KARUSA BATTERY ENERGY STORAGE SYSTEM (BESS) AND ASSOCIATED INFRASTRUCTURE, NEAR SUTHERLAND, NORTHERN CAPE PROVINCE

ENVIRONMENTAL MANAGEMENT PROGRAMME

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Prepared for
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PROJECT DETAILS

DFFE Reference	:	TBA
Title	:	Environmental Management Programme: Karusa Battery Energy Storage System (BESS) and associated infrastructure), near Sutherland, Northern Cape
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Specialists	:	The Biodiversity Company (Ecology, Freshwater, Avifauna and Soils) CTS Heritage (Heritage) EARES (Noise)
Applicant	:	Enel Green Power South Africa (Pty) Ltd
Report Status	:	Environmental Management Programme for 30-day review period as part of the BA Report
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When used as a reference this report should be cited as: Savannah Environmental (2022). Environmental Management Programme: Karusa BESS and Associated Infrastructure, near Sutherland, Northern Cape Province

DEFINITIONS AND TERMINOLOGY

The following definitions and terminology may be applicable to this project and may occur in the report below:

Alien species: A species that is not indigenous to the area or out of its natural distribution range.

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

Ambient sound level: The reading on an integrating impulse sound level meter taken at a measuring point in the absence of any alleged disturbing noise at the end of a total period of at least 10 minutes after such meter was put into operation.

Assessment: The process of collecting, organising, analysing, interpreting and communicating information which is relevant.

Biological diversity: The variables among living organisms from all sources including, terrestrial, marine and other aquatic ecosystems and the ecological complexes they belong to.

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

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

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

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

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

Disturbing noise: A noise level that exceeds the ambient sound level measured continuously at the same measuring point by 7 dB or more.

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

Ecosystem: A dynamic system of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit.

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

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

Environment: the surroundings within which humans exist and that is made up of:

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

Environmental Authorisation (EA): means the authorisation issued by a competent authority (Department of Environmental Affairs) of a listed activity or specified activity in terms of the National Environmental Management Act (No 107 of 1998) and the EIA Regulations promulgated under the Act.

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

Environmental Control Officer (ECO): An individual appointed by the Owner prior to the commencement of any authorised activities, responsible for monitoring, reviewing and verifying compliance by the EPC Contractor with the environmental specifications of the EMPr and the conditions of the Environmental Authorisation

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

Environmental impact assessment: Environmental Impact Assessment, as defined in the NEMA EIA Regulations, is a systematic process of identifying, assessing and reporting environmental impacts associated with an activity.

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

Environmental Management Programme (EMPr): A plan that organises and co-ordinates mitigation, rehabilitation and monitoring measures in order to guide the implementation of a project or facility and its ongoing maintenance after implementation.

Environmental Officer (EO): The Environmental Officer (EO), employed by the Contractor, is responsible for managing the day-to-day on-site implementation of this EMPr, and for the compilation of regular (usually weekly) Monitoring Reports. The EO must act as liaison and advisor on all environmental and related issues and ensure that any complaints received from the public are duly recorded and forwarded to the Site Manager and Contractor.

Habitat: The place in which a species or ecological community occurs naturally.

Hazardous waste: Any waste that contains organic or inorganic elements or compounds that may, owing to the inherent physical, chemical or toxicological characteristics of that waste, have a detrimental impact on health and the environment.

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

Incident: An unplanned occurrence that has caused, or has the potential to cause, environmental damage.

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

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

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

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

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

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

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

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

Vulnerable species: A taxon is Vulnerable when it is not Critically Endangered or Endangered but is facing a high risk of extinction in the wild in the medium-term future.

Waste: Any substance, material or object, that is unwanted, rejected, abandoned, discarded or disposed of, or that is intended or required to be discarded or disposed of, by the holder of that substance, material or object, whether or not such substance, material or object can be re-used, recycled or recovered and includes all wastes as defined in Schedule 3 to the Waste Amendment Act (as amended on June 2014); or any other substance, material or object that is not included in Schedule 3 that may be defined as a waste by the Minister by notice in the Gazette.

ABBREVIATIONS

The following abbreviations may be applicable to this project and may occur in the report below:

BA	Basic Assessment
BAR	Basic Assessment Report
dB	Decibels
DFFE	Department of Forestry, Fisheries and the Environment
DAEARDLR	Department of Agriculture, Environmental Affairs, Rural Development and Land Reform
DMRE	Department of Mineral Resources and Energy
EAP	Environmental Impact Practitioner
EHS	Environmental, Health and Safety
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
GPS	Global Positioning System
GWh	Giga Watt hour
HIA	Heritage Impact Assessment
I&APs	Interested and Affected Parties
IDP	Integrated Development Plan
IFC	International Finance Corporation
IPP	Independent Power Producer
kV	Kilo Volt
MW	Mega Watt
NEMA	National Environmental Management Act
NEMAA	National Environmental Management Amendment Act
NEMBA	National Environmental Management: Biodiversity Act
NERSA	National Energy Regulator of South Africa
NHRA	National Heritage Resources Act
NWA	National Water Act
SAHRA	South African National Heritage Resources Agency
SWMP	Stormwater Management Plan

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APPENDICES

CHAPTER 1: INTRODUCTION

Enel Green Power South Africa (Pty) Ltd proposes the construction and operation of a Battery Energy Storage System (BESS) and associated grid infrastructure in the proximity of the Karusa Wind Energy Facility ~45km south of the town of Sutherland along the R354 and 47km north west of the town of Laingsburg along the R323 in the Northern Cape Province. The Karusa WEF is a Round 4 REIPPPP Preferred Bidder project currently under construction. The general purpose and utilisation of a BESS is to save and store excess electrical output as it is generated, allowing for a timed release of electricity to the grid when the capacity is required the most and the provision of ancillary services to ensure reliable operation of power networks during normal operation and contingency events. BESS systems therefore provide flexibility and reliability services for the efficient operation of the electricity grid.

The BESS facility will be located on Portion 0 of Farm De Hoop 202, hereafter referred to as the affected property. The affected property has been identified by the applicant as the preferred project site suitable for the development of a BESS, based on the requirement for the BESS to be located in close proximity to the WEF substation. The BESS will be connected to the electricity grid via the Hidden Valley Substation. The project development site is located within the Komsberg Renewable Energy Development Zone (REDZ) and within the Central Corridor of the Strategic Transmission Corridors.

The nature and extent of the proposed BESS and associated infrastructure, as well as the potential environmental impacts associated with the construction, operation and decommissioning phases of the proposed infrastructure were assessed in a Basic Assessment Report (Savannah Environmental, 2022), compiled in accordance with the requirements of the EIA Regulations of 2014 (as amended). Site specific environmental issues and constraints within the BESS assessment zone were considered by independent specialist studies in order to determine the environmental suitability of the assessment zone for the proposed BESS project, delineate areas of sensitivity within the assessment zone, and ultimately inform the placement of the BESS infrastructure.

This EMPr has been developed on the basis of the findings of the Basic Assessment (BA), and must be implemented to protect sensitive on-site and off-site features through controlling construction, operation and decommissioning activities that could have a detrimental effect on the environment, and through avoiding or minimising potential impacts. All mitigation measures recommended in the BA Report and specialist reports must be implemented.

This EMPr is applicable to all employees and contractors working on the pre-construction, construction and operation and maintenance phases of the project. In terms of the Duty of Care provision in S28 (1) of NEMA, the project proponent must ensure that reasonable measures are taken throughout the life cycle of this project to ensure that any pollution or degradation of the environment associated with this project is avoided, halted or minimised. The document must therefore be adhered to and updated as relevant throughout the project life cycle, if and where required. This document fulfils the requirement of the EIA Regulations, 2014 (as amended) and forms part of the BA report for the project.

CHAPTER 2: PROJECT DETAILS

The BESS and associated infrastructure are proposed in close proximity to the authorised Hidden Valley Substation on Portion 0 of Farm De Hoop 202, near Sutherland, Northern Cape within the Karoo Hoogland Local Municipality as located in the Namakwa District Municipality (refer to **Table 2.1**).

2.1 Study Area

Table 2.1 provides information regarding the proposed project site identified for the Karusa BESS and associated infrastructure and also includes information regarding the properties that may be impacted by the development.

Table 2.1: A description of the study area identified for Karusa BESS and associated infrastructure

Province	Northern Cape Province
District Municipality	Namakwa District Municipality
Local Municipality	Karoo Hoogland Municipality
Ward number(s)	3
Nearest town(s)	Sutherland (+/- 45km) and Laingsburg (+/- 47km)
Affected Properties: Farm name(s), number(s) and portion numbers	**BESS and Associated Infrastructure:** » Portion 0 of Farm De Hoop 202; near Sutherland, Northern Cape
SG 21 Digit Code (s): Affected Properties	**BESS and Associated Infrastructure:** » Portion 0 of Farm De Hoop 202, Sutherland, Northern Cape: » C07200000000020200000

A locality map illustrating the location of the study area and the development area is provided in **Figure 2.1**.

2.2 Project Description

The infrastructure considered within this Basic Assessment process includes:

- A BESS with a capacity of up to 2 000 MWh, inside containers with a footprint of up to 6ha in extent and a maximum height of 3m. Both lithium-ion and Redox-flow technology are being considered for the project, depending on which is most feasible at the time of implementation.
- Access roads to the BESS (10m in width, approximately 70m long) branching off the existing roads, and internal roads (up to 8m wide) to be located within the total BESS footprint area.
- 33kV MV cabling between the BESS and the MV/HV substation and up to 132kV HV cabling to the HV substation
- Fencing around the BESS for increased security measures.
- Up to 132kV overhead or underground power line to be connected to the existing Hidden Valley Substation.
- Temporary laydown area to be located within the BESS footprint.
- Firebreak to be located within the BESS footprint.

» A Substation with a maximum height of - HV bus-bar up to10 m max and an HV Building up to 4 m max

The following has been considered within the Basic Assessment process for this project (refer to **Figure 2.2**):

» Buffer around the BESS site of 200m
» Power line corridor (100m) with 50m either side of centre line
» Buffer around Hidden Valley Substation of 200m

Three alternative power line alternatives were proposed for investigation as follows:

» Alternative 1: Loop in and Loop out of the Hidden Valley-Komsberg line
» Alternative 2: New power line to the Hidden Valley Substation following the routing of the Hidden Valley-Komsberg line
» Alternative 3: New power line to the Hidden Valley Substation following the access road to the north of the BESS site

The option of implementing the power line either as an overhead line or underground cabling has been considered.

A summary of the details and dimensions of the planned BESS and associated infrastructure associated with the project is provided in **Table 2.1.**

Table 2.1: Details of the proposed Karusa BESS and associated infrastructure

Infrastructure	Footprint, dimensions and details
Technology	Lithium-Ion or Redox-flow technology
BESS footprint	Up to 6ha in total extent, including foundation and containerised battery system
Capacity	Capacity of up to 2 000MWh
Access road to the BESS	This will branch off to the existing roads and will be 10m wide and approximately 70m long, with an internal road of up to 8m wide within the BESS footprint.
Medium Voltage Cabling	33kV MV cabling between the BESS and the MV/HV substation and
High Voltage Cabling	Up to 132kV HV cabling to the HV substation
Underground cabling depth	Maximum of 1.5 – 1.8m
Length of power line	Up to 1.6km
Height of power line towers	Up to 40m maximum
Substation height	HV bus-bar up to 10m max – HV Building up to 4m max
Fencing	Fencing around the entire footprint of the BESS will be installed for access restriction measures.
Laydown Area	Up to 10. 000 sqm to be located within the 6ha BESS footprint
Power line Corridor	The corridor will be 100 m wide in total (50 m either side of the centre line)
Buffer around the substation	A 200 m buffer is proposed around the Hidden Valley substation
Buffer around the BESS site	A 200m buffer is proposed around the BESS site

2.3. Project Development Phases associated with the BESS and Associated Infrastructure

Table 2.2 provides the details regarding the requirements and the activities to be undertaken during the BESS and associated infrastructure development phases (i.e. construction phase, operation phase and decommissioning phase).

Table 2.2: Details of the BESS and associated Infrastructure development phases (i.e. construction, operation and decommissioning)

Construction Phase	
Requirements	» Duration of the construction phase is expected to be 10-12 months. » Create direct construction employment opportunities. Subject to project final size, with an estimation of 250-300 employees and a maximum of 400-500 employees. » No on-site labour camps. Employees to be accommodated in the nearby towns such as Sutherland (+/- 46km) and Laingsburg (+/- 45km) and transported to and from site on a daily basis via a bus shuttle service. » Overnight on-site worker presence would be limited to security staff. » Construction waste will be temporarily stored on site and waste removal and sanitation will be undertaken by a sub-contractor or appointed contractor on a regular basis. » Electricity required for construction activities will be generated by a generator or will be sources from available Eskom distribution networks in the area. » Water required for the construction phase will be supplied by the municipality. In addition, borehole water will be used. Should water availability at the time of construction be limited, water will be transported to site via water tanks. Water will be used for sanitation as well as construction works.
Construction sequence: BESS	A BESS is constructed in the following simplified sequence: » Step 1: Surveying of the development area, engaging with affected landowners, environmental specialist walkthroughs (where needed); » Step 2: Final design and micro-sitting of the infrastructure based on geo-technical, topographical conditions and identified environmental sensitivities; » Step 3: Vegetation clearance; » Step 4: Construction of the BESS foundations; » Step 5: Assembly and construction of the BESS infrastructure on site; • For lithium-ion batteries, the battery cell packs (containing electrolyte solution) will be brought to site as sealed units which will be installed and connected on site. • For Redox-flow batteries, the battery system will be installed on site and then electrolyte solution will be pumped into the system from mobile storage drums/totes which are temporarily brought to site to deliver the electrolyte solution. No storage facility for the storage of electrolyte solution/s outside of the battery unit will be developed on site

	» Step 6: Assembly and construction of MV cabling connecting the BESS to the nearby substation (overhead or underground). Erection of fencing around the BESS. » Step 7: Rehabilitation of disturbed areas; » Step 8: Continued maintenance. It is anticipated that the construction of the BESS and associated infrastructure will take up to 12 months to complete.
Construction sequence: overhead Power line	Overhead power lines are constructed in the following simplified sequence: » Step 1: Surveying of the development area, engaging with affected landowners, environmental specialist walkthroughs to inform permitting requirements and micro-siting of the pylon infrastructure. » Step 2: Final design and micro-siting of the infrastructure based on geo-technical, topographical conditions and identified environmental sensitivities; » Step 3: Search-and-rescue activities, vegetation clearance and construction of access roads/tracks (where required) and watercourse crossings (where required); » Step 4: Construction of tower foundations; » Step 5: Assembly and erection of infrastructure on site; » Step 6: Stringing of conductors; » Step 7: Rehabilitation of disturbed areas; » Step 8: Continued maintenance.
Underground cabling	Underground cables are installed in the following simplified sequence: » Step 1: Surveying of the development area, engaging with affected landowners, environmental specialist walkthroughs to inform permitting requirements and micro-siting of the pylon infrastructure. » Step 2: Final design and micro-siting of the infrastructure based on geo-technical, topographical conditions and identified environmental sensitivities. » Step 3: Search-and-rescue activities, vegetation clearance and construction of access roads/tracks (where required) and watercourse crossings (where required). » Step 4: Excavation of trenches and placement of cables. » Step 5: Refill of trenches and rehabilitation of disturbed areas. » Step 6: Continued maintenance.
Activities to be undertaken	
Conduct surveys prior to construction	» Including, but not limited to: a geotechnical survey, final environmental walkthroughs (where required), site survey (including the final location of the BESS) and confirmation of the BESS footprint, and all other associated infrastructure.
Undertake site preparation	» Including the clearance of vegetation at the BESS foundation, establishment of the laydown areas, the establishment of access roads/tracks and excavations for foundations. » Stripping of topsoil to be stockpiled, backfilled, removed from site and/or spread on site. » To be undertaken in a systematic manner to reduce the risk of exposed ground being subjected to erosion.

	» Include search and rescue for identified species of concern within the disturbance footprint before construction.
Establishment of laydown areas and batching plant on site	» A laydown area for the storage of BESS infrastructure components within the ~6ha BESS footprint, » Concrete batching to take place within the footprint of the BESS to facilitate the concrete requirements for BESS infrastructure foundations.
Facility installation	» Installation of BESS infrastructure within the BESS footprint. » Installation of MV and HV cabling to connect the BESS to the nearby substation.
Undertake site rehabilitation	» Commence with rehabilitation efforts once construction is completed in an area, and all construction equipment is removed. » On commissioning, access points to the site that will not be required for the operation phase will be closed and prepared for rehabilitation.

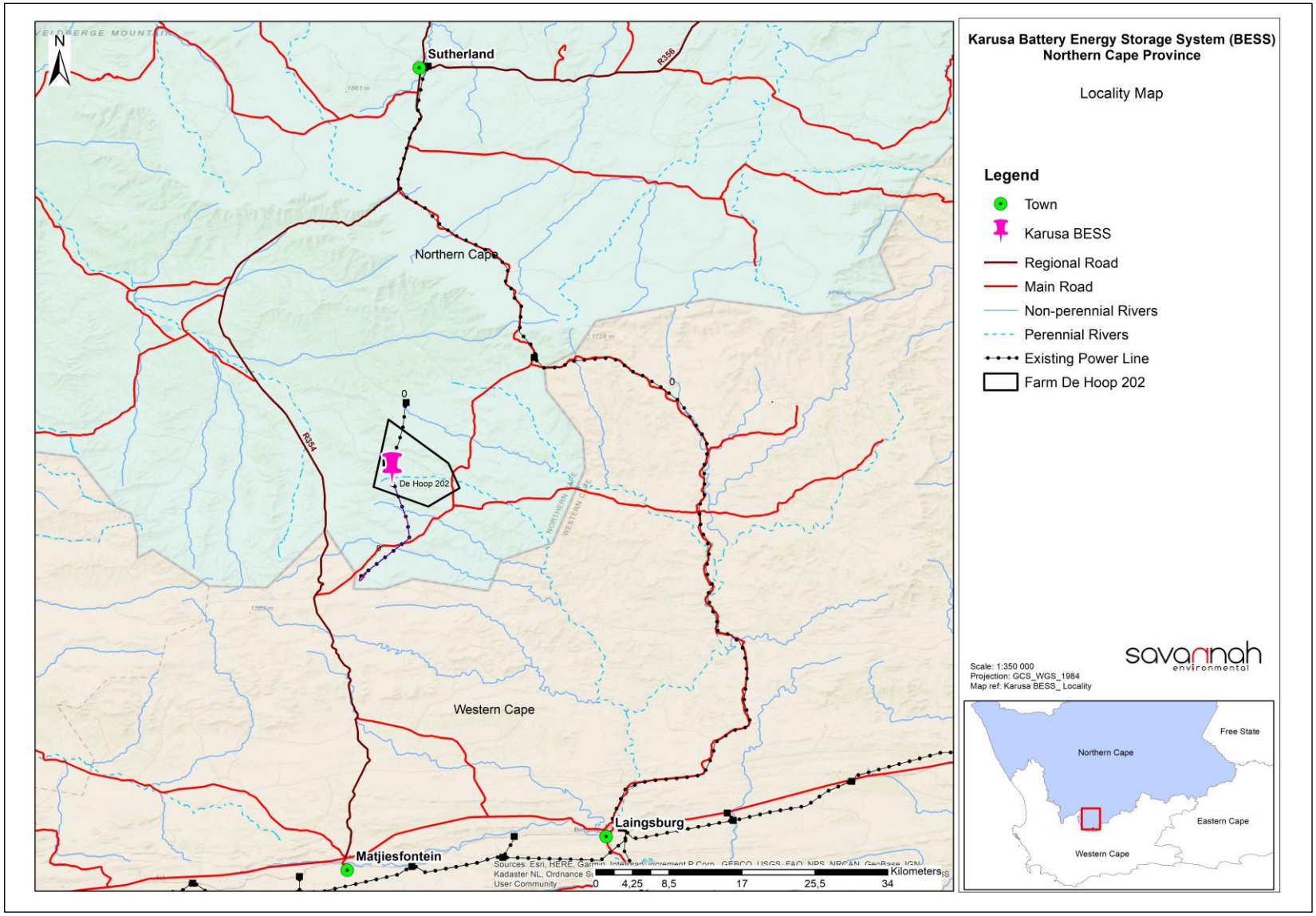

Figure 2.1: Locality map showing the BESS and associated infrastructure for the authorised Karusa Energy Facility (refer to **Appendix L**).

2.4 Findings of the Basic Assessment

No environmental fatal flaws were identified from the specialist studies conducted for the BESS and associated infrastructure. All impacts associated with the project establishment within the BESS assessment zone can be mitigated to acceptable levels or enhanced through the implementation of the recommended mitigation or enhancement measures.

The potential environmental impacts associated with the BESS and associated infrastructure for the Karusa Wind Energy Facility identified and assessed through the BA process include:

2.4.1. Ecological Impacts

The completion of a comprehensive desktop study, in conjunction with the results from the field survey, suggest there is a medium-high confidence in the information provided within the ecological assessment undertaken for the project. The survey ensured that there was suitable ground-truth coverage of the open-spaces or natural habitats, and ecosystems were assessed to obtain a general species (fauna and flora) overview and the major current impacts were observed.

The assessment area was identified with the screening as possessing a Very High sensitivity within a Terrestrial Biodiversity context, with the area and surrounding landscape regarded as part of a CBA. Presently, there are natural habitats within the assessment area that possess a High SEI. This is due to the combination of their functional integrity and conservation importance.

One (1) NT mammal species was recorded during the survey period. Based on the habitat present, there is also a high likelihood of select SCC occurring within the assessment area. Several plant Species of Conservation Concern that are provincially protected were recorded from the study area. Permits will be required for the trimming, removal or relocation of any such species from the provincial authorities.

The karoo scrub and rocky outcrop ecosystems were still natural to largely natural based on the diversity of species recorded, and the habitat physiognomy. The current natural ecosystems provide important ecosystem services including water regulation and pollination. However, certain areas are degraded due to overgrazing and erosion were still nevertheless functional. The findings of the field survey are therefore congruent with the screening tool.

Areas of rocky outcrops delineated as assigned an SEI of "Very High" sensitivity are considered no go areas. These may be spanned by overheard powerlines but no construction infrastructure is to be placed in these areas, including access tracks. Personnel are not to use these areas for any reason.

Based on the provided options for the proposed kV line:

1) Options A
    a. Overhead
    b. Underground
2) Option B
    a. Overhead
    b. Underground
3) Option c
    a. Overhead

b. Underground

The option with the least impacts is Option A, adjacent to the existing constructed road. Use of this option would reduce further fragmentation as well as limiting loss of biodiversity and SCC to one area. The Overhead option would decrease the impacts to vegetation and allow for the avoidance of no-go areas (one such area is present along Option A) however, this would have a greater impact on avifauna. The underground option will increase impacts to flora but decrease impacts to avifauna. Both are considered to have equal impacts overall and the decision on which option to use should be based on engineering, maintenance and cost considerations.

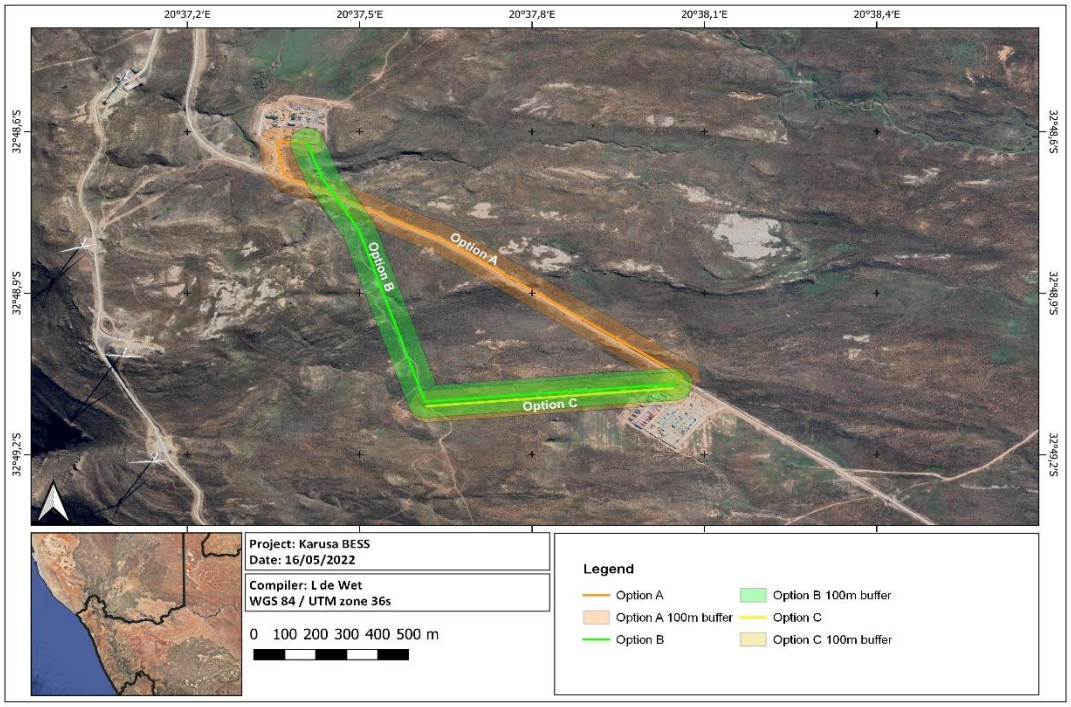

Figure 2.2: Map illustration the three options for the project

Based on a combination of desktop and in-field delineation, two (2) potential forms of a watercourse were identified and delineated within the 500 m regulated area applied. These include an artificial wetland system and episodic drainage lines/ features. No natural wetland systems were identified for the project area. The drainage lines are not characterised by riparian vegetation and grasses, these systems represent bare surfaces with evidence of surface run-off.

A 15 m buffer width was recommended for the project area (all drainage features) for the construction and operational phases. The buffered areas and drainage features have been allocated as a medium sensitivity.

An impact statement is required as per the NEMA regulations with regards to the proposed development. The main impacts on ecology expected from the proposed activity are the loss of CBA areas, degradation and further fragmentation of surrounding natural habitats, the direct mortality of fauna species and the emigration of fauna SCC due to disturbance. Impacts are expected to be of low to moderate significance following the implementation of mitigation measures.
Considering the above-mentioned information, the proposed development will result in the destruction of some functional habitats. It is the opinion of the specialist that the proposed activities can go ahead provided areas of high SEI are avoided, and control of introduced alien invasive plants, as well as erosion mitigation is

implemented. All Biodiversity Management Objectives provided in the specialist report included in Appendix D and mitigation measures provided in other supporting specialist reports must be implemented.

Due to the presence of non-perennial watercourses within the 500 m regulatory area, a risk assessment was completed in line with Section 21 (c) and (i) of the National Water Act, 1998, (Act 36 of 1998). Regarding the overhead or underground options, there are expected low post-mitigation risks, and a General Authorisation is permissible for the development.

2.4.2. Impacts on Heritage Resources (including archaeology and palaeontology)

Based on the existing heritage information available for the proposed development in addition to the fieldwork conducted by Booth (2012, 2015, 2020), CTS Heritage (2021) and Almond (2015, 2016), it is unlikely that the proposed development will negatively impact on significant heritage resources. There is no heritage objection to the proposed development and no preferred alternative from a heritage perspective. Furthermore, due to the number of Renewable Energy Facility projects in the immediate vicinity of this development that have already been granted Environmental Authorisation (EA, Figure 5), and due to the existing Soetwater OHL in the vicinity of the development, it is likely that this project will have low levels of cumulative impact significance for Heritage (archaeology, palaeontology and cultural landscape). That being said, due to the general heritage sensitivity of the broader context, it is recommended that:

» If concentrations of historical and pre-colonial archaeological heritage material and/or human remains (including graves and burials) are uncovered during construction, all work in the vicinity must cease immediately and be reported to the South African Heritage Resources Agency (SAHRA) so that systematic and professional investigation/excavation can be undertaken. Phase 2 mitigation in the form of test-pitting/sampling or systematic excavations and collections of the pre-colonial shell middens and associated artefacts will then be conducted to establish the contextual status of the sites and possibly remove the archaeological deposit before development activities continue.
» A person must be trained as a site monitor to report any archaeological sites found during the development. Construction managers/foremen and/or the Environmental Control Officer (ECO) should be informed before construction starts on the possible types of heritage sites and cultural material they may encounter and the procedures to follow when they find sites. The attached Chance Fossil Finds Procedure must be noted for inclusion into the EMPR to be adhered to in construction and excavation phases of development.
» Should substantial fossil remains such as vertebrate bones and teeth, plant-rich fossil lenses, fossil wood or dense fossil burrow assemblages be exposed during construction,
the responsible ECO/EO/Environmental Representative should safeguard these, preferably in situ, and alert SAHRA, i.e. The South African Heritage Resources Authority, as soon as possible (Contact details: Mr P. Hine P.O. Box 4637, Cape Town 8000. Tel: 021 462 4502. Email: phine@sahra.org.za) so that appropriate action can be taken by a professional palaeontologist, at the Proponent's expense. Mitigation would normally involve the scientific recording and judicious sampling or collection of fossil material as well as associated geological data (e.g. stratigraphy, sedimentology, taphonomy) by a suitably qualified palaeontologist.

No preference in terms of the alternatives for the power line was identified by the specialist as a result of the low impact expected. Therefore, the decision on which option to use should be based on engineering, maintenance and cost considerations.

2.4.3. Noise Impacts

The BESS facility generates low levels of noise relating to the climate control system. Considering the potential development zone, this BESS would be further than 1 000 m from the closest identified NSD at any location within this proposed area. At an estimated noise level of less than 60 dB, this is an insignificant noise and this noise will be inaudible at a distance further than 200 m from such a BESS. The sound will be inaudible at the closest NSD. The noise from the climate control system of the BESS is significantly less than the noise that will be generated by the proposed Karusa WEF, and noise from the climate control system will not cumulatively add to the noise of the WEF. The power line was not considered within this assessment as no noise is expected to be associated with this infrastructure.

It is therefore the opinion of the specialist that there exists no potential for a noise impact and that no further Scoping or other acoustical studies would be required for the proposed BESS and associated infrastructure. No specific mitigation measures regarding noise or additional noise measurements are recommended. No additional conditions regarding noise are recommended for inclusion in the EMPr. It is therefore recommended that the Karusa BESS project be approved.

