Proposed Development of a Battery Energy Storage and associated infrastructure at the Cuprum Substation located within Cuprum, near the town of Prieska, Northern Cape Province

Draft Environmental Management Programme

DFFE Reference Number: 14/12/16/3/3/1/2601

Eskom Holdings SOC (Pty) Ltd - Northern Cape Operating Unit

Project reference: Eskom BESS Cuprum Substation
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Quality information

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List of Accronyms

Acronym	Description
BA	Basic Assessment
CA	Competent Authority
CAM	Cape Agulhas Municipality
CAR	Corrective Action Request
CARA	Conservation of Agricultural Resources Act (Act 43 of 1983)
CSP	Concentrating Solar Power
DFFE	Department of Environmental Affairs
DNP	Defects Notification Period
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
EMS	Environmental Management System
EO	Environmental Officer
ETB	Ethylbenzene
FPA	Fire Protection Association
GCC	General Conditions of Contract 2015
GNR	General Notice Regulations
HIV/AIDS	Human Immunodeficiency Virus / Acquired Immunodeficiency Syndrome
HWC	Heritage Western Cape
I&APs	Interested and Affected Party(s)
IMS	Integrated Management System
ISO	International Organization for Standardization
JIV	Joint Investigation Visit
LM	Local Municipality
MSDS	Material Safety Data Sheets
MW	Megawatt
NCR	Non-Conformance Report
NEM: BA	National Environmental Management: Biodiversity Act (No. 10 of 2004) (NEM:BA)
NEM: WA	National Environmental Management: Waste Act (No. 59 of 2008)
NEMA	National Environmental Management Act (Act No. 107 of 1998) as amended
NHRA	National Heritage Resources Act (No. 25 of 1999)
NT	Near Threatened
NWA	National Water Act (No. 36 of 1998)

OHSA	Occupational Health and Safety Act (Act No. 85 of 1993)
PPE	Personal Protective Equipment
PSP	Professional Service Provider
QA/QC	Quality Assurance and Quality Control
QMS	Quality Management System
RAM	Responsibility Assignment Matrix
SAHRA	South African Heritage Resources Agency
SAICE	South African Institution Of Civil Engineering
SANAS	South African National Accreditation System
SANS	South African National Standards
SAPS	South African Police Services
SHEQ	Safety, Health, Environment and Quality
SO	Social Officer
SOC	State Owned Company
STP	Stored Pressure
TEM	Transport, Earthmoving And Materials Handling Equipment

Glossary of Techincal Terms

Term	Description
Clearing	Means the clearing and removal of vegetation, whether partially or in whole, including trees and shrubs, as specified.
Construction camp	Is the area designated for key construction infrastructure and services, including but not limited to offices, overnight vehicle parking areas, stores, the workshop, stockpile and lay down areas, hazardous storage areas (including fuels), the batching plant (if one is located at the construction camp), designated access routes, equipment cleaning areas and the placement of staff accommodation, cooking and ablution facilities, waste and wastewater management.
Contractor	The Contractor has overall responsibility for ensuring that all work, activities, and actions linked to the delivery of the contract, are in line with the Environmental Management Programme and that Method Statements are implemented as described.
Hazardous Substances	Is a substance governed by the Hazardous Substances Act, 1973 (Act No. 15 of 1973) as well as the Hazardous Chemical and Substances Regulations, 1995;
Heritage Remains	Heritage remains include: archaeological remains (including fossil bones and fossil shells); coins; indigenous and/or colonial ceramics; any articles of value or antiquity; marine shell heaps; stone artefacts and bone remains; structures and other built features; rock art and rock engravings; shipwrecks; and graves or unmarked human burials.
Method Statement	Means a written submission by the Contractor to the Project Manager in response to this EMPr or a request by the Project Manager, ECO and Eskom Environmental Practitioner. The Method Statement must set out the equipment, materials, labour and method(s) the Contractor proposes using to carry out an activity identified by the Project Manager when requesting the Method Statement. This must be done in such detail that the Project Manager, ECO and Eskom Environmental Practitioner is able to assess whether the Contractor's proposal is in accordance with this specification and/or will produce results in accordance with this specification. The Method Statement shall cover applicable details with regard to: i. Construction procedures; ii. Plant, materials and equipment to be used; iii. Transporting the equipment to and from site; iv. How the plant/ material/ equipment will be moved while on site; v. How and where the plant/ material/ equipment will be stored; vi. The containment (or action to be taken if containment is not possible) of leaks or spills of any liquid or material that may occur; vii. Timing and location of activities; viii. Compliance/ non-compliance; and ix. Any other information deemed necessary by the Project Manager.

Slope	Means the inclination of a surface expressed as one unit of rise or fall for so many horizontal units;
Solid waste	Means all solid waste, including construction debris, hazardous waste, excess cement/ concrete, wrapping materials, timber, cans, drums, wire, nails, food and domestic waste (e.g. plastic packets and wrappers).
Spoil	Means excavated material which is unsuitable for use as material in the construction works or is material which is surplus to the requirements of the construction works;
Topsoil	Means a varying depth (up to 300 mm) of the soil profile irrespective of the fertility, appearance, structure, agricultural potential, fertility and composition of the soil.
Works	Means the Works to be executed in terms of the Contract

Content of the EMPr

Content as required by NEMA EIA Regulations GN No. 982, Appendix 4	Chapter/Section number
a) Details of– (i) The EAP who prepared the EMPr; and (ii) The expertise of that EAP to prepare an EMPr, including a curriculum vitae;	Appendix A
b) A detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description;	Section 3.1
c) A map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that must be avoided, including buffers;	Figure 3-3
d) A description of the impact management objectives, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development including (i) Planning and design; (ii) Pre-construction activities; (iii) Construction activities; (iv) Rehabilitation of the environment after construction and where applicable post closure; and (v) Where relevant, operation activities;	Section 5
e) A description and identification of impact management outcomes required for the aspects contemplated in paragraph (d);	Section 5
f) A description of proposed impact management actions, identifying the manner in which the impact management objectives and outcomes contemplated in paragraphs (d) and (e) will be achieved, and must, where applicable, include actions to– (i) Avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation; (ii) Comply with any prescribed environmental management standards or practices; (iii) Comply with any applicable provisions of the Act regarding closure, where applicable; and (iv) Comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable;	Section 11
g) The method of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Section 11.15
h) The frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Section 11.15
i) An indication of the persons who will be responsible for the implementation of the impact management actions;	Section 6.8.3
j) The time periods within which the impact management actions contemplated in paragraph (f) must be implemented;	Section 11
k) The mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);	Section 7
l) A program for reporting on compliance, taking into account the requirements as prescribed by the Regulations;	Section 8.1

Content as required by NEMA EIA Regulations GN No. 982, Appendix 4	Chapter/Section number
m) An environmental awareness plan describing the manner in which– (i) The applicant intends to inform his or her employees of any environmental risk which may result from their work; and (ii) Risks must be dealt with in order to avoid pollution or the degradation of the environment; and	Section 6.16
n) Any specific information that may be required by the competent authority.	N/A

1. Introduction

An Environmental Management Programme (EMPr) is an environmental management tool used to prescribe management mechanisms or methods for the prevention of undue or reasonably avoidable adverse environmental impacts and for the enhancement of the positive environmental benefits of a development. The EMPr is based on the findings of the Basic Assessment (BA) process conducted in terms of the Environmental Impact Assessment (EIA) Regulations (2014), as amended. All works associated with the EIA process have been undertaken under the prevailing National Environmental Management Act (Act No. 107 of 1998) as amended (NEMA) and the EIA Regulations (2014), as amended.

An EMPr describes the measures that need to be taken to ensure the Duty of Care is bestowed upon those who cause, have caused or may in future cause pollution or degradation of the receiving environment, as per Section 28(1) of NEMA. Non-compliance to Section 28 (Duty of Care) is a criminal offence and may lead to criminal prosecution. Furthermore, this EMPr is drafted in compliance with NEMA Section 24N (Environmental Management Programme) requirements and the scope is to set conditions for the implementation of the environmental management component for all personnel involved with the development. As such, the EMPr outlines how the development will be managed throughout its planning, design, pre-construction, construction, rehabilitation and decommissioning lifecycle and is designed to mitigate negative environmental impacts; whilst enhancing positive impacts.

It is furthermore, used as a stand-alone document to guide and regulate environmental performance through all stages of development, including planning, design, construction, rehabilitation and maintenance, and eventual decommissioning (if applicable).

This EMPr has been developed for the installation and establishment of a Battery Energy Storage System (BESS) and associated infrastructure to accommodate the storage of energy (the Project). The BESS will typically store energy during the low demand load periods at night (23h00 to 4h59) and provide ancillary energy services into the grid during high demand periods in the day (5h00 to 22h59). The Project will provide energy support to business services within the area, integrate energy from the surrounding renewable facilities and act as a distributor collector substation for the surrounding substations. A full project overview can be found under Section 3 for additional information.

This EMPr must form part of the tender documentation to the Contractor(s) and becomes legally binding on the Contractor(s) and anyone acting on behalf of the Contractor(s) or the Applicant (Eskom SOC Holdings Limited – Northern Cape Operating Unit (Eskom)) during the development life-cycle process activities. The EMPr is designed to be as site-specific as possible. Moreover, this EMPr is a dynamic and flexible document and may need to be updated on a regular basis, as directed by the Environmental Control Officer (ECO). The EMPr remains in draft format until the CA (Department of Forestry, Fisheries and the Environment (DFFE)) approves the document of which some additional EA conditions will be incorporated into the EMPr.

2. Background to the EMPr

2.1 Nature of the EMPr

The EMPr is a legally required and binding document in the same manner as a licence or Environmental Authorisation (EA) and is required prior to undertaking an activity. The document is site specific to ensure that it complies with the requirements of reasonable protection of the environment as imposed by Section 28 of NEMA, which refers to Duty of Care. The EIA Regulations (2014), as amended, are used as a guideline for the content of the EMPr. In line with the requirements of Section 24N of NEMA, an EMPr must include:

- information on any proposed management, mitigation, protection or remedial measures that will be undertaken to address the environmental impacts that have been identified in a report contemplated in subsection 24 (1A), including environmental objectives in respect of –
  - planning and design;
  - pre-construction and construction activities;
  - the operation of undertaking of the activity in question;
  - the rehabilitation of the environment; and
  - details of -
    - the Environmental Assessment Practitioner (EAP) who prepared the EMPr; and
    - the expertise of that EAP to prepare an EMPr, including a curriculum vitae;
- a detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description;
- information identifying persons who will be responsible for the implementation of the measures contemplated in paragraph (2)
- information in respect of the mechanisms that proposed for monitoring compliance with the environmental management programme and for reporting on the compliance;
- as far as reasonably practicable, measures to rehabilitate the environment affected by the undertaking of the listed activity or specified activity to its natural or predetermined state or to a land use which conforms to the generally accepted principle of sustainable development; and
- a description of the manner in which it intends to-
  - modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;
  - remedy the cause of pollution or degradation and migration of pollutants; and
  - comply with any prescribed environmental management standards or practices.

The mitigation measures required in terms of Section 28, subsection (1) include measures to:

- investigate, assess and evaluate the impact on the environment;
- inform and educate employees about the environmental risks of their work and the manner in which their tasks must be performed to avoid causing significant pollution or degradation of the environment;
- cease, modify or control any act, activity or process causing the pollution or degradation;
- contain or prevent the movement of pollutants or the cause of degradation;
- eliminate any source of the pollution or degradation; or
- remedy the effects of the pollution or degradation.

This EMPr, as a standalone document, shall be used to guide and regulate environmental performance of the project through the construction and rehabilitation stages of the scheme. It contains the following elements:

- goal setting and performance measurement;

- compliance management;
- an assessment and management system;
- community relations;
- roles, responsibilities and accountabilities;
- risk management;
- emergency preparedness and response; and
- incident reporting and investigation.

To achieve these environmental management requirements, a defined and implementable system must be in place. This system comprises the “what” and the “how”.

- **The what:** The EMPr indicates to the Contractor what is required by setting objectives with measurable targets in place for the successful management of the scheme; and
- **The how:** Eskom is required to formulate procedures and/or guideline documents in compliance with its Quality Management System (QMS) requirements on how the objectives will be met.

2.2 Objectives

The main objective of the EMPr is to ensure the implementation of environmental practices that are aimed at the best form of environmental protection. The aim is to ensure that Eskom takes reasonable measures to protect the environment and to remedy impacts to the receiving environment, in line with the Duty of Care requirements introduced by the NEMA, Section 28. The EMPr draws Eskom’s attention to the monitoring, auditing and corrective actions that may be needed during construction of the project. Therefore, the other objectives[1] of the EMPr are to:

- avoid, minimise or correct the disturbance of ecosystems and loss of biodiversity;
- avoid, minimise or correct pollution and degradation of the environment;
- avoid or minimise waste, to reuse or recycle waste where possible and to dispose of waste in a responsible manner;
- apply a risk-averse and cautious approach; and
- anticipate and prevent negative impacts on the environment and on people’s environmental rights. Where impacts cannot be prevented, such impacts must be minimised and mitigated.

2.3 Scope of the EMPr

The EMPr outlines the impacts and mitigation measures associated with the planning and design, pre-construction and construction, operation, rehabilitation and closure (or decommissioning) of the Project. The roles, responsibilities and reporting procedures have been identified in the EMPr. It also contains a series of environmental specifications designed to avoid, minimise and, ultimately, manage the potential environmental impacts associated with the construction of the project.

The EMPr accommodates for the planning and design, pre-construction and construction, operation, rehabilitation and closure (or decommissioning) activities associated with the project.

2.4 Outcomes of the EMPr

This EMPr covers systems, strategies and procedures to ensure proposed developments associated with the proposed project meet the environmental outcomes and targets as prescribed herein.

The below outcomes, targets and execution are to ensure the development is undertaken in an environmental responsible manner (please refer to Table 2-1).

[1] As defined by the NEMA

Table 2-1 EMPr Outcomes

Outcomes	Targets	Execution
Compliance with legislative requirements	• 100% compliance with all requirements	• Review of audit reports
Compliance with Competent Authority (CA) conditions	• 100% compliance with all requirements	• Review of audit reports
Avoidance of environmental harm	• Compliance with EMPr, environmental authorisation and best practicable environmental option	• Implementation of development based environmental management system • Implementation of monitoring environmental controls • Environmental reporting, auditing and recording • Awareness training
Conformance with best practicable environmental option	• Conduct environmental inductions (at development commencement and every six months thereafter) and provide for weekly environmental toolbox talks • Achieve performance indicators and targets • Undertake environmental inspections • Undertake environmental audits as per prescribed audit schedule • Report and record all environmental incidents and non-conformances • Assign and complete corrective actions within the prescribed timeframes	• Training of personnel in EMPr measures • Environmental monitoring and audits • Review of non-conformance register • Review of environmental reports
Maintain commitments to stakeholders and community	• Minimal grievances • Respond to all grievances • Within the prescribed timeframes	• Review of Communications Register

2.5 Adaptive Management and Review of the EMPr

As part of an adaptive management strategy, this EMPr is a “living” and / or dynamic document that shall be reviewed prior to each development phase to ensure appropriateness and applicability. This approach shall allow for:

- Monitoring data gathered being used to evaluate impact management and mitigation;
- Assumptions being tested and uncertainties reduced; and
- EMPr efficacy being determined and whether reviews are required.

Such review can provide for:

- Revision of monitoring because of iterative learning;
- The determination of performance indicators and target success; and
- Revision of performance targets and target actions.

Therefore, the EMPr must be revised due to:

- Policy change;
- Management review;
- Audit recommendations;
- Grievances or non-conformance reports; and
- Legislative changes.

Please note the requirements associated with Regulations 29 and 31 of the EIA Regulations (2014), as amended, relating to the amendment processes:

- Part 1 Amendment (Regulation 29) shall be undertaken (the amendment shall require not formal submission of the EMPr to the CA; and no public participation). The amended EMPr shall however be submitted to the CA for record keeping when there is:
  - No change in scope of a valid environmental authorisation;
  - No increase in level or nature or assessed impact; and
  - A change of ownership or transfer of rights and obligations.
- Part 2 Amendment (Regulation 31) shall be undertaken when there is:
  - A change to the scope of a valid environmental authorisation;
  - An increase in level of or change in the nature of assessed impact; and
  - Inclusion of an activity not considered within the initial application for environmental authorisation or the environmental authorisation itself.

A Part 2 Amendment shall be applicable when the length of the construction period exceeds the period specified in the environmental authorisation when no operational aspects are applicable (please refer to Regulation 26 (d) (ii) of the EIA Regulations (2014), as amended.

The amendment shall require a formal submission of the EMPr to the CA; together with a public participation process. A Part 2 Amendment process may negatively impact upon the Contractor's programme.

2.6 The Continuous Improvement Approach

The approach adopted for this EMPr is derived from the Deming Cycle (refer to Figure 2-1), a cycle of continuous improvement that entails the reiterative actions of plan, do, check and act.

2.6.1 Plan

The EMPr for the upgrade communicated the Environmental Policy and intended environmental governance of Eskom to all parties. The project will be implemented under this policy, and all parties acting on behalf of Eskom will adhere to this policy. The organisational relationships required have been illustrated and the roles and responsibilities of each "organisation" have been defined.

Project-specific planning for the BESS and associated infrastructure involved listing activities associated with the works and the environmental aspects that may be impacted on. This provided a starting point from which aspect-specific environmental management objectives were established.

Environmental performance indicators were determined for these objectives and measurable targets were prescribed to monitor the environmental performance of the project.

Achieving the targets depends on compliance with this EMPr and the legislative requirements that underpin it.

2.6.2 Do

Throughout the proposed development, Eskom will be required to develop and maintain a QMS that is designed to ensure that best management practices are implemented in day-to-day construction management. Such a QMS must include at least the following information:

- Location and extent of associated infrastructure;
- Associated activities, such as the transportation of people and equipment;
- Resources and experience required (staffing);
- Materials and equipment to be used;
- Management actions;
- Human resources used;

- Construction-monitoring activities;
- Emergency / disaster incident and reaction procedures; and
- Rehabilitation procedures for the impacted environment.

Including these information topics in the Contractor's procedures and/or guideline documents will ensure that aspect-specific environmental management (based on this EMPr) forms an integral part of the construction works. It is, therefore, important for the Contractor to integrate the environmental management requirements into the construction activities by way of set procedures that are set out in its QMS.

The incorporation of the how and what will ensure that Eskom understands what is required of it and that it allows systems to be put in place to ensure that the execution of the requirements is monitored. Eskom must also develop a programme for monitoring aspect-specific indicators in terms of the targets provided in the EMPr.

2.6.3 Check

A system of assessing monitoring results has been developed to check on the Contractor's environmental management performance. Continuous assessment facilitates proactive management of environmental issues. Mitigation measures can then be successfully implemented on an on-going basis to keep environmental indicators within their target thresholds. Moreover, the assessment system also enables the assessment of the efficacy of the EMPr.

Regular auditing of environmental performance is prescribed to prove and preserve accountability in a legislative context.

2.6.4 Act

The assessments and monitoring of the results and findings of the regular audits must be documented within a reporting. Precautionary mitigation measures and corrective actions will be prescribed, and instructions will be given in order to implement these in the field.

The findings of monitoring and auditing programmes can also be used to update the EMPr. Although the EMPr is a project-specific document, it is dynamic and must be updated regularly to address the changing circumstances of the scheme.

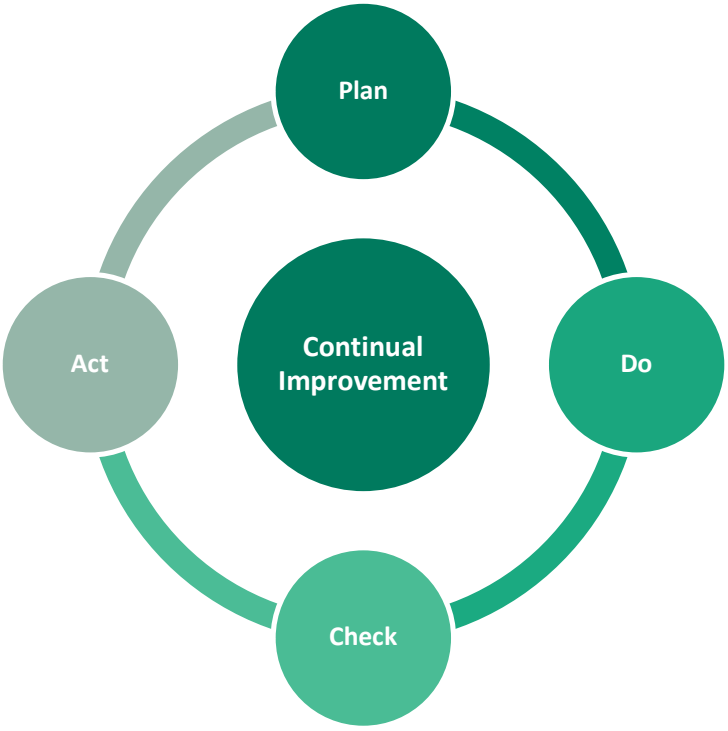


Figure 2-1 The Deming Cycle of Continuous Improvement

2.7 Eskom's Environmental Management System

Eskom has adopted ISO 14001 as a best-practice governance and corporate model for environmental management. Section 2.7 indicates Eskom's adaptive environmental management strategy which is formed on the basis of ISO 14001. This EMPr forms an integral part of the cyclical structure (Deming Cycle) of the EMS.

2.8 Legal and Administrative Framework

The development shall be implemented within the framework of the NEMA and other relevant environmentally related legislation, including national acts, provincial ordinances, municipal by-laws and/or guideline documents as referenced in Appendix G.2.

3. Project Description

The following sections provide an overview of the project background including details of the infrastructure associated with the BESS. Additional details regarding the construction and operational phase activities have also been included as sub-sections under the heading.

3.1 Background

The Cuprum Substation is located within the Prieska Network Development Plan (NDP) study area in the Northern Cape Operating Unit (NCOU). The NDP area encompasses the presented network up to and including Mooidraai and Kleinbegin Substations. The NDP falls within the Siyathemba Local Municipality and is partially within the Upington Renewable Energy Development Zone (REDZ).

It is anticipated that an end state of 1965MW of Independent Power Producer's (IPPs) would be connected in the Prieska REDZ. To date, 170MW is commissioned and 238MW is expected to come online. It is anticipated that the remainder of the 1965MW in capacity will be initiated by 2030 in alignment with the 2019 Integrated Resource Plan's (IRP) with the intent to add 26GW of renewable generation capacity to the grid by 2030.

Cuprum Substation is considered a distribution collector station and, therefore, a high potential platform for the assessment and application of BESS and renewable energy integration. Cuprum Substation consists of two 132/11kV step down transformers and a single 11/66kV step up transformer. The substation's 132/11kV transformers are not coupled on the secondary voltage side and consist of a 20MVA and 10MVA unit, respectively. The 20MVA is currently exclusively used to import 20MW of solar photovoltaic generation from the Mulilo Prieska 20MW IPP facility. The 10MVA transformer supplies an 11kV feeder and a step-up 12.5MVA 11/66kV transformer that feeds Karoo Substation via a 109km 66kV line. Cuprum Substation connects to Kronos 400/132kV Main Transmission Substation (MTS) via an 8km double circuit 132kV Kingbird overhead line. There is an extensive 132kV network adjoining Cuprum that extends to Garona, Upington and Boundary MT predominantly via the Wolf overhead lines that are due for refurbishment.

Cuprum Substation is considered a possible BESS substitute for the Karoo, Ganspan and Douglas proposed BESS sites. This is due to the advantage it offers as a single large site as opposed to three (3) individual sites, i.e. lower project costs and risks.

According to the IPP Strategic Plan for the Kronos/Cuprum network, which indicates the REIPP potential in the area from current connection applications to the Department of Energy (DoE), 636.5MW would be connected via Cuprum Substation. At the current stage three (3) projects have been committed and allocated to Cuprum Substation which include the Copperton Wind (102MW), Garob Wind (136 MW) and Mulilo Prieska Renewable Energy PV (20 MW).

In terms of electricity demand within the NDP area, the Prieska Copper Mine and the Square Kilometre Array (SKA) projects are the main drivers. Prieska Copper Mine was shut down in the 1990s as low copper prices hindered further exploration. An Australian company, Orion Gold, has acquired Agama Exploration and Mining, which owns a majority stake in the copper mine. To bring the plant back to production capacity, an application for a new 40MVA supply point at Cuprum Substation was lodged with Eskom.

The SKA project is an international effort to build the world's largest radio telescope, with eventually over a square kilometre (one million square metres) of collecting area. The SKA currently has a 33kV bulk supply point with a Notified Maximum Demand (NMD) of 1.5MVA at Karoo Substation. Demand peaked at 1MVA in 2018 and an application for NMD increase to 5.3MVA at the SKA was assessed in July 2019. Due to overloading of equipment, the Karoo Substation load will have to be supplied from Cuprum 132/11kV 20MVA transformer or a dedicated 132/66kV transformer.

3.1.1 Project activities

The project activities will include the following:

- Re-alignment of the Cuprum/Karoo 66kV and Cuprum/Kronos 11kV overhead lines along the peripheries of the Eskom property boundary to make provision for the BESS and substation expansion;
- Extension of the Cuprum Substation's fence around the substation to include the BESS area;

- Extension of the Cuprum Substation's 132kV busbar to make provision for the new transformer which will extend the substation on the south-western side;
- Placement of the BESS control panels in an existing control room located within the Cuprum Substation;
- Establishment of the BESS containers on a cleared area and connection to Eskom grid infrastructure;
- Extension of the existing road by 260m which will connect to the runway inside the Cuprum Substation; and
- Rerouting of a 350m water pipeline with a diameter of 32mm.

3.1.2 Infrastructure Developments

A BESS is a technology developed for storing electric charge by using specially developed batteries.

BESSs are a sub-set of Energy Storage Systems (ESSs) which is a general term for the ability of a system to store energy using thermal, electro-mechanical or electro-chemical solutions. Examples of these systems include pumped hydro, compressed air storage, mechanical flywheels as well as BESSs (Diwan, 2019). These systems complement intermittent sources of energy such as wind, tidal and solar power in an attempt to balance energy production and consumption (Diwan, 2019).

The underlying concept is based on the fact that the stored energy can be used at a later stage and can integrate variable renewable energy sources, such as wind and solar, into a power system or grid (Diwan, 2019). Due to the intermittent nature of renewable energy sources and the associated supply concerns, BESS technologies can address excess energy concerns by storing excess energy and dispatching into the power system/grid (SRK, 2019).

As indicated in Figure 3-1 below, there are several uses associated with BESS infrastructure. BESS technologies typically connect to renewable energy facilities and store additional electrical energy. The BESS also provides business ancillary support by connecting to the grid as well indirectly supplying energy to common appliances.

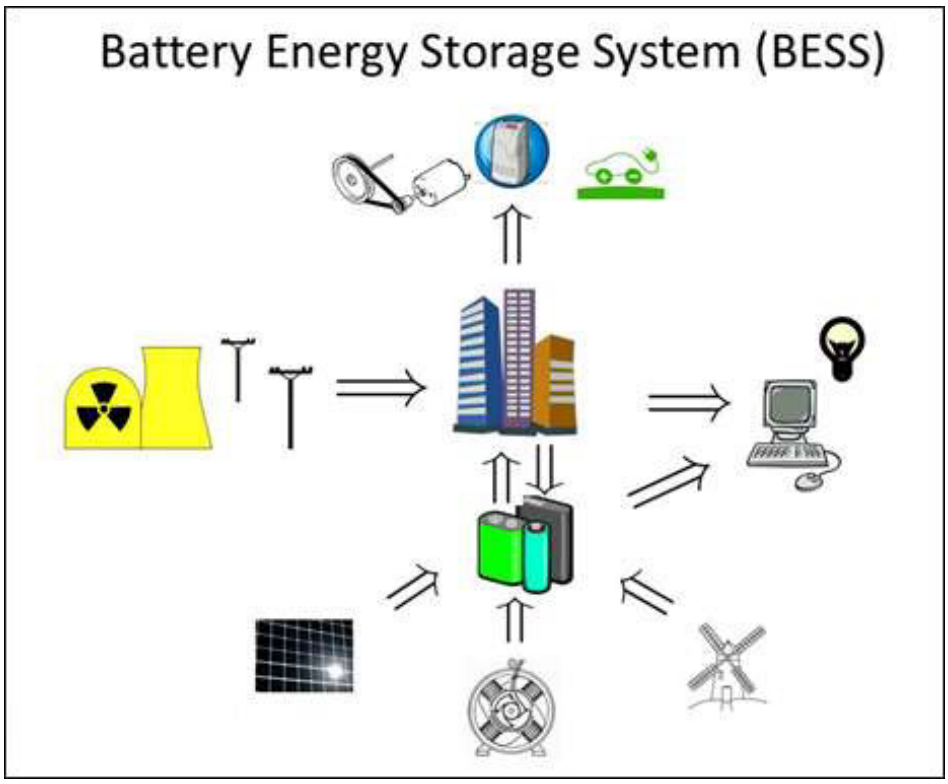


Figure 3-1 Flow diagram of common uses and linkages of BESS

Source: (Diwan, 2019)

In addition, the BESS uses peak arbitrage to store electricity during low consumption periods and dissipate during peak consumption periods. This results in peak clipping/shaving which reduces the overall network demand placed on the electrical grid during peak consumption. As a result, the BESS reduces the increased reliability on electrical infrastructure without exhausting substations through utilisation but rather incorporating technology into temporarily storing energy for future demand.

In the event where the BESS is not required to charge or discharge, it may be used for frequency regulation purposes (SRK, 2019). Frequency regulation involves monitoring of alternating current (AC) frequencies and responding to anomalies to keep the frequency close to the target frequency.

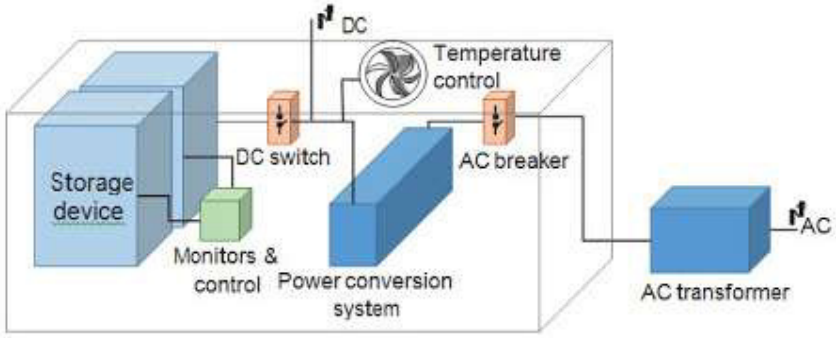
An electrical grid transmits power from generators to end users at a fixed alternating current (AC) frequency. If power generation is equal to power usage, the frequency remains stable (SRK, 2019). If power usage exceeds power generation, the frequency drops and could contribute to issues such as load shedding. Reversibly, if the power generation exceeds power usage the frequency rises and could ultimately lead to damage of the grid and connected devices. Additional renewables added to the grid increase variability in supply and fluctuations in frequencies which result in further difficulties to achieve an optimum frequency. Fossil fuel-based plants are traditionally used to provide frequency regulating services (SRK, 2019). Therefore, the BESS can be used for this application as it provides flexibility, faster response time and a lower overall carbon footprint in comparison to fossil fuel-based plants (SRK, 2019).

3.1.3 Components

The BESS consists of a number of rechargeable batteries, each comprising of one or more electrochemical cells. The battery cells are connected together into modules. These modules are then connected to form full battery stacks/packs.

The basic components of a BESS include the following (SRK, 2019):

- A battery stack (made up of multiple battery modules) contained within the storage device;
- The Battery Management System (BMS). This is responsible for monitoring, controlling, and protecting the battery cells, including preventing over-charge/under-charge;
- The Power Conversion System (PCS). The PCS contains the inverter to change the Direct Current (DC) from the battery to AC for use in the grid;
- A temperature control system; and
- External electrolyte tanks in the case of flow batteries.



Network integration equipment (e.g. power cables, control cables, isolators, circuit breakers, transformers, etc.) will also be required to connect the new BESS to existing infrastructure at the Cuprum Substation. The site will also require additional fencing, security equipment, lighting, and/or control room upgrades. A platform (compacted fill, earth protection layer and stone chip) for the BESS will be constructed to accommodate the containers and cable trenches to connect the BESS to the grid. The associated infrastructure including the 11kV and 66kV overhead powerlines, water pipeline and extension of the substation busbar (to accommodate 2 x 132kV feeder bays) has

been strategically placed and located around the Cuprum Substation to accommodate the BESS within the development footprint.

3.1.4 Size of the Project Area

The area for the BESS covers approximately 20 705 m^2 (195 m x 130 m (at its widest point)).

The realignment of the Cuprum/Karoo 66kV and Cuprum/Kronos 11kV overhead lines will be routed for approximately 800 m and 820 m, respectively, while the extension of the substation's 132kV busbar and associated structures covers approximately 7 298 m^2 (92 x 79m) (refer to **Error! Reference source not found.**). Additionally, a 260 m road (with a width of 5m at turning points and 7m at the corners) will be located around the west, south and east portions of the substation while 350 m water pipeline (with a diameter of 32mm) will enter the substation through the northern entrance and proceed to link into an existing building located in the centre of the substation. The existing substation fence will also be extended on the south-west end of the substation to accommodate the 3 x 132kV feeder bays (refer to **Error! Reference source not found.**).

