021).	Developer / Contractor	Prior to Construction on the Power Plant.
2. Provide raised sidewalk along at least one side of the D777 and D1021.	Developer / Contractor	Prior to Construction on the Power Plant.
3. Provide speed restriction signage on D777 and D1021.	Developer / Contractor	Prior to Construction on the Power Plant.
4. Provide sidewalks in Makhado for pedestrian road safety.	Developer / Contractor	Prior to Construction on the Power Plant.
5. Provide appropriate signage on N1 informing of likelihood of construction vehicles during the construction phase.	Developer / Contractor	At start of Construction Phase and for duration of Construction.
6. Reassess Level of Service (LOS) on D1021 approach to N1 in year 2045 (or sooner if deemed necessary) and upgrade the priority controlled intersection to a traffic roundabout when required.	Developer / Contractor	In Year 2045 or sooner if required.
7. Construct a rail line and siding to transport coal and limestone by rail to the Power Plant for the Operational Period.	Developer / Contractor	During the Operations Phase and will become more required as traffic volumes increase on the N1.
8. Use rail to transport materials from site during the decommissioning phase, as opposed to only using road based transport.	Developer / Contractor	Decommissioning Phase
9. Ensure vehicles are in a roadworthy condition.	Vehicle operator and Provincial Traffic Law Enforcement.	Duration of the project life cycle

Performance Indicator	» No traffic incidents involving the power station construction vehicles. » Appropriate signage in place » No complaints resulting from traffic congestion, delays or driver negligence associated with construction of the power station. » Level of Service (LOS) on D1021 approach to the N1.
Monitoring	» Visual monitoring of dust produced by traffic movement » Visual monitoring of traffic control measures to ensure they are effective

	» A complaints register must be maintained, in which any complaints from the community must be logged. Complaints must be investigated and, if appropriate, acted upon » An incident reporting system to be used to record non-conformances to the EMPr. » Monitor vehicle queues on the D1021 approach to the N1 and assess LOS when access to the N1 becomes more difficult, resulting in more delay and longer vehicle queues developing on the D1021. It is anticipated that access to the N1 will become more problematic from Year 2045.

OBJECTIVE 68: Appropriate Waste Management during construction

Project component/s	Storage and handling of waste
Potential Impact	» Generation of contaminated wastes from used chemical containers » Inefficient use of resources resulting in excessive waste generation » Pollution of the surrounding environment through inappropriate waste management practices » Litter or contamination of the site or water through poor waste management practices
Activity/risk source	» Construction activities » Spoil material from excavation, earthworks and site preparation
Mitigation: Target/Objective	» To ensure that the storage and handling of waste on-site does not cause pollution to the environment or harm to persons » To minimise production of waste » To ensure appropriate waste handling, storage and disposal » To avoid environmental harm from waste disposal

Mitigation: Action/control	Responsibility	Timeframe
1. Construction Contractors must provide specific detailed waste management method statements to appropriately deal with all waste streams.	Contractor	Construction
2. An integrated waste management approach that is based on waste minimisation must be implemented. This approach must include reduction, recycling, re-use and disposal where appropriate.	Contractor	Construction
3. Soil contaminated/ polluted as a result of major spillages must be removed from the site and disposed of at a licensed hazardous waste disposal facility. Soils contaminated/ polluted through minor spills can be treated on site provided they are contained and have not penetrated the soil surface.	Contractor	Construction
4. Hazardous waste substances must not be stored where there could be accidental leakage into surface or subterranean water.	Contractor	Construction
5. Oily water from bunded areas and workshop areas (oil tanks) must be removed from site by licensed Contractors and in secure containers to avoid spills.	Contractor	Construction

Mitigation: Action/control	Responsibility	Timeframe
6. Any storage and disposal permits/approvals which may be required must be obtained, and the conditions attached to such permits and approvals must be complied with.	Contractor	Construction
7. Specific areas must be designated on-site for the temporary management of various waste streams, i.e. general refuse, construction waste (wood and metal scrap) 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	Construction
8. Storage, handling and disposal of waste must be in accordance with legislated requirements (as detailed in NEM:WA and associated Regulations and Standards)	Contractor	Construction
9. Where possible, construction and general wastes on-site must be reused or recycled. Bins and skips must be available on-site for collection, separation and storage of waste streams (such as wood, metals, general refuse etc.).	Contractor	Construction
10. Disposal of waste must be in accordance with relevant legislative requirements, including the use of licensed Contractors.	Contractor	Construction
11. Waste bins must be available and located in the area where the contract staff are working.	Contractor	Construction
12. All general waste must be kept in sealable storage containers that are animal proof, i.e. bins or skips.	Contractor	Construction
13. All general waste on site must be collected weekly (or more regularly if required) by an approved Contractor (holder of a certificate indicating where the waste will be disposed of) .	Contractor	Construction
14. No waste may be buried or burnt on site.	Contractor	Construction
15. Hydrocarbon waste must be contained and stored in sealed containers within an appropriately bunded area.	Contractor	Construction
16. Waste and surplus dangerous goods must be kept to a minimum and must be transported by approved waste transporters to sites designated for their disposal.	Contractor	Construction
17. Documentation (waste manifest) must be maintained detailing the quantity, nature and fate of any regulated waste. Waste disposal records must be available for review at any time.	Contractor	Construction
18. Dispose of all solid waste collected at an appropriately registered waste disposal site. The disposal of waste shall be in accordance with all relevant legislation. Under no circumstances may waste be burnt on site.	Contractor	Construction
19. Where a registered waste site is not available close to the construction site, provide a method statement with regard to waste management.	Contractor	Pre-construction
20. Upon the completion of construction, the area must be cleared of potentially polluting materials.	Contractor	Completion of construction
21. Corrective action must be undertaken immediately if a complaint is made, or potential/actual leak or spill of polluting/toxic substance identified. This includes stopping the	Contractor	Construction

Mitigation: Action/control	Responsibility	Timeframe
contaminant from further escaping, cleaning up the affected environment as much as practically possible and implementing preventive measures.		

Performance Indicator	» No water or soil contamination by spills » 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 storage and handling practices and vehicle maintenance throughout construction phase. » Observation and supervision of waste management practices throughout the construction phase. » Waste collection to be monitored on a regular basis. » Waste documentation completed. » A complaints register must be maintained, in which any complaints from the community will be logged. Complaints must be investigated and, if appropriate, acted upon. » An incident reporting system will be used to record non-conformances to the EMPr.

OBJECTIVE 69: Appropriate Storage and Handling of chemicals and hazardous substances during construction

Project component/s	Storage and handling of chemicals and hazardous substances
Potential Impact	» Release of contaminated water from contact with spilled chemicals » Generation of contaminated wastes from used chemical containers » Pollution of the surrounding environment through inappropriate materials management practices » Pollution of water and soil resources
Activity/risk source	» Construction activities » Hydrocarbon use and storage » Fuelling of vehicles
Mitigation: Target/Objective	» 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 contamination/pollution of the environment or harm to persons » To avoid environmental harm from materials storage

Mitigation: Action/control	Responsibility	Timeframe
1. An effective monitoring system must be implemented during the construction phase to detect any leakage or spillage of hazardous substances during their transportation, handling, use and storage.	Contractor	Construction
2. Spill kits must be made available on-site for the clean-up of spills and leaks of contaminants.	Contractor	Construction

Mitigation: Action/control	Responsibility	Timeframe
3. Corrective action must be undertaken immediately if a complaint is made, or potential/actual leak or spill of polluting/toxic 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	Construction
4. In the event of a major spill or leak of contaminants, the area must be demarcated/isolated and the relevant administering authority must be immediately notified as per the notification of emergencies/incidents.	Contractor	Construction
5. All concrete mixing on site must be conducted in a designated area on an appropriately sealed surface.	Contractor	Construction
6. Soil contaminated/ polluted as a result of a major spill must be removed from the site and disposed of at a licensed hazardous waste disposal facility. Soils contaminated/ polluted through minor spills can be treated on site provided they are contained and have not penetrated the soil surface.	Contractor	Construction
7. Routine servicing and maintenance of vehicles must take place in designated areas (except for emergency situations or large cranes which cannot be moved off-site). If repairs of vehicles must take place on site, an appropriate drip tray must be used to contain any fuel or oils.	Contractor	Construction
8. All hazardous material and chemicals on site must be stored in a clearly marked, secure area. The secure area must be designed in a way to ensure that the hazardous material and chemicals will not leak or spill and harm the environment.	Contractor	Construction
9. All stored fuels to be maintained within a bunded area and on a sealed surface, or contained in an appropriate manner as per the requirements of SABS 089:1999 Part 1.	Contractor	Construction
10. Fuel storage areas must be inspected regularly to ensure bund stability, integrity and function.	Contractor ECO	Construction
11. Hazardous substances must not be stored where there could be accidental leakage into surface or subterranean water.	Contractor	Construction
12. Construction machinery must be stored in an appropriately demarcated, secure and sealed area.	Contractor	Construction
13. Oily water from bunded areas must be removed from site by licensed Contractors and in secure containers to avoid spills.	Contractor	Construction
14. The storage of flammable and combustible liquids such as oils will be in designated areas which are appropriately bunded, and stored in compliance with MSDS files.	Contractor	Construction
15. Any storage and disposal permits/approvals which may be required must be obtained, and the conditions attached to such permits and approvals will be compiled with.	Contractor	Construction
16. Transport of all hazardous substances must be in accordance with the relevant legislation and regulations.	Contractor	Construction
17. Upon the completion of construction, the area must be cleared of potentially polluting materials.	Contractor	Completion of construction

Performance Indicator	» No chemical spills outside of designated storage areas » No water or soil contamination by spills » 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 chemical storage and handling practices and vehicle maintenance throughout construction phase. » A Complaints Register must be maintained, in which any complaints from the community will be logged. Complaints will be investigated and, if appropriate, acted upon. » Observation and supervision of waste management practices throughout construction phase. » Waste collection to be monitored on a regular basis. » Waste documentation completed. » 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 EMPr.

OBJECTIVE 70: To minimise the potential risk of increased veld fires during the construction phase

Project component/s	Construction and establishment activities associated with the establishment of power station including infrastructure.
Potential Impact	Grass fires can pose a personal safety risk to local farmers and communities, and their homes, crops, livestock and farm infrastructure, such as gates and fences.
Activity/risk source	The presence of construction workers and their activities on the site can increase the risk of grass fires.
Mitigation: Target/Objective	To avoid and or minimise the potential risk of grass fires on local communities and their livelihoods.

Mitigation: Action/control	**Responsibility**	**Timeframe**
1. Ensure that open fires on the site for cooking or heating are not allowed except in designated areas.	Project Developer and Contractors	During construction and operations
2. Provide adequate firefighting equipment onsite	Contractors	During construction and operations
3. Provide fire-fighting training to selected construction staff.	Contractors	During construction and operations
4. Compensate farmers/community members at full market related replacement cost for any losses, such as livestock, damage to infrastructure etc.	Project Developer and Contractors	During construction and operations

Performance Indicator	» Conditions contained in the Construction EMPr. » Designated areas for fires identified on site at the outset of the construction phase. » Firefighting equipment and training provided before the construction phase commences.

Monitoring	» The Project Developer and/or appointed ECO must monitor indicators listed above to ensure that they have been met for the construction phase.

7.3 Detailing Method Statements

OBJECTIVE 71: To ensure all construction activities are undertaken with the appropriate level of environmental awareness to minimise environmental risk, in line with the specifications of the EMPr

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, and how specifications within this EMPr will be met. The Contractor will be required to describe how specified requirements will be achieved through the submission of written Method Statements to the Site Manager.

A Method Statement is defined as "*a written submission by the Contractor in response to the environmental specification or a request by the Site Manager, setting out the plant, materials, labour and method the Contractor proposes using to conduct an activity, in such detail that the 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:

» Details of the responsible person(s)
» 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 Site Manager.

Method Statements must be compiled for all activities which affect any aspect of the environment and should be applied consistently to all activities. Specific areas to be addressed in the method statement: pre, during, and post, construction include:

» Site establishment (which explains all activities from induction training to offloading, construction sequence for site establishment and the different amenities and to be established etc. Including a site camp plan indicating all of these).
» Preparation of the site (i.e. clearing vegetation, compacting soils and removing existing infrastructure and waste).
» Soil management/stockpiling and erosion control.
» Excavations and backfilling procedure.
» Stipulate norms and standards for water supply and usage (i.e.: comply strictly to licence and legislation requirements and restrictions)

- Stipulate the storm water management procedures recommended in the storm water management method statement.
- Ablution facilities (placement, maintenance, management and servicing)
- Solid Waste Management:
  - Description of the waste storage facilities (on site and accumulative).
  - Placement of waste stored (on site and accumulative).
  - Management and collection of waste process.
  - Recycle, re-use and removal process and procedure.
- Liquid waste management:
  - The design, establishment, maintenance and operation of suitable pollution control facilities necessary to prevent discharge of water containing polluting matter or visible suspended materials into rivers, streams or existing drainage systems.
  - Should grey water (i.e. water from basins, showers, baths, kitchen sinks etc.) need to be disposed of, this should link into existing facilities where possible. Where no facilities are available, grey water runoff must be controlled to ensure there is no seepage into wetlands or natural watercourses.
- Dust and noise pollution
  - Describe necessary measures to ensure that noise from construction activities is maintained within lawfully acceptable levels.
  - Procedure to control dust at all times on the site, access roads, borrow pits (if applicable) and spoil sites (dust control shall be sufficient so as not to have significant impacts in terms of the biophysical and social environments). These impacts include visual pollution, decreased safety due to reduced visibility, and negative effects on human health and ecology due to dust particle accumulation.
- Hazardous substance storage (Ensure compliance with all national, regional and local legislation with regard to the storage of oils, fuels, lubricants, solvents, wood treatments, bitumen, cement, pesticides and any other harmful and hazardous substances and materials. South African National Standards (SANS) apply).
  - Lists of all potentially hazardous substances to be used.
  - Appropriate handling, storage and disposal procedures.
  - Prevention protocol of accidental contamination of soil at storage and handling areas.
  - All storage areas, (i.e.: for harmful substances storage areas must be appropriately bunded with a suitable collection point for accidental spills and drip trays underneath dispensing mechanisms including leaking engines/machinery).
- Fire prevention and management measures on site.
- Fauna and flora protection process on and off site (i.e. removal to reintroduction or replanting, if necessary).
  - Rehabilitation and re-vegetation process.
- Incident and accident reporting protocol.
- General administration
- Designate access roads and the protocol to be followed while roads are in use.
- Requirements on gate control protocols.

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

Failure to submit a Method Statement may result in suspension of the activity concerned until such time as a Method Statement has been submitted and approved. The ECO should monitor the construction activities to ensure that these are undertaken in accordance with the approved Method Statement.

7.4 Awareness and Competence: Construction Phase of the Mutsho Power Project

OBJECTIVE 72: To ensure all construction 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 EMPr. 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 construction site and the surrounding environment.
- Ensuring that a copy of the EMPr 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 EMPr and the environmental specifications as they apply to the construction of the facility.
- 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 archaeological sites/objects, paleontological sites, 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 appropriate communication tools are used to outline the environmental "do's" and "don'ts" (as per the environmental awareness training course) to employees.
- Records must be kept of those that have completed the relevant training.
- Yearly Refresher sessions must be held to ensure the Contractor's staff are aware of their environmental obligations.

7.4.1 Environmental Awareness Training

Environmental Awareness Training must take the form of an on-site talk and demonstration by the ECO before the commencement of site establishment and construction on site. The education/awareness programme should be aimed at all levels of management and construction workers within the Contractor team. A record of attendance of this training must be maintained by the ECO on site.

7.4.2 Induction Training

Environmental induction training must be presented to all persons who are to work on the site – be it for short or long durations; Contractor's or Engineer's staff; administrative or site staff; sub-contractors or visitors to site.

This induction training should include discussing the Developer's environmental policy and values, the function of the EMPr and Contract Specifications, and the importance and reasons for compliance to these. The induction training must highlight overall do's and don'ts on site and clarify the repercussions of not complying with these. The non-conformance reporting system must be explained during the induction as well. Opportunity for questions and clarifications must form part of this training. A record of attendance of this training must be maintained by the Contractors representative on site.

7.4.3 Toolbox Talks

Toolbox talks should be held on a scheduled and regular basis (at least twice a month) where foremen, environmental and safety representatives of different components of the Works, and sub-consultants hold talks relating to environmental practices and safety awareness on site. These talks should also include discussions on possible common incidents occurring on site and the prevention of reoccurrence thereof. Records of attendance and the awareness talk subject must be kept on file.

7.5 Monitoring Programme: Construction Phase of the Mutsho Power Project

OBJECTIVE 73: 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 EMPr, but also to monitor any environmental issues and impacts which have not been accounted for in the EMPr that are, or could result in significant environmental impacts for which corrective action is required. The period and frequency of monitoring will be stipulated by the Environmental Authorisation (once issued). Where this is not clearly dictated, the Project Developer will determine and stipulate the period and frequency of monitoring required in consultation with relevant stakeholders and authorities. The Project Manager will ensure that the monitoring is conducted and reported.

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 ECO will ensure compliance with the EMPr, and to conduct monitoring activities. The ECO must have the appropriate experience and qualifications to undertake the necessary tasks. The ECO will report any non-compliance or where corrective action is necessary to the Site Manager and/or any other monitoring body stipulated by the regulating authorities.

The ECO will ensure compliance with the environmental authorisation (EA), EMPr, relevant permits and licences and the environmental legislation during construction, and will conduct monitoring activities on a regular basis. An independent ECO must be appointed, and must have the appropriate experience and qualifications to undertake the necessary tasks. The ECO will report any non-compliance or where corrective action is necessary to the Site Manager, DEA and/or any other monitoring body stipulated by the regulating authorities.

7.5.1 Non-Conformance Reports

All supervisory staff including Foremen, Resident Engineers, and the ECO must be provided the means to be able to submit non-conformance reports to the Site Manager. Non-conformance reports will describe, in detail, the cause, nature and effects of any environmental non-conformance by the Contractor. Records of penalties imposed may be required by the relevant authority within 48 (forty eight) hours.

The non-conformance report will be updated on completion of the corrective measures indicated on the finding sheet. The report must indicate that the remediation measures have been implemented timeously and that the non-conformance can be closed-out to the satisfaction of the Site Manager and ECO.

7.5.2 Monitoring Reports

A monitoring report will be compiled by the ECO on a monthly basis and must be submitted to DEA for their records. This report should include details of the activities undertaken in the reporting period, any non-conformances or incidents recorded, corrective action required, and details of those non-conformances or incidents which have been closed out. Records relating to monitoring must be kept on site and made available for inspection to any relevant and competent authority in respect of this development.

7.5.3 Final Audit Report

A final environmental audit report must be compiled by an independent auditor and be submitted to DEA upon completion of the construction and rehabilitation activities (within 30 days of completion of the construction phase (i.e.: within 30 days of site handover) and within 30 days of completion of rehabilitation activities. This report must indicate the date of the audit, the name of the auditor and the outcome of the audit in terms of compliance with the environmental authorisation conditions and the requirements of the EMPr. Records relating to audits must be kept on site and made available for inspection to any relevant and competent authority in respect of this development.

CHAPTER 8 MANAGEMENT PROGRAMME: REHABILITATION OF DISTURBED AREAS

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.

8.2 Objectives

In order to meet this goal, the following objective, actions and monitoring requirements are relevant:

OBJECTIVE 74: Appropriate 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 regular maintenance operations. Rehabilitation should be undertaken in an area as soon as possible after the completion of construction activities within that area. This is therefore an on-going activity and may commence while construction is still underway in other areas.

Project component/s	» Power Station » Lay down areas » Substation site » Access roads not required for operation and maintenance
Potential Impact	» Environmental integrity of site undermined resulting in reduced visual aesthetics, erosion, compromised land capability and the requirement for on-going management intervention
Activity/risk source	» Temporary laydown areas » 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
1. All temporary facilities, equipment and waste materials must be removed from site as soon as practically possible after construction is complete.	Contractor	Following execution of the works
2. All temporary fencing and danger tape must be removed once the construction phase has been completed.	Contractor	Following completion of construction

Mitigation: Action/control	Responsibility	Timeframe
		activities in an area
3. Necessary anti-erosion measures must be installed, where required, to minimise loss of topsoil and control erosion.	Contractor	Following completion of construction activities in an area
4. Disturbed areas must be rehabilitated/re-vegetated with appropriate natural vegetation and/or local seed mix. Re-use of native/indigenous plant species that were removed from disturbance areas in the rehabilitation phase.	Contractor in consultation with specialist/ suitable qualified person	Following completion of construction activities in an area
5. Re-vegetated areas may have to be protected from wind erosion and maintained until an acceptable plant cover has been achieved.	Contractor in consultation with a specialist/ suitable qualified person	Pre and Post-rehabilitation
6. All open spaces created through the construction process must be re-vegetated and rehabilitated in a manner recommended by the Rehabilitation Plan developed in the pre-construction phase.	Contractor in consultation with rehabilitation specialist	Pre and Post-rehabilitation
7. Any stockpiles should be re-vegetated to stabilise the soil, reduce run-off, and minimise erosion.	Contractor	Following completion of construction activities in an area

Performance Indicator	» All portions of site, including construction equipment camp and working areas, cleared of equipment and temporary facilities » Topsoil replaced on all areas and stabilised » Disturbed areas rehabilitated and acceptable plant cover achieved on rehabilitated sites » Completed site free of erosion and alien invasive plants
Monitoring	» On-going inspection of rehabilitated areas in order to determine effectiveness of rehabilitation measures implemented

CHAPTER 9 MANAGEMENT PROGRAMME: OPERATIONS

9.1 Overall Goal for Operation

Overall Goal for Operation: To ensure that the operation of the Mutsho Power Project and associated infrastructure 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 power station in a way that:

» Ensures that operation activities are properly managed in respect of environmental aspects and impacts.
» Enables the operation activities to be undertaken without significant disruption to other land uses in the area, in particular with regard to noise impacts, farming practices, traffic and road use, and effects on local residents.

9.2 Objectives

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

OBJECTIVE 75: Prevention of any further impact on flora, fauna and ecosystems

Project component/s	Operation of all infrastructure including: » Power station » Access roads » Substation » Ash dump
Potential Impact	Ecosystem break down and loss of biodiversity
Activity/Risk Source	» Operation of the power plant and associated infrastructure » Movement of employee vehicles within and around site.
Mitigation: Target/Objective	» To maintain minimised footprints of disturbance of vegetation/habitats on-site. » To ensure and encourage plant regrowth in non-operational areas of post-construction rehabilitation.

Mitigation: Action/control	Responsibility	Timeframe
1. Restrict maintenance activities to footprint of infrastructure associated with the power station.	Operation and Maintenance Contractor (O&M) and The Project Developer	Operation
2. Implement a Biodiversity Monitoring Programme for all components of the project.	The Project Developer and O&M Contractor	Operation
3. Implement an Air Quality Management Plan, including a Dust Management Programme and Emissions Control and Reduction Strategy.	The Project Developer and O&M Contractor	Operation

Mitigation: Action/control	Responsibility	Timeframe
4. Implement an appropriate Alien And Invasive Management Programme for all components of the project	The Project Developer and O&M Contractor	Operation
5. Implement an Integrated Water Resource Management Plan (IWRMP).	The Project Developer and O&M Contractor	Operation
6. Implement a Water Demand and Conservation Plan for the power station operation.	The Project Developer	Operation
7. Implement surface and groundwater monitoring programmes to monitor impacts on water quality.	The Project Developer and O&M Contractor	Operation
8. Implement a Zero Liquid Effluent Discharge (ZLED) policy for the power station.	The Project Developer and O&M Contractor	Operation
9. Independent environmental audits to be conducted during the operational phase at least once annually, or at a monitoring frequency to be determined by the DEA.	Independent environmental auditor	Operation Recommend bi-annual audits for first two years and then annually thereafter

Performance Indicator	» All plans are appropriately implemented. » Impacts on surrounding environment is minimised as far as possible.
Monitoring	» The Environmental Manager will keep records of the impacts and mitigation measures implemented during the operational phase. » Independent environmental auditing during the operational phase.

OBJECTIVE 76: Minimise emissions of particulates and SO_2 from the boiler stack

Project component/s	» Power generation – boiler stack
Potential Impact	» Developed and/or enhanced skills base of the local labour
Activities/risk sources	» Operations activities » Maintenance of boiler stack emission control technologies, i.e. Cottrell ESP and flue gas desulphurisation (FGD)
Mitigation: Target/Objective	» Limit the spatial extent and magnitude of ambient concentrations on SO_2 and PM_{10}

Mitigation: Action/control	Responsibility	Timeframe
1. Develop and implement maintenance plan for ESP and FGD	O&M Contractor	Ongoing during the operation phase
2. Conduct routine stack emission testing to ensure design performance is maintained and compliance with minimum emission standards	O&M Contractor	Annually during the operation phase
3. Register and report emissions according to requirements of the emission reporting regulations	O&M Contractor	As required by the emission reporting regulations

Performance Indicator	» Emissions do not exceed minimum emission standards » Emissions do not result in adaverse impacts to human health

Monitoring	» Ongoing monitoring and reporting

OBJECTIVE 77: Reduce the emission of dust during operations

Project component/s	» Coal storage and handling, ash disposal and unpaved site roads
Potential Impact	» Generation of dust during operations
Activities/risk sources	» Coal storage and handling, ash disposal and unpaved site roads
Mitigation: Target/Objective	» Limit the spatial extent and magnitude of particulate impacts » Reduce dust emissions through the implementation of a fugitive dust management plan (FDMP)

Mitigation: Action/control	Responsibility	Timeframe
1. Develop and implement a FDMP for the Mutsho site to address dust from coal storage and handling, ash disposal and unpaved site roads.	O&M Contractor	Ongoing during operations
2. Establish and operate a dust fallout monitoring network in terms of the dust control regulations	O&M Contractor	Annually during operations
3. Impose on-site speed restrictions	Contractor	On-going for the duration of construction and decommissioning

Performance Indicator	» Dust does not result in nuisance impacts on surrounding landowners and users. » Dust fallout does not exceed minimum emission standards » No complaints are received or grievances raised relating to dust generation
Monitoring	» Ongoing monitoring and reporting

OBJECTIVE 78: Prevent / limit impacts on water and habitat quality

Project component/s	» Site clearing, stripping of topsoil, conducting earthworks / terracing, and excavation for foundations etc.
Potential Impact	» Runoff containing pollutants and solid waste entering the surrounding watercourses cause deterioration in water and habitat quality
Activities/risk sources	» Waste generation/disposal and working with hazardous products
Mitigation: Target/Objective	» No significant impacts on water resources.

Mitigation: Action/control	Responsibility	Timeframe
1. Ensure correct waste management (including domestic refuse, sewage, spillages, etc.);	Environmental Officer	Throughout the operation from Construction to Post-Closure phase.
2. Ensure correct storage systems are used for the storage of hazardous products when constructing.	Environmental Officer	Throughout the operation from

Mitigation: Action/control	Responsibility	Timeframe
		Construction to Post-Closure phase.