2.4.4. Impacts on Soil and Agricultural Potential

One main low sensitivity soil form was identified within the assessment area, namely the Oakleaf soil form. The land capability sensitivities (DAFF, 2017) indicate land capabilities with "Low" and "Moderate" sensitivities, which correlates with the findings from the baseline assessment. This sensitivity was confirmed by the specialist on site.

The assessment area is not associated with any arable soils, due to the type of soil as well as the climate, which in itself limits crop production significantly. The land capabilities associated with the regulated area are only suitable for grazing, which corresponds with the current land use.

It is the specialist's opinion that the proposed development will have no impacts on the agricultural production ability of the land. Additionally, the proposed activities will not result in the segregation of any high production agricultural land. Therefore, the proposed development may be favourably considered. There is no preference in terms of the power line alternatives proposed.

The soil specialist concluded that the application should be considered favourably, on the condition that the mitigation measures are followed to prevent soil erosion and soil pollution and to minimise impacts on the veld quality of the farm portions that will be affected. The project infrastructure should also remain within the 500m project assessment zone affected footprint where the BESS will be constructed, but placement thereof anywhere in the assessment zone has been assessed in this report and does not alter any impacts, mitigations or ratings provided, and regardless of precise location within the 500m project assessment zone, is thus regarded as acceptable from an agricultural impact perspective.

2.5. Environmental Sensitivity Mapping

As part of the specialist investigations undertaken for the BESS and associated infrastructure, the sensitivity ratings in the DFFE screening tool report were confirmed. Specific environmental features and areas were identified which will be impacted by the construction of the proposed project. The current condition of the

features identified informed the sensitivity of the environmental features and the capacity for disturbance and change associated with the proposed development. The sensitive features identified specifically relate to ecology and heritage resources.

Considering the features identified within the development area, the specialists have provided an indication of the sensitivity of the environmental features for the development of the Karusa BESS and associated infrastructure within the assessed development area. The points below describe the sensitivity of the features as identified and mapped in **Figure 2.2**, which provides a sensitivity map of the development area overlain with the development footprint.

» The entire study area is assigned a Very High terrestrial sensitivity by the DFFE screening tool. The very high sensitivity is attributed to the presence of a CBA 1 and the presence of two (2) forms of a watercourse within the delineated 500 m and 100m regulated areas. These include an artificial wetland system and episodic drainage lines/ features. The karoo scrub and rocky outcrop ecosystems were still natural to largely natural based on the diversity of species recorded, and the habitat physiognomy. The current natural ecosystems provide important ecosystem services including water regulation and pollination. However, certain areas are degraded due to overgrazing and erosion were still nevertheless functional.

» The plant species theme was assigned a Medium Sensitivity by the DFFE screening tool and specialist studies. This is due to the fact that 19 threatened species are expected to occur within the assessment area.

» Specialist studies and the DFFE screening tool confirmed that the assessment area is associated with a Very High palaeontological sensitivity, due to the presence of a possible burial site.

» Agriculture is associated with Low and Medium Sensitivities as the assessment area has a land potential of 6.

» Forty-five (45) avifaunal species are expected to occur within the project area, however, none of these are regarded as being of conservation concern. These avifaunal species are expected to be impacted upon during the construction and operation phases of the project, however, impacts can be mitigated.

2.6 Overall Conclusion (Impact Statement)

The construction and operation of the Karusa BESS and associated infrastructure has been proposed by Enel Green Power South Africa (Pty) Ltd. The purpose of the BESS is to store excess electrical output as and when required by the off-taker. The assessment of the proposed BESS was undertaken by independent specialists and their findings have informed the results of this BA Report.

The specialist findings have indicated that there are no environmental fatal flaws associated with the development of the BESS provided that the recommended mitigation measures are implemented. The BESS is considered suitable for development, provided areas of sensitivity as determined by the specialists and detailed in section 6.~~2~~ 3 of this report are considered and recommended mitigation implemented. Positive impacts of the BESS and associated infrastructure are expected to occur at a national and regional level and are to outweigh the negative impacts, which are expected to occur at a local level and can be minimised through the careful placement of infrastructure. All impacts associated with the BESS and associated

infrastructure can be mitigated to acceptable levels. During the final design phase, infrastructure can be located anywhere within the buffer areas assessed apart from those areas identified as being of very high sensitivity (no-go).

2.7 Overall Recommendation

Considering the findings of the independent specialist studies, the impacts identified, as well as the potential to further minimise the impacts identified to acceptable levels through mitigation, it is the reasoned opinion of the Environmental Assessment Practitioner (EAP) that the development of the BESS and associated infrastructure is acceptable within the landscape and can reasonably be authorised. Infrastructure to be authorised includes the following:

- A BESS with a capacity of up to 2 000 MWh, inside containers with a footprint of up to 6ha in extent and a maximum height of 3m. Both lithium-ion and Redox-flow technology are being considered for the project, depending on which is most feasible at the time of implementation.
- Access roads to the BESS (10m in width, approximately 70m long) branching off of the existing roads, and internal roads (up to 8m wide) to be located within the total BESS footprint area.
- 33kV MV cabling between the BESS and the MV/HV substation and up to 132kV HV cabling to the HV substation
- Fencing around the BESS for increased security measures.
- Up to 132kV power line (either overhead or underground) to be connected to the existing Hidden Valley Substation. Although all options assessed are considered acceptable, the preferred alternative is that located within the corridor adjacent to the existing constructed road (i.e. Alternative 1).
- Temporary laydown area to be located within the BESS footprint.
- Firebreak to be located within the BESS footprint.
- A Substation with a maximum height of - HV bus-bar up to10 m max and an HV Building up to 4 m max.

The recommended validity period for the environmental authorisation is 10 years.

The following key conditions would be required to be included within the environmental authorisation issued for the Karusa BESS:

- All mitigation measures detailed within this BA Report, as well as the specialist reports contained within **Appendices D** to **G**, must be implemented.
- The EMPr as contained within **Appendix H** of this BA Report should form part of the contract with the Contractors appointed to construct and maintain the BESS and associated infrastructure in order to ensure compliance with environmental specifications and management measures. The implementation of the EMPr for all life cycle phases of the infrastructure is considered key in achieving the appropriate environmental management standards as detailed for this project.
- Areas of very high sensitivity (no-go) as identified must be avoided by all infrastructure as per relevant specialist recommendations.
- The project footprint must be minimised and must remain within the demarcated development area to avoid impacts on episodic drainage lines and SCCs in the surrounding areas.
- Following the final design of the BESS and associated infrastructure, a final layout must be submitted to DFFE for review and approval prior to commencing with construction once the route and grid connection is confirmed.

- A pre-construction walk-through of the final BESS and associated infrastructure footprint by an ecologist to survey for species of conservation concern (SCC) that would be affected and that can be translocated must be undertaken prior to the commencement of the construction phase. Permits from the relevant national and provincial authorities, i.e., CapeNature and the Department of Forestry, Fisheries, and the Environment (DFFE), and the Department of Environment and Nature Conservation, Kimberly (Northern Cape Province) must be obtained before the individual species of concern are disturbed.
- A chance find procedure must be implemented in the event that archaeological or palaeontological resources are found during the construction of the BESS and associated infrastructure. In the case where the proposed development activities bring these materials to the surface, work must cease and SAHRA must be contacted immediately.
- Obtain all other environmental permits for the project, as required.

Although all options assessed are considered acceptable, the preferred alternative is that located within the corridor adjacent to the existing constructed road (i.e. Alternative 1).

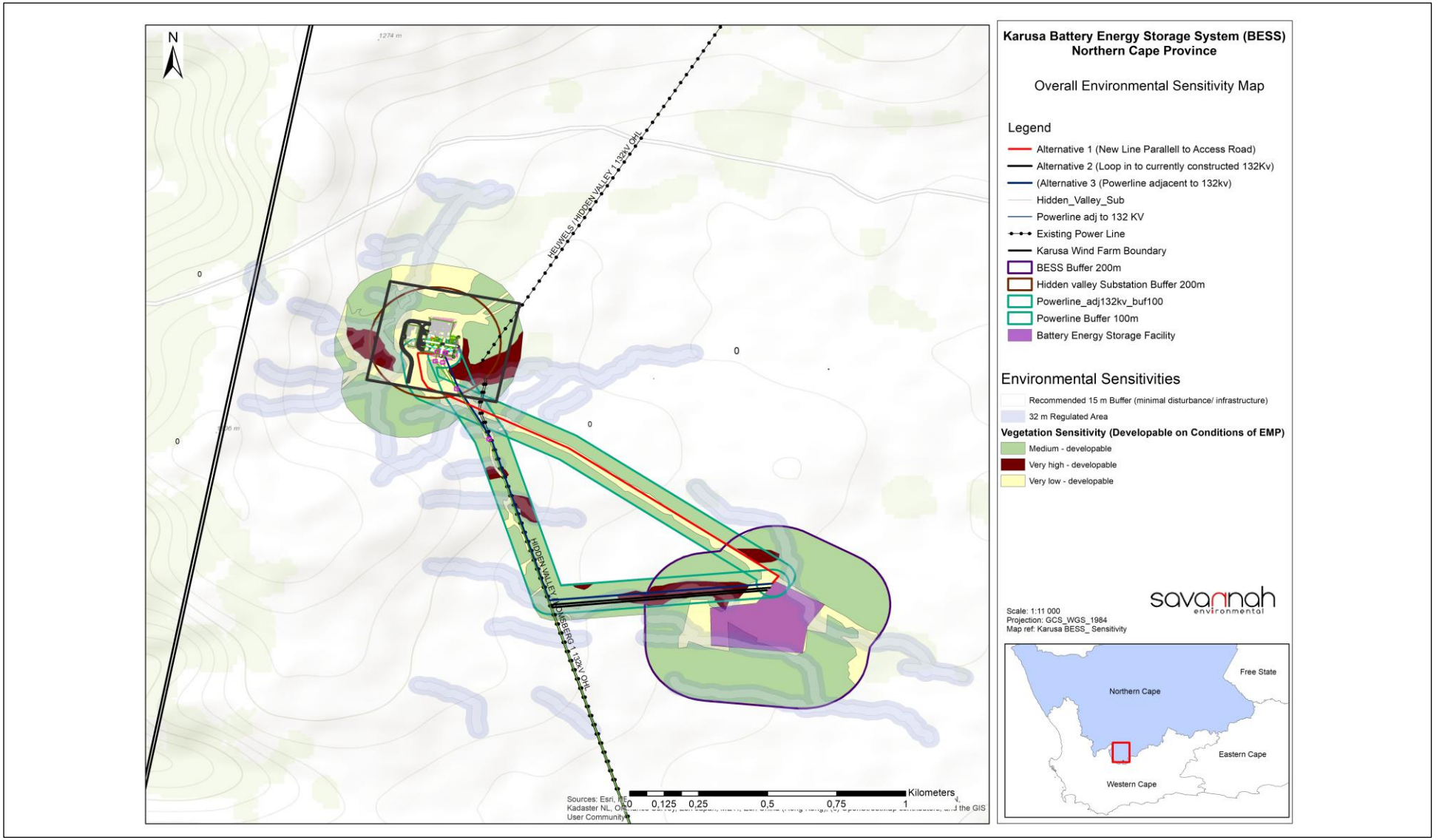

Figure 2.2: Sensitivity map of the BESS assessment zone.

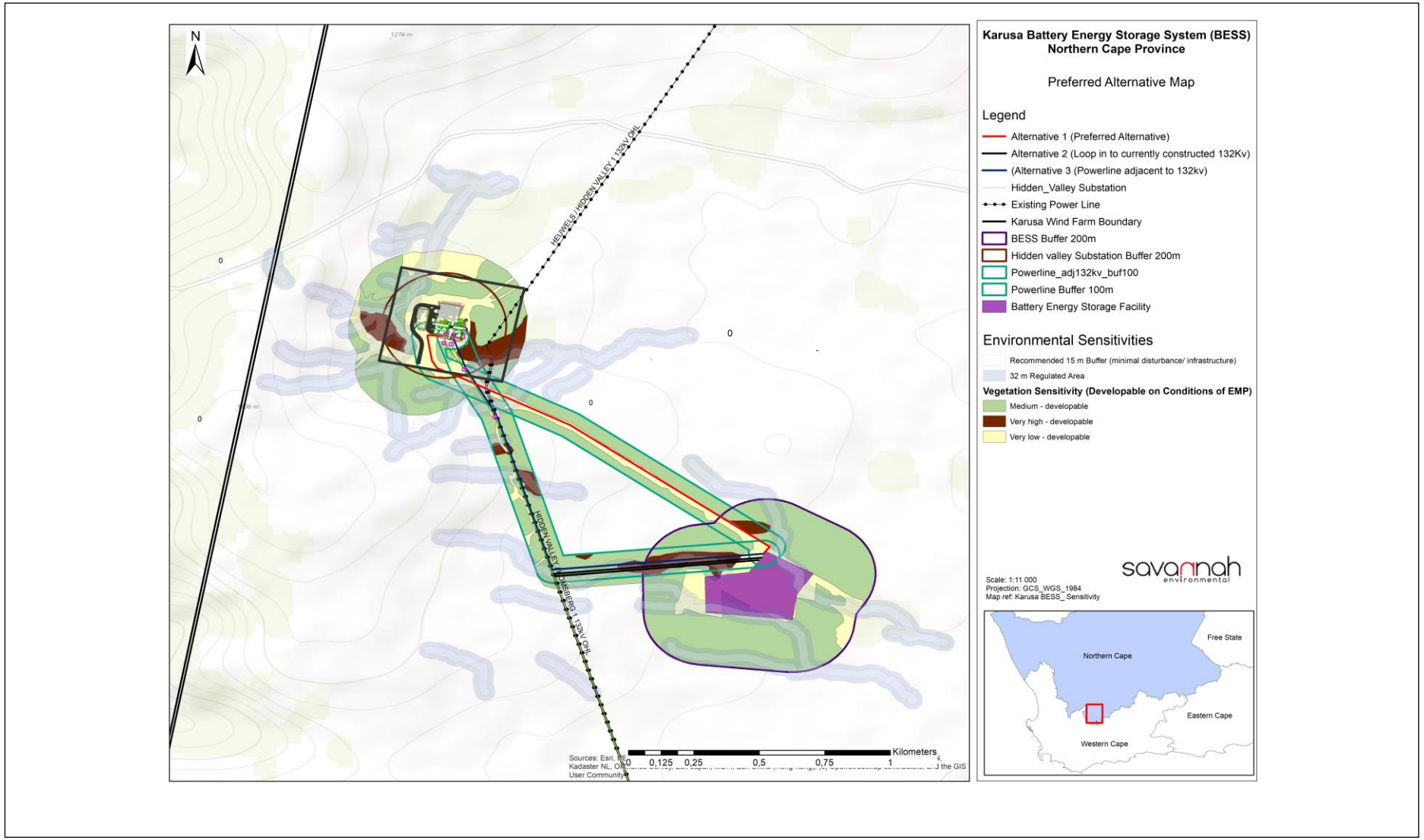

Figure 2.3: Preferred Alternative Map

CHAPTER 3: PURPOSE AND OBJECTIVES OF THE EMPR

An Environmental Management Programme (EMPr) is defined as "an environmental management tool used to ensure that undue or reasonably avoidable adverse impacts of the construction, operation and decommissioning of a project are prevented or mitigated, and that the positive benefits of the projects are enhanced". The objective of this EMPr is to provide consistent information and guidance for implementing the management and monitoring measures established in the permitting process and help achieve environmental policy goals. The purpose of an EMPr is to help ensure continuous improvement of environmental performance, reducing negative impacts and enhancing positive effects during the construction and operation of the facility. An effective EMPr is concerned with both the immediate outcome as well as the long-term impacts of the project.

The EMPr provides specific environmental guidance for the construction and operation phases of a project, and is intended to manage and mitigate construction and operation activities so that unnecessary or preventable environmental impacts do not result. These impacts range from those incurred during start up (site clearing and site establishment) through to those incurred during the construction activities themselves (erosion, noise, dust) to those incurred during site rehabilitation (soil stabilisation, re-vegetation) and operation. The EMPr also defines monitoring requirements in order to ensure that the specified objectives are met.

This EMPr is applicable to all employees and contractors working on the pre-construction, construction, and operation and maintenance phases of the project. The document must be adhered to and updated as relevant throughout the project life cycle.

This EMPr has been compiled in accordance with Appendix 4 of the EIA Regulations, 2014 (as amended) (refer to **Table 4.1**). This is a dynamic document and will be further developed in terms of specific requirements listed in any authorisations issued for the proposed project and/or as the project develops. This will ensure that the construction and operation activities are planned and implemented taking sensitive environmental features into account. The EMPr has been developed as a set of environmental specifications (i.e. principles of environmental management), which are appropriately contextualised to provide clear guidance in terms of the on-site implementation of these specifications (i.e. on-site contextualisation is provided through the inclusion of various monitoring and implementation tools).

The EMPr has the following objectives:

- Outline mitigation measures and environmental specifications which are required to be implemented for the planning, construction, rehabilitation and operation phases of the project in order to minimise the extent of environmental impacts, and to manage environmental impacts associated with the development of the Karusa BESS and associated infrastructure.
- Ensure that the construction and operation phases do not result in undue or reasonably avoidable adverse environmental impacts, and ensure that any potential environmental benefits are enhanced.
- Identify entities who will be responsible for the implementation of the measures and outline functions and responsibilities.
- Propose mechanisms and frequency for monitoring compliance, and prevent long-term or permanent environmental degradation.
- Facilitate appropriate and proactive responses to unforeseen events or changes in project implementation that were not considered in the BA process.

The mitigation measures identified within the BA process are systematically addressed in the EMPr, ensuring the minimisation of adverse environmental impacts to an acceptable level.

The developer must ensure that the implementation of the project complies with the requirements of all environmental authorisations, permits, and obligations emanating from relevant environmental legislation. This obligation is partly met through the development and the implementation of this EMPr, and through its integration into the relevant contract documentation provided to parties responsible for construction and/or operation activities on the site. Since this EMPr is part of the BA process for the project, it is important that this document be read in conjunction with the BA Report compiled for this project.

This will contextualise the EMPr and enable a thorough understanding of its role and purpose in the integrated environmental management process. Should there be a conflict of interpretation between this EMPr and the Environmental Authorisation (EA), the stipulations in the EA shall prevail over that of the EMPr, unless otherwise agreed by the authorities in writing. Similarly, any provisions in legislation overrule any provisions or interpretations within this EMPr.

This EMPr shall be binding on all the parties involved in the planning, construction and operation phases of the project, and shall be enforceable at all levels of contract and operational management within the project. The document must be adhered to and updated as relevant throughout the project life cycle. Any updates must be undertaken in accordance with the requirements of the relevant legislation.

CHAPTER 4: STRUCTURE OF THIS EMPR

The preceding chapters provide background to the EMPr and the proposed project, while the chapters that follow consider the following:

- Planning and design activities;
- Construction activities;
- Operation activities; and
- Decommissioning activities.

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

OBJECTIVE: Description of the objective that is necessary to meet the overall goal, which takes into account the findings of the BA specialist studies

Project Component/s	List of project components affecting the objective, i.e.: » BESS Infrastructure; » Access roads; » Power line; and » Associated infrastructure.
Potential Impact	Brief description of potential environmental impact if objective is not met.
Activity/Risk Source	Description of activities which could affect achieving the objective.
Mitigation: Target/Objective	Description of the target and/or desired outcomes of mitigation.

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

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

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

- Planned activities change (i.e. in terms of the components and/or layout of the facility);
- Modification to or addition to environmental objectives and targets;
- Additional or unforeseen environmental impacts are identified and additional measures are required to be included in the EMPr to prevent deterioration or further deterioration of the environment.
- Relevant legal or other requirements are changed or introduced; and
- Significant progress has been made on achieving an objective or target such that it should be re-examined to determine if it is still relevant, should be modified, etc.

4.1 Contents of this Environmental Management Programme (EMPr)

This EMPr has been prepared as part of the BA process being conducted in support of the application for EA for the Karusa BESS and associated infrastructure. This EMPr has been prepared in accordance with DFFE's requirements as contained in Appendix 4 of the EIA Regulations, 2014 (GNR 326). It provides recommended management and mitigation measures with which to minimise impacts and enhance benefits associated with the project.

An overview of the contents of this EMPr, as prescribed by Appendix 4 of the 2014 EIA Regulations (GNR 326), and where the corresponding information can be found within this EMPr is provided in **Table 4.1.**

Table 4.1: Summary of where the requirements of Appendix 4 of the 2014 NEMA EIA Regulations (GNR 326) are provided in this EMPr.

Requirement	Location in this EMPr
(1) An EMPr must comply with section 24N of the Act and include – (a) Details of – (i) The EAP who prepared the EMPr. (ii) The expertise of that EAP to prepare an EMPr, including a curriculum vitae.	Chapter 4 Appendix A
(b) A detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description.	Chapter 2
(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 should be avoided, including buffers.	Chapter 2 Appendix G
(d) A description of the impact management outcomes, 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.	Chapter 5
(ii) Pre-construction activities.	Chapter 5
(iii) Construction activities.	Chapter 6
(iv) Rehabilitation of the environment after construction and where applicable post closure.	Chapter 6
(v) Where relevant, operation activities.	Chapter 7
(f) A description of proposed impact management actions, identifying the manner in which the impact management outcomes contemplated in paragraph (d) will be achieved, and must, where applicable, include actions to –	Chapters 5 - 7

Requirement	Location in this EMPr
(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. (iv) Comply with any provisions of the Act regarding financial provision for rehabilitation, where applicable.	
(g) The method of monitoring the implementation of the impact management actions contemplated in paragraph (f).	Chapters 5 - 7
(h) The frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f).	Chapters 5 - 7
(i) An indication of the persons who will be responsible for the implementation of the impact management actions.	Chapters 5 - 7
(j) The time periods within which the impact management actions contemplated in paragraph (f) must be implemented.	Chapters 5 - 7
(k) The mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f).	Chapters 5 - 7
(l) A program for reporting on compliance, taking into account the requirements as prescribed by the Regulations.	Chapter 6
(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. (ii) Risks must be dealt with in order to avoid pollution or the degradation of the environment.	Chapter 6
(n) Any specific information that may be required by the competent authority.	N/A
(2) Where a government notice gazetted by the Minister provides for a generic EMPr, such generic EMPr as indicated in such notice will apply.	N/A

Project specific management plans have been developed for specific issues related to the BESS, as follows:

Appendix A: Grievance Mechanism for Public Complaints and Issues
Appendix B: Stormwater Management Plan
Appendix C: Waste Management Plan
Appendix D: Emergency Preparedness, Response and Fire Management Plan
Appendix E: Chance Find Protocol
Appendix F: Alien and Invasive Plant Management Plan
Appendix G: Plant Rescue Protection Plan
Appendix H: Erosion Management Plan
Appendix I: Revegetation and Rehabilitation Plan

4.2 Project Team

In accordance with Regulation 12 of the 2014 EIA Regulations (GNR 326), as amended, the applicant appointed Savannah Environmental (Pty) Ltd as the independent environmental consultants responsible for managing the application for EA and the supporting BA process. The application for EA and the BA process, is being managed in accordance with the requirements of NEMA, the 2014 EIA Regulations (GNR 326), as amended, and all other relevant applicable legislation.

4.2.1 Details and Expertise of the Environmental Assessment Practitioner (EAP)

Savannah Environmental is a leading provider of integrated environmental and social consulting, advisory and management services with considerable experience in the fields of environmental assessment and management. The company is wholly woman-owned (51% black woman-owned), and is rated as a Level 2 Broad-based Black Economic Empowerment (B-BBEE) Contributor. The company was established in 2006 with a clear objective to provide services to the infrastructure development sector. Savannah Environmental benefits from the pooled resources, diverse skills and experience in the environmental field held by its team that has been actively involved in undertaking environmental studies for a wide variety of projects throughout South Africa and neighbouring countries. Strong competencies have been developed in project management of environmental processes, as well as strategic environmental assessment and compliance advice, and the assessment of environmental impacts, the identification of environmental management solutions and mitigation/risk minimising measures.

This BA process is being managed by Jo-Anne Thomas. She is supported by Raquel Peters and Nondumiso Bulunga.

» **Jo-Anne Thomas**, the registered EAP on this project. She is a registered EAP with the Environmental Assessment Practitioners Association of South Africa (EAPASA - 2019/726) and a registered professional scientist with the South African Council for Natural Scientific Professions (SACNASP). She provides technical input for projects in the environmental management field, specialising in Strategic Environmental Advice, Environmental Impact Assessment studies, environmental auditing and monitoring, environmental permitting, public participation, Environmental Management Plans and Programmes, environmental policy, strategy and guideline formulation, and integrated environmental management. Her key focus is on integration of the specialist environmental studies and findings into larger engineering-based projects, strategic assessment, and providing practical and achievable environmental management solutions and mitigation measures. Responsibilities for environmental studies include project management (including client and authority liaison and management of specialist teams); review and manipulation of data; identification and assessment of potential negative environmental impacts and benefits; review of specialist studies; and the identification of mitigation measures.

» **Raquel Peters,** the principle author of this Report holds a BA (Hons) Environmental Management degree (with distinction) from the University of South Africa. She is a Junior Environmental Consultant at Savannah Environmental and her key focus is on undertaking environmental impact assessments, GIS mapping, environmental permitting and authorisations, compliance auditing, public participation, and environmental management plans and programmes.

» **Nondumiso Bulunga** – the public participation consultant for this project holds a master's degree in advanced Geographical Information System and has eight years of experience in the environmental field. Her key focus is on environmental and social impact assessments, public participation, stakeholder engagement environmental management screening as well as mapping using ArcGIS for a variety of environmental projects.

The Savannah Environmental professional team has considerable experience in environmental impact assessments and environmental management and has been actively involved in undertaking environmental

studies for a wide variety of projects throughout South Africa, including those associated with electricity generation and transmission.

Curricula Vitae (CVs) detailing the Savannah Environmental team's expertise and relevant experience are provided in **Appendix G** of the EMPr.

4.2.2 Details of the Specialist Consultants

A number of independent specialist consultants have been appointed as part of the BA project team in order to adequately identify and assess potential impacts associated with the project (refer to **Table 4.2)**. The specialist consultants have provided input into the BA Report as well as this EMPr.

Table 4.2: Specialist Consultants which provided input into the EMPr

Company	Specialist Area of Expertise	Specialist Name
The Biodiversity Company	Avifauna, Ecology, Wetlands, Aquatic Ecology and Soil, Land Use, Land Capability and Agricultural Potential	Andrew Husted Ivan Baker Leigh-Ann de Wet
CTS Heritage (Pty) Ltd	Heritage (including archaeology and palaeontology)	Jenna Lavin
EARES Enviro Acoustic Research	Noise (Compliance Statement)	Morné de Jager

CHAPTER 5: PLANNING AND DESIGN MANAGEMENT PROGRAMME

Overall Goal: undertake the pre-construction activities (planning and design phase) in a way that:

- Ensures that the design and layout of the BESS and associated infrastructure responds to the identified environmental constraints and opportunities.
- Ensures that pre-construction activities are undertaken in accordance with all relevant legislative requirements.
- Ensures that adequate regard has been taken of any landowner and community concerns and that these are appropriately addressed through design and planning (where appropriate).
- Ensures that the best environmental options are selected for the linear components (underground cable network, and the on-site facility substation), including the access roads.
- Enables the construction activities to be undertaken without significant disruption to other land uses and activities in the area.

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

5.1 Objectives

OBJECTIVE 1: Ensure the facility design responds to identified environmental constraints and opportunities

All impacts associated with the BESS and associated infrastructure can be mitigated to acceptable levels or enhanced through the implementation of the recommended management, mitigation or enhancement measures. Through the assessment of the Karusa BESS and associated infrastructure within the study area, it was concluded that the development of the BESS facility, access roads and power line are considered to be environmentally acceptable (subject to the implementation of the recommended mitigation measures and identified preferred alternatives). Identified sensitive areas as details in Figure 2.2 must be avoided.

Project Component/s	» Area infrastructure (i.e. BESS footprint and battery units, electrical transformers/switchgear and ancillary buildings). » Linear infrastructure (i.e. power line / cabling connecting the BESS to the substation, access road, internal roads and fencing).
Potential Impact	» Impact on identified sensitive areas. » Design fails to respond optimally to the environmental considerations.
Activities/Risk Sources	» Positioning of all project components and BESS footprint. » Pre-construction activities, e.g. geotechnical investigations, site surveys and environmental walk-through surveys (where required for permitting purposes). » Positioning of temporary sites.
Mitigation: Target/Objective	» The design of the facility responds to the identified environmental constraints and opportunities. » Site sensitivities are taken into consideration and avoided as far as possible, thereby mitigating potential impacts.

Mitigation: Action/Control	Responsibility	Timeframe
Plan and conduct pre-construction activities in an environmentally acceptable manner.	Developer Contractor	Pre-construction
Identified areas of high sensitivity (Figure 2.2) must be avoided during the final design and layout of the BESS, access roads and power line. These areas can be spanned, as long as no infrastructure, including construction phase access tracks are to be constructed or used. These areas must remain out of bounds.	Developer Contractor	Design
Finalise layout of all components, and submit to DFFE for approval prior to commencement of construction.	Developer Contractor	Pre-construction
The EMPr and the EA should form part of the contract with the Contractors appointed to construct the facility and associated infrastructure, and must be used to ensure compliance with environmental specifications and management measures.	Developer Contractor	Tender Design and Design Review Stage
Plan the placement of the temporary laydown areas in order to minimise vegetation clearing (i.e. in already disturbed areas) wherever possible and to avoid habitat loss and disturbance to adjoining areas and ensure the laydown areas are located in areas of low sensitivity and are properly fenced off.	Developer Contractor	Project planning
Plan development levels to minimise earthworks to ensure that levels are not elevated.	Developer Contractor	Project planning
The fence to be used to fence off the BESS must be designed to be animal and bird friendly in order to prevent entrapment and electrocutions of ground-dwelling animal and bird species. No electrified strands should be placed within 30cm of the ground or alternatively, the electrified strands should be placed on the inside of the fence and not on the outside.	Developer Contractor	Project planning
A walk-down of the BESS area and grid connection route is required prior to construction. This must be conducted by a qualified ecologist and archaeologist. Relevant permits must be applied for where species of conservation concern or heritage sites are impacted by infrastructure.	Archaeologist	Prior to construction commencing
Where appropriate and suitable, consider an aqueous electrolyte for the BESS which significantly reduces the hazards associated with organics and acids.	Developer Contractor	Project planning
Ensure clear rules and regulations for access to the proposed site are developed for implementation by the contractor during construction and the operator during operation.	Developer Contractor	Pre-Construction
Appropriate drainage channels must be designed and implemented, including the application of diffuse flow measures where discharge of rainwater on roads will be channelled directly into the natural environment,	Developer Contractor	Project planning
Minimise disturbance of the surrounding landscape and maintain existing vegetation around the development.	Developer / Contractor Design engineer	Planning and design
Reduce the construction period as far as possible through careful planning and productive implementation of resources.	Developer Contractor	Pre-construction
Compile appropriate action plans to have in place on site, and develop training for contactors and employees in the event of spills, leaks and other potential impacts to the aquatic systems.	Developer Contractor	Pre-construction

Performance Indicator	» The design meets the objectives and does not degrade the environment. » Demarcated sensitive areas are avoided based on the approved layout. » Design and layouts respond to the mitigation measures and recommendations in the BA Report.
Monitoring	» Review of the design by the Project Manager and the Environmental Control Officer (ECO) prior to the commencement of construction. » Monitor ongoing compliance with the method statements.