The development of the BESS and associated infrastructure will result in the clearance of approximately 53 000 m^2 (5.3 hectares) of indigenous vegetation

3.1.5 Servitudes

The servitude for the proposed BESS, road, water pipeline, 132kV busbar and fence extension is currently being applied for by Eskom. However, servitude negotiations and approval for the realignment of the overhead lines are in process as the powerlines infringe on the adjacent property not owned or currently leased by Eskom.

3.1.6 Site Access

The site is accessible through the R375 via an unnamed road labelled as Copperton/Alkantpan. The Cuprum Substation is access controlled and is only accessible by authorised personnel. Therefore, existing roads will be used to gain access to the site.

3.2 Construction Phase

This section includes a breakdown of the construction phase related activities including site establishment as well as the general approach to waste, water and energy efficiency.

3.2.1 Laydown Area

The Contractor will require laydown areas for the duration of the contract period. The location and extent of the proposed laydown areas are shown in **Error! Reference source not found.**. The laydown areas will be located on Vogelstruis Bult Farm 104 Portion 1, which is owned by the Applicant. The designated location will be contained within an access-controlled area and guarded by security.

3.2.2 Construction Camp

A construction camp will not be required for skilled migrant workers. The contractor(s) will source accommodation in nearby areas such as Copperton, Prieska and Douglas for their labourers during the construction phase.

3.2.3 Construction Activities

Construction planning and coordinating delivery of construction materials and equipment will be undertaken to reduce travel cost and fuel usage. The duration of the construction phase will be approximately 7 - 9 months from start to finish.

Refer to Section 3.1.1 for the construction activities.

3.2.4 Waste Effluent

The project will generate solid construction waste during construction however, it is understood that the waste volumes generated would not trigger the thresholds as prescribed in terms of the NEM:WA.

Waste resulting from construction activities will be collected and disposed of at a registered landfill site as per regulatory requirements. It is anticipated that no effluent will be generated during construction and operation of the proposed project.

3.2.5 Water Requirements and Use

The appointed construction Contractor will be responsible for his own arrangements regarding the supply of water for construction purposes.

Furthermore, no water will be abstracted (from a watercourse) for construction purposes and the development does not fall within 500 m of a watercourse – a water use licence is not required.

3.2.6 Energy Efficiency

The activity is expected to have minimal energy requirements and will not require additional generation infrastructure for construction equipment i.e. large generators. As such, no alternative energy sources have been identified at this time to support the project.

The contractor will be advised to avoid multiple trips when transporting equipment during construction in order to improve overall efficiencies and energy expenditure. The transportation of materials can be done simultaneously with other activities or where possible transport all construction materials at the same time.

3.3 Operational Phase

This section includes a breakdown of the operational phase activities including details regarding the approach to regular maintenance (including monitoring) and disposal.

3.3.1 Maintenance

The project will require regular maintenance and replacement of malfunctioning/weathered components in accordance with an operating and maintenance programme. In the event waste is generated from maintenance and replacement activities, all damaged/ replaced components will be removed from the site. These components will be disposed to a licensed waste facility. In the event hazardous waste is generated during the operational phase, the waste will be transported to registered hazardous waste management facility to be disposed of accordingly.

No additional solid waste will be generated during the operational phase.

3.3.2 Disposal

The lifecycle of the battery technologies varies from ten (10) to twenty-five (25) years. Eskom will include a return to supplier clause, whereby the supplier will be responsible to recycle any hazardous waste emanating from the technology operation, maintenance and finally replacement as well as meet any legislative requirement that this may require (SRK, 2019). Once the battery storage system has reached its end of life, the battery will be returned to the supplier for recycling in accordance with the NEM:WA.

The following section provides details on the battery options for the project. Three (3) different battery technologies, namely - Solid State Battery: Lithium Ion (Li-ion), Solid State Battery: Sodium Sulphur (NaS), and Flow Battery: Vanadium Redox Flow (VRF), have been proposed which present both unique (and in some cases common) physical and chemical properties. At this stage Eskom cannot commit to a particular technology due to commercial/procurement requirements associated with the BESS infrastructure (Refer to Appendix E of the FBAR). For this reason, a preferred technology cannot be recommended as part of the FBAR and associated Specialist Reports. The technology option will be chosen upon finalisation of the procurement and bid process. Therefore, the worst-case scenario has been assessed.

3.4 Project Location

The Project will be situated adjacent to the existing Cuprum Substation (29° 57' 33.14" S, 22° 18' 1.26" E) located within Copperton which is situated near the town of Prieska in the Northern Cape Province (refer to **Error! Reference source not found.**). The site falls under the Siyathemba Local Municipality and Pixley ka Seme District Municipality.

The development will traverse three (3) properties, as listed below:

- Vogelstruis Bult Farm 104 Portion 1;
- Vogelstruis Bult Farm 104 Portion 5; and
- Vogelstruis Bult Farm 104 Portion 25.

The Surveyor General (SG) 21-digit codes for the affected properties are provided in Table 3-1 below.

Table 3-1: SG 21 Digit Codes of the Affected Properties

Property	SG Office	Major Region						Minor Region				Erf / Farm Number					Portion Number				
1	Kimberley	C	0	6	0	0	0	0	0	0	0	0	0	1	0	4	0	0	0	0	1
2	Kimberley	C	0	6	0	0	0	0	0	0	0	0	0	1	0	4	0	0	0	0	5
3	Kimberley	C	0	6	0	0	0	0	0	0	0	0	0	1	0	4	0	0	0	2	5

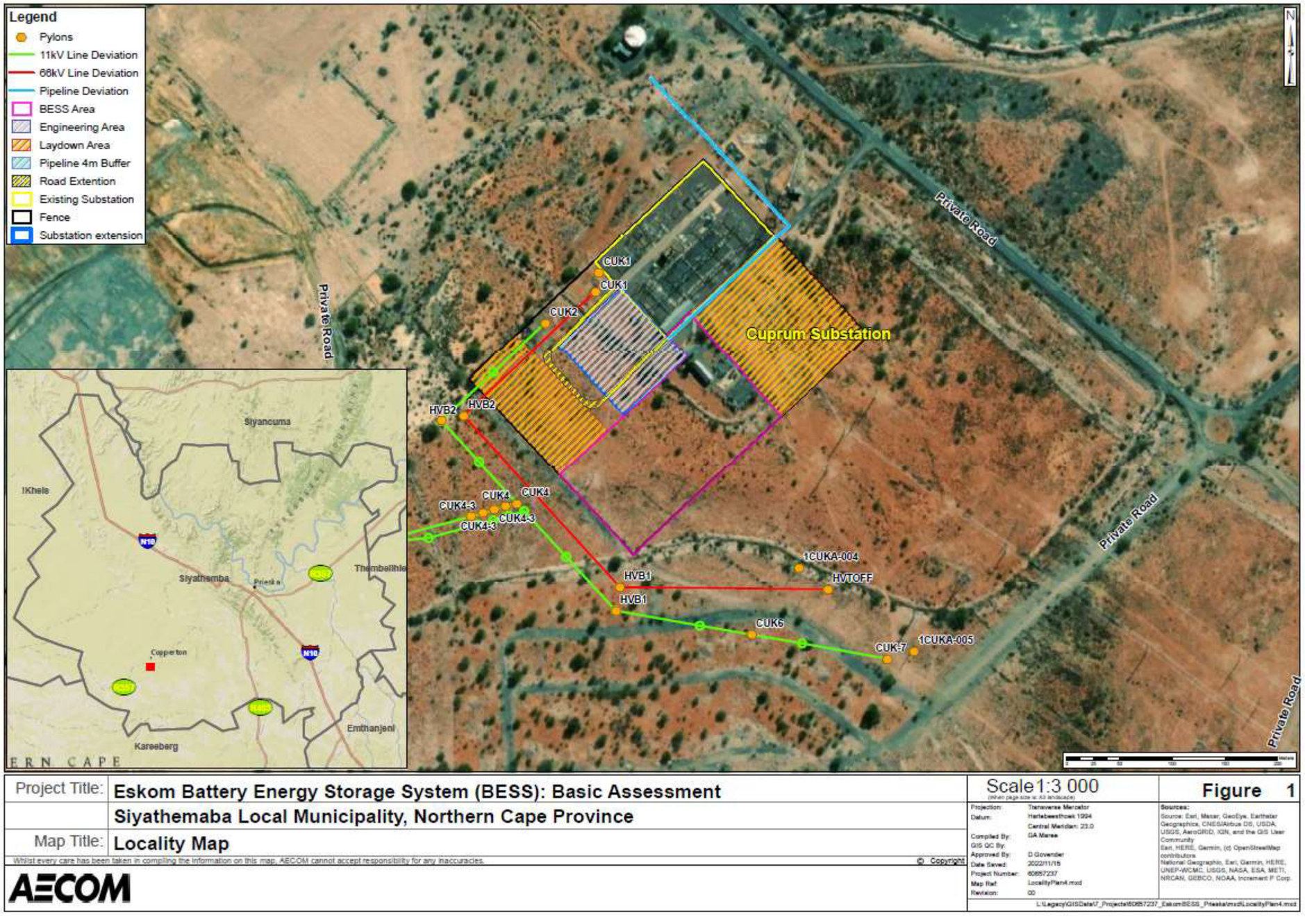


Figure 3-2 Locality Map

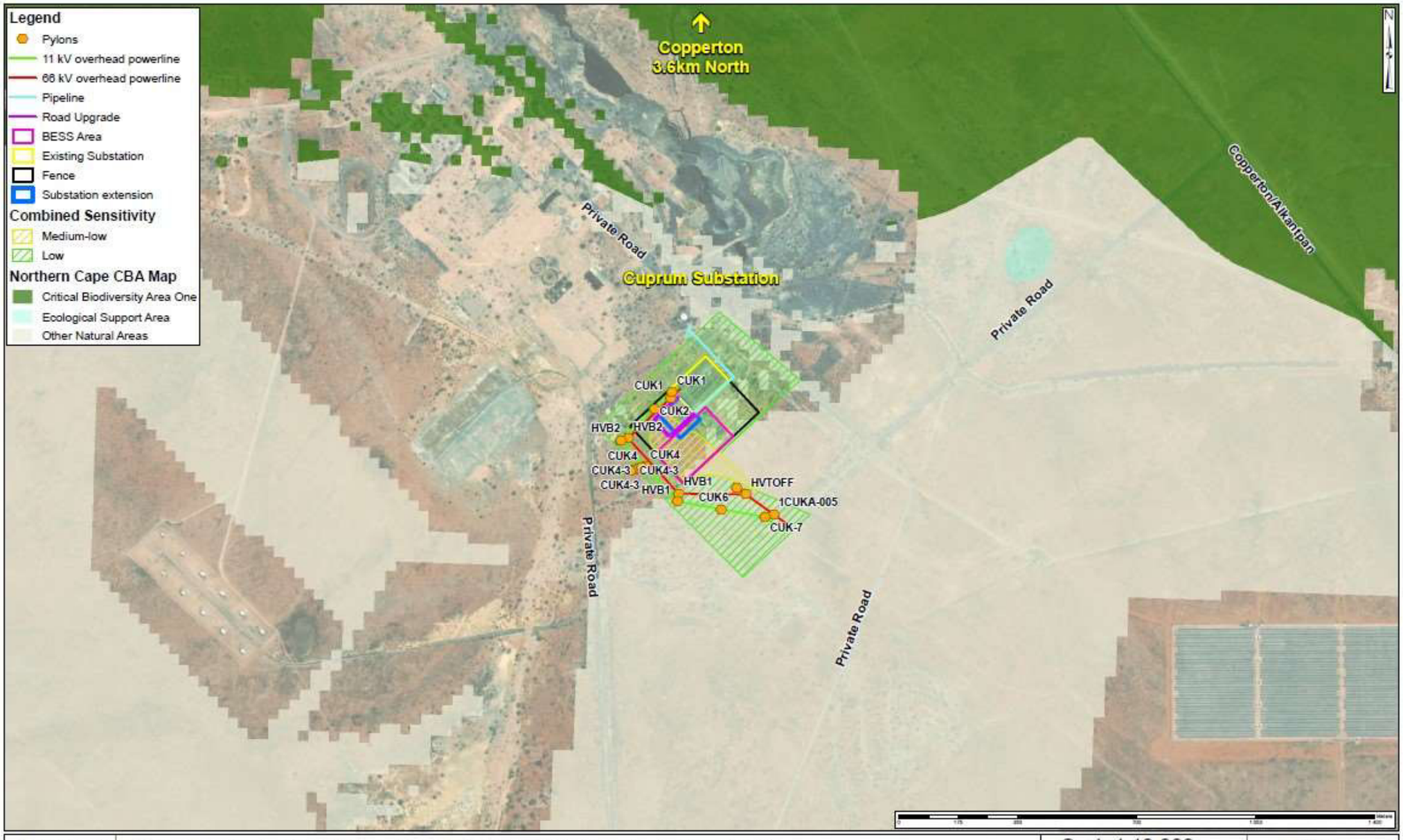


Figure 3-3 Site Sensitivity

4. Roles and Responsibilities

During the construction phase it is Eskom's responsibility to ensure that the Eskom Project Manager and Contractors involved in the construction of the Project receives a copy of the EMPr and ensure compliance with it. The EMPr is to be included as part of all tender documents. The appointed Contractor will be required to comply with the construction management regulations set out in this Draft EMPr. The Construction Manager will be responsible for ensuring that all construction staff adheres to the Draft EMPr specifications. A copy of the EMPr and EA from the DFFE will be kept on site at the construction site office and made available to all Contractor's staff, regulatory authorities and Interested and Affected Parties (I&APs) upon request. The roles and responsibilities of all role players are indicated below.

4.1 Leadership by Senior Management

Leadership by senior management is essential in developing a culture that values health, safety and environmental protection. Therefore, senior managers shall be required to demonstrate their commitment in their actions and decisions.

Eskom aims to create and sustain a culture within both the development; and all role players, to drive the commitment of zero harm to all people, to protect the environment and enhance the local communities.

To achieve this aim, personnel in leadership roles shall be suitably qualified and competent to provide leadership in health, safety and environmental management and will be required to:

- Know and understand the health, safety and environmental risks associated with their specific activities, how these risks are managed and the corrective actions to mitigate them;
- Visibly demonstrate health, safety and environmental management leadership through measurable actions (e.g. communicating the Eskom Occupational Health and Safety (OHS) Policy and Standards, undertaking health, safety and environmental worksite visits, engaging personnel and Contractors, and leading or participating in health, safety and environmental activities e.g. audits, investigations and campaigns;
- Motivate, coach and develop personnel in effective health, safety and environmental management by acting as a role model for compliance and reporting of issues and incidents, and encourage personnel to do the same; provide constructive health, safety and environmental feedback and celebrate success including health, safety and environmental management behaviours and performance in staffing decisions; and develop the team's health, safety and environmental management competencies;
- Ensure that all relevant personnel have undertaken induction training prior to working on site;
- Hold individuals accountable for their health, safety and environmental management behaviours and performance by insisting on compliance with applicable laws, regulations and development commitments; and
- Apply consistent consequence management to those who breach HSE Standards and procedures whilst rewarding correct health, safety and environmental behaviours.

4.2 Eskom's Roles and Responsibilities

Eskom will be responsible for overall environmental control on the project site during the construction works, operation, maintenance, decommissioning and rehabilitation phases. It is Eskom's responsibility to ensure that the Project Manager and Contractors involved receive a copy of the EMPr and ensure compliance with it. Eskom's responsibilities will also include:

- Appointing the Contractor;
- Appointing an independent ECO for the duration of the Contract;
- Being fully familiar with the BA Report, EA conditions and the EMPr;
- Communicating the contact details of the ECO to the DFFE prior to the Contract commencing;
- Forwarding audit reports (prepared by the ECO) on request, to the DFFE;
- Notifying the DFFE within 30 days of change of ownership/Applicant;

- Notifying the DFFE of any change of address of the owner/developer;
- Notifying the DFFE of changes in the development that result in significant environmental impacts;
- The overall implementation of the EMPr;
- Ensuring compliance, by all parties, and the imposition of penalties for non-compliance through the Project Manager / Engineer and ECO;
- Implementing corrective and preventive actions, where required; and
- Preventing pollution and actions that will harm or may cause harm to the environment.
- Ensuring the activity does not commence within 30 days of the EA being issued;
- Notifying the DFFE within 30 days that construction activity will commence;
- Notifying the DFFE in writing within 24 hours if any condition in the EA cannot be or is not adhered to; and
- Notifying the DFFE 14 days (or as stipulated in the EA) prior to commencement of the operational phase.

4.3 Project Manager/Engineer's Roles and Responsibilities

The Project Manager / Engineer will be responsible for the implementation of the EMPr throughout the construction phase and will report directly to Eskom. The responsibilities of the Project Manager / Engineer will include:

- Being fully familiar with the BA Report, EA conditions and the EMPr;
- Ensuring that all Contractors and Sub-Contractors adhere to the EMPr;
- Taking the required action when noncompliance is detected;
- Responding to any project-related complaints; and

4.4 Contractor's Roles and Responsibilities

The Contractors is responsible for all work performed on site and is to ensure all work is undertaken in accordance with the relevant client specifications and requirements. The responsibilities of the Contractor will include:

- Being responsible for the rehabilitation activities for the duration of the contract (so will Sub-Contractors and contract workers);
- Being responsible for ensuring work conducted is done within the framework of the EMPr and applicable legislation;
- Ensure that all Sub-Contractors have a copy of and are fully conversant with the contents of the EMPr;
- Being required to compile and provide Method Statements setting out, in detail, how management actions contained in the EMPr will be implemented;
- Appoint suitable professional service providers to undertake environmental monitoring as per Section 4.5 below;
- Being required to monitor construction related impacts upon the surrounding environment as per the Environmental Monitoring Method Statement;
- Undertake a pre-construction Photographic Survey (photos of various areas on the site taken before construction activities commence); and
- Appoint a suitably qualified Environmental Officer (EO), Fire Officer (FO) and Social Officer (SO) or Community Liaison Officer (CLO) for the duration of the contract (including the one-year Defects Notification Period (DNP));
- Maintaining a register of complaints and queries;
- Maintaining an environmental incident book of all incidents occurring on site.

4.5 Environmental Control Officer Roles and Responsibilities

The construction activities must be monitored by an ECO for the duration of the construction phase. The ECO must be well versed in environmental matters and have a minimum of two years of relevant on-site construction experience. The ECO must have a relevant environmental degree or other relevant tertiary qualification. The ECO must be a mature, level-headed and firm person with above-average communication and negotiating skills and be able to handle and address conflict management.

The responsibilities of the ECO include:

- Monitoring compliance with the environmental requirements set in the EMPr;
- Reviewing a weekly environmental monitoring report that is submitted by the EO;
- Compiling a monthly audit report based on the weekly monitoring reports submitted by the EO;
- Advising Eskom and Project Manager / Engineer about the interpretation, implementation and enforcement of the EMPr;
- Liaising with an archaeologist or heritage resources practitioner in the case of unearthing of artefacts and/or graves;
- Recommending rectification of non-compliances with the EMPr before significant impacts occur (e.g. debilitating injury or death or contamination) in consultation with the EO and the SO;
- Ensuring the Communications Register is maintained, and all complaints are dealt with within 10 days;
- Reporting any significant environmental incidents to the relevant regulatory authorities as may be required;
- Ensuring an environmental incident book of all incidents occurring on site is maintained and that corrective measures have been undertaken;
- Reviewing and approving Environmental Method Statements compiled by the Contractor;
- Reviewing the pre-construction photographic survey (photos of various areas of the site taken prior to site activities commencing);
- Inspecting and reporting on the efficiency of the method statements' management and mitigation programme; and
- Ensuring environmental awareness training is offered to all site personnel.

The ECO is responsible for providing an evaluation of compliance with the EMPr and not for enforcement of conditions of the EMPr. Eskom is responsible for enforcement of the conditions of the EMPr.

The Contractor and the Environmental Officer (EO) (Section 4.6) are accountable to the independent external ECO for non-compliance with the EMPr. The ECO provides feedback to the Eskom Environmental Practitioner who, in turn, reports to Project Manager/Engineer and I&APs, as required. Issues of non-compliance raised by the ECO must be taken up by the Project Manager/Engineer and resolved with the Contractor as per the conditions of his/her contract.

The ECO will remain employed for the full duration of the contract until all snag items have been resolved, rehabilitation measures have been completed, and the site is handed over to Eskom, thereby indicating the start of the operational phase.

4.6 Environmental Officer's Roles and Responsibilities

The EO must be appointed by the Contractor and is responsible for managing the day-to-day on-site implementation of the EMPr, and for the compilation of weekly environmental monitoring reports. In addition, the EO must act as liaison and advisor on all environmental and related issues, seek advice from the ECO when necessary, and ensure that any complaints received from I&APs (and communicated via the Eskom Environmental Practitioner, Project Manager/Engineer) are duly processed and addressed and that conflicts are resolved in an acceptable manner and within 10 days. The EO shall be full-time dedicated member of the Contractor's Team and must be approved by the Project Manager/Engineer.

The following qualifications, qualities and responsibilities are recommended for the individual appointed as the EO:

- A relevant environmental diploma or degree in natural sciences, as well as a minimum of three years' experience in construction-site monitoring, excluding health and safety;
- A level-headed and firm person with above-average communication and negotiating skills. The ability to handle and address conflict management situations will be an advantage; and
- Relevant experience in environmental site management and EMPr compliance monitoring.

The EO's responsibilities include:

- monitoring, on a daily basis, environmental specifications on site and compliance with the conditions of the EA, environmental legislation and EMPr;
- keeping a register of compliance / non-compliance with the environmental specifications;
- identifying and assessing previously unforeseen, actual or potential impacts on the environment;
- ensuring that a weekly environmental monitoring report is submitted to the ECO and Eskom Environmental Practitioner within 2 calendar days of the end of each week;
- conducting site inspections during the DNP, and bringing any environmental and social concerns to the attention of the ECO, Eskom Environmental Practitioner and Contractor;
- advising the Contractor on the rectification of any pollution, contamination or damage to the construction site, rights of way and adjacent land;
- attending site meetings (scheduled and *ad hoc*);
- presenting the environmental awareness training course and environmental induction to all staff, Contractors, Sub-Contractors and persons entering the site;
- monitoring the environmental awareness training for all new personnel on-site, as undertaken by the Contractor;
- ensuring that a copy of the EA and the latest version of the EMPr are available on site at all times;
- ensuring that the Contractor is made aware of all applicable changes to the EMPr that are approved by the DFFE;
- assisting the Contractor in drafting Environmental Method Statements and / or the Environmental Policy where such knowledge/expertise is lacking;
- compiling and maintaining a photographic record of the site during the pre-construction phase (prior to site activities commencing) and on completion of related works. This will include photographs for Environmental audit reports, Progress of environmental works, Non-conformance reports; and Corrective action;
- maintaining a record of all waste manifests; and
- undertaking daily environmental monitoring to ensure the Contractor's activities do not impact upon the receiving environment. Such monitoring shall include dust, noise and water monitoring.

Maintaining the following on site:

- weekly site diary;
- method statements;
- hazardous substances register including proof of safe waste disposal;
- environmental monitoring reports;
- communications and complaints register;
- a non-conformance register, and
- a register of audits.

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

4.7 Institutional and Functional Arrangements

The institutional and functional arrangements indicate the role players and institutional linkages involved in the development. The arrangement is dictated by the contract with Eskom. Figure 4-1 details the typical staffing arrangements associated with the project.

Figure 4-1 Typical staffing arrangements associated with the project

5. Impacts Assessed

5.1 Identification of Development Aspects, Impacts and Risk Assessment

This EMPr provides a system and set of procedures to ensure that Eskom establishes and maintains sound and effective controls to manage potential environmental impacts throughout the development, and wherever practicable, realise opportunities for enhanced environmental outcomes.

Therefore, for environmental management to be effective, it needs to be proactive rather than reactive. Environmental risk(s) associated with large scale developments shall be identified and assessed during the environmental impact assessment (EIA) process; whereas the Contractor shall identify environmental risk(s) as part of its health and safety assessment; and method statement compilation.

The assessment shall identify the significance of environmental risks and potential impacts using the following four-step approach:

i. identify each **element** with the potential to interact with the environment (e.g. characteristics and sensitivity of the environment);

ii. determine the potential **impacts** resulting from the activity including their duration, intensity and degree to which they can be **mitigated**;

iii. **rank risks** based on the likelihood of adverse impacts and the severity of the consequence, using the '**worst case scenario'**, as defined by the 'likelihood and consequence probability' risk matrix; and

iv. identify the level of mitigation required for each environmental aspect (e.g. the higher the potential severity of adverse environmental effects and the greater the consequence of those unmanaged effects the higher the degree of environmental management required).

Typical aspects include: aesthetics, dust, earthworks, erosion, flora and fauna, fire, hazardous substances, heritage, noise, rehabilitation, social, soil, sustainability, traffic, training, waste and water.

5.2 Summary of Key Impacts Identified

The key impacts identified and assessed during the BA process are listed below.

5.2.1 Design and Construction Phase

Impacts during the construction phase of the Project are considered for the worst-case scenario. Impacts of significance that may occur during the construction phase of the Project, include:

- Increased degradation and fragmentation of vegetation communities;
- Introduction and spread of alien invasive species;
- Displacement, loss and fragmentation of the faunal community due to habitat degradation/ destruction;
- Displacement, loss and fragmentation of the avifaunal communities due to habitat degradation and powerline collisions
- Degradation of receiving air quality conditions;
- Increased generation of noise;
- Soil contamination and erosion;
- Increased construction vehicle traffic on local roads;
- Increase in employment and skills development opportunities;
- Reduction in visual aesthetics;
- Damage or destruction of archaeological and/or palaeontological resources; and
- Pollution of the receiving environment due to inappropriate management and handling of waste.

5.2.2 Operational Phase

Impacts during the operational phase of the Project are considered for the worst-case scenario. Impacts of significance that may occur during the operational phase of the Project, include:

- Loss and displacement of indigenous vegetation;
- Loss and fragmentation of the faunal and avifaunal communities;
- Increased disturbance to avifaunal communities due to powerline collisions and electrocutions;
- Contamination of soil and groundwater resources;
- Improved development opportunities due to increased reliability of energy services; and
- Reduction in visual aesthetics.

5.2.3 Decommissioning and Closure

Impacts associated with the Project during decommissioning and closure relate to the dismantling of the BESS and associated infrastructure. The lifespan of the BESS varies across the technologies (refer to Section 3.3.2) after which Eskom plan to return the battery to the supplier for disposal. The impacts listed below relate to the dismantling and removal of the BESS, and return to the manufacturing facility:

- Contamination of soil and groundwater due to spills and leakages from the battery units during dismantling; and
- Contamination of soil and groundwater due to machinery hydrocarbon spills.

5.3 Aspects and Activities Matrix

Environmental aspects identified during the EIA process and site visit as well as aspects generally associated with construction-related activities have been identified and listed in Table 5-1.

Construction-related activities could have an impact on one or more of the aspects identified, as indicated by a tick mark in Table 5-1. Eskom will be required to check which aspects may be affected by which construction-related activity and to put measures in place to mitigate or reduce the impacts on each aspect.

The Contractor will have to monitor, implement and demonstrate to its performance in environmental management and impact mitigation. Thus, aspect-specific performance measures (indicators and targets) have been provided in the implementation tables in Section 11.15 to which the Contractor must adhere.

Table 5-1 Aspects/activities matrix

Phase	Aspect	Project Activity: Basic environmental awareness training required	BESS Site and Works	Access road to BESS Site	Substation extension, road expansion, powerline realignment and water pipeline Site and Works	Storage of hazardous material or dangerous goods	Site Office Establishment	Site Camp Establishment	Monitoring, auditing and incident reporting	Transportation of Material	Site Establishment	Site Disbandment
Construction Phase	Increased degradation and fragmentation of vegetation communities	✓	✓		✓	✓	✓	✓	✓	✓	✓	
	Introduction and spread of alien invasive species	✓	✓		✓	✓	✓	✓	✓		✓	
	Displacement, loss and fragmentation of the faunal community due to habitat degradation/destruction	✓	✓		✓	✓	✓	✓	✓		✓	
	Displacement, loss and fragmentation of the avifaunal community		✓		✓	✓	✓	✓			✓	
	Degradation to receiving		✓	✓	✓	✓	✓	✓	✓		✓	

Phase	Aspect	Project Activity: Basic environmental awareness training required	BESS Site and Works	Access road to BESS Site	Substation extension, road expansion, powerline realignment and water pipeline Site and Works	Storage of hazardous material or dangerous goods	Site Office Establishment	Site Camp Establishment	Monitoring, auditing and incident reporting	Transportation of Material	Site Establishment	Site Disbandment
	air quality conditions											
	Increased generation of noise	✓	✓	✓	✓		✓	✓	✓	✓	✓	
	Soil contamination and erosion	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
	Increased construction vehicle traffic on local roads		✓	✓	✓		✓	✓		✓	✓	✓
	Increase in employment opportunities and skills development opportunities		✓		✓		✓	✓			✓	
	Reduction in visual aesthetics					✓	✓	✓			✓	
	Damage or loss to archaeological and/or palaeontological resources	✓				✓	✓	✓	✓	✓	✓	

Phase	Aspect	Project Activity: Basic environmental awareness training required	BESS Site and Works	Access road to BESS Site	Substation extension, road expansion, powerline realignment and water pipeline Site and Works	Storage of hazardous material or dangerous goods	Site Office Establishment	Site Camp Establishment	Monitoring, auditing and incident reporting	Transportation of Material	Site Establishment	Site Disbandment
	Pollution of the receiving environment due to inappropriate management and handling of waste			✓		✓	✓	✓			✓	✓
Operational Phase	Loss and displacement of indigenous vegetation	✓							✓		✓	
	Loss and fragmentation of the faunal and avifaunal community	✓							✓		✓	
	Damage to natural and physical surroundings due BESS failure	✓							✓		✓	
	Increased disturbance to avifaunal communities due to	✓			✓				✓		✓	

Phase	Aspect	Project Activity: Basic environmental awareness training required	BESS Site and Works	Access road to BESS Site	Substation extension, road expansion, powerline realignment and water pipeline Site and Works	Storage of hazardous material or dangerous goods	Site Office Establishment	Site Camp Establishment	Monitoring, auditing and incident reporting	Transportation of Material	Site Establishment	Site Disbandment
	powerline collisions and electrocutions											
	Contamination of soil and groundwater resources	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
	Improved development opportunities due to increased reliability of energy services		✓		✓	✓			✓		✓	✓
	Reduction in visual aesthetics		✓	✓	✓	✓			✓	✓	✓	✓

6. Environmental Management

The Contractor's EO shall record and report upon environmental management measures undertaken to mitigate assessed impacts upon the environment.

6.1 Documentation

The holder of the EA is responsible for the upkeep and management of the environmental file.

The following documentation listed below must be kept on the project site for the full duration of the contract. Although electronic documentation must be kept, a hard copy of all documentation must be filed. The filing system must be updated, and relevant documents added as required. The environmental file must be made available at all times by the relevant authority. The environmental file will form part of the monthly environmental audits conducted by the ECO.

- Full copy of the signed Environmental Authorisation from the DFFE;
- Approved EMPr, as well as any amendments that are approved by the DFFE;
- Environmental policy of the contractor;
- Environmental method statements compiled by the contractor;
- Weekly environmental monitoring reports;
- Minutes and record of attendance of all environmental meetings;
- Environmental incident book;
- Communications register;
- Register of audits;
- Non-conformance reports;
- A copy of all site instructions issued;
- A copy of all corrective actions signed off (reference must be made to the non-conformance reports in this document); and
- Waste manifests.

6.2 Responsibility Matrix and Organogram

The Contractor must have a Responsibility Matrix and Organogram, approved by the ECO and the Project Manager/Engineer, displayed in an appropriate location. This will identify responsible parties, their contact details, and highlight their roles and responsibilities. This document must be updated on a regular basis to ensure that information is correct.

6.3 Environmental Inspections and Audits

Monthly audits will be conducted to monitor compliance with the EMPr and EA conditions during the construction phase of the Project. Photographic records of the site will support the visual assessment. The ECO will submit all audits to Eskom's Environmental Practitioner and the Project Manager/Engineer, who in turn shall submit the audits to the DFFE upon request. These findings will be kept on file at the project site.

External auditing may take place at unspecified times by the regulatory authorities. The regulatory authorities may, from time to time, also ask to view copies of audit reports drafted by the ECO.

6.4 Weekly Environmental Monitoring Report

The EO will be required to provide the ECO with a weekly environmental monitoring report covering the events of the past week. This will highlight key performance areas and provide feedback on corrective and preventive actions

taken. The EO will have the weekly reports signed off by the Contractor's Manager prior to submission to the ECO. Copies of all weekly reports must be kept in the environmental file.

6.5 Environmental Site Meetings

Environmental Site Meetings shall be held every second week or shall form part of the Project Progress Meeting. If the meetings are to be held separately, they shall be chaired by the Site Supervisor or Project Manager with the Contractor(s), EO(s) and Social Officer(s) in attendance. Minutes of the meetings must be kept in the environmental file and must include an attendance register.

6.6 Non-Conformance Report

A Non-Conformance Report (NCR) will be issued to the Contractor as a final step towards rectifying a failure in complying with a requirement of the EMPr. This will be requested by the ECO and issued via Project Manager/Engineer to the Contractor in writing. Preceding the issuing of the NCR, the Contractor will be presented with an opportunity to rectify the outstanding issue.