Performance Indicator	» No evidence of litter within the study area. » No spillage incidents leading to contamination of surrounding watercourses.
Monitoring	» Monthly checks should be conducted to ensure mitigation measures are in place and the effectiveness will be verified through assessing the performance indicators

OBJECTIVE 79: Prevent / limit groundwater contamination

Project component/s	» Disposal of ash on to ash dump and storage of coal onto coal stockpile
Potential Impact	» Groundwater contamination
Activities/risk sources	» Disposal of ash and stockpiling of coal.
Mitigation: Target/Objective	» No contamination of groundwater resources

Mitigation: Action/control	Responsibility	Timeframe
1. Coal compaction prior deposition onto the coal stockpile.	Environmental Officer, Develop / Contractor	Throughout the duration of the project life
2. Should an impact be detected through monitoring, affected receptors should be compensated.	Environmental Officer, Develop / Contractor	Throughout the duration of the project life
3. Monitoring for surface and groundwater resources.	Environmental Officer, Develop / Contractor	Throughout the duration of the project life
4. Instillation of a liner system.	Environmental Officer, Develop / Contractor	Throughout the duration of the project life

Performance Indicator	» Ensure the implementation of an appropriately designed liner at the ash dump and coal stockpile, and dry ash deposition
Monitoring	» Daily checks should be conducted to ensure mitigation measures are in place and the effectiveness will be verified through assessing the performance indicators

OBJECTIVE 80: Prevent / limit surface water contamination

Project component/s	» Storage of fuel and lubricants, storage of coal, operation of pollution control dam and storm water management systems, ash disposal, generation and removal of domestic and hazardous waste, operational use of ash dump, pipeline transportation of sewage and water.
Potential Impact	» Surface water contamination
Activities/risk sources	» Water contamination due to dirty water runoff reporting into the surrounding streams

Mitigation: Target/Objective	» No contamination of surface water resources

Mitigation: Action/control	Responsibility	Timeframe
1. Containment of dirty water runoff via the storm water channels into the runoff/storm water dams for re-use.	Environmental Officer, Develop / Contractor	Throughout the duration of the project life
2. Should the contained water be more than the water use requirement, BPGs advise that the water be recycled or as the last resort be treated to acceptable levels and discharged either to the natural environment or be supplied to other industries as a lower grade of water.	Environmental Officer, Develop / Contractor	Throughout the duration of the project life
3. Clean water emanating from upstream of the project area must be diverted away to the nearby natural environment.	Environmental Officer, Develop / Contractor	Throughout the duration of the project life

Performance Indicator	» No signs of spillages on site » No signs of erosion on site » Maintenance of vehicles and machinery on a regular basis » Spillage kits put in place
Monitoring	» Frequent checks (e.g. weekly) should be conducted to ensure mitigation measures are in place and the effectiveness will be verified through assessing the performance indicators

OBJECTIVE 81: Prevent / limit contamination of downstream watercourses

Project component/s	» Storage of fuel and lubricants, storage of coal, operation of pollution control dam and storm water management systems, ash disposal, generation and removal of domestic and hazardous waste, operational use of ash dump, pipeline transportation of sewage and water.
Potential Impact	» Contamination of downstream watercourses through seepage from ash dump and ash runoff dam
Activities/risk sources	» Day to day operation of the power station, including ash disposal and storm water management
Mitigation: Target/Objective	» No contamination of downstream water courses

Mitigation: Action/control	Responsibility	Timeframe
1. Ash should be conveyed directly to the ash dump, compacted, shaped and rehabilitated to prevent any potential contamination.	Environmental Officer	Throughout the operation phase to post-closure
2. Ash dump and ash-runoff dam should be lined with impermeable liners to prevent potential seepage into downstream watercourses.	Environmental Officer	Throughout the operation phase to post-closure
3. Separate clean and dirty water systems should be engineered to discharge into streams and a proposed PCD, respectively.	Environmental Officer	Throughout the operation phase to post-closure

Mitigation: Action/control	Responsibility	Timeframe
4. PCD should be over-engineered to include impermeable liner to prevent any potential seepage.	Environmental Officer	Throughout the operation phase to post-closure
5. Water within the PCD should be utilized within the operational area to facilitate the evaporation of the accumulated dirty water (e.g. dust suppression activities).	Environmental Officer	Throughout the operation phase to post-closure

Performance Indicator	» No accumulated ponds / pools of water are present on-site.
Monitoring	» Frequent checks (e.g. weekly / monthly) should be conducted to ensure mitigation measures are in place and the effectiveness will be verified through assessing the performance indicators

OBJECTIVE 82: Manage air emissions

Project component/s	» Ash dumps » Coal stock piles » Emissions from power station
Potential Impact	» Air pollution » Human health impacts
Activities/risk sources	» Power station operation » Ash management » Coal stock pile operations
Mitigation: Target/Objective	» Minimise air emissions

Mitigation: Action/control	Responsibility	Timeframe
1. Obtain Atmospheric Emissions Licence (AEL) prior to commencement of operation	Project Developer	Prior to operation
2. Comply with the conditions of the AEL throughout operational phase.	Project Developer	Operation
3. Implement a dust mitigation plan and undertake regular dust monitoring.	Project Developer	Operation
4. Implement an Emission Control and Reduction Strategy that aims to ensuring that the contribution to ambient concentrations is minimised.	Project Developer	Operation
5. Conduct air emissions monitoring	A suitably qualified person appointed by The Project Developer and O&M Contractor	Frequency to be determined by AEL
6. The sidewalls of the ash dump should be vegetated as they rise, and the vegetation cover should be maintained to reduce the exposed area and limit wind entrainment.	Project Developer	Operation
7. The top of the ash dump must be kept moist to bind the surface dust and prevent wind entrainment of dust.	Project Developer and O&M Contractor	Operation

Mitigation: Action/control	Responsibility	Timeframe
8. Roads should be tarred or traffic control measures implemented to limit vehicle-entrained dust from unpaved roads e.g. by limiting vehicle speeds and by restricting traffic volumes. Unpaved road surfaces should be sprayed with a surfactant to ensure high moisture content which will bind the silt.	Project Developer and O&M Contractor	Operation

Performance Indicator	Compliance with the conditions of the Atmospheric Emission's Licence (AEL).
Monitoring	» Emissions monitoring reports » Dust monitoring reports » Annual independent environmental auditing

OBJECTIVE 83: Control noise from the power station plant

Project component/s	» Cooling fans » Heavy machinery » Heavy vehicles and trucks » Operational staff
Potential Impact	» Noise and disturbances
Activities/risk sources	» Operation of the power station 24 hours a day
Mitigation: Target/Objective	» Ensure that the change in ambient sound/rating levels as experienced by receptors is less than 5dBA » Prevent the generation of nuisance noises » Ensure acceptable noise levels at surrounding stakeholders and receptors.

Mitigation: Action/control	Responsibility	Timeframe
1. Should any valid noise complaints be registered relating to the operation of the power station noise measurements should be conducted as recommended by an acoustical consultant.	Acoustical Consultant / suitably qualified person appointed by the Project Developer	As and when required during operation
2. If noise measurements are conducted annual feedback should be presented to all stakeholders and other Interested and Affected Parties (I&APs) in the area.	Acoustical Consultant / suitably qualified person appointed by the Project Developer	As and when required during operation
3. The findings of the noise report should also be made available to all potentially noise-sensitive developments in the area with the contents explained to them to ensure that they understand all the potential risks that the development may have on them and their families.	Acoustical Consultant / suitably qualified person appointed by the Project Developer	As and when required during operation
4. Continued noise monitoring at the dwellings of receptors staying closer than 1 500m (the number of NSD will depend on the final layout selected) from the power station. This could include NSDs 2, 3, 4, 5, 8 and 10 (if dwelling is occupied). Monitoring should continue as per the recommendation of the acoustic consultant doing the measurements.	Acoustical Consultant / suitably qualified person appointed by the Project Developer	As and when required during operation

Performance Indicator	» No noise complaints from the public or adjacent landowners » Ensure that maximum noise levels at potentially sensitive receptors are less than 42dBA
Monitoring	» Environmental manager/ Power Station to maintain a complaints register » Noise monitoring at the dwellings of receptors staying closer than 1 500m

OBJECTIVE 84: Traffic management during operation

Project component/s	» Vehicles » Operation Staff » Trucks and heavy vehicles / abnormal loads transporting limestone and other goods
Potential Impact	» Traffic congestion » Risk of accidents » Deterioration of road pavement conditions (both surfaced and gravel road) due to abnormal loads
Activity/risk source	» Transportation of limestone to the site via road » Daily commuting of operational staff to the power station
Mitigation: Target/Objective	» To minimise impact of traffic associated with the operation of the power station . » To minimise potential for negative interaction between pedestrians or sensitive users and traffic associated with the power station.

Mitigation: Action/control	Responsibility	Timeframe
1. All relevant permits for abnormal loads must be applied for from the relevant authority as required.	Contractors	As and when required
2. Designated accesses to the proposed site must be created to ensure safe entry and exit.	Project Developer and O&M Contractor	Operation
3. Appropriate road management strategies must be implemented on internal roads with all employees and Contractors required to abide by standard road and safety procedures.	Project Developer and O&M Contractor	Operation
4. Any traffic delays as a result of the power station operation must be co-ordinated with the appropriate authorities.	Project Developer and O&M Contractor	Operation
5. Appropriate road signage must be established at and road markings appropriate points warning of turning traffic and the power station site entrance (all signage to be in accordance with prescribed standards and must be appropriately maintained throughout the operational phase).	Project Developer and O&M Contractor	Operation

Performance Indicator	» No traffic incidents involving the power station vehicles. » Appropriate signage in place » No complaints resulting from traffic congestion, delays or driver negligence associated with power station.
Monitoring	» Visual monitoring of dust produced by traffic movement » Visual monitoring of traffic control measures to ensure they are effective » 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

OBJECTIVE 85: Limit the visual impact of the project

Project component/s	» Industrial Structures including the stacks, power generation units and conveyors
Potential Impact	» Further industrialisation of the landscape as viewed by sensitive receptors.
Activities/risk sources	» The nature of these elements will contrast with rural characteristics and will be highly obvious as new industrial development.
Mitigation: Target/Objective	» Reinstate any areas of vegetation that have been disturbed during construction. » Monitor rehabilitated areas post-decommissioning and implement remedial actions (monthly until establishment , thereafter at the middle and end of every growing season). » Minimise disturbance and maintain existing vegetation as far as is possible both within and surrounding the development area. » Deposit ash on the ash dump from north to south and rehabilitate the northern face of the dump at the earliest opportunity.

Mitigation: Action/control	Responsibility	Timeframe
1. Plan to deposit ash on the ash dump from north to south and rehabilitate the northern face of the ash dump at the earliest opportunity.	Developer / Contractor	Planning, Operation phases
2. Plan and implement lighting to minimise visible light at night.	Developer / Contractor	Planning. Construction, Operation phases
3. Undertake screen planting particularly between the substation and the Mopane / Waterpoort Road	Developer / Contractor / ECO / ELO	Operation phase
4. Manage vegetation buffers during the operational period to ensure their effectiveness in screening the development from surrounding areas.	Developer / ECO / ELO	Operation phase
5. Remove structures and rehabilitate site to natural state on decommissioning.	Developer / ECO / ELO	Operation, Decomissioning phase
6. Monitor rehabilitated areas post-construction and post-decommissioning and implement remedial actions.	Contractor / ECO / ELO	Operation, Decomissionin phase

Performance Indicator	» Vegetation presence and density. » Presence of unnecessary infrastructure. » Visibility of the power station.
Monitoring	» Evaluate the effectiveness of colours and surface finishes to visually recede from selected viewpoints in the Upland LCA. It should be possible to compare results with other existing power stations. » Evaluate health and effectiveness of vegetation to provide necessary screening before, during and after construction and annually thereafter. » Evaluate vegetation growth and reinstatement during decommissioning and for five years thereafter. » Take regular time-line photographic evidence (Responsibility: ECO and ELO).

	» Prepare regular reports.

OBJECTIVE 86: Limit the visual impact of the ash dump

Project component/s	» Ash dump
Potential Impact	» Further industrialisation of the landscape as viewed by sensitive receptors.
Activities/risk sources	» This element has the potential to contrast with the natural landform and colours / texture of the surrounding landscape which will exacerbate impacts. » There is also potential for dust rising from the facility to draw attention to it.
Mitigation: Target/Objective	» Design the ash dump to blend as best as possible with the surrounding natural landform. » Minimise and reinstate vegetation loss from surrounding areas during construction. » Undertake effective dust control at the ashing facility during the operational phase. » Rehabilitate the ashing facility on a progressive basis during the operational phase and decommissioning. Deposit ash from north to south in order to help provide a screen when the development is viewed from the north

Mitigation: Action/control	Responsibility	Timeframe
1. Minimise and reinstate surrounding vegetation loss.	Developer / Contractor	Planning, Construction, Operation phases
2. Undertake effective dust control at the ashing facility during the operational phase.	Developer / ECO / ELO	Operation phase
3. Rehabilitate the ashing facility on a progressive basis during the operational phase and decommissioning.	Developer / ECO / ELO	Operation phase
4. Monitor rehabilitated areas post-construction and post-decommissioning and implement remedial actions.	ECO / ELO	Operation, Decommissioning phase

Performance Indicator	» Natural appearance of the landform created by the ashing facility. » Vegetation cover on the ashing facility. » Ashing facility part screening development when viewed from the north. » Dust rising from the ashing facility.
Monitoring	» Evaluate vegetation growth and reinstatement during decommissioning and for five years thereafter. » Take regular time-line photographic evidence. » Responsibility: ECO and ELO. » Prepare regular reports.

OBJECTIVE 87: Maximise production, employment and local community benefits in the local economy during operations

Project component/s	» Operation and maintenance activities of the power station

Potential Impact	» Increased local economic activity and employment
Activities/risk sources	» Labour and procurement practices employed during operations
Mitigation: Target/Objective	» Maximise the production, and local community employment benefits in the local economy

Mitigation: Action/control	Responsibility	Timeframe
1. The operator of the power station should be encouraged to procure materials, goods and services required for the operation of the facility from local suppliers to increase the positive impact in the local economy as far as possible	Project Developer	Operation
2. Where possible, the local labour should be considered for employment to increase the positive impact on the local economy	Project Developer	Operation

Performance Indicator	» Number of contracts and percentage of contract values allocated to local SMMEs » Percentage of workers that are employed from local communities
Monitoring	» Checklists and annual reports inclusive of other performance assessments

OBJECTIVE 88: Contribute to skills development in the area during operations

Project component/s	» Operation and maintenance activities of the power station
Potential Impact	» Developed and/or enhanced skills base of the local labour
Activities/risk sources	» Operations and maintenance
Mitigation: Target/Objective	» Contribute to development of skills required to operate and maintain the Mutsho Power Project

Mitigation: Action/control	Responsibility	Timeframe
1. Provide learnerships and on-job training for the local employees	Project Developer	Pre-operation and operation

Performance Indicator	» Number of people enrolled in learnership programmes » Number of hours spent on on-job training
Monitoring	» Annual reports inclusive of other performance assessments

OBJECTIVE 89: Limit / reduce traffic related impacts

Project component/s	» Section of N1 between Makhado and Musina. » Section of D777 between N1 and D744 near Mopane. » Section of gravel road D777 (between D744 and D1021). » Gravel road D1021 (complete road from N1 to D777).
Potential Impact	» Vehicles travelling on gravel roads (D1021 and D777) will result in dust carrying onto nearby farms, reduced sight distance for drivers and pedestrians, deterioration of gravel roads and increased risk of collision. » Increased risk of collision with pedestrians and cattle in Mopane.

	» Increased risk of accidents on the N1 with increase in vehicle numbers. » Poor level of service on D1021 approach to the N1, expected from around Year 2045 depending on rate of increase in traffic volumes on the N1. » Increased number of heavy vehicles on the N1 would impact on the road pavement, requiring more regular maintenance.
Activity/risk source	» Transportation of raw materials to site » Vehicles utilising public roads » Increased number of vehicles (light and heavy) on N1 and D777, D744 and D1021.
Mitigation: Target/Objective	» Reduce traffic impact by ensuring safe traffic flow and reducing the likelihood of crashes.

Mitigation: Action/control	**Responsibility**	**Timeframe**
1. Reassess Level of Service (LOS) on D1021 approach to N1 in year 2045 (or sooner if deemed necessary) and upgrade the priority controlled intersection to a traffic roundabout when required.	Developer / Contractor	In Year 2045 or sooner if required.
2. Construct a rail line and siding to transport coal and limestone by rail to the Power Plant for the Operational Period.	Developer / Contractor	During the Operations Phase and will become more required as traffic volumes increase on the N1.
3. Ensure vehicles are in a roadworthy condition.	Vehicle operator and Provincial Traffic Law Enforcement.	Duration of the project life cycle

Performance Indicator	» No traffic incidents involving the power station vehicles. » Appropriate signage in place » No complaints resulting from traffic congestion, delays or driver negligence associated with construction of the power station. » Level of Service (LOS) on D1021 approach to the N1.
Monitoring	» Visual monitoring of dust produced by traffic movement » Visual monitoring of traffic control measures to ensure they are effective » A complaints register must be maintained, in which any complaints from the community must be logged. Complaints must be investigated and, if appropriate, acted upon » An incident reporting system to be used to record non-conformances to the EMPr. » Monitor vehicle queues on the D1021 approach to the N1 and assess LOS when access to the N1 becomes more difficult, resulting in more delay and longer vehicle queues developing on the D1021. It is anticipated that access to the N1 will become more problematic from Year 2045.

CHAPTER 10 MANAGEMENT PROGRAMME: DECOMMISSIONING

The lifespan of the proposed coal-fired power station is 30 years with the opportunity for extension. Equipment associated with this facility would only be decommissioned once it has reached the end of its economic life. It is most likely that decommissioning activities of the infrastructure of the facility discussed in this EIA would comprise the disassembly and disposal of the infrastructure. Decommissioning activities will involve disassembly of the production units and ancillary infrastructure, demolishing of buildings, removal of hazardous waste and rehabilitation of the ash dump and project site. The decommissioning activities would need to comply with the legislation relevant at the time.

Should the activity ever cease or become redundant, the Project Developer shall undertake the required actions as prescribed by legislation at the time and comply with all relevant legal requirements administered by any relevant and competent authority at that time.

10.1 Overall Goal for Decommissioning

Overall Goal for Decommissioning: Undertake the decommissioning phase of the Mutsho Power Project and associated infrastructure in a way that:

» Ensures that decommissioning activities are properly managed in respect of environmental aspects and impacts.
» Enables the decommissioning activities to be undertaken without significant disruption to other land uses in the area.
» Minimises the impact on the environment to be affected by decommissioning activities.

10.2 Objectives

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

OBJECTIVE 90: To avoid and or minimise the potential impacts associated with the decommissioning phase

Project component/s	» Decommissioning of the power station and associated infrastructure.
Potential Impact	» Decommissioning will result in job losses, which in turn can result in a number of social impacts. » Decommissioning is also similar to the construction phase in that it will also create temporary employment opportunities. » Decommissioning can cause environmental impacts.
Activity/risk source	» Decommissioning of the power station and associated infrastructure.
Mitigation: Target/Objective	» To avoid and or minimise the potential social and environmental impacts associated with decommissioning of the power station.

Mitigation: Action/control	Responsibility	Timeframe
1. Retrenchments should comply with South African labour legislation of the day	Project Developer and O&M Contractor	Decommissioning.
2. Rehabilitation to be undertaken in terms of specifications outlined in the Rehabilitation Section of this EMPr (refer to **Chapter 8**) as well as in terms of any specific requirements applicable at the time.	Project Developer and O&M Contractor	Decommissioning.
3. Once the facility has exhausted its life span, the main facility and all associated infrastructure not required for the post rehabilitation use of the site should be removed and all disturbed areas appropriately rehabilitated. An ecologist should be consulted to give input into rehabilitation specifications.	Project Developer and O&M Contractor	Decommissioning.
4. All rehabilitated areas should be monitored for at least a year following decommissioning, and remedial actions implemented as and when required.	Project Developer/O&M Contractor	Decommissioning.
5. Rehabilitation of the site should start immediately after decommissioning is completed.	Project Developer/O&M Contractor	Decommissioning.
6. All excavations must be rehabilitated with soil and topsoil, which should not contain invasive plant species	Project Developer/O&M Contractor	Decommissioning.
7. Re-vegetation specifications to be developed.	Project Developer/O&M Contractor	Decommissioning.
8. All building materials must be removed from the site. All compacted surfaces must be ripped and re-vegetated as per the re-vegetation specifications.	Project Developer/O&M Contractor	Decommissioning.
9. Rehabilitation to be conducted in a progressive manner (i.e. once decommissioning in an area has been completed the area will be rehabilitated). The rehabilitation of the area with indigenous vegetation must coincide with the rainfall events and all alien invasive vegetation shall be removed.	Project Developer/appointed Contractor	Decommissioning.
10. Rehabilitation measures for the site are to include the following: » Re-contouring ∗ Subsoil stockpiles should be used to re-contour construction affected areas. The Contractor shall restore the profile, soil condition and landform to as close as possible state to the pre-construction state. » Scarification and ripping ∗ All areas where rehabilitation interventions are required shall be cross-ripped before topsoil placement. Topsoil and fertile soil shall be uniformly scarified to allow for vegetation growth » Fertilising ∗ The Contractor shall be required to perform soil analysis tests on the top 75mm of prepared surface prior to re-vegetation/seeding to determine the required fertiliser levels for permanent cover. » Seed acquisition	Project Developer/ appointed Contractor	Decommissioning.

Mitigation: Action/control	Responsibility	Timeframe
* The Contractor shall purchase seed from a South African National Seed Organisation (SANSOR) accredited dealer.		
11. Schedule works for placing of topsoil once all infrastructure has been successfully decommissioned. Seeding can then take place after the first rains of the season and should be concluded by one month before the end of the growing season.	Project Developer/ appointed Contractor	Decommissioning.
12. The seed mix for use in rehabilitation must be an approved mix of indigenous grass species common to the area.	Project Developer/ appointed Contractor	Decommissioning.
13. Maintain rehabilitated areas free of weeds and invader plants until the end of the Defects Notification Period applicable to rehabilitation. Control of weeds and invader plants must be done in accordance with the specifications stipulated in the CARA.	Project Developer/ appointed Contractor	Decommissioning.
14. Implement appropriate measures to erosion in areas impacted upon by their activities. All erosion repairs must be implemented at the first signs thereof and no erosion shall be allowed to develop on a large scale.	Project Developer/ appointed Contractor	Decommissioning.
15. All recyclable rubble and solid waste (e.g. scrap metal, cables, bottles, cans, and plastic residues) shall be collected and disposed of through a registered recycling company. Waste manifests will be kept by the Contractor and shown to the ECO on request.	Project Developer/ appointed Contractor	Decommissioning.
16. All non-recyclable rubble and solid waste shall be collected and disposed of at an approved waste disposal site. Waste manifests will be shown to the ECO on request.	Project Developer/ appointed Contractor	Decommissioning.
17. The constructed dirty water channels will have to remain until post closure to ensure that dirty water is captured and contained during removal of infrastructures.	Project Developer/ appointed Contractor	Post-Decommissioning
18. Rain water seeping through the ash dump can dissolve contaminants and pollute the groundwater. Although the rain water infiltration rate can be minimised by the application of a liner and rehabilitation of the ash dump, the amount of salt load reaching the groundwater could be significant over many years. » Continuous post-closure monitoring is required to ensure that no drastic water quality changes are recorded. » The monitoring should continue until such time that a steady state water quality is achieved. » The numerical model needs to be updated and should be calibrated with the recorded monitoring data. » Once the model is calibrated, it should be used to predict the shape and size of contamination plume up to 100 years after closure.	Project Developer/ appointed Contractor	Post-Decommissioning
19. Prepare a Rehabilitation Close-Out Report	Project Developer/ appointed Contractor	Post-Decommissioning

Performance Indicator	» South African Labour legislation at the relevant time » Successful re-vegetation and rehabilitation of the site
Monitoring	» Rehabilitation undertaken in accordance with the EMPr » Monitoring of Rehabilitation by ECO and Rehabilitation Close-Out Report

OBJECTIVE 91: Reduce dust generation

Project component/s	» Decomissioning activities
Potential Impact	» Generation of dust which could result in a nuisance impact
Activities/risk sources	» Unpaved site roads and vehicle movement
Mitigation: Target/Objective	» Limit the spatial extent and magnitude of nuisance dust impacts

Mitigation: Action/control	Responsibility	Timeframe
1. Water / dampen site access roads.	Contractor	Twice daily for the duration of construction and decommissioning
2. Restrict vehicle access to the site.	Contractor	Ongoing for the duration of construction and decommissioning
3. Impose on-site speed restrictions	Contractor	Ongoing for the duration of construction and decommissioning

Performance Indicator	» Dust does not result in nuisance impacts on surrounding landowners and users. » Dust fallout does not exceed minimum emission standards » No complaints are received or grievances raised relating to dust generation
Monitoring	» Ongoing monitoring and reporting

OBJECTIVE 92: Prevent / limit siltation of natural resources

Project component/s	» Decommissioning activities (demolition of power plant, rehabilitation of an area, generation and disposal of demolition waste and rehabilitation of access roads)
Potential Impact	» Siltation and contamination of natural water resources
Activities/risk sources	» Decommissioning and closure activities
Mitigation: Target/Objective	» No siltation of natural water resources

Mitigation: Action/control	Responsibility	Timeframe
1. Use of accredited contractors for removal or demolition of infrastructures.	Environmental Officer, Develop / Contractor	Throughout the duration of

Mitigation: Action/control	Responsibility	Timeframe
		decommissioning and closure phase
2. Re-vegetation of the rehabilitated area to ensure good drainage surface profile.	Environmental Officer, Develop / Contractor	Throughout the duration of decommissioning and closure phase
3. The constructed dirty water channels will have to remain until post closure. This will ensure that dirty water is captured and contained during removal of infrastructures.	Environmental Officer, Develop / Contractor	Throughout the duration of decommissioning and closure phase

Performance Indicator	» Decommissioning activities occurring within the project footprint only » No signs of erosion on site » No signs of dust emanating from site.
Monitoring	» Frequent checks (e.g. weekly) should be conducted to ensure mitigation measures are in place and the effectiveness will be verified through assessing the performance indicators

OBJECTIVE 93: Prevent / limit groundwater contamination post-closure

Project component/s	» Presence of ash dump (decommissioning and post-closure)
Potential Impact	» Groundwater contamination post closure
Activities/risk sources	» Rain water seeping through the ash dump is expected to dissolve contaminants and that would pollute the groundwater. The risk of leachate generation and its threat to the groundwater environment can be minimised by the liner and rehabilitation of the dump. A well-managed dry ash dump poses minimal threat to groundwater contamination (Hodgson et al. 1998)
Mitigation: Target/Objective	» No contamination of grouondwater resources post-closure

Mitigation: Action/control	Responsibility	Timeframe
1. The impact could be moderate with the liner installed and the ash dump rehabilitated. Formation of the pozzolanic layer is additional mitigation that occurs naturally over time. Continuous post-closure monitoring is required so that drastic deterioration in groundwater quality is detected soon as it occurs, allowing for mitigation measures to implemented early. Should an impact be detected through monitoring, affected receptors should be compensated.	Environmental Officer, Develop / Contractor	Throughout the duration of the post-closure phase

Performance Indicator	» Continuous post-closure monitoring of water quality changes
Monitoring	» Monitoring for a period of 5 years with respect to vegetation establishment on the dump and then groundwater monitoring for a further 5 years.