OBJECTIVE 2: Ensure that relevant permits and plans are in place to manage impacts on the environment

Project Component/s	» Area infrastructure (i.e. BESS footprint and battery units, electrical transformers/switchgear and ancillary buildings). » Linear infrastructure (i.e. power line / cabling connecting the BESS to the substation, access road, internal roads and fencing).
Potential Impact	» Impact on identified sensitive areas and protected species. » Design fails to respond optimally to the environmental considerations.
Activities/Risk Sources	» Positioning of all project components. » Pre-construction activities, e.g. geotechnical investigations, site surveys of on-site facility footprint and internal access roads and environmental walk-through surveys (where required for permitting purposes). » Positioning of temporary sites.
Mitigation: Target/Objective	» To ensure that the design of the facility responds to the identified environmental constraints and opportunities. » To ensure that pre-construction activities are undertaken in an environmentally friendly manner. » To ensure that the design of the facility responds to the identified constraints identified through pre-construction surveys.

Mitigation: Action/Control	Responsibility	Timeframe
Should abnormal loads have to be transported by road to the site, a permit must be obtained from the relevant Provincial Government. Alert traffic authorities well in advance of any heavy loads that must be transported on local roads and elicit their assistance in controlling traffic associated with the transportation of these loads.	Developer Contractor transporting material to site.	Planning and design
A pre-construction walk through of the facility's layout, proposed grid connection and the main access road must be undertaken by an ecological specialist to inform the need for such permit requirements. Relevant permits must be obtained for impacts on protected plant species. Copies of permits/licenses must be submitted to the Director: Environmental Impact Evaluation at the DFFE.	Developer/ Contractor Specialist	Pre-construction
Affected individuals of selected protected flora and fauna species which cannot be avoided should be translocated to a safe area on the site prior to construction. This is to be undertaken as part of the search and rescue operations prior to construction.	Developer Specialist	Pre-construction

Mitigation: Action/Control	Responsibility	Timeframe
Vegetation clearing to commence only after the walk through has been conducted and necessary permits obtained, and the and necessary search and rescue translocation activities have been carried out.	Developer Contractor	Pre-construction
Pre-construction environmental induction must be provided to all construction staff on site to ensure that basic environmental principles are adhered to. This includes awareness of no littering, appropriate handling of pollution and chemical spills, avoiding fire hazards, minimising wildlife interactions, remaining within demarcated construction areas etc.	Developer/ Contractor Specialist	Pre-construction
A Chance Find Protocol must be implemented in the event that archaeological or palaeontological resources are found.	Developer Contractor	Pre-construction
A Stormwater Management Plan (SWMP) must be developed and implemented and should provide for a drainage system sufficiently designed to prevent water run-off causing soil erosion.	Developer/ Contractor Design engineer	Pre-construction

Performance Indicator	» Permits are obtained and relevant conditions complied with. » Permit obtained to destroy or translocate affected individuals of protected fauna and flora species. » Relevant management plans and Method Statements prepared and implemented.
Monitoring	» Review of the design by the Project Manager and the ECO prior to the commencement of construction. » Monitor ongoing compliance with the EMPr and method statements.

OBJECTIVE 3: Ensure effective communication mechanisms

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

Project component/s	» Area infrastructure (i.e. BESS footprint and battery units, electrical transformers/switchgear and ancillary buildings). » Linear infrastructure (i.e. power line connecting the substation, access road, fencing).
Potential Impact	» Impacts on affected and surrounding landowners, communities and land uses
Activity/risk source	» Activities associated with construction » Activities associated with operation
Mitigation: Target/Objective	» Effective communication with affected and surrounding landowners, and communities. » Addressing of any issues and concerns raised as far as possible in as short a timeframe as possible.

Mitigation: Action/control	Responsibility	Timeframe
A grievance mechanism (Appendix A) must be compiled and implemented for the public during both the construction and operation phases of the facility. This procedure should include	Developer Contractor O&M Contractor	Pre-construction (construction procedure)

Mitigation: Action/control	Responsibility	Timeframe
details of the contact person who will be receiving issues raised by interested and affected parties, and the process that will be followed to address issues.		Pre-operation (operation procedure)
Develop and implement a grievance mechanism for the construction, operation and closure phases of the project for all employees, contractors, subcontractors and site personnel. This procedure should be in line with the South African Labour Law.	Developer Contractor O&M Contractor	Pre-construction (construction procedure) Pre-operation (operation procedure)
Organise local community meetings to advise the local labour of the project that is planned to be established and the jobs that can potentially be applied for.	EO	Pre-construction
Before construction commences, representatives from the local municipality, community leaders, community-based organisations and the surrounding property owners (of the larger area), must be informed of the details of the contractors, size of the workforce and construction schedules.	Developer Contractor	Pre-construction and construction

Performance Indicator	» Effective communication procedures in place.
Monitoring	» A grievance mechanism (Appendix A) and register must be maintained by the Contractor to record all complaints and queries relating to the project and the action taken to resolve the issue. » All correspondence should be in writing. » Developer and contractor must keep a record of local recruitments and information on local labour; to be shared with the ECO for reporting purposes during construction.

CHAPTER 6: MANAGEMENT PROGRAMME: CONSTRUCTION

Overall Goal: Undertake the construction phase in a way that:

- Ensures that construction activities are appropriately managed in respect of environmental aspects and impacts.
- Enables construction activities to be undertaken without significant disruption to other land uses and activities in the area, in particular concerning farming practices, road use, and effects on local residents.
- Minimises the impact on the indigenous natural vegetation, and habitats of ecological value.
- Minimises impacts on fauna in the study area.
- Minimises the impact on heritage sites should they be uncovered.
- Ensures rehabilitation of disturbed areas following the execution of construction works, such that residual environmental risks are remediated or curtailed.

6.1 Institutional Arrangements: Roles and Responsibilities for the Construction Phase

As the developer, Enel Green Power South Africa (Pty) Ltd must ensure that the project complies with the requirements of all environmental authorisations and permits, and obligations emanating from other relevant environmental legislation. This obligation is partly met through the development of the EMPr, and the implementation of the EMPr through its integration into the contract documentation. The Developer will retain various key roles and responsibilities during the construction phase.

OBJECTIVE 1: Establish clear reporting, communication, and responsibilities in relation to the overall implementation of the EMPr

Formal responsibilities are necessary to ensure that key procedures are executed. Specific responsibilities of the Technical Director/Manager, Site Manager, Internal Environmental Officer (EO), Safety and Health Representative, Independent Environmental Control Officer (ECO) and Contractor for the construction phase of this project are as detailed below. Formal responsibilities are necessary to ensure that key procedures are executed. **Figure 6.1** provides an organogram indicating the organisational structure for the implementation of the EMPr.

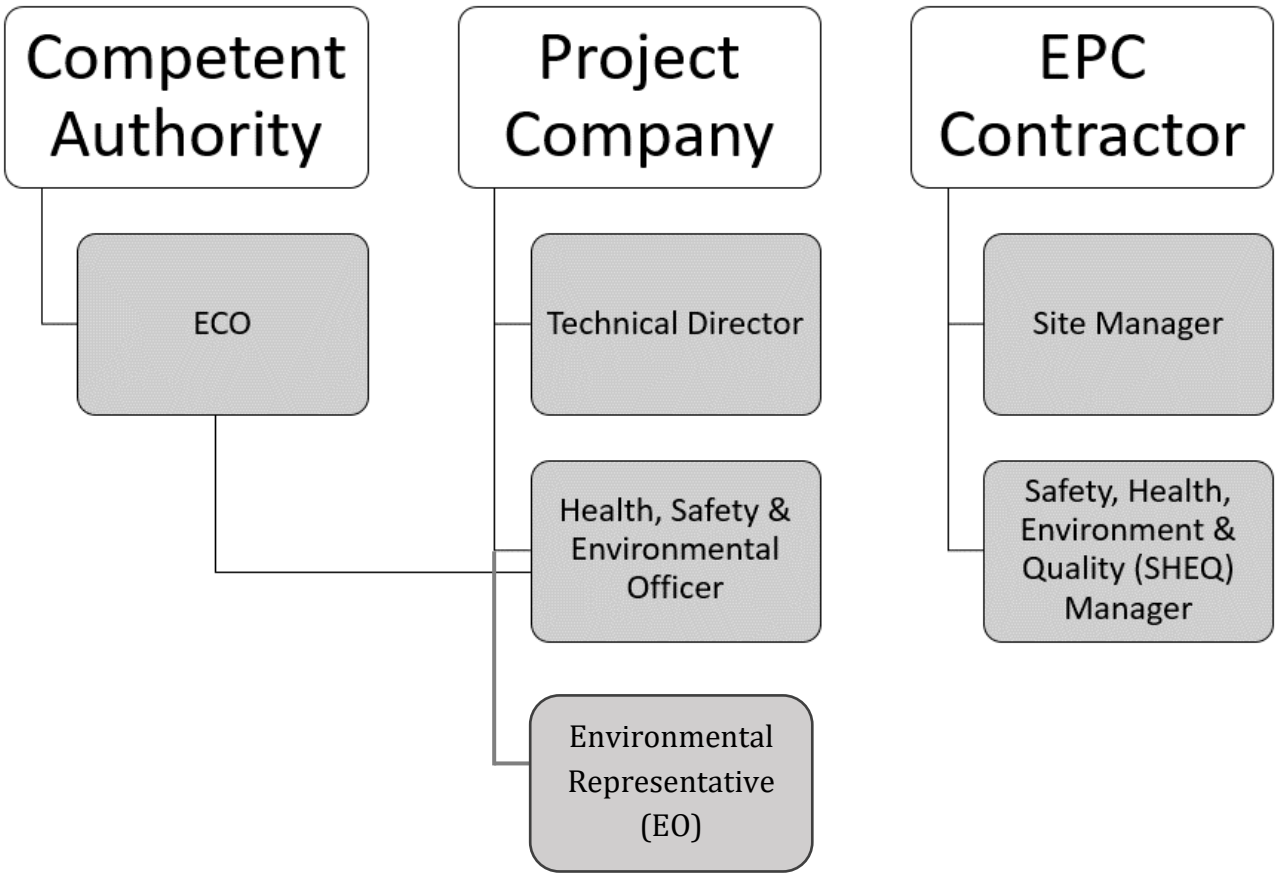

Figure 6.4: Organisational structure for the implementation of the EMPr

Please further note: The contractor (EPC) may also have an Environmental Representative (EO) role, which would work in conjunction with the developer EO depicted in Figure 6.1 above. In addition, note that for the purposes of this EMPr the roles of "Project Company" is used interchangeably with that of the "Developer".

Construction Manager will:

» Ensure all specifications and legal constraints specifically with regards to the environment are highlighted to the Contractor(s) so that they are aware of these.
» Ensure that the Developer and its Contractor(s) are made aware of all stipulations within the EMPr and Environmental Authorisation.
» Ensure that the EMPr is correctly implemented throughout the project by means of site inspections and meetings. This will be documented as part of the site meeting minutes through input from the independent ECO.
» Be fully conversant with the BA Report for the project, the EMPr, the conditions of the Environmental Authorisation, and all relevant environmental legislation.
» Be fully knowledgeable with the contents of all relevant licences and permits.

Site Manager (The Contractor's on-site Representative) will:

- Be fully knowledgeable with the contents of the BA Report.
- Be fully knowledgeable with the contents and conditions of the Environmental Authorisation.
- Be fully knowledgeable with the contents of the EMPr.
- Be fully knowledgeable with the contents of all relevant environmental legislation, and ensure compliance with these.
- Have overall responsibility of the EMPr and its implementation.
- Conduct audits to ensure compliance to the EMPr.
- Ensure there is communication with the Technical Director, the ECO, the Internal EO and relevant discipline engineers on matters concerning the environment.
- Be fully knowledgeable with the contents of all relevant licences and permits.
- Ensure that no actions are taken which will harm or may indirectly cause harm to the environment, and take steps to prevent pollution on the site.
- Confine activities to the demarcated construction site.

An **Independent ECO** must be appointed by the project developer prior to the commencement of any authorised activities and will be responsible for monitoring, reviewing and verifying compliance by the Contractor with the environmental specifications of the EMPr and the conditions of the Environmental Authorisation. Accordingly, the ECO will:

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

As a general mitigation strategy, the ECO should conduct frequent audits of the site preparation and initial clearing activities to ensure the correct demarcation of no-go areas, to facilitate environmental induction with construction staff and to supervise any flora relocation and faunal rescue activities that may need to take place during the site clearing (i.e. during site establishment, and earthworks). Thereafter, further frequent site compliance inspections should be conducted, which must be increased in frequency if required. The period and frequency of monitoring will be stipulated by the EA (once issued). Where this is not clearly

dictated, the Developer will determine and stipulate the period and frequency of monitoring required in consultation with relevant stakeholders and authorities

The ECO will be supplemented with **the EPC Contractor's/Project Company's Environmental Officer (EO) / the EPC Contractor's EO** who will be located on site on a daily basis and will guide the EPC Contractors/Project Company to ensure compliance with the environmental considerations. Therefore, in the absence of the ECO there will be a designated owner's EO present to deal with any environmental issues that may arise. The ECO shall remain employed until all rehabilitation measures, as required for implementation due to construction damage, are completed and the site handed over for operation.

Contractor's Safety, Health and Environment Representative and/or Environmental Officer: The Contractor's Safety, Health and Environment (SHE) Representative, employed by the Contractor, is responsible for managing the day-to-day on-site implementation of this EMPr, and for the compilation of regular (usually weekly) Monitoring Reports. In addition, the SHE must act as liaison and advisor on all environmental and related issues and ensure that any complaints received from the public are duly recorded and forwarded to the Site Manager and Contractor. In some instances, a separate EO may be appointed to support this function.

The EPC Contractor's Safety, Health and Environment Representative and/or EO should:

- Be well versed in environmental matters.
- Understand the relevant environmental legislation and processes and the implementation thereof.
- Understand the hierarchy of Environmental Compliance Reporting, and the implications of Non-Compliance.
- Know the background of the project and understand the implementation programme.
- Be able to resolve conflicts and make recommendations on site in terms of the requirements of this specification.
- Keep accurate and detailed records of all EMPr-related activities on site. The EO shall keep a daily diary for monitoring the site specific activities as per the project schedule.
- Supervise any flora relocation and faunal rescue activities that may need to take place during the site clearing (i.e. during site establishment, and excavation of foundations) and therefore needs the relevant training/ experience. The EO will have the overall responsibility for day-to day environmental management and implementation of mitigations.
- The EO is responsible for reporting to the ECO on the day-to-day on-site implementation of this EMPr and other Project Permits/Authorisations.
- Ensure or otherwise train and induct all contractor's employees prior to commencement of any works.
- Ensure that there is daily communication with the Site Manager regarding the monitoring of the site.
- Compilation of Weekly and Monthly Monitoring Reports to be submitted to the ECO and Site Manager.
- In addition, the EO/ Environmental Representative must act as project liaison and advisor on all environmental and related issues and ensure that any complaints received from the public are duly recorded and forwarded to the Site Manager, ECO and Contractor(s).

Contractors and Service Providers: It is important that Contractors are aware of the responsibilities in terms of the relevant environmental legislation and the contents of this EMPr. The Contractors must appoint an Internal EO who will be responsible for informing contractor employees and sub-contractors of their environmental obligations in terms of the environmental specifications, and for ensuring that employees are adequately experienced and properly trained in order to execute the works in a manner that will minimise environmental impacts. The Internal EO and Contractor's obligations in this regard include the following:

- Must be fully knowledgeable on all environmental features of the construction site and the surrounding environment.
- Be fully knowledgeable with the contents and the conditions of the Environmental Authorisation.
- Be fully knowledgeable with the contents with the EMPr.
- Be fully knowledgeable of all the licences and permits issued for the site.
- Ensure a copy of the Environmental Authorisation and EMPr is easily accessible to all on-site staff members.
- Ensure contractor employees are familiar with the requirements of this EMPr and the environmental specifications as they apply to the construction of the solar PV facility.
- Ensure that prior to commencing any site works, all contractor employees and sub-contractors must have attended environmental awareness training included in the induction training which must provide staff with an appreciation of the project's environmental requirements, and how they are to be implemented.
- Ensure that any complaints received from the public are duly recorded and forwarded to the Site Manager and Contractor.
- Manage the day-to-day on-site implementation of this EMPr, and the compilation of regular (usually weekly) Monitoring Reports.
- Keep record of all activities on site, problems identified, transgressions noted and a task schedule of tasks undertaken, including those of the Independent ECO.
- Inform staff of the environmental issues as deemed necessary by the Independent ECO.

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

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

6.2 Objectives

In order to meet the overall goal for construction, the following objectives, actions, and monitoring requirements have been identified.

OBJECTIVE 2: Minimise impacts related to inappropriate site establishment

Project Component/s	» Area infrastructure (i.e. BESS footprint and battery units, electrical transformers/switchgear and ancillary buildings).

	» Linear infrastructure (i.e. power line / cabling connecting the BESS to the substation, access road, internal roads and fencing).
Potential Impact	» Hazards to landowners and the public. » Damage to indigenous natural vegetation. » Loss of threatened plant species. » Visual impact of general construction activities, and the potential scarring of the landscape due to vegetation clearing and resulting erosion.
Activities/Risk Sources	» Any unintended or intended open excavations (foundations and/or trenches). » Movement of construction vehicles in the area and on site. » Transport to and from the temporary construction area/s.
Mitigation: Target/Objective	» To secure the site against unauthorised entry. » To protect members of the public/landowners/residents. » No loss of or damage to sensitive vegetation in areas outside the immediate development footprint. » Minimal visual intrusion by construction activities and intact vegetation cover outside of the immediate construction work areas.

Mitigation: Action/Control	Responsibility	Timeframe
Secure site, working areas and excavations in an appropriate manner.	Contractor	Site establishment, and duration of construction
Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads.	Contractor	Construction
Reduce and control construction dust through the use of approved dust suppression techniques as and when required (i.e. whenever dust becomes apparent).	Contractor	Construction
Restrict construction activities to daylight hours in order to negate or reduce the visual impacts associated with lighting.	Contractor	Construction
Access to the construction site must be controlled to avoid unauthorised entry	Contractor	Construction
All unattended open excavations must be adequately demarcated and/or fenced.	Contractor	Construction
Establish appropriately bunded areas for storage of hazardous materials (e.g. fuel to be required during construction).	Contractor	Site establishment, and duration of construction
Visual impacts must be reduced during construction through minimising areas of surface disturbance, controlling erosion, using dust suppression techniques, and restoring exposed soil as closely as possible to their original contour and vegetation.	Contractor	Site establishment, and duration of construction
Establish the necessary ablution facilities with chemical toilets and provide adequate sanitation facilities and ablutions for construction workers so that the surrounding environment is not polluted (at least one sanitary facility for each sex and for every 30 workers as per the 2014 Construction Regulations; Section 30(1)(b)) at appropriate locations on site).	Contractor	Site establishment, and duration of construction
Temporary ablution or sanitation facilities must not be located within 100m from any drainage line or within the 1:100 year flood.	Contractor	Site establishment, and duration of construction
Supply adequate weather and vermin proof waste collection bins and skips (covered at minimum with secured netting or shade cloth) at the site where construction is being undertaken.	Contractor	Site establishment, and duration of construction

Mitigation: Action/Control	Responsibility	Timeframe
Separate bins should be provided for general and hazardous waste. Provision should be made for separation of waste for recycling.		
Infrastructure should be consolidated where possible in order to minimise the amount of ground and air space used. This would involve using existing/approved pylons and associated infrastructure for the kV lines.	Contractor	Construction
Power lines must be marked with industry standard (at the time of construction) bird flight diverters.	Contractor	Construction and maintained during operation
Fencing mitigations: » Top 2 strands must be smooth wire » Routinely retention loose wires » Minimum 30cm between wires » Place markers on fences	Contractor	Construction
Perches (if in accordance with Eskom standards) should be placed on pylons to allow for avifauna to perch on the pylons in positions safe from electrocution.	Contractor	Construction
Portable toilets must be pumped dry to ensure the system does not degrade over time and spill into the surrounding area.	Health and Safety Officer	Construction

Performance Indicator	» Site is secure and there is no unauthorised entry. » No members of the public/ landowners injured. » Appropriate and adequate waste management and sanitation facilities are provided at construction site.
Monitoring	» An incident reporting system is used to record non-conformances to the EMPr. » EO to monitor all construction areas on a continuous basis until all construction is completed. Non-conformances must be immediately reported to the Site Manager.

OBJECTIVE 3: Appropriate management of the construction site and construction workers

Project Component/s	» Area infrastructure (i.e. BESS footprint and battery units, electrical transformers/switchgear and ancillary buildings). » Linear infrastructure (i.e. power line / cabling connecting the BESS to the substation, access road, internal roads and fencing).
Potential Impact	» Damage to indigenous natural vegetation and sensitive areas. » Damage to and/or loss of topsoil (i.e. pollution, compaction etc.). » Impacts on the surrounding environment due to inadequate sanitation and waste removal facilities. » Pollution/contamination of the environment.
Activities/Risk Sources	» Vegetation clearing and levelling of equipment storage area/s. » Access to and from the equipment storage area/s. » Ablution facilities.

	» Contractors not aware of the requirements of the EMPr, leading to unnecessary impacts on the surrounding environment.
Mitigation: Target/Objective	» Limit equipment storage within demarcated designated areas. » Ensure adequate sanitation facilities and waste management practices are implemented. » Ensure appropriate management of actions by on-site personnel in order to minimise impacts to the surrounding environment.

Mitigation: Action/Control	Responsibility	Timeframe
Access to the construction site must be controlled to avoid unauthorised entry.	Contractor	Construction
All personnel to undergo environmental awareness training. A signed register of attendance must be kept for proof. Discussions are required on sensitive environmental receptors within the project area to inform contractors and site staff of the presence of species, their identification, conservation status and importance, biology, habitat requirements and management requirements within the Environmental Authorisation and the EMPr.	Contractor	Construction
In order to minimise impacts on the surrounding environment, contractors must be required to adopt a certain Code of Conduct and commit to restricting construction activities to areas within the development footprint. Contractors and their sub-contractors must be familiar with the conditions of the EA, the BA Report, and this EMPr, as well as the requirements of all relevant environmental legislation.	Contractor	Construction
Introduce an incident reporting system to be tabled at weekly/monthly project meetings.	Contractor and sub-contractor/s	Pre-construction
Infrastructure such as the perimeter fences (including gates) and the main access and internal roads must be maintained or repaired if disturbed or damaged due to construction activities.	Contractor	Construction
All vehicles must be road worthy and drivers must be licensed, obey traffic rules, follow speed limits and be made aware of potential road safety issues.	Contractor and sub-contractor/s	Construction
Implement penalties for drivers of heavy and light vehicles for reckless driving or speeding as a way to enforce compliance to traffic rules.	Contractor	Construction
Heavy and light vehicles must be inspected regularly to ensure their road safety worthiness. Records pertaining to this must be maintained and made available for inspection as necessary.	Contractor	Construction
Ensure all construction equipment and vehicles are properly maintained at all times.	Contractor	Construction
Restrict the operation of power tools and plant that generate noise to daylight hours as per the Environment Conservation Act (Act No. 73 of 1989) during the construction phase, and/or as any deviation that is approved by the relevant authorities.	Contractor	Construction
Ensure that construction workers are clearly identifiable. All workers should carry identification cards and wear identifiable clothing.	Contractor	Construction

Mitigation: Action/Control	Responsibility	Timeframe
Ensure that operators and drivers are properly trained and make them aware, through regular toolbox talks, of any risk they may pose to the community and/or environment.	Contractor	Construction
Contact details of emergency services should be prominently displayed on site.	Contractor	Construction
Open fires on the site for heating, smoking or cooking are not allowed, except in designated areas.	Contractor	Construction
Contractor must provide adequate firefighting equipment on site and provide firefighting training to selected construction staff.	Contractor	Construction
Personnel trained in first aid should be on site to deal with smaller incidents that require medical attention.	Contractor	Construction
Ensure waste storage facilities are maintained and emptied on a regular basis.	Contractor	Site establishment, and duration of construction
Ensure compliance with all national, regional and local legislation with regard to the storage, handling and disposal of waste, hydrocarbons, chemicals, solvents and any other harmful and hazardous substances and materials.	Contractor	Construction
Ensure ablution facilities are appropriately maintained. Ablutions must be cleaned regularly and associated waste disposed of at a registered/permitted waste disposal site. Ablutions must be removed from site when construction is completed.	Contractor and sub-contractor/s	Duration of contract
All litter must be deposited in a clearly marked, closed, animal-proof disposal bin in the construction area. Particular attention needs to be paid to food waste.	Contractor and sub-contractor/s	Duration of contract
Keep a record of all hazardous substances stored on site. Clearly label all the containers storing hazardous waste.	Contractor	Duration of contract
No disturbance of flora or fauna must be undertaken outside of the demarcated construction area/s.	Contractor and sub-contractor/s	Duration of contract
Workers must be aware of the importance of drainage lines and drainage systems (especially those surrounding the development footprint) and the significance of not undertaking activities that could result in pollution of the features.	Contractor and EO	Pre-construction Construction
Ensure all requirements of the OHS Act and any other relevant health and safety protocols are appropriately implemented.	Contractor	Construction
Keep record of all accidents or transgressions of safety in accordance with OHS Act and implement corrective action.	Contractor	Construction

Performance Indicator	» Ablution and waste removal facilities are in a good working order and do not pollute the environment due to mismanagement. » Excess vegetation clearing and levelling is not undertaken. » No complaints regarding contractor behaviour or habits are received. » Appropriate training of all staff is undertaken prior to them commencing work on the construction site. » Code of Conduct drafted before commencement of the construction phase. » Compliance with OHS Act. » Vehicles are roadworthy, inspected regularly and speed limits are adhered to. » Roadworthy certificates are in place for all vehicles. » Roads and the perimeter fence are maintained or improved if disturbed.

Monitoring	» Regular audits of the construction on site by the EO. » Proof of disposal of sewage at an appropriate licensed wastewater treatment works. » Proof of disposal of waste at an appropriate licensed waste disposal facility. » An incident reporting system should be used to record non-conformances to the EMPr. » Observation and supervision of Contractor practices throughout the construction phase by the EO. » Complaints are investigated and, if appropriate, acted upon. » Comprehensive record of accidents and incidence and related investigations, findings and corrective action in accordance with the OHS Act.

OBJECTIVE 4: Limit disturbance of vegetation and loss of protected flora during construction

Potential Impact	» Loss of plant cover leading to erosion as well as loss of faunal habitat and loss of specimens of protected plants. » Loss of vegetation and habitats
Activity/Risk Source	Vegetation clearing for the following » Clearing for infrastructure establishment. » Access and internal roads. » Temporary laydown areas. » Construction Camps. » Infringement into high SEI areas » Relocation/destruction of protected plant species » Spill events i.e vehicle dripping » Erosion » Risk of fires » Laydown areas and material storage & placement
Mitigation: Target/Objective	» Low footprint and low impact on terrestrial environment. » Low impact on protected plant species.

Mitigation: Action/Control	Responsibility	Timeframe
Erosion control measures should be implemented in areas where slopes have been disturbed.	Management/EO	Construction & Operation
Revegetation of cleared areas or monitoring to ensure that recovery is taking place.	Management/EO	Construction & Operation
Alien plant clearing where necessary.	Management/EO	Construction & Operation
All development areas must be clearly demarcated. No development is to occur in areas possessing 'Very High' SEI. Only the 'High' SEI areas that have been authorised for development should be intruded into. These areas can be spanned, as long as no infrastructure, including construction phase access tracks are to be constructed or used. These areas must remain out of bounds.	Project Manager	Operation
Areas of indigenous vegetation outside of the direct project footprint, should under no circumstances be fragmented or disturbed further.	Project Manager	Operation
All activities must make use of existing roads and tracks as far as practically and feasibly possible.	Project Manager	Operation

Mitigation: Action/Control	Responsibility	Timeframe
Apply for a permit to relocate protected plant species into the relocation areas already used for transplantation of rescued plants.	Project Manager	Construction
All laydown areas, chemical toilets etc. should be restricted to 'Very Low' SEI areas. Any materials may not be stored for extended periods of time and must be removed from the project area once the construction phase has been concluded. Use of re-usable/recyclable materials are recommended.	Project Manager Foreman	Construction
Progressive rehabilitation of areas that have been cleared of invasive plants will enable topsoil to be returned more rapidly, thus ensuring more recruitment from the existing seedbank Any woody material removed can be shredded and used in conjunction with the topsoil to augment soil moisture and prevent further erosion.	Project Manager	Operation
Areas that have been disturbed but will not undergo development must be revegetated with indigenous vegetation.	Project Manager	Operation
A spill management plan must be put in place to ensure that should there be any chemical spill out or over that it does not run into the surrounding areas. The Contractor shall be in possession of an emergency spill kit that must always be complete and available on site. Drip trays or any form of oil absorbent material must be placed underneath vehicles/machinery and equipment when not in use.	Project Manager Contractors Foreman	Operation
Eroded areas must be rehabilitated using the appropriate techniques and re-vegetated using indigenous flora.	Project Manager	Operation

Performance Indicator	» Vegetation loss restricted to infrastructure footprint. » Low impact on protected plant species. » Permit obtained to destroy or translocate affected individuals of protected species.
Monitoring	EO to monitor construction to ensure that: » Vegetation is cleared only within essential areas. » Erosion risk is maintained at an acceptable level through flow regulation structures where appropriate and the maintenance of plant cover wherever possible.