Preceding requirements to the submitting of the NCR will entail an issue that has been highlighted to the Contractor in the audits for corrective action. Should this issue not be corrected or completed to the satisfaction of the Project Manager/Engineer and ECO, the issue is escalated to an NCR.

Should the ECO assess an incident / issue and find it to be significant (e.g. non-repairable damage upon the environment), it will be reported to the DFFE and immediately escalated to the level of an NCR. This will be done in consultation with Eskom's Environmental Practitioner and the Project Manager/Engineer.

The following information must be recorded in the NCR:

- Details of non-conformance;
- Any plant or equipment involved;
- Any chemicals or hazardous substances involved;
- Work procedures not followed;
- Any other physical aspects; and
- Nature of the risk.

Actions agreed to by all parties following consultation that must adequately address the identified non-conformance. This may take the form of specific control measures and must take the hierarchy of controls into account. This must accompany the NCR for filing purposes;

- The agreed timeframe by which the contractor must have implemented the actions documented in the NCR; and
- The ECO must verify that the agreed actions have taken place on or soon after the agreed completion date. Where the actions are complete, the ECO and Contractor must sign the close-out portion of the non-conformance form and file it with the contract documentation.

6.7 Environmental Emergency Response

The Contractor's environmental emergency procedures must ensure that there will be an appropriate response to unexpected or accidental actions or incidents that could cause environmental impacts. Such incidents may include:

- Accidental discharges to water (i.e. into a water resource) and land;
- Accidental spillage of hazardous substances (typically electrolyte, oil, petrol, and diesel);
- Accidental toxic emissions into the air; and
- Specific environmental and ecosystem effects from accidental releases or incidents.

The Environmental Emergency Response Plan is separate to the Health and Safety Plan as it is aimed at responding to environmental incidents and must ensure the following has been included:

- Construction employees shall be adequately trained in terms of incidents and emergency situations;
- Details of the organisation (manpower) and responsibilities, accountability and liability of personnel;
- A list of key personnel and contact numbers;
- Details of emergency services (e.g. The fire department, spill clean-up services) shall be listed;
- Internal and external communication plans, including prescribed reporting procedures;
- Actions to be taken in the event of different types of emergencies;
- Incident recording, progress reporting and remediation measures to be implemented; and
- Information on hazardous materials to be maintained and recorded on site, including the potential impact associated with each, and measures to be taken in the event of accidental release.

The Contractor(s) will comply with the environmental emergency preparedness and incident -reporting requirements, as required by the Occupational Health and Safety Act (Act No. 85 of 1993) (OHSA), the NEMA, the National Water Act (Act No. 36 of 1998), and/or any other relevant legislation listed in Appendix B.

6.7.1 Incident Reporting

Once the incident has been stabilised and initial notifications have been issued to the relevant parties, a full incident investigation shall be required with detailed corrective and preventative measures. A formal report shall be submitted within seven days to the Project Manager/Engineer and Eskom Environmental Practitioner, including all remediation measures undertaken to repair any damage caused and to prevent the incident from re-occurring. Information recorded for all incidents shall include:

- Nature of incident;
- Damages, injuries or fatalities sustained, and the parties involved;
- Any risks such incident poses;
- Toxicity of the substances involved;
- Steps taken to avoid or minimise the effects of the incident and any future incidents / re-occurrence; and
- Clean-up procedures, remedial actions and assessment of immediate and long-term effects.

6.7.2 Reportable Environmental Incidents

Reportable incidents are those:

- That cause substantial damage to the environment, or
- That have significant potential impact on the environment.

These can include:

- Any spill to a watercourse, including drains as defined under relevant legislation;
- Loss of hydrocarbons or chemicals greater than 20L in volume to land;
- Spills or releases, including soil movement, which has moved offsite and has a negative impact;
- Death or injury of livestock, wildlife or fauna of any kind caused by the construction activities;
- Interference with any previously undetected sites of cultural significance without obtaining the appropriate approval;
- Transfer of known alien invasive vegetation and diseases as a result of construction related activities;
- Fires;
- Traffic incident;
- Damage to property outside the development footprint;
- Unresolved landowner issues whereby agreement cannot be reached;

- An incident that is likely to cause regional or widespread negative publicity;
- Serious environmental damage or imminent risk of serious environmental damage;
- Significant environmental degradation, pollution or non-conformance of this EMPr or any other legislative requirement; and
- Exceedances of prescribed dust fall standards where dust fall monitoring is required.

Key incident reporting numbers relevant to the project shall be provided as per Section 6.7.4 below.

6.7.3 Emergency Response Procedure

Appropriate risk management and the prevention of emergency situations is fundamental to all construction related activities and the implementation of the EMPr is aimed at anticipating, preventing and mitigating foreseeable risks associated with the development. Part of the risk management strategy is to ensure that in the event of an emergency situation, plans have been developed so that pre-planned response, notification and recovery activities can be initiated.

The Contractor's Emergency Preparedness and Incident Management Plan shall establish the structures of emergency teams, the communication processes and the resources, which may be required for managing the emergency. The Emergency Preparedness and Incident Management Plan shall therefore comprise of the following:

- general responsibilities;
- incident management and notification structure;
- event classification and notification; and
- resources and training requirements.

The objectives of the Emergency Preparedness and Incident Management Plan shall be to:

- decrease the level of risk to life, property and the environment;
- describe how an emergency response is initiated and how the emergency teams are activated;
- specify command, control and communication arrangements between Eskom, Project Manager/Engineer, Contractor, external response and government authorities;
- identify the roles and responsibilities of all personnel likely to be at the location of the emergency or involved in the response;
- identify emergency response equipment required;
- identify training requirements for response personnel; and
- provide the basis for training of all people who could be involved in an emergency.

6.7.4 Contact Information

The following key incident reporting numbers relevant to construction related activities shall be included within the Emergency Preparedness and Incident Management Plan:

- Eskom Representative;
- Project Manager/Engineer;
- Engineers Representative;
- Construction Contractor;
- Construction Manager;
- Environment Control Officer;
- Health and Safety Manager;
- Environmental Officer;

- Community Liaison Officer;
- Grievance Contact;
- Fire Department and local Fire Protection Association (FPA);
- Hospitals / clinics;
- South African Police Services;
- Air Quality Officer;
- Disaster Management;
- DFFE;
- Department of Water and Sanitation (DWS);
- Siyathemba Local Municipality;
- Pixley Ka Seme District Municipality; and
- South African Heritage Resources Authority (SAHRA).

6.8 Protected Species and Area Management

The following section includes details of the Northern Cape Biodiversity Spatial Plan and National Priority Areas.

6.8.1 Northern Cape Biodiversity Spatial Plan

Critical Biodiversity Areas (CBA's) are terrestrial and aquatic features in the landscape that are critical for retaining biodiversity and supporting continued ecosystem functioning and services. These form the key outputs of a systematic conservation assessment and are the biodiversity sectors inputs into multi-sectoral planning and decision-making tools. The Northern Cape CBA map serves as a key development tool to assist planning and decision making in the province. The map identifies biodiversity priority areas (CBAs and Ecological Support Areas (ESAs)) together with protected areas that are important for the persistence of a viable representative sample of all ecosystem types and species as well as the long-term ecological functioning of the landscape as a whole.

The project does not occur within any CBA or ESA, and borders an area classified as Other Natural Areas (ONAs), with a few isolated patches of ONA falling within the site. The re-alignment of the two powerlines will take place within areas marked as ONA.

6.8.2 National Priority Areas

National priority consists of formal and informal (private) Protected Areas (i.e. nature reserves), Important Bird Areas (IBAs), RAMSAR sites, National Fresh Water Ecosystem Priority Areas (NFEPA) and National Protected Areas Expansion Strategy Focus Areas (NPAES).

The project is not situated within or close to any national priority areas, including important Bird Areas (IBAs) and Protected Areas (PAs). There are no priority areas, including protected areas, within a 10km radius of the project. The nearest PA is the Prieska koppie Nature Reserve, 54km to the northeast, and the Platberg Karoo Conservancy Important Bird Area (IBA) lies 148.5km to the southeast.

6.8.3 Responsibilities

The protection of indigenous species during the construction and operational phases of the project must be allocated as follows:

6.8.3.1 The Developer

This refers to the project proponent, Eskom. They will be responsible for the following:

- Ensure that the requirements set out in this management plan are adhered to and implemented.
- Allocate the responsibilities assigned to the ECO to an independent suitably qualified individual prior to the start of construction activities on site.

- Provide all principal contractors working on the project with a copy of this management plan as part of tender contract documentation to allow the contractors to cost for its requirements within their respective construction contracts.

6.8.3.2 The Engineer

The Engineer of the proposed development will be responsible for the overall implementation of the management plan during the construction phase of the project. To effectively implement the plant rescue plan, the engineer must be aware of the findings, mitigation measures and conclusions of the Final BA Report, the requirements of the EA, the EMPr, and this management plan.

6.8.3.3 The Environmental Control Officer and Environmental Officer

The ECO and EO are responsible for monitoring and verifying the implementation of the management plan during the construction phases of the project. To effectively implement the management plan, the ECO must be aware of the findings, mitigation measures and conclusions of the Final BA Report and relevant authorisations.

6.8.3.4 The Contractor

The contractor, being any directly appointed company or individual undertaking the implementation of works, will be responsible for complying with the management plan at all times during the construction phase.

6.8.4 Mitigation Measures to Prevent Loss of Vegetation and Ecological Process

- Any priority species encountered must be identified and rescued prior to any excavation or construction activities;
- As far as possible, the proposed project aspects must be contained (and restricted) to within the footprint areas of the existing substation. This will require that existing access roads be used, and no additional access routes are permitted (excluding the road extension included in the Scope of Works);
- Additional areas of indigenous vegetation (outside of the required clearance), even secondary communities must under no circumstances be fragmented or disturbed further or used as an area for dumping of waste;
- All laydown, storage areas etc must be restricted to within the project areas and all access roads must be kept within this area or from existing access roads;
- Areas that are denuded during construction need to be re-vegetated with indigenous vegetation to prevent erosion during flood events. This will also reduce the likelihood of encroachment by alien invasive plant species;
- Implementation of the attached alien vegetation management plan for the project areas;
- Monitor the establishment of alien invasive species within the areas affected by the construction and maintenance and take immediate corrective action where invasive species are observed to establish;
- Retain vegetation and soil in position for as long as possible, removing it immediately ahead of construction earthworks in that area and returning it where possible afterwards; and
- Rehabilitate or revegetate disturbed areas in accordance with the Rehabilitation Plan (**Appendix B)** for the substation and surrounding areas;
- No trapping, killing or poisoning of any wildlife is to be allowed on site; and
- Staff must be educated about the sensitivity of faunal species and measures must be put in place to deal with any species that are encountered during the construction process. The intentional killing of any animals including snakes, insects, lizards, birds or other animals must be strictly prohibited.

6.9 Incident Management

The Contractor is required to put in place an effective management system that will prevent or mitigate the occurrence of an incident. All the environmental incidents must be reported to the ECO and the Project Manager and management mechanisms are to be implemented to deal with the incident as quickly as possible.

A formal report must be submitted within 48 hours to the ECO and the Project Manager and Eskom Environmental Practitioner, including all remediation measures undertaken to repair any damage caused and to prevent the incident from re-occurring. Once the incident has been stabilised and initial notifications have been issued to the relevant parties, a full incident investigation is required complete with detailed corrective and preventative measures:

- Nature of incident;
- Damages, injuries or fatalities sustained, and the parties involved;
- Any risks such incident poses;
- Toxicity of the substances involved;
- Steps taken to avoid or minimise the effects of the incident and any future incidents; and
- Clean-up procedures, remedial actions and assessment of immediate and long-term effects.

6.10 Method Statements

It is a statutory requirement to ensure the wellbeing of employees and of the environment. Therefore, the Contractor must submit a Method Statement to the Project Manager/Engineer, Eskom Environmental Practitioner and the ECO for approval prior to the commencement of construction works. A Method Statement is a document detailing how a particular process will be carried out. It must detail the possible dangers/risks associated with the particular part of the project and the methods of control to be established and to show how the work will be managed in a safe and environmentally responsible manner.

The Contractor shall be required to undertake various tasks / activities in order to fulfil the conditions as stipulated in the contract. Therefore, in order for the Project Manager to be satisfied that the Contractor has a comprehensive understanding of the requirements of the task / activity, the Contractor shall submit method statements to the Project Manager for approval prior to the commencement of the activity. The method statement is a dynamic document integrating all facets of the activity, thereby ensuring the reader a comprehensive understanding of the actions associated with implementing the activity.

The method statement shall be submitted to the Project Manager for approval a minimum of 7 days prior to the commencement of the activity. During this period, the Project Manager shall consult with other members of the project management team to ascertain the Contractors knowledge and understanding of the requirements. Should the Project Manager ascertain that the detail of the Method Statement is not sufficient; the method statement shall be returned to the Contractor for review and re-submission.

Upon acceptance of the method statement, both the Project Manager and the Contractor shall sign the method statement denoting mutual agreement that the contents thereof meet the minimum requirements to successfully complete the activity. By signing the method statement, the Contractor commits to working in accordance the agreed method.

Due to the method statement being a dynamic document, regular amendments may be required to ensure the implementation thereof corresponds with how the task / activity is actually being implemented; and in accordance to potentially changing requirements.

6.10.1 Purpose

The purpose of the method statement is to:

- Outline the safe manner in which the task / activity is to be undertaken;
- Provide induction material for all undertaking the task / activity to understand;
- Meet legal requirements – hazard identification and control;
- Provide a programme against work, material, time, staff and anticipated problems are to be managed; and
- Act as a tool in quality assurance.

6.10.2 Scope

A method statement describes the scope of the intended task / activity in an easy to understand step – by – step manner. This is particularly important to reduce potential confusion and ambiguity of the contents by those personnel required to implement it.

The method statement must clearly indicate:

- **What** – a brief concise description of the task / activity to be undertaken;
- **Who** – a brief concise description of the personnel involved with undertaking the task / activity;
- **When** - a brief concise description of the sequence of actions with due commencement and completion dates of the task / activity to be undertaken;
- **Where** - a brief concise description and map / drawing of the locality of the task / activity to be undertaken;
- **Why** - a brief concise description of the importance and requirement of the task / activity to be undertaken; and
- **How** - a brief concise description of the methods to be implemented, materials and equipment to be used for the task / activity to be undertaken.

6.10.3 Language Use

The method statement must be written in plain English so that they are understood by all. Therefore, a well thought through and well written method statement providing clear and concise specific work plans, can save much time and money and potentially prevent the occurrence of incidents and accidents.

The implementation therefore of the method statements shall be audited by the ECO. Consequently, the method statements must contain sufficient information and detail to satisfy the Project Manager and ECO that the works will be implemented correctly and that potential incidents / accidents shall mitigated and managed.

Please remember to:

- Consider the reader;
- Communicate a clear message;
- Use clear and concise language; and
- Consider how the information is portrayed.

6.10.4 Site Specific Requirements

The method statement must be project specific. Method statements copying information contained within the EMPr, specifications or other documents shall not be considered as they do not indicate to the person responsible for approving the document, that the Contractor has a clear understanding of what is required.

6.10.5 Minimum Requirements

The method statement must contain as a minimum the following:

- Description
  - Provide a brief and concise description of the task at hand;
  - List all the details of qualifications and experience required for the completion of the task; and
  - Experience may cover previous work done in the area that may not require certificates or licences.
- Personnel, Duties and Responsibilities
  - Give details of the duties and specific responsibilities of supervisors and other personnel. For example, describe such things as daily toolbox talks and guidance provided by the Environmental Officer;
  - Training Required to Complete Work; and
  - Make sure that all workers and their Supervisors are trained in the procedures needed to complete the job safely and in an environmentally responsible way, especially when undertaking task for the first time or where new or changed work methods are utilised.
- Programme
  - Provide a clear and concise programme indicating all phases and time frames associated with the task.
- Construction sequence and method

  - Indicate all steps associated with task at hand. This must be done in a manner which is easily understandable and leaves no uncertainties to staff that are required to implement the task in the field.

- Possible Hazards

  Include all possible hazards such as:

  - Hazardous substances, explosives, dust, etc.;
  - Hazards to others in area; and
  - Rubbish, electrical, fills.

- Resources/Plant/Equipment
  - List resources, plant and equipment that you will use on the job, e.g. ladders, scaffold etc.

- Health and Safety
  - List all safety controls such as Material Safety Data Sheets (MSDS);
  - Warning Signs;
  - Personal protective equipment;
  - Storage of materials and equipment;
  - Fellow workers/public safety provisions; and
  - Housekeeping

- Monitoring Systems
  - How will the execution of the task be monitored?

- General
  - Explanation of important technical/environmental terms

The Contractor will be accountable for all actions taken in non-compliance of the accepted Method Statements. The Contractor shall keep all the method statements and subsequent revisions on file, copies of which must be distributed to all relevant personnel for implementation.

The Contractor will be required to submit, a method statement as listed in Table 6-1 and identified in the contract, for approval by the Project Manager, Eskom Environmental Practitioner and the ECO prior to the start of construction activities.

The Contractor shall submit project a task specific method statement to the Project Manager within 7 days prior to the commencement of the activity. Activities shall only be allowed to commence once the method statements have been accepted by the Project Manager.

Refer to Appendix F for further on details of the method statement.

Table 6-1 List of components to be included in the method statement required for construction activities

Component(s)	Objective	Target	Criteria
BESS (Installation)	To detail the procedure of installing the BESS as well as associated equipment	• No spills and zero harm to the surrounding environment • Zero safety incidents and damage to the surrounding environment	Reduce incidents related to installation of the BESS including transporting the electrolyte material and containment structures for the BESS infrastructure.
Bunding	To contain and manage all hazardous substance releases into the environment.	• Zero spills • No environmental pollution occurring. • Management according to agreed procedures.	Method of bunding and covering for static and mobile plant.
Construction Site and Office / Yard Establishment	To ensure site infrastructure, plant, materials and equipment are contained within a suitably secure locality that is adequately zoned and authorised in terms of regulatory requirements.	• No complaints from landowners • No damage to private property • Compliance to regulatory requirements. • No unplanned disturbance to construction related activities.	• Site office/yard layout and preparation • Method of installing fences required for no-go areas, working areas and construction areas • Preparation of the working area • Removal of vegetation
Cement Mixing / Concrete Batching / Bentonite Mixing	Provide measures to contain cementitious products impacting upon the surrounding environment.	• All cementitious mixing to occur within demarcated localities. • No indiscriminate spoiling of cementitious products in non-designated areas. • No impacts upon receiving water resources.	Location, layout and preparation of cement / concrete batching facilities, including the methods employed for mixing concrete and the management of run-off water from such areas.
Environmental Monitoring	Implement a programme whereby impacts upon the surrounding can be monitored and implement measures to mitigate such impacts.	• Compliance with regulatory requirements. • Ensure no incidents or accidents occur which negatively impact upon the surrounding environment.	Monitoring construction-related impacts upon the surrounding environment is kept within the environmental specifications and applicable legislation. The following variables are to be monitored: • Dust (e.g., by using reused water). • Noise (increase of 7dB above ambient is considered disturbing noise). • Contaminated water (through dewatering operations, etc.). • Waste: waste manifests for waste disposal including waste sent for recycling.
Erosion control	Prevent erosion and reduce potential impacts upon the surrounding environment.	• Slopes > 1:1 must have additional anti-erosion mechanisms. • No evidence of erosion. • No evidence of disturbance outside of project area.	Method(s) of erosion control, including erosion of spoil material.

Component(s)	Objective	Target	Criteria
Fuels and Fuel Spills	Manage and contain all refuelling activities to prevent and mitigate potential impacts.	• All refuelling to occur within designated areas. • All hydrocarbons to be contained within approved bunded facilities. • Identified staff to undergo suitable spill clean-up training.	• Methods of refuelling vehicles. • Details of methods for fuel spills and clean-up operations.
Solid and Liquid Waste Management	Implement measures to reduce, monitor and manage waste generation, whilst maximising recycling efficiency.	• Ensure all waste products are disposed of at a registered waste landfill site designed to cater for said waste product. • Proof of waste generated, reused, recycled and disposed of, including disposal certificates, must be kept on site. • Contain all waste with in approved designated areas and stored in marked containers. • Containers of hazardous waste and waste oils must be stored in a bunded, covered area. • No evidence of contamination by waste. • Bins provided at regular intervals. • No evidence of litter.	• Solid and liquid waste control and removal of waste from site. • Methods for the disposal of vegetation, paper and plastics and/or building materials. • Methods for the recycling of oils etc.
Vegetation Clearing	To remove existing vegetation (trees and shrubs only).	No brush cut of indigenous vegetation (grass and forb species, including Fynbos species) in medium and high sensitivity areas.	To ensure effective and efficient re-growth of vegetation in medium and high sensitivity areas.
Wash Areas	To ensure plant and equipment used on site are kept clean whilst containing and preventing the release of potential contaminants into the receiving environment.	• No contamination of the receiving environment through the washing and cleaning of equipment and plant. • Compliance with regulatory requirements.	• Location, layout, preparation, and operation of all wash areas, including vehicle washing, workshop washing, paint washing and clearing • Method for the treatment of wastewater prior to discharge.

6.11 Communication Register

All complaints or communications that are received from I&APs or any other stakeholder must be recorded in a Communications Register. These complaints and communications will be brought to the attention of the Project Manager/Engineer, where upon it will be investigated and a response will be given to the Complainant, I&APs or stakeholder within 10 days.

The Complaints Register shall include the following information:

- Record the time and date of the complaint/communication;
- A detailed description of the complaint/communication;
- Action and resources used to correct the complaint and when the complaint has been closed;
- Photographic evidence of the complaint (where possible);
- Record details of the complainant including, not limited to, details on who laid the complaint, the person responsible for resolving the complaint;
- A written response to the complainant indicating rectification of the complaint;
- Information regarding the relevant authority that was contacted or notified in writing (person, time and date); and
- The person responsible for addressing the complaint or implementing the rectification.

The relevant authorities include:

- DWS (e.g. for any incidents involving the contamination of water resources);
- DFFE (e.g. uses of appropriate herbicides for eradication of alien invasive species, and permits for trees of special concern);
- Department of Health (e.g. for incidents such as contamination of water resources, accidental spill of hazardous substances);
- Department of Labour (e.g. for labour disputes or injuries on duty);
- DFFE (e.g. for any significant incident of pollution of the soil and air);
- Department of Transport and Public Works (e.g. for the diversion of traffic due to construction activities);
- Department of Agriculture, Environmental Affairs, Rural Development and Land Reform;
- Siyathemba Local Municipality Integrated Development Plan 2017-2022;
- Siyathemba Local Municipality Spatial Planning and Land Use Management Act (16/2013) (By-law);
- Pixley Ka Seme District Municipality Integrated Development Plan 2017 – 2022; and
- Pixley Ka Seme District Municipality Spatial Development and Land Development Plan 2013 – 2018 (By-law);

6.11.1 Contractual Communication Protocol

The communication protocol shall be determined by contractual requirements. Such protocol shall be agreed to at the inception meeting where a responsibility assignment matrix (RAM) will be developed detailing the main communications or actions and the authorized staff responsibilities for initiation, preparation, review, approval and issue.

6.11.2 Local Government and Public Liaison

The Contractor shall direct all communication via Eskom; or as directed by the Employers Agent.

6.12 Waste Manifests

The Contractor shall ensure that all solid (including hazardous) waste is either beneficiated on-site or removed from site and disposed of at a registered landfill site or nearby waste transfer station with capacity to accept the

project generated waste. The nearest registered waste disposal site is located within Prieska e.g. Prieska waste disposal site (Slagterskamp 1 of the Remaining Extend of Erf 1). The waste manifest shall be kept on record for auditing purposes and waste disposal slips must be filed after disposing at a licensed landfill site. All waste management practices must be put in place and adhered to by staff, contractors and all other persons entering the site.

6.13 Good Housekeeping

The Contractor is to practice good housekeeping throughout the construction phase. This must eliminate disputes about responsibility, facilitate efficient and timeous running of the project. Over and above practising accepted construction methods in accordance with South African National Standards (SANS) 10120, this must include measures to preserve the environment inside the work area.

6.14 Planning and Design

6.14.1 Planning

Planning is typically undertaken by Eskom at development outset and sets out prescriptive measures to achieve desired results. These measures are typically conceptual at this stage and become more refined with time.

Eskom typically calls for detailed (engineering) designs and appoints an EAP to undertake the EIA process. This process may contribute to the determination of feasibility but does not do so exclusively.

6.14.2 Design

As the design shall lay the groundwork for the future operation of the development, the environmental authorisation conditions and EIA specialist recommendations shall inform the design. Furthermore, due to the evolving nature of the development, it is incumbent upon Eskom's Environmental Practitioner to inter alia determine and guide regulatory process requirements that inform the evolving designs.

6.15 Corrective and Preventative Measures (follow-up on monitoring and audits)

The Contractor shall initiate a process to correct and prevent future occurrences occurring.

Table 6-2 Corrective Action

Corrective action(s)	Action	Timeframes	Responsibilities
	Initiate corrective and preventative measures	Immediate	Eskom, Eskom Environmental Practitioner / Engineer and Contractor
	Control source and or reduce impact upon the environment / community.	Within 1 day of occurrence being identified	
	Manage incident / accident / grievance in accordance to approved procedure.	Within 3 days of occurrence being identified	
	Monitor to verify no further occurrence takes place.	Within 5 days of occurrence being identified	

6.16 Training

Environmental responsibility requirements for all role players are contained within the respective position description as outlined in Section 4. Consequently, all recruitment shall be undertaken with the aim of engaging personnel with the appropriate levels of competency and experience.

Furthermore, all personnel shall receive environmental training of the type and level appropriate to their role and responsibility. The Contractor's environmental awareness training programmes shall be targeted at the two levels of employment: management and labour.

The Contractor shall manage and implement all the requirements associated with presenting the training programme before the Commencement Date. The Contractor shall be required to initiate Environmental Awareness Training **within 7 days** of construction commencing. Staff shall be trained prior to commencement of working. Proof of training shall be submitted to Eskom.

The Contractor may be requested to provide additional training (in the trainee's first language) on-site regarding environmental aspects that are unclear to the construction personnel. A translator may be required and requested to assist in this additional training. The cost for the translator will be borne by the Contractor. The Contractor shall implement the training programme at own cost.

All staff shall:

- be inducted prior to commencing work;
- receive task based / skills training;
- receive weekly environmental toolbox talks;
- undergo six monthly refresher (environmental) training; and
- be retrained as per corrective action outcome(s).

The Contractor shall keep records of personnel experience, qualifications and training undertaken, including inductions, in a training register. The training register shall include the following details:

- who was trained;
- when the training took place;
- name of the trainer;
- a general description of the content of the training; and
- effectiveness of training programmes.

All employees must receive general project related work skills training required to enable them to work safely and effectively, including:

- Health and safety;
- Emergency drills (including fire drills);
- Firefighting;
- Acceptable behaviour with regard to flora and fauna;
- Management and minimising of waste, including waste separation;
- Maintenance of equipment to prevent the accidental discharge or spill of fuel, oil, lubricants, cement, mortar, and other chemicals where applicable;
- Monitoring of equipment to notice any signs of potential failure;
- Spill and emergency management;
- Disaster management;
- Incident reporting;
- General code of conduct towards I&APs (e.g. not to use I&AP toilets, water taps, bins, etc.); and
- Handling of hazardous waste

Inductions which need to be conducted prior to any construction works occurring, will include but not be limited to information on:

- Information on applicable specifications, plans and method statements which are applicable to the project;
- Management and minimising of waste, including waste separation;

- Maintenance of equipment to prevent the accidental discharge or spill of fuel, oil, lubricants, cement, mortar and other chemicals;
- Responsible handling, storage and transportation of hazardous materials;
- Environmental emergency procedures and incident reporting; and
- General code of conduct towards I&APs.

The EO may be requested to provide additional training (in a first language) on-site regarding environmental aspects that are unclear to the construction personnel. A translator may be required and requested to assist in this additional training. The cost for the translator will be borne by the Contractor. The Contractor shall implement the training programme at own cost.

6.17 Grievance Procedure

A grievance procedure is a management tool used to prescribe management mechanisms or methods to address grievances arising from affected stakeholders on a development.

The Contractor shall adhere to the grievance management procedures as agreed with the Employers Agent.

6.18 Final Environmental Compliance Report

A Final Environmental Compliance Report will be compiled by the ECO for submission to Eskom at the end of the construction phase. The report will include details of:

- The completion of all environmental conditions and mitigation measures listed in the EMPr and the EA;
- All environmental incidents and completed corrective actions;
- The findings of the Environmental Audits;
- Conclusions as to whether environmental constraints, guidelines, norms and stipulations have been met and, if not, reasons why they have not been met;
- An indication of the outcomes of the environmental monitoring conducted;
- All Monthly Environmental Monitoring Reports (as an attachment);
- A copy of all Method Statements (as an attachment);
- A copy of the environmental incident register (as an attachment); and
- A copy of the Complaints Register.

7. Monitoring

7.1 Monitoring Approach

Monitoring shall be carried out by the respective environmental representative from Eskom, Eskom Environmental Practitioner and Contractor.

7.2 Inspections

Site inspections shall be carried out on a daily basis by the Contractor's Environmental Officer to ensure measures implemented are effective in mitigating impacts.

The ECO shall undertake inspections, as a minimum, monthly (or as prescribed in the conditions of authorisation) in order to provide an account of environmental compliance with the EMPr during construction.

The Contractors Environmental Officer / Community Liaison Officer shall undertake monitoring to verify that construction related activities are not negatively impacting upon the environment; health of employees and members of the surrounding community; nor local economy (e.g. farming).

7.3 Compliance Monitoring

The Contractors Environmental Officer or professional service provider shall undertake compliance monitoring to verify construction related activities are not exceeding prescribed thresh holds.

The Contractor shall submit environmental compliance monitoring data to Eskom's Environmental Practitioner on a monthly basis.

7.4 Auditing (Internal and External)

The ECO shall undertake monthly internal audits to verify the measures implemented by the Contractor to suitably mitigate identified risks / impacts.

The Environmental Auditor shall undertake external audits at the frequency prescribed by the relevant CA.

7.5 Time Programme

All monitoring undertaken by the responsible roles mentioned in this section shall be undertaken as per the monitoring programmes, where prescribed either by law or by Eskom. The ECO will undertake monthly site visits and produce a monthly report.

7.6 Quality Control System (For Monitoring)

Quality Assurance and Quality Control (QA/QC) addresses both the management of construction related activities and the "development" being constructed. QA includes the documented processes required to ensure that the development satisfies the needs for which it was undertaken; and will meet the development specifications and data quality outcomes. It also includes all activities of the overall management function that are required in meeting the outcomes of the development including planning, QC elements and any scope changes.

The Contractor shall consequently develop and maintain a Quality Assurance and Quality Control Integrated Management System (IMS) made up of both a QMS based on ISO 9001; and an environmental management system based on ISO 14001.

All environmental / social monitoring shall follow accepted monitoring protocols / norms and standards; and shall be informed by the outcomes of any specialist studies.

All analysis of samples, if required, shall be done at a South African National Accreditation System (SANAS) 17025 accredited laboratory; unless specified in the Contractors method statement and approved by the Employers Agent.

8. Assurance

8.1 Reporting

Reporting is the process of measuring actual performance or how well the mitigation measures have been implemented, including the format, timing and responsibility for reporting.

8.1.1 General Reporting

Reporting by the various role players shall be undertaken in accordance to the table below.

Table 8-1: Periodic Reporting

Report	Timing	Prepared by	Reviewed by
Weekly	On the first day of the following week	Environmental Officer	Eskom Environmental Practitioner with support of the ECO
Monthly	Within 7 days of completion of reporting period	Environmental Officer	Eskom Environmental Practitioner with support of the ECO
Change Management	Whenever required	ECO / Environmental Auditor	Eskom Environmental Practitioner / CA
Close-out Report	Within 30 days of completion of construction related activities	Environmental Officer	Eskom Environmental Practitioner in support of the ECO
Audit Report - Internal	Within 7 days of completion of reporting period	ECO	Employers Agent
Audit Report - External	Within 7 days of completion of reporting period	Environmental Auditor	CA
Grievance	Within 7 days of grievance	Environmental Officer / Community Liaison Officer	Eskom Environmental Practitioner with support of the ECO

8.1.2 Incident Reporting

The Contractor shall undertake incident reporting in accordance to the below table. Please note that NEMA Section 30 and 30A have prescriptive timeframes in which a CA is to be notified.

Table 8-2: Incident Reporting

Reporting	Action	Responsibility	Timeframe
	Report incident to Eskom Environmental Practitioner / Engineer	Eskom, Eskom Environmental Practitioner / Engineer and Contractor	Immediate notification
	Incident report submitted to Eskom Environmental Practitioner / Engineer		Within 7 days of incident
	Contractor to select appropriate remedy to rectify non-conformance and provide revised method statement to the Eskom Environmental Practitioner for approval.		Within 10 days of incident

8.2 Implementation (Contractor)

8.2.1.1 Weekly Environmental and Social Monitoring Reports

The Contractor shall undertake daily site inspections, the outcomes of which shall be submitted in a weekly report by the Environmental Officer to the Eskom Environmental Practitioner. Such reports shall include:

- a summary of the results of the daily and weekly inspections;
- any non-conformances and corrective actions taken;
- work status and tasks to be completed;
- environmental activities undertaken;
- environmental incidents or grievances;
- environmental monitoring;
- consultation undertaken;
- progress of reinstatement; and
- results of any audits undertaken.