OBJECTIVE 94: Prevent / limit surface water contamination post-closure

Project component/s	» Presence of ash dump (decommissioning and post-closure
Potential Impact	» Contaminated surface runoff and elevated runoff velocities are likely to affect receiving watercourses.
Activities/risk sources	» Demolition and removal of the infrastructure will lead to potential negative impacts on the integrity of the associated aquatic ecosystems
Mitigation: Target/Objective	» No contamination of surface water resources post-closure

Mitigation: Action/control	Responsibility	Timeframe
1. Demolition activities should take place during the dry season to minimise runoff.	Environmental Officer, Develop / Contractor	Throughout the duration of the decommissioning and post-closure phase
2. Sequential removal of infrastructure and subsequent revegetation should be conducted during the closure process.	Environmental Officer, Develop / Contractor	Throughout the duration of the decommissioning and post-closure phase

Performance Indicator	» Contaminated surface runoff and elevated runoff velocities are likely to affect receiving watercourses.
Monitoring	» Frequent checks (e.g. weekly) should be conducted to ensure mitigation measures are in place and the effectiveness will be verified through assessing the performance indicators

OBJECTIVE 95: Control noise due to decommissioning activities

Project component/s	» Decommissioning activities including the dismantling and removal of plant and equipment
Potential Impact	» Increased noise levels at potentially noise-sensitive receptors. » Changing ambient sound levels could change the acceptable land use capability.
Activities/risk sources	» Decommissioning activities including the dismantling and removal of plant and equipment
Mitigation: Target/Objective	» Ensure that the change in ambient sound / rating levels as experienced by receptors is less than 5dBA. » Prevent the generation of nuisance noises.

Mitigation: Action/control	Responsibility	Timeframe
1. Make use of smaller / quieter equipment when operating near receptors.	Contractor	Decommissioning phase

Mitigation: Action/control	Responsibility	Timeframe
2. Where possible, only conduct decommissioning activities during the day. If night-time activities are required, do not conduct these closer than 500m to any receptors (prevent a noise level exceeding 42dBA at receptors). Ensure that equipment is well maintained and fitted with the correct and appropriate noise abatement measures.	Developer / Contractor	Decommissioning phase
3. Use available material to develop a berm (permanent or temporary) between construction activities and surrounding noise-sensitive receptors to break the line of sight as soon as possible. This berm should ideally be constructed during the daytime using minimal equipment. With correct implementation such a berm can significantly reduce noise levels at the surrounding receptors.	Contractor	Decommissioning phase
4. Ensure that truck drivers participate in an environmental induction programme, highlighting the need to consider the local community (topics such as slower driving, minimal use of hooters, minimal use of air-brakes, and maintenance of haul trucks).	Contractor	Decommissioning phase

Performance Indicator	» Ensure that the change in ambient sound levels or rating level as experienced by receptors is less than 5dBA at night. » Ensure that maximum noise levels at potentially sensitive receptors are less than 42dBA. » No noise complaints are registered.
Monitoring	» ECO to monitor is any noise complaints is lodged with the Contractor.

OBJECTIVE 96: Limit the visual impact of the project

Project component/s	» Industrial Structures including the stacks, power generation units and conveyors
Potential Impact	» Further industrialisation of the landscape as viewed by sensitive receptors.
Activities/risk sources	» The nature of these elements will contrast with rural characteristics and will be highly obvious as new industrial development.
Mitigation: Target/Objective	» Remove infrastructure not required for the post-decommissioning use of the site. » Return all possible areas to their original state. » Monitor rehabilitated areas post-decommissioning and implement remedial action as necessary.

Mitigation: Action/control	Responsibility	Timeframe
1. Minimise and reinstate vegetation loss	Contractor / ECO / ELO	Construction, Decomissioning phases
2. Remove structures and rehabilitate site to natural state on decommissioning.	Developer / ECO / ELO	Operation, Decomissioning phase

Mitigation: Action/control	Responsibility	Timeframe
3. Monitor rehabilitated areas post-construction and post-decommissioning and implement remedial actions.	Contractor / ECO / ELO	Operation, Decomissionin phase

Performance Indicator	» Vegetation presence and density. » Presence of unnecessary infrastructure. » Visibility of the power station.
Monitoring	» Evaluate the effectiveness of colours and surface finishes to visually recede from selected viewpoints in the Upland LCA. It should be possible to compare results with other existing power stations. » Evaluate health and effectiveness of vegetation to provide necessary screening before, during and after construction and annually thereafter. » Evaluate vegetation growth and reinstatement during decommissioning and for five years thereafter. » Take regular time-line photographic evidence (Responsibility: ECO and ELO). » Prepare regular reports.

OBJECTIVE 97: Limit the visual impact of the ash dump

Project component/s	» Ash dump
Potential Impact	» Further industrialisation of the landscape as viewed by sensitive receptors.
Activities/risk sources	» This element has the potential to contrast with the natural landform and colours / texture of the surrounding landscape which will exacerbate impacts. » There is also potential for dust rising from the facility to draw attention to it.
Mitigation: Target/Objective	» Design the ash dump to blend as best as possible with the surrounding natural landform. » Minimise and reinstate vegetation loss from surrounding areas during construction. » Undertake effective dust control at the ashing facility during the operational phase. » Rehabilitate the ashing facility on a progressive basis during the operational phase and decommissioning. Deposit ash from north to south in order to help provide a screen when the development is viewed from the north

Mitigation: Action/control	Responsibility	Timeframe
1. Monitor rehabilitated areas post-construction and post-decommissioning and implement remedial actions.	ECO / ELO	Operation, Decomissioning phases

Performance Indicator	» Natural appearance of the landform created by the ashing facility. » Vegetation cover on the ashing facility. » Ashing facility part screening development when viewed from the north. » Dust rising from the ashing facility.
Monitoring	» Evaluate vegetation growth and reinstatement during decommissioning and for five years thereafter. » Take regular time-line photographic evidence. » Responsibility: ECO and ELO.

	» Prepare regular reports.

OBJECTIVE 98: Limit / reduce traffic related impacts

Project component/s	» Section of N1 between Makhado and Musina. » Section of D777 between N1 and D744 near Mopane. » Section of gravel road D777 (between D744 and D1021). » Gravel road D1021 (complete road from N1 to D777).
Potential Impact	» Vehicles travelling on gravel roads (D1021 and D777) will result in dust carrying onto nearby farms, reduced sight distance for drivers and pedestrians, deterioration of gravel roads and increased risk of collision. » Increased risk of collision with pedestrians and cattle in Mopane. » Increased risk of accidents on the N1 with increase in vehicle numbers. » Poor level of service on D1021 approach to the N1, expected from around Year 2045 depending on rate of increase in traffic volumes on the N1. » Increased number of heavy vehicles on the N1 would impact on the road pavement, requiring more regular maintenance.
Activity/risk source	» Transportation of components from site » Vehicles utilising public roads » Increased number of vehicles (light and heavy) on N1 and D777, D744 and D1021.
Mitigation: Target/Objective	» Reduce traffic impact by ensuring safe traffic flow and reducing the likelihood of crashes.

Mitigation: Action/control	**Responsibility**	**Timeframe**
1. Use rail to transport materials from site during the decommissioning phase, as opposed to only using road based transport.	Developer / Contractor	Decommissioning Phase
2. Ensure vehicles are in a roadworthy condition.	Vehicle operator and Provincial Traffic Law Enforcement.	Duration of the project life cycle

Performance Indicator	» No traffic incidents involving the power station vehicles. » Appropriate signage in place » No complaints resulting from traffic congestion, delays or driver negligence associated with construction of the power station. » Level of Service (LOS) on D1021 approach to the N1.
Monitoring	» Visual monitoring of dust produced by traffic movement » Visual monitoring of traffic control measures to ensure they are effective » A complaints register must be maintained, in which any complaints from the community must be logged. Complaints must be investigated and, if appropriate, acted upon » An incident reporting system to be used to record non-conformances to the EMPr. » Monitor vehicle queues on the D1021 approach to the N1 and assess LOS when access to the N1 becomes more difficult, resulting in more delay and longer vehicle queues developing on the D1021. It is anticipated that access to the N1 will become more problematic from Year 2045.

APPENDIX A:
EAP CVs

savannah environmental

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Johannesburg, South Africa

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CURRICULUM VITAE OF JO-ANNE THOMAS

Profession: Environmental Management and Compliance Consultant; Environmental Assessment Practitioner

Specialisation: Environmental Management; Strategic environmental advice; Environmental compliance advice & monitoring; Environmental Impact Assessments; Policy, strategy & guideline formulation; Project Management; General Ecology

Work experience: Nineteen (19) years in the environmental field

VOCATIONAL EXPERIENCE

Provide technical input for projects in the environmental management field, specialising in Strategic Environmental Advice, Environmental Impact Assessment studies, environmental auditing and monitoring, environmental permitting, public participation, Environmental Management Plans and Programmes, environmental policy, strategy and guideline formulation, and integrated environmental management. Key focus on integration of the specialist environmental studies and findings into larger engineering-based projects, strategic assessment, and providing practical and achievable environmental management solutions and mitigation measures. Responsibilities for environmental studies include project management (including client and authority liaison and management of specialist teams); review and manipulation of data; identification and assessment of potential negative environmental impacts and benefits; review of specialist studies; and the identification of mitigation measures. Compilation of the reports for environmental studies is in accordance with all relevant environmental legislation.

Undertaking of numerous environmental management studies has resulted in a good working knowledge of environmental legislation and policy requirements. Recent projects have been undertaken for both the public- and private-sector, including compliance advice and monitoring, electricity generation and transmission projects, various types of linear developments (such as National Road, local roads and power lines), waste management projects (landfills), mining rights and permits, policy, strategy and guideline development, as well as general environmental planning, development and management.

SKILLS BASE AND CORE COMPETENCIES

- Project management for a range of projects
- Identification and assessment of potential negative environmental impacts and benefits through the review and manipulation of data and specialist studies
- Identification of practical and achievable mitigation and management measures and the development of appropriate management plans
- Compilation of environmental reports in accordance with relevant environmental legislative

requirements
- External and peer review of environmental reports & compliance advice and monitoring
- Formulation of environmental policies, strategies and guidelines
- Strategic and regional assessments; pre-feasibility & site selection
- Public participation processes for a variety of projects
- Strategic environmental advice to a wide variety of clients both in the public and private sectors
- Working knowledge of environmental planning processes, policies, regulatory frameworks and legislation

EDUCATION AND PROFESSIONAL STATUS

Degrees:

- B.Sc Earth Sciences, University of the Witwatersrand, Johannesburg (1993)
- B.Sc Honours in Botany, University of the Witwatersrand, Johannesburg (1994)
- M.Sc in Botany, University of the Witwatersrand, Johannesburg (1996)

Short Courses:

- Environmental Impact Assessment, Potchefstroom University (1998)
- Environmental Law, Morgan University (2001)

Professional Society Affiliations:

- Registered with the South African Council for Natural Scientific Professions as a Professional Natural Scientist: Environmental Scientist (400024/00)

EMPLOYMENT

Date	Company	Roles and Responsibilities
2006 - Current:	Savannah Environmental (Pty) Ltd	Director Project manager Independent specialist environmental consultant, Environmental Assessment Practitioner (EAP) and advisor.
1997 – 2005:	Bohlweki Environmental (Pty) Ltd	Senior Environmental Scientist at. Environmental Management and Project Management
January – July 1997:	Sutherland High School, Pretoria	Junior Science Teacher

PROJECT EXPERIENCE

Project experience includes large infrastructure projects, including electricity generation and transmission, wastewater treatment facilities, mining and prospecting activities, property development, and national roads, as well as strategy and guidelines development.

RENEWABLE POWER GENERATION PROJECTS: PHOTOVOLTAIC SOLAR ENERGY FACILITIES

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Christiana PV 2 SEF, North West	Solar Reserve South Africa	Project Manager & EAP
De Aar PV facility, Northern Cape	iNca Energy	Project Manager & EAP

Project Name & Location	Client Name	Role
Everest SEF near Hennenman, Free State	FRV Energy South Africa	Project Manager & EAP
Graafwater PV SEF, Western Cape	iNca Energy	Project Manager & EAP
Grootkop SEF near Allanridge, Free State	FRV Energy South Africa	Project Manager & EAP
Hertzogville PV 2 SEF with 2 phases, Free State	SunCorp / Solar Reserve	Project Manager & EAP
Karoshoek CPV facility on site 2 as part of the larger Karoshoek Solar Valley Development East of Upington, Northern Cape	FG Emvelo	Project Manager & EAP
Kgabalatsane SEF North-East for Brits, North West	Built Environment African Energy Services	Project Manager & EAP
Kleinbegin PV SEF West of Groblershoop, Northern Cape	MedEnergy Global	Project Manager & EAP
Lethabo Power Station PV Installation, Free State	Eskom Holdings SoC Limited	Project Manager & EAP
Majuba Power Station PV Installation, Mpumalanga	Eskom Holdings SoC Limited	Project Manager & EAP
Merapi PV SEF Phase 1 – 4 South-East of Excelsior, Free State	SolaireDirect Southern Africa	Project Manager & EAP
Sannaspos Solar Park, Free State Province	SolaireDirect Southern Africa	Project Manager & EAP
Ofir-Zx PV Plant near Keimoes, Northern Cape	S28 Degrees Energy	Project Manager & EAP
Oryx SEF near Virginia, Free State	FRV Energy South Africa	Project Manager & EAP
Project Blue SEF North of Kleinsee, Northern Cape	WWK Development	Project Manager & EAP
S-Kol PV Plant near Keimoes, Northern Cape	S28 Degrees Energy	Project Manager & EAP
Sonnenberg PV Plant near Keimoes, Northern Cape	S28 Degrees Energy	Project Manager & EAP
Tutuka Power Station PV Installation, Mpumalanga	Eskom Transmission	Project Manager & EAP
Two PV sites within the Northern Cape	MedEnergy Global	Project Manager & EAP
Two PV sites within the Western & Northern Cape	iNca Energy	Project Manager & EAP
Upington PV SEF, Northern Cape	MedEnergy Global	Project Manager & EAP
Vredendal PV facility, Western Cape	iNca Energy	Project Manager & EAP
Waterberg PV plant, Limpopo	Thupela Energy	Project Manager & EAP
Watershed Phase I & II SEF near Litchtenburg, North West	FRV Energy South Africa	Project Manager & EAP
Alldays PV & CPV SEF Phase 1, Limpopo	BioTherm Energy	Project Manager & EAP

Basic Assessments

Project Name & Location	Client Name	Role
Aberdeen PV SEF, Eastern Cape	BioTherm Energy	Project Manager & EAP
Christiana PV 1 SEF on Hartebeestpan Farm, North-West Province	Solar Reserve South Africa	Project Manager & EAP
Heuningspruit PV1 & PV 2 facilities near Koppies, Free State	Sun Mechanics	Project Manager & EAP
Kakamas PV Facility, Northern Cape	iNca Energy	Project Manager & EAP
Kakamas II PV Facility, Northern Cape	iNca Energy	Project Manager & EAP
Machadodorp 1 PV SEF, Mpumalanga	Solar To Benefit Africa	Project Manager & EAP
PV site within the Northern Cape	iNca Energy	Project Manager & EAP
PV sites within 4 ACSA airports within South Africa, National	Airports Company South Africa (ACSA)	Project Manager & EAP
RustMo1 PV Plant near Buffelspoort, North West	Momentous Energy	Project Manager & EAP
RustMo2 PV Plant near Buffelspoort, North West	Momentous Energy	Project Manager & EAP
RustMo3 PV Plant near Buffelspoort, North West	Momentous Energy	Project Manager & EAP
RustMo4 PV Plant near Buffelspoort, North West	Momentous Energy	Project Manager & EAP

Project Name & Location	Client Name	Role
Sannaspos PV SEF Phase 2 near Bloemfontein, Free State	SolaireDirect Southern Africa	Project Manager & EAP
Solar Park Expansion within the Rooiwal Power Station, Gauteng	AFRKO Energy	Project Manager & EAP
Steynsrus SEF, Free State	SunCorp	Project Manager & EAP
Thaba Eco Lodge PV Facility, Gauteng	Camco Clean Energy	Project Manager & EAP

Screening Studies

Project Name & Location	Client Name	Role
Allemans Fontein SEF near Noupoort, Northern Cape	Fusion Energy	Project Manager & EAP
Amandel SEF near Thabazimbi, Limpopo	iNca Energy	Project Manager & EAP
Arola/Doornplaat SEF near Ventersdorp, North West	FRV & iNca Energy	Project Manager & EAP
Bloemfontein Airport PV Installation, Free State	The Power Company	Project Manager & EAP
Brakspruit SEF near Klerksorp, North West	FRV & iNca Energy	Project Manager & EAP
Carolus Poort SEF near Noupoort, Northern Cape	Fusion Energy	Project Manager & EAP
Damfontein SEF near Noupoort, Northern Cape	Fusion Energy	Project Manager & EAP
Everest SEF near Welkom, Free State	FRV & iNca Energy	Project Manager & EAP
Gillmer SEF near Noupoort, Northern Cape	Fusion Energy	Project Manager & EAP
Grootkop SEF near Allansridge, Free State	FRV & iNca Energy	Project Manager & EAP
Heuningspruit PV1 & PV 2 near Koppies, Free State	Cronimat	Project Manager & EAP
Kimberley Airport PV Installation, Northern Cape	The Power Company	Project Manager & EAP
Kolonnade Mall Rooftop PV Installation in Tshwane, Gauteng	Momentous Energy	Project Manager & EAP
Loskop SEF near Groblersdal, Limpopo	S&P Power Unit	Project Manager & EAP
Marble SEF near Marble Hall, Limpopo	S&P Power Unit	Project Manager & EAP
Morgenson PV1 SEF South-West of Windsorton, Northern Cape	Solar Reserve South Africa	Project Manager & EAP
OR Tambo Airport PV Installation, Gauteng	The Power Company	Project Manager & EAP
Oryx SEF near Virginia, Free State	FRV & iNca Energy	Project Manager & EAP
Rhino SEF near Vaalwater, Limpopo	S&P Power Unit	Project Manager & EAP
Rustmo2 PV Plant near Buffelspoort, North West	Momentous Energy	Project Manager & EAP
Spitskop SEF near Northam, Limpopo	FRV & iNca Energy	Project Manager & EAP
Steynsrus PV, Free State	Suncorp	Project Manager & EAP
Tabor SEF near Polokwane, Limpopo	FRV & iNca Energy	Project Manager & EAP
UpingtonAirport PV Installation, Northern Cape	The Power Company	Project Manager & EAP
Valeria SEF near Hartebeestpoort Dam, North West	Solar to Benefit Africa	Project Manager & EAP
Watershed SEF near Lichtenburg, North West	FRV & iNca Energy	Project Manager & EAP
Witkop SEF near Polokwane, Limpopo	FRV & iNca Energy	Project Manager & EAP
Woodmead Retail Park Rooftop PV Installation, Gauteng	Momentous Energy	Project Manager & EAP

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
ECO and bi-monthly auditing for the construction of the Adams Solar PV Project Two South of Hotazel, Northern Cape	Enel Green Power	Project Manager
ECO for the construction of the Kathu PV Facility, Northern Cape	REISA	Project Manager
ECO and bi-monthly auditing for the construction of	Enel Green Power	Project Manager

Project Name & Location	Client Name	Role
the Pulida PV Facility, Free State		
ECO for the construction of the RustMo1 SEF, North West	Momentous Energy	Project Manager
ECO for the construction of the Sishen SEF, Northern Cape	Windfall 59 Properties	Project Manager
ECO for the construction of the Upington Airport PV Facility, Northern Cape	Sublanary Trading	Project Manager
Quarterly compliance monitoring of compliance with all environmental licenses for the operation activities at the Kathu PV facility, Northern Cape	REISA	Project Manager

Compliance Advice and ESAP Reporting

Project Name & Location	Client Name	Role
Aggeneys Solar Farm, Northern Cape	BioTherm Energy	Environmental Advisor
Airies II PV Facility SW of Kenhardt, Northern Cape	BioTherm Energy	Environmental Advisor
Kalahari SEF Phase II in Kathu, Northern Cape	Engie	Environmental Advisor
Kathu PV Facility, Northern Cape	Building Energy	Environmental Advisor
Kenhardt PV Facility, Northern Cape	BioTherm Energy	Environmental Advisor
Kleinbegin PV SEF West of Groblershoop, Northern Cape	MedEnergy	Environmental Advisor
Konkoonises II SEF near Pofadder, Northern Cape	BioTherm Energy	Environmental Advisor
Konkoonsies Solar Farm, Northern Cape	BioTherm Energy	Environmental Advisor
Lephalale SEF, Limpopo	Exxaro	Environmental Advisor
Pixley ka Seme PV Park, South-East of De Aar, Northern Cape	African Clean Energy Developments (ACED)	Environmental Advisor
RustMo1 PV Plant near Buffelspoort, North West	Momentous Energy	Environmental Advisor
Scuitdrift 1 SEF & Scuitdrift 2 SEF, Limpopo	Building Energy	Environmental Advisor
Sirius PV Plants, Northern Cape	Aurora Power Solutions	Environmental Advisor
Upington Airport PV Power Project, Northern Cape	Sublunary Trading	Environmental Advisor
Upington SEF, Northern Cape	Abengoa Solar	Environmental Advisor
Ofir-ZX PV SEF near Keimoes, Northern Cape	Networx S28 Energy	Environmental Advisor

Due Diligence Reporting

Project Name & Location	Client Name	Role
5 PV SEF projects in Lephalale, Limpopo	iNca Energy	Environmental Advisor
Prieska PV Plant, Northern Cape	SunEdison Energy India	Environmental Advisor
Sirius Phase One PV Facility near Upington, Northern Cape	Aurora Power Solutions	Environmental Advisor

Environmental Permitting, S53, Water Use Licence (WUL), Waste Management Licence (WML) & Other Applications

Project Name & Location	Client Name	Role
Biodiversity Permit & WULA for the Aggeneys SEF near Aggeneys, Northern Cape	BioTherm Energy	Project Manager & EAP
Biodiversity Permit for the Konkoonises II SEF near Pofadder, Northern Cape	BioTherm Energy	Project Manager & EAP
Biodiversity Permitting for the Lephalale SEF, Limpopo	Exxaro Resources	Project Manager & EAP

Project Name & Location	Client Name	Role
Environmental Permitting for the Kleinbegin PV SEF West of Groblershoop, Northern Cape	MedEnergy	Project Manager & EAP
Environmental Permitting for the Upington SEF, Northern Cape	Abengoa Solar	Project Manager & EAP
Environmental Permitting for the Kathu PV Facility, Northern Cape	Building Energy	Project Manager & EAP
Environmental Permitting for the Konkoonsies Solar Farm, Northern Cape	BioTherm Energy	Project Manager & EAP
Environmental Permitting for the Lephalale SEF, Limpopo	Exxaro Resources	Project Manager & EAP
Environmental Permitting for the Scuitdrift 1 SEF & Scuitdrift 2 SEF, Limpopo	Building Energy	Project Manager & EAP
Environmental Permitting for the Sirius PV Plant, Northern Cape	Aurora Power Solutions	Project Manager & EAP
Permits for the Kleinbegin and UAP PV Plants, Northern Cape	MedEnergy Global	Project Manager & EAP
S53 Application for Arriesfontein Solar Park Phase 1 – 3 near Danielskuil, Northern Cape	Solar Reserve / SunCorp	Project Manager & EAP
S53 Application for Hertzogville PV1 & PV 2 SEFs, Free State	Solar Reserve / SunCorp	Project Manager & EAP
S53 Application for the Bloemfontein Airport PV Facility, Free State	Sublunary Trading	Project Manager & EAP
S53 Application for the Kimberley Airport PV Facility, Northern Cape	Sublunary Trading	Project Manager & EAP
S53 Application for the Project Blue SEF, Northern Cape	WWK Developments	Project Manager & EAP
S53 Application for the Upington Airport PV Facility, Free State	Sublunary Trading	Project Manager & EAP
WULA for the Kalahari SEF Phase II in Kathu, Northern Cape	Engie	Project Manager & EAP

RENEWABLE POWER GENERATION PROJECTS: CONCENTRATED SOLAR FACILITIES (CSP)

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Ilanga CSP 2, 3, 4, 5, 7 & 9 Facilities near Upington, Northern Cape	Emvelo Holdings	Project Manager & EAP
Ilanga CSP near Upington, Northern Cape	Ilangethu Energy	Project Manager & EAP
Ilanga Tower 1 Facility near Upington, Northern Cape	Emvelo Holdings	Project Manager & EAP
Karoshoek CPVPD 1-4 facilities on site 2 as part of the larger Karoshoek Solar Valley Development East of Upington, Northern Cape	FG Emvelo	Project Manager & EAP
Karoshoek CSP facilities on sites 1.4; 4 & 5 as part of the larger Karoshoek Solar Valley Development East of Upington, Northern Cape	FG Emvelo	Project Manager & EAP
Karoshoek Linear Fresnel 1 Facility on site 1.1 as part of the larger Karoshoek Solar Valley Development East of Upington, Northern Cape	FG Emvelo	Project Manager & EAP

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
ECO for the construction of the !Khi CSP Facility, Northern Cape	Abengoa Solar	Project Manager
ECO for the construction of the Ilanga CSP 1 Facility near Upington, Northern Cape	Karoshoek Solar One	Project Manager
ECO for the construction of the Kathu Solar Park, Northern Cape	Kathu Solar	Project Manager
ECO for the construction of the KaXu! CSP Facility, Northern Cape	Abengoa Solar	Project Manager
Internal audit of compliance with the conditions of the IWUL issued to the Karoshoek Solar One CSP Facility, Northern Cape	Karoshoek Solar One	Project Manager

Screening Studies

Project Name & Location	Client Name	Role
Upington CSP (Tower) Plant near Kanoneiland, Northern Cape	iNca Energy and FRV	Project Manager & EAP

Compliance Advice and ESAP reporting

Project Name & Location	Client Name	Role
Ilanga CSP Facility near Upington, Northern Cape	Ilangethu Energy	Environmental Advisor
Ilangalethu CSP 2, Northern Cape	FG Emvelo	Environmental Advisor
Kathu CSP Facility, Northern Cape	GDF Suez	Environmental Advisor
Lephalale SEF, Limpopo	Cennergi	Environmental Advisor
Solis I CSP Facility, Northern Cape	Brightsource	Environmental Advisor

Environmental Permitting, S53, Water Use Licence (WUL), Waste Management Licence (WML) & Other Applications

Project Name & Location	Client Name	Role
Environmental Permitting for the Ilanga CSP Facility near Upington, Northern Cape	Ilangethu Energy	Project Manager & EAP
Environmental Permitting for the Kathu CSP, Northern Cape	GDF Suez	Project Manager & EAP
WULA for the Solis I CSP Facility, Northern Cape	Brightsource	Project Manager & EAP

RENEWABLE POWER GENERATION PROJECTS: WIND ENERGY FACILITIES

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Sere WEF, Western Cape	Eskom Holdings SoC Limited	EAP
Aberdeen WEF, Eastern Cape	Eskom Holdings SoC Limited	Project Manager & EAP
Amakhala Emoyeni WEF, Eastern Cape	Windlab Developments	Project Manager & EAP
EXXARO West Coast WEF, Western Cape	EXXARO Resources	Project Manager & EAP
Goereesoe Wind Farm near Swellendam, Western Cape	iNca Energy	Project Manager & EAP
Hartneest WEF, Western Cape	Juwi Renewable Energies	Project Manager & EAP
Hopefield WEF, Western Cape	Umoya Energy	EAP
Kleinsee WEF, Northern Cape	Eskom Holdings SoC Limited	Project Manager & EAP