OBJECTIVE 5: Limit loss of faunal species

Potential Impact	» Disturbance of faunal communities due to construction as well as poaching and hunting risk from construction staff
Activity/Risk Source	» Noise impacts on fauna » Relocation of faunal species » Collection of eggs, nest destruction and poaching » Habitat transformation during construction. » Presence of construction crews. » Operation of heavy vehicles. » Clearance of vegetation
Mitigation: Target/Objective	» Low faunal impact during construction.

Mitigation: Action/Control	Responsibility	Timeframe
A qualified environmental control officer must be on site when construction begins to identify fauna species that will be directly disturbed and to relocate fauna/flora that are found during the construction activities. The area must be walked though prior to construction to ensure no faunal species remain in the habitat and get killed. Should animals not move out of the area on their own relevant specialists must be contacted to advise on how the species can be relocated.	Project Manager Contractor	Construction
Noise must be kept to an absolute minimum during the evenings and at night to minimize all possible disturbances to amphibian species and nocturnal mammals	Project Manager Foreman	Construction
No trapping, killing, or poisoning of any wildlife is to be allowed	Project Manager	Operation
The duration of the construction should be minimized to as short term as possible, to reduce the period of disturbance on fauna	Project Manager	Construction
All personnel should undergo environmental induction with regards to avifauna and in particular awareness about not harming, collecting or hunting terrestrial species (e.g. guineafowl, francolin), and owls, which are often persecuted out of superstition.	Project Manager	Construction
Signs must be put up stating that should any person be found poaching any species they will be fined.	Project Manager	Construction
Construction must take place in the winter months as much is feasible.	Project Manager	Construction
Environmental induction for all construction staff	Management/EO	Construction
ECO to monitor and enforce a ban on hunting, collecting etc. of all plants and animals or their products.	Management/EO	Construction
Any fauna encountered during construction should be removed to safety by the EO or other suitably qualified person, or allowed to passively vacate the area.	Management/EO	Construction
All vehicles to adhere to low speed limits (40km/h max) on the site, to reduce risk of faunal collisions as well as reduce dust.	Management/EO	Construction
All night-lighting should use low-UV type lights (such as HPS bulbs), which do not attract insects. The lights should also be directed downward to ensure they do not result in large amounts of light pollution.	Management/EO	Construction

Performance Indicator	» Low impact on faunal species » Low mortality of fauna due to construction machinery and activities. » No poaching etc of fauna by construction personnel during construction. » Removal to safety of fauna encountered during construction.
Monitoring	» Monitoring should be on-going. » Monitoring for compliance during the construction phase. All incidents to be noted.

OBJECTIVE 6: Control of Encroachment of Alien Invasive Plants

Potential Impact	» Encroachment of alien invasive species
Activity/Risk Source	» Prescence of construction crew

	» Carried in by construction vehicles
Mitigation: Target/Objective	» Control the spread of alien invasive species

Mitigation: Action/Control	**Responsibility**	**Timeframe**
The footprint area of construction should be kept to a minimum. The footprint area must be clearly demarcated to avoid unnecessary disturbances to adjacent areas thereby causing further encroachment of invasive species.	Project Manager Contractor	Construction
An Invasive Alien Plant control programme (Appendix F) must be implemented to control the encroachment of invasive plant species. It is essential that invasives be removed from areas that have been categorised as possessing a 'High' or 'Very High' SEI.	Project Manager Contractor	Operation

Performance Indicator	» No or limited presence of alien invasive species
Monitoring	» Monitoring should be undertaken bi-annually

OBJECTIVE 7: Protection and management of soil and agricultural resources on site

Project Component/s	» Area infrastructure (i.e. BESS footprint and battery units, electrical transformers/switchgear and ancillary buildings). » Linear infrastructure (i.e. power line / cabling connecting the BESS to the substation, access road, internal roads and fencing). » Alteration of natural areas into impervious surfaces impacting on the local hydrological regime of the area.
Potential Impact	» Impacts on soil (soil pollution) » Loss of topsoil or livestock grazing » Soil Erosion.
Activity/Risk Source	» Site preparation and earthworks. » Excavation. » Construction of infrastructure. » Site preparation (e.g. compaction). » Stockpiling of topsoil, subsoil and spoil material.
Mitigation: Target/Objective	» To minimise the development footprint as far as possible. » To minimise impacts on surrounding sensitive areas. » To minimise impacts on soils. » Minimise spoil material. » Minimise erosion potential. » Minimise the grazing lost by construction activities » Reduce the potential increase in surface flow velocities and the impact on localised drainage systems.

Mitigation: Action/Control	**Responsibility**	**Timeframe**
Topsoil must be removed and stored at a maximum height of 2m and stored separately from subsoil and must be reapplied where appropriate as soon as possible in order to encourage and facilitate	Contractor	Construction

Mitigation: Action/Control	Responsibility	Timeframe
rapid regeneration of the natural vegetation on cleared areas. (maximum length of time before re-use 12 months).		
Soil stockpiles must be located away from any drainage lines or preferential water flow path in the landscape, to minimise soil erosion from these	Contractor	Construction
Soil stockpiles must be dampened with a dust suppressant or an equivalent to prevent erosion by wind.	Contractor	Duration of construction
Stockpiles are not to be used as stormwater control features.	Contractor	Construction
Dust-reducing mitigation measures must be put in place and must be strictly adhered to, for all areas of construction. This includes the wetting of exposed soft soil surfaces and increasing dust suppression on windy days which will decrease the likelihood of dust being generated.	Contractor	Construction
All graded or disturbed areas which must not be covered by permanent infrastructure such as paving, buildings or roads must be stabilised using appropriate erosion control measures.	Contractor	Construction
A method statement must be developed and submitted to the engineer to deal with erosion issues prior to bulk earthworks operations commencing.	Contractor	Before and during construction
Signs of erosion within the development footprint must be documented through photographic evidence encompassed with the inclusion of the GPS coordinates of the identified problem areas.	EO	Duration of project
Where erosion takes place, the EO must inspect the degree of erosion and propose suitable mitigation measures to prevent further erosion.	Contractor EO	Construction
Any erosion problems observed within the development area as a result of the construction activities must be rectified immediately and monitored thereafter to ensure that they do not re-occur.	Contractor	Construction
Any signs of soil erosion on site should be documented (including photographic evidence and coordinates of the problem areas) and submitted to the management team for further action.	Contractor	Construction
During construction the contractor shall protect areas susceptible to erosion by installing appropriate temporary and permanent drainage works as soon as possible and by taking other measures necessary to prevent the surface water from being concentrated in streams and from scouring the slopes, banks or other areas.	Contractor	construction
Erosion control measures to be regularly maintained.	Contractor	Construction
Only the designated access routes are to be used to reduce any unnecessary compaction.	Contractor	Construction
Topsoil to be stripped when the soil is dry in order to reduce compaction. The topsoil should be stripped by means of an excavator bucket, and loaded onto dump trucks.	Contractor	Construction
The handling of the stripped topsoil must be minimized to ensure the soil's structure does not deteriorate significantly	Contractor	Construction
Vegetation clearance must be restricted to areas where infrastructure is constructed	Contractor	Construction

Mitigation: Action/Control	Responsibility	Timeframe
Removal of obstacles to allow for access of construction vehicles must be kept to only where essential.	Contractor	Construction
Prior arrangements must be made with the landowners to ensure that livestock and game animals are moved to areas where they cannot be injured by vehicles traversing the area.	Contractor	Duration of project
No boundary fence must be opened without the landowners' permission.	Contractor	Duration of project
No open fires made by the construction teams are allowable during the construction phase.	Contractor	Construction
Land clearance must only be undertaken immediately prior to construction activities and only within the development footprint;	Contractor	Construction
Unnecessary land clearance must be avoided;	Contractor	Duration of project
Where possible, conduct the construction activities outside of the rainy season.	Contractor	Construction
Maintenance must be undertaken regularly on all vehicles and construction/maintenance machinery to prevent hydrocarbon spills;	Contractor	Construction
Any waste generated during construction, must be stored into designated containers and removed from the site by the construction teams.	Contractor	Construction
Ensure battery transport and installation by accredited staff / contractors.	Contractor	Construction
Compile (and adhere to) a procedure for the safe handling of battery cells during transport and installation.	Contractor	Construction
Foundations and trenches must be backfilled to originally excavated materials as much as possible. Excess excavation materials must be disposed of only in approved areas, or, if suitable, stockpiled for use in reclamation activities.	Contractor	Site establishment, and duration of construction and rehabilitation
The mitigation measures included in the Stormwater Management Plan (**Appendix B** of the EMPr) must be implemented.	Contractor Developer	Duration of project
Stormwater management around the construction footprint areas must be undertaken to ensure that sediment-laden run-off does not enter drainage lines.	Contractor	Construction
Any stormwater within the site must be handled in a suitable manner. Contaminated water must not be discharged into the surrounding environment.	Contractor and Engineers	Construction
All roads and other hardened surfaces must have runoff control features which redirect water flow and dissipate any energy in the water which may pose an erosion risk.	Contractor	Construction
The access roads should be permeable to allow for drainage from the road surface. In this regard, suitable stormwater management should be implemented to allow for water to drain from the roads without causing erosion.	Contractor	Construction
Appropriate drainage channels must be designed and implemented, including the application of diffuse flow measures where discharge of rainwater on roads will be channelled directly into the natural environment,	Contractor	Construction

Mitigation: Action/Control	Responsibility	Timeframe
New access and internal roads within the site are to be constructed according to design and contract specifications.	Contractor	Construction

Performance Indicator	» Topsoil appropriately stored, managed and rehabilitated. » Limited soil erosion around the development area. » No activity is undertaken in restricted areas. » Minimal level of soil degradation. » Minimal level of grazing lost due to construction. » No impacts due to runoff. » Appropriate stormwater management practices implemented.
Monitoring	» Contractor's EO to provide supervision and oversight of vegetation clearing activities within sensitive areas such as near drainage lines. » Supervision of all clearing and earthworks. » Ongoing monitoring of erosion management measures within the development area. » An incident reporting system will be used to record non-conformances to the EMPr.

OBJECTIVE 8: Protection of Heritage Resources

Project Component/s	» Area infrastructure (i.e. BESS footprint and battery units, electrical transformers/switchgear and ancillary buildings). » Linear infrastructure (i.e. power line / cabling connecting the BESS to the substation, access road, internal roads and fencing).
Potential Impact	» Heritage objects or artefacts found on site and within the development footprint are inappropriately managed or destroyed.
Activity/Risk Source	» Site preparation and earthworks. » Equipment installation. » Mobile construction equipment movement on site.
Mitigation: Target/Objective	» To ensure that any heritage objects found on site are treated appropriately and in accordance with the relevant legislation.

Mitigation: Action/control	Responsibility	Timeframe
Construction managers/foremen should be informed before construction starts on the possible types of heritage sites and cultural material they may encounter and the procedures to follow when they find sites.	EO	Prior to construction commencing
A person must be trained as a site monitor to report any archaeological sites found during the development.	Contractor	Prior to construction commencing
All staff must be made familiarised with procedures for dealing with heritage objects/sites.	Contractor	Duration of contract, particularly during excavations
EO to alert workers to the importance of reporting fossil bones seen on site and to the possibility of encountering human remains.	EO	Construction

Mitigation: Action/control	Responsibility	Timeframe
A Chance Find Protocol (**Appendix E**) must be implemented in the event that archaeological or palaeontological resources are found.	Developer Contractor	Construction and duration of contract
If concentrations of historical and pre-colonial archaeological heritage material and/or human remains (including graves and burials) are uncovered during construction, all work in the vicinity must cease immediately and be reported to the South African Heritage Resources Agency (SAHRA) so that systematic and professional investigation/excavation can be undertaken. Phase 2 mitigation in the form of test-pitting/sampling or systematic excavations and collections of the pre-colonial shell middens and associated artefacts will then be conducted to establish the contextual status of the sites and possibly remove the archaeological deposit before development activities continue.	EO Developer	Construction and duration of contract
. Should substantial fossil remains such as vertebrate bones and teeth, plant-rich fossil lenses, fossil wood or dense fossil burrow assemblages be exposed during construction, the responsible ECO/EO/Environmental Representative should safeguard these, preferably in situ, and alert SAHRA, i.e. The South African Heritage Resources Authority, as soon as possible (Contact details: Mr P. Hine P.O. Box 4637, Cape Town 8000. Tel: 021 462 4502. Email: phine@sahra.org.za) so that appropriate action can be taken by a professional palaeontologist, at the Proponent's expense. Mitigation would normally involve the scientific recording and judicious sampling or collection of fossil material as well as associated geological data (e.g. stratigraphy, sedimentology, taphonomy) by a suitably qualified palaeontologist	EO, Archaeologist	Construction
If unmarked human burials are uncovered, the SAHRA Burial Grounds & Graves (BGG) Unit (Thingahangwi Tshivhase/Mimi Seetelo 012 320 8490) must be alerted immediately.	EO Developer	Construction and duration of contract.

Performance Indicator	» No disturbance outside of designated work areas. » All heritage items discovered are dealt with as per the legislative guidelines.
Monitoring	» Observation of excavation activities by the EO throughout construction phase. » Supervision of all clearing and earthworks. » Due care taken during earthworks and disturbance of land by all staff and any heritage objects found reported. » Appropriate permits obtained from SAHRA prior to the disturbance or destruction of heritage sites (if required). » An incident reporting system will be used to record non-conformances to the EMPr.

OBJECTIVE 9: Appropriate handling and management of waste

The construction activities associated with the Karusa BESS and associated infrastructure will involve the generation of various wastes. In order to manage the wastes effectively, guidelines for the assessment,

classification, and management of wastes, along with industry principles for minimising construction wastes must be implemented. The main wastes expected to be generated by the construction activities include:

» general solid waste;
» hazardous waste;
» inert waste (rock and soil); and
» liquid waste (including grey water and sewage).

Project Component/s	» Area infrastructure (i.e. BESS footprint and battery units, electrical transformers/switchgear and ancillary buildings). » Linear infrastructure (i.e. power line / cabling connecting the BESS to the substation, access road, internal roads and fencing).
Potential Impact	» Inefficient use of resources resulting in excessive waste generation. » Litter or contamination of the site or water through poor waste management practices.
Activity/Risk Source	» Packaging. » Other construction wastes, including chemicals used during construction. » Hydrocarbon use and storage. » Spoil material from excavation, earthworks and site preparation.
Mitigation: Target/Objective	» To comply with waste management legislation. » To minimise production of waste. » To ensure appropriate waste storage and disposal. » To avoid environmental harm from waste mismanagement on site. » A waste manifest must be developed for the ablutions showing proof of disposal of sewage at appropriate water treatment works.

Mitigation: Action/Control	Responsibility	Timeframe
Construction method and materials must be carefully considered in view of waste reduction, re-use, and recycling opportunities.	Contractor	Duration of contract
Construction contractors must provide specific detailed waste management plans to deal with all waste streams.	Contractor	Duration of contract
Ensure that no litter, refuse, wastes, rubbish, rubble, debris and builders wastes generated on the premises are placed, dumped or deposited on adjacent/surrounding properties, and that the waste is disposed of an appropriately licensed disposal facility.	Contractor	Duration of contract
Waste disposal at the construction site must be avoided by separating and trucking out of waste.	Contractor	Construction
Specific areas must be designated on-site for the temporary management of various waste streams, i.e. general refuse, construction waste (wood and metal scrap), and contaminated waste as required. Location of such areas must seek to minimise the potential for impact on the surrounding environment, including prevention of contaminated runoff, seepage, and vermin control.	Contractor	Duration of contract
Where practically possible, construction and general wastes on site must be reused or recycled. Bins and skips must be available on-site for collection, separation, and storage of waste streams (such as wood, metals, general refuse etc.).	Contractor	Duration of contract
Disposal of waste must be in accordance with relevant legislative requirements, including the use of licensed contractors.	Contractor	Duration of contract

Mitigation: Action/Control	Responsibility	Timeframe
Uncontaminated waste must be removed regularly (i.e. as skips are nearing being full); other wastes must be removed for recycling/ disposal at an appropriate frequency.	Contractor	Duration of contract
Hydrocarbon waste must be contained and stored in sealed containers within an appropriately bunded area and clearly labelled.	Contractor	Duration of contract
Waste must be kept to a minimum and must be transported by approved waste transporters to sites designated for their disposal.	Contractor	Duration of contract
All sewage disposal to take place at a registered and operational wastewater treatment works. Slips of disposal to be retained as proof of responsible disposal.	Contractor	Maintenance: duration of contract within a particular area
All liquid waste must be contained in appropriately sealed vessels/ponds within the footprint of the development, and be disposed of at a designated waste management facility after use.	Contractor	Duration of contract
Documentation (waste manifest) must be maintained detailing the quantity, nature, and fate of any regulated waste. Waste disposal records must be available for review at any time.	Contractor	Duration of contract
SABS approved spill kits must be available and easily accessible.	Contractor	Duration of contract
Regularly serviced chemical toilet facilities and/or septic tank must be used to ensure appropriate control of sewage.	Contractor	Duration of contract
Daily inspection of all chemical toilets and septic tanks must be performed by environmental representatives on site.	Contractor	Duration of contract
In the event where sewage is discharged into the environment, all contaminated vegetation/ rock and soil must be removed immediately and treated as hazardous waste.	Contractor	Duration of construction
Under no circumstances may waste be burnt on site or on surrounding premises.	Contractor	Duration of construction
Where a registered waste site is not available close to the construction site, provide a method statement with regard to waste management.	Contractor	Duration of construction
Implement an integrated waste management approach (**Appendix C**) that is based on waste minimisation and incorporates reduction, recycling, re-use and disposal where appropriate. Where solid waste is disposed of, such disposal shall only occur at a landfill licensed in terms of section 20(b) of the National Environmental Management Waste Act, 2008 (Act 59 of 2008).	Contractor	Duration of construction
Upon the completion of construction, the area must be cleared of potentially polluting materials. Spoil stockpiles must also be removed and appropriately disposed of or the materials re-used for an appropriate purpose.	Contractor	Completion of construction
Upon the completion of construction, all sanitation facilities (including chemical toilets) must be removed, as well as the associated waste to be disposed of at a registered waste disposal site.	Contractor	Completion of construction
Refuse bins will be emptied and secured. Temporary storage of domestic waste shall be in covered waste skips. Recycling is encouraged.	Contractor	Duration of construction

Mitigation: Action/Control	Responsibility	Timeframe
All building rubble, solid and liquid waste etc. generated during the construction activities must be disposed of as necessary at an appropriately licensed refuse facility.	Contractor	Duration of construction
Waste management must be a priority and all waste must be collected and stored effectively. All solid waste collected shall be disposed of at a licensed disposal facility	Project Manager	Construction
Where a registered disposal facility is not available close to the project area, the Contractor shall provide a method statement with regard to waste management. Under no circumstances may domestic waste be burned on site	Project Manager Health and Safety Officer	Construction

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

OBJECTIVE 10: Appropriate handling and storage of chemicals, hazardous substances

The construction phase may involve the storage and handling of a variety of chemicals including adhesives, abrasives, oils and lubricants, paints and solvents.

Project Component/s	» Laydown areas. » Temporary chemical storage areas.
Potential Impact	» Generation of contaminated wastes from used chemicals or chemical containers. » Soil pollution.
Activity/Risk Source	» Vehicles associated with site preparation and earthworks. » Construction activities of area and linear infrastructure. » Hydrocarbon spills by vehicles and machinery during earthworks, vegetation clearance and transport of workers, materials and equipment and fuel storage tanks. » Accidental spills of hazardous chemicals. » Pollution from concrete mixing.
Mitigation: Target/Objective	» To ensure that the storage and handling of chemicals and machinery on-site does not cause pollution to the environment or harm to persons. » Prevent and contain chemical leaks. » Undertake proper waste management. » Store hazardous chemicals safely in a bunded area.

Mitigation: Action/Control	Responsibility	Timeframe
Implement an emergency preparedness plan (**Appendix D)** during the construction phase.	Contractor	Duration of Contract
Any liquids stored on site, including fuels and lubricants, must be stored in accordance with applicable legislation.	Contractor	Duration of Contract
Spill kits must be made available on-site for the clean-up of spills and leaks of contaminants.	Contractor	Duration of contract
Losses of fuel and lubricants from the oil sumps and steering racks of vehicles and equipment must be contained using a drip tray with plastic sheeting filled with absorbent material when not parked on hard standing.	Contractor	Construction
Ensure battery transport and installation by accredited staff / contractors.	Contractor	Construction
Compile (and adhere to) a procedure for the safe handling of battery cells during transport and installation.	Contractor	Construction
Establish or utilise an appropriate Hazardous Store which is in accordance with the Hazardous Substance Amendment Act, No. 53 of 1992. This should include but not be limited to: » Designated area; » All applicable safety signage; » Firefighting equipment; » Enclosed by an impermeable bund; » Protected from the elements, » Lockable; » Ventilated; and » Have adequate capacity to contain 110% of the largest container contents.	Contractor	Duration of Contract
Corrective action must be undertaken immediately if a complaint is made, or potential/actual leak or spill of polluting substance identified. This includes stopping the contaminant from further escaping, cleaning up the affected environment as much as practically possible and implementing preventive measures. Where required, a NEMA Section 30 report must be submitted to DFFE within 14 days of the incident.	Contractor	Duration of contract
In the event of a major spill or leak of contaminants, the relevant administering authority must be immediately notified as per the notification of emergencies/incidents.	Contractor	Duration of contract
Spilled concrete must be cleaned up as soon as possible and disposed of at a suitably licensed waste disposal site. Check vehicles and machinery daily for oil, fuel and hydraulic fluid leaks and undertake regular high standard maintenance on vehicles.	Contractor	Duration of contract
Accidental spillage of potentially contaminating liquids and solids must be cleaned up immediately in line with procedures by trained staff with the appropriate equipment.	Contractor	Duration of contract
Any contaminated/polluted soil removed from the site must be disposed of at a licensed hazardous waste disposal facility.	Contractor	Duration of contract
All stored fuels to be maintained within an appropriate bund and on a sealed surface as per the requirements of SABS 089:1999 Part 1 and any relevant by-laws.	Contractor	Duration of contract

Mitigation: Action/Control	Responsibility	Timeframe
Fuel storage areas must be inspected regularly to ensure bund stability, integrity, and function.	Contractor	Duration of contract
Construction machinery must be stored in an appropriately sealed area.	Contractor	Duration of contract
Oily water from bunds at the on-site facility substation must be removed from site by licensed contractors.	Contractor	Duration of contract
The storage of flammable and combustible liquids such as oils must be undertaken in designated areas which are appropriately bunded, and stored in compliance with Material Safety Data Sheets (MSDS) files.	Contractor	Duration of contract
Any storage and disposal permits/approvals which may be required must be obtained, and the conditions attached to such permits and approvals must be complied with.	Contractor	Duration of contract
Transport of all hazardous substances must be in accordance with the relevant legislation and regulations.	Contractor	Duration of contract
An effective monitoring system must be put in place to detect any leakage or spillage of all hazardous substances during their transportation, handling, installation and storage.	Contractor	Construction
Precautions must be in place to limit the possibility of oil and other toxic liquids entering the soil or clean stormwater system.	Contractor	Construction
As much material as possible must be pre-fabricated and then transported to site to avoid the risks of contamination associated with mixing, pouring and the storage and handling of chemicals and compounds on site.	Contractor	Construction
All chemicals and toxicants used during construction must be stored in bunded areas.	Contractor	Construction
All waste generated on-site during construction must be adequately managed.	Contractor	Construction
Minimise fuels and chemicals stored on site.	Contractor	Construction
Install bunds on storage areas and take other precautions to reduce the risk of spills.	Contractor	Construction
Implement a contingency plan to handle spills, so that environmental damage is avoided.	Contractor	Construction
No refuelling, servicing of plant/equipment or chemical substance storage allowed outside of designated areas.	Contractor	Construction
Drip trays should be used during al fuel/chemical dispensing and be placed beneath standing machinery/plant.	Contractor	Construction
In the case of hazardous (including petrochemical) spillages, the spill must be collected immediately and stored in a designated area until it can be disposed of in accordance with the Hazardous Chemical Substances Regulations, 1995 (Regulation 15).	Contractor	Construction

Performance Indicator	» No chemical spills outside of designated storage areas. » No water or soil contamination by spills. » No complaints received regarding waste on site or indiscriminate dumping. » Safe storage of hazardous chemicals. » Proper waste management.

Monitoring	» Observation and supervision of chemical storage and handling practices and vehicle maintenance throughout the construction phase. » A grievances register must be maintained, in which any complaints from the community will be logged. » An incident reporting system will be used to record non-conformances to the EMPr. » On-going visual assessment to detect polluted areas and the application of clean-up and preventative procedures. » Records of accidental spills and clean-up procedures and the results thereof must be audited on an annual basis by the ECO. » Records of all incidents that caused chemical pollution must be kept and a summary of the results must be reported to management annually.

OBJECTIVE 11: Ensure appropriate rehabilitation of disturbed areas such that residual environmental risks are remediated or curtailed

Areas requiring rehabilitation will include all areas disturbed during the construction phase and that are not required for regular operation and maintenance operations. Rehabilitation must be undertaken in an area as soon as possible after the completion of construction activities within that area.

Project Component/s	» All areas affected by construction activities and not required for operation.
Potential Impact	» Environmental integrity of the site undermined resulting in reduced visual aesthetics, erosion and increased runoff, and the requirement for on-going management intervention.
Activity/Risk Source	» Temporary construction areas. » Other disturbed areas/footprints.
Mitigation: Target/Objective	» Ensure and encourage site rehabilitation of disturbed areas. » Ensure that the site is appropriately rehabilitated following the execution of the works, such that residual environmental impacts (including erosion) are remediated or curtailed.

Mitigation: Action/Control	Responsibility	Timeframe
Implement an appropriate Revegetation and Rehabilitation Plan (Appendix I).	Contractor	Following execution of the works
All temporary facilities, equipment, and waste materials must be removed from site as soon as construction is completed.	Contractor	Following execution of the works
All left-over construction material must be removed from site once construction on a land portion is completed.	Contractor	Following execution of the works
Any left-over construction materials must be removed from site.	Contractor	Following execution of the works
Level any remaining soil removed from excavation pits that remained on the surface instead of allowing small stockpiles of soil to remain on the surface.	Contractor	Following execution of the works
The area must be shaped to a natural topography.	Contractor	Following completion of construction activities in an area

Mitigation: Action/Control	Responsibility	Timeframe
No planting or importing any listed invasive alien plant species (all Category 1a, 1b and 2 invasive species) to the site for landscaping, rehabilitation or any other purpose must be undertaken.	Contractor	Following completion of construction activities in an area
Compacted areas must be ripped (perpendicularly) to a depth of 300mm (or as determined by an ecologist based on the local conditions), and the area must be top soiled and re-vegetated.	Contractor	Following completion of construction activities in an area
Necessary drainage works and anti-erosion measures must be installed, where required, to minimise loss of topsoil and control erosion.	Contractor	Following completion of construction activities in an area
Topsoil from all excavations and construction activities must be salvaged and reapplied during reclamation. Soils must be replaced in the correct sequence / profile.	Contractor	Following completion of construction activities in an area
Re-vegetated areas may need to be protected from wind erosion and maintained until an acceptable plant cover has been achieved.	Developer in consultation with rehabilitation specialist	Post-rehabilitation
Erosion control measures must be used in sensitive areas such as steep slopes, hills, and drainage systems if necessary.	Developer in consultation with EO and rehabilitation specialist (if required)	Post-rehabilitation
On-going alien plant monitoring and removal must be undertaken on all areas of natural vegetation on an annual basis.	Developer	Post-rehabilitation

Performance Indicator	» All portions of the site are cleared of equipment and temporary facilities. » Topsoil is replaced on all areas and stabilised where practicable or required after construction and temporally utilised areas. » Disturbed areas are rehabilitated and an acceptable plant cover achieved on rehabilitated sites. » The completed site is free of erosion and alien invasive plants.
Monitoring	» Rehabilitated areas must be monitored (responsibility of EO) on a weekly basis throughout the construction phase and preferably on a monthly basis thereafter and to the point where the area has been rehabilitated to a satisfactory level. This will however be related to the level of post-rehabilitation works required and will be decided on the specific rehabilitation requirements post-construction. » On-going inspection of rehabilitated areas in order to determine the effectiveness of rehabilitation measures implemented during the operational lifespan of the facility. » On-going alien plant monitoring and removal should be undertaken on an annual basis.

6.3 Detailing Method Statements

OBJECTIVE 12: Ensure all construction activities are undertaken with the appropriate level of environmental awareness to minimise environmental risk

The environmental specifications are required to be underpinned by a series of Method Statements, within which the Contractors and Service Providers are required to outline how any identified environmental risks will practically be mitigated and managed for the duration of the contract, and how specifications within this

EMPr will be met. That is, the Contractor will be required to describe how specified requirements will be achieved through the submission of written Method Statements to the Site Manager, EO and ECO.

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

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

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

- Site establishment (which explains all activities from induction training to offloading, construction sequence for site establishment and the different amenities and to be established etc. Including a site camp plan indicating all of these).
- Preparation of the site (i.e. clearing vegetation, compacting soils, and waste).
- Soil management/stockpiling and erosion control.
- Excavations and backfilling procedure.
- Stipulate norms and standards for water supply and usage (i.e.: comply strictly to licence and legislation requirements and restrictions).
- Stormwater method statement.
- Ablution facilities (placement, maintenance, management and servicing).
- Solid Waste Management:
  - Description of the waste storage facilities (on site and accumulative).
  - Placement of waste stored (on site and accumulative).
  - Management and collection of waste process.
  - Recycle, re-use and removal process and procedure.
- Liquid waste management.
- Design, establish, maintain and operate suitable pollution control facilities necessary to prevent discharge of water containing polluting matter or visible suspended materials into the surrounding environment. Should grey water (i.e. water from basins, showers, baths, kitchen sinks etc.) need to be disposed of, link into an existing facility where possible. Where no facilities are available, grey water runoff must be controlled to ensure no seepage into the surrounding environment occurs.
- Dust and noise pollution:

- Describe the necessary measures to ensure that noise from construction activities is maintained within lawfully acceptable levels.
- Procedure to control dust at all times on the site, access roads and spoil sites (dust control shall be sufficient so as not to have significant impacts in terms of the biophysical and social environments). These impacts include visual pollution, decreased safety due to reduced visibility, negative effects on human health and the ecology due to dust particle accumulation.