8.2.1.2 Monthly environmental and social audit reports;

The ECO shall submit a consolidated and detailed monthly report to the Eskom Environmental Practitioner.

8.3 Supervision (Engineer)

8.3.1 Corrective Action Requests

A Corrective Action Request (CAR) shall be issued to the Contractor instructing the initiation of corrective action. The Contractor shall initiate an investigative process to determine root cause, thereby preventing future recurrence, within the timeframe prescribed by the Employers Agent.

Follow up actions shall be assessed by the ECO to verify implementation of approved corrective actions, recommendations and their effectiveness in preventing re occurrence.

8.3.2 Action on Non-Conformance Report

Preceding the issuing of a NCR (Section 6.6), the Contractor shall be presented with an opportunity to rectify the outstanding issue (via a CAR). Should this issue not be corrected or completed to the satisfaction of the Eskom Environmental Practitioner, the issue shall be escalated to an NCR.

An NCR shall be issued to the Contractor as a final step towards rectifying a failure in complying with a requirement of the EMPr. The Eskom Environmental Practitioner shall issue the NCR to the Contractor in writing.

Should the ECO assess an incident / issue and find it to be significant (e.g. non-repairable damage upon the environment), it shall be reported to the authorities and immediately escalated to the level of an NCR. This shall be done in consultation with the Eskom Environmental Practitioner.

The following information must be recorded in the NCR (in accordance to the NCR system as part of Eskom's policy):

- details of non-conformance;
- any plant or equipment involved;
- any chemicals or hazardous substances involved;
- work procedures not followed;
- any other physical aspects; and

- nature of the risk.

Actions agreed by all parties following consultation shall adequately address the identified non-conformance. This shall take the form of specific control measures and take the hierarchy of controls into account. This shall accompany the NCR for filing purposes.

The agreed timeframe by which the Contractor shall have implemented the actions shall be documented in the NCR.

All NCRs shall be tracked and managed according to the development's quality control protocols.

The Eskom Environmental Practitioner shall verify that the agreed actions have taken place on or soon after the agreed completion date. Where the actions are complete, the Eskom Environmental Practitioner and Contractor shall sign the Close-Out portion of the Non-Conformance Form and file it with the contract documentation.

8.4 Audits (ECO and Environmental Auditor)

In addition to the prescribed monitoring undertaken by the Contractor, comprehensive audits shall be undertaken to determine the efficacy of the management measures implemented to manage and mitigate impacts.

8.4.1 Internal Audits

Detailed audit reports shall be drafted by the ECO indicating system deficiencies, non-conformances and adverse or potentially adverse environmental conditions arising from construction related activities.

The audit reports shall provide verifiable findings on the level of performance compliance; the ability to sufficiently provide for the avoidance, management and mitigation of environmental impacts; and levels of compliance with the EMPr and any other regulatory requirement. The audit reports shall be made available to the external Environmental Auditor.

All ECO audit reports shall be submitted to the Eskom Environmental Practitioner monthly.

Audit reports for developments, where an EIA process has been undertaken, shall be submitted to the Eskom Environmental Practitioner for review prior to their submission to the relevant CA.

8.4.2 External Audits

External audits shall be undertaken by an independent Environmental Auditor, at the timeframes as prescribed by the CA. These environmental audit reports shall comply with the requirements as prescribed in Regulation 34 of the EIA Regulations, 2014, as amended.

All environmental audit reports shall be submitted to the Eskom Environmental Practitioner for review prior to their submission to the relevant CA.

8.5 Evaluation of Performance

8.5.1 Identify Trends

The Contractor shall analyse data obtained from monitoring programmes / audits to determine underlying patterns of performance in relation to time. Such outcomes shall aid the Contractor in implementing corrective actions, thereby pre-empting future possible environmental degradation or pollution.

8.5.2 Measure Progress

The Contractor shall monitor efficacy of mitigation measures implemented; and continually strive to improve the manner in which it protects the environment.

8.6 Review by Senior Management

The Contractor shall undertake periodic reviews by its senior management to evaluate efficacy of on-site environmental management systems in delivering the desired environmental, health, safety and social protection.

These reviews shall be undertaken at intervals dictated by the current life-cycle stage; efficacy of EMPr implementation; level of compliance to internal and external audits and level of risk posed by upcoming activities.

The Eskom Environmental Practitioner shall reserve the right to issue a Corrective Action Request should the Contractor fail to adequately address issue at hand.

9. Suspension of Works

If the Contractor has not complied with one or more of the clauses of the EMPr the ECO may recommend the withholding of the payment certificate or the suspension of construction works to the Project Manager/Engineer and the Eskom Environmental Practitioner. This may be conducted after having served the Contractor with a NCR and until the Contractor complies with the clauses of the EMPr. All delays resulting from such suspension shall be at the Contractor's expense.

10. Resource Allocations

Financial implications for items and activities mentioned in the EMPr must be recognised by the Contractor (for the construction phase) and provision for these costs must be made. Such costs can include (but may not be limited to) mitigation actions, environmental awareness training, monitoring and auditing requirements and measures for rectification and rehabilitation, management of archaeological / heritage findings unearthed during construction, including any equipment or specialists required for these items.

11. Implementation of the EMPr

The EMPr provides an integrated approach to environmental management. This approach is designed to guide the appropriate allocation of human resources, assign responsibilities, develop procedures and ensure project compliance with regulatory and best practice requirements.

Where conflict exists between this and any other document / specification, the following shall apply in descending order of applicability:

- A DFFE authorised EMPr;
- This EMPr; and
- Contractual Specifications.

The Contractor is expected to implement all mitigations listed below. It is the responsibility of Eskom's Environmental Practitioner to monitor the contractor's compliance with the EMPr and relevant environmental permits/legal requirements.

11.1 Earthworks Management

Earthworks may be required during site activities and are generally of low impact and short duration. The objectives are to minimise impacts on the receiving environment. The following mitigation measures are recommended:

- Topsoil shall be stockpiled separately from subsoil. All stockpiles shall be stabilised, not be higher than 1.5m;
- Stockpiles shall be protected from rain run-off and erosion;
- Spoil must be used as backfill to rehabilitate areas impacted upon by earthwork activities; and
- Excess spoil material disposed of at the nearest registered landfill site as identified by the Contractor and approved by the Project Manager, Eskom's Environmental Practitioner and ECO.

11.2 Excavation Activities

Excavation activities will be required during the site activities and are generally of low impact and short duration. The objectives are to minimise impacts on the receiving environment. The following mitigation measures are recommended:

- Regularly remove excavated material from site to manage the size of soil stockpiles;
- Stockpiles of material to be removed from site must be easily accessible by dump or skip trucks and away from potentially sensitive receptors;
- Excavated soil must be placed on sheeting surrounded by a berm to prevent the entry of water;
- Should groundwater be encountered, the Environmental Consultant may be appointed to include groundwater sampling in the site assessment; and
- Excavated soils and stones may be used in the immediate vicinity as backfill, fixing or roads, filling of dongas. It may not be dumped in the shrubland/veld.

11.3 Vegetation Management

The objective is to put into place measures to preserve fauna and flora through control of construction activities.

- Any priority species encountered must be identified and rescued prior to any excavation or construction activities;
- As far as possible, the proposed project aspects must be contained (and restricted) to within the development footprint areas. This will require that existing access roads be used, and no new access routes are permitted;
- Additional areas of indigenous vegetation (outside of the required clearance), even secondary communities must under no circumstances be fragmented or disturbed further or used as an area for dumping of waste;
- All laydown, storage areas etc must be restricted to within the project areas and all access roads must be kept within this area or from existing access roads;
- Cleared areas for construction must be continually monitored to ensure no potential erosion can occur;
- Areas that are denuded during construction need to be re-vegetated with indigenous vegetation to prevent erosion during flood events. This will also reduce the likelihood of encroachment by alien invasive plant species;
- The footprint area must be kept clear of alien vegetation. The typical alien vegetation species found within the study area is *Prosopis glandulosa var. torreyana* (Honey Mesquite);
- Implementation of the attached Alien Vegetation Management Plan for the project areas;
- Monitor the establishment of alien invasive species within the areas affected by the construction and maintenance and take immediate corrective action where invasive species are observed to establish;
- Retain vegetation and soil in position for as long as possible, removing it immediately ahead of construction earthworks in that area and returning it where possible afterwards; and
- Rehabilitate or revegetate disturbed areas in accordance with the Rehabilitation Plan for the substation and surrounding areas (refer to **Appendix B**);

11.4 Fauna Management (Including Avifauna)

The following mitigation measures for impacts on faunal communities must be included:

- No trapping, killing or poisoning of any wildlife is to be allowed on site;
- Staff must be educated about the sensitivity of faunal species and measures must be put in place to deal with any species that are encountered during the construction process. The intentional killing of any animals including snakes, insects, lizards, birds or other animals must be strictly prohibited;

- As far as possible, the proposed project aspects must be contained (and restricted) to within the footprint areas of the existing substation. This will require that existing access roads be used, and no new access routes are permitted (excluding the road extension included in the Scope of Works);
- Care must be taken not to interact directly with any wildlife encountered;
- Any active animal burrows, nests etc. must not be disturbed and must be cordoned off and the relevant specialist consulted on how to proceed;
- Construction shall commence in the dry winter period where possible when birds are least active;
- All construction activities must remain within the construction footprint. Construction camps, stockpiles, and temporary storage areas must remain within the study area and within the substation property. No natural vegetation in the surrounding areas must be cleared;
- If any active bird nests are encountered, the area must be cordoned off and the relevant specialist consulted on how to proceed;
- No wild bird or animal shall under any circumstance be hunted, handled, removed or be interfered with by construction workers or by maintenance staff during operations;
- During the powerline re-alignment, only pole structures that are approved as “bird friendly” by Eskom’s ENVIROTECH Forum must be used for the new pole positions;
- All construction activities, relating to powerlines, must be undertaken in line with the approved generic EMPr for overhead distribution infrastructure as approved by the DFFE (attached as **Appendix C**);
- Any pole structure that are not bird friendly must be replaced, if it not possible to do so during the construction phase then Eskom must endeavour to replace these as soon as possible; and
- Powerlines in the vicinity of the substation must be monitored on a regular basis for bird mortalities by electrocution or collision with the lines.

11.5 Dust and Air Quality Management

The following mitigation measures for impacts on air quality must be included:

- Dust emissions must be monitored and comply with regulatory requirements, including the air quality management plan for the Siyathemba Municipality;
- A Dust Monitoring must be implemented;
- Routinely spray all dust generating surfaces with water, a dust suppressant agent or similar to prevent dust generation;
- The clearing of vegetation must be limited to where necessary;
- Stockpiles (e.g. soil) must be maintained for as short a time as possible and must be protected by revegetation or use of a cover. Stockpiles must be situated away from nearby receptors and must consider the predominant wind direction;
- During the transfer of material to stockpiles, the drop heights must be minimised to control the dispersion of materials;
- Handling of soils is not to be conducted during high winds;
- The Contractor will be solely responsible for the management and mitigation of dust generation;
- During periods of wind in excess of 35 km/h, soils must not be handled;
- Erect appropriate notification signs at construction areas to warn the public about the hazards around the construction site; and
- Construction vehicles must keep to the speed limits (25 km/h within the construction site).

11.6 Noise Management

The following mitigation measures for impacts on the generation of noise must be included:

- Noise levels must be maintained to a minimum and comply with regulatory requirements;
- Construction activities must be limited to working hours (07h00-18h00) Monday to Saturday excluding public holidays (unless prior permission is provided by surrounding landowners);
- Vehicles and construction equipment must be kept in good working condition to limit excessive noise pollution;
- Limit the movement of construction vehicles to off-peak periods (where possible) and where sensitive receptors are situated;
- Noise monitoring is to be undertaken by the Contractor where there is a risk of noise levels being 7dB higher than ambient to receptors in the area of activities. Where the Contractor can manage the noise generation so that this risk is avoided or where activities are not close to the public, this monitoring will not be necessary; and
- Adhere to the Siyathemba Municipality Noise Policy with regards to prohibitions relating to disturbing noise, generator sets and construction noise, including the SANS 10103:2008 and Occupational Health and Safety Act requirements.

11.7 Hazardous Substances Management

The following mitigation measures for management of hazardous substances must be included:

- The Contractor(s) are to develop an Emergency Response Plan which highlights the procedures to follow in the event of an emergency incident (fire, spills, etc);
- A Method Statement must be developed for the handling and transportation of the battery components and electrolytes. All cargo must be checked and transported to the site (by an authorisation transportation company);
- All electrolyte and active materials must be encapsulated by a protective covering;
- Where possible material must be pre-fabricated and then transported to site to avoid the risks of contamination associated with mixing, pouring and the storage of chemicals and compounds on site;
- All hazardous substances to be kept in a bunded, impermeable and ventilated facility;
- All staff to be trained in the safe handling and spill management of all substances used on site;
- All staff are to be trained in the management of hazardous substances;
- All small portable equipment which contains fuel or oil must be placed in a drip tray to prevent potential leaks from impacting on the soil or groundwater;
- Spill kits, absorbents and spill containment products must be kept on site and used where spills occur or there is a risk of contamination;
- All staff are to be provided with appropriate Personal Protective Equipment (PPE);
- All machinery and equipment must be inspected regularly for faults and possible leaks, these must be serviced off-site;
- Emergency numbers for spills management are to be available on site at all times;
- Spills which occur shall be immediately contained to prevent spreading, contaminated soil shall be removed where applicable and the area remediated using a suitable spill absorbent/remediation product;
- Records of all spillages shall be maintained.
- All stockpiles must be protected from erosion, stored on flat areas where run-off will be minimised, and be surrounded by berms;
- All stockpiles shall be stabilised, not be higher than 1.5m, and must blend in with the surrounding topography;
- Spoil must be used as backfill to rehabilitate areas impacted upon by earthwork activities;
- The attached Rehabilitation Plan must be implemented to protect topsoil from erosion;
- Excavated and graded bare areas must not be left for long period without been constructed; and

- Graded bare soil and stockpiles must be protected and located away from stormwater drainage lines to avoid siltation and sedimentation.

11.8 Soil and Groundwater Contamination

The following mitigation measures for impacts to soil and groundwater contamination must be included:

- The Contractor is to take appropriate measures to prevent and control soil and water contamination.
- Ensure that excavated material is removed from site regularly;
- Excavated soil must be stockpiled away from sensitive receptors such as watercourses;
- Excavated and graded bare areas must not be left for long period without been constructed.
- Identified hydrocarbon impacted soil must be disposed of in accordance with local by- laws and environmental legislation;
- Ensure that backfill material is not impacted before use by the contractor; and
- Identified hydrocarbon impacted groundwater must be disposed of in accordance with local by-laws and environmental legislation; and

11.9 Traffic Management

It is expected that there will be a limited increase in project vehicle numbers due to the size of project and nature of site activities. The following mitigation measures must be implemented:

- Appropriate notification signs shall be erected at entrances to the construction site to warn visitors and pedestrians about the hazards around the construction site and the presence of heavy vehicles, where appropriate;
- Construction vehicles are to keep to the speed limits (25 km/h on the construction site);
- All vehicles must travel along designated routes;
- No additional access routes are permissible (only existing routes and the road extension included in the Scope of Works); and
- Roads must be maintained in an acceptable condition for the safe travel of the public and project personnel.

11.10 Aesthetics Management

Construction related activities have a short, yet visually negative impact upon the natural environment and the project footprint. The following mitigation measures for aesthetic impacts must be included:

- Keep dust levels down by regularly wetting dirt roads and exposed soil areas;
- Remove rubble and other waste that is generated by the construction process as soon as possible and dispose at an appropriate dump site;
- Implement rehabilitation of disturbed areas as soon as possible to limit the duration of exposed soil surfaces;
- Monitor the rehabilitated areas for at least 6 months to ensure a sufficient vegetation cover is established that will prevent erosion from occurring;
- Keep the construction camp neat and tidy at all times. Remove any waste from the site or contain it in an enclosed area out of sight from sensitive viewpoints;
- Equipment and materials to be neatly stored in designated areas;
- No natural features shall be defaced;
- Litter sweeps must be conducted regularly to ensure that the construction, office and site areas are clean;
- Lighting must face down, not into surrounding environment, to provide adequate lighting for Health and Safety requirements;
- Stockpiles must be regularly and neatly maintained;

- Rehabilitation of all areas impacted upon through construction related activities must be achieved; and
- All construction general waste must be removed from the site and transported to the licensed landfill site.

11.11 Heritage Resource Management

The following mitigation measures on the impacts to heritage resources must be implemented:

- The footprint impact of the proposed construction activities must be kept to minimal to limit the possibility of encountering chance finds within the proposed development site.
- If any evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils or other categories of heritage resources are found during the proposed development, SAHRA APM Unit (Natasha Higgitt/Phillip Hine 021 462 5402) must be alerted as per section 35(3) of the NHRA. Non-compliance with section of the NHRA is an offense in terms of section 51(1)e of the NHRA and item 5 of the Schedule;
- If heritage resources are uncovered during the course of the development, a professional archaeologist or palaeontologist, depending on the nature of the finds, must be contracted as soon as possible to inspect the heritage resource. If the newly discovered heritage resources prove to be of archaeological or palaeontological significance, a Phase 2 rescue operation may be required subject to permits issued by SAHRA;
- Under no circumstances must any archaeological, historical or any physic cultural property heritage material be destroyed or removed from site;
- Should remains and/or artefacts be discovered on the development site during earthworks, all work will cease in the area affected and the Contractor will immediately inform the Construction Manager who in turn will inform PHRA; and
- If unmarked human burials are uncovered, the SAHRA Burial Grounds and Graves (BGG) Unit (Thingahangwi Tshivhase/Mimi Seetelo 012 320 8490), must be alerted immediately as per section 36(6) of the NHRA. Non-compliance with section of the NHRA is an offense in terms of section 51(1)e of the NHRA and item 5 of the Schedule;
- Should any remains be found on site that is potentially human remains, the PHRA, Eskom and South African Police Service must be contacted. Should any unmarked burials be exposed during construction, potential custodians must be trekked, consulted and relevant rescue/relocation permits must be obtained from SAHRA and or Department of Health before any grave relocation process in accordance with the National Heritage Resource Act, 1999 (Act No. 25 of 1999)
- Should chance archaeological materials or human burial remains be exposed during subsurface construction burial remains be exposed during subsurface construction work on any section of the proposed development laydown sites, work must cease on the affected area and the discovery must be reported to the heritage authorities immediately so that an investigation and evaluation of the finds can be made. The overriding objective be, where remedial action is warranted is to minimize disruption in construction scheduling while recovering archaeological and any affected cultural heritage data as stipulated by the NHRA Regulations.
- If during construction, operational or closure phases of this project, any person employed by the applicant, one of its subsidiaries, contractors and subcontractors, or service provider, finds any artefact of cultural significance, work must cease at the site of the find and this person must report this find to their immediate supervisor and through their supervisor to the site manager. The site manager must then make an initial assessment of the extent of the find and confirm the extent of the work stoppage in that area before informing Eskom environmental practitioner who will ensure that the right steps are being followed i.e., notifying SAHRA and an archaeologist contacted.
- If archaeological materials are unearthed, all construction activities within a radius of at least 20m of such indicator must cease and the area demarcated by a danger tape. Accordingly, Eskom Environmental Practitioner must immediately contact a professional archaeologist and inform SAHRA.
- It is the responsibility of the applicant to protect the site from publicity (i.e., media) until a mutual agreement is reached.

- If fossils or sub-fossils are exposed during construction, it is advised that the ECO must follow the Chance Palaeontological Find Procedure as stipulated below and to contact a palaeontologist for further advice.

  The following procedure must be considered in the event that previously unknown fossils or fossil sites are exposed or found during the life of the project:

  - Surface excavations must continuously be monitored by the ECO and any fossil material be unearthed the excavation must be halted.
  - If fossiliferous material has been disturbed during the excavation process it must be put aside to prevent it from being destroyed.
  - The ECO has to take a GPS reading of the site and take digital pictures of the fossil material and the sire from which it came.
  - The ECO then must contact a palaeontologist and supply the palaeontologist with the information so that the palaeontologist can assess the importance of the find and make recommendations.
  - If the palaeontologist is convinced that this is a major find an inspection of the site must be scheduled as soon as possible in order to minimise delays to the development.

11.12 Fire Management

Construction related activities associated may pose a threat of damage to property, infrastructure and natural areas due to fire. The objective is to restrict the occurrence of fires and ensure all role players can respond efficiently and effectively, thereby reducing potential impact. The following mitigation measures must be included:

- Fire extinguishers must be available at all points of storage of flammable products;
- Stored pressure (STP) Dry Powder Fire Extinguishers must be used and at least one shall be provided per 50 m^2 floor surface area;
- The fire extinguishers must be checked on a monthly basis to ensure they have not been used/exceeded their yearly service intervals;
- Basic firefighting equipment shall be kept and maintained at all construction fronts at all times. Basic firefighting equipment shall not be restricted to fire extinguishers, but shall take cognisance of site-specific conditions and shall include fire beaters and water bowser, as and where required;
- Relevant staff are to undergo basic firefighting training;
- The Contractor shall assign the position of Fire Officer to one of its senior staff members who shall be competent and adequately trained to fulfil the position of Fire Officer;
- The Fire Officer shall be responsible for ensuring immediate and appropriate actions in the event of a fire and shall ensure that employees are aware of the procedures to be followed. The Fire Officer will be responsible for contacting emergency services for assistance;
- Any fires that occur shall be reported to Siyathemba Local Municipality immediately and reported in turn to the relevant authority (CAM, provincial government and national government);
- The site induction shall include information on fire prevention and firefighting and safety in the event of a fire;
- Ensure that the necessary materials and equipment for dealing with oil, fuel and hazardous substance spills and leaks are available on site and up to date at all times;
- No open fires shall be permitted on or off-site;
- No on-site burning of any waste materials, vegetation, litter or refuse shall be permitted; and
- Designated smoking areas, together with appropriate ash trays / bins shall be provided. The disposal of cigarette butts into the surrounding environment shall not be permitted.

11.13 Waste Management

Waste management activities associated with the activities will be dependent on the hazard rating of the waste. The appropriate mitigation measures listed below must be included for disposal for various forms of waste and overall waste management.

- Wherever possible, materials must be reused or recycled to reduce amounts of waste that needs to be disposed of at a landfill;
- No illegal waste disposal must occur (without a waste license having been obtained);
- General waste must be stored separately from hazardous waste. General waste must be stored in bins, skips or similar containers with lids only;
- Hazardous waste must be stored in a bunded roofed area. Water from cleaning the bund must be collected and disposed of at an appropriate landfill;
- General waste that is not reused or recycled can only be disposed of at a registered landfill. Hazardous waste must be disposed of at a registered hazardous waste landfill;
- Disposal of hazardous waste to be conducted by a licensed contractor / professional service provider;
- Store and handle all hazardous materials and waste in accordance with their respective material safety data sheets;
- Record must be kept of all wastes generated and what proportions are being reused or recycled. Records of waste disposed at landfills must also be recorded. Disposal certificates must be obtained from landfill sites to document waste delivered to the landfill;
- No septic tanks (French drains) must be used. All sewage shall be removed to the municipal wastewater treatment works;
- Portable sanitation facilities must be erected for construction personnel with a ratio of 1 toilet for every 15 employees (1:15);
- Use of these facilities must be enforced (these facilities must be kept clean so that they are a desired alternative to the surrounding vegetation). These facilities must also be monitored and serviced regularly by an approved service provider so as to prevent contamination of the water resources;
- The project footprint must be kept clean, and waste removed to the waste storage facility on site daily;
- Anti-litter/ anti-dumping must be implemented on site and daily litter patrols must be conducted at the site camp and within the construction footprint; and
- Scavenger and weatherproof bins must be provided.

11.14 Water Management

Water is a finite resource which requires sound management practices and conservation. The following mitigation measures in relation to water management must be included:

- No water is permitted to be abstracted from water resources such as rivers/wetlands/stream/dams for construction purposes. All water used during the construction period must be transported to the site by the Contractor(s) and responsibility sources i.e. no illegal abstraction of water;
- Storm water runoff must be prevented from coming into contact with waste or contaminants on the site. Discharge of effluents or polluted water into the water resources shall not be allowed;
- Water emanating from the mixing of cementitious products must be contained and prevented from entering the environment;
- Water released by the Contractor into the environment must comply with the standards imposed by the DWS; and
- Adequate water supply shall be provided to the workers on the site.

11.15 Implementation Tables

Table 11-1 Typical aspects and impacts associated with the planning and design activities

Planning and Design Phase

Activity/Issue		Action required	Responsible Party
1.	Appointments	• Appointment of an ECO.	Eskom
2.	Aspects to be included in the design	• Existing services shall not be impacted upon.	Eskom
3.	Employment creation	• The tender documentation must stipulate the use of local labourers or enterprises, where feasible. • The use of local labour shall be maximised, where feasible. • It shall be ensured that the Contractor uses local skills, or train semi-skilled people or re-skill appropriate candidates for employment purposes where possible. • On-site training shall focus on the development of transferable skills (technical, marketing of their own skills and entrepreneurial skills) to ensure long term benefits to the individuals involved.	Project Manager/Engineer, Contractor, EO, ECO
4.	Affected Landowners	• The proposed powerlines will cross two (2) properties on which Prieska Coopper Zinc Mine (Pty) Ltd (PCZM) holds Mining Rights, namely: – Vogelstruis Bult Farm 104 Portion 25 (PCZM Mining Right Area); and – Vogelstruis Bult Farm 104 Portion 1 (Vardocube Mining Right Area). • Eskom and their appointed contractor/s must make contact with PCZM well ahead of the works commencing to discuss aspects like mine access protocol, required working areas, services connections such as water, opportunities for shared infrastructure and mining area safety risks including mine safety induction as well as sensitive sites and no-go areas to take note off on the PCZM and Vardocube properties.	Eskom, Project Manager/Engineer, Contractor

11.15.1 Environmental Specifications – Construction Activities – Pre-Construction

Table 11-2: Typical aspects and impacts associated with the pre-construction activities

Pre – Construction

Impact Management Outcome		Impact Management Action	Responsible Party	Monitoring
1.	Timing of construction related activities	• The Contractor shall appoint the EO prior to the commencement of works and his/her name shall be provided to the Project Manager/Engineer and Eskom's Environmental Practitioner 15 days prior to the commencement of construction related works. • The Contractor shall be required to provide training (by the EO) to all personnel regarding the potential impact of construction related activities upon sensitive environments.	Contractor, EO	-
2.	Defining works procedures	The Contractor shall compile method statements for all activities / tasks to be undertaken during the implementation of the required works.	Contractor	-
3.	Flora and Fauna	This shall form part of the Contractor's pre-construction survey.	Contractor, EO, ECO	-
4.	Pre-construction Photographic Survey and Botanical Walkdown	• The Pre-construction Photographic Survey and Botanical Walkdown must be conducted prior to the commencement of the construction works conducted to ensure that sensitive habitats and species are avoided, where possible. • The walk-through must be attended by the ECO, a Botanical Specialist and the Contractor. • Photographic evidence of the condition of the receiving environment, including the powerline servitude area, must be compiled. The following must be recorded: – The presence and location of TOPS or species of conservation concern – Sensitive receptors immediately adjacent/close to the servitude / corridor. – Existing services, buildings, and structures: Position, type, condition and other details of existing services (fencing, gates, roads, telephone lines, power lines etc.), buildings and structures within the construction site. This survey must include photographical records, documented per cadastral portion. – Access issues. – Areas where contamination has previously occurred. • A Search and Rescue Plan must be developed for any TOPs or species of conservation concern that are identified during the site walk-through. • All planned construction activities, relating to powerlines, must be undertaken in line with the approved generic EMPr for overhead	Contractor, EO, ECO, Eskom's Environmental Practitioner	-

Pre – Construction

Impact Management Outcome	Impact Management Action	Responsible Party	Monitoring
	distribution infrastructure as approved by the DFFE (attached as Appendix C) • Information and agreements to be captured in a document for the affected land portions (copy of which is to be submitted to the Project Manager/Engineer.		
5. Daily living and movement patterns	• Speed limits shall be adhered to when using local roads. • Access routes and access points for heavy construction vehicles must be indicated to warn motorists of the movement of these vehicles. • Limit the movement of construction vehicles to off-peak periods (where possible) and where sensitive receptors are situated e.g., nature reserves. • Machinery and vehicles must be in good working order to limit excessive noise pollution. • Construction activities must adhere to all relevant legislation. • Construction activities must be limited to normal working hours (07h00-18h00) Monday to Saturday excluding public holidays (unless prior permission is provided by surrounding landowners). • Construction vehicles must keep to the speed limits. Speeding on gravel access roads must also be avoided to limit any excess dust pollution. • Construction camp sites must be fenced off prior to construction to limit unauthorised entry. • The construction approach must ensure that no existing infrastructure is damaged, and that the alignment does not negatively impact on possible future projects and/or infrastructure maintenance projects.	Project Manager/Engineer, Contractor, EO, ECO	-
6. Local economic benefits	• Local sourcing of materials would assist in providing more economic and employment opportunities for the local people. • Local procurement could result in indirect economic spin-offs and benefits such as increased income, and expansion of other local economic sectors. • Maximise the use of local labour even if the number of locals that would be employed would be limited. There is opportunity for the Contractor to appoint local labour especially for the low-skilled tasks e.g., flag person for traffic calming measures. Prevent nepotism/ corruption in local recruitment structures. • Proportionally divide any potential local unskilled labour opportunities with the assistance of the Ward Councillors. These opportunities include the performance of general and basic construction activities (e.g., digging trenches, foundations and the erection of notices, etc.). Ward councillors and officials from Eskom could assist in determining	Contractor	-

Pre – Construction

Impact Management Outcome	Impact Management Action	Responsible Party	Monitoring
	local subcontractors and/or labourers that must be considered for possible employment e.g., those subcontractors residing in the affected areas with the necessary skills. • Promote employment of women. • Monitor employment targets over the duration of construction.		
7. Training and induction of employees	• The Contractor must ensure that all people involved (including Sub-Contractors, casual labour, etc.) are aware of and familiar with the environmental requirements. The Contractor's EO is responsible for providing at least one hour of environmental training to each member of the construction staff. If required, further training must be conducted by the ECO. • The Contractor's EO must monitor the performance of the construction staff to ensure that the training and induction have been understood and is being followed. • The Contractor must continue and extend HIV/AIDS awareness and support programmes amongst its staff and sub-contractors.	Contractor, EO, ECO	-

11.15.2 Environmental Specifications – Construction Activities – Site Office Establishment

Table 11-3 Typical aspects and impacts associated with the site office establishment activities

Construction Activities – Site office Establishment

Impact Management Outcome		Impact Management Action	Responsible Party	Monitoring
1.	Construction site office/yard and site	The Contractor's site camps will be erected within the construction footprint at the Cuprum Substation. The following actions must be considered during establishment: • All construction activities, materials, equipment and personnel will be restricted to within the area specified. • The location of the site office / yard selected will minimise nuisance impacts on neighbours (e.g., visual intrusion, lights at night, noise, dust, movement of people and vehicles, safety and security risks). Should temporary fencing be required, the Contractor shall fence off the construction camp areas with high diamond mesh fence or similar. All temporary fencing must be removed on completion of the Works. • The camps must be used for the working hours activities of the Contractor's and the Employer's personnel and for all related facilities required by the Contractor and the Employer such as workshops, stores, testing laboratories, etc. The Contractor shall take all necessary steps required to comply fully with public legislation and regulation and all specification clauses governing the environment, health, transport, safety and public disturbance impacts. Accommodation of labour at camp sites will not be allowed. • Should at any stage of the Works Eskom and/or the Project Manager/Engineer and/or the ECO be of the opinion that the camp sites of the Contractor are causing disturbance or inconvenience to nearby residents, then the authority granted by this clause for the Contractor may be withdrawn, either partially or entirely. • The Contractor shall, at all times, conform to all requirements contained in law or bylaws, as well as any other requirements set by the controlling land and local authorities. • The Contractor must not remove or damage any trees or shrubs on the site of the construction camps or laydown areas without the permission of the Project Manager/Engineer/Eskom Environmental Practitioner and where required it shall be done in accordance with the environmental requirements and relevant permits in place. • The Contractor shall water all access roads, as well as working areas used by vehicles inside camps, as required or as may be directed by the Project Manager/Engineer, to prevent dust being entrained by vehicles or wind. Alternative sources of water must be considered for	Contractor, EO, ECO	ECO-as per time programme

Construction Activities – Site office Establishment

Impact Management Outcome	Impact Management Action	Responsible Party	Monitoring
	dust suppression purposes to ensure no wastage of water. Existing tarred access roads must be used, where available. • At completion of construction work the Contractor must break and remove all concrete slabs etc. in construction camps and at batching plants, remove to approved spoil sites and hand over the sites in a clean and tidy condition. • No Taking-Over-Certificate shall be issued for the Works unless the site cleaning is done to the satisfaction of the Project Manager/Engineer/Eskom Environmental Practitioner and ECO. Rehabilitation of impacted areas shall be done in accordance with the specifications included in EMPr and the Rehabilitation Plan (**Appendix B**) and method statement. • The Contractor shall submit a method statement for the establishment of the camp sites, including a drawing with the position, layout and type of facilities. Additionally, a Method Statement detailing the layout and method of establishment and operation of the batching plant shall be submitted by the Contractor. • Strict control of dust shall be undertaken, and due consideration must be given to the NEM:AQA, SANS 1929: Ambient air quality – limits for common pollutants, 2011 and the Siyathemba Municipality Air Quality Guideline • Temporary containers must be placed in accordance to the site layout and within the development footprint (approved within the EA). • All waste generated on site must not be stored at the site camp at one point for more than 90 days and must be taken to the nearest registered waste disposal facility. Proof of waste disposal must be maintained and kept on file on site. • Sufficient water and sanitation facilities must be provided for the workers on site during the construction period with a ratio of 1:15. • All equipment must be maintained on a regular basis and must be in good working order. • A bunded and designated hazardous material storage area must be established • Domestic solid waste bins must be placed and labelled at the site camp and separated into paper, plastics, metal, glass, and food waste <u>Accommodation of employees</u> • The Contractor shall make his own arrangements to house his employees and to transport them to site. • No informal housing or squatting will be allowed. The standard of the accommodation provided by the Contractor shall be subject to the approval of the Project Manager/Engineer.		