Project Name & Location	Client Name	Role
Klipheuwel/Dassiesfontein WEF within the Overberg area, Western Cape	BioTherm Energy	Project Manager & EAP
Moorreesburg WEF, Western Cape	iNca Energy	Project Manager & EAP
Oyster Bay WEF, Eastern Cape	Renewable Energy Resources Southern Africa	Project Manager & EAP
Project Blue WEF, Northern Cape	Windy World	Project Manager & EAP
Rheboksfontein WEF, Western Cape	Moyeng Energy	Project Manager & EAP
Spitskop East WEF near Riebeeck East, Eastern Cape	Renewable Energy Resources Southern Africa	Project Manager & EAP
Suurplaat WEF, Western Cape	Moyeng Energy	Project Manager & EAP
Swellendam WEF, Western Cape	IE Swellendam	Project Manager & EAP
Tsitsikamma WEF, Eastern Cape	Exxarro	Project Manager & EAP
West Coast One WEF, Western Cape	Moyeng Energy	Project Manager & EAP

Basic Assessments

Project Name & Location	Client Name	Role
Amakhala Emoyeni Wind Monitoring Masts, Eastern Cape	Windlab Developments	Project Manager & EAP
Beaufort West Wind Monitoring Masts, Western Cape	Umoya Energy	Project Manager & EAP
Hopefield Community Wind Farm near Hopefield, Western Cape	Umoya Energy	Project Manager & EAP
Koekenaap Wind Monitoring Masts, Western Cape	EXXARO Resources	Project Manager & EAP
Koingnaas WEF, Northern Cape	Just Palm Tree Power	Project Manager & EAP
Laingsburg Area Wind Monitoring Masts, Western Cape	Umoya Energy	Project Manager & EAP
Overberg Area Wind Monitoring Masts, Western Cape	BioTherm Energy	Project Manager & EAP
Oyster Bay Wind Monitoring Masts, Eastern Cape	Renewable Energy Systems Southern Africa (RES)	Project Manager & EAP

Screening Studies

Project Name & Location	Client Name	Role
Albertinia WEF, Western Cape	BioTherm Energy	Project Manager & EAP
Koingnaas WEF, Northern Cape	Just Pal Tree Power	Project Manager & EAP
Napier Region WEF Developments, Western Cape	BioTherm Energy	Project Manager & EAP
Tsitsikamma WEF, Eastern Cape	Exxarro Resources	Project Manager & EAP
Various WEFs within an identified area in the Overberg area, Western Cape	BioTherm Energy	Project Manager & EAP
Various WEFs within an identified area on the West Coast, Western Cape	Investec Bank Limited	Project Manager & EAP
Various WEFs within an identified area on the West Coast, Western Cape	Eskom Holdings Limited	Project Manager & EAP
Various WEFs within the Western Cape	Western Cape Department of Environmental Affairs and Development Planning	Project Manager & EAP
Velddrift WEF, Western Cape	VentuSA Energy	Project Manager & EAP
Wind 1000 Project	Thabo Consulting on behalf of Eskom Holdings	Project Manager & EAP

Project Name & Location	Client Name	Role
Wittekleibosch, Snylip & Doriskraal WEFs, Eastern Cape	Exxarro Resources	Project Manager & EAP

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
ECO for the construction of the West Coast One WEF, Western Cape	Aurora Wind Power	Project Manager
ECO for the construction of the Gouda WEF, Western Cape	Blue Falcon	Project Manager
EO for the Dassiesklip Wind Energy Facility, Western Cape	Group 5	Project Manager
Quarterly compliance monitoring of compliance with all environmental licenses for the operation activities at the Gouda Wind Energy facility near Gouda, Western Cape Province	Blue Falcon	Project Manager
Annual auditing of compliance with all environmental licenses for the operation activities at the West Coast One Wind Energy facility near Vredenburg, Western Cape Province	Aurora Wind Power	Project Manager

Compliance Advice

Project Name & Location	Client Name	Role
Amakhala Phase 1 WEF, Eastern Cape	Cennergi	Environmental Advisor
Dassiesfontein WEF within the Overberg area, Western Cape	BioTherm Energy	Environmental Advisor
Excelsior Wind Farm, Western Cape	BioTherm Energy	Environmental Advisor
Great Karoo Wind Farm, Northern Cape	African Clean Energy Developments (ACED)	Environmental Advisor
Hopefield Community WEF, Western Cape	African Clean Energy Developments (ACED)	Environmental Advisor
Rheboksfontein WEF, Western Cape	Moyeng Energy	Environmental Advisor
Tiqua WEF, Western Cape	Cennergi	Environmental Advisor
Tsitsikamma WEF, Eastern Cape	Cennergi	Environmental Advisor
West Coast One WEF, Western Cape	Moyeng Energy	Environmental Advisor

Due Diligence Reporting

Project Name & Location	Client Name	Role
Witteberg WEF, Western Cape	EDPR Renewables	Environmental Advisor
IPD Vredenburg WEF within the Saldanha Bay area, Western Cape	IL&FS Energy Development Company	Environmental Advisor

Environmental Permitting, S53, Water Use Licence (WUL), Waste Management Licence (WML) & Other Applications

Project Name & Location	Client Name	Role
Biodiversity Permitting for the Power Line between the Tsitikamma Community WEF & the Diep River Substation, Eastern Cape	Cennergi	Project Manager & EAP

Project Name & Location	Client Name	Role
Biodiversity Permitting for the West Coast One WEF, Western Cape	Aurora Wind Power	Project Manager & EAP
Environmental Permitting for the Excelsior WEF, Western Cape	BioTherm Energy	Project Manager & EAP
Plant Permits & WULA for the Tsitsikamma Community WEF, Eastern Cape	Cennergi	Project Manager & EAP
S24G and WULA for the Rectification for the commencement of unlawful activities on Ruimsig AH in Honeydew, Gauteng	Hossam Soror	Project Manager & EAP
S24G Application for the Rheboksfontein WEF, Western Cape	Ormonde - Theo Basson	Project Manager & EAP
S53 Application & WULA for Suurplaat and Gemini WEFs, Northern Cape	Engie	Project Manager & EAP
S53 Application for the Hopefield Community Wind Farm near Hopefield, Western Cape	Umoya Energy	Project Manager & EAP
S53 Application for the Project Blue WEF, Northern Cape	WWK Developments	Project Manager & EAP
S53 for the Oyster Bay WEF, Eastern Cape	RES	Project Manager & EAP
WULA for the Great Karoo Wind Farm, Northern Cape	African Clean Energy Developments (ACED)	Project Manager & EAP

CONVENTIONAL POWER GENERATION PROJECTS (COAL)

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Mutsho Power Station near Makhado, Limpopo Province	Mutsho Consortium	Project Manager & EAP
Coal-fired Power Station near Ogies, Mpumalanga	Ruukki SA	Project Manager & EAP
Thabametsi IPP Coal-fired Power Station, near Lephalale, Limpopo	Axia	Project Manager & EAP
Transalloys Coal-fired Power Station, Mpumalanga	Transalloys	Project Manager & EAP
Tshivasho IPP Coal-fired Power Station (with WML), near Lephalale, Limpopo	Cennergi	Project Manager & EAP
Umbani Coal-fired Power Station, near Kriel, Mpumalanga	ISS Global Mining	Project Manager & EAP
Waterberg IPP Coal-Fired Power Station near Lephalale, Limpopo	Exxaro Resources	Project Manager & EAP

Basic Assessments

Project Name & Location	Client Name	Role
Coal Stockyard on Medupi Ash Dump Site, Limpopo Province	Eskom Holdings	Project Manager & EAP
Biomass Co-Firing Demonstration Facility at Arnot Power Station East of Middleburg, Mpumlanaga	Eskom Holdings	Project Manager & EAP

Screening Studies

Project Name & Location	Client Name	Role
Baseload Power Station near Lephalale, Limpopo	Cennergi	Project Manager & EAP
Coal-Fired Power Plant near Delmas, Mpumalanga	Exxaro Resources	Project Manager & EAP

Makhado Power Station, Limpopo	Mutsho Consortium, Limpopo	Project Manager & EAP

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
ECO for the Camden Power Station, Mpumalanga	Eskom Holdings	Project Manager

Compliance Advice

Project Name & Location	Client Name	Role
Thabametsi IPP Coal-fired Power Station, near Lephalale, Limpopo	Axia	Environmental Advisor

Environmental Permitting, S53, Water Use Licence (WUL), Waste Management Licence (WML) & Other Applications

Project Name & Location	Client Name	Role
Permit application for the Thabametsi Bulk Water Pipeline, near Lephalale, Limpopo	Axia	Project Manager & EAP
S53 & WULA for the Waterberg IPP Coal-Fired Power Station near Lephalale, Limpopo	Exxaro Resources	Project Manager & EAP
S53 Application for the Tshivasho Coal-fired Power Station near Lephalale, Limpopo	Cennergi	Project Manager & EAP

CONVENTIONAL POWER GENERATION PROJECTS (GAS)

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Ankerlig OCGT to CCGT Conversion project &400 kV transmission power line between Ankerlig and the Omega Substation, Western Cape	Eskom Holdings SoC Limited	Project Manager & EAP
Gourikwa OCGT to CCGT Conversion project & 400 kV transmission power line between Gourikwa & Proteus Substation, Western Cape	Eskom Holdings SoC Limited	Project Manager & EAP
Richards Bay Gas to Power Combined Cycle Power Station, KwaZulu-Natal	Eskom Holdings SoC Limited	Project Manager & EAP
Richards Bay Gas to Power Plant, KwaZulu-Natal	Richards Bay Gas	Project Manager & EAP
Decommissioning & Recommissioning of 3 Gas Turbine Units at Acacia Power Station & 1 Gas Turbine Unit at Port Rex Power Station to the existing Ankerlig Power Station in Atlantis Industria, Western Cape	Eskom Holdings	Project Manager & EAP

Screening Studies

Project Name & Location	Client Name	Role
Fatal Flaw Analysis for 3 area identified for the establishment of a 500MW CCGT Power Station	Globeleq Advisors Limited	Project Manager & EAP
Richards Bay Gas to Power Combined Cycle Power Station, KwaZulu-Natal	Eskom Holdings SoC Limited	Project Manager & EAP

GRID INFRASTRUCTURE PROJECTS

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Aggeneis-Oranjemond Transmission Line & Substation Upgrade, Northern Cape	Eskom Transmission	Project Manager & EAP
Ankerlig-Omega Transmission Power Lines, Western Cape	Eskom Transmission	Project Manager & EAP
Karoshoek Grid Integration project as part of the Karoshoek Solar Valley Development East of Upington, Northern Cape	FG Emvelo	Project Manager & EAP
Koeberg-Omega Transmission Power Lines,, Western Cape	Eskom Transmission	Project Manager & EAP
Koeberg-Stikland Transmission Power Lines, Western Cape	Eskom Transmission	Project Manager & EAP
Kyalami Strengthening Project, Gauteng	Eskom Transmission	Project Manager & EAP
Mokopane Integration Project, Limpopo	Eskom Transmission	Project Manager & EAP
Saldanha Bay Strengthening Project, Western Cape	Eskom Transmission	Project Manager & EAP
Steelpoort Integration Project, Limpopo	Eskom Transmission	Project Manager & EAP
Transmission Lines from the Koeberg-2 Nuclear Power Station site, Western Cape	Eskom Transmission	Project Manager & EAP
Tshwane Strengthening Project, Phase 1, Gauteng	Eskom Transmission	Project Manager & EAP

Basic Assessments

Project Name & Location	Client Name	Role
Dassenberg-Koeberg Power Line Deviation from the Koeberg to the Ankerlig Power Station, Western Cape	Eskom Holdings	Project Manager & EAP
Golden Valley II WEF Power Line & Substation near Cookhouse, Eastern Cape	BioTherm Energy	Project Manager & EAP
Golden Valley WEF Power Line near Cookhouse, Eastern Cape	BioTherm Energy	Project Manager & EAP
Karoshoek Grid Integration project as part of the Karoshoek Solar Valley Development East of Upington, Northern Cape	FG Emvelo	Project Manager & EAP
Konkoonsies II PV SEF Power Line to the Paulputs Substation near Pofadder, Northern Cape	BioTherm Energy	Project Manager & EAP
Perdekraal West WEF Powerline to the Eskom Kappa Substation, Westnern Cape	BioTherm Energy	Project Manager & EAP
Rheboksfontein WEF Powerline to the Aurora Substation, Western Cape	Moyeng Energy	Project Manager & EAP
Soetwater Switching Station near Sutherland, Northern Cape	African Clean Energy Developments (ACED)	Project Manager & EAP
Solis Power I Power Line & Switchyard Station near Upington, Northern Cape	Brightsource	Project Manager & EAP
Stormwater Canal System for the Ilanga CSP near Upington, Northern Cape	Karoshoek Solar One	Project Manager & EAP
Tsitsikamma Community WEF Powerline to the Diep River Substation, Eastern Cape	Eskom Holdings	Project Manager & EAP

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role

ECO for the construction of the Ferrum-Mookodi Transmission Line, Northern Cape and North West	Trans-Africa Projects on behalf of Eskom	Project Manager
EO for the construction of the Gamma-Kappa Section A Transmission Line, Western Cape	Trans-Africa Projects on behalf of Eskom	Project Manager
EO for the construction of the Gamma-Kappa Section B Transmission Line, Western Cape	Trans-Africa Projects on behalf of Eskom	Project Manager
EO for the construction of the Hydra IPP Integration project, Northern Cape	Trans-Africa Projects on behalf of Eskom	Project Manager
EO for the construction of the Kappa-Sterrekus Section C Transmission Line, Western Cape	Trans-Africa Projects on behalf of Eskom	Project Manager
EO for the construction of the Namaqualand Strengthening project in Port Nolloth, Western Cape	Trans-Africa Projects on behalf of Eskom	Project Manager
ECO for the construction of the Neptune Substation Soil Erosion Mitigation Project, Eastern Cape	Eskom	Project Manager
ECO for the construction of the Ilanga-Gordonia 132kV power line, Northern Cape	Karoshoek Solar One	Project Manager

Environmental Permitting, S53, Water Use Licence (WUL), Waste Management Licence (WML) & Other Applications

Project Name & Location	Client Name	Role
Environmental Permitting and WULA for the Rockdale B Substation & Loop in Power Lines,	Eskom Holdings	Project Manager & EAP
Environmental Permitting and WULA for the Steelpoort Integration project, Limpopo	Eskom Holdings	Project Manager & EAP
Environmental Permitting for Solis CSP near Upington, Northern Cape	Brightsource	Project Manager & EAP

MINING SECTOR PROJECTS

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Elitheni Coal Mine near Indwe, Eastern Cape	Elitheni Coal	Project Manager & EAP
Groot Letaba River Development Project Borrow Pits	liso	Project Manager & EAP
Grootegeluk Coal Mine for coal transportation infrastructure between the mine and Medupi Power Station (EMPr amendment) , Limpopo	Eskom Holdings	Project Manager & EAP
Waterberg Coal Mine (EMPr amendment), Limpopo	Seskoko Resources	Project Manager & EAP

Basic Assessments

Project Name & Location	Client Name	Role
Rare Earth Separation Plant in Vredendal, Western Cape	Rareco	Project Manager & EAP

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
ECO for the construction of the Duhva Mine Water Recovery Project, Mpumalanga	Eskom Holdings SoC Limited	Project Manager
External compliance audit of Palesa Coal Mine's Integrated Water Use License (IWUL), near KwaMhlanga, Mpumalanga Province	HCI Coal	Project Manager

Project Name & Location	Client Name	Role
External compliance audit of Palesa Coal Mine's Waste Management License (WML) and EMP, near KwaMhlanga, Mpumalanga Province	HCI Coal	Project Manager
External compliance audit of Mbali Coal Mine's Integrated Water Use License (IWUL), near Ogies, Mpumalanga Province	HCI Coal	Project Manager

Environmental Permitting, S53, Water Use Licence (WUL), Waste Management Licence (WML) & Other Applications

Project Name & Location	Client Name	Role
Waste Licence Application for the Rare Earth Separation Plant in Vredendal, Western Cape	Rareco	Project Manager & EAP
WULA for the Expansion of the Landfill site at Exxaro's Namakwa Sands Mineral Separation Plant, Western Cape	Exxaro Resources	Project Manager & EAP

INFRASTRUCTURE DEVELOPMENT PROJECTS (BRIDGES, PIPELINES, ROADS, WATER RESOURCES, STORAGE, ETC)

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Bridge across the Ngotwane River, on the border of South Africa and Botswana	Eskom Holdings	Project Manager & EAP
Chemical Storage Tanks, Metallurgical Plant Upgrade & Backfill Plant upgrade at South Deep Gold Mine, near Westornaria, Gauteng	Goldfields	Project Manager & EAP
Expansion of the existing Welgedacht Water Care Works, Gauteng	ERWAT	Project Manager & EAP
Golden Valley WEF Access Road near Cookhouse, Eastern Cape	BioTherm Energy	Project Manager & EAP
Great Fish River Wind Farm Access Roads and Watercourse Crossings near Cookhouse, Eastern Cape	African Clean Energy Developments (ACED)	Project Manager & EAP
Ilanga CSP Facility Watercourse Crossings near Upington, Northern Cape	Karoshoek Solar one	Project Manager & EAP
Modification of the existing Hartebeestfontein Water Care Works, Gautng	ERWAT	Project Manager & EAP
N10 Road Realignment for the Ilanga CSP Facility, East of Upington, Northern Cape	SANRAL	Project Manager & EAP
Nxuba (Bedford) Wind Farm Watercourse Crossings near Cookhouse, Eastern Cape	African Clean Energy Developments (ACED)	Project Manager & EAP
Pollution Control Dams at the Medupi Power Station Ash Dump & Coal Stockyard, Limpopo	Eskom	Project Manager & EAP
Qoboshane borrow pits (EMPr only), Eastern Cape	Emalahleni Local Municipality	Project Manager & EAP
Tsitsikamma Community WEF Watercourse Crossings, Eastern Cape	Cennergi	Project Manager & EAP

Basic Assessments

Project Name & Location	Client Name	Role
Harmony Gold WWTW at Doornkop Mine, Gauteng	Harmony Doornkop Plant	Project Manager & EAP

Project Name & Location	Client Name	Role
Ofir-ZX Watercourse Crossing for the Solar PV Facility, near Keimoes, Northern Cape	Networx S28 Energy	Project Manager & EAP
Qoboshane bridge & access roads, Eastern Cape	Emalahleni Local Municipality	Project Manager & EAP
Relocation of the Assay Laboratory near Carletonville, Gauteng	Sibanye Gold	Project Manager & EAP
Richards Bay Harbour Staging Area, KwaZulu-Natal	Eskom Holdings	Project Manager & EAP
S-Kol Watercourse Crossing for the Solar PV Facility, East of Keimoes, Northern Cape	Networx S28 Energy	Project Manager & EAP
Sonnenberg Watercourse Crossing for the Solar PV Facility, West Keimoes, Northern Cape	Networx S28 Energy	Project Manager & EAP

Screening Studies

Project Name & Location	Client Name	Role
Roodepoort Open Space Optimisation Programme (OSOP) Precinct, Gauteng	TIMAC Engineering Projects	Project Manager & EAP

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
ECO and bi-monthly auditing for the construction of the Olifants River Water Resources Development Project (ORWRDP) Phase 2A: De Hoop Dam, R555 realignment and housing infrastructure	Department of Water and Sanitation	Project Manager Auditor
ECO for the Rehabilitation of the Blaaupan & Storm Water Channel, Gauteng	Airports Company of South Africa (ACSA)	Project Manager
Due Diligence reporting for the Better Fuel Pyrolysis Facility, Gauteng	Better Fuels	Project Manager
ECO for the Construction of the Water Pipeline from Kendal Power Station to Kendal Pump Station, Mpumalanga	Transnet	Project Manager

Environmental Permitting, S53, Water Use Licence (WUL), Waste Management Licence (WML) & Other Applications

Project Name & Location	Client Name	Role
WULA for the Izubulo Private Nature Reserve, Limpopo	Kjell Bismeyer, Jann Bader, Laurence Saad	Project Manager & EAP
WULA for the Masodini Private Game Lode, Limpopo	Masodini Private Game Lodge	Environmental Advisor
WULA for the Ezulwini Private Nature Reserve, Limpopo	Ezulwini Investments	Project Manager & EAP
WULA for the Masodini Private Game Lode, Limpopo	Masodini Private Game Lodge	Project Manager & EAP
WULA for the N10 Realignment at the Ilanga SEF, Northern Cape	Karoshoek Solar One	Project Manager & EAP

HOUSING AND URBAN PROJECTS

Basic Assessments

Project Name & Location	*Client Name*	*Role*
Postmasburg Housing Development, Northern Cape	*Transnet*	*Project Manager & EAP*

Compliance Advice and reporting

Project Name & Location	Client Name	Role
Kampi ya Thude at the Olifants West Game Reserve, Limpopo	Nick Elliot	Environmental Advisor

ENVIRONMENTAL MANAGEMENT TOOLS

Project Name & Location	Client Name	Role
Development of the 3rd Edition Environmental Implementation Plan (EIP)	Gauteng Department of Agriculture and Rural Development (GDARD)	Project Manager & EAP
Development of Provincial Guidelines on 4x4 routes, Western Cape	Western Cape Department of Environmental Affairs and Development Planning	EAP
Compilation of Construction and Operation EMP for the Braamhoek Transmission Integration Project, Kwazulu-Natal	Eskom Holdings	Project Manager & EAP
Compilation of EMP for the Wholesale Trade of Petroleum Products, Gauteng	Munaca Technologies	Project Manager & EAP
Operational Environmental Management Programme (OEMP) for Medupi Power Station, Limpopo	Eskom Holdings	Project Manager & EAP
Operational Environmental Management Programme (OEMP) for the Dube TradePort Site Wide Precinct	Dube TradePort Corporation	Project Manager & EAP
Operational Environmental Management Programme (OEMP) for the Kusile Power Station, Mpumalanga	Eskom Holdings	Project Manager & EAP
Review of Basic Assessment Process for the Wittekleibosch Wind Monitoring Mast, Eastern Cape	Exxaro Resources	Project Manager & EAP
Revision of the EMPr for the Sirius Solar PV	Aurora Power Solutions	Project Manager & EAP
State of the Environment (SoE) for Emalahleni Local Municipality, Mpumalanga	Simo Consulting on behalf of Emalahleni Local Municipality	Project Manager & EAP
Aspects and Impacts Register for Salberg Concrete Products operations	Salberg Concrete Products	EAP

PROJECTS OUTSIDE OF SOUTH AFRICA

Project Name & Location	Client Name	Role
Advisory Services for the Zizabona Transmission Project, Zambia, Zimbabwe, Botswana & Namibia	PHD Capital	Advisor
EIA for the Semonkong WEF, Lesotho	MOSCET	Project Manager & EAP
EMP for the Kuvaninga Energia Gas Fired Power Project, Mozambique	ADC (Pty) Ltd	Project Manager & EAP
Environmental Screening Report for the SEF near Thabana Morena, Lesotho	Building Energy	EAP
EPBs for the Kawambwa, Mansa, Mwense and Nchelenge SEFs in Luapula Province, Zambia	Building Energy	Project Manager & EAP
ESG Due Diligence for the Hilton Garden Inn Development in Windhoek, Namibia	Vatange Capital	Project Manager
Mandahill Mall Rooftop PV SEF EPB, Lusaka, Zambia	Building Energy	Project Manager & EAP

savannah environmental

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CURRICULUM VITAE OF SARAH WATSON

Profession: Environnemental Consultant

Specialisation: Environmental Impact Assessment, Environmental Management, Environmental Compliance and Due Diligence, and Compilation of Reports for projects in the infrastructure sector.

Work Experience: Seven (7) years in the environmental field

VOCATIONAL EXPERIENCE

Sarah has a Bachelor of Social Science (B.Soc.Sci.) Honours Degree in Geography and Environmental Management from the University of KwaZulu-Natal (UKZN), and seven (7) years of experience as an Environmental Consultant in the field of Environmental Impact Assessment and Environmental Management. She has experience working on a range of projects, specifically within the telecommunications; residential; industrial; bulk infrastructure; rural development; and energy sectors.

SKILLS BASE AND CORE COMPETENCIES

- Environmental Assessment
- Environmental Management
- Environmental Compliance Monitoring
- Geographic Information System (GIS)
- Stakeholder Engagement

EDUCATION AND PROFESSIONAL STATUS

Degrees:

- B.Soc.Sci. Honours in Geography and Environmental Management, University of KwaZulu-Natal, 2007.
- B.Soc.Sci. Geography and Environmental Management, University of KwaZulu-Natal, 2006.

Professional Society Affiliations:

- Member of the South African affiliate of the International Association for Impact Assessment (IAIAsa).

- Member of the Society of South African Geographers (SSAG).