» Hazardous substance storage (ensure compliance with all national, regional and local legislation with regard to the storage of oils, fuels, lubricants, solvents, wood treatments, bitumen, cement, pesticides and any other harmful and hazardous substances and materials. South African National Standards apply).
- Lists of all potentially hazardous substances to be used.
- Appropriate handling, storage and disposal procedures.
- Prevention protocol of accidental contamination of soil at storage and handling areas.
- All storage areas, (i.e. for harmful substances appropriately bunded with a suitable collection point for accidental spills must be implemented and drip trays underneath dispensing mechanisms including leaking engines/machinery).

» Fire prevention and management measures on site.
» Fauna and flora protection process on and off site (i.e. removal to reintroduction or replanting, if necessary).
- Rehabilitation, re-vegetation process and bush clearing.

» Incident and accident reporting protocol.
» General administration.
» Designate access road and the protocols while roads are in use.
» Requirements on gate control protocols.

The Contractor may not commence with the activity covered by the Method Statement until it has been approved by the Site Manager (with input from the ECO), except in the case of emergency activities and then only with the consent of the Site Manager. Approval of the Method Statement will not absolve the Contractor from their obligations or responsibilities in terms of their contract. Failure to submit a method statement may result in suspension of the activity concerned until such time that an appropriate method statement has been submitted and approved.

6.4 Awareness and Competence: Construction Phase

OBJECTIVE 13: To ensure all construction personnel have the appropriate level of environmental awareness and competence to ensure continued environmental due diligence and on-going minimisation of environmental harm

To achieve effective environmental management, it is important that all personnel involved in the project are aware of the responsibilities in terms of the relevant environmental legislation and the contents of this EMPr. The ECO is responsible for monitoring compliance pre, during and post construction (until rehabilitation is completed). The contractor is responsible for informing employees and sub-contractors of their environmental obligations in terms of the environmental specifications, and for ensuring that employees are adequately experienced and properly trained in order to execute the works in a manner that will minimise environmental impacts.

The Contractors obligations in this regard include the following:

- All Employees must have a basic understanding of the key environmental features of the construction site and the surrounding environment. This includes the discussion/explanation of site environmental matters during toolbox talks.
- The content and requirements of Method Statements are to be clearly explained to all plant operators and general workers. All staff acting in a supervisory capacity are to have copies of the relevant Method Statements and be aware of the contents thereof.
- Ensuring that a copy of the EMPr is readily available on-site, and that all senior site staff are aware of the location and have access to the document. Senior site staff will be familiar with the requirements of the EMPr and the environmental specifications as they apply to the construction of the facility.
- Ensuring that, prior to commencing any site works, all employees and sub-contractors have attended an Environmental Awareness Training session. The training session must provide the site staff with an appreciation of the project's environmental requirements, and how they are to be implemented.
  - Records must be kept of those that have completed the relevant training.
  - Training should be done either in a written or verbal format but must be appropriate for the receiving audience.
  - Refresher sessions must be held to ensure the contractor staff are aware of their environmental obligations as practically possible.
- All sub-contractors must have a copy of the EMPr and sign a declaration/ acknowledgement that they are aware and familiar with the contents and requirements of the EMPr and that they will conduct work in such a manner as to ensure compliance with the requirements of the EMPr.
- Contractors and main sub-contractors must have basic training in the identification of archaeological sites/objects, and protected flora and fauna that may be encountered on the site.
- Awareness of any other environmental matters, which are deemed to be necessary by the ECO.
- Ensuring that employee information posters, outlining the environmental "do's" and "don'ts" (as per the environmental awareness training course) are erected at prominent locations throughout the development area.

Therefore, prior to the commencement of construction activities and before any person commences with work thereafter, adequate environmental awareness and responsibility are to be appropriately presented to all staff present on-site, clearly describing their obligations towards environmental controls and methodologies in terms of this EMPr. This training and awareness will be achieved in the following ways:

6.4.1 Environmental Awareness and Induction Training

The EO, in consultation with the contractor, shall ensure that all construction workers receive an induction presentation, as well as on-going environmental education and awareness, on the importance and implications of the EMPr and the environmental requirements it prescribes. The presentation shall be conducted, as far as is possible, in the employees' language of choice. The contractor must provide a translator from their staff for the purpose of translating should this be necessary.

As a minimum, induction training should include:

- Explanation of the importance of complying with the EMPr;
- Explanation of the importance of complying with the Environmental Authorisation;
- Discussion of the potential environmental impacts of construction activities;
- Awareness regarding sensitivities on the site, including sensitive plant species (including the use of visual aids and on-site identification);

- The benefits of improved personal performance;
- Employees' roles and responsibilities, including emergency preparedness (this should be combined with this induction, but presented by the contractor's Health and Safety Representative);
- Explanation of the mitigation measures that must be implemented when carrying out their activities; and
- Explanation of the specifics of this EMPr and its specification (no-go areas, etc.).

Environmental Awareness Training must take the form of an on-site talk and demonstration by the EO/ECO before the commencement of site establishment and construction on site. The education/awareness programme must be aimed at all levels of management and construction workers within the contractor team. A record of attendance of this training must be maintained by the EO/ECO on site. Proof of awareness training must be kept on record. Environmental induction training must be presented to all persons who are to work on the site – be it for short or long durations; Contractor's or Engineer's staff; administrative or site staff; sub-contractors or visitors to site.

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

6.4.2 Toolbox Talks

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

6.5 Monitoring Programme: Construction Phase

OBJECTIVE 14: To monitor the performance of the control strategies employed against environmental objectives and standards

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

The following monitoring frequency is however proposed for consideration by the Competent Authority to be included in the Environmental Authorisation:

i. Monthly ECO site inspections with associated monitoring checklist and monthly inspection report for the duration of the construction phase, to be kept within the site environmental file;
ii. Monthly submission of ECO monitoring reports once the monthly report is finalised. In essence, one monthly ECO report submission to DFFE Compliance directorate for the duration of the construction phase.

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

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

All documentation e.g. audit/monitoring/compliance reports and notifications, required to be submitted to the DFFE in terms of the EA, must be submitted to the Director: Compliance Monitoring of the Department.

Records relating to monitoring and auditing must be kept on site and made available for inspection to any relevant and competent authority in respect of this development.

6.5.1. Non-Conformance Reports

All supervisory staff including Foremen, Engineers, EO and the ECO must be provided the means to be able to submit non-conformance reports to the Site Manager. Non-conformance reports will describe, in detail, the cause, nature and effects of any environmental non-conformance by the Contractor.

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

6.5.2. Monitoring Reports

A monitoring report will be compiled by the ECO in accordance with the period and frequency of monitoring as stipulated by the EA (once issued), although the suggested monitoring frequency has been provided in Section 6.5 above for consideration to the competent authority. Where this is not clearly dictated, the Developer will determine and stipulate the period and frequency of monitoring required in consultation with relevant stakeholders and authorities. The monitoring report must be submitted to the Director: Compliance Monitoring at DFFE for their records. This Report must include details of the activities undertaken in the reporting period, any non-conformances or incidents recorded, corrective action required, and details of those non-conformances or incidents which have been closed out. The contractor must ensure that all waste manifests are provided to the ECO on a monthly basis in order to inform and update the DFFE regarding waste related activities.

6.5.3. Audit Reports

The holder of the EA must, for the period during which the EA and EMPr remain valid, ensure that project compliance with the conditions of the EA and the EMPr are audited according to the requirements of the EA and any relevant Regulation contained within the Environmental Impact Assessment Regulations (2014), as amended read with the National Environmental Management Act, (No. 107 of 1998), and that the audit reports are submitted to the Director: Compliance Monitoring of the DFFE.

6.5.4. Final Audit Report

A final environmental audit report must be compiled by an independent auditor and be submitted to DFFE upon completion of the construction and rehabilitation activities. The Report must be submitted within 30 days of completion of rehabilitation activities. This Report must indicate the date of the audit, the name of the auditor and the outcome of the audit in terms of compliance with the EA conditions and the requirements of the EMPr.

CHAPTER 7: OPERATION MANAGEMENT PROGRAMME

Overall Goal: To ensure that the operation of the BESS and associated infrastructure does not have unforeseen impacts on the environment and to ensure that all impacts are monitored and the necessary corrective action taken in all cases. In order to address this goal, it is necessary to operate the facility in a way that:

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

7.1. Objectives

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

OBJECTIVE 1: Establish clear reporting, communication, and responsibilities in relation to overall implementation of the EMPr during operation

Formal responsibilities are necessary to ensure that key procedures are executed. Specific responsibilities of the Operations Manager, and Technical/SHEQ Manager for the operation phase of this project are detailed below. These resources can be the same as those for the wind farm, where relevant.

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

The **Technical/SHEQ Manager** will:

» Manage and report on the facility's environmental performance.
» Maintain a register of all known environmental impacts and manage the monitoring thereof.
» Conduct internal environmental audits and co-ordinate external environmental audits.
» Liaise with statutory bodies such as the National and Provincial Department of Environmental Affairs, Forestry and Fisheries (DFFE) on environmental performance and other issues.
» Conduct environmental training and awareness for the employees who operate and maintain the facility.
» Compile environmental policies and procedures.
» Liaise with interested and affected parties on environmental issues of common concern.
» Track and control the lodging of any complaints regarding environmental matters.

OBJECTIVE 2: Limit the ecological footprint of the Karusa BESS and associated infrastructure

Project Component/s	Presence and operation of the facility including » Movement of vehicles to and from the site.
Potential Impact	» Alien plant invasion » Erosion » Pollution » Faunal Impacts
Activities/Risk Sources	» Alien plant invasion in and around the road. » Unregulated runoff from the access road. » Human presence during road maintenance activities » Pollution from maintenance vehicles due to oil or fuel leaks etc. » Maintenance activities which may lead to negative impacts such as pollution, herbicide drift etc. » Avifaunal collisions with power lines and connection lines and fences » Electrocution by power line
Mitigation: Target/Objective	» Low ecological footprint of the grid connection infrastructure during operation.

Mitigation: Action/Control	**Responsibility**	**Timeframe**
Vegetation control should be by manual clearing and herbicides should not be used except to control alien plants in the prescribed manner.	Management/ Contractor	Operation
Annual monitoring for alien plant species - with follow up clearing as needed – or as per the frequency stated in the alien invasive management plan to be developed for the site.	Management/ Contractor	Operation
Cleared areas are to be re-vegetated to prevent erosion.	Management/ Contractor	Operation
Annual site inspection for erosion or water flow regulation problems – with follow up remedial action where problems are identified.	Management/ Contractor	Operation
Perches (if in accordance with Eskom's standards) should be placed on pylons to allow for avifauna to perch on the pylons in positions safe from electrocution.	Management/ Contractor	Operation
Ensure that monitoring is sufficiently frequent (preferably monthly for the first year, followed by quarterly thereafter) to detect electrocutions reliably and that any areas where electrocutions occurred are repaired as soon as possible.	Management/ Contractor	Operation
During the first year of operation, quarterly reports summarizing interim findings should be complied by the owner of the powerlines and submitted to BirdLife South Africa. If the findings indicate that electrocutions have not occurred or are minimal with no red-listed species, an annual report can be submitted.	Management/ Contractor	Operation

Performance Indicator	» No erosion problems experienced on the site » Low abundance of alien plants.
Monitoring	» Annual monitoring with records of alien species presence and clearing actions.

	» Annual monitoring with records of erosion problems and mitigation actions taken with photographs.

OBJECTIVE 3: Ensure appropriate operation and maintenance of the battery energy storage system

Project Component/s	» Battery Energy Storage System.
Potential Impact	» Fire and safety risks » Leakages and impacts on soils and water resources.
Activities/Risk Sources	» Inappropriate operation and maintenance of BESS.
Mitigation: Target/Objective	» To avoid and or minimise the potential risk of associated with the operation and maintenance of the BESS.

Mitigation: Action/Control	Responsibility	Timeframe
Compile (and adhere to) a procedure for the safe handling of battery cells	O&M Contractor	Operation
Ensure that battery supplier user guides, safety specifications and MSDS are filed on site at all times.	O&M Contractor	Operation
Operate, maintain and monitor the BESS as per supplier specifications.	O&M Contractor	Operation
Compile method statements for approval by the Technical/SHEQ Manager for battery cell, electrolyte and battery cell/ container replacement. Maintain method statements on site.	O&M Contractor	Operation
Ensure that all maintenance contractors/ staff are familiar with the supplier's specifications.	O&M Contractor	Operation
Provide signage on site specifying the types of batteries in use and the risk of exposure to hazardous material and electric shock.	O&M Contractor	Operation
Provide signage on site specifying how electrical and chemical fires should be dealt with by first responders, and the potential risks to first responders (e.g. toxic fumes). Provide suitable firefighting equipment on site.	O&M Contractor	Operation
Maintain strict access control to the battery storage area.	O&M Contractor	Operation
Undertake regular visual checks on BESS equipment to identify signs of damage or leaks.	O&M Contractor	Operation
Provide environmental awareness training to all personnel on site. Training should include discussion of: o Potential impact of electrolyte spills on groundwater; o Suitable disposal of waste and effluent; o Key measures in the EMPr relevant to worker's activities; o How incidents and suggestions for improvement can be reported. Ensure that all attendees remain for the duration of the training and on completion sign an attendance register that clearly indicates participants' names.	O&M Contractor	Operation

Performance Indicator	» BESS operated and maintained in accordance with supplier specifications. » Appropriate signage on site. » Employees appropriately trained. » Required documentation available on site. » Firefighting equipment and training provided before the operation phase commences.
Monitoring	» The O&M contractor must monitor indicators listed above to ensure that they have been met.

OBJECTIVE 4: Ensure the implementation of an appropriate fire management plan and general management measures during the operation phase

The following below can be used as a guide for appropriate fire management (also refer to **Appendix E** of the EMPr):

Project Component/s	» Operation and maintenance of BESS and associated infrastructure.
Potential Impact	» Veld fires can pose a personal safety risk to local farmers and communities, and their homes, crops, livestock and farm infrastructure, such as gates and fences. In addition, fire can pose a risk to the facility infrastructure.
Activities/Risk Sources	» The presence of operation and maintenance personnel and their activities on the site can increase the risk of veld fires.
Mitigation: Target/Objective	» To avoid and or minimise the potential risk of veld fires on local communities and their livelihoods.

Mitigation: Action/Control	Responsibility	Timeframe
Prepare and annually review a fire risk assessment.	O&M Contractor	Operation
Establish a fire-fighting management plan during operation.	O&M Contractor	Operation
Provide adequate firefighting equipment on site and ensure that it is suitably maintained.	O&M Contractor	Operation
Equip all hazardous substance stores and waste storage areas with fire extinguishers.	O&M Contractor	Operation
Ensure that all personnel on site are aware of the location of firefighting equipment on the site and how the equipment is operated.	O&M Contractor	Operation
Liaise with the local fire-firefighting department with regards to emergency procedures.	O&M Contractor	Operation
Ensure that appropriate communication channels are established to be implemented in the event of a fire.	O&M Contractor	Operation
Fire breaks should be established and maintained where and when required. Cognisance must be taken of the relevant legislation when planning and burning firebreaks (in terms of timing, etc.).	Contractor	Operation
Upon completion of the construction phase, an emergency evacuation plan must be drawn up to ensure the safety of the staff and surrounding land users in the case of an emergency.	O&M Contractor	Operation
Provide suitable emergency and safety signage on site, and demarcate any areas which may pose a safety risk (including	O&M Contractor	Operation

Mitigation: Action/Control	Responsibility	Timeframe
hazardous substances.). Emergency numbers for local police, fire department and the Local Municipality must be placed in a prominent clearly visible area on site.		
Alien Invasive species should be regularly controlled in order to decrease the fire risk associated with the site.	O&M Contractor	Operation
Designated smoking areas must be established with suitable receptacles for disposal.	O&M Contractor	Operation
Contact details of the local fire and emergency services must be readily available.	O&M Contractor	Operation
The fire risk on site is a point of discussion that must take place as part of the environmental induction training prior to commencement of construction.	O&M Contractor	Operation
The contractor must also comply with the requirements of the Occupational Health and Safety Act with regards to fire protection.	O&M Contractor	Operation

Performance Indicator	» Firefighting equipment and training provided before the operation phase commences. » Firebreak implemented and maintained. » Emergency contact details available on site.
Monitoring	» The O&M contractor must monitor indicators listed above to ensure that they have been met.

OBJECTIVE 5: Appropriate handling and management of waste

The operation of the facility will involve the generation of limited waste products, most significantly spent battery components which must be appropriately managed.

Project Component/s	» BESS components. » Power line.
Potential Impact	» Contamination of water or soil because of poor waste management. » Inappropriate handling and disposal of waste.
Activity/Risk Source	» Maintenance activities related to operation of the BESS infrastructure
Mitigation: Target/Objective	» Comply with waste management legislation. » Minimise production of waste. » Ensure appropriate waste disposal. » Avoid environmental harm from waste disposal.

Mitigation: Action/Control	Responsibility	Timeframe
Develop a waste management plan, detailing: » Expected type and amount of waste; » Measures to reduce waste; » Type of storage for different waste types; » Waste contractors that will collect waste; and » Monitoring procedures to ensure the waste management plan is implemented.	O&M Contractor	Operation and maintenance

Mitigation: Action/Control	Responsibility	Timeframe
Ensure that service providers dispose of used batteries properly by requesting and retaining receipts for disposal/refurbishment.	O&M Contractor	Operation and maintenance
Storage areas for any waste must be appropriately sealed and bunded.	O&M Contractor	Operation
All structures and/or components replaced during maintenance activities must be appropriately disposed of at an appropriately licensed waste disposal site or sold to a recycling merchant for recycling.	O&M Contractor	Operation
Disposal of waste must be in accordance with relevant legislative requirements, including the use of licensed contractors.	O&M Contractor	Operation
All food waste and litter at the site should be placed in bins with lids and removed from the site on a regular basis.	O&M Contractor	Operation
Waste handling, collection, and disposal operations must be managed and controlled by a waste management contractor.	O&M Contractor	Operation
All sewage disposal to take place at a registered and operational wastewater treatment works or via an implemented sewage system on site. Where appropriate, proof of disposal to be retained as proof of responsible disposal.	O&M Contractor	Operation
Used oils and chemicals: » Appropriate disposal must be arranged with a licensed facility in consultation with the administering authority. » Waste must be stored and handled according to the relevant legislation and regulations.	O&M Contractor	Operation
General waste must be recycled where possible or disposed of at an appropriately licensed landfill.	O&M Contractor	Operation
Hazardous waste and general waste must be stored and disposed of separately.	O&M Contractor	Operation
Separation and recycling of different waste materials should be supported.	O&M Contractor	Operation
Immediately report significant spillages and initiate an environmental site assessment for risk assessment and remediation if necessary.	O&M Contractor	Operation
On-site battery maintenance should be done over appropriate sealed surfaces with appropriate containment measures and any hazardous substances must be disposed of appropriately	O&M Contractor	Operation
Defective or broken components must be removed and stored within a designated covered storage area prior to being removed from the site.	O&M Contractor	Operation
Waste management must be a priority and all waste must be collected and stored effectively. All solid waste collected shall be disposed of at a licensed disposal facility	Project Manager	Operation
Where a registered disposal facility is not available close to the project area, the Contractor shall provide a method statement with regard to waste management. Under no circumstances may domestic waste be burned on site	Project Manager Health and Safety Officer	Operation

Performance Indicator	» No complaints received regarding waste on site.

	» Internal site audits identifying that waste segregation recycling and reuse is occurring appropriately where possible. » Provision of all appropriate waste manifests. » No contamination of soil or water as a result of the BESS.
Monitoring	» Waste collection must be monitored on a regular basis. » Records of accidental spills and clean-up procedures and the results thereof must be audited by the EO & Environmental Manager during the operation phase. » Waste documentation must be completed and made available for inspection. » An incidents/grievances register must be maintained, in which any complaints from the community must be logged. » Complaints must be investigated and, if appropriate, acted upon. » Regular reports on exact quantities of all waste streams exiting the site must be compiled by the waste management contractor and monitored by the O&M Contractor. » All appropriate waste disposal certificates accompany the monthly reports.

OBJECTIVE 5: Appropriate handling and management of hazardous substances and dangerous goods

The operation of the Karusa BESS and associated infrastructure will involve the storage of chemicals and hazardous substances (solvents or heavy metal substances where Li-Ion batteries are involved, or sulphuric acid and Vanadium in the case of Vanadium Redox-flow batteries).

Project Component/s	» Area infrastructure (i.e. BESS footprint and battery units, electrical transformers/switchgear and control units as applicable).
Potential Impact	» Contamination of water or soil because of poor materials management. » Unsafe operational practices leading to containment breaches of hazardous materials
Activity/Risk Source	» Maintenance activities related to operation of the BESS infrastructure
Mitigation: Target/Objective	» Comply with relevant legislation regarding the handling and storage of hazardous and dangerous goods. » Ensure appropriate storage, containment and handling of chemicals and hazardous substances.

Mitigation: Action/Control	Responsibility	Timeframe
Ensure signage on all battery storage areas indicating as a minimum: » The battery type (and chemical name/s). » Who to contact (immediately) if a spill or leak is detected. » MSDS sheets (alternatively ensure that these are available on site).	O&M Contractor	Operation and maintenance
Spill kits must be made available on-site for the clean-up of spills and leaks of contaminants.	O&M Contractor	Operation and maintenance
Storage areas for hazardous substances must be appropriately sealed and bunded.	O&M Contractor	Operation
All hazardous materials must be stored in the appropriate manner (stored in sealed containers within a clearly demarcated designated area) to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should	O&M Contractor	Operation

Mitigation: Action/Control	Responsibility	Timeframe
be cleaned up in the appropriate manner as related to the nature of the spill.		
Care must be taken to ensure that spillage of oils and other hazardous substances are limited during maintenance. Handling of these materials should take place within an appropriately sealed and bunded area. Should any accidental spillage take place, it must be cleaned up according to specified standards regarding bioremediation.	O&M Contractor & sub-contractor(s)	Operation and maintenance
Immediately report significant spillages and initiate an environmental site assessment for risk assessment and remediation if necessary.	O&M Contractor	Operation
Emergency response arrangements and systems such as foam pourers, fire-fighting systems and cooperation with emergency responders must be implemented. Preventive measures could include maintenance procedures to prevent the occurrence of a catastrophic loss of containment, as well as strict control of ignition sources and other measures which may be required according to standards such as those prescribed by the South African National Standards system.	O&M Contractor	Operation

Performance Indicator	» No complaints received regarding storage of hazardous and dangerous goods on site. » No contamination of soil or water.
Monitoring	» Check vehicles and machinery monthly for oil, fuel and hydraulic oil leaks. » Undertake high standard maintenance of the vehicles and machinery. » Monitor hydrocarbon spills from vehicles and machinery during operations continuously and record the volume and nature of the spill, location and clean up actions. » Records of accidental spills and clean-up procedures and the results thereof must be audited by the EO & Environmental Manager during the operation phase. » Complaints must be investigated and, if appropriate, acted upon.

CHAPTER 8: MANAGEMENT PROGRAMME: DECOMMISSIONING

The lifespan of the proposed Karusa BESS facility will be more than 20 years. Equipment associated with this facility would only be decommissioned once it has reached the end of its economic life or if it is no longer required. The lifespan of Karusa BESS could be extended depending on the condition of the infrastructure. An assessment will be undertaken prior to the end of the lifecycle of the plant to determine whether the plant should be decommissioned or whether the operation of the plant should continue.

It is most likely that decommissioning activities of the infrastructure of the facility discussed in the BA process would comprise the disassembly, removal, recycling, resale and disposal of the infrastructure and components. Decommissioning activities will involve disassembly of the production units and ancillary infrastructure, demolishing of buildings, removal of waste from the site and rehabilitation to the desired end-use. Future use of the site after decommissioning of the Karusa BESS facility could possibly form part of an alternative industry that would be able to utilise some of the existing infrastructure associated with the facility. This would however be dependent on the development plans of the area at the time.

As part of the decommissioning phase the developer will undertake the required permitting processes applicable at the time of decommissioning.

The relevant mitigation measures contained under the construction section should be applied during decommissioning and therefore are not repeated in this section. All decommissioning phase activities must be conducted in accordance with the regulations in effect at the time.

8.1. Objectives

Within a period of at least 12 months prior to the decommissioning of the site, a Decommissioning Method Statement must be prepared and submitted to the Local Planning Authority, as well as the Provincial and National Environmental Authority (unless the prevailing legislation at the time requires a different approach and in which case takes precedence and must be followed accordingly). This method statement must cover site restoration, soil replacement, landscaping, conservation, and a timeframe for implementation. Furthermore, this decommissioning must comply with all relevant legal requirements administered by any relevant and competent authority at that time.

The objectives of the decommissioning phase of the proposed project are to:

- Follow a process of decommissioning that is progressive and integrated into the short- and long-term project plans that will assess the closure impacts proactively at regular intervals throughout project life.
- Implement progressive rehabilitation measures, beginning during the construction phase.
- Leave a safe and stable environment for both humans and animals and make their condition sustainable.
- Return rehabilitated land-use to a standard that can be useful to the post-project land user.
- Where applicable, prevent any further soil and surface water contamination by maintaining suitable storm water management systems.
- Maintain and monitor all rehabilitated areas following re-vegetation, and if monitoring shows that the objectives have been met, apply for closure.

8.2. Approach to the Decommissioning Phase

It is recommended that planning of the decommissioning of the project and rehabilitation of the site should take place well in advance (at least two years) of the planned decommissioning activities. Important factors that need to be taken into consideration are detailed below.

Two possible scenarios for this decommissioning phase are detailed below:

SCENARIO 1: TOTAL DECOMMISSIONING OF THE FACILITY

If the decision is taken at the end of the project lifespan to totally decommission the facility, i.e. make the land available for an alternative land use, the following should take place:

- All concrete and imported foreign material must be removed from site
- The ground must be levelled and covered with subsoil and topsoil where exposed by the decommissioning activities.
- Infrastructure not required for the post-decommissioning use of the site must be removed and appropriately disposed of, recycled or resold as appropriate, in accordance with applicable regulations at the time of decommissioning.
- Access roads and servitudes not required for the post-decommissioning use of the site must be rehabilitated. If necessary, an ecologist should be consulted to give input into rehabilitation specifications.
- Tracks that are to be utilised for the future land use operations should be left *in-situ*. The remainder of the tracks to be removed (ripped) and topsoil replaced.
- All ancillary buildings and access points are to be removed unless they can be used for the future land use.
- Underground electric cables are to be removed if they cannot be used in the future land use.
- All material or components must be re-used or recycled wherever possible.
- Where not possible to recycle, materials should be appropriately disposed of.
- The competent authority may grant approval to the owner not to remove the landscaping and underground foundations.
- The site must be seeded with locally sourced indigenous vegetation (unless otherwise dictated by the future land use) to allow revegetation of the site.
- Monitor rehabilitated areas quarterly for at least two years (expected) following decommissioning, and implement remedial action as and when required, or as frequently as determined by a qualified botanist at the time of decommissioning.

SCENARIO 2: PARTIAL DECOMMISSIONING OF THE FACILITY

Should more advanced technology become available it may be decided to continue to use the site as a battery energy storage system. Much of the existing infrastructure is likely to be re-used in the upgraded facility. In this case, all infrastructure that will no longer be required for the upgraded facility must be removed as described for Scenario 1. The remainder of the infrastructure should remain in place or upgraded depending on the requirements of the new facility. Any upgrades to the facility at this stage must comply with relevant legislation applicable at the time.

8.2.1. Identification of structures for post-closure use

Access roads should be assessed in conjunction with the future land users to determine if these could be used. Where not required, these access roads should be decommissioned and rehabilitated.

8.2.2. Removal of infrastructure

All infrastructure must be dismantled and removed. Inert material must be removed from site and disposed of at a suitably registered landfill site. The facility components must be removed and recycled where possible or disposed of at a suitably registered landfill site. All foundations must be removed to a depth of 1m. Hard surfaces must be ripped to a depth of 1m and vegetated.

8.2.3. Soil rehabilitation

The steps that should be taken during the rehabilitation of soils are as follows:

» The deposited soils must be ripped to ensure reduced compaction;
» An acceptable seed bed should be produced by surface tillage;
» Restore soil fertility;

8.2.4. Establishment of vegetation

The objective is to restore the development area to a self-sustaining cycle, i.e. to realise the re-establishment of the natural nutrient cycle with ecological succession initiated.

The objectives for the re-vegetation of reshaped and top-soiled land are to:

» Prevent erosion;
» Restore the land to the agreed land capability;
» Re-establish eco-system processes to ensure that a sustainable land use can be established without requiring fertilizer additions; and
» Restore the biodiversity of the area as far as possible.

8.2.5. Maintenance

Established vegetation requires regular maintenance. If the growth medium consists of low-fertility soils, then regular maintenance will be required until the natural fertility cycle has been restored.

8.2.6. Monitoring

The purpose of monitoring is to ensure that the objectives of rehabilitation are met and that the rehabilitation process is followed. The physical aspects of rehabilitation should be carefully monitored during the progress of establishment of desired final ecosystems
The following items should be monitored continuously:
» Erosion status; and
» Faunal and floral species diversity
» Spread of alien invasive species

APPENDIX A

GRIEVANCE MECHANISM

GRIEVANCE MECHANISM / PROCESS

PURPOSE

This Grievance Mechanism has been developed to receive and facilitate the resolution of concerns and grievances regarding the project's environmental and social performance with external stakeholders. The aim of the Grievance Mechanism is to ensure that grievances or concerns raised by external stakeholders are addressed in a manner that:

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

The aim of this Grievance Mechanism is to provide a process to address grievances in a manner that does not require a potentially costly and time-consuming legal process. This plan should be updated through the project development construction and operation process (where needs be) to ensure relevance at all project stages.

PROCEDURE FOR RECEIVING AND RESOLVING GRIEVANCES

The following proposed grievance procedures are to be complied with throughout the construction, operation and decommissioning phases of the project. These procedures should be updated as and when required to ensure that the Grievance Mechanism is relevant for the project and effective in providing the required processes.