Construction Activities – Site office Establishment

Impact Management Outcome	Impact Management Action	Responsible Party	Monitoring
	• Construction workers must be supervised at all times. • Social risks shall be communicated via training to the personnel living on site. <u>Power supply, water and other services</u> • The Contractor shall make his own arrangements regarding the supply of electrical power, water and all other services. No direct payment will be made for the provision of electricity, water and other services. The cost thereof shall be deemed to be included in the rates and amounts tendered for the various items of work for which these services are required, or in the Contractor's preliminary and general items. The Contractor will only obtain water from third parties if these parties are registered water users in terms of the NWA, and subject to a letter from the third parties allowing the Contractor to obtain this water. • The Contractor shall pay all consumption charges, and at his cost provide all connections, consumption meters, pipe work, storage tanks, transformers, cables, transport, and other items associated with the supply of water and electricity for the Works. All connections to services of a Local Municipality (LM) (or its provider) shall be at points and to standards approved by the Project Manager/Engineer and the LM or designated provider. • During the construction of the BESS and associated infrastructure, it is anticipated that satellite site offices may be required, which shall comprise a portable toilet, sheltered eating area and refuse bins. These must not be larger than 30 m² and shall be approved by the Project Manager/Engineer/Eskom Environmental Practitioner and ECO. The site office location shall have easy access and must preferably already be cleared or disturbed by previous human activity (e.g. previous construction camps, stockpile areas, parts of the existing road that forms part of the construction servitude or existing turning circles). All construction activities, materials, equipment and personnel will be restricted to within the area specified. <u>General</u> • The Contractor will not be permitted to paint / mark or deface natural features in an attempt to demarcate the site. Hazard tape must not be used to demarcate the external boundaries, as this easily breaks, littering the surrounding environment. • Pre-construction photographs will be taken by the ECO to determine the condition of the site before construction begins. This will provide a benchmark for rehabilitation as rehabilitated areas must match or better the pre-disturbance state.		

Construction Activities – Site office Establishment

	Impact Management Outcome	Impact Management Action	Responsible Party	Monitoring
		• The site office / yard and construction footprint will be kept clean, neat and tidy at all times, and all construction materials will be stored in a neat and organised manner. • Security guards are to be provided for after hours. • Landowners close to the campsite office / yard shall be informed of the procedure for lodging complaints with regard to the Contractor's behaviour. • Local police services must be kept informed of the planned developments to ensure that they are able to adequately deal with any disruptive behaviour.		
2.	Designated vehicle and plant cleaning and maintenance areas	• All vehicles and equipment requiring maintenance and servicing shall be taken off site and must be parked on an impermeable surface. Alternatively, drip trays (in a good condition) must be placed below all vehicles / plant. Plastic sheets are not to be used as drip trays. • No servicing of vehicles on-site. • No maintenance of vehicles must be done on site under any circumstance. Leaking equipment shall be repaired immediately or removed from the site. Spills from such leaks or breakages (e.g., hydraulic pipe bursts etc.) shall be reported to the Project Manager/Engineer and treated immediately. • Washing of vehicles must not be done at the construction site, and all vehicles requiring washing and servicing must be taken off site to a car wash / service station.	Contractor, EO, ECO	ECO- as per time programme

11.15.3 Environmental Specifications – Construction Activities – Site Management

Table 11-4 Typical aspects and impacts associated with the site management activities

Construction Activities Site Management

Impact Management Outcome	Impact Management Action	Responsible Party	Monitoring
1. Aesthetics Management			
Aesthetics	• The Contractor will ensure all components associated with site establishment are designed and positioned to limit the nuisance factor affecting surrounding landowners/users. All walls and roofs of buildings will be painted with a non-reflective matt paint of which the colour will be approved by the Project Manager/Engineer. Lighting will be of a downward facing spill off type to a maximum height of 3 m and must be so positioned to provide adequate lighting for Health and Safety requirements, without being a nuisance to adjacent neighbours. • No natural features must be defaced. Waste must be removed regularly to a registered landfill site. Daily litter patrols must be conducted, and record of these patrols kept. Bins must be wind proof and placed permanently within the camp and construction areas. • Litter caused by employees must not be tolerated. The ECO must monitor the sanitation of the work site. • The Contractor shall ensure that all solid (including hazardous) waste is either beneficiated on-site or removed from site or disposed of at a registered landfill site or nearby waste transfer station with capacity to accept the project generated waste. The nearest waste disposal site is located within Prieska e.g. Prieska waste disposal site (Slagterskamp 1 of the Remaining Extend of Erf 1). The waste manifest shall be kept on record including the waste disposal slips which must be filed for auditing purposes. All waste management practices must be put in place and adhered to by staff, contractors and all other persons entering the site. • The proposed construction must match the receiving environment as best as practicably possible.	Contractor, EO, ECO	ECO- as per time programme
Visual intrusions	All portable toilets shall be screened from public view with a shade cloth enclosure.	Contractor, EO, ECO	ECO- as per time programme
2. Dust Management			
Air quality	• Vehicles and machinery will be maintained in good running condition. • Stockpiles (e.g., soil) must be maintained for as short a time as possible and must be enclosed by a berm. Stockpiles must be situated as close as possible to the construction footprint for re use in rehabilitation and away from the site boundary, water resources and nearby receptors, and must take the predominant wind direction into account.	Contractor, EO, ECO	ECO- as per time programme

Construction Activities Site Management

Impact Management Outcome	Impact Management Action	Responsible Party	Monitoring
	• During the transfer of material to stockpiles, the drop heights must be minimised to control the dispersion of materials. • The Contractor will solely be responsible for the management and mitigation of dust generation. • The Contractor shall routinely spray all dust-generating surfaces with water, a dust suppressing agent or similar substance to prevent dust generation. Potable and contaminated water will not be used as a dust-suppressing agent and only recycled and/or rainwater is to be used, when available. • Handling of soils is not to be conducted during winds in excess of 35 km/h. • No *ad hoc* cooking fires are allowed on site except in designated cooking areas. • Dust emissions must be monitored and comply with regulatory requirements, including the AQMP for the Siyathemba Municipality. • Routinely spray all dust generating surfaces with water, a dust suppressant agent or similar to prevent dust generation. • The clearing of vegetation must be limited to where necessary. • Provide safe points for vehicular crossings and traffic control managed by flag persons. • Erect appropriate notification signs at construction areas to warn the public about the hazards around the construction site. • Construction vehicles must keep to the speed limits (25 km/h on the construction site).		
3. Earthworks Management			
Transport, earthmoving and materials handling equipment (TEM)	• The Contractor shall ensure compliance with the Occupational Health and Safety Act (1993) and the relevant regulations for the operation and maintenance of TEM equipment. • The Contractor shall ensure all TEM, vehicles and equipment are maintained in good working condition to maximise efficiency and minimise pollution. All TEM and other equipment shall only be washed in designated washing areas to minimise water pollution and soil contamination. The designated washing areas are to be located at least 30m away from the watercourses and its buffer zones. • Soil / gravel material being transported to site by trucks will be covered to ensure that dust is not blown off the material. • The Contractor shall inform all suppliers that all materials are appropriately secured to ensure safe passage to and from site.	Contractor, EO, ECO	ECO- as per time programme
4. Erosion Management			

Construction Activities Site Management

Impact Management Outcome	Impact Management Action	Responsible Party	Monitoring
Erosion	• The Contractor shall be responsible for the prevention of erosion in areas impacted upon by their activities. All erosion repairs must be implemented at the first signs thereof. The Contractor must present the site in an erosion-free state before the issuing of the Taking-over Certificate. • Carefully monitoring of construction is essential to locate and mitigate any erosion observed speedily. Investigations must be conducted after every rain downpour. Any problems need to be rectified immediately to avoid problem escalating and siltation of downstream dams and stream occurring. • Cleared areas for construction must be continually monitored to ensure no potential erosion can occur	Contractor, EO, ECO	ECO- as per time programme
Stormwater	• For flat areas and areas located below road levels as well as areas generating high runoff such as parking areas, special precautions must be taken to protect buildings and surrounding structures from flooding. • Where stormwater runoff has the potential to be contaminated with environmentally harmful substances, for instance at wash bays, oil and grease traps will be provided to remove these substances from the generated runoff. • The substances will be separated from the runoff water in these oil and grease traps, removed and legally disposed of at frequent intervals and runoff returned to the natural drainage systems in order to minimize the environmental impact of this proposed development. • Stormwater systems must ensure that a downpour does not lead to erosion of surface areas.	Contractor, EO, ECO,	ECO- as per time programme
5. Fauna and Flora Management			
Flora and fauna	• The ECO and the Eskom Environmental Practitioner must be informed of all animals found on site in order to ensure proper capture, translocation and release. Trapping, collection, poisoning and/or shooting of any animals by construction personnel is forbidden. • The Contractor shall not keep domesticated animals on any of the camp sites. • No trees shall be damaged, pruned or removed without the necessary permits in place. • The attached Alien Invasive Species Management Plan must be implemented, with the removal of all alien vegetation from within the development footprint (Refer to **Appendix A**). This shall take place within one year of construction commencement. • Care must be taken during the alien vegetation removal process to ensure that no unnecessary fires are created through the stacking of biomass. • Imported materials must be free of alien vegetation species.	Contractor, EO, ECO,	ECO- as per time programme

Construction Activities Site Management

Impact Management Outcome	Impact Management Action	Responsible Party	Monitoring
	• Maximise use of existing roads and access to areas outside the construction footprint must be strictly controlled. • Rehabilitation of areas disturbed during project activities (and other rehabilitation or replanting as may be specified) shall be undertaken to reinstate natural flora, in accordance with the attached Rehabilitation Plan (**Appendix B**) and prevent the expansion of weeds and invasive alien species. All material brought in must be from a reliable source and free of alien seeds or grass runners. • Areas that are denuded during construction need to be re-vegetated with indigenous vegetation to prevent erosion during flood events. This will also reduce the likelihood of encroachment by alien invasive plant species. • Denuded areas left undeveloped must be reshaped to existing prior contours. • The Contractor shall ensure all areas rehabilitated are kept weed free during the DNP. • All movable and low mobility fauna (such as reptiles and amphibians) must be translocated at the same time. • No trapping, killing, or poisoning of any wildlife is to be allowed on site. • Staff must be educated about the sensitivity of faunal species and measures must be put in place to deal with any species that are encountered during the construction process. The intentional killing of any animals including snakes, insects, lizards, birds or other animals must be strictly prohibited. • As per the recommendations of the Avifaunal Specialist and Eskom Standards, all powerline poles must be of a bird friendly design. • Topsoil must then be stripped, stored nearby, and kept free of alien invasive plants and weeds and once construction is complete this must be replaced where after the chipped mulch can be spread over the top.		
Vermin	• The site must be kept clean and tidy at all times to ensure no vermin is attracted to it. • The use of pesticides is prohibited unless approved through the submission of a Method Statement to the Project Manager/Engineer/Eskom Environmental Practitioner and ECO.	Contractor, EO, ECO,	ECO- as per time programme
Environmental Auditing	During construction, activities will be monitored and recorded by the EO and audited against the EMPr by the ECO. Monitoring and incident information will be communicated to the relevant authorities. Any complaint will be recorded and investigated. After construction, the site needs to be inspected and monitored to ensure that the rehabilitation activities have been successful by the Contractor and are maintained by Eskom.	Contractor, EO, ECO, Eskom	ECO- as per time programme

Construction Activities Site Management

Impact Management Outcome		Impact Management Action	Responsible Party	Monitoring
	Ecologically sensitive areas	• All areas of medium sensitivity or natural vegetation outside the immediate construction footprints must be regarded as no-go areas. These areas must not be accessed by people or vehicles. • No ancillary activity, such as temporary housing, temporary ablution, storing of equipment or waste disposal must be permitted in the areas mapped or classified as ecologically sensitive. • If any indigenous vegetation is to be cleared this must be brush cut, chipped, and stored nearby on site (must not include any IAP or exotic species and be kept free of these) to be used as mulch spread lightly over the construction footprint once works are complete	Contractor, EO, ECO	ECO- as per time programme
6.	Fire and Emergency Management			
	Safety and Security	• Construction property and equipment are to be clearly marked with identification tags. • Access to the construction site must be restricted and guarded. • Construction workers will wear clothing marked with the logo of the construction company and will carry identification cards. • The Contractor will maintain a consistent workforce that is familiar with the rules, practices, and attitudes towards the misappropriation of property. • PPE and clothing shall be given to workers and the usage thereof shall be enforced to avoid construction-related accidents. • The Contractor shall implement measures to ensure the safety of pedestrians crossing the roads used by construction vehicles. • Potentially hazardous areas must be demarcated and clearly marked. • No unauthorised firearms or dangerous weapons are permitted on site. • Security (infrastructure and personnel) on-site must be implemented during the construction period.	Contractor, EO, ECO	ECO- as per time programme
	Health Risks	• A Health and Safety Officer is to be appointed for the duration of the construction period, and his/her contact details are to be made available to the ECO. • The Contractor must continue and extend HIV/AIDS awareness and support programmes amongst staff and sub-contractors. • Adequate water supply and sanitation-related facilities shall be provided to the workers at the construction sites, with due consideration of applicable water restrictions. This shall typically include 1 toilet to every 15 workers. The toilets shall be located no more than 100 m away from any work front. • Emergency response processes must be in place. All relevant communities and adjacent landowners must be notified of the correct procedures for dealing with serious emergencies.	Contractor, H&S Officer	ECO- as per time programme

Construction Activities Site Management

Impact Management Outcome	Impact Management Action	Responsible Party	Monitoring
	• Adequate water supply and sanitation related facilities must be provided to the workers at the construction sites. • Construction waste must be disposed of at registered landfill sites to prevent any surface and groundwater pollution. • Construction sites must be fenced off to avoid unauthorised entry by individuals.		
Environmental emergency response	• In the event of actions that may result in significant environmental damage, an environmental emergency response plan must be in place to limit the extent of environmental damage. Procedures and policies will be established to ensure that an incident does not recur. • Incidents will be reported immediately to the responsible person. All incidents will be documented in the environmental incident book. The relevant authority will be informed after an incident.	Contractor, EO, ECO	ECO- as per time programme
Incident management	• The Contractor shall identify the types of environmental incidents that are likely to occur on site and ensure measures are put in place to prevent or mitigate the effects of such incidents. • All SHE incidents must be reported by the Contractors employees to the Contractor. The Contractor shall immediately report the incident to the Project Manager/Engineer and put into place management mechanisms to deal with the incident as quickly as possible. • Once the incident has been stabilised and initial notifications have been issued to the relevant parties, a full incident investigation is required complete with detailed corrective and preventative measures. The Contractor is required to provide an incident report to the Project Manager/Engineer, which, as a minimum, must include the following: • Nature of incident. • Damages, injuries or fatalities sustained, and the parties involved. • Any risks such incident poses. • Toxicity of the substances involved if any. • Steps taken to avoid or minimise the effects of the incident and any future incidents. • Clean-up procedures, remedial actions and assessment of immediate and long-term effects. • A formal report must be submitted within seven days to the Project Manager/Engineer, including all remediation measures undertaken to repair any damage caused and to prevent the incident from recurring.	Contractor, EO, ECO	ECO- as per time programme
Fire management	• The Contractor shall prepare and implement a Fire Management Method Statement to reduce fire-associated risk and thereby maintain a safe working environment and reduce negative impacts on the natural and social environment. The Contractor shall prepare the Fire Management	Contractor, EO, ECO	ECO- as per time programme

Construction Activities Site Management

Impact Management Outcome	Impact Management Action	Responsible Party	Monitoring
	Method Statement for approval by the Project Manager/Engineer within the first month of site establishment. • The method statement is to include the following as a minimum: • Measures to reduce the risk of fires starting and spreading. • Details on how the Contractor is to manage and control fires during construction. • Fire prevention equipment and where it will be located • The format and means for recording and reporting on fire mitigation, management and monitoring. • The Contractor will, ultimately, be responsible for fires that break out as a result of his activities during the implementation of the project, as well as the containment thereof. Eskom's liability with regards to fire is transferred to the Contractor for the duration of the Contract. The Contractor shall take reasonable measures to reduce the risk of fires during construction. The Contractor shall limit the risk of fires through a combination of the methods below: • The Contractor shall assign the fire management duties to a senior official. The senior official shall be competent and adequately trained to fulfil the position. The EO shall be responsible for ensuring immediate and appropriate action in the event of a fire and shall ensure that employees are aware of the procedures to be followed. • All perimeter boundaries adjoining neighbouring properties must have fire breaks in place. The fire break width maintenance requirements and responsibilities will be determined by the Contractor in conjunction with the land owner. The fire management method statement must include but not be limited to the following: • A list of the major workplace fire hazards • Proper handling and storage procedures, • Potential ignition sources (such as welding and smoking), • Control procedures, and • Type of fire protection equipment or systems to be used for control. • All staff shall receive training on fire hazards as a part of the site induction training by the Contractor before commencing work on the site. • Suitable firefighting resources must be placed at all fronts. • The Contractor shall ensure compliance with the Occupational Health and Safety Act (1993) and the relevant regulations regarding fire-fighting equipment. • In the event of a fire on site, the Contractor shall mobilise all nearby personnel and do everything possible to extinguish or contain the fire until the CAM Fire Brigade arrive.		

Construction Activities Site Management

Impact Management Outcome	Impact Management Action	Responsible Party	Monitoring
	• Proof of construction workers training on fire hazards and firefighting is to be kept on file and shown to the ECO on request. • Any fires that occur shall be reported upon discovery to the Project Manager/Engineer and to the relevant authority. • No open fires shall be permitted on or off the site or for the preparation of meals within designated eating areas. • No on-site burning of waste materials, litter or refuse shall be permitted. • Smoking shall not be permitted on site, except in designated smoking areas. Designated smoking areas are not to include those areas where there is a fire hazard. Fire hazard areas include the workshop and fuel storage areas and any areas where the material supports the rapid spread of an initial flame. • The Contractor shall be required to monitor the following on an on-going basis: • Regular drills, at least twice per year, must be performed to ensure adequate response by all Contractors' staff. • Annual revision of Fire Management Method Statement.		
7. Hazardous Substance Management			
Cement / concrete mixing	• The Contractor will submit a Method Statement which includes the mixing of cementitious and related products, and this must include remedial actions for spillages of cement and concrete. • Empty hazardous cement bags must be secured with adequate binding material if these will be temporarily stored on site in appropriate containers. Used cement bags shall be disposed of in weatherproof bins on site to prevent the generation of windblown cement dust and to prevent the bags from blowing away. The cement bags must be disposed as hazardous waste at a hazardous waste facility. All disposal certificates must be recorded and filed on site. • Pre-mixed cement must be used as far as possible. • During construction, where pre-mixed cement cannot be used, the Contractor(s) must ensure that concrete is mixed in appropriate structures to prevent the contamination of the surrounding environment. All visible remains are to be removed and disposed of as hazardous waste and all surplus material is to be removed. Plastic sheets and the bare ground are not to be used for mixing purposes. Batching plant and cement wash down area to established within a bunded areas and lined with high density polyethylene (HDPE) liner. The size of the bund needs to be scaled to accommodate the volume of cement of the batching plant at its maximum capacity. • Location of the batching plant must be on a flat area, not on a slope.	Contractor, EO, ECO	ECO- as per time programme

Construction Activities Site Management

Impact Management Outcome	Impact Management Action	Responsible Party	Monitoring
	• Waste manifests must be obtained by the Contractor for the disposal of inert concrete to a registered waste landfill site. • All visible remains of excess concrete shall be physically removed and disposed of on completion of construction. • Where cement powder has been spilled onto the bare soil, the contaminated soil shall be removed, placed into an appropriate container and disposed of at a registered hazardous landfill site. • All cementitious mixing must occur within demarcated areas. • A washout bay must be provided for washing of all equipment that has come into contact with concrete. Water used for washing must be restricted. • Any hardened concrete from the washout facility or concrete mixer can either be reused or disposed of at an appropriate licenced disposal facility. •		
Chemical spill control	• If a spill of any kind occurs, corrective action will be taken (notification of incident, isolation of contaminated material and safe disposal). • Spills shall be controlled with the following actions: • Method statements will be developed for potential hydrocarbon and chemical spill incidents. • Spillage control will be provided by impervious bunding or collecting spills to a sump for disposal or controlling by absorbent material on standby. • Capacity of impervious bund structures must be 110% of the capacity of the largest tank within the bund structure. • Spill containment facilities, such as impermeable or lined bunds (concrete is not impermeable) or drip trays in good condition will be provided in oil and chemical storage sites. • Material from lined bunded areas will not be buried during rehabilitation. • Re-fuelling and handling of chemicals will occur only in a designated area. • Spill kits will be available on site and staff will be trained in their use. • The spill will immediately be cleaned up and disposed of at a registered hazardous waste landfill site. • All spills and actions will be reported in the site Environmental Incident Book. • Leakages must be repaired on mobile equipment and containment / drip trays must be placed underneath immobile equipment until the leakage has been repaired. The drip tray will have a small spill sock placed in it to capture small spills. • All generators will be permanently placed on drip trays to contain any spillages that may occur.	Project Manager/Engineer, Contractor, EO and ECO	ECO- as per time programme

Construction Activities Site Management

Impact Management Outcome	Impact Management Action	Responsible Party	Monitoring
	• A spill response team must be brought onto the site to clean the affected area in the event of a spill greater than 100 litres. • If hydrocarbons are leaked or spilled, immediate rehabilitation with a product such as Drizit or Ecodynamics will be used, and contaminated soils shall be removed for disposal off-site.		
Chemical storage	• Hazardous materials include diesel, petroleum, oil, cement, bitumen, Ethylbenzene (ETB), solvent-based paints, drilling fluids, pesticides, herbicides and Liquid Petroleum Gas (LPG). • All chemicals will be stored in specifically designed, lockable and lined storage areas where reactive substances are classed and segregated. • All hazardous substances must be stored in a lined bunded area and sufficient spill absorbent material must be provided for the type of hazardous substance stored. The chemicals will not be stored within 30 m of watercourses. • The chemicals will be labelled according to the chemical hazard rating and, as such, adequate signage must be displayed indicating the appropriate management measures to be implemented in the event of a spill / fire. Material Safety Data Sheets (MSDS) of chemicals used must be kept on file on site at all times. • The Contractor must use the least environmentally harmful chemical in undertaking specific duties / requirements.	Contractor, EO, ECO	ECO- as per time programme
8. Heritage Management			
Heritage resources / human remains	• The Contractor and workers must be notified that archaeological finds may be exposed during the construction work. • Should a find of heritage importance be unearthed, construction activities will stop immediately at the site of discovery. The area will be fenced off with a radius of 20m around the unearthed item, demarcated as a no-go area and access will be prohibited. Should there be a risk of the find being violated, whether intentionally or inadvertently, the Contractor shall be required to appoint a guard to enforce the no-go area policy. The ECO and Project Manager/Engineer/Eskom Environmental Practitioner hall be notified immediately. • The ECO will advise Eskom to contact an archaeologist to undertake further studies and determine the importance of such a find. All related activities will be undertaken by the archaeologist, or under his/her supervision, to ensure no unnecessary damage takes place on the site. • During this period, work will not take place in the demarcated area. Work will be continued further along the site at a distance which is clearly well out of the area that may be affected by the findings. Should the findings be clearly limited to a particular area the ECO and Project	Contractor, EO, ECO	ECO- as per time programme

Construction Activities Site Management

Impact Management Outcome	Impact Management Action	Responsible Party	Monitoring
	Manager/Engineer/Eskom Environmental Practitioner, in consultation with the archaeologist, will be free to determine what can reasonably be deemed a safe no-work distance, which will be kept clear of activities. • Work will only recommence on the written consent of the archaeologist and/or the SAHRA / NCHRA. • Finds containing human remains shall immediately be reported by the Project Manager/Engineer to the South African Police Services (SAPS). • All parties concerned shall respect the potentially sensitive and confidential nature of the heritage resource, particularly human remains. • Under no circumstances shall any artefacts be removed, destroyed or interfered with by anyone on site. • The Contractor and workers shall be advised of the penalties associated with the unlawful removal of cultural, historical, archaeological or paleontological artefacts, as set out in Section 51(1) of the National Heritage Resources Act (No. 25 of 1999) (NHRA). • Any extension to the project footprint shall require assessment by a qualified heritage practitioner prior to commencement of works. • The SAHRA Archaeology, Palaeontology and Meteorites Unit must be alerted when site work commences; • Strict and clear reporting procedures for chance findings must be followed by applicant and contractors throughout the period of construction; • If any evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils or other categories of heritage resources are found during the proposed development, SAHRA APM Unit (Natasha Higgitt/Phillip Hine 021 462 5402) must be alerted as per section 35(3) of the NHRA. Non-compliance with section of the NHRA is an offense in terms of section 51(1)e of the NHRA and item 5 of the Schedule; and • If unmarked human burials are uncovered, the SAHRA Burial Grounds and Graves (BGG) Unit (Thingahangwi Tshivhase/Mimi Seetelo 012 320 8490), must be alerted immediately as per section 36(6) of the NHRA. Non-compliance with section of the NHRA is an offense in terms of section. 51(1)e of the NHRA and item 5 of the Schedule.		
9. Infrastructure Management			
Storage facilities	• The Contractor will provide storage facilities for equipment, plant and materials in such a way as to prevent damage to either the environment or to the stored item.	Contractor, EO, ECO	ECO- as per time programme

Construction Activities Site Management

Impact Management Outcome	Impact Management Action	Responsible Party	Monitoring
	• Such items stored will be in a damp and weatherproof, well ventilated and bunded facility that is raised sufficiently above ground level to prevent the ingress of storm water. • All chemicals, lubricants and fuels will be stored in secondary containment units that are capable of storing 110% of the contents stored. These secondary containment units will be impermeable, fireproof and constructed to approvals as obtained from the Project Manager/Engineer.		
Eating areas	• The Contractor shall provide staff with suitable eating areas that are weatherproof and away from construction related nuisance e.g., dust and noise. These designated eating areas must be for normal working hours only. The Contractor is to provide refuse bins and lids which are cleaned on a daily basis. The Contractor must ensure staff does not leave food items lying around after breaks. The Contractor shall ensure a dedicated cleaning function at the eating areas after every meal. • Fires will not be allowed anywhere in construction and associated project areas.	Contractor, EO, ECO	ECO- as per time programme
Lay-down areas	• The Contractor shall set aside suitably sized areas for the storing of construction and associated materials. These areas must have a firm substratum and adequate drainage to ensure rapid drying out of the areas. The Contractor shall be responsible for keeping all areas of the site for which he is responsible in a neat, clean, sanitary and orderly condition in accordance with the specifications.	Contractor, EO, ECO	ECO- as per time programme
Temporary site closure	• In the event of temporary site closure (e.g., during pay weekends and annual shutdown period), the Contractor shall check the site, ensure that the following conditions pertain and report on compliance with this clause: – Fuels / flammables / hazardous materials stores – Every effort shall be made to ensure that fuel stores are as low in volume as practicable. – There are no leaks. – The outlet is secure and locked. – The bund is cleaned and empty. – Fire extinguishers are serviced and accessible. – The area is secure from accidental damage through vehicle collision and the like. – Emergency and contact numbers are available and displayed. – There is adequate ventilation in enclosed spaces. – Erosion – Wind and dust mitigation measures such as brush packs, irrigation are in place.	Contractor, EO, ECO	ECO- as per time programme

Construction Activities Site Management

Impact Management Outcome	Impact Management Action	Responsible Party	Monitoring
	– Excavated and filled slopes and stockpiles are at a stable angle and capable of accommodating normal expected water flows. – There are sufficient detention ponds or channels in place. – Water contamination and pollution – Hazardous fuel stores are secure. – Cement and materials stores are secure. – Toilets are empty and secured. – Refuse bins are empty and secured. – Bunding is clean and treated with appropriate material that will absorb/ breakdown and where possible be designed to encapsulate minor hydrocarbon spillage. – Drip trays are empty and secure.		
Fencing at foundation sites	• The Contractor shall ensure all foundation excavations are adequately secured at the close of work each day. Fences capable of keeping livestock, domesticated animals and people out shall be used. These fences shall be clearly demarcated with safety mesh – no hazard tape or netting must be used. • The Contractor shall remove all temporary fencing upon completion of works.	Contractor, EO, ECO	EO / ECO- as per time programme
Sourcing of materials	• Commercial sources will be used. Permits received from suppliers must be kept at the construction site office.	Contractor, EO, ECO	-
10. Land Use			
I&APs relations and adjacent landowners	• The Contractor shall erect and maintain information boards in the position, quantity, design and dimensions specified by the Project Manager/Engineer. Such boards shall include general information of the activity and contact details for complaints by I&APs in accordance with details provided by the Project Manager/Engineer. The EO is to liaise with the community with regard to comments and queries by I&APs.	Project Manager/Engineer, Contractor, ECO	-
Landowner interactions	• Interactions with landowners, local communities and other affected parties need to be done by the Contractor's EO. • All interactions with Landowners/Residents must be recorded in a Complaints Register, which shall be made available to the Project Manager/Engineer on a monthly basis. • Occupiers of affected properties must be notified well in advance about proposed project and associated construction activities. Communication with the affected landowners/occupiers of land must be done at least 4 weeks prior to construction.	Project Manager/Engineer, Contractor, ECO	-

Construction Activities Site Management

Impact Management Outcome	Impact Management Action	Responsible Party	Monitoring
	• Alternative access roads always provided at partial road closures and other traffic disruptions. • Adequate road signage is to be provided to indicate alternative access to these premises during construction. • Interactions with landowners, local communities and other affected parties need to be done by the Contractor's EO. • The Contractor shall respect the property and rights of landowners and communities at all times and shall treat all such persons with courtesy. The Contractor shall keep records of all communication in a Property File for each property. • The Contractor shall ensure disruptions to Landowners/Residents and I&APs affected shall be minimised. • The Contractor shall ensure private property adjoining the site is not damaged due to construction related activities. Access to and from private property shall also not be affected by construction related activities. The Contractor shall absolve the Project Manager/Engineer of any and all risk and liability in this regard. • Prior to property access, the EO will arrange a meeting between the Contractor, Landowner/Resident, and the ECO. This meeting will be held on the property affected and is aimed at determining Landowner/Resident, Contractor, Environmental and Social requirements. Aspects identified in the specifications for the pre-construction survey must be recorded. • In addition, the Fencing Act (Act 63 of 1963) regulates activities associated with fencing and gates. Therefore, in terms of this Act, it is critical for the Contractor and Eskom to agree on fences and gates that need dismantling/erection. • Where existing fences have to be dismantled and re-erected, they shall be erected to the same design as the original and to the satisfaction of the landowner, but with such modifications as may be required by the Project Manager/Engineer. • All incidents occurring during the completion of the Contractors duties shall be reported to the Project Manager/Engineer in writing, by the Contractor. The Project Manager/Engineer will then assess the incident, concern or claim with the assistance of the ECO and determine the compensation/corrective action required by the Contractor. • The Contractor will take all actions required to ensure no re-occurrence of the incident/claim or concern occurs again. • The Contractor shall adhere to the timeframes for dealing with Landowner/I&AP concerns below: – Record concern in the Complaints Register and verbally notify the ECO – immediate.		