EMPLOYMENT

Date	Company	Roles and Responsibilities
October 2016 – Current	Savannah Environmental (Pty) Ltd	Environmental Consultant *Tasks included: Executing Environmental Impact Assessment (EIA) processes, GIS Work, Environmental Screening, Environmental Due Diligence, and Environmental Management and auditing*
December 2013 – December 2014	Golder Associates Africa (Pty) Ltd	Environmental Consultant *Tasks included: Executing Environmental Impact Assessment (EIA) and Basic Assessment (BA) processes, GIS work, Environmental Due Diligence, and Environmental Management and auditing*
January 2011 – November 2013	Scientific and Industrial Research (CSIR)	Environmental Consultant *Tasks included: Executing Environmental Impact Assessment (EIA) and Basic Assessment (BA) processes, GIS work, Public Participation, Environmental Screening, and Environmental Management*
April 2008 – December 2010	K2M Environmental (Pty) Ltd	Environmental Consultant *Tasks included: Assisting Senior Environmental Consultant with executing Basic Assessment (BA) processes, GIS work, Public Participation, Preliminary Environmental Screening, and Environmental Managements*

PROJECT EXPERIENCE

<u>Renewable Power Generation Projects: Solar Energy Facilities</u>

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	*Client Name*	*Role*
Combined EIA for the Betelgeuse PV Solar Projects 1, 2, 3 and 4; between Murraysburg and Victoria West, Western Cape Province.	*Aurora Power Solutions (Pty) Ltd*	*Environmental, GIS and Public Participation Consultant (Scoping Phase)*
EIA for the 75 MW Glen Thorne PV Solar Facility, near Bloemfontein, Free State Province.	*SolaireDirect*	*Author of the draft Scoping Report (SR)*

Basic Assessments

Project Name & Location	*Client Name*	*Role*

BA for the PV Power Project on Kennilworth Farm, Northern Cape.	*Biotherm Energy*	*Author of the draft Basic Assessment Report (BAR)*

Screening Studies

Project Name & Location	***Client Name***	***Role***
Environmental Site Screening Assessment For Solar PV Energy Facilities proposed at Salima, Lilongwe and Golomoti, Central Region, Malawi.	*H1 Holdings (Pty) Ltd*	*Environmental and GIS Consultant*

Environmental Compliance, Auditing and ECO

Project Name & Location	***Client Name***	***Role***
2017 Annual Environmental Compliance Evaluation with the Equator Principles and Environmental and Social Action Plan for the Mulilo Solar PV De Aar Photovoltaic Solar Energy Facility, Northern Cape Province	*Mulilo Renewable Energy Solar PV De Aar (Pty) Ltd*	*Auditor*
2017 Annual Environmental Compliance Evaluation with the Equator Principles and Environmental and Social Action Plan for the Mulilo Solar PV Prieska Photovoltaic Solar Energy Facility, Northern Cape Province	*Mulilo Renewable Energy Solar PV Prieska (Pty) Ltd*	*Auditor*
Biannual Environmental Compliance Audit of the Konkoonsies 10MW Photovoltaic (PV) Solar Energy Facility near Pofadder, Northern Cape Province	*Limarco 77(Pty) Ltd*	*Auditor*
Biannual Environmental Compliance Audit of the Aries 10MW Photovoltaic (PV) Solar Energy Facility near Kenhardt, Northern Cape Province	*Sevenstones 159 (Pty) Ltd*	*Auditor*
Final Environmental Compliance Audit for the Xina Solar One Thermal Plant, near Pofadder, Northern Cape Province	*Xina Solar One RF (Pty) Ltd*	*Auditor*

<u>Renewable Power Generation Projects: Wind Energy Facilities</u>

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	***Client Name***	***Role***
Combined EIA for the Ishwati Emoyeni Wind Energy Facility and associated Eskom Grid Connection Infrastructure, near Murraysburg, Western Cape Province.	*Windlab Developments South Africa (Pty) Ltd (WDSA)*	*Environmental, GIS, and Public Participation Consultant (Scoping Phase)*
EIA for the proposed Universal Wind Energy Project in the Coega IDZ, Eastern Cape Province.	*Universal Wind*	*Environmental Consultant*

Screening Studies

Project Name & Location	***Client Name***	***Role***
Environmental Screening Study (ESS) of Sites being Investigated for Potential Wind Energy Projects, in the Northern Cape, Eastern Cape, Western Cape; and KwaZulu-Natal Provinces.	*Confidential*	*Environmental and GIS Consultant*

Due Diligence Reporting

Project Name & Location	Client Name	Role
Environmental and Social Due Diligence Report for the Roggeveld Wind Farm in the Northern and Western Cape Province.	*Building Energy South Africa (Pty) Ltd*	*Environmental Consultant*

Conventional Power Generation Projects (Coal)

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
H2 Energy Power Station and associated infrastructure near KwaMhlanga, Mpumalanga Province.	*H2 Clean Energy (Pty) Ltd*	*Environmental and GIS Consultant*
Mutsho Power Project and Associated Infrastructure on a site near Makhado (Louis Trichardt), Limpopo Province.	*Mutsho Power (Pty) Ltd*	*Environmental and GIS Consultant*

Screening Studies

Project Name & Location	Client Name	Role
Environmental Site Screening Assessment for a new coal-fired power station near Makhado (Louis Trichardt), Limpopo Province.	*Confidential*	*Environmental and GIS Consultant*

Mining Sector Projects

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
ESIA for a proposed Iron Ore Mine near Melmoth, Northern KwaZulu-Natal.	*Jindal Mining (Pty) Ltd*	*Environmental Consultant (Scoping Phase)*
ESIA for a proposed Iron Ore Processing Site near Melmoth, KwaZulu-Natal Province.	*Jindal Processing (Pty) Ltd*	*Environmental Consultant (Scoping Phase)*

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
Independent External Compliance audit of Palesa Mine's Integrated Water Use License (IWUL), near KwaMhlanga, Mpumalanga Province	*HCI Coal*	*Auditor*
Independent External Compliance audit of Palesa Mine's Waste Management License (WML), near KwaMhlanga, Mpumalanga Province	*HCI Coal*	*Auditor*
Independent External Compliance audit of Mbali Mine's Integrated Water Use License (IWUL), near Ogies, Mpumalanga Province	*HCI Coal*	*Auditor*

Infrastructure Development Projects (bridges, pipelines, roads, etc.)

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	***Client Name***	***Role***
EIA for the proposed Vopak-Reatile Terminal Richards Bay Bulk Liquid Storage and Handling Facility, Richards Bay, KwaZulu-Natal Province.	*Vopak South Africa Developments (Pty) Ltd.*	*Environmental Consultant (Scoping Phase)*
EIA for a proposed Common User Marine Servitude and Pipelines	*Coega Development Corporation (CDC)*	*Environmental Consultant (Scoping Phase)*

Basic Assessments

Project Name & Location	***Client Name***	***Role***
BA for site clearing and site preparation activities on Lots 4 and 5 of Portion 3 of Erf 11478 in the South Dunes Precinct of the Port of Richards Bay, KwaZulu-Natal Province.	*Vopak South Africa Developments (Pty) Ltd.*	*Environmental Consultant*
BA for the proposed Hlabisa Bulk Water Supply Scheme, Hlabisa, KwaZulu-Natal Province.	*Mhlathuze Water*	*Environmental, GIS and Public Participation Consultant*
BA for the proposed construction of a Bulk Sewage Rising Main, City of uMhlathuze, KwaZulu-Natal Province.	*City of uMhlathuze Local Municipality.*	*Environmental, GIS and Public Participation Consultant*
BA for the proposed Rita Light Industrial Park Development, near Camperdown, KwaZulu-Natal Province.	*Daisy Wheel Investments (Pty) Ltd*	*Environmental, GIS and Public Participation Consultant*
BA for the development of a Light Industrial Park on Portion 10 of the Farm Balgowrie, Camperdown, KwaZulu-Natal.	*Daisy Wheel Investments (Pty) Ltd*	*Environmental, GIS and Public Participation Consultant*
BA for the construction of a MTN Telecommunication Mast and associated Base Station near Richards Bay, KwaZulu-Natal Province.	*BSO International on behalf of MTN*	*Environmental, GIS and Public Participation Consultant*
BA for the construction of a MTN Telecommunication Mast and associated Base Station at Felixton, near Empangeni, KwaZulu-Natal Province.	*BSO International on behalf of MTN*	*Environmental, GIS and Public Participation Consultant*
BA for the construction of a MTN Telecommunication Mast and associated Base Station near Ballito, KwaZulu-Natal Province.	*BSO International on behalf of MTN*	*Environmental, GIS and Public Participation Consultant*
BA for the construction of a MTN Telecommunication Mast and associated Base Station near Howick, KwaZulu-Natal Province.	*BSO International on behalf of MTN*	*Environmental, GIS and Public Participation Consultant*
BA for the construction of a MTN Telecommunication Mast and associated Base Station near Richmond, KwaZulu-Natal Province.	*BSO International on behalf of MTN*	*Environmental, GIS and Public Participation Consultant*
BA for the construction of a MTN Telecommunication Mast and associated Base Station in Durban, KwaZulu-Natal Province.	*BSO International on behalf of MTN*	*Environmental, GIS and Public Participation Consultant*
BA for the construction of a MTN Telecommunication Mast and associated Base Station near Kokstad, KwaZulu-Natal Province.	*BSO International on behalf of MTN*	*Environmental, GIS and Public Participation Consultant*

Project Name & Location	***Client Name***	***Role***
BA for the construction of a MTN Telecommunication Mast and associated Base Station near Richmond, KwaZulu-Natal Province.	*BSO International on behalf of MTN*	*Environmental, GIS and Public Participation Consultant*
BA for the construction of a MTN Telecommunication Mast and associated Base Station near Mkondeni, Pietermaritzburg, KwaZulu-Natal Province.	*BSO International on behalf of MTN*	*Environmental, GIS and Public Participation Consultant*
BA for the construction of a MTN Telecommunication Mast and associated Base Station in Pietermaritzburg, KwaZulu-Natal Province.	*BSO International on behalf of MTN*	*Environmental, GIS and Public Participation Consultant*
BA for the construction of a MTN Telecommunication Mast and associated Base Station in Bulwer, KwaZulu-Natal Province.	*BSO International on behalf of MTN*	*Environmental, GIS and Public Participation Consultant*
BA for the construction of a MTN Telecommunication Mast and associated Base Station near Camperdown, KwaZulu-Natal Province.	*BSO International on behalf of MTN*	*Environmental, GIS and Public Participation Consultant*
BA for the construction of a MTN Telecommunication Mast and associated Base Station near Underberg, KwaZulu-Natal Province.	*BSO International on behalf of MTN*	*Environmental, GIS and Public Participation Consultant*
BA for the construction of a MTN Telecommunication Mast and associated Base Station in Cowies Hill, KwaZulu-Natal Province.	*BSO International on behalf of MTN*	*Environmental, GIS and Public Participation Consultant*
BA for the construction of a MTN Telecommunication Mast and associated Base Station in Phoenix, KwaZulu-Natal Province.	*BSO International on behalf of MTN*	*Environmental, GIS and Public Participation Consultant*
BA for the construction of a MTN Telecommunication Mast and associated Base Station near Kokstad, Eastern Cape Province.	*BSO International on behalf of MTN*	*Environmental, GIS and Public Participation Consultant*
BA for the construction of a MTN Telecommunication Mast and associated Base Station near Vulindlela, KwaZulu-Natal Province.	*BSO International on behalf of MTN*	*Environmental, GIS and Public Participation Consultant*
BA for the construction of a MTN Telecommunication Mast and associated Base Station near Mpendle, KwaZulu-Natal Province.	*BSO International on behalf of MTN*	*Environmental, GIS and Public Participation Consultant*
BA for the construction of a MultiChoice Water Tower Transmission Installations and associated Base Stations in Isipingo, KwaZulu-Natal Province	*BSO International on behalf of MultiChoice*	*Environmental, GIS and Public Participation Consultant*
BA for the construction of a MultiChoice Water Tower Transmission Installations and associated Base Stations in Umlazi, KwaZulu-Natal Province	*BSO International on behalf of MultiChoice*	*Environmental, GIS and Public Participation Consultant*
BA for the construction of a MultiChoice Rooftop Transmission Installation and associated Base Station in Reservoir Hills, KwaZulu-Natal Province.	*BSO International on behalf of MultiChoice*	*Environmental, GIS and Public Participation Consultant*
BA for the construction of a MultiChoice Rooftop Transmission Installation and associated Base Station in Wentworth, KwaZulu-Natal Province.	*BSO International on behalf of MultiChoice*	*Environmental, GIS and Public Participation Consultant*
BA for the construction of a MultiChoice Rooftop Transmission Installation and associated Base Station in Queensburgh, KwaZulu-Natal Province.	*BSO International on behalf of MultiChoice*	*Environmental, GIS and Public Participation Consultant*

Project Name & Location	Client Name	Role
BA for the construction of a MultiChoice Rooftop Transmission Installation and associated Base Station at the University of KwaZulu-Natal (UKZN), KwaZulu-Natal Province.	*BSO International on behalf of MultiChoice*	*Environmental, GIS and Public Participation Consultant*
BA for the construction of a MultiChoice Rooftop Transmission Installation and associated Base Station in Amanzimtoti, KwaZulu-Natal Province.	*BSO International on behalf of MultiChoice*	*Environmental, GIS and Public Participation Consultant*
BA for the construction of an iBurst Telecommunication Mast and associated Base Station in Kloof, KwaZulu-Natal Province	*BSO International on behalf of iBurst*	*Environmental, GIS and Public Participation Consultant*

Screening Studies

Project Name & Location	Client Name	Role
ESS for the proposed Development of Pier 1 Phase 2 Container Terminal in the Port of Durban, KwaZulu-Natal Province.	*Transnet Capital Projects (TCP).*	*Environmental Consultant and co-author*

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
Construction of a New Distribution Centre and Warehouse on Erf 5539 and 5540 (Chloorkop X74), Lords View Industrial Park, Gauteng Province	*Olivier & Partners on behalf of ARB Holdings (Pty) Ltd*	*Environmental Control Officer (ECO)*
Gap Analysis of Venture Diversified Product (VDP) Rosslyn Facility's EMS, in Rosslyn, Gauteng Province	*Venture Diversified Product (VDP) Rosslyn*	*Auditor*
Construction of the Hlabisa Bulk Water Supply Scheme, in Hlabisa, KwaZulu-Natal Province	*Mhlathuze Water*	*Environmental Control Officer (ECO)*

Training

Project Name & Location	Client Name	Role
Capacity Building Workshop on Amended Environmental Impact Assessment Regulations and Associated Legislation, Durban, KwaZulu-Natal	*Transnet*	*Assistant Environmental Consultant and Researcher*

Housing and Urban Projects

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
EMP for the Makhasaneni Rural Subsidised Housing Development, in Mthonjaneni (Ward 5), KwaZulu-Natal Province.	*Stedone Developments and Bigen Africa on behalf of the Mthonjaneni Local Municipality, and the KwaZulu-Natal Department of Housing.*	*Environmental and GIS Consultant*
EMP for the Ntembisweni Rural Subsidised Housing Development in the Ntembisweni Traditional Authority Area near Greytown, KwaZulu-Natal Province.	*Stedone Developments and Bigen Africa on behalf of the Umvoti Local Municipality, and the KwaZulu-Natal Department of Housing.*	*Environmental and GIS Consultant*

Project Name & Location	Client Name	Role
EMP for the Sikhonyane Rural Subsidised Housing Development, in the Sikhonyane Traditional Authority area, KwaZulu-Natal Province.	*Stedone Developments and Bigen Africa on behalf of the Mandeni Local Municipality, and the KwaZulu-Natal Department of Housing.*	*Environmental and GIS Consultant*
EMP for the Umzumbe Cluster A Rural Subsidised Housing Development, near Umzumbe, KwaZulu-Natal Province.	*Stedone Developments and Bigen Africa on behalf of the Umzumbe Local Municipality, and the KwaZulu-Natal Department of Housing.*	*Environmental and GIS Consultant*
EMP for the Applebosch Rural Subsidised Housing Development near Ndwedwe, KwaZulu-Natal Province.	*Stedone Developments and Bigen Africa on behalf of the Msunduzi Local Municipality, and the KwaZulu-Natal Department of Housing.*	*Environmental and GIS Consultant*

Basic Assessments

Project Name & Location	Client Name	Role
BA for the proposed Loch-Sloy Rural Subsidised Housing Development, near Estcourt, KwaZulu-Natal Province.	*Imbabazane Local Municipality*	*Environmental, GIS and Public Participation Consultant*
BA for the proposed "Living in THE PARK" Residential Development, near Albert Falls, KwaZulu-Natal Province.	*J.H.K Developers*	*Environmental, GIS and Public Participation Consultant*
BA for the proposed Residential Development on the Remainder of Erf 215, Prince's Grant, KwaZulu-Natal Province.	*Princes Grant*	*Environmental, GIS and Public Participation Consultant*
BA for the proposed Greenmeadow Lane Retirement Village, KwaZulu-Natal Province.	*Rodney Blake Jolly on behalf of Georgies Avenue Investments (Pty) Ltd*	*Environmental, GIS and Public Participation Consultant*

Screening Studies

Project Name & Location	Client Name	Role
Preliminary Environmental Assessment for a Rural Subsidised Housing Development, in the Ntembisweni Traditional Authority area near Greytown, KwaZulu-Natal Province.	*Stedone Developments and Bigen Africa on behalf of the Umvoti Local Municipality, and the KwaZulu-Natal Department of Housing.*	*Environmental and GIS Consultant*
Preliminary Environmental Assessment for a Rural Subsidised Housing Development, in the Mkhwanazi Traditional Authority area, KwaZulu-Natal Province.	*Stedone Developments and Bigen Africa on behalf of the City of uMhlathuze Local Municipality, and the KwaZulu-Natal Department of Housing.*	*Environmental and GIS Consultant*
Preliminary Environmental Assessment for a Rural Subsidised Housing Development, at Makhasaneni in Ward 5 of the Mthonjaneni Local Municipality, KwaZulu-Natal Province.	*Stedone Developments and Bigen Africa on behalf of the Mthonjaneni Local Municipality, and the KwaZulu-Natal Department of Housing.*	*Environmental and GIS Consultant*

Project Name & Location	***Client Name***	***Role***
Preliminary Environmental Assessment for a Rural Subsidised Housing Development, at the Sikhonyane Traditional Authority area, KwaZulu-Natal Province.	*Stedone Developments and Bigen Africa on behalf of the Mandeni Local Municipality, and the KwaZulu-Natal Department of Housing.*	*Environmental and GIS Consultant*
Preliminary Environmental Assessment for a Rural Subsidised Housing Development, near Ndwedwe, KwaZulu-Natal Province.	*Stedone Developments and Bigen Africa on behalf of the Msunduzi Local Municipality, and the KwaZulu-Natal Department of Housing.*	*Environmental and GIS Consultant*
Preliminary Environmental Assessment for a Rural Subsidised Housing Development, at Nxamalala Traditional Authority area, KwaZulu-Natal Province.	*Stedone Developments and Bigen Africa on behalf of the Impendle Local Municipality, and the KwaZulu-Natal Department of Housing.*	*Environmental and GIS Consultant*
Preliminary Environmental Assessment for a Rural Subsidised Housing Development, KwaZulu-Natal Province.	*Stedone Developments and Bigen Africa on behalf of the Local Municipality, and the KwaZulu-Natal Department of Housing.*	*Environmental and GIS Consultant*
Preliminary Environmental Assessment for a Rural Subsidised Housing Development, at KwaDolo Traditional Authority area, KwaZulu-Natal Province.	*Stedone Developments and Bigen Africa on behalf of the Msinga Local Municipality, and the KwaZulu-Natal Department of Housing.*	*Environmental and GIS Consultant*
Preliminary Environmental Assessment for a Rural Subsidised Housing Development, at Ndlangubo Traditional Authority area, KwaZulu-Natal Province.	*Stedone Developments and Bigen Africa on behalf of the uMlalazi Local Municipality, and the KwaZulu-Natal Department of Housing.*	*Environmental and GIS Consultant*
Preliminary Environmental Assessment for a Rural Subsidised Housing Development, at the Embo Traditional Authority area, KwaZulu-Natal Province.	*Stedone Developments and Bigen Africa on behalf of the Maphumulo Local Municipality, and the KwaZulu-Natal Department of Housing.*	*Environmental and GIS Consultant*
Preliminary Environmental Assessment for a Rural Subsidised Housing Development, at Mthandeni Traditional Authority area, KwaZulu-Natal Province.	*Stedone Developments and Bigen Africa on behalf of the Maphumulo Local Municipality, and the KwaZulu-Natal Department of Housing.*	*Environmental and GIS Consultant*
Preliminary Environmental Assessment for the Highflats Slum Clearance Housing Project near Ixopo, KwaZulu-Natal Province.	*Stedone Developments and Bigen Africa on behalf of the Ubuhlebezwe Local Municipality, and the KwaZulu-Natal Department of Housing.*	*Environmental and GIS Consultant*

Environmental Permitting & WUL Applications

Project Name & Location	***Client Name***	***Role***
Application for Planning Consent for the proposed Kwamavundla Rural Subsidised Housing Development in the Kwamavundla Traditional Authority area, KwaZulu-Natal Province.	*Stedone Developments and Bigen Africa on behalf of the Hibiscus Coast Local Municipality, and the KwaZulu-Natal Department of Housing.*	*GIS Consultant and assistant Environmental Consultant*
Application for Planning Consent for the proposed Ngolokodo Rural Subsidised Housing Development, near Nquthu KwaZulu-Natal Province.	*Stedone Developments and Bigen Africa on behalf of the Ubuhlebezwe Local Municipality, and the KwaZulu-Natal Department of Housing.*	*GIS Consultant and assistant Environmental Consultant*
Application for Planning Consent for the proposed Mdletshe Traditional Authority Rural Subsidised Housing Development, KwaZulu-Natal Province.	*Stedone Developments and Bigen Africa on behalf of the Hlabisa Local Municipality, and the KwaZulu-Natal Department of Housing.*	*GIS Consultant and assistant Environmental Consultant*
Application for Planning Consent for the proposed Makhasaneni Rural Subsidised Housing Development, KwaZulu-Natal Province.	*Stedone Developments and Bigen Africa on behalf of the Mthonjaneni Local Municipality, and the KwaZulu-Natal Department of Housing.*	*GIS Consultant and assistant Environmental Consultant*
Application for Planning Consent for the proposed Njomelwane Rural Subsidised Housing Development, KwaZulu-Natal Province.	*Stedone Developments and Bigen Africa on behalf of the Ntambanana Local Municipality, and the KwaZulu-Natal Department of Housing.*	*GIS Consultant and assistant Environmental Consultant*
Application for Planning Consent for the proposed Umzumbe Cluster A Rural Subsidised Housing Development, KwaZulu-Natal Province.	*Stedone Developments and Bigen Africa on behalf of the Umzumbe Local Municipality, and the KwaZulu-Natal Department of Housing.*	*GIS Consultant and assistant Environmental Consultant*
Application for Planning Consent for the proposed Ntanzi Rural Subsidised Housing Development, KwaZulu-Natal Province.	*Stedone Developments and Bigen Africa on behalf of the Nongoma Local Municipality, and the KwaZulu-Natal Department of Housing.*	*GIS Consultant and assistant Environmental Consultant*
Application for Planning Consent for the proposed Abakwahlabisa Rural Subsidised Housing Development, KwaZulu-Natal Province.	*Stedone Developments and Bigen Africa on behalf of the Hlabisa Local Municipality, and the KwaZulu-Natal Department of Housing.*	*GIS Consultant and assistant Environmental Consultant*

Environmental Management Tools

Screening Studies

Project Name & Location	***Client Name***	***Role***
Umzinyathi District Municipality's Strategic Environmental Assessment (July 2009).	*Umzinyathi District Municipality*	*Assistant GIS Consultant*

Specialist Studies

Social Impact Assessments

Project Name & Location	***Client Name***	***Role***
BA for the Kruisvallei Hydroelectric Power Generation Scheme, Free State Province	*Zevobuzz (Pty) Ltd*	*Social Consultant*
Lake Management Plan for Lake Mzingazi, Richards Bay, KwaZulu-Natal Province	*City of uMhlathuze*	*Social Consultant (Review and update of Social Assessment)*

APPENDIX B:
EMERGENCY RESPONSE PLAN

EMERGENCY PREPAREDNESS, RESPONSE AND FIRE MANAGEMENT PLAN

1. PURPOSE

The purpose of the Emergency Preparedness and Response Plan is:

- To assist contractor personnel to prepare for and respond quickly and safely to emergency incidents, and to establish a state of readiness which will enable prompt and effective response to possible events.
- To control or limit any effect that an emergency or potential emergency may have on site or on neighbouring areas.
- To facilitate emergency response and to provide such assistance on the site as is appropriate to the occasion.
- To ensure communication of all vital information as soon as possible.
- To facilitate the reorganisation and reconstruction activities so that normal operations can be resumed.
- To provide for training so that a high level of preparedness can be continually maintained.

This plan outlines response actions for potential incidents of any size. It details response procedures that will minimise potential health and safety hazards, environmental damage, and clean-up efforts. The plan has been prepared to ensure quick access to all the information required in responding to an emergency event. The plan will enable an effective, comprehensive response to prevent injury or damage to the construction personnel, public, and environment during the project. Contractors are expected to comply with all procedures described in this document. A Method Statement should be prepared at the commencement of construction detailing how this plan is to be implemented as well as details of relevant responsible parties for the implementation. The Method Statement must also reflect conditions of the IFC Performance Standard 1 and include the following:

- Identification of areas where accidents and emergency situations may occur.
- Communities and individuals that may be impacted.
- Response procedure.
- Provisions of equipment and resources.
- Designation of responsibilities.
- Communication.
- Periodic training to ensure effective response to potentially affected communities.

2. PROJECT-SPECIFIC DETAILS

Fuel will be stored within the construction camp on site during construction. The potential for contaminating the soil resource is dependent on the presence of vehicles, machinery and processes involving various types of chemicals. The presence of people on the site during both construction and operation could increase the risk of fire in the area if appropriate prevention measures are not in place.

Due to the scale and nature of this development, it is anticipated that the following risks could potentially arise during the construction and operations phases:

- Fires.

- Leakage of hazardous substances.
- Storage of flammable materials and substances.
- Flood events and overflow of wastewater retention dam.
- Accidents.
- Natural disasters.

3. EMERGENCY RESPONSE PLAN

There are three levels of emergency as follows:

- **Local Emergency:** An alert confined to a specific locality.
- **Site Emergency:** An alert that cannot be localised and which presents danger to other areas within the site boundary or outside the site boundary.
- **Evacuation:** An alert when all personnel are required to leave the affected area and assemble in a safe location.

If there is any doubt as to whether any hazardous situation constitutes an emergency, then it must be treated as an Evacuation.

Every effort must be made to control, reduce or stop the cause of any emergency provided it is safe to do so. For example, in the event of a fire, isolate the fuel supply and limit the propagation of the fire by cooling the adjacent areas. Then confine and extinguish the fire (where appropriate) making sure that re-ignition cannot occur; for a gas fire it is usually appropriate to isolate the fuel and let it burn itself out but keep everything around the fire cold.

3.1. Emergency Scenario Contingency Planning

3.1.1. Scenario: Spill which would result in the contamination of land, surface or groundwater

i. Spill Prevention Measures

Preventing spills must be the top priority at all operations which have the potential of endangering the environment. The responsibility to effectively prevent and mitigate any scenario lies with the Contractor and the ECO. In order to reduce the risk of spills and associated contamination, the following principles should be considered during construction and operation activities:

- All equipment refuelling, servicing and maintenance activities should only be undertaken within appropriately sealed designated areas.
- All maintenance materials, oils, grease, lubricants, etc. should be stored in a designated area in an appropriate storage container.
- No refuelling, storage, servicing, or maintenance of equipment should take place within 50m of drainage lines or sensitive environmental resources in order to reduce the risk of contamination by spills.
- No refuelling or servicing should be undertaken without absorbent material or drip pans properly placed to contain spilled fuel.
- Any fluids drained from the machinery during servicing should be collected in leak-proof containers and taken to an appropriate disposal or recycling facility.

- If these activities result in damage or accumulation of product on the soil, the contaminated soil must be disposed of as hazardous waste. Under no circumstances shall contaminated soil be added to a spoils pile and transported to a regular disposal site.
- Chemical toilets used during construction must be regularly cleaned. Chemicals used in toilets are also hazardous to the environment and must be controlled. Portable chemical toilets could overflow if not pumped regularly or they could spill if dropped or overturned during moving. Care and due diligence should be taken at all times.
- Contact details of emergency services and HazMat Response Contractors are to be clearly displayed on the site. All staff are to be made aware of these details and must be familiar with the procedures for notification in the event of an emergency.

ii. Procedures

The following action plan is proposed in the event of a spill:

1. Spill or release identified.
2. Assess personal safety, safety of others and environment.
3. Stop the spill if safely possible.
4. Contain spill to limit entering water bodies and surrounding areas.
5. Identify substance spilled.
6. Quantify spill (under or over guideline/threshold levels).
7. Notify Site Manager and emergency response crew and authorities (in event of major spill).
8. Inform users (and downstream users) of potential risk.
9. Clean up of spill using spill kit or by HazMat team.
10. Record spill incident on company database.

a) Procedures for containing and controlling the spill (i.e. on land or in water)

Measures can be taken to prepare for quick and effective containment of any potential spills. Each contractor must keep sufficient supplies of spill containment equipment at the construction sites, at all times during and after the construction phase. These should include specialised spill kits or spill containment equipment. Other spill containment measures include using drip pans underneath vehicles and equipment every time refuelling, servicing, or maintenance activities are undertaken.

Specific spill containment methods for land and water contamination are outlined below.