- Local landowners, communities and authorities must be informed in writing by the Developer of the grievance mechanism and the process by which grievances can be brought to the attention of the Developer through its designated representative. This must be undertaken with the commencement of the construction phase.
- A company representative must be appointed as the contact person to which grievances can be directed. The name and contact details of the contact person must be provided to local landowners, communities and authorities when requested.
- Project related grievances relating to the construction, operation and or decommissioning phases must be addressed in writing to the contact person. The contact person should assist local landowners and/ or communities who may lack resources to submit/prepare written grievances, by recording grievances and completing written grievance notices where applicable, translating requests or concerns or by facilitating contact with relevant parties who can address the raised concerns. The following information should be obtained, as far as possible, regarding each written grievance, which may act as both acknowledgement of receipt as well as record of grievance received:
    a. The name and contact details of the complainant;
    b. The nature of the grievance;
    c. Date raised, received, and for which the meeting (if required depending on severity) was arranged;
    d. Persons elected to attend the meeting (which will depend on the severity of the grievance); and

e. A clear statement that the grievance procedure is, in itself, not a legal process. Should such avenues be desired, they must be conducted in a separate process and do not form part of this grievance mechanism.

» The grievance must be registered with the contact person who, within 2 working days of receipt of the grievance, must contact the Complainant to discuss the grievance and, if required, agree on suitable date and venue for a meeting in order to discuss the grievances raised. Unless otherwise agreed, the meeting should be held within 2 weeks of receipt of the grievance, albeit subject to appointment of mediators which may require additional time should this be required.
» The contact person must draft a letter to be sent to the Complainant acknowledging receipt of the grievance, the name and contact details of the Complainant, the nature of the grievance, the date that the grievance was raised, and the date and venue for the meeting (once agreed and only if required).
» A grievance register must be kept on site (in electronic format, so as to facilitate editing and updating), and shall be made available to all parties wishing to gain access thereto.
» Prior to the meeting being held the contact person must contact the Complainant to discuss and agree on the parties who should attend the meeting, as well as a suitable venue. The people who will be required to attend the meeting will depend on the nature of the grievance. While the Complainant and or Developer are entitled to invite their legal representatives to attend the meeting/s, it should be made clear to all the parties involved in the process that the grievance mechanism process is not a legal process, and that if the Complainant invites legal representatives, the cost will be their responsibility. It is therefore recommended that the involvement of legal representatives be limited as far as possible, as a matter of last resort, and that this process be primarily aimed at stakeholder relationship management as opposed to an arbitration or litigation mechanism.
» The meeting should be chaired by the Developer's representative appointed to address grievances. The Developer must supply and nominate a representative to capture minutes and record the meeting/s.
» Draft copies of the minutes must be made available to the Complainant and the Developer within 5 working days of the meeting being held. Unless otherwise agreed, comments on the Draft Minutes must be forwarded to the company representative appointed to manage the grievance mechanism within 5 working days of receipt of the draft minutes.
» The meeting agenda must at a minimum include the discussion of the grievance, avoidance and mitigation measures available and proposed by all parties, as well as a clear indication of the future actions and responsibilities, and deadlines, in order to put into effect the proposed measures and interventions to successfully resolve the grievance.
» In the event of the grievance being resolved to the satisfaction of all the parties concerned, the outcome must be recorded and signed off by the relevant parties. The record should provide details of the date of the meeting/s, the names of the people that attended the meeting/s, the outcome of the meeting/s, and where relevant, the measures identified to address the grievance, the party responsible for implementing the required measures, and the agreed upon timeframes for the measures to be implemented.
» In the event of a dispute between the Complainant and the Developer regarding the grievance, the option of appointing an independent mediator to assist with resolving the issue should be discussed. The record of the meeting/s must note that a dispute has arisen and that the grievance has not been resolved to the satisfaction of all the parties concerned.
» In the event that the parties agree to appoint a mediator, the Developer will be required to identify three (3) mediators and forward the names and CVs to the Complainant within 2 weeks of the dispute being declared. The Complainant, in consultation with the Developer, must identify the preferred mediator

and agree on a date for the next meeting. The cost of the mediator must be borne by the Developer. The Developer must supply and nominate a representative to capture minutes and record the meeting/s.

- In the event of the grievance, with the assistance of the mediator, being resolved to the satisfaction of all the parties concerned, the outcome must be recorded and signed off by the relevant parties, including the mediator. The record should provide details on the date of the meeting/s, the names of the people that attended the meeting/s, the outcome of the meeting/s, and where relevant, the measures identified to address the grievance, the party responsible for implementing the required measures, and the agreed upon timeframes for the measures to be implemented.
- In the event of the dispute not being resolved, the mediator must prepare a draft report that summaries the nature of the grievance and the dispute. The report should include a recommendation by the mediator on the proposed way forward with regard to addressing the grievance.
- The draft report must be made available to the Complainant and the Developer for comment before being finalised and signed by all parties, which signature may not be unreasonably withheld by either party. Unless otherwise agreed, comments on the draft report must be forwarded to the company representative appointed to manage the grievance mechanism within 5 working days. The way forward will be informed by the recommendations of the mediator and the nature of the grievance.

A Complaint is closed out when no further action is required, or indeed possible. Closure status must be classified and captured following mediation or successful resolution in the Complaints Register as follows:

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

The grievance mechanism does not replace the right of an individual, community, group or organisation to take legal action should they so wish. In the event of the grievance not being resolved to the satisfaction of Complainant and/or the Developer, either party may be entitled to legal action if an appropriate option, however, this grievance mechanism aims to avoid such interactions by addressing the grievances within a short timeframe, and to mutual satisfaction, where possible.

APPENDIX B

STORMWATER MANAGEMENT PLAN

STORMWATER MANAGEMENT PLAN

1. PURPOSE

By taking greater cognisance of natural hydrological patterns and processes it is possible to develop stormwater management systems in a manner that reduces these potentially negative impacts and mimic nature. The main risks associated with inappropriate stormwater management are increased erosion risk and risks associated with flooding.

This Stormwater Management Plan addresses the management of stormwater runoff from the development footprint and significant impacts relating to resultant impacts such as soil erosion and downstream sedimentation. The main factors influencing the planning of stormwater management measures and infrastructure are:

» Topography and slope gradients;
» Placing of infrastructure and infrastructure design;
» Annual average rainfall; and
» Rainfall intensities.

The objective of the plan is, therefore, to provide measures to address runoff from disturbed portions of the development footprint, such that they:

» do not result in concentrated flows into natural watercourses i.e. provision should be made for temporary or permanent measures that allow for attenuation, control of velocities and capturing of sediment upstream of natural watercourses, provided the relevant water use authorisation allows for this.
» do not result in any necessity for concrete or other lining of natural watercourses to protect them from concentrated flows off the facility infrastructure, if not necessary, and provided the relevant water use authorisation allows for this.

do not divert flows out of their natural flow pathways, thus depriving downstream watercourses of water, unless permissible in any relevant water use authorisation.

This Stormwater Management Plan must be updated and refined once the construction/ civil engineering plans have been finalised following detailed design.

2. STORMWATER MANAGEMENT PRINCIPLES

In the design phase, various stormwater management principles should be considered including:

» Prevent concentration of stormwater flow at any point where the ground is susceptible to erosion.
» Reduce storm water flows as far as possible by the effective use of permissible attenuating devices (such as swales, berms, silt fences) where allowed in terms of any water use authorisation, if applicable. As construction progresses, the storm water control measures are to be monitored and adjusted to ensure complete erosion and pollution control at all times.
» Silt traps must be used where there is a danger of topsoil or material stockpiles eroding and entering streams and other sensitive areas.
» Construction of gabions and other stabilisation features on steep slopes may be undertaken to prevent erosion, if deemed necessary and where allowed in terms of any water use authorisation, if applicable.

- Minimise the area of exposure of bare soils to minimise the erosive forces of wind, water and all forms of traffic.
- Ensure that development does not increase the rate of stormwater flow above that which the natural ground can safely accommodate at any point in the sub-catchments.
- Ensure that all stormwater control works are constructed in a safe and aesthetic manner in keeping with the overall development.
- Plan and construct stormwater management systems to remove contaminants before they pollute surface waters or groundwater resources.
- Contain soil erosion, whether induced by wind or water forces, by constructing protective works to trap sediment at appropriate locations. This applies particularly during construction.
- Avoid situations where natural or artificial slopes may become saturated and unstable, both during and after the construction process.
- Design and construct roads to avoid concentration of flow along and off the road. Where flow concentration is unavoidable, measures to incorporate the road into the pre-development stormwater flow should not exceed the capacity of the culvert. To assist with the stormwater run-off, gravel roads should typically be graded and shaped with a 2-3% crossfall back into the slope, allowing stormwater to be channelled in a controlled manner towards the, natural drainage lines and to assist with any sheet flow within the development footprint.
- Design culvert inlet structures to ensure that the capacity of the culvert does not exceed the pre-development storm water flow at that point. Provide detention storage on the road and/or upstream of the storm water culvert. Where any culverts are required within watercourses, this may only be undertaken if absolutely necessary and where the relevant water use authorisation allows for this, where applicable.
- Where water use authorisation is required and permits, design outlet culvert structures to dissipate flow energy. Any unlined downstream channel must be adequately protected against soil erosion.
- Where the construction of a building causes a change in the vegetative cover of the site that might result in soil erosion, the risk of soil erosion by stormwater must be minimised by the provision of appropriate artificial soil stabilisation mechanisms or re-vegetation of the area. Any inlet to a piped system should be fitted with a screen or grating to prevent debris and refuse from entering the stormwater system.
- Preferably all drainage channels on site should remain in the natural state so that the existing hydrology is not disturbed.

3.1. Engineering Specifications

Detailed engineering specifications for a Stormwater Management Plan describing and illustrating the proposed stormwater control measures must be prepared by the Civil Engineers during the detailed design phase and should be based on the underlying principles of this Stormwater Management Plan. This should include erosion control measures. Requirements for project design include:

- Erosion control measures to be implemented before and during the construction period, including the final stormwater control measures (post construction) must be indicated within the Final/Updated Stormwater Management Plan.
- All temporary and permanent water management structures or stabilisation methods must be indicated within the Final/Updated Stormwater Management Plan.

- The drainage system for the development footprint should be designed to specifications that can adequately deal with a 1:50 year intensity rainfall event or more to ensure sufficient capacity for carrying stormwater around and away from infrastructure.
- Procedures for stormwater flow through a site need to take into consideration both normal operating practice and special circumstances. Special circumstances in this case typically include severe rainfall events.
- An on-site Engineer or Environmental Officer is to be responsible for ensuring implementation of the erosion control measures on site during the construction period.
- The EPC Contractor holds ultimate responsibility for remedial action in the event that the approved stormwater plan is not correctly or appropriately implemented and damage to the environment is caused.

During the construction phase, the contractor must prepare a Stormwater Control Method Statement to ensure that all construction methods adopted on site do not cause, or precipitate soil erosion and shall take adequate steps to ensure that the requirements of the Stormwater Management Plan are met before, during and after construction. The Storm Water Control Method Statement must also comply with any relevant water use authorisation, where applicable. The designated responsible person on site, must be indicated in the Stormwater Control Method Statement and shall ensure that no construction work takes place before the relevant stormwater control measures are in place, and are in compliance with any relevant and applicable water use authorisation.

An operation phase Stormwater Management Plan should be designed and implemented if not already addressed by the mitigations implemented as part of construction, with a view to preventing the passage of concentrated flows off hardened surfaces and onto natural areas.

APPENDIX C

WASTE MANAGEMENT PLAN

WASTE MANAGEMENT PLAN

1. PURPOSE

A Waste Management Plan (WMP) plays a key role in achieving sustainable waste management throughout all phases of the project. The plan prescribes measures for the collection, temporary storage and safe disposal of the various waste streams associated with the project and includes provisions for the recovery, re-use and recycling of waste. The purpose of this plan is therefore to ensure that effective procedures are implemented for the handling, storage, transportation and disposal of waste generated from the project activities on site.

This WMP has been compiled as part of the project EMPr and is based on waste stream information available at the time of compilation. Construction and operation activities must be assessed on an ongoing basis in order to determine the efficacy of the plan and whether further revision of the plan is required. This plan should be updated once the relevant Contractors have been appointed and further detail regarding waste quantities and categorisation and disposal become available, during the construction phase, as well as for the operation phase. This plan should be updated throughout the life cycle of the facility, as required in order to ensure that appropriate measures are in place to manage and control waste and to ensure compliance with relevant legislation.

Prior to the commencement of construction, a detailed Waste Management Method Statement and Plan for the site should be compiled by the Contractor.

2. RELEVANT ASPECTS OF THE SITE

It is expected that the development of facility will generate construction solid waste, as well as general waste and hazardous waste during the lifetime of the project.

Waste generated on site, originates from various sources, including but not limited to:

- Concrete waste generated from spoil and excess concrete.
- Contaminated water, soil, rocks and vegetation due to hydrocarbon spills.
- Hazardous waste from vehicle, equipment and machinery parts and servicing, used hydrocarbon containers, batteries situated in specially adapted shipping containers, and waste ink cartridges.
- Recyclable waste in the form of paper, glass, steel, aluminium, wood/ wood pallets, plastic (PET bottles, PVC, LDPE) and cardboard.
- Organic waste from food waste as well as alien and endemic vegetation removal.
- Sewage from portable toilets and septic tanks.
- Inert waste from spoil material from site clearance and trenching works.

3. LEGISLATIVE REQUIREMENTS

Waste in South Africa is currently governed by several regulations (and as amended where relevant), including:

- National Environmental Management: Waste Act (NEM: WA), 2008 (Act 59 of 2008);
- National Environmental Management: Waste Amendment Act, 2014 (Act 26 of 2014);

- The South African Constitution (Act 108 of 1996);
- Hazardous Substances Act (Act 5 of 1973);
- Health Act (Act 63 of 1977);
- Environment Conservation Act (Act 73 of 1989);
- Occupational Health and Safety Act (Act 85 of 1993);
- National Water Act (Act 36 of 1998);
- The National Environmental Management Act (Act 107 of 1998) (as amended);
- Municipal Structures Act (Act 117 of 1998);
- Municipal Systems Act (Act 32 of 2000);
- Mineral and Petroleum Resources Development Act (Act 28 of 2002); and
- Air Quality Act (Act 39 of 2004).

Storage of waste must be conducted in accordance with the National Norms and Standards for the Storage of Waste, published in GNR 926.

4. WASTE MANAGEMENT PRINCIPLES

An integrated approach to waste management is needed on site. Such an approach is illustrated in **Figure 1**.

It is important to ensure that waste is managed with the following objectives in mind during all phases of the project:

- Reducing volumes of waste is the greatest priority;
- If reduction is not feasible, the maximum amount of waste is to be recycled; and
- Waste that cannot be recycled is to be disposed of in the most environmentally responsible manner.

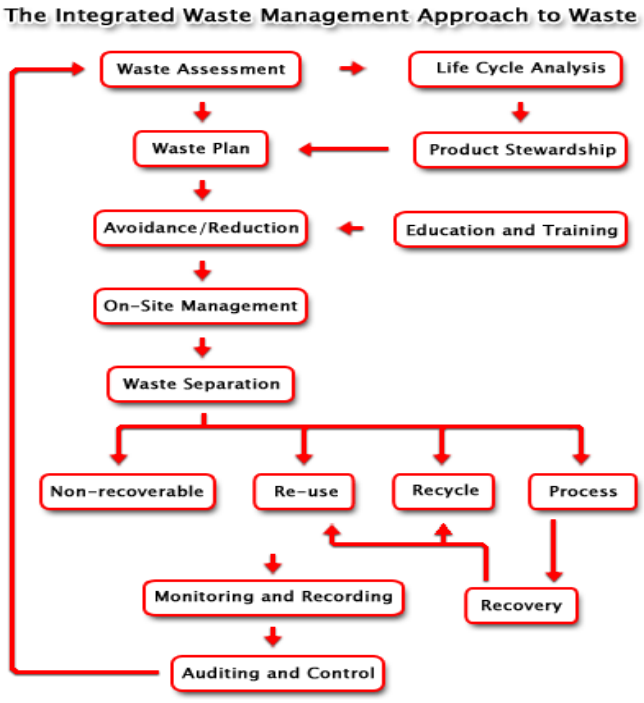

Figure 1: Integrated Waste Management Flow Diagram

(Source: http://www.enviroserv.co.za/pages/content.asp?SectionId=496)

4.1. Construction phase

A generic plan for the management of waste during the construction phase is detailed below. A Method Statement and Plan detailing specific waste management practices during construction should be prepared by the Contractor preferably prior to the commencement of construction or at the very least within one month of construction to allow for initial establishment if required, for approval by the Project Engineer.

4.1.1. Waste Assessment / Inventory

- The Environmental Officer (EO), or designated staff member, must develop, implement and maintain a waste inventory reflecting all waste generated during construction for both general and hazardous waste streams.
- Construction methods and materials should be carefully considered in view of waste reduction, re-use, and recycling opportunities, to be pro-actively implemented.
- Once a waste inventory has been established, targets for the recovery of waste (minimisation, re-use, recycling) should be set.
- The EO must conduct waste classification and rating in terms of SANS 10288 and Government Notice 634 published under the NEM: WA.

4.1.2. Waste collection, handling and storage

- It is the responsibility of the EO to ensure that each subcontractor implements their own waste recycling system, i.e. separate bins for food waste, plastics, paper, wood, glass cardboard, metals, etc. Such practises must be made contractually binding upon appointment of the subcontractors.
- Waste manifests and waste acceptance approvals (i.e. receipts) from designated waste facilities must be kept on file at the site office, in order to record and prove continual compliance for future auditing.
- Septic tanks and portable toilets must be monitored by the EO or responsible subcontractor and maintained regularly.
- Waste collection bins and hazardous waste containers must be provided by the principal contractor and subcontractors and placed at strategic locations around the site for the storage of organic, recyclable and hazardous waste.
- A dedicated waste area must be established on site for the storage of all waste streams before removal from site. The storage period must not trigger listed waste activities as per the NEMWA, GN 921 of November 2013.
- Signage/ colour coding must be used to differentiate disposal areas for the various waste streams (i.e. paper, cardboard, metals, food waste, glass etc.).
- Hazardous waste must be stored within a bunded area constructed according to SABS requirements and must ensure complete containment of the spilled material in the event of a breach. As such, appropriate bunding material, design, capacity and type must be utilised to ensure that no contamination of the surrounding environment will occur despite a containment breach. The net capacity of a bunded compound in a storage facility should be at least 110% of the net capacity of the combined tank capacity. Treat interconnected tanks as a single tank of equivalent total volume for the purposes of the bund design criteria.

- The location of all temporary waste storage areas must aim to minimise the potential for impact on the surrounding environment, including prevention of contaminated runoff, seepage, and vermin control, while being reasonably placed in terms of centrality and accessibility on site. Where required, an additional temporary waste storage area may be designated, provided identical controls are exercised for these locations.
- Waste storage shall be in accordance with all Regulations and best-practice guidelines.
- Under no circumstances may waste be burnt or buried on site.
- A dedicated waste management team must be appointed by the principal contractors' SHE Officer, who will be responsible for ensuring the continuous sorting of waste and maintenance of the area. The waste management team must be trained in all areas of waste management and monitored by the SHE Officer.
- All waste removed from site must be done by a registered/ licensed subcontractor, who must supply information regarding how waste recycling/ disposal will be achieved. The registered subcontractor must provide waste manifests for all removals at least once a month or for every disposal made, records of which must be kept on file at the site camp for the duration of the construction period.
- SABS approved spill kits must be available and easily accessible.
- Ensure battery transport and installation by accredited staff / contractors.
- Compile (and adhere to) a procedure for the safe handling of battery cells during transport and installation.
- Establish or utilise an appropriate Hazardous Store which is in accordance with the Hazardous Substance Amendment Act, No. 53 of 1992. This should include but not be limited to:
    - Designated area;
    - All applicable safety signage;
    - Firefighting equipment;
    - Enclosed by an impermeable bund;
    - Protected from the elements,
    - Lockable;
    - Ventilated; and
    - Have adequate capacity to contain 110% of the largest container contents.
- In the event of a major spill or leak of contaminants, the relevant administering authority must be immediately notified as per the notification of emergencies/incidents.
- The storage of flammable and combustible liquids such as oils must be undertaken in designated areas which are appropriately bunded, and stored in compliance with Material Safety Data Sheets (MSDS) files.
- An effective monitoring system must be put in place to detect any leakage or spillage of all hazardous substances during their transportation, handling, installation and storage.

4.1.3. Management of waste storage areas

- Waste storage must be undertaken in accordance with the relevant Norms and Standards.
- The position of all waste storage areas must be located so as to ensure minimal degradation to the environment. The main waste storage area must have a suitable storm water system separating clean and contaminated storm water.
- Collection bins placed around the site must be maintained and emptied on a regular basis by the principal contractor to avoid overflowing receptacles.

- Inspections and maintenance of the main waste storage area must be undertaken daily. Skips and storage containers must be clearly marked, or colour coded and well-maintained. Monitor for rodents and take corrective action if they become a problem.
- Waste must be stored in designated suitable containers and not directly on the ground.
- Inspections and maintenance of bunds must be undertaken regularly. Bunds must be inspected for leaks or cracks in the foundation and walls.
- It is assumed that any rainwater collected inside the bund is contaminated and must be treated by oil/water separation (or similar method) prior to dewatering, or removed and stored as hazardous waste, and not released into the environment.
- If any leaks occur in the bund, these must be amended immediately.
- Bund systems must be designed to avoid dewatering of contaminated water, but to rather separate oil and hydrocarbons from water prior to dewatering.
- Following rainfall event bunds must always be dewatered in order to maintain a sufficient storage capacity in the event of a breach.
- No mixing of hazardous and general waste is allowed.

4.1.4. Disposal

- Waste generated on site must be removed on a regular basis. This frequency may change during construction depending on waste volumes generated at different stages of the construction process, however removal must occur prior to the storage capacity being reached to avoid overflow of containers and poor waste storage.
- Waste must be removed by a suitably qualified contractor and disposed of at an appropriately licensed landfill site. Proof of appropriate disposal must be provided by the contractor to the EO and ECO.

4.1.5. Record keeping

The success of the WMP is determined by measuring criteria such as waste volumes, cost recovery from recycling and cost of disposal. Recorded data can indicate the effect of training and education, or the need for education. It will provide trends and benchmarks for setting goals and standards. It will provide clear evidence of the success or otherwise of the plan.

- Documentation (waste manifest, certificate of issue or safe disposal) must be kept detailing the quantity, nature, and fate of any regulated waste for audit purposes.
- Waste management must form part of the monthly reporting requirements in terms of volumes generated, types, storage and final disposal.

4.1.6. Training

Training and awareness regarding waste management shall be provided to all employees and contractors as part of the toolbox talks or on-site awareness sessions with the EO and at the frequency as set out by the EO.

4.2. Operation phase

It is expected that the operation phase will result in the production of limited amounts of general waste consisting mostly of cardboard, paper, plastic, tins, metals and a variety of synthetic compounds. Hazardous

wastes (including grease, oils, spent battery components or materials) will also be generated. All waste generated will be required to be temporarily stored at the facility in appropriately sealed containers prior to disposal at a permitted landfill site or other facilities.

The following waste management principles apply during the operation phase:

- The SHE Manager must develop, implement and maintain a waste inventory reflecting all waste generated during operation for both general and hazardous waste streams.
- Adequate waste collection bins at site must be supplied. Separate bins should be provided for general and hazardous waste.
- Recyclable waste must be removed from the waste stream and stored separately.
- All waste must be stored in appropriate temporary storage containers (separated between different operation wastes, and contaminated or liquid waste).
- Waste storage shall be in accordance with all best-practice guidelines and under no circumstances may waste be burnt on site.
- Waste generated on site must be removed on a regular basis throughout the operation phase.
- Waste must be removed by a suitably qualified contractor and disposed of at an appropriately licensed landfill site. Proof of appropriate disposal must be provided by the contractor and kept on site.
- Ensure signage on all battery storage areas indicating as a minimum:
  - The battery type (and chemical name/s).
  - Who to contact (immediately) if a spill or leak is detected.
  - MSDS sheets (alternatively ensure that these are available on site).
- On-site battery maintenance should be done over appropriate sealed surfaces with appropriate containment measures and any hazardous substances must be disposed of appropriately
- Defective or broken components must be removed and stored within a designated covered storage area prior to being removed from the site.

5. Monitoring of Waste Management Activities

Records must be kept of the volumes/ mass of the different waste streams that are collected from the site throughout the life of the project. The appointed waste contractor is to provide monthly reports to the operator containing the following information:

- Monthly volumes/ mass of the different waste streams collected;
- Monthly volumes/ mass of the waste that is disposed of at a landfill site;
- Monthly volumes/ mass of the waste that is recycled;
- Data illustrating progress compared to previous months.

This report will aid in monitoring the progress and relevance of the waste management procedures that are in place. If it is found that the implemented procedures are not as effective as required, this WMP is to be reviewed and amended accordingly.
This report must from part of the EO's monthly reports, which are submitted to the Project Company's representative and to the ECO (during construction) and SHE officer (during operations).

APPENDIX D

EMERGENCY PREPAREDNESS AND FIRE MANAGEMENT PLAN

EMERGENCY PREPAREDNESS, RESPONSE AND FIRE MANAGEMENT PLAN

1. PURPOSE

The purpose of the Emergency Preparedness and Response Plan is:

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

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

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

2. PROJECT-SPECIFIC DETAILS

The BESS is proposed to be located on Farm De Hoop, No. 202 near to the Karusa WEF facility substation and will be approximately 6ha in total extent. The general purpose and utilisation of a BESS is to save and store excess electrical output as it is generated, allowing for a timed release of electricity to the grid when the capacity is required the most and the provision of ancillary services to ensure reliable operation of power networks during normal operation and contingency events. BESS systems therefore provide flexibility and reliability services for the efficient operation of the electricity grid.

Both Lithium-Ion ion and Redox-flow technology are being considered for the project, depending on which is most feasible at the time of implementation. The battery will be enclosed within a container.

The infrastructure included as part of the BESS are:

- A BESS with a capacity of up to 2 000 MWh, inside containers with a footprint of up to 6ha in extent and a maximum height of 3m. Both lithium-ion and Redox-flow technology are being considered for the project, depending on which is most feasible at the time of implementation.
- Access roads to the BESS (10m in width, approximately 70m long) branching off of the existing roads, and internal roads (up to 8m wide) to be located within the total BESS footprint area.
- 33kV MV cabling between the BESS and the MV/HV substation and up to 132kV HV cabling to the HV substation
- Fencing around the BESS for increased security measures.
- Up to 132kV overhead or underground power line to be connected to the existing Hidden Valley Substation.
- Temporary laydown area to be located within the BESS footprint.
- Firebreak to be located within the BESS footprint.
- A Substation with a maximum height of - HV bus-bar up to10 m max and an HV Building up to 4 m max

3. EMERGENCY RESPONSE PLAN

There are three levels of emergency as follows:

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

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

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

3.1. Emergency Scenario Contingency Planning

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

i. Spill Prevention Measures

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

- All equipment refuelling, servicing and maintenance activities should only be undertaken within appropriately sealed/contained or bunded designated areas.

- All maintenance materials, oils, grease, lubricants, etc. should be stored in a designated area in an appropriate storage container.
- No refuelling, storage, servicing, or maintenance of equipment should take place within sensitive environmental resources and associated environmental sensitivity buffer zones (where applicable) in order to reduce the risk of contamination by spills.
- No refuelling or servicing should be undertaken without absorbent material or drip pans properly placed to contain spilled fuel.
- Any fluids drained from the machinery during servicing should be collected in leak-proof containers and taken to an appropriate disposal or recycling facility.
- If these activities result in damage or accumulation of product on the soil, the contaminated soil must be disposed of as hazardous waste. Under no circumstances shall contaminated soil be added to a spoils pile and transported to a regular disposal site.
- Chemical toilets used during construction must be regularly cleaned. Chemicals used in toilets are also hazardous to the environment and must be controlled. Portable chemical toilets could overflow if not pumped regularly or they could spill if dropped or overturned during moving. Care and due diligence should be taken at all times.
- Contact details of emergency services and HazMat Response Contractors are to be clearly displayed on the site. All staff are to be made aware of these details and must be familiar with the procedures for notification in the event of an emergency.

ii. Procedures

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

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

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

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

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

Containment of Spills on Land

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

» *Dykes* - Dykes can be created using soil surrounding a spill on land. These dykes are constructed around the perimeter or down slope of the spilled substance. A dyke needs to be built up to a size that will ensure containment of the maximum quantity of contaminant that may reach it. A plastic tarp can be placed on and at the base of the dyke such that the contaminant can pool up and subsequently be removed with sorbent materials or by pump into barrels or bags. If the spill is migrating very slowly, a dyke may not be necessary and sorbents can be used to soak up contaminants before they migrate away from the source of the spill.

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

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

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

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

c) Procedures for restoring affected areas

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

3.1.2. Scenario: Fire (and fire water handling)

iii. Action Plan

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

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

i. Procedures

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

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

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

a) Procedures for initial actions

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

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

b) Reporting procedures

In terms of the requirements of NEMA, the responsible person must, within 14 days of the incident, report to the Director General, provincial head of department and municipality.