Construction Activities Site Management

Impact Management Outcome	Impact Management Action	Responsible Party	Monitoring
	– Respond to the concern – within 1 day of concern being raised. – Rectify/mitigate concern – within 3 days of concern being raised depending on the nature of the comment. – Respond in writing on "close out" of concern – within 5 days of concern being raised depending on the nature of the comment. – Submit to the Project Manager/Engineer a detailed report – within 7 days of concern being raised. • All servitude approvals and consents must be in place with regards to Vogelstruis Bult Farm 104 Portion 5. • I&APs that are directly affected by the construction phase must be notified prior to any nuisance activities and be notified of any temporary road closures at least seven (7) days in advance. • Provide safe points for vehicular crossings and traffic control managed by flag persons.		
Communications Register	All complaints received will be investigated and a response given to the complainant within 10 days. Complaints and positive feedback received from I&APs must be recorded in the Communications Register. The complaint will be brought to the attention of the Project Manager/Engineer, who will respond accordingly.	Project Manager,/Engineer Contractor, EO,ECO	ECO- as per time programme
Inflow of workers	• Maximise the use of local labour and contractors where possible by developing a strategy to involve local labour in the construction process. • The recruitment process and the use of contractors must be clearly communicated with the local communities, especially via the Ward Councillors. • The communication strategy must ensure that unrealistic employment expectations are not created. • Before construction commences, representatives from the Local Community and community leaders (e.g., Ward Councillors) and community-based organisations, must be informed of the details of the contractors, size of the workforce and construction schedules. • Should a large number of temporary workers not form part of the local community members, the contractor shall make certain that the "outside" workforce carry identification tags or uniforms to be easily identifiable. It must furthermore be ensured that the inflow of workers and their presence in the high-density settlements do not create conflict within these surrounding communities. • Local community organisations and policing forums / neighbourhood watches must be informed of the presence of an outside workforce (where relevant).	Project Manager/Engineer, Contractor, EO, SO, ECO	-

Construction Activities Site Management

Impact Management Outcome	Impact Management Action	Responsible Party	Monitoring
	• A transparent and all-inclusive communication and recruitment process must be implemented by the contractor. • Accommodation facilities must be adequate and must be able to deal with the requirements set by the contractor • Construction workers must be supervised at all times. • Security (infrastructure and personnel) on-site must be implemented during the construction period.		
Safety and security	• The movement of construction vehicles through the local communities must be limited to off-peak periods (if possible) to minimise adverse impacts on the movement of pedestrians (schoolchildren and individuals walking to and from work) and to a lesser extent on private vehicular traffic. • Signs must be erected at strategic locations throughout the area, warning residents and visitors about the hazards around the construction site and the presence of heavy vehicles. • Employing local community members could minimise the potential for criminal activity or perceived perception of an increase in criminal activity due to the presence of an outside workforce. • Screening of workers that apply for work could be useful to lessen perceived negative perceptions about the outside workforce. • The contractor must develop an emergency response plan to specifically deal with the increased risk of fires. • The public shall not be allowed to enter or near the working / construction areas. • Staff on site shall always wear reflector PPE. • Open excavations will be marked and demarcated with mesh net • Construction vehicle must travel within a recommended speed limit, maximum speed 30km/h to avoid dust and collision. • Temporary roads must be maintained to benefit and accommodate commuters to and from work. • Dust management of the site to be managed according to Ambient Air Quality section above.	Project Manager/Engineer, Contractor, EO,ECO	ECO- as per time programme
11. Noise Management			
Noise	• Noise sources include construction machinery, power tools and compressors, vehicle movements, general construction activity and drilling. To limit noise levels, the following actions will be taken: • Vehicles and machinery will be kept in good working order and equipped with silencers if necessary.	Contractor, EO, ECO	-

Construction Activities Site Management

Impact Management Outcome	Impact Management Action	Responsible Party	Monitoring
	• Noisy activities will only be undertaken only during normal working hours (07h00-18h00) Monday to Saturday excluding public holidays (unless prior permission is provided by surrounding landowners). Work must not be conducted outside this period without the written authorisation of the Project Manager/Engineer. • The speed of delivery and construction vehicles in construction areas will be limited to 25km/h. • Any complaints will be investigated, and corrective action implemented and documented. • Noise levels must be limited to a minimum and ensure they comply with regulatory requirements. • Construction activities shall be limited to working hours (07h00-18h00) Monday to Saturday excluding public holidays (unless prior permission is provided by surrounding landowners). • Vehicles and construction equipment must be kept in good working condition to limit excessive noise pollution. • Limit the movement of construction vehicles to off-peak periods (where possible) and where sensitive receptors are situated. • Siythemba Municipality Noise Policy with regards to prohibitions relating to disturbing noise, machinery in residential areas, generator sets and construction noise will be adhered to, including the SANS codes for this zone.		
12. Rehabilitation Plan			
Vegetation	See 11.3 and Appendix B		
13. Soil Management			
Soil management	• All removed soil and material must not be stockpiled within the system. • All stockpiles must be protected from erosion, stored on flat areas where run-off will be minimised, and be surrounded by bunds. • The Rehabilitation Plan (**Appendix B**) must be implemented to correct scour and erosion • Excavated and graded bare areas must not be left for long period without being constructed. • Graded bare soil and stockpiles must be protected and located away from storm water way and drainage lines to avoid siltation and sedimentation in watercourses. • Compaction by vehicles or poor storage methodology or careless handling of topsoil can cause erosion or contamination.	Contractor, EO, ECO	ECO- as per time programme

Construction Activities Site Management

Impact Management Outcome	Impact Management Action	Responsible Party	Monitoring
	• The objective is to prevent compaction and the loss of soil structure, the following soil handling techniques shall be employed: • Soil stockpiles must not be higher than 1.5 m with slopes of 1 m vertical to 2 m horizontal • Stockpile topsoil and subsoils separately. • The Contractor must not compact soil stockpiles and stockpiles must be removed from undisturbed area. Stockpiling must be done on cleared areas only. • Soil will not be handled during windy conditions (else it shall be dampened to reduce dust production) • Repeated handling of soil will be avoided. • Overburden must be removed and stockpiled separately from topsoil stockpiles. • Overburden stockpiles must not be permitted to overflow and contaminate topsoil stockpiles. • All polluted soils shall be replaced by the Contractor(s) at his own cost. • Ensure there is no windblown dust in the servitude areas during construction by continual wetting of open sandy soils.		
Spoil	Excess material obtained from the foundation footprint, shall be spoilt off site at the registered landfill site or reused.	Contractor, EO, ECO	ECO- as per time programme
14. Traffic Management			
Traffic management	• The Contractor shall provide safe points for vehicular crossing at designated points. These points will be manned by flag persons. • Appropriate notification signs shall be erected by the Contractor at entrances to the construction site to warn visitors and pedestrians about the hazards around the construction site and the presence of heavy vehicles, where appropriate. • Construction vehicles are to keep to the speed limits (25km/h on the construction site). • The Contractor shall provide safe points for vehicular crossing at designated points. These points must be manned by flag persons. • Appropriate notification signs shall be erected at entrances to the construction site to warn visitors and pedestrians about the hazards around the construction site and the presence of heavy vehicles, where appropriate.	Contractor, EO, ECO	
15. Training Programmes			

Construction Activities Site Management

Impact Management Outcome	Impact Management Action	Responsible Party	Monitoring
Construction personnel information posters	The Contractor shall erect and maintain information posters for the information of his employees depicting actions to be taken to ensure compliance with aspects of the EMPr. Such posters shall be erected at the site access area, eating areas, and any other locations specified by the Project Manager/Engineer.	Contractor, EO, ECO	-
16. Waste Management			
Waste management	• A waste sorting facility will be established at the construction site office / yard. Solid waste will be separated into recyclable and non-recyclable waste. • Timber, metal, oil, paper, bricks, tyres, batteries and any other major recyclable wastes will be stored in safe, secure areas prior to disposal. Proof of disposal or removed for recycling must be kept on file and presented to the ECO on request. • General non-recyclable refuse will be collected in appropriate bins with secure lids to be disposed of at a registered waste landfill site or at the nearest transfer station with capacity to accept the waste generated by the project. Proof of disposal must be kept on file and presented to the ECO on request. • The Contractor will provide weather and vermin-proof bins, which shall be cleaned on a daily basis. Waste stockpiled temporarily must not exceed 5 days. The contractor must provide skips/waste collection bins for different waste types. The Contractor must ensure that staff do not leave food lying around after breaks. • Site inductions must include litter collection and litter must be collected continuously at working areas. • A separate oil container will be used to ensure that oil wastes are contained. • All chemical drums will be transported to a designated and lined bunded area when full, empty or when the contents of the drum are unusable or unknown. All drums will be appropriately disposed of at a registered hazardous waste landfill site. Proof of disposal must be kept on file and presented to the ECO on request. • No burning, burying or dumping of any solid waste materials will be permitted on site. This includes temporary dumping or storage outside the designated and fenced off development area. • Measures to control illegal dumping of construction waste must be in place as this may result in pollution to the surface water run-off. • Anti-litter/ anti-dumping mitigation measures must be implemented and included in the Integrated Waste Management Plan to be developed.	Contractor, EO, ECO	ECO- as per time programme

Construction Activities Site Management

Impact Management Outcome	Impact Management Action	Responsible Party	Monitoring
	• Staff must be well trained and continuously informed of mitigation measures included in the Integrated Waste Management Plan. • Continuous monitoring of potential litter and illegal dumping areas must take place • The Contractor will supply temporary ablution facilities (e.g., non-chemical or composting toilets) of an acceptable standard, with a minimum of one facility per 15 workers. The use of the surrounding areas for ablutions is strictly prohibited. The temporary ablution facilities will be monitored on a regular basis to ensure that the toilets are cleaned and emptied on a regular basis by a licensed contractor. The temporary ablution facilities will be secured to the ground to prevent them from being blown over in high winds. • Ablution facilities must be placed within 100 m of work areas. • Litter caused by employees must not be tolerated. The EO must monitor the sanitation of the work site. • The Contractor shall ensure that all solid (including hazardous) waste is either beneficiated on-site or removed from site is disposed of at a registered landfill site or nearby waste transfer station with capacity to accept the project generated waste. The nearest waste disposal site is located within Prieska e.g., Prieska waste disposal site (Slagterskamp 1 of the Remaining Extend of Erf 1). The waste manifest shall be kept on record and waste disposal slips must be recorded for auditing purposes. All waste management practices must be put in place and adhered to by staff, contractors and all other persons entering the site. Records of solid waste removal must be kept, and records maintained to confirm safe disposal. • All waste generated on-site during construction must be adequately managed. Separation and recycling of different waste materials is supported. • Adequate scavenger-proof refuse disposal containers must be supplied to control solid waste on-site. • Ensure that environmental awareness training is offered to all site personnel - including topics on safe waste disposal, etc. • Provide waste receptacles to separate waste at the source, i.e., paper, glass, tin, food waste, etc., and provide all contractors and contractor's employs with training on the separation of waste. • Portable sanitation facilities must be erected for construction personnel. • Use of these facilities must be enforced (these facilities must be kept clean so that they are a desired alternative to the surrounding vegetation). These facilities must also be monitored and serviced regularly so as to prevent contamination of the water resources.		

Construction Activities Site Management

Impact Management Outcome	Impact Management Action	Responsible Party	Monitoring
	• The construction site must be inspected for litter on a daily basis. Extra care must be taken on windy days. Precautions must be taken to avoid litter from entering watercourses. • Soil that is contaminated with, e.g., cement, petrochemicals, or paint, must be disposed of at a registered waste disposal site and is not to be deposited into the any watercourses. • It must be ensured that all hazardous contaminants are stored in designated areas that are sign-posted, lined with an appropriate barrier and bunded to 110% of the volumes of liquid being stored to prevent the bio-physical contamination of the environment (ground and surface water and soil contamination). • Any significant spills on-site must be reported to the relevant Authority (e.g., DWS / Eskom etc.) and must be remediated as per the EMPr.		
17. Water Management			
Statute	• All the requirements of the NWA regarding water use and pollution management must be adhered to at all times.	Project Manager/Engineer, Contractor, EO,ECO	-
Surface and groundwater	• Storm water runoff must be prevented from coming into contact with waste or contaminants on the site. Discharge of effluents or polluted water into the water resources shall not be allowed. • All TEM shall be refuelled off-site. • Water emanating from the mixing of cementitious products must be contained and prevented from entering the environment. • The Contractor shall prevent the discharge of any pollutants, such as bentonite, cements, concrete, lime, chemicals and fuels into any water resource. • Water released by the Contractor into the environment must comply with the attached DWS water standards. • In order to avoid the accumulation of groundwater beneath the structures special attention must be given to allow water to drain out of the excavations though allowing the base of the excavation to be graded to a selected position at a minimum gradient of 1 % where water will either be pumped or gravitated out.	Contractor, EO, ECO	ECO- as per time programme
Health and safety	Adequate water supply and sanitation related facilities must be provided to the workers at the construction sites.	Contractor	-

11.15.4 Environmental Specifications – Vegetation Activities

Table 11-5 Typical aspects and impacts associated with the vegetation activities

Rehabilitation Activities

Impact Management Outcome	Impact Management Action	Responsible Party	Monitoring
1. Vegetation	• The Contractor shall utilise the EMPr as the basis against which all the construction works shall comply. • Disturbed areas that will no longer be in use will be rehabilitated as indicated by the ECO. If areas had topsoil removed and stockpiled prior to use, the surface will be ripped, and the topsoil will be replaced. All soils and topsoil material must be bought from a reliable source and must be free of alien seeds or grass runners. • The Contractor must limit the removal of trees and stockpile felled vegetation to the footprint of the proposed development. Trees to be removed must be clearly marked and the footprint area demarcated. Branches may be used to reduce surface run-off in exposed areas. • All vegetation cleared from the site must be used for mulching, as far as practical. • Fences, barriers and demarcations associated with the various construction phases and activities must be removed. • The site will be cleared of all litter. • The Contractor must repair any damage that the construction works have caused to neighbouring properties. • All remaining construction materials must be removed from the site. • Once construction activities are completed, the area must be rehabilitated and all vegetation (i.e., trees and grass) must be restored. • A meeting must be held on site between Eskom or representative, the ECO and the Contractor to approve all rehabilitation activities and to ensure that the site has been restored to a condition that is acceptable and approved by Eskom. • Rehabilitation will be conducted in a progressive manner (i.e., once construction in an area has been completed the area will be rehabilitated). • Construction works must remain within the demarcated areas. • Loss vegetation and ecological processes during construction: • Construction areas must be clearly marked out and surrounding areas must be observed as no-go areas. • Utilise the existing gravel road (best option) or road edge gutter within the assessed corridor for the trench with overburden soil to be placed in the road during construction. • If any indigenous vegetation is to be cleared this must be brush cut, chipped, and stored nearby on site (must not include any IAP or exotic species and be kept free of these) to be used as mulch spread lightly over the construction footprint once works are complete.	Eskom Contractor, ECO, EO	ECO- as per time programme

Rehabilitation Activities

Impact Management Outcome	Impact Management Action	Responsible Party	Monitoring
	• Topsoil must then be stripped, stored nearby and kept free for IAPs and weeds and once construction is complete this must be replaced where after the chipped mulch can be spread over the top. <u>Re-contouring:</u> Subsoil stockpiles must 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. <u>Control of weeds and invader plants during vegetation:</u> • Target, remove and control all invasive alien species through implementation of the attached Alien Invasive Species Management Plan, in particular at the *Prosopis glandulosa var. torreyana* (Honey Mesquite). • Bush-cutting the vegetation causes woody invasive species to vigorously resprout, resulting in further problems. Felling and poisoning with herbicide is the best method for removing larger specimens. Seedlings must be hand-pulled, and herbicide must only be used on seedlings if their cover is over 80% of the total vegetation cover. • The Contractor shall maintain rehabilitated areas free of weeds and invader plants until the end of the DNP applicable to rehabilitation. Control of weeds and invader plants must be done in accordance with the specifications stipulated in the Conservation of Agricultural Resources Act (Act 43 of 1983) (CARA) and the NEM:BA. • Practise early detection and rapid response for Invasive Alien Plant species and ruderal weeds that occur during construction of the pipeline and after completion for a minimum of one (1) year. • If any indigenous vegetation is to be cleared this must be brush cut, chipped, and stored nearby on site (must not include any IAP or exotic species and be kept free of these) to be used as much spread lightly over the construction footprint once works are complete. • Topsoil must be stripped, stored nearby, and kept free for IAPs and weeds and once construction is complete this must be replaced where after the chipped mulch can be spread over the top. • All works must be monitored by an EO		
2. Monitoring	• After construction, the site needs to be inspected by the ECO to ensure that the rehabilitation activities have been successful and to monitor alien vegetation re-growth. The ECO will report the condition of rehabilitation to Eskom. • Eskom is responsible for clearing alien vegetation within the rehabilitated areas.	ECO, Eskom	ECO- as per time programme

11.15.5 Environmental Specifications – Operational Activities

The operational activities reflected in the table below highlight specific requirements which need to be implemented by the Eskom during the operational phase of the development (where applicable).

Table 11-6 Typical aspects and impacts associated with the operation activities

Operational / Maintenance Activities

Impact Management Outcome		Impact Management Action	Responsible Party	Monitoring
1.	Dust Management	Eskom shall preserve air quality levels to an extent that public health; safety and environmental protection are assured. • Avoid maintenance activities during periods where the wind speed is 35 km/h or more, which is usually experienced in summer. • Maintenance vehicles must keep to the speed limits (30km/h within the approved area and on access roads). • Dust monitoring must be implemented	Eskom, Contractor, ECO, EO	ECO- as per time programme
2.	Earthworks Management	Eskom shall minimise impacts on the receiving environment and disturbances to flora, fauna and affected landowners.	Eskom, Contractor, ECO, EO	ECO- as per time programme
3.	Erosion Management	Eskom shall implement measures to prevent erosion and reduce potential impacts upon the surrounding environment.	Eskom, Contractor, ECO, EO	ECO- as per time programme
4.	Fauna and Flora Management	Eskom shall preserve fauna and flora through control of operational and maintenance activities. Prevent infestation of alien species during operational and maintenance activities.	Eskom, Contractor, ECO, EO	ECO- as per time programme
		CARA requires that further spread of the species must be prevented. This control must be done on an annual basis by implementation of the Alien Invasive Management and Rehabilitation Plan attached to this EMPr		
		Felling and poisoning with herbicide is the best method for removing larger specimens. Seedlings must be hand-pulled and herbicide must only be used on seedlings if their cover is over 80% of the total vegetation cover.		
		The presence of invasive alien trees within the project footprint must be monitored and controlled in accordance with the attached Alien Invasive Species Plan (Refer to **Appendix A**).		
		Target, remove and control all invasive alien species.		
		Implement a site-specific weed eradication plan		
5.	Fire and Emergency Management	Eskom shall restrict the occurrence of fires and ensure all role players can respond efficiently and effectively, thereby reducing potential impact.	Eskom, Contractor, ECO, EO	ECO- as per time programme

Operational / Maintenance Activities

	Impact Management Outcome	Impact Management Action	Responsible Party	Monitoring
		Orange safety fencing must be used around any area that requires the digging of a trench for maintenance purposes.		
		The standard specifications for municipal civil engineering works must be followed for emergency maintenance purposes.		
6.	BESS failure mitigation	• An operating and maintenance programme must be implemented in some manner which includes identification of overcharge, overheating and short circuits. The applicant must further investigate insulation material to be used around the modules. • Short circuit detection and protection must be implemented in some manner in the selected BESS technology. • Fire detection and suppression systems must be installed. • Fire extinguishers must be available at all points of storage of flammable product. • Handling of the battery modules must be undertaken in accordance to the operating manual and OEM instructions. • Fire management must be implemented as stated in Section 11.12. • The fire extinguishers must be checked on a monthly basis to ensure they have not been used or damaged from surrounding construction activities. • Fire Officer must be able to detect fires and undertake regular monitoring. • All staff shall receive training on fire prevention and safety in the event of a fire. Annual refresher courses shall be presented to all staff. • Details of the Siyathemba Fire Department must be recorded on site and updated quarterly. • No open fires shall be permitted on or off-site, except for activities authorised by the Applicant. All authorised fires shall occur at designated fireplaces, which shall be suitably resourced to contain and suppress any potential run away fire. • Biomass in the vicinity of infrastructure shall be removed at regular intervals to reduce fuel load and fire hazards. • Conduct fire and emergency drills every six months and record details within the environmental and safety file. • Ensure the BESS and associated infrastructure are maintained regularly and operate efficiency to reach full extent of the positive impact. • Ensure compliance with all environmental permits, management and Rehabilitation Plans in order to reach optimal functioning and safety targets.	Eskom, Contractor, ECO, EO	ECO- as per time programme
7.	Hazardous Substance Management	Eskom shall minimise the impact of hazardous substance storage, handling, and disposal on the receiving environment	Eskom, Contractor, ECO, EO	ECO- as per time programme
		Accidental pollution incidents shall be reported to Eskom immediately when they occur. Eskom shall notify the relevant authorities as well as arrange appropriate improvement.		

Operational / Maintenance Activities

Impact Management Outcome		Impact Management Action	Responsible Party	Monitoring
		All potentially hazardous waste generated at the site including diesel, petroleum, oil and lubricants; pesticides; and effluent disinfectants shall be removed and disposed by an approved subcontractor to an approved disposal site. Potentially hazardous raw and waste materials shall be handled and stored on-site in accordance with the manufacturer's specification and in accordance with the Act.		
		Should pesticides be used for controlling weeds or vegetation at any place adjacent to the powerline, the Fertilisers, Farms Feeds, Agricultural Remedies and Stock Remedies Act, 1947 (Act No. 36 of 1947) apply. Should subcontractors apply pesticides, Eskom shall ensure that their operators are registered according to the Act.		
8.	Heritage Management	Eskom shall limit and mitigate potential heritage impacts and chance findings should they occur.	Eskom, Contractor, ECO, EO	ECO- as per time programme
		Where chance finds are unearthed, proof of work being stopped immediately and proof of consultation with a heritage specialist / archaeologist (depending on the find) and SAHRA / NCHRA must be kept on site.		
9.	Infrastructure Management	Eskom shall reduce impacts of the infrastructure on air quality, aesthetics, land access and the surrounding environment.	Eskom, Contractor, ECO, EO	-
10.	Land Use	Eskom shall minimise disturbances to landowners; land use rights and associated impacts upon commercial activities.	Eskom, Contractor, ECO, EO	ECO- as per time programme
		Eskom shall respond to queries and complaints from the public and documenting the details of such communications.		
		No soil erosion or invasion of declared weeds and/or invader plant(s) takes place, especially on rehabilitated areas. Eskom shall continue to monitor and implement, if required, the Rehabilitation Plan (**Appendix B**) and Alien Invasive Species Control Plan on the site, especially the rehabilitated areas. The requirements of CARA and NEM:BA shall apply.		
		It is imperative that the construction of additional access roads be undertaken in full consultation with the property owners. Land to be used for future agricultural activities must not be negatively impacted on.		
11.	Noise Management	Reduce operational and maintenance related noise affecting the surrounding environment.	Eskom, Contractor, ECO, EO	ECO- as per time programme
		Noise emanating from operational activities shall not be disturbing noise. The sound level from the site measured at the nearest dwelling must not exceed the ambient noise level by more than 7dBA.		

Operational / Maintenance Activities

Impact Management Outcome		Impact Management Action	Responsible Party	Monitoring
		Siyathemba Municipality Noise Policy with regards to prohibitions relating to disturbing noise, machinery in residential areas, generator sets and construction noise will be adhered to, including the SANS codes for this zone.		
12.	Rehabilitation Plan	To rehabilitate impacted areas to a suitable land capability class similar to that of the surrounding environment. Rehabilitation will take existing land uses into consideration. Rehabilitation must start immediately after work is completed and must be undertaken in accordance with the attached Rehabilitation Plan (**Appendix B**)	Eskom, Contractor, ECO, EO	ECO- as per time programme
13.	Soil Management	Eskom shall manage the removal and stockpiling of topsoil and subsoil during the maintenance and operation phase of the scheme for use during rehabilitation.	Eskom, Contractor, ECO, EO	ECO- as per time programme
14.	Training Programmes	Eskom shall foster skills transfer, environmental awareness, health and safety awareness and materials and equipment skills.	Eskom, Contractor, ECO, EO	ECO- as per time programme
15.	Waste Management	Eskom shall implement measures to reduce, monitor and manage waste generation, whilst maximising recycling efficiency.	Eskom, Contractor, ECO, EO	ECO- as per time programme
16.	Traffic Management	Appropriate notification signs shall be erected at entrances to the construction site to warn visitors and pedestrians about the hazards around the construction site and the presence of heavy vehicles, where appropriate.	Contractor, ECO, EO	ECO- as per time programme
		Construction vehicles are to keep to the speed limits (30 km/h during operation).		
16.	Water Management	Eskom shall minimise the impact and maintain integrity of affected water resources.	Eskom, Contractor, ECO, EO	-
		Precaution shall be taken that no surface or groundwater becomes polluted either through seepage or natural flow. Any deliberate or unplanned pollution of water is an offence according to the NWA and punishable with an undetermined fine, and/or five years imprisonment.		
		Should an incident occur, which can cause water pollution, especially if it affects watercourses, the office of the DWS shall be contacted immediately (see requirements in the NWA). Cleaning up shall take place in consultation with the DWS.		
		No person shall discard or dump any litter within or adjacent to the servitude. At all times operation and maintenance staff must ensure that litter is discarded in appropriate containers.		
		Any solid waste derived during operation and maintenance shall be disposed at registered landfill site.		

11.15.6 Environmental Specifications – Rehabilitation (refer to Appendix B for more detail)

The rehabilitation activities reflected in the table below highlight specific requirements which need to be implemented by Eskom during the rehabilitation phase of the development.

Table 11-7 Typical aspects and impacts associated with the rehabilitation activities

Rehabilitation Activities

Impact Management Outcome	Impact Management Action	Responsible Party	Monitoring
1. Rehabilitation Plan	• To rehabilitate impacted areas to a suitable land capability class similar to that of the surrounding environment. Rehabilitation will take existing land uses into consideration. Rehabilitation must start immediately after decommissioning is completed. • Backfill excavations and dongas • All excavations must be rehabilitated with soil and topsoil, which must not contain invasive plant species (in compliance with the CARA and NEM: BA, as amended), to the satisfaction of the ECO. • All building materials must be removed from the site. All compacted surfaces must be ripped and re-vegetated as per the re-vegetation specifications. • A meeting must be held on-site between Eskom or representative, the ECO and the appointed Contractor to approve all rehabilitation activities and to ensure that the site has been restored to a condition that is acceptable by the DFFE and approved by Eskom. • The most suitable seed mix for disturbed areas to be used in rehabilitation would include indigenous species. • Rehabilitation will be conducted in a progressive manner (i.e., once construction 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.	Contractor, ECO, EO	ECO- as per time programme
2. Rehabilitation Measures	<u>Rehabilitation measures for the site are to include the following:</u> • All disturbed and cleared areas must be re-vegetated with indigenous perennial shrubs and grasses from the local area. • Re-contouring: Subsoil stockpiles must 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. • The Contractor shall maintain rehabilitated areas free of weeds and invader plants until the end of the DNP applicable to rehabilitation. Control of weeds and invader plants must be done in accordance with the specifications stipulated in the CARA and NEM:BA. <u>Erosion control:</u> • The Contractor shall be responsible for the prevention of erosion in areas impacted upon by their activities. All erosion repairs must be implemented at the	Contractor, ECO, EO	ECO- as per time programme

Rehabilitation Activities

Impact Management Outcome	Impact Management Action	Responsible Party	Monitoring
	first signs thereof and no erosion shall be allowed to develop on a large scale. The Contractor must present the site in an erosion free state before the issuing of the Performance Certificate.		
3. Soil Management	Eskom shall manage the removal and stockpiling of topsoil and subsoil during the decommissioning phase of the scheme for use during rehabilitation.	Contractor, ECO, EO	ECO- as per time programme
4. Stormwater	• Improved storm water networks to prevent erosion and scouring. • Curb head cut erosion and the collapse of embankments. • Create energy dissipation at all discharge points.	Contractor, ECO, EO	ECO- as per time programme
5. Traffic Management	Eskom shall minimise the impacts and extent of related traffic on the surrounding road network and environment, whilst maximising road user safety.	Contractor, ECO, EO	ECO- as per time programme

12. Guidelines

The Contractor is advised to include these Annexures within their on-site Environmental File. They are to be used to inform “how” the EMPr is to be implemented during construction related activities.

Appendix G1: Provision of details of the author(s) and related expertise
Provision of details of the author(s) and related expertise, as per requirements contained within Annexure 16 EMPr Alignment with NEMA Sec 24N.

Appendix G2 – Legal and Administrative Framework
Provides Legislation, Permits, Standards and Guidelines against which the Contractor is to adhere during the development. This also includes potential authorisations / permits / licences required prior to construction commencement.

Appendix G3 – Environmental Authorisation
The Contractor is advised that developments which trigger an EIA may place further Conditions on the Contractor against which compliance is required. The Contractor is advised to be cognisant of these additional requirements and price accordingly.

Appendix G4 - Eskom OHS Policy
Provides Eskom’s OHS Policy.

Appendix G5 – Site Plan
Provides further details relating to the Site Plan.

Appendix G6 - Method statement
This Annexure provides the Contractor with the minimum requirements to be included within the method statement. It is incumbent upon the Contractor to provide a task or activity focussed method statement, providing the Eskom Environmental Practitioner a holistic overview of all aspects associated with undertaking of the task / activity.
A method statement template has specifically not been provided to ensure that the method statement submitted by the Contractor aligns with Contractor QMS requirements.

Appendix G7 - Sensitivity Mapping
Provides for sensitivity mapping of “no-go” areas where the Contractor’s activities are to be restricted.

Appendix G8 – Environmental Monitoring of Water
Provides for the monitoring of wastewater generated due to construction related activities; and its discharge into a water resource, as per regulatory requirements.

Appendix G9 – Environmental Monitoring of Dust
Provides for the monitoring of dust generated due to construction related activities, as per regulatory requirements.

Appendix G10 – Environmental Monitoring of Noise
Provides for the monitoring of noise generated due to construction related activities, as per regulatory requirements.

Appendix G11 - General Conditions of Contract
Provides for references relate to the SAICE General Conditions of Contract 2015 (GCC).

Appendix G12 – EMPr Alignment with NEMA Sec 24N
Provides for a cross link to ensure EMPr contents complies with NEMA Section 24 N, together with Appendix 4 of General Notice Regulations (GNR) 982 the EIA Regulations (2014), as amended.

Appendix G13 - Typical Aspects and Impacts Table
Provides for typical aspects and impacts generally associated with the various life cycle phases of a development. In the absence of an EIA Aspects and Impact Table, this table shall prompt the Contractor in the anticipation of possible risks. The Contractor is to use the Tables as a guideline in assessing risks / impacts when compiling method statements.

Appendix G14 - Monitoring Control and Eradication Plan for Invasive Species
Provide for the handling and control of invasive species across the development site as well as details and procedures for removal. Refer to **Appendix A** of the EMPr.

Appendix G15 – Rehabilitation Plan
Procedures for the rehabilitation of the environment following the completion of construction activities. Refer to **Appendix B** of the EMPr.

Appendix G16 – Generic Environmental Management Programme (EMPr) for the development and expansion for overhead electricity transmission and distribution infrastructure
This document constitutes a generic EMPr relevant to applications for the development or expansion of overhead electricity transmission and distribution infrastructure, and all listed and specified activities necessary for the realisation of such infrastructure. Refer to **Appendix C** of the EMPr.

APPENDIX A

ALIEN INVASIVE VEGETATION MANAGEMENT PLAN

Proposed Development of a Battery Energy Storage System (BESS) and associated infrastructure at the Cuprum Substation, near the town of Prieska, Northern Cape Province

Alien and Invasive Species Management Plan

Eskom Holdings SOC (Pty) Ltd – Northern Cape Operating Unit

DFFE Reference: 14/12/16/3/3/1/2601
Project Number: 60657237

November 08 2022

Delivering a better world

Quality information

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1. Purpose of the Alien and Invasive Vegetation Management Plan

The purpose of the Alien and Invasive Species Management Plan (AISMP) is to provide a framework for the management of alien and invasive vegetation throughout all phases of the project, including pre-construction through to the operational phase of the project. The broad objectives of the AISMP are:

- Provide general and species-specific guidance on the removal, control and containment of alien and invasive species;
- To control the presence, dispersal and encroachment of alien and invasive vegetation on the site;
- Developing and implementing an alien and invasive vegetation monitoring, control, and eradication programme;
- To aid rehabilitation efforts on site as part of the Rehabilitation Management Plan (RMP).

2. Study site – Relevant Environmental Information

The study site is located within the Bushmanland Bioregion and within the original extent of the veld-type known as Bushmanland Basin Shrubland. The Bushmanland Basin Shrubland veld-type is situated within the greater Nama Karoo Biome. The study site is very flat and the average downgradient slope from south-east to north-west varies only by 1.2% – 0.8%. The vegetational component on site was classified as being badly to moderately disturbed due to historic impacts, originating mainly from mining activities (Maree, 2021). According to (Maree, 2021) there was no infestation of alien and invasive vegetation on site, but some species were scattered throughout the site.

3. Relevant Legislation

3.1 National Environmental Management: Biodiversity Act, 2004 (Act No.10 of 2004)

The National Environmental Management: Biodiversity Act (NEM:BA) regulates all invasive organisms in South Africa, including a wide range of fauna and flora. Regulations have been published in Government Notices R.506, R.507, R.508 and R.509 of 2014 under NEM:BA. According to this Act and the Regulations, any species designated under Section 70 cannot be propagated, grown, bought, or sold without a permit. As per the NEM:BA; alien and invasive species are categorized according to required legislative actions. These categories are explained below:

- **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.

4. Responsibility

To ensure the AISMP is effectively implemented on site during the pre-construction, construction and post-construction phases, the responsibilities as outlined below should be assigned.

4.1 Developer

Will be responsible for the following:

1. Overall accountability for the implementation of AISMP; including setting and reviewing monitoring requirements of this plan;
2. Allocate responsibilities with regards to the implementation and monitoring of the AISMP to the respective responsible parties, namely the Project Manager, Contractor/s and Environmental Control Officer (ECO);
3. Provide a copy of this management plan to all principle contractors as part of the tender contract documentation to allow contractors to cost this requirement in their respective contract documents.