Containment of Spills on Land

Spills on land include spills on rock, gravel, soil and/or vegetation. It is important to note that soil is a natural sorbent, and therefore spills on soil are generally less serious than spills on water as contaminated soil can be more easily recovered. It is important that all measures be undertaken to avoid spills reaching open water bodies. The following methods could be used:

- *Dykes*
  Dykes can be created using soil surrounding a spill on land. These dykes are constructed around the perimeter or down slope of the spilled substance. A dyke needs to be built up to a size that will ensure containment of the maximum quantity of contaminant that may reach it. A plastic tarp can be

placed on and at the base of the dyke such that the contaminant can pool up and subsequently be removed with sorbent materials or by being pumped into barrels or bags. If the spill is migrating very slowly, a dyke may not be necessary and sorbents can be used to soak up contaminants before they migrate away from the source of the spill.

» *Trenches*
Trenches can be dug out to contain spills. Spades, pick axes or a front-end loader can be used depending on the size of trench required. Spilled substances can then be recovered using a pump or sorbent materials.

Containment of Spills on Water

Spills in water can negatively impact water quality and aquatic life. All measures need to be undertaken to contain spills on open water. The following methods could be used:

» *Weirs*
Weirs can be used to contain spills in streams and to prevent further migration downstream. Plywood or other materials found on site can be placed into and across the width of the stream, such that water can still flow under the weir. Weirs are however only effective for spilled substances which float on the water surface.

» *Barriers*
In some situations barriers made of netting or fence material can be installed across a stream, and sorbent materials placed at the base to absorb spilled substance. Sorbents will need to be replaced as soon as they are saturated. Water will be allowed to flow through.

b) Procedures for transferring, storing, and managing spill related wastes

Used sorbent materials are to be placed in plastic bags for future disposal. All materials mentioned in this section are to be available in the spill kits. Following clean up, any tools or equipment used must be properly washed and decontaminated, or replaced if this is not possible.

Spilled substances and materials used for containment must be placed into empty waste oil containers and sealed for proper disposal at an approved disposal facility.

c) Procedures for restoring affected areas

Criteria that may be considered include natural biodegradation of oil, replacement of soil and revegetation. Once a spill of reportable size has been contained, the ECO and the relevant Authority must be consulted to confirm that the appropriate clean up levels are met.

3.1.2. Scenario: Fire (and fire water handling)

i. Action Plan

The following action plan is proposed in the event of a fire:

1. Quantify risk.
2. Assess personal safety, safety of others and environment.
3. If safe – attempt to extinguish fire using appropriate equipment.
4. If not safe to extinguish, contain fire.
5. Notify Site Manager and emergency response crew and authorities.
6. Inform users (and downstream users) of potential risk of fire.
7. Record incident on company database.

ii. Procedures

Because large scale fires may spread very fast in the environment it is most advisable that the employee/contractor not put his/her life in danger in the case of an uncontrolled fire.

Portable firefighting equipment must be provided in line with the Building Code of South Africa and the relevant provincial building code. All emergency equipment including portable fire extinguisher, hose reels, hydrants must be maintained and inspected by a qualified contractor in accordance with the relevant legislation and National standards.

Current evacuation signs and diagrams for the building or site that are compliant to relevant state legislation must be provided in a conspicuous position, on each evacuation route. Contact details for the relevant emergency services should be clearly displayed on site and all employees should be aware of procedures to follow in the case of an emergency.

a) Procedures for initial actions

Persons should not fight the fire if any of the following conditions exist:

» They have not been trained or instructed in the use of a fire extinguisher.
» They do not know what is burning.
» The fire is spreading rapidly.
» They do not have the proper equipment.
» They cannot do so without a means of escape.
» They may inhale toxic smoke.

b) Reporting procedures

» Report fire immediately to the Site Manager, who will determine if it is to be reported to the relevant emergency services and authorities.
» The Site Manager must have copies of the Report form to be completed.

1. SUMMARY: RESPONSE PROCEDURE

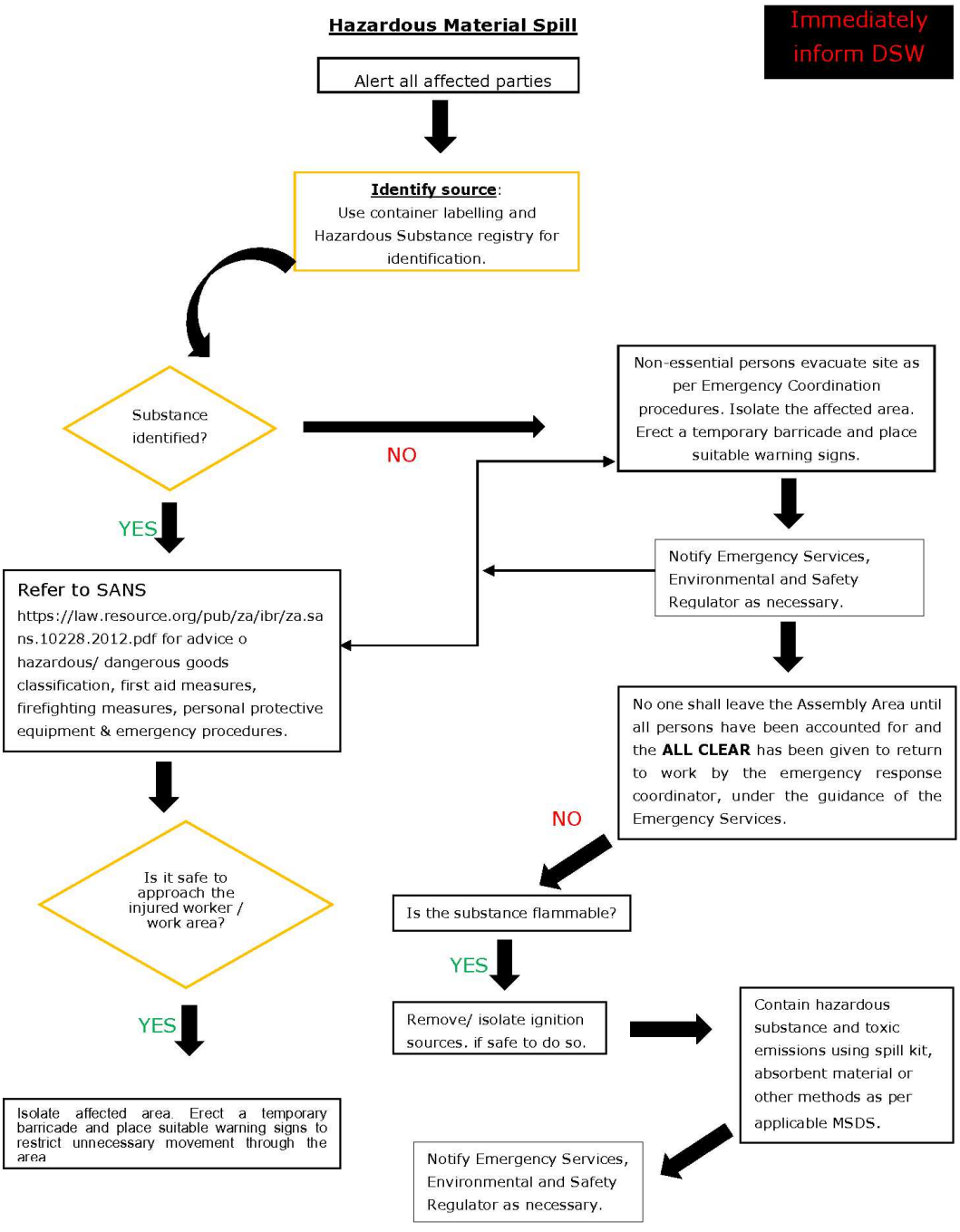

Figure 1: Hazardous Material Spill.

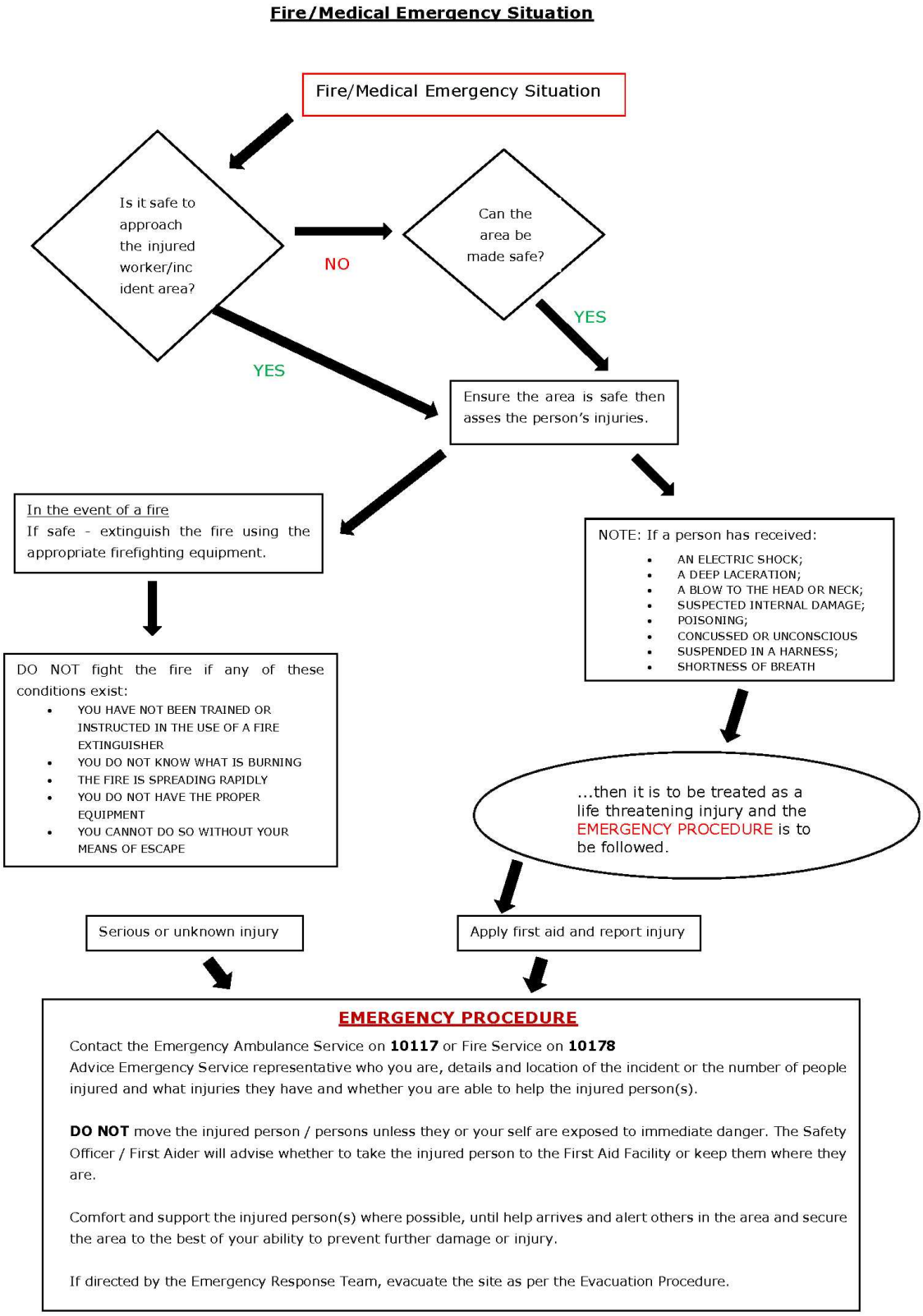

Figure 2: Emergency Fire/Medical.

APPENDIX C:
ALIEN INVASIVE PLANT (AIP) MANAGEMENT PLAN

ALIEN INVASIVE PLANT (AIP) MANAGEMENT PLAN

1. PURPOSE

Alien Invasive Plant (AIP) species pose the second largest threat to biodiversity after direct habitat destruction. The purpose of this Alien Invasive Plant (AIP) Management Plan is to provide a framework for the management of alien and invasive plant species within the project site during the construction and operation of the Mutsho Power Project. The broad objectives of the plan includes the following:

- Ensure alien plants do not become dominant in parts or the whole site through the control and management of alien and invasive species presence, dispersal and encroachment.
- Develop and implement a monitoring and eradication programme for alien and invasive plant species.
- Promote the natural re-establishment and planting of indigenous species in order to retard erosion and alien plant invasion.

2. LEGISLATIVE CONTEXT

Conservation of Agricultural Resources Act (No. 43 of 1983) (CARA)

In terms of the amendments to the regulations under the Conservation of Agricultural Resources Act (No. 43 of 1983) (CARA), all declared alien plant species must be effectively controlled. Landowners are legally responsible for the control of invasive alien plants on their properties. In terms of this Act, 198 alien species are listed as declared weeds and invaders and ascribed to one of the following categories:

- **Category 1:** Prohibited and must be controlled.
- **Category 2 (commercially used plants):** May be grown in demarcated areas provided that there is a permit and that steps are taken to prevent their spread.
- **Category 3 (ornamentally used plants):** May no longer be planted. Existing plants may be retained as long as all reasonable steps are taken to prevent the spreading thereof, except within the flood line of watercourses and wetlands.

National Environmental Management: Biodiversity Act (No.10 of 2004) (NEM:BA)

The National Environmental Management: Biodiversity Act (No. 10 of 2004) (NEM:BA) regulates all invasive organisms in South Africa, including a wide range of fauna and flora. Regulations have been published under NEM:BA in Government Notices GNR 506, 507, 508 and 509 of 2013. According to this Act and the Regulations, any species designated under Section 70 cannot be propagated, grown, bought or sold without a permit. Below is an explanation of the three categories:

- **Category 1a:** Invasive species requiring compulsory control. Any specimens of Category 1a listed species need, by law, to be eradicated from the environment. No permits will be issued.
- **Category 1b:** Invasive species requiring compulsory control as part of an invasive species control programme. Remove and destroy. These plants are deemed to have such a high invasive potential that infestations can qualify to be placed under a government sponsored invasive species management programme. No permits will be issued.

- **Category 2:** Invasive species regulated by area. A demarcation permit is required to import, possess, grow, breed, move, sell, buy or accept as a gift any plants listed as Category 2 plants. No permits will be issued for Category 2 plants to exist in riparian zones.
- **Category 3:** Invasive species regulated by activity. An individual plant permit is required to undertake any of the following restricted activities (import, possess, grow, breed, move, sell, buy or accept as a gift) involving a Category 3 species. No permits will be issued for Category 3 plants to exist in riparian zones.

Plants listed under the above categories are detailed within Notice 1 of the Alien and Invasive Species published in GNR 599 of 01 August 2014. The following guide is a useful starting point for the identification of alien plant species: Bromilow, C. 2010. Problem Plants and Alien Weeds of South Africa. Briza, Pretoria.

It is important to note that alien plant species that are regulated in terms of the Conservation of Agricultural Resources Act (No. 43 of 1983) (CARA) as weeds and invader plants are exempted from NEM:BA. This implies that the provisions of CARA in respect of listed weed and invader plants supersede those of NEM:BA.

3. ALIEN PLANT MANAGEMENT PRINCIPLES

3.1. Prevention and early eradication

A prevention strategy should be considered and established, including regular surveys and monitoring for invasive alien plants, effective rehabilitation of disturbed areas and prevention of unnecessary disturbance of natural areas.

Monitoring plans should be developed which are designed to identify Alien Invasive Plant Species shortly after they establish in the project area. Keeping up to date on which weeds are an immediate threat to the site is important, but efforts should be planned to update this information on a regular basis. When new Alien Invasive Plant Species are recorded on site, an immediate response of locating the site for future monitoring and either hand-pulling the weeds or an application of a suitable herbicide (where permissible only) should be planned. It is, however, better to monitor regularly and act swiftly than to allow alien invasive plants to become established on site.

3.2. Containment and control

If any alien invasive plants are found to become established on site, action plans for their control should be developed, depending on the size of the infestations, budgets, manpower considerations and time must also be allocated. Separate plans of control actions should be developed for each location and/or each species. Appropriate registered chemicals and other possible control agents should be considered in the action plans for each site / species. The key is to ensure that no invasions get out of control. Effective containment and control will ensure that the least energy and resources are required to maintain this status over the long-term. This will also be an indicator that natural systems are impacted to the smallest degree possible.

3.3. General Clearing and Guiding Principles

Alien invasive plant species control programs are long-term management projects and should include a clearing plan which includes follow up actions for rehabilitation of the cleared area. The lighter infested areas should be cleared first to prevent the build-up of seed banks. Pre-existing dense mature stands should ideally be left for last, as they probably won't increase in density or pose a greater threat than they are currently. Collective management and planning with neighbours may be required in the case of large woody invaders as seeds of alien invasive plant species are easily dispersed across boundaries by wind or water courses. All clearing actions should be monitored and documented to keep records of which areas are due for follow-up clearing.

i. Clearing Methods

Different species require different clearing methods such as manual, chemical or biological methods or a combination of both. Care should however be taken that the clearing methods used do not encourage further invasion. As such, regardless of the methods used, disturbance to the soil should be kept to a minimum.

Fire shall not be used for alien species control or vegetation management at the site. The best-practice clearing method for each species identified should be used.

» **Mechanical control**
This entails damaging or removing the plant by physical action. Different techniques could be used, e.g. uprooting, felling, slashing, mowing, ringbarking or bark stripping. This control option is only really feasible in sparse infestations or on a small scale, and for controlling species that do not coppice after cutting. Species that tend to coppice, need to have the cut stumps or coppice growth treated with herbicides following the mechanical treatment. Mechanical control is labour intensive and therefore expensive, and could cause severe soil disturbance and erosion.

» **Chemical Control**
Although it is usually preferable to use manual clearing methods where possible, such methods may create additional disturbance which stimulates alien plant invasion and may also be ineffective for many woody species which re-sprout. Where herbicides are to be used, the impact of the operation on the natural environment should be minimised by observing the following:

- Area contamination must be minimised by careful, accurate application with a minimum amount of herbicide to achieve good control.
- All care must be taken to prevent contamination of any water bodies. This includes due care in storage, application, cleaning equipment and disposal of containers, product and spray mixtures.
- Equipment should be washed where there is no danger of contaminating water sources and washings carefully disposed of at a suitable site.
- To avoid damage to indigenous or other desirable vegetation, products should be selected that will have the least effect on non-target vegetation.
- Coarse droplet nozzles should be fitted to avoid drift onto neighbouring vegetation.
- The appropriate health and safety procedures should also be followed regarding the storage, handling and disposal of herbicides.

For all herbicide applications, the following Regulations and guidelines should be followed:

- Working for Water: Policy on the Use of Herbicides for the Control of Alien Vegetation.
- Pesticide Management Policy for South Africa published in terms of the Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act (No. 36 of 1947) – GNR 1120 of 2010.
- South African Bureau of Standards (SABS), Standard SANS 10206 (2010)

According to Government Notice No. 13424 dated 26 July 1992, it is an offence to "*acquire, dispose, sell or use an agricultural or stock remedy for a purpose or in a manner other than that specified on the label on a container thereof or on such a container*".

Contractors using herbicides need to have a valid Pest Control Operators License (limited weeds controller) according to the Fertilizer, Farm Feeds, Agricultural Remedies and Stock Remedies Act (No. 36 of 1947). This is regulated by the Department of Agriculture, Forestry and Fisheries (DAFF).

» **Biological control**

Biological weed control consists of the use of natural enemies to reduce the vigour or reproductive potential of an alien invasive plant. Biological control agents include insects, mites, and micro-organisms such as fungi or bacteria. They usually attack specific parts of the plant, either the reproductive organs directly (i.e. flower buds, flowers or fruit) or the seeds after they have dropped. The stress caused by the biological control agent may kill a plant outright or it might impact on the plants reproductive capacity. In certain instances, the reproductive capacity is reduced to zero and the population is effectively sterilised. All of these outcomes will help to reduce the spread of the species.

To obtain biocontrol agents, provincial representatives of the Working for Water (WfW) Programme or the Directorate: Land Use and Soil Management (LUSM), Department of Agriculture, Forestry and Fisheries (DAFF) can be contacted.

3.4. General management practices

The following general management practices should be encouraged or strived for:

- » Establish an on-going monitoring programme for construction phase to detect and quantify any alien invasive species that may become established and identify the problem species.
- » Alien vegetation regrowth on areas disturbed by construction must immediately be controlled, and recorded throughout the entire site during construction and operation.
- » Care must be taken to avoid the introduction of alien invasive plant species to the site. Particular attention must be paid to imported material such as building sand or dirty earth-moving equipment. Stockpiles should be checked regularly and any weeds emerging from material stockpiles should be removed.
- » Cleared areas that have become invaded by alien species can be sprayed with appropriate herbicides provided that these are such that they break down on contact with the soil. Residual herbicides should not be used. Mechanical/ manual method should however also be considered as an option.
- » The effectiveness of vegetation control varies seasonally and this is also likely to impact alien invasive species. Control early in the wet season will allow species to re-grow and follow-up control

is likely to be required. Leaving control until late in the wet season to avoid follow-up control is unadvisable as this may allow alien species to set seed before control and hence will not contribute towards reducing alien species abundance. Vegetation control should therefore be aimed at the middle of the wet season, with a follow-up event towards the end of the wet season. No exact dates can be specified as each season is unique and management must therefore respond according to the state and progression of the vegetation.

- Alien invasive plant management is an iterative process and it may require repeated control efforts to significantly reduce the abundance of a species. This is often due to the presence of large and persistent seed banks. However, repeated control usually results in rapid decline once seed banks become depleted.
- Some alien species are best individually pulled by hand.
- Regular vegetation control to reduce plant biomass within the site should be conducted. This should be timed so as to coincide with the critical growth phases of the most important alien invasive plant species on site. This will significantly reduce the cost of alien invasive plant management as this should contribute towards the control of dominant alien species and additional targeted control will be required only for a limited number of species.
- No alien species should be cultivated on-site. If vegetation is required for aesthetic purposes, then non-invasive, water-wise locally-occurring species should be used.
- During operation, surveys for alien species should be conducted regularly. It is recommended that this be undertaken every 6 months for the first two years after construction and annually thereafter. All alien plants identified should be cleared using appropriate means.

3.5. Monitoring

In order to monitor the impact of clearing activities; follow-ups and rehabilitation efforts, monitoring must be undertaken. This section provides a description of a possible monitoring programme that will provide an assessment of the magnitude of alien plant invasion on site as well as an assessment of the success of the management programme.

In general, the following principles apply for monitoring:

- Photographic records must be kept of areas to be cleared prior to work starting and at regular intervals during initial clearing activities. Similarly, photographic records should be kept of the area from immediately before and after follow-up clearing activities. Rehabilitation processes must also be recorded.
- Simple records must be kept of daily operations, e.g. area/location cleared, labour units and, if ever used, the amount of herbicide used.
- It is important that, if monitoring results in the detection of alien invasive plants, that this leads to immediate action.

The following monitoring could be used as a baseline to ensure management of alien invasive plant species.

Construction Phase

Monitoring Action	Indicator	Timeframe
Document alien invasive species present at the site	List of alien plant species	Pre-construction and monthly thereafter
Document alien plant distribution	Alien plant distribution map within priority areas	Quarterly
Document and record alien invasive plant control measures implemented	Record of clearing activities	Quarterly
Review and evaluation of control success rate	Decline in documented alien abundance over time	Biannually

Operation Phase

Monitoring Action	Indicator	Timeframe
Document alien invasive plant species distribution and abundance over time at the site	Alien plant distribution map	Biannually
Document alien invasive plant control measures implemented and success rate achieved	» Records of control measures and their success rate. » A decline in alien distribution and cover over time at the site	Biannually
Document rehabilitation measures implemented and success achieved in problem areas	Decline in vulnerable bare areas over time	Biannually

APPENDIX D:
REHABILITATION PLAN

REHABILITATION PLAN

1. PURPOSE

The purpose of the rehabilitation plan is to ensure that areas cleared or impacted during construction activities of the proposed facility are rehabilitated with a plant cover that reduces the risk of erosion from these areas as well as restores some ecosystem function. The purpose of the rehabilitation plan for the site can be summarised as follows:

- Achieve long-term stabilisation of all disturbed areas to minimise erosion potential.
- Re-vegetate all disturbed areas with suitable local plant species.
- Minimise visual impact of disturbed areas.
- Ensure that disturbed areas are sufficient for future uses.

This Rehabilitation Plan should be closely aligned with other site-specific plans, including the Erosion Management Plan, Soil Management Plan, and Alien Invasive Plant (AIP) Management Plan. Prior to commencement of construction, a detailed Rehabilitation Plan and Method Statement for the site should be compiled with the aid of a Rehabilitation Specialist.

2. REHABILITATION METHODS

- On areas where seed and organic matter retention is low, it is recommended that soil savers are used to stabilise the soil surface. Soil savers are man-made materials, usually constructed of organic material such as hemp or jute and are usually applied in areas where traditional rehabilitation techniques are not likely to succeed.
- In areas where soil saver is used, it should be pegged down to ensure that it captures soil and organic matter flowing over the surface
- The final rehabilitated area should resemble the current composition and structure of the soil as far as practicably possible.
- Progressive rehabilitation is an important element of the rehabilitation strategy and should be implemented where feasible.
- Once rehabilitated, areas should be protected to prevent trampling and erosion.
- No construction equipment, vehicles or unauthorised personnel should be allowed onto areas that have been rehabilitated.
- Where rehabilitation sites are located within actively grazed areas, they should be fenced, this must be undertaken in consultation with the landowner.
- Fencing should be removed once a sound vegetative cover has been achieved.
- Any runnels, erosion channels or wash aways developing after revegetation should be backfilled and consolidated and the areas restored to a proper stable condition.

3. MONITORING AND FOLLOW-UP ACTION

Throughout the lifecycle of the development, regular monitoring and adaptive management must be put in place to detect any degradation of rehabilitated areas. During the construction phase, the Environmental Officer (EO) and EPC Contractor will be responsible for initiating and maintaining a suitable monitoring system. Once the development is operational, the Project Proponent will need to identify a

suitable entity that will be able to take over and maintain the monitoring cycle and initiate adaptive management as soon as it is required. Monitoring personnel must be adequately trained.

The following are the minimum criteria that should be monitored:

» Composition and density of replanted vegetation, distinguishing between species introduced for initial revegetation only and species that are part of the pre-determined desirable end state.
» Associated nature and stability of surface soils.
» Re-emergence of alien invasive plant species. If noted, remedial action must be taken immediately.

The initial revegetation period post construction is estimated to be over a period of 6 (minimum) to 12 months (maximum), or a time period specified by the rehabilitation specialist, particularly if planting of trees and shrubs occurs. The rehabilitation phase (including post seeding maintenance) should be at least 12 months (depending on time of seeding and rainfall) to ensure establishment of an acceptable plant cover is achieved (excluding invasive plant species or weeds).

Monitoring and follow-up actions are important to achieve the desired cover and soil protection. The following monitoring protocol is recommended:

» Re-vegetated areas should be monitored every 4 months for the first 12 months following construction.
» Re-vegetated areas showing inadequate surface coverage (i.e. less than 20% within 12 months after re-vegetation) should be prepared and re-vegetated.
» Any areas showing erosion, should be re-contoured and seeded with indigenous grasses or other locally occurring species which grow quickly.

If the plants have not established and the acceptable plant cover is not achieved within the specified maintenance period, maintenance of these areas shall continue until an acceptable plant cover is achieved (excluding alien invasive plant species or weeds). Additional seeding or planting may be necessary to achieve acceptable plant cover. Hand seeding may have to be considered as an option in this case.

Monitoring of rehabilitation success and follow-up adaptive management, together with clearing of emerging alien invasive plant species should continue until the decommissioning phase has been completed.