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

SUMMARY: RESPONSE PROCEDURE

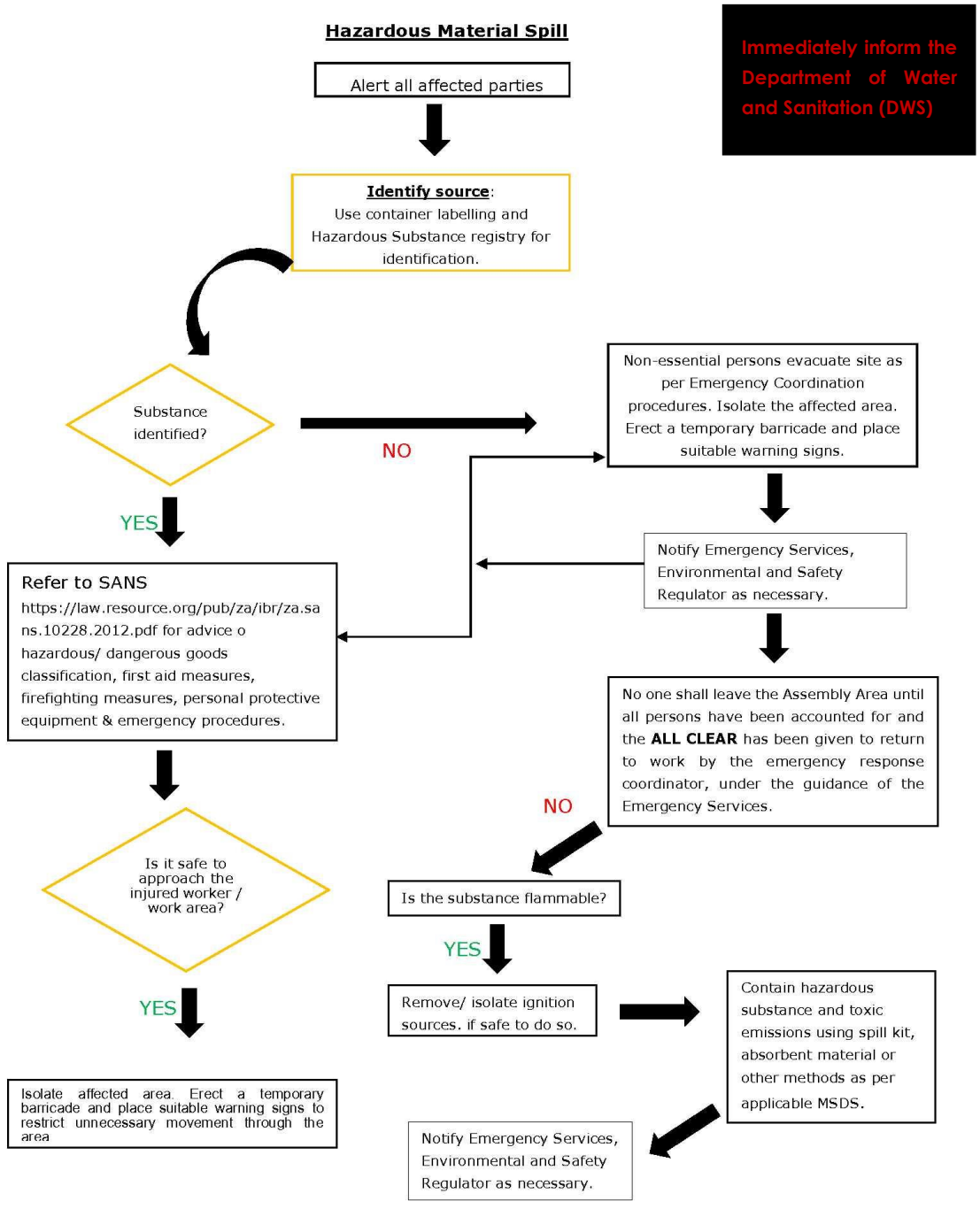

Figure 1: Hazardous Material Spill

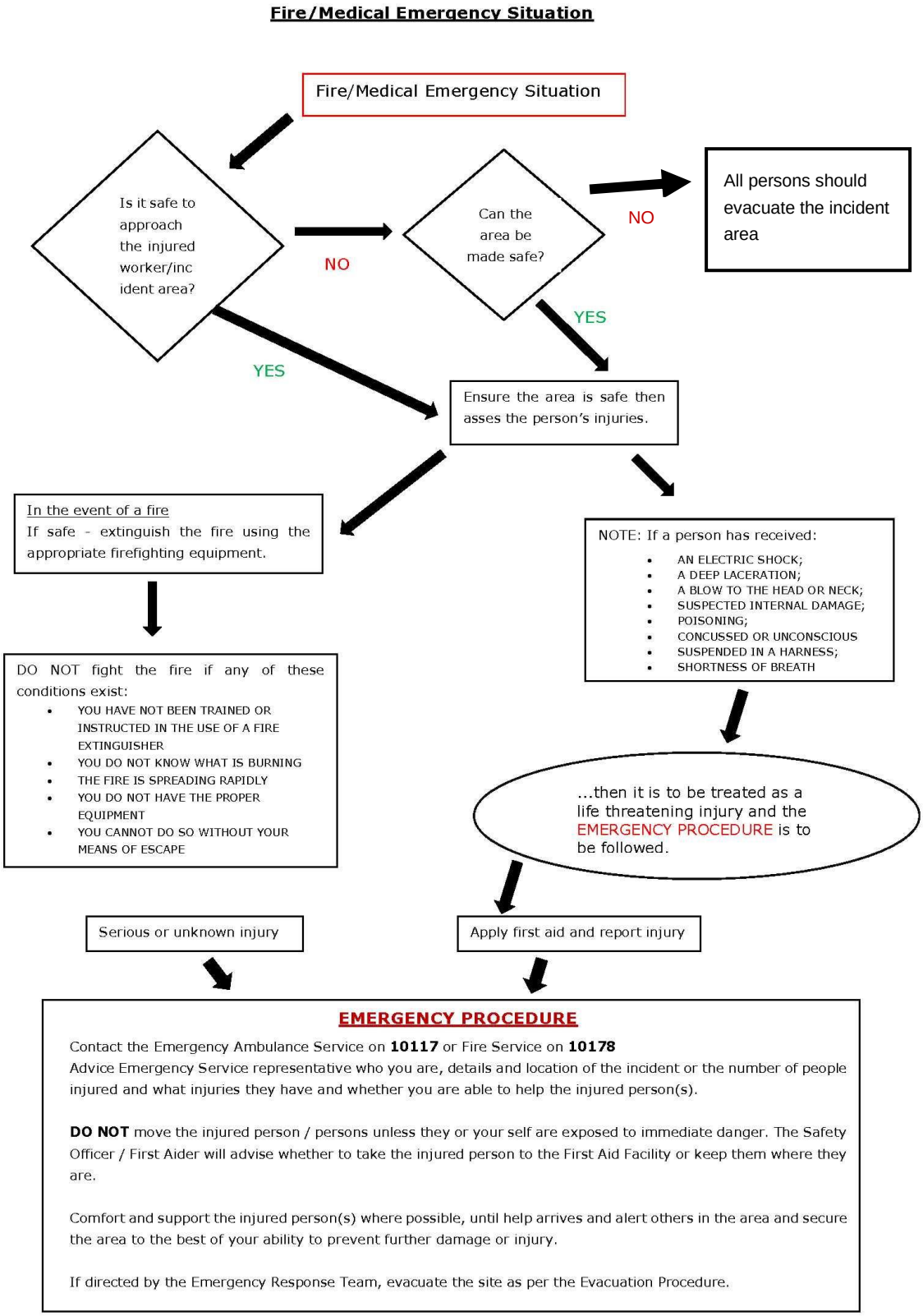

Figure 2: Emergency Fire/Medical

4. PROCEDURE RESPONSIBILITY

The Contractor's Safety, Health and Environment (SHE) Representative, employed by the Contractor, is responsible for managing the day-to-day on-site implementation of this Plan, and for the compilation of regular (usually weekly) Monitoring Reports. In addition, the SHE must act as liaison and advisor on all environmental and related issues in conjunction with the Contractor's Environmental Officer (EO), where relevant.

The local authorities will provide their assistance when deemed necessary, or when it has been requested and/or indicated in Section 30 (8) of NEMA. The provincial authority will provide assistance and guidance where required and conduct awareness programmes.

APPENDIX E

CHANCE FIND PROTOCOL

CTS HERITAGE

CHANCE FINDS OF PALAEONTOLOGICAL MATERIAL

(Adopted from the HWC Chance Fossils Finds Procedure: June 2016)

Introduction

This document is aimed to inform workmen and foremen working on a construction and/or mining site. It describes the procedure to follow in instances of accidental discovery of palaeontological material (please see attached poster with descriptions of palaeontological material) during construction/mining activities. This protocol does not apply to resources already identified under an assessment undertaken under s. 38 of the National Heritage Resources Act (no 25 of 1999).

Fossils are rare and irreplaceable. Fossils tell us about the environmental conditions that existed in a specific geographical area millions of years ago. As heritage resources that inform us of the history of a place, fossils are public property that the State is required to manage and conserve on behalf of all the citizens of South Africa. Fossils are therefore protected by the National Heritage Resources Act and are the property of the State. Ideally, a qualified person should be responsible for the recovery of fossils noticed during construction/mining to ensure that all relevant contextual information is recorded.

Heritage Authorities often rely on workmen and foremen to report finds, and thereby contribute to our knowledge of South Africa's past and contribute to its conservation for future generations.

Training

Workmen and foremen need to be trained in the procedure to follow in instances of accidental discovery of fossil material, in a similar way to the Health and Safety protocol. A brief introduction to the process to follow in the event of possible accidental discovery of fossils should be conducted by the designated Environmental Control Officer (ECO) for the project, or the foreman or site agent in the absence of the ECO It is recommended that copies of the attached poster and procedure are printed out and displayed at the site office so that workmen may familiarise themselves with them and are thereby prepared in the event that accidental discovery of fossil material takes place.

Actions to be taken

One person in the staff must be identified and appointed as responsible for the implementation of the attached protocol in instances of accidental fossil discovery and must report to the ECO or site agent. If the ECO or site agent is not present on site, then the responsible person on site should follow the protocol correctly in order to not jeopardize the conservation and well-being of the fossil material.

Once a workman notices possible fossil material, he/she should report this to the ECO or site agent.Procedure to follow if it is likely that the material identified is a fossil:

- The ECO or site agent must ensure that all work ceases immediately in the vicinity of the area where the fossil or fossils have been found;
- The ECO or site agent must inform SAHRA of the find immediately. This information must include photographs of the findings and GPS co-ordinates;
- The ECO or site agent must compile a Preliminary Report and fill in the attached Fossil Discoveries: Preliminary Record Form within 24 hours without removing the fossil from its original position. The Preliminary Report records basic information about the find including:
    - The date
    - A description of the discovery
    - A description of the fossil and its context (e.g. position and depth of find)
    - Where and how the find has been stored
    - Photographs to accompany the preliminary report (the more the better):
        - A scale must be used
        - Photos of location from several angles
        - Photos of vertical section should be provided
        - Digital images of hole showing vertical section (side);
        - Digital images of fossil or fossils.

Upon receipt of this Preliminary Report, SAHRA will inform the ECO or site agent whether or not a rescue excavation or rescue collection by a palaeontologist is necessary.

- Exposed finds must be stabilised where they are unstable and the site capped, e.g. with a plastic sheet or sand bags. This protection should allow for the later excavation of the finds with due scientific care and diligence. SAHRA can advise on the most appropriate method for stabilisation.
- If the find cannot be stabilised, the fossil may be collect with extreme care by the ECO or the site agent and put aside and protected until SAHRA advises on further action. Finds collected in this way must be safely and securely stored in tissue paper and an appropriate box. Care must be taken to remove the all fossil material and any breakage of fossil material must be avoided at all costs.

No work may continue in the vicinity of the find until SAHRA has indicated, in writing, that it is appropriate to proceed.

CTS HERITAGE

FOSSIL DISCOVERIES: PRELIMINARY RECORDING FORM		
Name of project:		
Name of fossil location:		
Date of discovery:		
Description of situation in which the fossil was found:		
Description of context in which the fossil was found:		
Description and condition of fossil identified:		
GPS coordinates:	*Lat:*	*Long:*
If no co-ordinates available then please describe the location:		
Time of discovery:		
Depth of find in hole		
Photographs (tick as appropriate and indicate number of the photograph)	*Digital image of vertical section (side)*	
	Fossil from different angles	
	Wider context of the find	
Temporary storage (where it is located and how it is conserved)		
Person identifying the fossil Name:		
Contact:		
Recorder Name:		
Contact:		
Photographer Name:		
Contact:		

CTS Heritage
34 Harries Street, Plumstead, Cape Town, 7800
Tel: +27 (0)87 073 5739 **Email:** info@ctsheritage.com **Web:** www.ctsheritage.com

APPENDIX F

ALIEN PLANT MANAGEMENT PLAN

ALIEN PLANT MANAGEMENT PLAN

1. PURPOSE

Invasive alien species pose the second largest threat to biodiversity after direct habitat destruction. The purpose of this Alien Plant Management Plan is to provide a framework for the management of alien and invasive plant species during the construction and operation of the Karusa BESS and associated infrastructure development. The broad objectives of the plan includes the following:

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

2. RELEVANT ASPECTS OF THE SITE

The project area falls into the Shale Renosterveld vegetation types (within the Fynbos biome), forming the predominant renosterveld group, accounting for 86% of the extent of renosterveld (Mucina & Rutherford, 2006). This vegetation extends beyond the fynbos and into the karoo shales where a higher grass cover is observed as a result of rainfall patterns. On a fine-scale vegetation type, the proposed development overlaps with a single vegetation type, the Central Mountain Shale Renosterveld. This vegetation type occurs in the Northern and Western Cape provinces on the Southern and south-eastern slopes of the Klein-Roggeveldberge and Komsburg below the Roggeveld section of the Great Escarpment (facing the Moordenaars Karoo) as well as farther east below Besemgoedberg and Suurkop west of Merweville and in the west in the Karookop area between Losper se Berg and high points around Thyshoogte.

During the field assessment undertaken as part of the BA process, no alien invasive plant species have been identified, however considering the fact that the project site falls within a CBA, it is recommended that any invasive alien plant (IAP) species that may colonize the area in the future be controlled by implementing an Invasive Alien Plant Management Programme.

Alien invasive plant species are expected to occur within the karoo scrub habitat, rocky outcrop habitat and the riparian thicket habitat.

3. LEGISLATIVE CONTEXT

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

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

- Category 1: Prohibited and must be controlled.

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

National Environmental Management: Biodiversity Act, 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 2013 under NEMBA. According to this Act and the regulations, any species designated under Section 70 cannot be propagated, grown, bought or sold without a permit. Below is an explanation of the three categories:

- Category 1a: Invasive species requiring compulsory control. Any specimens of Category 1a listed species need, by law, to be eradicated from the environment. No permits will be issued.
- Category 1b: Invasive species requiring compulsory control as part of an invasive species control programme. Remove and destroy. These plants are deemed to have such a high invasive potential that infestations can qualify to be placed under a government sponsored invasive species management programme. No permits will be issued.
- Category 2: Invasive species regulated by area. A demarcation permit is required to import, possess, grow, breed, move, sell, buy or accept as a gift any plants listed as Category 2 plants. No permits will be issued for Cat 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 Cat 3 plants to exist in riparian zones.

Plants listed under the categories above are detailed within Notice 1 of the Alien and Invasive Species published in GNR599 of 01 August 2014. The following guide is a useful starting point for the identification of alien species: Bromilow, C. 2010. Problem Plants and Alien Weeds of South Africa. Briza, Pretoria.

It is important to note that alien species that are regulated in terms of the Conservation of Agricultural Resources Act (Act 43 of 1983) (CARA) as weeds and invader plants are exempted from NEM:BA. This implies that the provisions of the CARA in respect of listed weed and invader plants supersede those of NEM:BA.

4. ALIEN PLANT MANAGEMENT PRINCIPLES

4.1. Prevention and early eradication

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

Monitoring plans should be developed which are designed to identify Invasive Alien Plant Species shortly after they arrive in the project area. Keeping up to date on which weeds are an immediate threat to the site is important, but efforts should be planned to update this information on a regular basis. When new Invasive Alien Plant Species are recorded on site, an immediate response of locating the site for future

monitoring and either hand-pulling the weeds or an application of a suitable herbicide should be planned. It is, however, better to monitor regularly and act swiftly than to allow invasive alien plants to become established on site.

4.2. Containment and control

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

4.3. General Clearing & Guiding Principles

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

- **Clearing Methods**

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

Fire should not be used for alien control or vegetation management at the site. The best-practice clearing method for each species identified should be used. The preferred clearing methods for most alien species can be obtained from the Department of Water Affairs and Forestry (DWAF) Working for Water (WfW) Website. http://www.dwaf.gov.za/wfw/Control/

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

- **Chemical Control**
  Although it is usually preferable to use manual clearing methods where possible, such methods may create additional disturbance which stimulates alien invasion and may also be ineffective for many

woody species which resprout. Where herbicides are to be used, the impact of the operation on the natural environment should be minimised by observing the following:

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

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

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

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

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

» **Biological control**

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

To obtain biocontrol agents, provincial representatives of the Working for Water Programme or the Directorate: Land Use and Soil Management (LUSM), Department of Forestry, Fisheries and the Environment (DFFE) can be contacted. Should biocontrol agents be employed, relevant permits must first be obtained based on the regulation pertaining to the use of biocontrol agents.

4.4. General management practices

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

- Establish an ongoing site specific monitoring programme for construction phase to detect and quantify any alien species that may become established and identify the problem species.
- Alien vegetation regrowth on areas disturbed by construction must be immediately controlled once recorded throughout the entire site during construction and operation.
- Care must be taken to avoid the introduction of alien invasive plant species to the site. Particular attention must be paid to imported material such as building sand or dirty earth-moving equipment. Stockpiles should be checked regularly and any weeds emerging from material stockpiles should be removed.
- Cleared areas that have become invaded by alien species can be sprayed with appropriate herbicides provided that these are such that break down on contact with the soil. Residual herbicides should not be used.
- The effectiveness of vegetation control varies seasonally and this is also likely to impact alien species. Control early in the wet season will allow species to re-grow and follow-up control is likely to be required. It is tempting to leave control until late in the wet season to avoid follow-up control. However, this may allow alien species to set seed before control and hence will not contribute towards reducing alien species abundance. Therefore, vegetation control should be aimed at the middle of the wet season, with a follow-up event towards the end of the wet season. There are no exact dates that can be specified here as each season is unique and management must therefore respond according to the state and progression of the vegetation.
- Alien management is an iterative process and it may require repeated control efforts to significantly reduce the abundance of a species. This is often due to the presence of large and persistent seed banks. However, repeated control usually results in rapid decline once seed banks become depleted.
- Some alien species are best individually pulled by hand and in the case of Opuntia removed from the site.
- Regular vegetation control to reduce plant biomass within the site should be conducted. This should be timed so as to coincide with the critical growth phases of the most important alien species on site. This will significantly reduce the cost of alien management as this should contribute towards the control of the dominant alien species and additional targeted control will be required only for a limited number of species.
- No alien species should be cultivated on-site. If vegetation is required for aesthetic purposes, then non-invasive, water-wise locally-occurring species should be used
- During operation, surveys for alien species should be conducted regularly, (as determined by the site specific alien vegetation management plan for the site, where applicable). All aliens identified should be cleared using appropriate means.

4.5. Monitoring

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

In general, the following principles apply for monitoring:

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

The following monitoring suggestions may be used as a guideline and may be updated by a site specific invasive alien plan, towards management of alien invasive plant species:

Construction Phase

Monitoring Action	Indicator	Timeframe
Document alien species present at the site	List of alien species	Preconstruction & monthly thereafter
Document alien plant distribution	Alien plant distribution map within priority areas	Once off 6 month following commencement of construction, and thereafter weekly EO reports to document and record alien control measures throughout construction phase
Document & record alien control measures implemented	Record of clearing activities	Weekly EO reports to document and record alien control measures throughout construction phase
Review & evaluation of control success rate	Decline in documented alien abundance over time	Biannually

Operation Phase

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

Proposed monitoring framework for the control of invasive alien plants within the property

Metric	Frequency	Method	Response
How effective are the control methods?	4-6 months after every operation	Survey the cleared areas and look for regrowth. Before and after photographs are effective for this. Observe for non-target effects of herbicide application.	If the survey reveals that the control methods are effective, e.g. low levels of re-sprouting, continue following the herbicide mixtures and control methods. If non-target plants are dying off where herbicides were applied, ensure appropriate training for herbicide applicators, demonstrate the off-target effects to herbicide applicators to ensure they are using the correct methods and herbicides. (If the results show that the control methods are not effective, adapt by e.g. cutting lower above ground or changing herbicides or timing of herbicide application.
Do the infestation levels decrease?	Annually	Survey the cleared areas and record species, densities and size. Before and after pictures are very effective.	If the infestation levels are not decreasing, reconsider clearing intervals and look at clearing methods. If infestation levels are decreasing, then continue current control method.
Quantity of herbicides used	During every operation	Keep track of cost and ensure no wastage. Record herbicide usage	Track usage over time, it will reveal a certain trend in quantities for different infestation levels. Less herbicides should be used when the infestation levels are lower. Record herbicide cost.
Does the indigenous vegetation recover in the cleared areas?	Annually	Survey the cleared areas and look out for indigenous species variety and presence. Before and after pictures are effective.	If there is recovery of indigenous vegetation, then continue current control method. If there is no recovery, consider rehabilitation with local indigenous species.
How many jobs were created?	After every operation	Timesheets	Job creation figures are useful when asking for landowner assistance from WFW or to demonstrate contributions to jobs and socio-economic conditions
How many person days (PD) were spent per operations?	After every operation	Timesheets	Keep track of cost and assist with planning and budgeting. Determine cost per person per day (PD)

APPENDIX G

PLANT RESCUE AND PROTECTION PLAN

PLANT RESCUE AND PROTECTION PLAN

1. PURPOSE

The purpose of the plant rescue and protection plan is to implement avoidance and mitigation measures to reduce the impact of the development of the Karusa BESS and associated infrastructure on listed and protected plant species and their habitats and to provide guidance on search and rescue of species of conservation concern.

2. RELEVANT ASPECTS OF THE SITE

The area falls into the Shale Renosterveld vegetation types (within the Fynbos biome), forming the predominant renosterveld group, accounting for 86% of the extent of renosterveld (Mucina & Rutherford, 2006). This vegetation extends beyond the fynbos and into the karoo shales where a higher grass cover is observed as a result of rainfall patterns. On a fine-scale vegetation type, the proposed development overlaps with a single vegetation type, the Central Mountain Shale Renosterveld. This vegetation type occurs in the Northern and Western Cape provinces on the Southern and south-eastern slopes of the Klein-Roggeveldberge and Komsburg below the Roggeveld section of the Great Escarpment (facing the Moordenaars Karoo) as well as farther east below Besemgoedberg and Suurkop west of Merweville and in the west in the Karookop area between Losper se Berg and high points around Thyshoogte.

Seven (7) of the recorded flora species are protected by legislation and include *Crassula deltoides*, *Crassula muscosa, Crassula tomentosa* var. *glabrifolia*., *Tylecodon Wallichii, Antimima logonii*, Mesembryanthemum sp. and *Ruschia intricata*. Therefore, these species are not allowed to be collected, unless a permit from the Department of Environment and Nature Conservation, Kimberly (Northern Cape Province) is granted for their removal, and damage to these species by anthropogenic activities must be avoided.

3. PRINCIPLES FOR SEARCH AND RESCUE

Successful plant rescue can only be achieved if:

- Species can be removed from their original habitat with minimal damage to the plant, especially the roots.
- All plants removed are safely stored and treated according to their specific requirements prior to being transplanted again.
- They are relocated into a suitable habitat and protected from further damage and all disturbances to aid their re-establishment.
- Timing of planting activities is planned with the onset of the growing season.
- Steps are taken where necessary to aid the initial establishment of vegetation, including occasional watering.

The following principles apply in terms of plant rescue and protection:

- Prior to construction, a walk-through of the final development footprint should be undertaken by a suitably qualified botanist/ecologist to locate and identify all listed and protected species which fall within the development footprint, as well as to identify species suitable for search and rescue.

- A permit is required to translocate or destroy any listed and protected species even if they do not leave the property. This permit should be obtained prior to ay search and rescue operations being undertaken.
- Where suitable species are identified, a search and rescue operation of these species should be undertaken within the development footprint prior to the commencement of construction.
- As far as possible, timing of search and rescue activities should be planned with the onset of the growing season.
- Affected individuals should be translocated to a similar habitat outside of the development footprint and marked for monitoring purposes. For each individual plant that is rescued, the plant must be photographed before removal, tagged with a unique number or code and a latitude longitude position recorded using a hand-held GPS device.
- The rescued plants must be planted into a container to be housed within a temporary nursery on site or immediately planted into the target habitat.
- Rescued plants, if re-planted back in the wild, should be placed as close as possible to where they were originally removed. Re-planting into the wild must cause as little disturbance as possible to existing natural ecosystems. The position of he rescued individual/s must be recorded to aid in future monitoring of that plant.
- During construction, the ECO must monitor vegetation clearing at the site. Any deviations from the plans that may be required should first be checked for listed species by the ECO or Environmental Officer and any listed species present which are able to survive translocation should be translocated to a safe site.
- Any listed species suitable for translocation observed within the development footprint that were not previously observed be translocated to a safe site.
- The collecting of plants of their parts should be strictly forbidden. Appropriate signage in this regard should be placed at the entrance gates to the site. Staff should be informed of the legal and conservation aspects of harvesting plants from the wild as part of the environmental induction training.
- Sensitive habitats and area outside project development should be clearly demarcated as no go areas during the construction and operational phase to avoid accidental impacts.

4. PROTECTED PLANT SPECIES KNOWN TO OCCUR WITHIN THE BROAD VICINITY OF THE BESS

The POSA database and the DFFE screening tool indicates that 19 threatened species are expected to occur within the assessment area and are provided in Table 1 below.

Table 1: Threatened flora species that are expected to occur within the assessment area associated with proposed project area. DD = Data Deficient, EN = Endangered, NT = Near Threatened and VU = Vulnerable

Family	Scientific name	Conservation Status	Endemism	Habitat	Likelihood of occurrence
Crassulaceae	*Adromischus phillipsiae*	Rare	Endemic	Sheltered rock crevices in loam soil	Low
Aizoaceae	*Antimima pumila*	DD	Endemic	Western Cape	Low
Asparagaceae	*Asparagus mollis*	VU	Endemic	Dwyka tillite, known only from four locations	Low
Asteraceae	*Eriocephalus grandiflorus*	Rare	Endemic	Lower foothills in quarts patches	Medium
Iridaceae	*Geissorhiza karooica*	NT	Endemic	Succulent karoo shrubland, on coarse shale slopes	High
Iridaceae	*Ixia linearifolia*	Rare	Endemic	Rocky south-facing slopes in renosterveld	High
Iridaceae	*Ixia mollis*	VU	Endemic	Among rocks on seasonally moist south-facing sandy or clay slopes. Known only from 4 locations.	Low
Hyacinthaceae	*Lachenalia longituba*	VU	Endemic	Stony clay in seasonally wet, boggy sites that bake rock hard in summer	Low
Fabaceae	*Lotononis venosa*	EN	Endemic	Open karroid scrub on sandy clay alluvium.	Low

Hypoxidaceae	*Pauridia breviscapa*	Rare	Endemic	Shaded or sheltered damp, shallow loamy soils on south-facing slopes and in seepages at the base of rocks	Medium
Iridaceae	*Romulea eburnea*	VU	Endemic	Shale soils. Known only from two locations.	Medium
	Sensitive species 1107	Rare	Endemic	Shallow pans on sandstone slabs	Medium
	Sensitive species 142	VU	Endemic	Heavy clay soils	Medium
	Sensitive species 338	Rare	Endemic	Known from less than 10 sites. Occurs in succulent karoo in shallow clay soils in seasonally damp depressions.	Low
	Sensitive species 620	Rare	Endemic	Occurring in shaded rock crevices, often on south-facing slopes	High
	Sensitive species 722	Rare	Endemic	Moist places usually associated with rocks and often under over-hanging rocks	Medium
	Sensitive species 886	Rare	Endemic	Steep or gentle slopes of a mainly southern aspect in low karroid scrub	Low
	Sensitive species 936	Rare	Endemic	Range-restricted occurring in a poorly explored area in Fynbos and succulent karoo in seasonally damp sandy loam or rocky flats in shale renosterveld.	High
Scrophulariaceae	*Zaluzianskya mirabilis*	Rare	Endemic	Gravely ground and dry river courses	High

The list of flora species recorded within the assessment area provided below in Table 2.

Table 2: Summary of flora species recorded within the assessment area and their respective growth form and conservation status. Species in bold are protected by legislation. EN = Endangered, NT= Near Threatened, VU = Vulnerable and LC = Least Concern

Family	*Scientific name*	Growth form	Conservation Status
	Angiospermae indet		
	Angiospermae indet		
	Angiospermae indet		
	Indet 1		
Aizoaceae	*Antimima loganii*	succulent	VU
Aizoaceae	*Mesembryanthemum*	succulent	
Aizoaceae	*Ruschia intricata*	shrub; succulent	LC
Anacardiaceae	*Searsia longispina*	shrub;	LC
Asparagaceae	*Asparagus capensis*	shrub	LC
Asparagaceae	Asparagus sp. indet	shrub	
Asteraceae	Asteraceae sp. indet	shrub	
Asteraceae	Asteraceae sp. indet	shrub	
Asteraceae	*Berkheya rigida*	herb	LC
Asteraceae	*Chrysocoma ciliata*	shrub	LC
Asteraceae	*Dicerothamnus rhinocerotis*	shrub	LC
Asteraceae	*Dimorphotheca cuneata*	shrub;	LC
Asteraceae	*Euryops lateriflorus*	shrub;	LC
Asteraceae	*Macledium spinosum*	Succulent	LC
Asteraceae	*Oedera genistifolia*	shrub	LC

Asteraceae	*Pentzia incana*	shrub	LC
Asteraceae	*Pteronia incana*	shrub;	LC
Asteraceae	*Seriphium plumosum*	shrub;	LC
Crassulaceae	*Crassula deltoidea*	succulent	LC
Crassulaceae	*Crassula muscosa*	succulent	LC
Crassulaceae	*Crassultomentosa* var. *glabrifolia*	succulent	
Crassulaceae	*Tylecodon wallichii*	Succulent	LC
Ebenaceae	*Diospyros austro-africana*	shrub	LC
Fabaceae	Fabaceae sp. indet		
Hyacinthaceae	*Drimia capensis*	geophyte;	LC
Poaceae	Poaceae sp. indet	graminoid;	
Poaceae	Poaceae sp. indet	graminoid;	
Poaceae	*Tragus sp.*	graminoid;	
Santalaceae	*Thesium strictum*	succulent	LC
Santalaceae	*Viscum capense*	parasite	LC
Zygophyllaceae	*Roepera fulva*	shrub	

Seven (7) of the recorded flora species are protected by legislation and include *Crassula deltoides, Crassula muscosa, Crassula tomentosa* var. *glabrifolia*., *Tylecodon Wallichii*, *Antimima logonii, Mesembryanthemum* sp. and *Ruschia intricata*. Therefore, these species are not allowed to be collected, unless a permit from the Department of Environment and Nature Conservation, Kimberly (Northern Cape Province) is granted for their removal, and damage to these species by anthropogenic activities must be avoided.

APPENDIX H

EROSION MANAGEMENT PLAN

PRINCIPLES FOR EROSION MANAGEMENT

1. PURPOSE

Exposed and unprotected soils are the main cause of erosion in most situations. Therefore, this erosion management plan and the revegetation and rehabilitation plan are closely linked to one another and should not operate independently, but should rather be seen as complementary activities within the broader environmental management of the site and should therefore be managed together.