4.2 Project Manager

Will be responsible for the following:

1. Overall implementation of the AISMP;
2. The Project Manager must be familiar with the conditions and content as set out in the Environmental Authorisation (EA), Environmental Management Programme (EMPr), AISMP; and the RMP.
3. The Project Manager must communicate the conditions and contents of the EA, EMPr, RMP, and AISMP to all contractors and ensure the requirements of these are included in the environmental induction provided prior to the start of construction activities.
4. Assigning areas that require action in terms of removing, clearing, controlling, or containing alien and invasive vegetation to applicable contractor/s; it is recommended that one contractor is tasked with all matters related to the removal, clearing, controlling or containing of alien and invasive vegetation.

4.3 Contractor/s

Will be responsible for the following:

1. Complying with the conditions as set out in the EA, EMPr, AISMP, and RMP;
2. Ensure that all employees undergo appropriate environmental induction;
3. Follow instructions issued by the Project Manager;
4. Compiling method statements for removal, clearing, control or containment of alien and invasive species approval from the Project Manager and ECO;
5. Ensuring sufficient budget us made available for the implementation of the Rehabilitation Management Plan (RMP) and the AISMP

4.4 Environmental Control Officer

Will be responsible for the following:

1. The ECO must be familiar with the conditions and content as set out in the EA, EMPr, AISMP and the RMP;
2. Undertake site inspections to monitor the compliance with the conditions of the EA, EMPr, AISMP, and RMP and advise appropriate action to correct any non-compliance;
3. Assist in identifying alien and invasive species on site;
4. Assist in identifying areas that will require input in terms of removing, clearing, controlling or containing alien and invasive species as well as suggesting appropriate measures to be implemented as to achieve the removal, clearing, control or containment of alien and invasive species;
5. Monitor the implementation of the AISMP and the success of removal, clearing, control and containment measures implemented.

5. Alien and Invasive Vegetation

The terminology “alien and invasive vegetation”, in the context of this document, refers to flora species as identified in Notice 3: National List of Invasive Species, published in terms of Sections 70(1), 71(3) and 71A of the NEM:BA. The term “alien” refers to a flora species that does not naturally occur within the Republic of South Africa but has been introduced in an artificial manner. The term “invasive” refers to the growth pattern of a flora species and typically means a species that grows aggressively, thereby “invading” an area and often dominating, displacing, or replacing indigenous flora species with less aggressive growth patterns. The terminology “alien and invasive vegetation” is often thought of as being one and the same. It must be noted, however, that alien vegetation species do exist without being invasive, similarly invasive vegetation species do exist without being alien. Most species listed in Notice 3 of the NEM: BA are both “alien” and “invasive” in nature and therefore are collectively referred to as alien and invasive vegetation species.

Alien and invasive vegetation species can typically grow in more unfavourable conditions than indigenous species and typically outcompete indigenous vegetation to establish and proliferate in an area. Construction activities are likely to cause varying levels of disturbance to topsoil and it is therefore highly likely that alien vegetation will sprout in newly disturbed sections. It is therefore imperative that management measures are implemented for the control of alien and invasive vegetation during each stage of the proposed development. The management of alien and invasive vegetation, with steps and considerations of each phase is explained in detail below.

5.1 Pre-Construction Phase

5.1.1 Mapping

The ECO must create a comprehensive Alien and Invasive Vegetation Map of the entire site, with input from the Contractor. This map should divide the entire site into Alien Vegetation Management Units (AVMU’s) with unique identifiers. The units to be mapped can then be classified according to the following conceptual classes: The number of Alien and Invasive Vegetation Species (AIVS) present and the level of infestation.

Table 1 Alien vegetation map; conceptual classes

Number of AIVS Present	Level of infestation
4+	Very High
3	High
2	Medium
1	Low
0	None

Each AVMU should then be assigned a number (of AIVS present) and a level (of infestation); for example, AVMU 1 (2, Low) and AVMU 2 (3, Low).

Dividing the entire site into AVMU’s can be used to estimate the eventual costs of managing alien and invasive vegetation on site and the success of interventions measure can be measured. The information calculated in this activity should be communicated to the applicable contractor/s to ensure contractor/s plan for sufficient resources to implement alien and invasive vegetation management strategies satisfactorily.

5.1.2 Photographic Record

A site inspection must be performed to photograph all AVMU’s on site. The number of alien and invasive species and level of infestation should be noted for each AVMU. The photos must be kept on record with associated attributional data such as GPS coordinates.

5.2 Construction Phase

Prior to any disturbances or construction activities on site, the alien and invasive vegetation identified in the AVMU’s should go through an initial phase of management measures. The ECO and Project Manager should collectively decide the applicable management measures to be implemented in each AVMU and communicate this information

to the contractor/s. The management measures decided on will vary according to the specific species present, the level of their infestation and the legislative requirement for their control. The section below details species specific removal, clearing, control and containment measures. Implementing management measures for alien and invasive vegetation before any disturbances or construction activities has the following benefits:

- Alien vegetation seeds and plants do not get displaced to areas of the site where they are not actively growing, thus the potential spread of alien and invasive vegetation seeds is limited;
- Topsoil in which alien vegetation was actively growing must be identified. This topsoil can then be stored separately from clean topsoil (i.e., topsoil where no alien vegetation was growing in);
- Provides contractor/s with a trial run of the effectiveness of alien and invasive vegetation management measures. where different Contractor/s can learn of the effectiveness of different irrigation regimens.

5.2.1 Overarching Principles

The following principles apply to the overall prevention of the establishment and growth of alien and invasive species:

1. As far as possible only areas that fall within the direct footprint of new infrastructure should be cleared of vegetation.
2. Areas are to be cleared of vegetation in stages, this will limit the amount of time bare soil is left disturbed and unprotected. The longer soil is left in a disturbed and bare state, the greater the chance of alien and invasive species establishment and seed dispersal.
3. Construction vehicles and machinery should make use of existing roads as far as possible to limit potential soil disturbance.
4. Laydown areas and site camps should be placed on existing infrastructure where possible.
5. Naturally vegetated areas that do not fall within the direct footprint of new infrastructure should be cordoned off and avoided by machinery, personnel, and vehicles.
6. Topsoil stockpiles should be kept free of alien and invasive vegetation.
7. Erosion of exposed soils should be prevented where possible.
8. No topsoil is to be sourced from outside of the project area as these can contain seeds of alien and invasive vegetation species foreign to the site.
9. Rehabilitated areas must be cordoned off to avoid trampling and disturbances until such a time that vegetation cover is sufficient.
10. Alien and invasive vegetation should not be allowed to become established or re-established on site. It is best to control such vegetation as soon as possible to avoid the setting of seed and dispersal of seed across the site.
11. Minimal soil disturbance should take place, especially when alien and invasive vegetation is removed by mechanical means.

5.2.2 Control Methods

Alien and invasive vegetation can be controlled via two principal methods, namely mechanical and chemical control and combinations there-of. Generally simple mechanical control is the easiest method to implement for a large variety of alien and invasive vegetation species. Mechanical and chemical control methods are explained in greater detail below.

It is recommended that control of alien and invasive vegetation takes place from the onset of the project and particularly in the middle of the wet season or before the specific alien and invasive species sets its seed, whichever is first. Alien and invasive vegetation management is a repetitive process, and it may require several 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.

Mechanical Control

Numerous alien and invasive vegetation species can be removed by hand or with the help of simple tools. Different techniques could be used, e.g., mowing, uprooting, slashing, felling or ring-barking. This control option is only really feasible in sparse infestations or on a small scale, and for controlling species that do not coppice (create new growth nodes either on the stem or roots) after cutting.

Mechanical control of seedlings:

- Seedlings of alien and invasive vegetation can be pulled out by hand and left to dry.

Mechanical control of shrubs and small trees:

- Smaller trees and shrubs can be removed using a “tree popper”; alternatively;
- Top growth can be cut off using mechanical tools whereafter roots and stems are removed from the soil;
- It is important that all stems and roots are removed as alien and invasive vegetation species often “coppice” and re-grow from these structures.

5.2.2.1 Chemical Control

Chemical control should only be used as a last resort as it can harm non-target indigenous vegetation and requires the storage of chemicals that pose an environmental pollution risk should anything go awry. Chemical control involves the use of registered herbicides on targeted alien and invasive species. Chemical control can be an effective method in controlling, especially dense alien and invasive vegetation infestations. The following should be noted when chemical control is decided as a method of control:

1. Contractor/s that make use of herbicides are required to have a valid Pest Control Operators License (limited weeds controller) according to the Fertilizer, Farm Feeds, Agricultural Remedies and Stock Remedies Act (Act No. 36 of 1947). This is regulated by the Department of Agriculture, Forestry and Fisheries.
2. For the application of any herbicides the following regulations and guidelines should be followed:
    - Working for Water: Policy on the Use of Herbicides for the Control of Alien Vegetation (available at: https://www.dws.gov.za/wfw/Legal/Docs/doc/Herb%20Policy%2015January%202002%20.pdf
    - Pesticide Management Policy for South Africa published in terms of the Fertilizers, Farm Feeds Agricultural Remedies and Stock Remedies Act, 1947 (Act No. 36 of 1947) – GNR 1120 of 2010.
    - South African Bureau of Standards, Standard SANS 10206 (2010).
3. Herbicides should be selected that will have the least negative effect on non-target species.
4. Herbicides should not be applied in windy conditions and course nozzles should be fitted on spraying equipment to prevent the spreading of herbicide onto non-target vegetation and species.
5. The appropriate health and safety measures should be implemented and adhered to with regards to the storage, handling and disposal of herbicides.

5.2.3 Alien and invasive vegetation species

According to (Maree, 2021) there was no infestation of alien and invasive vegetation species on site, but some species were scattered throughout the site. Table 2 below details the alien and invasive species recorded on site.

Table 2 Alien and invasive plant species recorded on site.

Species	Common name	Plant type
Argemone ochroleuca	White-flowered Mexican poppy	Weed
Malva verticillata	Cluster mallow	Weed
Prosopis glandulosa	Honey mesquite	Tree
Ricinus communis	Castor oil plant	Weed

The South African National Biodiversity Institute (SANBI) provides a database, namely the Botanical Database of Southern Africa (BODATSA). The database was used to access distribution records of alien and invasive vegetation that have been historically recorded within the greater vicinity of the study area. The area used for this record is shown in Figure 1 below.

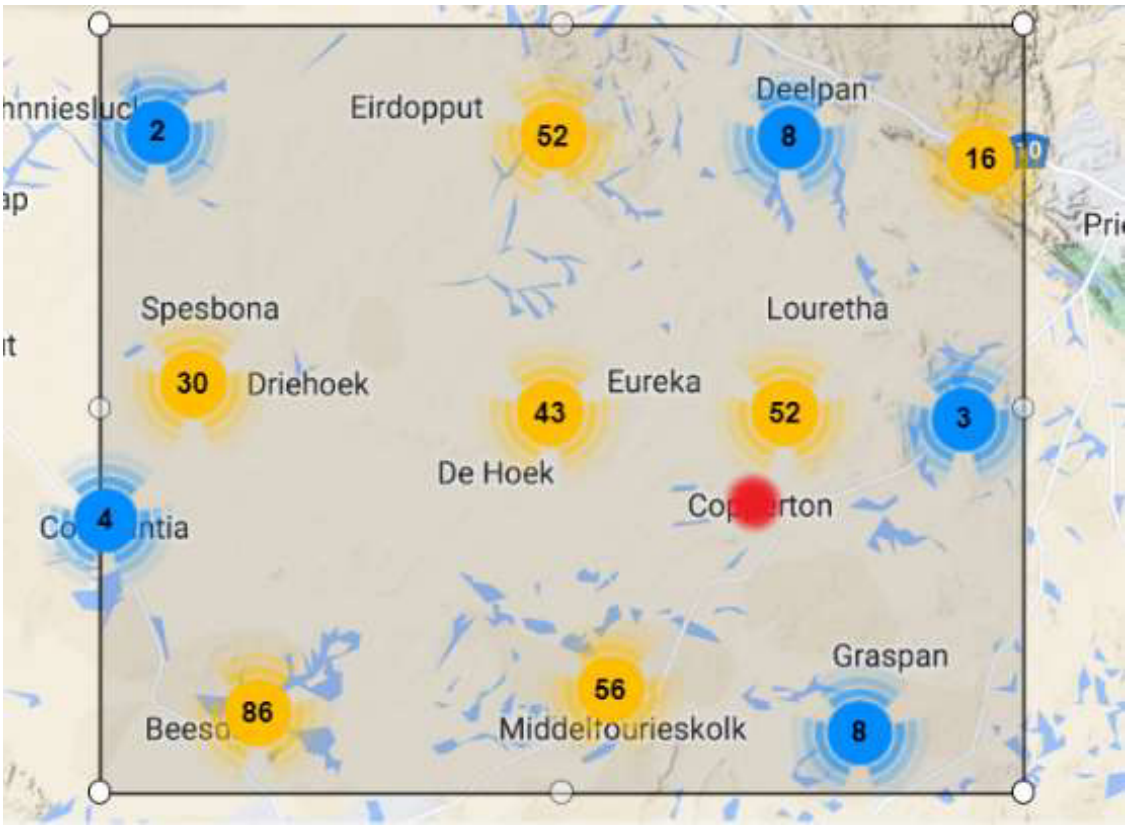

Figure 1: Botanical records as per BODATSA, the study site is indicated by the red marker.

Table 3 details the alien and invasive species that have historically been recorded as per the botanical record created with BODATSA.

Table 3 Alien and invasive plant species that can potentially occur on the study site.

Species	Common name	Plant type
Atriplex lindleyi	Lindley's saltbush	Shrub
Prosopis velutina	Velvet mesquite	Tree
Salsola kali	Tumbleweed	Shrub
Salvia tilifolia	Lindenleaf sage	Herb

5.2.4 Species specific control measures

This section details potential control measures for the alien and invasive vegetation species recorded on the study site as well as those that could potentially sprout on the study site. The department of Water and Sanitation website can be accessed for further reading and guidance on control measures. Specifically, the guide for clearing invasive alien plants as well as the (AIP treatment tables terrestrial) that details specific herbicides per species to use for chemical control measures. To access the treatment tables, follow these steps:

- Head over to: https://www.dws.gov.za/wfw/Control/ - On the webpage scroll down to AIP Treatment Tables Terrestrial.
- An excel document will open and alien and invasive species can be searched for in the leftmost tab according to their scientific name.

5.2.4.1 *Argemone ochroleuca* – White – flowered Mexican Poppy (Recorded on site)

NEM:BA Category: 1b – Remove and destroy

Plant type: Weed

Description: Small to medium weed with very prickly and spiny leaves. The plant is poisonous and a skin irritant (Bromilow, 2018), care should therefore be taken to wear gloves and long-sleeved shirts when removing this plant.

Control: *Argemone ochroleuca* is best removed mechanically, alternatively post-emergence herbicides could be used to control them (Bromilow, 2018).

Source: Invasives South Africa - https://invasives.org.za

5.2.4.2 *Malva verticillata* – Chinese mallow (Recorded on site)

NEM:BA Category: 1b – Remove and destroy

Plant type: Weed

Description: An erect annual (one season) or biennial (one or more season) plant with small white, pink or red flowers.

Control: Best controlled by mechanical means before the onset and dispersal of seeds.

Source: Wikimedia commons - https://commons.wikimedia.org/wiki

5.2.4.3 *Prosopis glandulosa* – Honey mesquite (Recorded on site) and *Prosopis velutina* – Velvet mesquite (Potentially occur on site)

NEM:BA Category: 3 (In the Northern Cape Province) – No legislative requirement to control. Remove and destroy as a best practice measure.

Plant type: Tree

Description: *Prosopis* species typically establish seedlings after rainfall events. *Prosopis* species generally grow in dense thickets. Seedlings and trees typically have very deep roots.

Control: Prosopis species is best controlled with a mixture of mechanical control followed up with chemical control such as “cut-stump” herbicide application. Smaller trees can be removed with a “tree popper”.

Source: Invasives South Africa - https://invasives.org.za

5.2.4.4 *Ricinus communis* – Castor oil plant (Recorded on site)

NEM:BA Category: 2 – Remove and destroy

Plant type: Weed

Description: Typically, a biennial weed that can grow up to four meters in height. The seeds are very poisonous.

Control: Plants can easily be chopped and uprooted before the setting of seeds.

Source: Invasives South Africa - https://invasives.org.za

5.2.4.5 *Atriplex lindleyi* – Lindley’s saltbush (Potentially occur on site)

NEM:BA Category: 1b – Remove and destroy

Plant type: Shrub

Description: A low growing, biennial semi-deciduous shrub.

Control: Mechanical control before the dispersal of seeds, no registered herbicides (Bromilow, 2018).

Source: iSpotnature - https://www.ispotnature.org/

5.2.4.6 *Salsola kali* – Tumbleweed (Potentially occur on site)

NEM:BA Category: 1b – Remove and destroy

Plant type: Shrub

Description: An annual shrub, dries and forms a spherical tumbleweed that disperses thousands of seeds as it is blown by the wind (Bromilow, 2018).

Control: Mechanical control, especially in the seedling stage (Bromilow, 2018).

Source: Invasives South Africa - https://invasives.org.za

5.2.4.7 *Salvia tilifolia* – Lindenleaf sage (Potentially occur on site)

NEM:BA Category: 1b – Remove and destroy

Plant type: Herb

Description: Annual herb growing up to one-meter tall, characteristic blue flowers carried at the top of the plant.

Control: Mechanical control, especially in the seedling stage.

Source: Invasives South Africa - https://invasives.org.za

5.3 Post-Construction Phase

5.3.1 Final Monitoring of all Alien Vegetation Management Units (AVMU's)

All AVMU's to be subjected to a final inspection and necessary alien vegetation control measures to be implemented where needed. Associated short reports and pre- and post-photographic record to be compiled.

5.3.2 Final Alien Vegetation Management Report

All short reports for all AVMU's to be combined in the production of a final Alien and Invasive Species Management Report, detailing the efforts undertaken and the associated outcomes with a detailed photographic record.

6. Monitoring Programme

To assess the efficacy of alien and invasive vegetation control efforts, monitoring must be undertaken. This section provides a description of a monitoring programme. Data gathered through effective monitoring and record keeping can be used to inform ongoing management measures and estimated resources that will be required for future management.

Table 4 Rehabilitation Programme provides a guideline of the required activities and responsible parties. The table provides general information and should be read in conjunction with the Alien and Invasive Vegetation Management Plan detailed in the sections above.

Table 4 Rehabilitation Programme

Phase of construction	Activity	Responsibility	Frequency
Pre-construction	Mapping and classification of AVMU's	ECO	Once-off
	Comprehensive photographic record of each AVMU	PM / ECO	Once-off
Construction	Development of species-specific method statements for the control of alien and invasive vegetation within each AVMP	Contractor/s	Ongoing
	Implementation of either mechanical, chemical or a combination of the two control methods in each AVMU where control is needed	Contractor/s	Ongoing
	Monitoring of alien and invasive vegetation growth within each AVMU post control measures being implemented	Contractor/s & ECO	Ongoing
	Follow-up control (either mechanical, chemical or a combination of the two control methods in each AVMU where control is needed	Contractor/s	Ongoing (if and when need)
	Implementation of the RMP concurrently with the AISMP (where appropriate)	Contractor/s	Ongoing
	Photographic record (before and after each round of control measures being implemented)	Contractor/s & ECO	Ongoing
	Short reports, with before and after photographs, after each round of control measures being implemented for each AVMU	Contractor/s & ECO, PM to sign off.	Ongoing
Post-construction	Control measures to be implemented in AVMU's still in need of such control	Contractor/s; ECO and PM to sign off.	Ongoing
	Short reports for all AVMU's to be combined in the production of a final Alien and Invasive Vegetation Management Report, detailing the efforts undertaken and the associated outcomes	Contractor/s; ECO and PM to sign off.	Once-off
Operational	Monitoring of all AVMU's and deciding if any control measures are to be implemented	ECO	3 monthly for the first year, thereafter annually in the middle of the rainy season

References

Bromilow, 2018. Problem Plants and Alien Weeds of Southern Africa, Revised Fourth Edition, Briza Publications, Pretoria, South Africa.

Maree, J.O. 2021. Terrestrial ecological assessment for the proposed development of a Battery Energy Storage System (BESS) and associated infrastructure at the Cuprum substation located within Copperton, near the town of Prieska, Northern Cape Province. Sativa – Travel and Environmental consultants, Midrand, South Africa.
The following are references consulted but not quoted directly in the report:

POSA (2022). Plants of South Africa - an online checklist. POSA ver. 3.0. Available at: http://posa.sanbi.org.

Department of Environment, Forestry and Fisheries (2020). National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004). Alien and Invasive Species List 2020.

Appendix A Specialist's Declaration

I, Daniel Meintjes, declare that –

- I act as the independent environmental assessment practitioner in this site sensitivity verification;
- I have expertise in conducting environmental impact assessments, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I will perform the work relating to the site sensitivity verification in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I will take into account, to the extent possible, the matters listed in Regulation 13 of the Regulations when preparing the site sensitivity verification and any report relating to the site sensitivity verification;
- I undertake to disclose to the applicant and the Competent Authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the site sensitivity verification by the Competent Authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the Competent Authority, unless access to that information is protected by law, in which case it will be indicated that such information exists and will be provided to the Competent Authority;
- I will perform all obligations as expected from an environmental assessment practitioner in terms of the Regulations; and
- I am aware of what constitutes an offence in terms of Regulation 48 and that a person convicted of an offence in terms of Regulation 48(1) is liable to the penalties as contemplated in Section 49B of the Act.
- Disclosure of Vested Interest (delete whichever is not applicable)
- I do not have and will not have any vested interest (either business, financial, personal or other) in the proposed activity proceeding other than remuneration for work performed in terms of the Regulations;
- ~~I have a vested interest in the proposed activity proceeding, such vested interest being:~~

_____
_____
_____
_____

Signature of the Specialist	
Name of Company	AECOM SA (Pty) Ltd
Date	08/11/2022

Appendix B Specialist's CV

Daniel Meintjes Cand.Sci.Nat.
Junior Environmental Scientist

Key skills
Terrestrial Ecological Assessments
Avifaunal Assessments
Environmental Control Officer
Enironmental Authorisations / Licenses / Permitting
Due Diligence Assessments
Project Management

Years of experience
3

Years with AECOM
1 Month

Education
BSc Hons (Geography)(*Cum Laude*) – University of Johannesburg (2017)
BSc (Environmental Management & Geography) – University of Johannesburg (2016)

Professional affiliations
Cand.Sci.Nat (SACNASP) (131263)
Southern African Bird Atlas Project (SABAP2) (21002)
Fitzpatrick Institute of African Ornithology (21002)

Language skills
Afrikaans - Proficient
English - Proficient
German - Some ability

Date of birth
28/06/1993

Nationality
South African

Daniel is a registered Candidate Natural Scientist (Cand.Sci.Nat.) with 3 years' experience in the field of environmental management focussing on environmental permitting and compliance. He also has experience in ecological baseline surveys and assessments, with a specialisation in avifauna.

Professional History

AECOM SA (Pty) Ltd, Centurion, South Africa: Junior Environmental Scientist, November 2022

The Biodiversity Company: Terrestrial Ecologist and Environmental Consultant with specialisation in Avifauna, October 2022

Prism Environmental Management Services: Junior Environmental Assessment Practitioner, November 2020 – September 2022

Project Experience

Terrestrial Ecology Surveys

- Proposed Airfield for the Anglo-American Kolomela Mine, Baseline terrestrial ecological survey (incl. Avifauna) (2022), EXM Environmental Advisory Services, Postmasburg, Northern Cape Province.
- Proposed Langside PV self-generation facility, Baseline Avifaunal survey & reporting (2022), Chand Environmental Consultants, Queenstown, Eastern Cape Province.
- Proposed Langside PV self-generation facility, Baseline terrestrial ecological survey & reporting (2022), Chand Environmental Consultants, Queenstown, Eastern Cape Province.

- Proposed Stilfontein PV self-generation facility, Baseline terrestrial ecological reporting (2022), Savannah Environmental (Pty) Ltd., Klerksdorp, North-West Province.
- Proposed expansion of crushing activities at the Blastrite (Pty) Ltd facility, Baseline terrestrial ecological survey & reporting (incl. Avifauna) (2022), Rustenburg, North-West Province.
- Proposed commercial development of Homes Haven Extension 17, Ecological Habitat Scan and Reporting (2021), Papachinos Ltd, Mogale City, Gauteng Province.
- Proposed mixed-use development of Portions 29 and 237 of the Farm Rietfontein 189 IQ, Ecological Habitat Scan and Reporting (2021), Guvon Beleggings (Pty) Ltd, Mogale City, Gauteng Province.
- Proposed residential development of Strubensvallei Ext 21, Ecological Habitat Assessment and Reporting (incl. Avifauna) (2020-2021), Renico Kagisano Earthworks & Civils (Pty) Ltd., Strubensvallei, Gauteng Province.
- Proposed Lanseria Medical Waste Facility, Ecological Habitat Assessment and Reporting (incl. Avifauna) (2021), Tshenolo Waste (Pty) Ltd, Lanseria, Gauteng Province.
- Proposed commercial development of Eagle's Nest Extension 9, Ecological Habitat Assessment and Reporting (incl. Avifauna) (co-author) (2020-2021), Alberton, Gauteng Province.
- Proposed residential development of Strubensvallei Extension 24, Ecological Habitat Assessment and Reporting (incl. Avifauna) (co-author) (2020-2021), Renico Kagisano Earthworks & Civils (Pty) Ltd., Strubensvallei, Gauteng Province.
- Proposed commercial development of Portion 220 of the Farm Leeuwkuil, Ecological Habitat Scan & Reporting (2021), Vereeniging, Gauteng Province.
- Proposed mix-use development of Greengate Extension 100 & 101, Ecological Habitat Assessment & Reporting (incl. Avifauna) (2020-2021), Genesis Projects, Mogale City, Gauteng Province.
- Proposed residential development of Greengate Extension 102 & 103, Ecological Habitat Assessment & Reporting (incl. Avifauna) (2020-2021), Genesis Projects, Mogale City, Gauteng Province.
- Proposed mix-use development of Greengate Extension 104 & 106, Ecological Habitat Assessment & Reporting (incl. Avifauna) (2020-2021), Genesis Projects, Mogale City, Gauteng Province.
- Proposed commercial development of Greengate Extension 105, Ecological Habitat Assessment & Reporting (incl. Avifauna) (2020-2021), Genesis Projects, Mogale City, Gauteng Province.
- Proposed residential development of Witkoppen Extension 57, Ecological Habitat Scan & Reporting (2021), Renico Kagisano Earthworks & Civils (Pty) Ltd., Sandton, Gauteng Province.
- Proposed fueling station development of Portion 237 of the Farm Rietfontein 189 IQ, Ecological Habitat Assessment & Reporting (incl. Avifauna) (2021-2022), Guvon Beleggings (Pty) Ltd., Mogale City, Gauteng Province.
- Proposed residential expansion development of Ruimsig Extension 120, Ecological Habitat Scan & Reporting (2021), Poortview, Gauteng Province.
- Proposed residential development of Kengies Extension 35, Ecological Habitat Assessment (incl. Avifauna) (Field-Assistant) (2020), Lumal Construction (Pty) Ltd, Sandton, Gauteng Province.
- Proposed residential development of Allens Nek Extension 57, Ecological Habitat Assessment (Field-Assistant) (2020), Renico Kagisano Earthworks & Civils (Pty) Ltd., Strubensvallei, Gauteng Province.
- Proposed expansion of construction activities at #3 Shaft Northam Zondereinde Mine, Ecological Habitat Scan (Field-Assistant) (2020), Northam Platinum Ltd., Northam, Limpopo Province.

Environmental Permitting

- Proposed Camel Valley Residential Development, Basic Assessment Report (2022) (Drafting), Pretoria, Gauteng Province.
- Proposed mix-use development of Greengate Extension 100 & 101, Scoping and Environmental Impact Report & Water Use License Application (2020-2022) (Drafting), Genesis Projects, Mogale City, Gauteng Province.
- Proposed residential development of Greengate Extension 102 & 103, Basic Assessment Report (2020-2022) (Drafting), Genesis Projects, Mogale City, Gauteng Province.

- Proposed mix-use development of Greengate Extension 104 & 106, Basic Assessment Report & Water Use License (2020-2022) (Drafting), Genesis Projects, Mogale City, Gauteng Province.
- Proposed commercial development of Greengate Extension 105, Basic Assessment Report (2020-2021) (Drafting), Genesis Projects, Mogale City, Gauteng Province.
- Proposed residential development of Strubensvallei Extention 24, Basic Assessment Report & Water Use License Application (2020-2021) (Drafting), Renico Kagisano Earthworks & Civils (Pty) Ltd., Strubensvallei, Gauteng Province.
- Proposed residential development of Kengies Extension 35, Basic Assessment Report & Water Use License Application (2020-2021) (Drafting), Lumal Construction (Pty) Ltd, Sandton, Gauteng Province.

Environmental Compliance:

- Steyn City Mixed Development | Currently the largest 'green' development in South Africa (2021-2022), Steyn City Properties (Pty) Ltd, Fourways, Gauteng Province.
- Northam Zondereinde #3 Shaft Construction Works | World's deepest platinum shaft (2020-2022), Northam Platinum Ltd., Northam, Limpopo Province.
- Eskom Electrical Construction Works at #3 Shaft Northam Zondereinde Mine (2021-2022), Northam Platinum Ltd., Northam, Limpopo Province.
- Riverside View Ext 84 (to be incorporated into the Steyn City development) – Boundary Wall construction (2022), Steyn City Properties (Pty) Ltd, Fourways, Gauteng Province.
- K46 Phase 2 Road Construction (2021-2022), WSP, Diepsloot, Gauteng Province.
- K33/K52 Intersection Road Construction (2020-2022), WSP, Fourways, Gauteng Province.
- Klinkerstene Landfill Site Landfill Cell Construction (2021-2022), Interwaste (Pty) Ltd, Delmas, Mpumalanga Province.
- Vaal River City Township Development (2020-2021), Vereeniging, Gauteng Province.
- BBS Township Development – Industrial Facility (2021), Lenasia, Gauteng Province.
- Tirong Residential Development (2020-2022), Derek Warren Developments (Pty) Ltd, Kya Sands, Gauteng Province.
- Kengies X40 Residential Township Development (2020-2022), Lumal Construction (Pty) Ltd, Sandton, Gauteng Province.
- Peach Tree Extension 15, Residential Township Development (2022), Fourways, Gauteng, Province.
- Chevron Crushtech – Waste Treatment and Recovery Facility (2020-2021), Sandshifters, Fourways, Gauteng Province.
- Peach Tree Extension 15, Residential Township Development (2022), Fourways, Gauteng, Province.
- Klipfontein View Filling Station Development (2020-2021), Gulf Oil, Midrand, Gauteng Province.
- Steyn City Mixed-Use Development - Annual WUL audit | Currently the largest 'green' development in South Africa (2021), Steyn City Properties (Pty) Ltd, Fourways, Gauteng Province.
- Steyn City Mixed-Use Development - Annual Gas Storage Audit | Currently the largest 'green' development in South Africa (2020 & 2021), Steyn City Properties (Pty) Ltd, Fourways, Gauteng Province.
- Northam Platinum Zondereinde Mine – Annual Performance Assessment (EMPr, WUL, WML & AEL) (2022), Northam Platinum Ltd., Northam, Limpopo Province.
- Chevron Crushtech – Annual Waste storage, handling, and treatment audit (2020), Sandshifters, Fourways, Gauteng Province.
- Maroelasdal Ext 72 – Substation Closure Audit (2021), Sandton, Gauteng Province.
- Klipfontein View Filling Station – Closure Audit (2021), Gulf Oil, Midrand, Gauteng Province.
- Kengies Ext. 40 Residential township development - Annual WUL audit (2021), Lumal Construction (Pty) Ltd, Sandton, Gauteng.
- K33/K52 Road Construction Intersection – Closure Audit (2022), WSP, Fourways, Gauteng Province.