APPENDIX E:
CONCEPTUAL STORMWATER MANAGEMENT PLAN

STORMWATER MANAGEMENT PLAN

1. CONCEPTUAL STORM WATER MANAGEMENT PLAN

Power plant operations have the potential to impact upon the natural water course when storm water runoff from the power plant areas finds its way into these watercourses. This may increase levels of Suspended Solids (SS) within local watercourses thereby causing siltation of these natural water bodies. During heavy rainfalls, runoff could also mobilise chemicals and contaminants from the coal stockpile and plant area into the natural streams thereby impacting the water quality in those streams. The aim of this conceptual Stormwater Management Plan (SWMP) is to ensure that these impacts are prevented by fulfilling the requirements of the National Water Act (No. 36 of 1998) (NWA) and more particularly Government Notice 704 (Government Gazette 20118 of June 1999) (hereafter referred to as GNR 704). GNR 704 was established to provide regulations on the use of water for mining and related activities, aimed at the protection of water resources.

The following definitions from GNR 704 are appropriate to the classification of catchments and design of storm water management measures for the proposed Mutsho Power Project:

- **Clean water system:** includes any dam, other forms of impoundment, canal, works, pipeline and any other structure or facility constructed for the retention or conveyance of unpolluted (clean) water.
- **Dam:** includes any storm water dam, settling dam, evaporation dam, catchment or barrier dam and any other form of impoundment used for the storage of unpolluted water or water containing waste (i.e. dirty water).
- **Dirty area:** means any area at a mine or ***activity*** which causes, has caused or is likely to cause pollution of a water resource.
- **Dirty water system:** This includes any dirty water diversions bunds, channels, pipelines, dirty water dams or other forms of impoundment, and any other structure or facility constructed for the retention or conveyance of water containing waste (i.e. dirty water).
- **Activity:** means any mining or related process which includes the operation of washing plants, mineral processing facilities, mineral refineries and extraction plants; the operation and use of mineral loading and off-loading zones, transport facilities and mineral storage yards, whether situated at the mine or not; in which any substance is stockpiled, stored, accumulated, dumped, disposed of or transported.

The guidelines for storm water management have been outlined in the Best Practice Guideline G1: Storm Water Management, published in August 2006. The procedure to develop the SWMP for the mining or related environment should be based on the 10 step methodology outlined in the Best Practice Guidelines (BPG) G1: Storm Water Management. The conceptual SWMP to follow adheres to the BPG mentioned above.

1.1. Objectives

The SWMP will provide conceptual inputs into the management of the proposed storm water structures outlined in the Layout design and make recommendations for additional erosion and placement of storm water management structures.

The measures provided in the SWMP have been developed in accordance with the principles of BPG G1: Storm water management (DWS, 2006), with the objective of keeping clean and dirty water separate, as defined by the following:

- Collect all storm water that is of poor quality in a dirty water trench and contain it within the dirty water facilities (dams) for reuse.
- Ensure that all storm water structures that are designed to keep dirty and clean water separate can accommodate a defined precipitation event. The magnitude of the precipitation event used in this assessment is the 1:50 year, 24-hour event.
- Route all clean storm water directly to natural watercourses without increasing the risk of a negative impact on safety and infrastructure, e.g. loss of life or damage to property due to an increase in the peak runoff flow.
- Ensure that the maximum volume of clean water runoff is diverted directly to watercourses.
- The SWMP must be sustainable over the life cycle of the power station and over different hydrological cycles and must incorporate principles of risk management.
- The statutory requirements of various regulatory agencies and the interests of stakeholders must be considered and incorporated.

1.2. Proposed Storm Water Management Measures

In order to meet the design principles listed above, the following storm water management measures are proposed:

- Placement of clean water diversion berms to divert clean water emanating upstream of the proposed power plant and ash dump infrastructure to the downstream natural environment.
- Dirty water channels or trenches to be placed around the power plant infrastructure areas and ash dump area, such that all dirty water is captured and conveyed to the runoff / stormwater dam.

APPENDIX F:
TRAFFIC AND TRANSPORTATION PLAN

TRAFFIC AND TRANSPORTATION MANAGEMENT PLAN

1. PURPOSE

The purpose of this traffic and transportation management plan (TMP) is to address regulatory compliance, traffic management practices, and protection measures to help reduce impacts related to transportation and the construction of temporary and long-term access within the vicinity of the project site. The objectives of this plan include the following:

- To avoid incidents and accidents while vehicles are being driven and while transporting personnel, materials, and equipment to and from the project site.
- To raise greater safety awareness in each driver and to ensure the compliance of all safe driving provisions for all the vehicles.
- To raise awareness to ensure drivers respect and follow traffic regulations.
- To ensure compliance with all legislation regulating traffic and transportation within South Africa.
- To avoid the deterioration of access roads and the pollution that can be created due to noise and emissions produced by equipment, machinery, and vehicles.

2. TRAFFIC AND TRANSPORTATION MANAGEMENT PRINCIPLES

- Prior to the commencement of construction the contractor must develop their own Transport Management Plan (TMP) based on the requirements laid out in this plan.
- The contractor must ensure that all required permits for the transportation of abnormal loads are in place prior to the transportation of equipment and project components to the site. Specific abnormal load routes must be developed with environmental factors taken into consideration.
- Before construction commences, authorised access routes must be clearly marked in the field with signs or flagging. The Construction Contractor must review the location of designated access and will be responsible for ensuring construction travel is limited to designated routes. The entrance of the main access road must not be constructed before a blind rise or on a bend of the public road.
- All employees must attend an environmental induction on site. Through this induction, employees will be instructed to use only approved access roads and obey jurisdictional and posted speed limits to minimise potential impacts to the environment and other road users.
- The contractor will be responsible for making sure that their suppliers, vendors, and subcontractors strictly comply with the principles of this TMP and the contractor's TMP.
- Adjacent landowners must be notified of the construction schedule.
- Access roads and entrances to the site should be carefully planned to limit any intrusion on the neighbouring property owners and road users.
- Signs must be posted in the project area to notify landowners and others of the construction activity.
- Flagging must be provided at access points to the site and must be maintained until construction is completed on the site.
- Speed limits must be established and enforced over all construction traffic.
- Speed controls and implementation of appropriate dust suppression measures must be enforced to minimise dust pollution.
- Throughout construction the contractor will be responsible for monitoring the condition of access roads used by project traffic and for ensuring that roads are maintained in a condition that is comparable to the condition they were in before the construction began.

- Drivers must have an appropriate valid driver's license.
- All vehicles must be maintained in good mechanical, electrical, and electronic condition, including but not limited to the brake systems, steering, tyres, windshield wipers, side mirrors and rear-view mirror, safety belts, signal indicators, and lenses.
- Any traffic delays attributable to construction traffic must be co-ordinated with the appropriate authorities.
- No deviation from approved transportation routes must be allowed, unless roads are closed for reasons outside the control of the contractor.
- Impacts on local communities must be minimised. Consideration should be given to limiting construction vehicles travelling on public roadways during the morning and late afternoon commute time.

3. MONITORING

- The principal contractor must ensure that all vehicles adhere to the speed limits. Repeat offenders must be penalised. A speeding register must be kept with details of the offending driver.
- Where traffic signs are not being adhered to, engineering structures must be used to ensure speeds are reduced.

APPENDIX G:
HYDROLOGY AND GEOHYDROLOGY MONITORING PROCEDURE

HYDROLOGICAL AND GEOHYDROLOGICAL WATER MONITORING PROGRAMME

1. AQUATIC BIOMONITORING PROGRAMME

Based on the field survey undertaken, It is expected that the aquatic systems are highly likely to be dry throughout most of the year and as a result, it is suggested that an adaptive biomonitoring plan (inlcuding varied assessment indices and deceased frequency) be applied should the development be commissioned. **Table 1** presents a tentative biomonitoring programme within the receiving watercourses:

Table 1: Proposed aquatic biomonitoring programme.

Indicator	Proposed Frequency	Applicable Monitoring Sites
In situ water quality	Annually (wet-season)	If possible, assess the following sites: » Site VR1 and Site VR3. » Site DU3 and Site DU4. » Site SR1 and Site SR2.
Invertebrate Habitat Assessment System (IHAS)	Annually (wet-season)	
Index for Habitat Integrity (IHI)	Annually (wet-season)	
South African Scoring System (SASS) and Macroinvertebrate Response Assessment Index (MIRAI)	Annually (wet-season)	
Fish Community and Fish Response Assessment Index (FRAI)	Annually (wet-season)	
Integrated EcoStatus4	Annually (wet-season)	

While limited baseline data is available (excluding riparian habitat conditions), both spatial and temporal trends should be assessed within the study area to establish any annual variation. Also, the collection of diatom assemblages analysis at each of the aforementioned sampling sites should be considered in the event that these sites are not conducive to the intended monitoring programme (e.g. low water levels, insufficient habitat, etc.).

In addition, since the impoundments are likely to yield an improved probability of holding a limited volume of water for extended periods of time, it would be valuable to determine the potential toxicity of various aspects within the study area, if any.

Table 2: Proposed toxicity analysis monitoring programme.

Indicator	Proposed Frequency	Applicable Monitoring Sites
Toxicity Assessment (Screening-level) of four biological levels	Annually (wet-season)	If possible, assess the following sites: » Site DU3 and Site DU4. » Site SR1 and Site SR2.

It should be noted that the proposed biomonitoring programme should be reassessed following the final selection of the infrastructure layout should the development be authorised to be commissioned, as it may not be necessary to monitor the sensitive sites associated with the Farm Du Toit 563 (e.g. the downstream impoundments) if the infrastrucure remains within the south-eastern catchment area. With regards to the proposed alternatives, this would only be applicable if Alternative A was selected for implementation. Although it is acknowledged that the Peferred Alternative and Alternative B may yield minor impacts upon the catchment and should anything be flagged during the monitoring phase, toxicity assessment should be re-considered for strategic implemention.

2. WETLAND MONITORING

The health of the wetlands and the freshwater systems as indicated in the Hydrology and Geohydrology Specialist report as well as in the desktop target ecological categories should be used as a baseline ecological management target going forward.

Monitoring of the wetlands and freshwater systems occurring within the project area, as well as in the vicinity of the proposed infrastructures should be monitored annually to determine any deviations from the baseline ecological state. These assessments should form part of an annual monitoring programme, which is to be implemented for the life of the proposed project.

3. GROUNDWATER MONITORING

Groundwater monitoring should be undertaken to establish the following impacts of the ash dump and coal stockpile on the groundwater environment:

- Groundwater quantity trends, through monitoring of groundwater levels and is standard practise and will be a requirement with respect to the Water Use Licence (WUL).
- Groundwater quality trends, through sampling.

Groundwater quality should be monitored because potentially contaminating leachate from the ash dump and stockpile may reach the local aquifer. Groundwater levels should be monitored because groundwater level recovery may occur if private boreholes cease abstraction; recovery (depending on the extent) may result in baseflow feeding the local streams and if the water quality if found to have deteriorated, the local streams may be impacts by project activities.

A total of 5 monitoring locations are recommended for groundwater monitoring; 2 existing and 3 to be drilled (shown in relation to the Preferred Alternative (refer to **Figure 1**)).

Borehole selection was based on groundwater flow direction. Some located downstream to monitor potential contamination migration by advection and others located upstream in order to monitor potential contamination migration by dispersion (migration driven by a concentration gradient). Priority was given to existing boreholes from financial perspective. The depth of the boreholes is recommended to be approximately 40m taking into consideration the local water levels.

Table 3: Recommended monitoring boreholes.

Borehole ID	Latitude	Longitude	Comment
VRIBH2	-22.702	29.82695	Existing
DUTBH1	-22.6769	29.80434	Existing
MUTBH1	-22.6670	29.8179	New
MUTBH2	-22.689	29.839	New
MUTBH3	-22.669	29.839	New

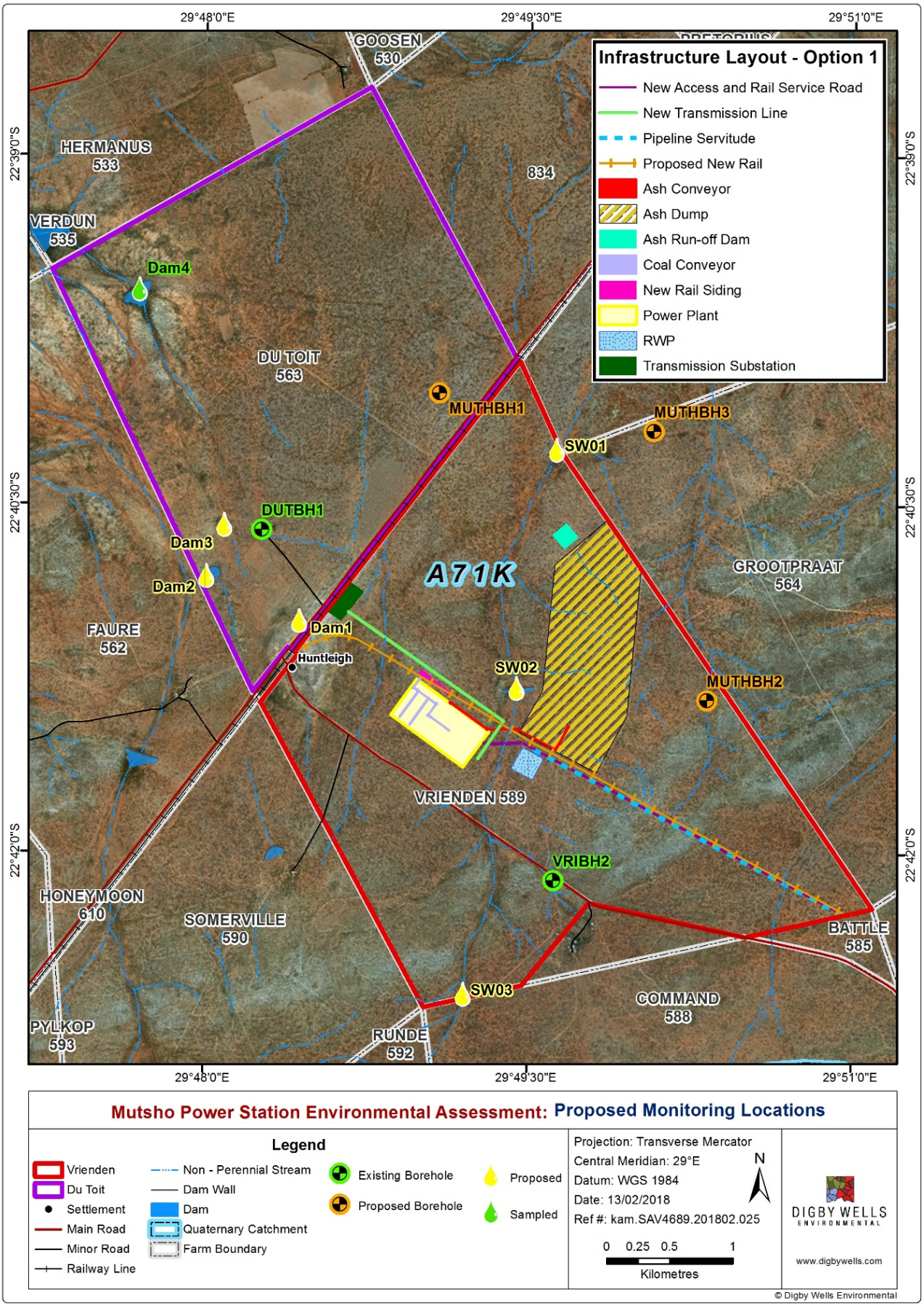

Figure 1: Proposed groundwater and surface water monitoring network.

Water Level

Groundwater levels must be recorded bi-annually to detect any changes or trends in groundwater elevation and flow direction. It is important to understand if the ash dump is impacting upon the water levels, thus it is recommended that this be undertaken.

Water Sampling and Preservation

When sampling the following procedures are proposed:

- One (1) litre plastic bottles with a cap are required for the sampling exercises.
- Glass bottles are required if organic constituents are to be tested.
- Collected samples must be stored in cooler box or fridge while on site.
- Sample bottles should be marked clearly with the borehole name, date of sampling, sampling depth and the sampler's name and submitted to a SANAS accredited laboratory.

Sampling Frequency

Groundwater is a slow-moving medium and drastic changes in the groundwater composition are not normally encountered within days. Considering that the ash dump and coal stockpile facility will be lined and that the water level is at a reasonable depth currently, water quality monitoring should be conducted quarterly to reflect influences of wet and dry seasons. The sampling frequency could be adjusted based on the water quality trend analysis. Water quality trend analysis will serve as detection of rapid of slow water quality deterioration (if any changes occur at all).

Samples should be collected by using Water Research Commission (WRC), 2007, Groundwater Sampling: A Comprehensive Guide for Sampling Methods and should be analysed by a SANAS accredited laboratory. It is suggested that the monitoring frequency established during the operational phase (after adjustments are made based on observing trends) be maintained post-closure until satisfactory groundwater quality is reached and thereafter signed off by the relevant authorities. Satisfactory groundwater quality is when stable quality trends are observed overtime, stability regarding the absence of water quality deterioration.

Parameters to be Monitored

- TDS, EC, pH, Alkalinity.
- Major ions i.e. Ca, Mg, Na, K, SO4, NO3, F, Cl.
- Minor and trace metals, including As, Al, Co, Cr, Zn, Cd, Cu, Fe, Ni, V, Mn.

Data Storage

During any project, good hydrogeological decisions require good information developed from raw data. The production of good, relevant and timely information is the key to achieve qualified long-term and short-term plans. To minimize groundwater contamination, it is necessary to utilize all relevant groundwater data.

The generation and collection of this data is very expensive as it requires intensive hydrogeological investigations and therefore the data has to be managed in a centralised database to optimize on cost

efficiency. Digby Wells has compiled a WISH-based database during the course of this investigation and it is highly recommended that the applicant utilise this database and continuously update and manage it as new data becomes available.

4. SURFACE WATER MONITORING

A monitoring programme is essential as a management tool to detect any flaws as they arise and to ensure that the necessary mitigation measures are implemented. It also ensures that storm water management structures are in working order. Monitoring should be implemented throughout the life of the power plant.

Water quality monitoring within the power plant area should be conducted to determine the quality of water circulating within the system. This will help to understand the suitability of water in times where excess water needs to be discharged into natural streams. The monitoring programme is detailed in **Table 4**.

Table 4: Surface Water Monitoring Programme.

Monitoring Element	Comment	Frequency	Responsibility
Water quality	Grab samples should be collected from the monitoring points indicated on **Figure 1.** Ensure that monitoring of water circulating within the system is conducted (water within the runoff/storm water dams). Water quality parameters to be analysed include, but not limited to: » Alkalinity, Cl, SO_4, NO_3, PO_4, NH_4, F,Ca, Mg, Na, K, Fe, Al, Mn, Cr, Cu, Ni, Pb, Zn, Cd, Co » pH & Conductivity » Total Hardness	Monthly	Environmental Officer (EO)
Physical structures and storm water management infrastructure performance	Personnel should have a walk around facilities to determine the facilities conditions and pick out any anomalies in the storm water management systems such as blockages or overflows. Dams are inspected for silting and blockages of inflows, pipelines for hydraulic integrity; monitor the overall SWMP performance.	Weekly monitoring and immediately after extreme rainfall events. This will ensure that leaks and overflows are detected immediately before a significant impact occurs. Monthly with the general maintenance schedule at the power plant.	Environmental Officer / Any Designated personnel
Meteorological data	Measure rainfall.	Real time automatic weather system if in place, otherwise collect rainfall readings after every rainfall event on a daily basis.	Environmental Technician Sampler

APPENDIX H:
GRIEVANCE MECHANISM

GRIEVANCE MECHANISM / PROCESS

PURPOSE

This Grievance Mechanism has been developed to receive and facilitate resolution of concerns and grievances about the Mutsho Power Project's environmental and social performance. The aim of the grievance mechanism is to ensure that grievances or concerns raised by local landowners and or communities are addressed in a manner that:

- Provides a predictable, transparent, and credible process to all parties, resulting in outcomes that are seen as fair, effective, and lasting.
- Builds trust as an integral component of broader community relations activities.
- Enables more systematic identification of emerging issues and trends, facilitating corrective action and pre-emptive engagement.

The aim of this Grievance Mechanism is to address grievances in a manner that does not require a potentially costly and time consuming legal process.

PROCEDURE FOR RECEIVING AND RESOLVING GRIEVANCES

- Local landowners, communities and authorities must be informed in writing by the Project Proponent of the Grievance Mechanism and the process by which grievances can be brought to the attention of the Project Proponent through its designated representative.
- A company representative must be appointed as the contact person in order for grievances to be addressed. The name and contact details of the contact person must be provided to local landowners, communities and authorities.
- Project related grievances relating to the construction, operation and / or decommissioning phase must be addressed in writing to the contact person. The contact person should assist local landowners and or communities who may lack resources to submit / prepare written grievances.
- The grievance must be registered with the contact person who, within two (2) working days of receipt of the grievance, must contact the Complainant to discuss the grievance and, if required, agree on suitable date and venue for a meeting in order to discuss the grievances raised. Unless otherwise agreed, the meeting should be held within two (2) weeks of receipt of the grievance.
- The contact person must draft a letter to be sent to the Complainant acknowledging receipt of the grievance, the name and contact details of Complainant, the nature of the grievance, the date that the grievance was raised, and the date and venue for the meeting (once agreed if this is required).
- Prior to the meeting being held the contact person must contact the Complainant to discuss and agree on the parties who should attend the meeting. The people who will be required to attend the meeting will depend on the nature of the grievance. While the Complainant and or Project Proponent are entitled to invite their legal representatives to attend the meeting(s), it should be made clear to all the parties involved in the process that the Grievance Mechanism process is not a legal process, and that if the Complainant invites legal representatives, the cost will be their responsibility. It is therefore recommended that the involvement of legal representatives be limited.
- The meeting should be chaired by the Project Proponent's representative appointed to address grievances. The Project Proponent must provide a person to take minutes of and record the meeting(s). Any costs associated with hiring venues must be covered by the Project Proponent.

- Draft copies of the minutes must be made available to the Complainant and the Project Proponent within four (4) working days of the meeting being held. Unless otherwise agreed, comments on the Draft Minutes must be forwarded to the company representative appointed to manage the Grievance Mechanism within four (4) working days of receipt of the draft minutes.
- In the event of the grievance being resolved to the satisfaction of all the parties concerned, the outcome must be recorded and signed off by the relevant parties. The record should provide details of the date of the meeting(s), the names of the people that attended the meeting(s), the outcome of the meeting(s), and where relevant, the measures identified to address the grievance, the party responsible for implementing the required measures, and the agreed upon timeframes for the measures to be implemented.
- In the event of a dispute between the Complainant and the Project Proponent regarding the grievance, the option of appointing an independent mediator to assist with resolving the issue should be discussed. The record of the meeting(s) must note that a dispute has arisen and that the grievance has not been resolved to the satisfaction of all the parties concerned.
- In the event that the parties agree to appoint a mediator, the Project Proponent will be required to identify three (3) mediators and forward the names and CVs to the Complainant within two (2) weeks of the dispute being declared. The Complainant, in consultation with the Project Proponent, must identify the preferred mediator and agree on a date for the next meeting. The cost of the mediator must be borne by the Project Proponent. The Project Proponent must provide a person to take minutes of and record the meeting(s).
- In the event of the grievance, with the assistance of the mediator, being resolved to the satisfaction of all the parties concerned, the outcome must be recorded and signed off by the relevant parties, including the mediator. The record should provide details on the date of the meeting(s), the names of the people that attended the meeting(s), the outcome of the meeting(s), and where relevant, the measures identified to address the grievance, the party responsible for implementing the required measures, and the agreed upon timeframes for the measures to be implemented.
- In the event of the dispute not being resolved, the mediator must prepare a draft report that summaries the nature of the grievance and the dispute. The report should include a recommendation by the mediator on the proposed way forward with regard to the addressing the grievance.
- The draft report must be made available to the Complainant and the Project Proponent for comment before being finalised and signed by all parties. Unless otherwise agreed, comments on the draft report must be forwarded to the company representative appointed to manage the grievance mechanism within four (4) working days. The way forward will be informed by the recommendations of the mediator and the nature of the grievance.

A Complaint is closed out when no further action can be or needs to be taken. Closure status will be classified in the Complaints Register as follows:

- Resolved. Complaints where a resolution has been agreed and implemented and the Complainant has signed the Confirmation Form.
- Unresolved. Complaints where it has not been possible to reach an agreed resolution and the case has been authorised for close out by the Appeals Committee.
- Abandoned. Complaints where the Complainant is not contactable after one month following receipt of a Complaint and efforts to trace his or her whereabouts have been unsuccessful.

The Grievance Mechanism does not replace the right of an individual, community, group or organization to take legal action should they so wish. In the event of the grievance not being resolved to the

satisfaction of Complainant and or the Project Proponent, either party may be of the opinion that legal action may be the most appropriate option.

APPENDIX I:
SOIL MANAGEMENT PLAN

SOIL MANAGEMENT PLAN

1. PURPOSE

Some of the most significant impacts on soil properties occur as a result of activities associated with construction. Construction activity can have adverse impacts on soil in a number of ways by:

- Covering soil with impermeable materials, effectively sealing it and resulting in significant detrimental impacts on soils' physical, chemical and biological properties, including drainage characteristics.
- Contaminating soil as a result of accidental spillage or the use of chemicals.
- Over-compacting soil through the use of heavy machinery or the storage of construction materials.
- Reducing soil quality, for example by mixing topsoil with subsoil.
- Wasting soil by mixing it with construction waste or contaminated materials, which then have to be treated before reuse or even disposed of at landfill as a last resort.

Careful management of topsoil and subsoil is an important aspect of sustainable use of materials that are being stripped. Without a proper Soil Resource Plan there is the risk of losing, damaging or contaminating valuable soil resources. The purpose of this Soil Management Plan is to outline principles for soil management to ensure the integrity of the resource during and post-construction. This plan should be read together with the Emergency Response Plan in order to minimise the risk of contamination of soils.

2. SOIL HORIZONS

Topsoil

The top-most soil layer (0 – 25cm) in undisturbed areas. This soil layer is important as it contains nutrients, organic material, seeds, communities of microorganisms, fungi and soil fauna. All the contents of the topsoil layer are necessary for soil processes such as nutrient cycling, and support growth of new plants. The biologically active upper layer of soil is fundamental in the development of soils and the sustainability of the entire ecosystem. Fungi, algae, cyanobacteria and non-vascular plants form a 'living crust' on the soil surface that influences the retention of resources (principally nutrients and water), as well as reducing the potential for soil erosion.

In general, the greatest concentration of seeds (i.e. up to 90% of the seedbank) is found in the top 5 – 10cm of topsoil. Soil nutrients and other biological elements also have a higher concentration in the top 5 – 10cm of soil, but can occur up to 25cm.

Subsoil

Soil generally deeper than 25cm. The subsoil contains lower levels of nutrients, but the soil texture is still suitable for plant growth.

Overburden

All the soil below the subsoil layer, generally characterised by a fine soil texture which is sometimes high in clay and salt content which makes plant growth difficult. Such soils comprise a sterile growth medium, devoid of nutrients, and depending on the clay content, are of high salinity and often phytotoxic. Even shallow-lying overburden soils are largely depleted of nutrients. These soils constitute an unsuitable medium for the establishment of plants.

3. PRINCIPLES FOR SOIL MANAGEMENT

3.1. The correct handling of topsoil

» Before beginning work on site, topsoil should be stripped from all areas that will be disturbed by construction activities. Appropriate equipment must be used and appropriate work practices must be implemented for soil stripping as mishandling soil can have an adverse effect on its properties.
» Topsoil should be stripped in the driest condition possible.
» Topsoil must be retained on site in order to be used in site rehabilitation. The correct handling of the topsoil layer is in most cases the key to rehabilitation success.
» It is important that the correct depth of topsoil is excavated in order to ensure good plant growth. If excavation is too shallow, then an important growth medium for new seedlings could be lost. If excavation is too deep, this could lead to the dilution of the seed and nutrient rich topsoil with deeper sterile soil.
» Topsoil and subsoil layers must never be mixed. The mixture of topsoil with the deeper sterile soil hinders the germination of seeds which are buried too deep in the soil layer. Mixture of soil layers also leads to the dilution of nutrient levels which are at highest concentration within the topsoil, resulting in lower levels of nutrients available for new seedlings.
» To enable soil to be reused on site at a later stage, it needs to be stored in temporary stockpiles to minimise any damage or loss of function. Stockpiles should not be higher than 2m. Alternatively topsoil berms can be created on the site boundaries. There are a number of important considerations when creating stockpiles – including soil erosion, pollution to watercourses and the risk of flooding. These will be affected by the size, height and method of forming stockpiles, and how they are protected and maintained.
» Topsoil must be stored separately from other soil in heaps until construction in an area is complete.
» The duration of topsoil storage should be minimised as far as possible. Storing topsoil for long periods leads to seed bank depletion following germination during storage, and anoxic conditions develop inside large stockpile heaps.
» All stockpiles must be positioned away from drainage lines.
» Sediment fencing should be erected downslope of all stockpiles to intercept any sediment and upslope runoff should be diverted away from stockpiles.

3.2. Stripping of Subsoil

The following protocols must be followed when stripping subsoil:

» Where subsoil is required to be stripped, this should be undertaken before commencement of construction from all areas that are to be disturbed by construction activities or driven over by vehicles.
» Subsoil stripping depths depend on the correct identification of the sub-soil types on an ad-hoc basis, where no formal survey data exists.
» Subsoil should be stripped in the driest condition possible.
» To enable soil to be reused on site at a later stage, it needs to be stored in temporary stockpiles to minimise any damage or loss of function. There are a number of important considerations when creating stockpiles – including soil erosion, pollution to watercourses and the risk of flooding. These will be affected by the size, height and method of forming stockpiles, and how they are protected and maintained.
» All stockpiles must be positioned away from drainage lines.

» Sediment fencing should be erected downslope of all stockpiles to intercept any sediment and upslope runoff should be diverted away from stockpiles.

APPENDIX J:
EROSION MANAGEMENT PLAN

EROSION MANAGEMENT PLAN

1. PURPOSE

It is widely recognised that developments impact negatively on drainage systems. By taking greater cognisance of natural hydrological patterns and processes it is possible to develop stormwater management systems in a manner that reduces these potentially negative impacts and mimics the natural environment. The main risks associated with inappropriate stormwater management are increased erosion risk and risks associated with flooding. Therefore, the stormwater management principles and erosion management plan are closely linked to one another and should be managed together.

Stormwater management principles address the management of stormwater runoff from the development site and significant impacts relating to resultant impacts such as soil erosion and downstream sedimentation. The main factors influencing the planning of stormwater management measures and infrastructure are:

» Annual average rainfall.
» Rainfall intensities.
» Soil and vegetation cover.
» Topography and slope gradients.
» Placing of infrastructure and infrastructure design.

The objective of the plan is to provide measures to address run-off from disturbed portions of the site, such that they:

» Do not result in concentrated flows into natural watercourses i.e. provision should be made for temporary or permanent measures that allow for attenuation, control of velocities and capturing of sediment upstream of natural watercourses.
» Do not result in any necessity for concrete or other lining of natural watercourses to protect them from concentrated flows off the development.
» Do not divert flows out of their natural flow pathways, thus depriving downstream watercourses of water.

This plan must be updated and refined once the construction / civil engineering plans have been finalised.

Exposed and unprotected soils are the main cause of erosion in most situations. Therefore, this erosion management plan and the Rehabilitation Plan are closely linked to one another and should not operate independently, but should rather be seen as complementary activities within the broader environmental management of the site and should therefore be managed together.

2. EROSION AND SEDIMENT CONTROL PRINCIPLES

The goals of erosion control during and after construction at the site should be to:

» Protect the land surface from erosion.

- Intercept and safely direct run-off water from undisturbed upslope areas through the site without allowing it to cause erosion within the site or become contaminated with sediment.
- Progressively revegetate or stabilise disturbed areas.

These goals can be achieved by applying the management practices outlined in the following sections.

2.2. On-Site Erosion Management

General factors to consider regarding erosion risk at the site includes the following:

- Soil loss will be greater during wet periods than dry periods. Intense rainfall events outside of the wet season, such as occasional summer thunder storms can also cause significant soil loss. Therefore precautions to prevent erosion should be present throughout the year.
- Soils loss will be greater on steeper slopes. Ensure that steep slopes are not de-vegetated and subsequently become hydrophobic (i.e. have increased runoff and a decreased infiltration rate) increasing the erosion potential.
- Soil loss is related to the length of time that soils are exposed prior to rehabilitation or stabilisation. Therefore the gap between construction activities and rehabilitation should be minimised. Phased construction and progressive rehabilitation are therefore important elements of the erosion control strategy.
- The extent of disturbance will influence the risk and consequences of erosion. Therefore site clearing should be restricted to areas required for construction purposes only. As far as possible, large areas should not be cleared at one time, especially in areas where the risk of erosion is higher.
- Roads should be planned and constructed in a manner which minimises their erosion potential. Roads should therefore follow the contour as far as possible. Roads parallel to the slope direction should be avoided as far as possible.
- Where necessary, new roads constructed should include water diversion structures present with energy dissipation features present to slow and disperse the water into the receiving area.
- Roads and other disturbed areas should be regularly monitored for erosion. Any erosion problems recorded should be rectified as soon as possible and monitored thereafter to ensure that they do not re-occur.
- Compacted areas should have adequate drainage systems to avoid pooling and surface flow. Heavy machinery should not compact those areas which are not intended to be compacted as this will result in compacted hydrophobic, water repellent soils which increase the erosion potential of the area. Where compaction does occur, the areas should be ripped.
- All bare areas should be revegetated with appropriate locally occurring species, to bind the soil and limit erosion potential.
- Silt fences should be used where there is a danger of topsoil or material stockpiles eroding and entering streams and other sensitive areas.
- Gabions and other stabilisation features should be used on steep slopes and other areas vulnerable to erosion to minimise erosion risk as far as possible.
- Activity at the site after large rainfall events when the soils are wet and erosion risk is increased should be reduced.
- Topsoil should be removed and stored separately during construction activities, and should be reapplied where appropriate as soon as possible in order to encourage and facilitate rapid regeneration of the natural vegetation on cleared areas.

» Regular monitoring of the site for erosion problems during construction (ongoing) and operation (at least twice annually) is recommended, particularly after large summer thunderstorms have been experienced.

3.1.1. Erosion control mechanisms

The contractor may use the following mechanisms to combat erosion when necessary:

» Reno mattresses.
» Slope attenuation.
» Hessian material.
» Shade catch nets.
» Gabion baskets.
» Silt fences.
» Storm water channels and catch pits.
» Soil bindings.
» Geofabrics.
» Hydro-seeding and/or re-vegetating.
» Mulching over cleared areas.
» Boulders and size varied rocks.
» Tilling.

2.3. Monitoring

The site must be monitored continuously during construction and operation in order to determine any indications of erosion. If any erosion features are recorded as a result of the activities on site the Environmental Officer (during construction) or Environmental Manager (during operation) must:

» Assess the significance of the situation.
» Take photographs of the soil degradation.
» Determine the cause of the soil erosion.
» Inform the contractor / operator that rehabilitation must take place and that the contractor / operator is to implement a rehabilitation method statement and management plan.
» Monitor that the contractor / operator is taking action to stop the erosion and assist them where needed.
» Report and monitor the progress of the rehabilitation weekly and record all the findings in a site register.
» All actions with regards to the incidents must be reported on a monthly compliance report which will be submitted to the Competent Authority (during construction), and kept on file for consideration during the annual audits (during construction and operation).

The Contractor / Developer (in consultation with an appropriate specialist) must:

» Select a system / mechanism to treat the erosion.
» Design and implement the appropriate system / mechanism
» Monitor the area to ensure that the system functions like it should. If the system fails, the method must be adapt or adjust to ensure the accelerated erosion is controlled.
» Continue monitoring until the area has been stabilised.

3. STORMWATER MANAGEMENT PRINCIPLES

In the design phase, various stormwater management principles should be considered including:

- Prevent concentration of stormwater flow at any point where the ground is susceptible to erosion.
- Reduce stormwater flows as far as possible by the effective use of attenuating devices (such as swales, berms, and silt fences). As construction progresses, the stormwater control measures are to be monitored and adjusted to ensure complete erosion and pollution control at all times.
- Minimise the area of exposure of bare soils to minimise the erosive forces of wind, water and all forms of traffic.
- Ensure that development does not increase the rate of stormwater flow above that which the natural ground can safely accommodate at any point in the sub-catchments.
- Ensure that all stormwater control works are constructed in a safe and aesthetic manner in keeping with the overall development.
- Plan and construct stormwater management systems to remove contaminants before they pollute surface waters or groundwater resources.
- Contain soil erosion, whether induced by wind or water forces, by constructing protective works to trap sediment at appropriate locations. This applies particularly during construction.
- Avoid situations where natural or artificial slopes may become saturated and unstable, both during and after the construction process.
- Design and construct roads to avoid concentration of flow along and off the road. Where flow concentration is unavoidable, measures to incorporate the road into the major stormwater system should be taken, with the provision of detention storage facilities at suitable points.
- To assist with the stormwater run-off, gravel roads should typically be graded and shaped with a 2 – 3% crossfall back into the slope, allowing stormwater to be channelled in a controlled manor towards the natural drainage lines and to assist with any sheet flow on the site.
- Where the construction of a building causes a change in the vegetative cover of the site that might result in soil erosion, the risk of soil erosion by stormwater must be minimised by the provision of appropriate artificial soil stabilisation mechanisms or revegetation of the area. Any inlet to a piped system should be fitted with a screen, or grating to prevent debris and refuse from entering the stormwater system.
- Preferably all rivers and drainage channels on site and contained within the larger area of the property (i.e. including buffer zone) should remain in the natural state so that the existing hydrology is not disturbed.

3.2. Engineering Specifications

A detailed Stormwater Management Plan describing and illustrating the proposed stormwater control measures must be prepared by the Civil Engineers during the detailed design phase. This should include erosion control measures. Requirements for project design include:

- Erosion control measures to be implemented before and during the construction period, including the final stormwater control measures (post construction).
- The location, area / extent (m^2 / ha) and specifications of all temporary and permanent water management structures or stabilisation methods must be indicated within the Stormwater Management Plan.

- The drainage system for the site should be designed to specifications that can adequately deal with a 1:50 year intensity rainfall event or more to ensure sufficient capacity for carrying stormwater around and away from infrastructure.
- Procedures for stormwater flow through a project site need to take into consideration both normal operating practice and special circumstances. Special circumstances in this case typically include severe rainfall events.
- An onsite Engineer or Environmental Officer to be responsible for ensuring implementation of the erosion control measures on site during the construction period.
- The Developer holds ultimate responsibility for remedial action in the event that the approved stormwater plan is not correctly or appropriately implemented and damage to the environment is caused.

During the construction phase, the contractor must prepare a Stormwater Control Method Statement to ensure that all construction methods adopted on site do not cause, or precipitate soil erosion and shall take adequate steps to ensure that the requirements of the Stormwater Management Plan are met before, during and after construction. The designated responsible person on site, as indicated in the Stormwater Control Method Statement shall ensure that no construction work takes place before the stormwater control measures are in place.

An operational phase stormwater management plan should be designed and implemented, with a view to preventing the passage of concentrated flows off hardened surfaces and onto natural areas.

APPENDIX K:
CHANCE FIND PROCEDURE

CHANCE FIND PROCEDURE

The possibility of the occurrence of subsurface finds cannot be excluded. Therefore, if during construction any possible finds such as stone tool scatters, artefacts or bone and fossil remains are made, the operations must be stopped and a qualified archaeologist must be contacted for an assessment of the find.

This procedure applies to the developer's permanent employees, its subsidiaries, contractors and subcontractors, and service providers. The aim of this procedure is to establish monitoring and reporting procedures to ensure compliance with this policy and its associated procedures. Construction crews must be properly inducted to ensure they are fully aware of the procedures regarding chance finds as discussed below.

- If during the pre-construction phase, construction, operations or closure phases of this project, any person employed by the developer, one of its subsidiaries, contractors and subcontractors, or service provider, finds any artefact of cultural significance or heritage site, this person must cease work at the site of the find and report this find to their immediate supervisor, and through their supervisor to the senior on-site manager.
- It is the responsibility of the senior on-site Manager to make an initial assessment of the extent of the find, and confirm the extent of the work stoppage in that area.
- The senior on-site Manager will inform the Environmental Control Officer (ECO) of the chance find and its immediate impact on operations. The ECO will then contact a professional archaeologist for an assessment of the finds who will notify the South African Heritage Resource Agency (SAHRA).

APPENDIX L:
WASTE MANAGEMENT PLAN

WASTE MANAGEMENT PLAN

1. PURPOSE

A Waste Management Plan (WMP) plays a key role in achieving sustainable waste management throughout all phases of the project. The plan prescribes measures for the collection, temporary storage and safe disposal of the waste streams associated with the project and includes provisions for the recovery, re-use and recycling of waste. The purpose of this plan is therefore to ensure that effective procedures are implemented for the handling, storage, transportation and disposal of waste that is generated from the project activities on site.

This WMP has been compiled as part of the project Environmental Management Programme (EMPr) and includes waste stream information available at the time of compilation. Construction practices and operations must be measured and analysed on an ongoing basis in order to determine the efficacy of the plan and whether further revision of the plan is required. This plan should be further updated should further detail regarding waste quantities and categorisation become available, during the construction and / or operation phases.

2. LEGISLATIVE REQUIREMENTS

Waste in South Africa is currently governed by several pieces of legislation, including:

» The South African Constitution (Act No. 108 of 1996).
» National Environmental Management Act (No. 107 of 1998) (as amended) (NEMA)
» National Environmental Management: Waste Act (No. 59 of 2008) (NEM:WA).
» National Environmental Management: Waste Amendment Act (No. 26 of 2014) (NEM:WAA).
» National Environmental Management: Air Quality Act (No. 39 of 2004) (NEM:AQA)
» National Water Act (No. 36 of 1998) (NWA)
» Mineral and Petroleum Resources Development Act (No. 28 of 2002) (MPRDA)
» Environment Conservation Act (No. 73 of 1989) (ECA).
» National Health Act (No. 63 of 1977) (NHA).
» Occupational Health and Safety Act (No. 85 of 1993) (OHSA).
» Hazardous Substances Act (No. 05 of 1973) (HSA).
» Municipal Structures Act (No. 117 of 1998)
» Municipal Systems Act (No. 32 of 2000)

Storage of waste must be undertaken in accordance with the National Norms and Standards for the Storage of Waste published in GNR 926.

3. WASTE MANAGEMENT PRINCIPLES

An integrated approach to waste management on site is needed. Such an approach is illustrated in **Figure 1**.

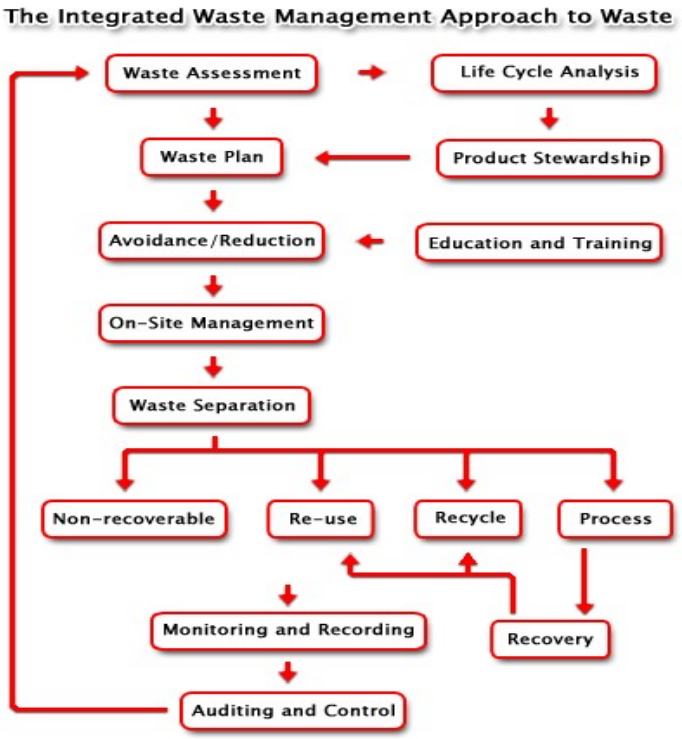

Figure 1: Integrated Waste Management Flow Diagram.
(Source: http://www.enviroserv.co.za/pages/content.asp?SectionId=496)

It is important to ensure that waste is managed with the following objectives in mind during all phases of the project:

- Reducing volumes of waste is a priority.
- If reduction is not feasible, the maximum amount of waste is to be recycled.
- Waste that cannot be recycled is to be disposed of in the most environmentally responsible manner as possible.

3.1. Construction phase

A plan for the management of waste during construction waste is detailed below. Construction practices must be measured and analysed in order to determine the efficacy of the plan and whether further revision of the plan is required. A Method Statement detailing specific waste management practices during construction should be prepared by the Contractor prior to the commencement of construction.

4.1.1. Waste Assessment / Inventory

- The Environmental Officer (EO), or designated staff member, must develop, implement and maintain a waste inventory reflecting all waste generated during construction for both general and hazardous waste streams.
- Construction method and materials should be carefully considered in view of waste reduction, re-use, and recycling opportunities.
- Once a waste inventory has been established, targets for recovery of waste (minimisation, re-use, recycling) should be set.

» The EO must conduct waste classification and rating in terms of SANS 10288 and GNR 634 published under NEM:WA.

4.1.2. Waste collection, handling and storage

» Each subcontractor must implement their own waste recycling system, i.e. separate bins for food waste, plastics, paper, wood, glass cardboard, metals, etc.
» Portable toilets must be monitored and maintained daily.
» Below ground storage of septic tanks, if installed, must withstand the external forces of the surrounding environment. The area above the tank must be demarcated to prevent any vehicles or heavy machinery from driving around the area.
» Waste collection bins and hazardous waste containers must be provided by the principal contractor and placed at various areas around site for the storage of organic, recyclable and hazardous waste.
» A dedicated waste area must be established on site for the storage of all waste streams, before removal from site.
» Signage / colour coding must be used to differentiate disposal areas for the various waste streams (i.e. paper, cardboard, metals, food waste, glass etc.).
» Hazardous waste must be stored within a bunded area constructed according to SABS requirements. The volume of waste stored in the bunds must not exceed 110% of the bund capacity.
» The location of all temporary waste storage areas must aim to minimise the potential for impact on the surrounding environment, including prevention of contaminated runoff, seepage, and vermin control.
» Waste storage shall be in accordance with all Regulations and best-practice guidelines and under no circumstances may waste be burnt on site.
» A dedicated waste management team must be appointed by the principal contractors' EO, whom will be responsible for ensuring the continuous sorting of waste and maintenance of the area. The waste management team must be trained in all areas of waste management and monitored by the EO.
» All waste removed from site must be done so by a registered / licensed subcontractor, whom must supply information regarding how waste recycling / disposal will be achieved. The registered subcontractor must provide waste manifests for all removals at least once a month.

4.1.3. Management of waste storage areas

» The position of all waste storage areas must be located at least 32m away from water features and ensure minimal degradation to the environment. The main waste storage area must have a suitable stormwater system separating clean and dirty stormwater.
» Collection bins placed around site and at subcontractors' camps (if at a different location than the main site camp) must be maintained and emptied on a regular basis by the principal contractor.
» Inspections and maintenance of the main waste storage area must be undertaken daily. Skips and storage containers must be clearly marked or colour coded and well-maintained, not allowing access to vermin or other rodents. A tarp or shade cloth should ideally be used to ensure avifauna does not have access to waste.
» Waste must be stored in designated containers and not on the ground.
» Inspections and maintenance of bunds must be undertaken daily. Bunds must be inspected for leaks or cracks in the foundation and walls.

» It is assumed that any rainwater collected inside the bund is contaminated and must be removed and stored as hazardous waste, and not released into the environment. If any leaks occur in the bund, these must be removed immediately.

4.1.4. Disposal

» Waste generated on site must be removed on a regular basis. This frequency may change during construction depending on waste volumes generated at different stages of the construction process.
» Waste must be removed by a suitably qualified contractor and disposed of at an appropriately licensed landfill site. Proof of appropriate disposal must be provided by the contractor to the EO and ECO.

4.1.5. Record keeping

The success of the Waste Management Plan is determined by measuring criteria such as waste volumes, cost recovery from recycling, cost of disposal. Recorded data can indicate the effect of training and education, or the need for education. It will provide trends and benchmarks for setting goals and standards. It will provide clear evidence of the success or otherwise of the plan.

» Documentation (waste manifest, certificate of issue or safe disposal) must be kept detailing the quantity, nature, and fate of any regulated waste for audit purposes.
» Waste management must form part of the monthly reporting requirements in terms of volumes generated, types, storage and final disposal.

4.1.6. Training

Training and awareness regarding waste management shall be provided to all employees and contractors as part of the toolbox talks or on-site awareness sessions with the EO and at the frequency as set out by the ECO.

3.2. Operation phase

It is expected that the operational phase will result in the production of general waste consisting mostly of cardboard, paper, plastic, tins, metals and a variety of synthetic compounds. Apart from ash which is to be disposed of to the ash dump, limited hazardous wastes (grease, oils) may also be generated during maintenance activities. All waste generated will be required to be temporarily stored at the facility in appropriate sealed containers prior to disposal at a permitted landfill site.

The following waste management principles apply during the operational phase:

» The Environmental Manager must develop, implement and maintain a waste inventory reflecting all waste generated during operation for both general and hazardous waste streams.
» Adequate waste collection bins at site must be supplied. Separate bins should be provided for general and hazardous waste.
» Recyclable waste must be removed from the waste stream and stored separately.
» All waste must be stored in appropriate temporary storage containers (separated between different construction wastes, and contaminated or wet waste) at each construction area prior to being taken

to the construction camp for final sorting (if required) and further temporary storage. Waste storage shall be in accordance with all best-practice guidelines and under no circumstances may waste be burnt on site.

» Waste generated on site must be removed on a regular basis throughout the operational phase.
» Waste must be removed by a suitably qualified contractor and disposed at an appropriately licensed landfill site. Proof of appropriate disposal must be provided by the contractor and kept on site.

4. Monitoring of Waste Management Activities

Records must be kept of the volumes / mass of the different waste streams that are collected from the site throughout the life of the project. The appointed waste contractor is to provide monthly reports to the operator containing the following information:

» Monthly volumes / mass of the different waste streams collected.
» Monthly volumes / mass of the waste that is disposed of at a landfill site.
» Monthly volumes / mass of the waste that is recycled.
» Data illustrating progress compared to previous months.

This report will aid in monitoring the progress and relevance of the waste management procedures that are in place. If it is found that the implemented procedures are not as effective as required, this WMP is to be reviewed and amended accordingly. This report must from part of the EO's reports to the ECO on a monthly basis.

APPENDIX M:
ENVIRONMENTAL NOISE MANAGEMENT PLAN

ENVIRONMENTAL NOISE MONITORING PLAN

Environmental Noise Measurement can be divided into two distinct categories, namely:

» Passive measuring – the registering of any complaints (reasonable and valid) regarding noise.
» Active measuring – the measurement of noise levels at identified locations.

Active environmental noise monitoring is recommended due to the proximity of a potential noise-sensitive receptor within the area of potential of influence. Additional noise monitoring must be done should a reasonable and valid noise complaint be registered. It is the responsibility of the developer to investigate this complaint as per the following sections. It is recommended that the noise investigation be done by an independent acoustic consultant.

While this section recommends a noise monitoring programme, it should be used as a guideline as site specific conditions may require that the monitoring locations, frequency or procedure be adapted.

1. MEASUREMENT LOCALITIES AND PROCEDURES

Measurement Localities

Quarterly noise measurements are recommended at NSD03 and NSD04 as well as at the location of the person that registered a valid and reasonable noise complaint. The measurement location should consider the direct surroundings to ensure that other sound sources cannot influence the reading.

Measurement Frequencies

Quarterly measurements are recommended during the construction phase, as well as the first two years of the operational phase. The necessity of continuing the noise monitoring programme can be reviewed by the acoustic consultant during the second year of operation.

Once-off measurements if and when a reasonable and valid noise complaint is registered. Results and feedback must be provided to the complainant. If required and recommended by an acoustic consultant, there may be follow-up measurements or a noise monitoring programme can be implemented.

Measurement Procedures

Ambient sound measurements should be collected as defined in SANS 10103:2008. Due to the variability that naturally occurs in sound levels at most locations, it is recommended that semi-continuous measurements are conducted over a period of at least 24 hours, covering at least a full day- (06:00 – 22:00) and night-time (22:00 – 06:00) period. Measurements should be collected in 10-minute bins defining the 10-minute descriptors such as LAeq,I (National Noise Control Regulation requirement), L¬A90,f (background noise level as used internationally) and L¬Aeq,f (Noise level used to compare with IFC noise limit). Spectral frequencies should also be measured to define the potential origin of noise. When a noise complaint is being investigated, measurements should be collected during a period or in conditions similar to when the receptor experienced the disturbing noise event.

2. RELEVANT STANDARD FOR NOISE MEASUREMENTS

Noise measurements must be conducted as required by the National Noise Control Regulations (GNR 154 of 1992) and SANS 10103:2008. It should be noted that the SANS standard also refers to a number of other standards.

3. DATA CAPTURE PROTOCOLS

Measurement Technique

Noise measurements must be conducted as required by the National Noise Control Regulations (GNR 154 of 1992) and SANS 10103:2008.

Variables to be analysed

Measurements should be collected in 10-minute bins defining the 10-minute descriptors such as LAeq,I (National Noise Control Regulation requirement), L¬A90,f (background noise level as used internationally) and L¬Aeq,f (Noise level used to compare with IFC noise limit). Noise levels should be co-ordinated with the 10-m wind speed. Spectral frequencies should also be measured to define the potential origin of noise.

Database Entry and Backup

Data must be stored unmodified in the electronic file saved from the instrument. This file can be opened to extract the data to a spread sheet system to allow the processing of the data and to illustrate the data graphically. Data and information should be safeguarded from accidental deletion or corruption.

Feedback to Receptor

A measurement report must be compiled considering the requirements of the National Noise Control Regulations (GN R154 of 1992) and SANS 10103:2008. The facility must provide feedback to the potential noise-sensitive receptors using the channels and forums established in the area to allow interaction with stakeholders, alternatively in a written report.

4. STANDARD OPERATING PROCEDURES FOR REGISTERING A COMPLAINT

When a noise complaint is registered, the following information must be obtained:

- Full details (names, contact numbers, location) of the complainant.
- Date and approximate time when this non-compliance occurred.
- Description of the noise or event.
- Description of the conditions prevalent during the event (if possible).