Other Project Experience

- Wetland Survey, delineation, and ground truthing (Strubensvallei Ext. 24) (Assistant to the specialist)
- Wetland Survey Allen's Nek Extension 57 (Field Assistant).
- South African Scoring System Version 5 (SASS5) sampling as part of the biomonitoring required to inform the Aquatic Biodiversity Report (Schoemanskloof Area, Mpumalanga).
- Wetland Survey, delineation, and ground truthing (Eagle's Nest Ext 9 (Assistant to the specialist).
- Wetland Survey, delineation, and ground truthing (Greengate Ext 100 & 101(Field Assistant).
- Wetland Survey and ground truthing (Greengate Ext 105) (Field Assistant).
- South African Scoring System Version 5 (SASS5) sampling as part of the biomonitoring required to inform the Aquatic Biodiversity Report (Steyn City).
- Heritage Field Assessment (Northam Zondereinde Shaft #3(Field Assistant).
- South African Scoring System Version 5 (SASS5) sampling as part of the biomonitoring required to inform the Aquatic Biodiversity Report (Schoemanskloof Area, Mpumalanga).
- Wetland Survey, Delineation, and ground truthing (Schoemanskloof Area, Mpumalanga) (Assistant to the specialist).
- Heritage Field Assessment – Witkoppen Ext 57 (Assistant to the Specialist).
- Weekly In-situ sampling of the Jukskei River – Steyn City (2 months) – Assisted the Aquatic Specialist with fieldwork due to personal absence from the office.
- Weekly Ex-situ sampling of the Lagoon at Steyn City (2 months) – Assisted the Aquatic Specialist with fieldwork due to personal absence from the office.
- Porcupine Park Open Space Management Plan – Field Survey and Report Writing – Natural Open Space part of the Steyn City Development.
- Registration in terms of the Gauteng Provincial Environmental Management Framework (Portion 220 of the farm Leeuwkuil) (Vanderbijlpark)
- Registration in terms of the Gauteng Provincial Environmental Management Framework (Portion 237 of the farm Rietfontein 189 IQ, Mogale City.
- Registration in terms of the Gauteng Provincial Environmental Management Framework (Hurlingham, Sandton).
- NEMA Query – Dam construction on a farm, Ventersdorp Area.
- Environmental Induction Training Presentation – K46 Phase 2
- Environmental Toolbox Talks Compilation – K46 Phase 2

Published Articles

Gijsbert Hoogendoorn, Daniel Meintjes, Clare Kelso & Jennifer Fitchett (2018) Tourism as an incentive for rewilding: the conversion from cattle to game farms in Limpopo province, South Africa, Journal of Ecotourism, DOI:10.1080/14724049.2018.1502297

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APPENDIX B

REHABILITATION PLAN

AECOM

Proposed Development of a Battery Energy Storage System (BESS) and associated infrastructure at the Cuprum Substation, near the town of Prieska, Northern Cape Province

Rehabilitation Management Plan

Eskom Holdings SOC (Pty) Ltd – Northern Cape Operating Unit

DFFE Reference: 14/12/16/3/3/1/2601

Project Number: 60657237

November 07 2022

Delivering a better world

Quality information

Prepared by	Checked by	Verified by	Approved by
			
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Revision History

Revision	Revision date	Details	Authorized	Name	Position
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Figures

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Tables

1. Purpose of the Rehabilitation Management Plan

The objective of the Rehabilitation Management Plan is to provide a framework for returning naturally vegetated areas that may have been impacted upon during the construction phase of the project to a similar or better state prior to being impacted upon by construction activities. Successful implementation of the Rehabilitation Management Plan will ensure impacted areas are restored and the following is achieved:

- Vegetation plant cover is restored to reduce the erosion potential of the site and achieve long-term stability of the landscape;
- Potential for Alien and Invasive plant species to grow on site is reduced;
- Previously disturbed areas are recovered, and visual impacts are decreased; and
- Ecosystem function is restored.

2. Study site – Relevant Environmental Information

The study site is located within the Bushmanland Bioregion and within the original extent of the veld-type known as Bushmanland Basin Shrubland. The Bushmanland Basin Shrubland veld-type is situated within the greater Nama Karoo Biome. The study site is very flat and the average downgradient slope from south-east to north-west varies only by 1.2% – 0.8%. The vegetational component on site was classified as being badly to moderately disturbed due to historic impacts, originating mainly from mining activities (Maree, 2021). The vegetation encountered on site consists mostly of low shrubs and grasses interspersed with sandy and dolomitic stone areas, with trees and large shrubs scattered throughout the area (Maree, 2021).

3. Responsibility

To ensure the Rehabilitation Management Plan is effectively implemented on site during the pre-construction, construction and post-construction phases, the responsibilities as outlined below should be assigned.

3.1 Developer

Will be responsible for the following:

1. Overall accountability for the implementation of the Rehabilitation Management Plan; including setting and reviewing monitoring requirements of this plan;
2. Allocate responsibilities with regards to the implementation and monitoring of the Rehabilitation Management Plan to the respective responsible parties, namely the Project Manager, Contractor/s and Environmental Control Officer;
3. Provide a copy of this management plan to all principle contractors as part of the tender contract documentation to allow contractors to cost this requirement in their respective contract documents.

3.2 Project Manager

Will be responsible for the following:

1. Overall implementation of the Rehabilitation Management Plan;
2. The Project Manager must be familiar with the conditions and content as set out in the Environmental Authorisation (EA), Environmental Management Plan (EMPr), Rehabilitation Management Plan (RMP) and the Alien and Invasive Species Management Plan (AISMP);
3. The Project Manager must communicate the conditions and contents of the EA, EMPr, RMP, and AISMP to all contractors and ensure the requirements of these are included in the environmental induction provided prior to the start of construction activities.
4. Assigning areas that require rehabilitation to applicable contractor/s; it is recommended that one contractor is tasked with rehabilitating affected areas.

3.3 Contractor/s

Will be responsible for the following:

1. Complying with the conditions as set out in the EA, EMPr, RMP, and AISMP;
2. Ensure that all employees undergo appropriate environmental induction;
3. Follow instructions issued by the Project Manager;
4. Compiling method statements for rehabilitation of affected areas for approval from the project manager and ECO.

3.4 Environmental Control Officer

Will be responsible for the following:

1. The ECO must be familiar with the conditions and content as set out in the EA, EMPr, RMP and the AISMP;
2. Undertake site inspections to monitor the compliance with the conditions of the EA, EMPr, RMP, and AISMP and advise appropriate action to correct any non-compliance;
3. Assist in identifying areas that will require rehabilitation and the appropriate rehabilitation measures to be implemented as per this Plan;
4. Monitor the implementation of the RMP and the success of rehabilitation measures implemented.

4. Rehabilitation

Rehabilitation aims to restore impacted areas to a similar or better state than they were in prior to the impact. Rehabilitation is an ongoing process and planning for rehabilitation should start in the pre-construction phase. It is quick to disturb, destroy or alter naturally vegetated areas and slow to rehabilitate and restore such areas. Impacts and disturbances should therefore be kept to an absolute minimum with adequate planning and monitoring of construction activities.

Rehabilitation in the context of this project will mean the establishment of a good coverage of pioneer species that will aid in stabilizing soils, protect soils against erosion and assist in creating the necessary microclimatic and nutrient conditions for sub-climax species to eventually replace the pioneer species in the ecological succession process.

The rehabilitation process will effectively start in the Pre-construction Phase and will continue through the Construction Phase to the Post-construction Phase. The rehabilitation process, with steps and considerations of each phase is explained in detail below.

The appropriate rehabilitation methods prescribed in this report is based on the findings of a study conducted by Visser *et. al.* 2007 in a paper titled: *Restoring bare patches in the Nama Karoo of South Africa*, published in the African Journal of Range & Forage Science.

4.1 Pre-Construction Phase

4.1.1 Photographic Record

A site inspection must be performed to photograph all areas that will be impacted on during the Construction Phase to establish baseline conditions in terms of species composition and vegetive coverage. The photos must be kept on record with associated attributional data such as GPS coordinates.

4.1.2 Mapping

A comprehensive coverage map of the entire site must be created that can define areas according to the following conceptual classes:

Table 1 Coverage map; conceptual classes

Area (Class)	Rehabilitation scale required (Full, Some, None)
Transformed (Existing infrastructure)	Transformed (Existing infrastructure)
To be transformed (New infrastructure)	To be transformed (New infrastructure)
Areas expected to be impacted (i.e., heavy machinery movement)	Areas expected to be impacted (i.e., heavy machinery movement)
Areas to be cleared but will have no infrastructure once construction activities are complete	Areas to be cleared but will have no infrastructure once construction activities are complete
Any other areas	Any other areas

The coverage map should be used to estimate the eventual costs of rehabilitation efforts required on site and financial provision must be made available for this process. The information calculated in this activity should be communicated to the applicable contractor/s to ensure contractor/s plan for sufficient resources to complete rehabilitation activities satisfactorily.

4.2 Construction Phase

Rehabilitation of areas should preferably start as soon as the impacts have ceased. It is therefore probable that various areas on the site will be in different phases of rehabilitation throughout the Construction Phase. Implementing rehabilitation as quickly as possible has the following benefits:

- Rehabilitated areas have greater success when the mulch material is still in a fresh state.
- Contractor/s can learn of the effectiveness of different irrigation regimens.
- Sufficient personnel and financial provision can be made for available for areas that will have to be rehabilitated.

4.2.1 Vegetation Clearance

The following principles and steps must be followed:

1. Prior to any vegetation clearance, all, Alien Invasive Species should be appropriately removed as outlined in the AISMP.
2. As far as possible only areas that fall within the direct footprint of new infrastructure should be cleared of vegetation.
3. Construction vehicles and machinery should make use of existing roads as far as possible.
4. Laydown areas and site camps should be placed on existing infrastructure where possible.
5. Naturally vegetated areas that do not fall within the direct footprint of new infrastructure should be cordoned off and avoided by machinery, personnel, and vehicles.
6. Only vegetation should be cleared, either mechanically or by hand using a brush-cutter and care should be taken to clear the least amount of topsoil during this step.

4.2.2 Vegetation Storage

The following principles and steps must be followed:

1. Cleared vegetation can be stockpiled or bagged to be used as mulch during rehabilitation. Mulching is the covering of the soil with a layer of organic matter (leaves, bark, twigs, and wood chips).
2. Cleared vegetation should be stored for the shortest possible time.
3. Any seeds that are released from the stockpiled vegetation should be collected and used in rehabilitation.

4.2.3 Soil Management

The following principles and steps must be followed:

1. Prior to any removal of soil on site the ECO and the Contractor are to agree on the depth of the top soil. This will require a visual inspection of the soil profile in a freshly-dug pit. The soil profile will show distinct layers with the topmost layer being the topsoil, followed by a subsoil layer which is followed by the parent rock layer and finally the bedrock layer.
2. All soil layers must be stored as separate stockpiles and no mixing of layers must be permitted.
3. The mineral, organic matter and soil macro structure composition of each layer differs, and it is therefore essential that this structure is maintained for eventual successful rehabilitation.
4. Backfilling of excavated areas should be done in the reverse order than the layers were taken out.
5. Topsoil is to be only handled twice; once to strip and stockpile and secondly to replace, shape and scarify.
6. Topsoil stockpiles should not exceed 1.5m in height and should be protected to prevent erosion if needed.
7. Topsoil stockpiles should remain free of weeds and alien and invasive plant species; these should be appropriately removed as per the AISMP.
8. The topsoil and subsoil layers of areas where there was above average growth of Alien and Invasive Species should preferably be stored separately. This measure will ensure that seeds of Alien and Invasive Species present in the soil is not spread to other areas on site lacking these seeds during rehabilitation.

4.2.4 Ripping, Scarifying and Levelling of Replaced Topsoil

The following principles and steps must be followed:

1. The topsoil layer should be ripped or scarified to promote infiltration, aeration, and to improve the availability of the existing seedbank.
2. Ripped or scarified areas must not be compacted.
3. The replacement of soil should attempt to recreate the pre-existing landscape topography throughout the rehabilitated areas.

4.2.5 Vegetation Replacement

The following principles and steps must be followed:

1. Any collected seeds from the vegetation stockpiles must be evenly sown across the topsoil layer.
2. Areas should be evenly irrigated at regular intervals if the rehabilitation does not coincide with the rainfall season, keeping in mind the typical moisture requirements of vegetation in this arid environment.
3. Mulch (leaves, bark, twigs, and wood chips) should be spread evenly across the topsoil layer.
4. The provision of mulch provides a protective layer that protects the topsoil layer against erosion and raindrop impacts during the establishment of vegetation. In addition, mulch aids in creating a microclimate that is more conducive for seedling development and establishment in lowering the temperature and increasing available moisture and nutrients.
5. Rehabilitated areas must be cordoned off to avoid trampling and disturbances until such a time that vegetation cover is sufficient.

4.2.6 Vegetation Establishment

The following principles and steps must be followed:

1. With implementation of especially the soil management principles it is expected that the available seedbank within the topsoil should be sufficient for the re-establishment of vegetation in rehabilitated areas.

2. Alien and Invasive vegetation is likely to sprout and should be appropriately removed immediately as per the specifications in the AISMP.
3. Once a sufficient coverage of vegetation has been achieved in a rehabilitated area, a photographic record should be created to compare pre-existing conditions to post-rehabilitation conditions. The results of rehabilitation must be reported on in the Close-Out Audit Report, to be compiled by the ECO following completion of construction and rehabilitation activities.
4. The above-mentioned photographic record and associated report-back should be undertaken for each specific area that is rehabilitated and included in the Close-Out Audit Report. the ECO must provide comment as to whether rehabilitation has been satisfactorily completed for each specific area.
5. Tree species such as *Vachellia karroo* (Sweet thorn) and *Senegalia mellifera* (Black thorn) are typically slow growing and should preferably be sourced commercially. The ECO is to assist with specific method statements on how to plant these species.

4.3 Post-Construction Phase

4.3.1 Photographic Record and Reporting

The following principles and steps must be followed:

1. All reports and associated photographic records for each rehabilitated area should be combined in the post-construction and post-rehabilitation Close-Out Audit report to be compiled by the ECO. The report must indicate if rehabilitation of all impacted areas has been satisfactorily achieved.
2. The individual reports and final report should be kept on record and be made available on request to the applicable department or auditor during any future audits in the post-construction phase.
3. Alien and invasive vegetation growth should be monitored in rehabilitated areas by an Eskom Environmental Officer, on a 3-monthly basis during the first year and thereafter annually, in the middle of the rainy season, for the lifetime of the operational project.
4. Adequate measures should be employed for the removal and or management of alien and invasive vegetation growth.

5. Rehabilitation Programme

Table 2 Rehabilitation Programme provides a guideline of the required activities and responsible parties. The table provides general information and should be read in conjunction with the Rehabilitation Management Plan detailed in the sections above.

Table 2 Rehabilitation Programme

Phase of construction	Activity	Responsibility	Frequency
Pre-construction	*Comprehensive photographic record*	ECO	Once-off
	Mapping	Project Manager / ECO	Once-off
Construction	*Removal of Alien and Invasive Vegetation (see AISMP)*	Contractor/s	Ongoing
	Clearing of vegetation, including stockpiling and brush cutting	Contractor/s	Ongoing
	Seed collection from stockpiles	Contractor/s	Ongoing
	Soil management	Contractor/s	Ongoing
	Ripping, scarifying, and levelling of replaced topsoil	Contractor/s	Ongoing
	Vegetation replacement	Contractor/s	Ongoing

Phase of construction	Activity	Responsibility	Frequency
	Vegetation establishment	Contractor/s	Ongoing
	Short reports & photographic record	Contractor/s; ECO and PM to sign off.	Once-off for each area.
Post-construction	*Final rehabilitation comment in Close-Out Audit Report*	ECO.	Once-off for the entire area.
	Monitoring the site for erosion and Alien and Invasive Species growth	Eskom Environmental Officer	3 Monthly during first year of operation and annually thereafter for the lifetime of the operational phase

6. Plant Species

The following section provides and overview of the current vegetational coverage on site and the expected plant species. According to (Maree, 2021) some of the following plant species were recorded on the study site:

Table 3 Examples of plant species recorded on site.

Species	Common name	Plant type
Vachellia karroo	Sweet thorn	Tree
Senegalia mellifera	Black thorn	Tree
Aptosimum spinescens	Kankerbossie (a)	Dwarf Shrub
Lycium cinereum	Boksdoring (a)	Shrub
Pentzia spinescens	Doringkaroo (a)	Shrub
Rhigozum trichotomum	Three-thorn	Shrub
Aristida adscensionis	Annual Three-awn	Grass
Enneapogon desvauxii	Eight-day grass	Grass
Stipagrostis ciliata	Tall bushman grass	Grass
Stipagrostis obtusa	Small bushman grass	Grass
Argemone ochroleuca	White-flowered Mexican poppy	Alien invasive
Malva verticillata	Cluster mallow	Alien invasive
Prosopis glandulosa	Honey mesquite	Alien invasive
Ricinus communis	Castor oil plant	Alien invasive

According to Mucina & Rutherford, 2006 the Bushmanland Basin Shrubland is characterised by slightly irregular plains with dwarf shrubland dominated by a mixture of low sturdy and spiny (and sometimes also succulent) shrubs (*Rhigozum, Salsola, Pentzia, Eriocephalus*), 'white' grasses (*Stipagrostis*) and in years of high rainfall also by abundant annuals such as species of *Gazania* and *Leysera*.

The full list of expected plant species within the Bushmanland Basin Shrubland according to Mucina & Rutherford, 2006. The letter (d) denotes dominant.

Tall Shrubs: *Lycium cinereum (d), Rhigozum trichotomum (d).*

Low Shrubs: *Aptosimum spinescens (d), Hermannia spinosa (d), Pentzia spinescens (d), Zygophyllum microphyllum (d), Aptosimum elongatum, Aptosimum marlothii, Berkheya annectens, Eriocephalus microphyllus var. pubescens, Eriocephalus pauperrimus, Eriocephalus spinescens, Felicia clavipilosa subsp. clavipilosa, Limeum aethiopicum, Osteospermum armatum, Osteospermum spinescens, Pegolettia retrofracta, Phaeoptilum*

spinosum, Plinthus karooicus, Polygala seminuda, Pteronia glauca, Pteronia inflexa, Pteronia leucoclada, Pteronia mucronata, Pteronia sordida, Rosenia humilis, Selago albida, Senecio niveus, Tetragonia arbuscula, Zygophyllum lichtensteinianum.

Succulent Shrubs: *Salsola tuberculata (d), Aridaria noctiflora subsp. straminea, Brownanthus ciliatus subsp. ciliatus, Galenia sarcophylla, Lycium bosciifolium, Ruschia intricata, Salsola namibica, Sarcocaulon patersonii, Sarcocaulon salmoniflorum, Tripteris sinuata var. linearis, Zygophyllum flexuosum.*

Semiparasitic Shrub: *Thesium hystrix.*

Herbs: *Gazania lichtensteinii (d), Leysera tenella (d), Amaranthus praetermissus, Chamaesyce inaequilatera, Dicoma capensis, Indigastrum argyraeum, Lepidium desertorum, Monsonia umbellata, Radyera urens, Sesamum capense, Tribulus terrestris, Tribulus zeyheri.*

Succulent Herbs: *Mesembryanthemum crystallinum, Mesembryanthemum stenandrum, Trianthema parvifolia, Zygophyllum simplex.*

Graminoids: *Aristida adscensionis (d), Enneapogon desvauxii (d), Stipagrostis ciliata (d), Stipagrostis obtusa (d), Aristida congesta, Enneapogon scaber, Stipagrostis anomala, Tragus berteronianus, Tragus racemosus.*

7. References

Maree, J.O. 2021. Terrestrial ecological assessment for the proposed development of a Battery Energy Storage System (BESS) and associated infrastructure at the Cuprum substation located within Copperton, near the town of Prieska, Northern Cape Province. Sativa – Travel and Environmental consultants, Midrand, South Africa.

Mucina, L. and Rutherford, M.C. (Eds.) (2006). The vegetation of South Africa, Lesotho and Swaziland. Strelizia 19. South African National Biodiversity Institute, Pretoria, South Africa.

Visser, N., Morris, C., Hardy, M.B., Botha, J.C. (2007). Restoring bare patches in the Nama Karoo of South Africa, African Journal of Range & Forage Science, 24:2, 87-96.

The following are references consulted but not quoted directly in the report:

Ashman, M., Puri, G. (2013). Essential Soil Science. Hoboken, NJ: Wiley-Blackwell, New-Jersey, United States of America.

Van Oudtshoorn F. (2004). Gids tot die grasse van Suider-Afrika. Second Edition. Pretoria. Briza Publikasies.

Appendix A Specialist's Declaration

I, Daniel Meintjies, declare that –

- I act as the independent environmental assessment practitioner in this site sensitivity verification;
- I have expertise in conducting environmental impact assessments, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I will perform the work relating to the site sensitivity verification in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I will take into account, to the extent possible, the matters listed in Regulation 13 of the Regulations when preparing the site sensitivity verification and any report relating to the site sensitivity verification;
- I undertake to disclose to the applicant and the Competent Authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the site sensitivity verification by the Competent Authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the Competent Authority, unless access to that information is protected by law, in which case it will be indicated that such information exists and will be provided to the Competent Authority;
- I will perform all obligations as expected from an environmental assessment practitioner in terms of the Regulations; and
- I am aware of what constitutes an offence in terms of Regulation 48 and that a person convicted of an offence in terms of Regulation 48(1) is liable to the penalties as contemplated in Section 49B of the Act.
- Disclosure of Vested Interest (delete whichever is not applicable)
- I do not have and will not have any vested interest (either business, financial, personal or other) in the proposed activity proceeding other than remuneration for work performed in terms of the Regulations;
- ~~I have a vested interest in the proposed activity proceeding, such vested interest being:~~

_____
_____
_____
_____

Signature of the Specialist	
Name of Company	AECOM SA (Pty) Ltd
Date	08/11/2022

Appendix B Specialist's CV

Daniel Meintjes Cand.Sci.Nat.
Junior Environmental Scientist

Key skills
Terrestrial Ecological Assessments
Avifaunal Assessments
Environmental Control Officer
Enironmental Authorisations / Licenses / Permitting
Due Diligence Assessments
Project Management

Years of experience
3

Years with AECOM
1 Month

Education
BSc Hons (Geography)(*Cum Laude*) – University of Johannesburg (2017)
BSc (Environmental Management & Geography) – University of Johannesburg (2016)

Professional affiliations
Cand.Sci.Nat (SACNASP) (131263)
Southern African Bird Atlas Project (SABAP2) (21002)
Fitzpatrick Institute of African Ornithology (21002)

Language skills
Afrikaans - Proficient
English - Proficient
German - Some ability

Date of birth
28/06/1993

Nationality
South African

Daniel is a registered Candidate Natural Scientist (Cand.Sci.Nat.) with 3 years' experience in the field of environmental management focussing on environmental permitting and compliance. He also has experience in ecological baseline surveys and assessments, with a specialisation in avifauna.

Professional History

AECOM SA (Pty) Ltd, Centurion, South Africa: Junior Environmental Scientist, November 2022

The Biodiversity Company: Terrestrial Ecologist and Environmental Consultant with specialisation in Avifauna, October 2022

Prism Environmental Management Services: Junior Environmental Assessment Practitioner, November 2020 – September 2022

Project Experience

Terrestrial Ecology Surveys

- Proposed Airfield for the Anglo-American Kolomela Mine, Baseline terrestrial ecological survey (incl. Avifauna) (2022), EXM Environmental Advisory Services, Postmasburg, Northern Cape Province.
- Proposed Langside PV self-generation facility, Baseline Avifaunal survey & reporting (2022), Chand Environmental Consultants, Queenstown, Eastern Cape Province.

- Proposed Langside PV self-generation facility, Baseline terrestrial ecological survey & reporting (2022), Chand Environmental Consultants, Queenstown, Eastern Cape Province.
- Proposed Stilfontein PV self-generation facility, Baseline terrestrial ecological reporting (2022), Savannah Environmental (Pty) Ltd., Klerksdorp, North-West Province.
- Proposed expansion of crushing activities at the Blastrite (Pty) Ltd facility, Baseline terrestrial ecological survey & reporting (incl. Avifauna) (2022), Rustenburg, North-West Province.
- Proposed commercial development of Homes Haven Extension 17, Ecological Habitat Scan and Reporting (2021), Papachinos Ltd, Mogale City, Gauteng Province.
- Proposed mixed-use development of Portions 29 and 237 of the Farm Rietfontein 189 IQ, Ecological Habitat Scan and Reporting (2021), Guvon Beleggings (Pty) Ltd, Mogale City, Gauteng Province.
- Proposed residential development of Strubensvallei Ext 21, Ecological Habitat Assessment and Reporting (incl. Avifauna) (2020-2021), Renico Kagisano Earthworks & Civils (Pty) Ltd., Strubensvallei, Gauteng Province.
- Proposed Lanseria Medical Waste Facility, Ecological Habitat Assessment and Reporting (incl. Avifauna) (2021), Tshenolo Waste (Pty) Ltd, Lanseria, Gauteng Province.
- Proposed commercial development of Eagle's Nest Extension 9, Ecological Habitat Assessment and Reporting (incl. Avifauna) (co-author) (2020-2021), Alberton, Gauteng Province.
- Proposed residential development of Strubensvallei Extension 24, Ecological Habitat Assessment and Reporting (incl. Avifauna) (co-author) (2020-2021), Renico Kagisano Earthworks & Civils (Pty) Ltd., Strubensvallei, Gauteng Province.
- Proposed commercial development of Portion 220 of the Farm Leeuwkuil, Ecological Habitat Scan & Reporting (2021), Vereeniging, Gauteng Province.
- Proposed mix-use development of Greengate Extension 100 & 101, Ecological Habitat Assessment & Reporting (incl. Avifauna) (2020-2021), Genesis Projects, Mogale City, Gauteng Province.
- Proposed residential development of Greengate Extension 102 & 103, Ecological Habitat Assessment & Reporting (incl. Avifauna) (2020-2021), Genesis Projects, Mogale City, Gauteng Province.
- Proposed mix-use development of Greengate Extension 104 & 106, Ecological Habitat Assessment & Reporting (incl. Avifauna) (2020-2021), Genesis Projects, Mogale City, Gauteng Province.
- Proposed commercial development of Greengate Extension 105, Ecological Habitat Assessment & Reporting (incl. Avifauna) (2020-2021), Genesis Projects, Mogale City, Gauteng Province.
- Proposed residential development of Witkoppen Extension 57, Ecological Habitat Scan & Reporting (2021), Renico Kagisano Earthworks & Civils (Pty) Ltd., Sandton, Gauteng Province.
- Proposed fueling station development of Portion 237 of the Farm Rietfontein 189 IQ, Ecological Habitat Assessment & Reporting (incl. Avifauna) (2021-2022), Guvon Beleggings (Pty) Ltd., Mogale City, Gauteng Province.
- Proposed residential expansion development of Ruimsig Extension 120, Ecological Habitat Scan & Reporting (2021), Poortview, Gauteng Province.
- Proposed residential development of Kengies Extension 35, Ecological Habitat Assessment (incl. Avifauna) (Field-Assistant) (2020), Lumal Construction (Pty) Ltd, Sandton, Gauteng Province.
- Proposed residential development of Allens Nek Extension 57, Ecological Habitat Assessment (Field-Assistant) (2020), Renico Kagisano Earthworks & Civils (Pty) Ltd., Strubensvallei, Gauteng Province.
- Proposed expansion of construction activities at #3 Shaft Northam Zondereinde Mine, Ecological Habitat Scan (Field-Assistant) (2020), Northam Platinum Ltd., Northam, Limpopo Province.

Environmental Permitting

- Proposed Camel Valley Residential Development, Basic Assessment Report (2022) (Drafting), Pretoria, Gauteng Province.

- Proposed mix-use development of Greengate Extension 100 & 101, Scoping and Environmental Impact Report & Water Use License Application (2020-2022) (Drafting), Genesis Projects, Mogale City, Gauteng Province.
- Proposed residential development of Greengate Extension 102 & 103, Basic Assessment Report (2020-2022) (Drafting), Genesis Projects, Mogale City, Gauteng Province.
- Proposed mix-use development of Greengate Extension 104 & 106, Basic Assessment Report & Water Use License (2020-2022) (Drafting), Genesis Projects, Mogale City, Gauteng Province.
- Proposed commercial development of Greengate Extension 105, Basic Assessment Report (2020-2021) (Drafting), Genesis Projects, Mogale City, Gauteng Province.
- Proposed residential development of Strubensvallei Extention 24, Basic Assessment Report & Water Use License Application (2020-2021) (Drafting), Renico Kagisano Earthworks & Civils (Pty) Ltd., Strubensvallei, Gauteng Province.
- Proposed residential development of Kengies Extension 35, Basic Assessment Report & Water Use License Application (2020-2021) (Drafting), Lumal Construction (Pty) Ltd, Sandton, Gauteng Province.

Environmental Compliance:

- Steyn City Mixed Development | Currently the largest ‘green’ development in South Africa (2021-2022), Steyn City Properties (Pty) Ltd, Fourways, Gauteng Province.
- Northam Zondereinde #3 Shaft Construction Works | World’s deepest platinum shaft (2020-2022), Northam Platinum Ltd., Northam, Limpopo Province.
- Eskom Electrical Construction Works at #3 Shaft Northam Zondereinde Mine (2021-2022), Northam Platinum Ltd., Northam, Limpopo Province.
- Riverside View Ext 84 (to be incorporated into the Steyn City development) – Boundary Wall construction (2022), Steyn City Properties (Pty) Ltd, Fourways, Gauteng Province.
- K46 Phase 2 Road Construction (2021-2022), WSP, Diepsloot, Gauteng Province.
- K33/K52 Intersection Road Construction (2020-2022), WSP, Fourways, Gauteng Province.
- Klinkerstene Landfill Site Landfill Cell Construction (2021-2022), Interwaste (Pty) Ltd, Delmas, Mpumalanga Province.
- Vaal River City Township Development (2020-2021), Vereeniging, Gauteng Province.
- BBS Township Development – Industrial Facility (2021), Lenasia, Gauteng Province.
- Tirong Residential Development (2020-2022), Derek Warren Developments (Pty) Ltd, Kya Sands, Gauteng Province.
- Kengies X40 Residential Township Development (2020-2022), Lumal Construction (Pty) Ltd, Sandton, Gauteng Province.
- Peach Tree Extension 15, Residential Township Development (2022), Fourways, Gauteng, Province.
- Chevron Crushtech – Waste Treatment and Recovery Facility (2020-2021), Sandshifters, Fourways, Gauteng Province.
- Peach Tree Extension 15, Residential Township Development (2022), Fourways, Gauteng, Province.
- Klipfontein View Filling Station Development (2020-2021), Gulf Oil, Midrand, Gauteng Province.
- Steyn City Mixed-Use Development - Annual WUL audit | Currently the largest ‘green’ development in South Africa (2021), Steyn City Properties (Pty) Ltd, Fourways, Gauteng Province.
- Steyn City Mixed-Use Development - Annual Gas Storage Audit | Currently the largest ‘green’ development in South Africa (2020 & 2021), Steyn City Properties (Pty) Ltd, Fourways, Gauteng Province.
- Northam Platinum Zondereinde Mine – Annual Performance Assessment (EMPr, WUL, WML & AEL) (2022), Northam Platinum Ltd., Northam, Limpopo Province.
- Chevron Crushtech – Annual Waste storage, handling, and treatment audit (2020), Sandshifters, Fourways, Gauteng Province.

- Maroelasdal Ext 72 – Substation Closure Audit (2021), Sandton, Gauteng Province.
- Klipfontein View Filling Station – Closure Audit (2021), Gulf Oil, Midrand, Gauteng Province.
- Kengies Ext. 40 Residential township development - Annual WUL audit (2021), Lumal Construction (Pty) Ltd, Sandton, Gauteng.
- K33/K52 Road Construction Intersection – Closure Audit (2022), WSP, Fourways, Gauteng Province.

Other Project Experience

- Wetland Survey, delineation, and ground truthing (Strubensvallei Ext. 24) (Assistant to the specialist)
- Wetland Survey Allen's Nek Extension 57 (Field Assistant).
- South African Scoring System Version 5 (SASS5) sampling as part of the biomonitoring required to inform the Aquatic Biodiversity Report (Schoemanskloof Area, Mpumalanga).
- Wetland Survey, delineation, and ground truthing (Eagle's Nest Ext 9 (Assistant to the specialist).
- Wetland Survey, delineation, and ground truthing (Greengate Ext 100 & 101(Field Assistant).
- Wetland Survey and ground truthing (Greengate Ext 105) (Field Assistant).
- South African Scoring System Version 5 (SASS5) sampling as part of the biomonitoring required to inform the Aquatic Biodiversity Report (Steyn City).
- Heritage Field Assessment (Northam Zondereinde Shaft #3(Field Assistant).
- South African Scoring System Version 5 (SASS5) sampling as part of the biomonitoring required to inform the Aquatic Biodiversity Report (Schoemanskloof Area, Mpumalanga).
- Wetland Survey, Delineation, and ground truthing (Schoemanskloof Area, Mpumalanga) (Assistant to the specialist).
- Heritage Field Assessment – Witkoppen Ext 57 (Assistant to the Specialist).
- Weekly In-situ sampling of the Jukskei River – Steyn City (2 months) – Assisted the Aquatic Specialist with fieldwork due to personal absence from the office.
- Weekly Ex-situ sampling of the Lagoon at Steyn City (2 months) – Assisted the Aquatic Specialist with fieldwork due to personal absence from the office.
- Porcupine Park Open Space Management Plan – Field Survey and Report Writing – Natural Open Space part of the Steyn City Development.
- Registration in terms of the Gauteng Provincial Environmental Management Framework (Portion 220 of the farm Leeuwkuil) (Vanderbijlpark)
- Registration in terms of the Gauteng Provincial Environmental Management Framework (Portion 237 of the farm Rietfontein 189 IQ, Mogale City.
- Registration in terms of the Gauteng Provincial Environmental Management Framework (Hurlingham, Sandton).
- NEMA Query – Dam construction on a farm, Ventersdorp Area.
- Environmental Induction Training Presentation – K46 Phase 2
- Environmental Toolbox Talks Compilation – K46 Phase 2

Published Articles

Gijsbert Hoogendoorn, Daniel Meintjes, Clare Kelso & Jennifer Fitchett (2018) Tourism as an incentive for rewilding: the conversion from cattle to game farms in Limpopo province, South Africa, Journal of Ecotourism, DOI:10.1080/14724049.2018.1502297

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APPENDIX C

GENERIC EMPR FOR POWERLINES

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