This Erosion Management Plan addresses the management and mitigation of significant impacts relating to soil erosion. The objective of the plan is to provide:

- A general framework for soil erosion and sediment control, which enables the contractor to identify areas where erosion can occur and be accelerated by construction related activities.
- An outline of general methods to monitor, manage and rehabilitate erosion, ensuring that all erosion resulting from all phases of the development is addressed.

2. RELEVANT ASPECTS OF THE SITE

The project site is characterised by Fc 266 and Ib 288 land types. The Fc land type consists of Glenrosa and/or Mispah soil forms with the possibility of other soil forms occurring throughout. The Ib land type consists of miscellaneous land classes including rocky areas with miscellaneous soils.

The one main dominant sensitive soil form was identified as the Oakleaf soil form. The Oakleaf soil forms consists of an orthic topsoil on top of a deep neocutanic horizon. The abovementioned soil has been determined to have a land capability of class "III" and "IV" as well as a climate capability level 8 given the low Mean Annual Precipitation (MAP) and the high Mean Annual Potential Evapotranspiration (MAPE) rates. The combination between the determined land capabilities and climate capabilities results in a land potential of "L6", which is defined as having very restricted potential. Regular and/or severe limitations due to soil, slope, temperatures or rainfall. It is non-arable. The sensitivity of this land potential is characterised by a "Low Sensitivity".

The construction and operational phases of the proposed project will leave the project site vulnerable to erosion as a result of the continued fragmentation and degradation of habitats and ecosystems.

3. EROSION AND SEDIMENT CONTROL PRINCIPLES

The goals of erosion control during and after construction at the site should be to:

» Protect the land surface from erosion;
» Intercept and safely direct run-off water from undisturbed upslope areas through the site without allowing it to cause erosion within the site or become contaminated with sediment; and
» Progressively revegetate or stabilise disturbed areas.

These goals can be achieved by applying the management practices outlined in the following sections.

3.1. On-Site Erosion Management

General factors to consider regarding erosion risk at the site includes the following:

- Soil loss will be greater during wet periods than dry periods. Intense rainfall events outside of the wet season, such as occasional summer thunder storms can also cause significant soil loss. Therefore, precautions to prevent erosion should be present throughout the year.
- Soils loss will be greater on steeper slopes. Ensure that steep slopes are not de-vegetated and subsequently become hydrophobic (i.e. have increased runoff and a decreased infiltration rate) increasing the erosion potential.
- Soil loss is related to the length of time that soils are exposed prior to rehabilitation or stabilisation. Therefore, the gap between construction activities and rehabilitation should be minimised. Phased construction and progressive rehabilitation are therefore important elements of the erosion control strategy.
- The extent of disturbance will influence the risk and consequences of erosion. Therefore site clearing should be restricted to areas required for construction purposes only. As far as possible, large areas should not be cleared at a one time, especially in areas where the risk of erosion is higher.
- Roads should be planned and constructed in a manner which minimises their erosion potential. Roads should therefore follow the contour as far as possible. Roads parallel to the slope direction should be avoided as far as possible.
- Where necessary, new roads constructed should include water diversion structures present with energy dissipation features present to slow and disperse the water into the receiving area.
- Roads and other disturbed areas should be regularly monitored for erosion. Any erosion problems recorded should be rectified as soon as possible and monitored thereafter to ensure that they do not re-occur.
- Compacted areas should have adequate drainage systems to avoid pooling and surface flow. Heavy machinery should not compact those areas which are not intended to be compacted as this will result in compacted hydrophobic, water repellent soils which increase the erosion potential of the area. Where compaction does occur, the areas should be ripped.
- All bare areas should be revegetated with appropriate locally occurring species, to bind the soil and limit erosion potential.
- Silt fences should be used where there is a danger of topsoil or material stockpiles eroding and entering streams and other sensitive areas.
- Gabions and other stabilisation features should be used on steep slopes and other areas vulnerable to erosion to minimise erosion risk as far as possible.
- Activity at the site after large rainfall events when the soils are wet and erosion risk is increased should be reduced.
- Topsoil should be removed and stored separately during construction activities, and should be reapplied where appropriate as soon as possible in order to encourage and facilitate rapid regeneration of the natural vegetation on cleared areas.
- Regular monitoring of the site for erosion problems during construction (ongoing) and operation (at least twice annually) is recommended, particularly after large summer thunderstorms have been experienced.

3.1.1. Erosion control mechanisms

The contractor may use the following mechanisms (whichever proves more appropriate/ effective) and only if permissible in terms of the water use authorisation (where applicable) to combat erosion when necessary:

» Reno mattresses
» Slope attenuation
» Hessian material
» Shade catch nets
» Gabion baskets
» Silt fences
» Storm water channels and catch pits
» Soil bindings
» Geofabrics
» Hydro-seeding and/or re-vegetating
» Mulching over cleared areas
» Boulders and size varied rocks
» Tilling

3.2. Engineering Specifications

A detailed engineering specifications Storm-water Management Plan describing and illustrating the proposed stormwater control measures must be prepared by the Civil Engineers during the detailed design phase and should be based on the underlying principles of the Stormwater Management Plan (Appendix B of the EMPr) as well as aligned to the water use authorisation where applicable and this should include erosion control measures. Requirements for project design include:

» Erosion control measures to be implemented before and during the construction period, including the final stormwater control measures (post construction).
» All temporary and permanent water management structures or stabilisation methods must be indicated within the Stormwater Management Plan, and must be in line with any applicable water use authorisation (where there are conflicts, the water use authorisation requirements will take precedence).
» An onsite Engineer or Environmental Officer to be responsible for ensuring implementation of the erosion control measures on site during the construction period.
» The Developer holds ultimate responsibility for remedial action in the event that the approved stormwater plan is not correctly or appropriately implemented and damage to the environment is caused.

3.3. Monitoring

The site must be monitored continuously during construction and operation in order to determine any indications of erosion. If any erosion features are recorded as a result of the activities on site the Environmental Officer (during construction) or Environmental Manager (during operation) must:

» Assess the significance of the situation.
» Take photographs of the soil degradation.
» Determine the cause of the soil erosion.

- Inform the contractor/operator that rehabilitation must take place and that the contractor/operator is to implement a rehabilitation method statement and management plan.
- Monitor that the contractor/operator is taking action to stop the erosion and assist them where needed.
- Report and monitor the progress of the rehabilitation weekly and record all the findings in a site register.
- All actions with regards to the incidents must be reported on a monthly compliance report which will be submitted to the Competent Authority (during construction) and kept on file for consideration during the annual audits (during construction and operation).

The Contractor/ Developer (in consultation with an appropriate specialist) must:

- Select a system/mechanism to treat the erosion.
- Design and implement the appropriate system/mechanism
- Monitor the area to ensure that the system functions like it should. If the system fails, the method must be adapt or adjust to ensure the accelerated erosion is controlled.
- Continue monitoring until the area has been stabilised.

4. CONCLUSION

The Erosion Management Plan is a document to assist the Developer with guidelines on how to manage erosion. The implementation of management measures is not only good practice to ensure minimisation of degradation, but also necessary to ensure compliance with legislative requirements. This document forms part of the EMPr, and is required to be considered and adhered to during the design, construction, operation and decommissioning phases of the project.

5. REFERENCES

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APPENDIX I

REVEGETATION AND REHABILITATION PLAN

REVEGETATION AND REHABILITATION PLAN

1. PURPOSE

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

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

This rehabilitation plan should be closely aligned with other site-specific plans, including the erosion management plan, soil management plan, alien plant management plan, and plant rescue and protection plan. Prior to commencement of construction, a detailed rehabilitation plan and Method Statement for the site should be compiled with the aid of a rehabilitation specialist.

2. RELEVANT ASPECTS OF THE SITE

The area falls into the Shale Renosterveld vegetation types (within the Fynbos biome), forming the predominant renosterveld group, accounting for 86% of the extent of renosterveld (Mucina & Rutherford, 2006). This vegetation extends beyond the fynbos and into the karoo shales where a higher grass cover is observed as a result of rainfall patterns. On a fine-scale vegetation type, the proposed development overlaps with a single vegetation type, the Central Mountain Shale Renosterveld. This vegetation type occurs in the Northern and Western Cape provinces on the Southern and south-eastern slopes of the Klein-Roggeveldberge and Komsburg below the Roggeveld section of the Great Escarpment (facing the Moordenaars Karoo) as well as farther east below Besemgoedberg and Suurkop west of Merweville and in the west in the Karookop area between Losper se Berg and high points around Thyshoogte.

3. PROTECTED PLANT SPECIES KNOWN TO OCCUR WITHIN THE BROAD VICINITY OF THE BESS

The POSA database and the DFFE screening tool indicates that 19 threatened species are expected to occur within the assessment area and are provided in Table 1 below.

Table 1: Threatened flora species that are expected to occur within the assessment area associated with proposed project area. DD = Data Deficient, EN = Endangered, NT = Near Threatened and VU = Vulnerable

Family	Scientific name	Conservation Status	Endemism	Habitat	Likelihood of occurrence
Crassulaceae	*Adromischus phillipsiae*	Rare	Endemic	Sheltered rock crevices in loam soil	Low
Aizoaceae	*Antimima pumila*	DD	Endemic	Western Cape	Low
Asparagaceae	*Asparagus mollis*	VU	Endemic	Dwyka tillite, known only from four locations	Low
Asteraceae	*Eriocephalus grandiflorus*	Rare	Endemic	Lower foothills in quarts patches	Medium
Iridaceae	*Geissorhiza karooica*	NT	Endemic	Succulent karoo shrubland, on coarse shale slopes	High
Iridaceae	*Ixia linearifolia*	Rare	Endemic	Rocky south-facing slopes in renosterveld	High
Iridaceae	*Ixia mollis*	VU	Endemic	Among rocks on seasonally moist south-facing sandy or clay slopes. Known only from 4 locations.	Low
Hyacinthaceae	*Lachenalia longituba*	VU	Endemic	Stony clay in seasonally wet, boggy sites that bake rock hard in summer	Low
Fabaceae	*Lotononis venosa*	EN	Endemic	Open karroid scrub on sandy clay alluvium.	Low
Hypoxidaceae	*Pauridia breviscapa*	Rare	Endemic	Shaded or sheltered damp, shallow loamy soils on south-facing slopes and in seepages at the base of rocks	Medium
Iridaceae	*Romulea eburnea*	VU	Endemic	Shale soils. Known only from two locations.	Medium
	Sensitive species 1107	Rare	Endemic	Shallow pans on sandstone slabs	Medium
	Sensitive species 142	VU	Endemic	Heavy clay soils	Medium
	Sensitive species 338	Rare	Endemic	Known from less than 10 sites. Occurs in succulent karoo in shallow clay soils in seasonally damp depressions.	Low
	Sensitive species 620	Rare	Endemic	Occurring in shaded rock crevices, often on south-facing slopes	High

	Sensitive species 722	Rare	Ende mic	Moist places usually associated with rocks and often under over-hanging rocks	Medium
	Sensitive species 886	Rare	Ende mic	Steep or gentle slopes of a mainly southern aspect in low karroid scrub	Low
	Sensitive species 936	Rare	Ende mic	Range-restricted occurring in a poorly explored area in Fynbos and succulent karoo in seasonally damp sandy loam or rocky flats in shale renosterveld.	High
Scrophul ariaceae	*Zaluziansky a mirabilis*	Rare	Ende mic	Gravely ground and dry river courses	High

The list of flora species recorded within the assessment area provided below in Table 2.

Table 2: Summary of flora species recorded within the assessment area and their respective growth form and conservation status. Species in bold are protected by legislation. EN = Endangered, NT= Near Threatened, VU = Vulnerable and LC = Least Concern

Family	***Scientific name***	**Growth form**	**Conservation Status**
	Angiospermae indet		
	Angiospermae indet		
	Angiospermae indet		
	Indet 1		
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Aizoaceae	*Mesembryanthemum*	succulent	
Aizoaceae	*Ruschia intricata*	shrub; succulent	LC
Anacardiaceae	*Searsia longispina*	shrub;	LC
Asparagaceae	*Asparagus capensis*	shrub	LC
Asparagaceae	Asparagus sp. indet	shrub	
Asteraceae	Asteraceae sp. indet	shrub	
Asteraceae	Asteraceae sp. indet	shrub	
Asteraceae	*Berkheya rigida*	herb	LC
Asteraceae	*Chrysocoma ciliata*	shrub	LC
Asteraceae	*Dicerothamnus rhinocerotis*	shrub	LC
Asteraceae	*Dimorphotheca cuneata*	shrub;	LC
Asteraceae	*Euryops lateriflorus*	shrub;	LC
Asteraceae	*Macledium spinosum*	Succulent	LC
Asteraceae	*Oedera genistifolia*	shrub	LC
Asteraceae	*Pentzia incana*	shrub	LC
Asteraceae	*Pteronia incana*	shrub;	LC

Asteraceae	*Seriphium plumosum*	shrub;	LC
Crassulaceae	*Crassula deltoidea*	succulent	LC
Crassulaceae	*Crassula muscosa*	succulent	LC
Crassulaceae	*Crassultomentosa* var. *glabrifolia*	succulent	
Crassulaceae	*Tylecodon wallichii*	Succulent	LC
Ebenaceae	*Diospyros austro-africana*	shrub	LC
Fabaceae	Fabaceae sp. indet		
Hyacinthaceae	*Drimia capensis*	geophyte;	LC
Poaceae	Poaceae sp. indet	graminoid;	
Poaceae	Poaceae sp. indet	graminoid;	
Poaceae	*Tragus sp.*	graminoid;	
Santalaceae	*Thesium strictum*	succulent	LC
Santalaceae	*Viscum capense*	parasite	LC
Zygophyllaceae	*Roepera fulva*	shrub	

Seven (7) of the recorded flora species are protected by legislation and include Crassula deltoides, Crassula muscosa, Crassula tomentosa var. glabrifolia., Tylecodon Wallichii, Antimima logonii, Mesembryanthemum sp. and Ruschia intricata. Therefore, these species are not allowed to be collected, unless a permit from the Department of Environment and Nature Conservation, Kimberly (Northern Cape Province) is granted for their removal, and damage to these species by anthropogenic activities must be avoided.

4. REHABILITATION METHODS

» Immediately after replacing topsoils in disturbed areas, the soil surface must be revegetated with a suitable plant cover.
» It is expected that soil seed banks of indigenous vegetation are likely to be present to initiate initial vegetation cover. However, simply applying this topsoil to a well prepared rehabilitation site does not result in the same species richness and diversity as the surrounding areas. In some areas the natural regeneration of the vegetation may be poor and the application of seed to enhance vegetation recovery may be required.
» Where possible, seed could be collected from plants present at the site during plant rescue operations. Indigenous seeds may also be harvested for purposes of re-vegetation in areas that are free of alien or invasive vegetation, either at the site prior to clearance or from suitable neighbouring sites. It must be noted however that this requirement is not strictly required (it is optional) and will be based on the most suitable approach to be undertaken at the time once assessed.
» Where and if seed collection takes place, this should be undertaken by a suitably qualified specialist who is familiar with the various seed types associated with the plant species and rehabilitation in the area.

- Seed collection may be done throughout the year as seed ripens, but can also be restricted to summer, when a large amount of the perennial seed should have ripened. The collection of unripe seeds will reduce the percentage germination thereby reducing the effectiveness of the rehabilitation efforts. Seeds should be stored in paper or canvas bags dusted with insecticide, and sown at the onset of the rainy season.
- Seed can be sown onto the soil, but should preferably be applied in conjunction with measures to improve seedling survival such as scarification of the soil surface or simultaneous application of mulch. Additional organic material may be added to the soil mix, if required, to assist with water retention during the early stages of seedling establishment.
- It should be ensured that the seed mix is as diverse as possible in the first season. After the first season, when pioneer plant communities have successfully established, attempts should be made to re-sow and replant the area with more perennial and woody species. It is a process that will require several follow-ups.
- Planting is dependent on species involved. Planting of species recommended for rehabilitation should be carried out as far as is practicable to coincide with the onset of the first significant rains. In general however, planting should commence as soon as possible after construction is completed in order to minimise the potential for erosion.
- The final vegetation cover should resemble the original (non-encroached and indigenous) vegetation composition and structure as far as practicably possible.
- Progressive rehabilitation is an important element of the rehabilitation strategy and should be implemented where feasible. Re-vegetation of disturbed surfaces must occur immediately after construction activities are completed.
- Once revegetated, areas should be protected to prevent trampling and erosion as far as practically possible.
- No construction equipment, vehicles or unauthorised personnel should be allowed onto areas that have been vegetated.
- Where rehabilitation sites are located within actively grazed areas, they should be fenced if permitted by the landowner.
- Fencing should be removed once a reasonable vegetative cover has been achieved.
- Any runnels, erosion channels or wash aways developing after revegetation should be backfilled and consolidated and the areas restored to a proper stable condition.

5. MONITORING AND FOLLOW-UP ACTION

Throughout the lifecycle of the development, regular monitoring and adaptive management must be in place to detect any new degradation of rehabilitated areas. During the construction phase, the EO and contractor will be responsible for initiating and maintaining a suitable monitoring system. Once the development is operational, the project company will need to identify a suitable entity that will be able to take over

and maintain the monitoring cycle and initiate adaptive management as soon as it is required. Monitoring personnel must be adequately trained.

The following are the minimum criteria that should be monitored:

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

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

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

» Re-vegetated areas should be monitored every 4 months for the first 12 months following construction.
» Re-vegetated areas showing inadequate surface coverage (less than 30% within 12 months after re-vegetation) should be prepared and re-vegetated;
» Any areas showing erosion, should be re-contoured and seeded with indigenous grasses or other locally occurring species which grow quickly.

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

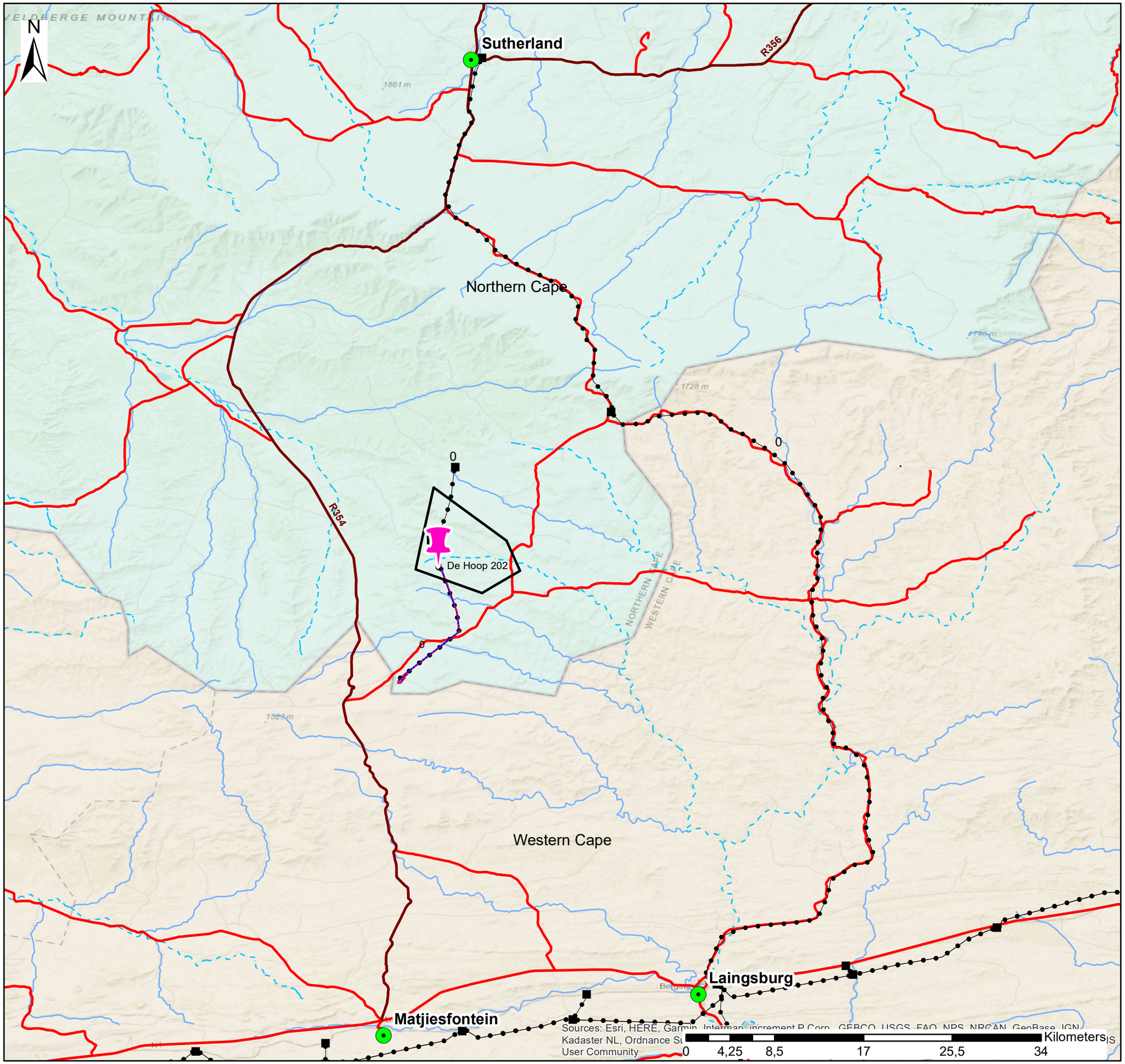
Monitoring of rehabilitation success and follow-up adaptive management, together with clearing of emerging alien plant species should continue until the decommissioning phase has been completed.

APPENDIX J

MAPS

Karusa Battery Energy Storage System (BESS)
Northern Cape Province

Locality Map



Legend

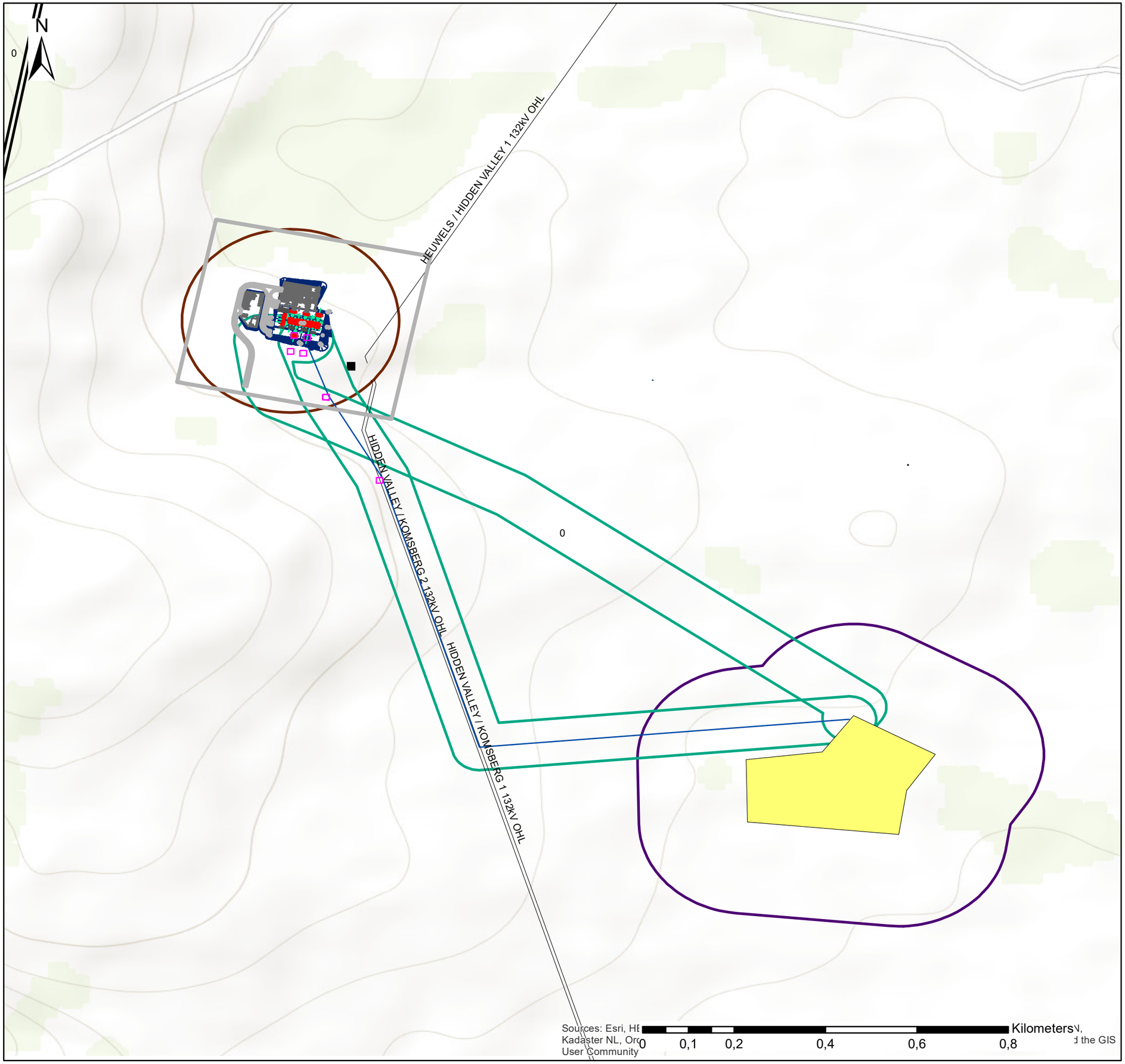
- Town
- Karusa BESS
- Regional Road
- Main Road
- Non-perennial Rivers
- Perennial Rivers
- Existing Power Line
- Farm De Hoop 202

savannah environmental

Scale: 1:350 000
Projection: GCS_WGS_1984
Map ref: Karusa BESS_ Locality

Karusa Battery Energy Storage System (BESS)
Northern Cape Province

Layout Map



Legend

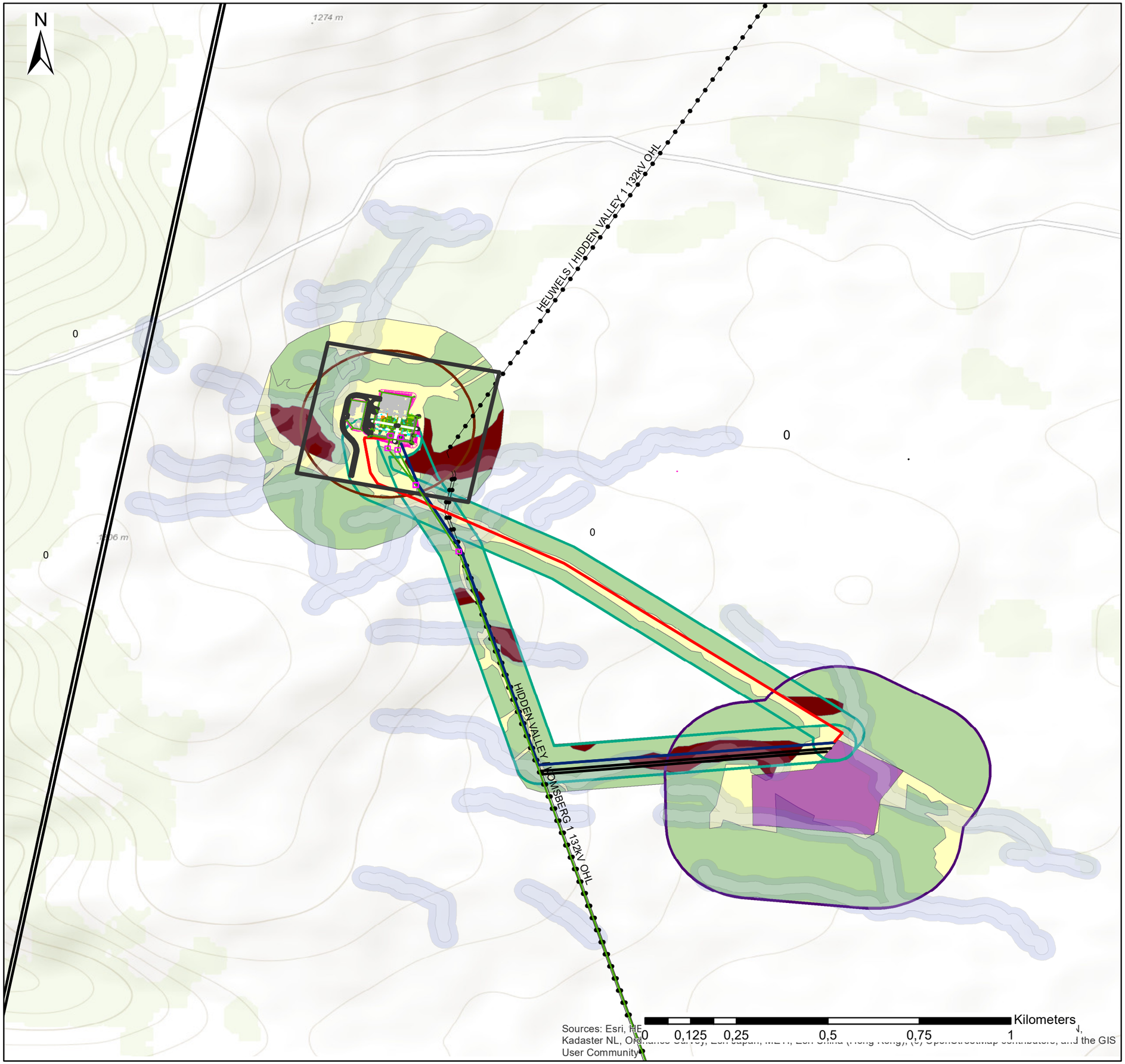
- Platfortm Boundary
- Substation Level 1
- IPP Substation
- Platform Boundary
- Substation Footprint
- Structures Plan
- Hidden_Valley_Sub
- Powerline_adjacent 132kv
- Existing Power Line
- BESS
- Powerline Buffers 132kV
- Hidden valley Substation Buffer 200m
- BESS Buffer 200m

Scale: 1:8000
Projection: GCS_WGS_1984
Map ref: Karusa BESS_ Layout

savannah environmental

Karusa Battery Energy Storage System (BESS)
Northern Cape Province

Overall Environmental Sensitivity Map



Legend

- Alternative 1 (New Line Parallell to Access Road)
- Alternative 2 (Loop in to currently constructed 132Kv)
- (Alternative 3 (Powerline adjacent to 132kv)
- Hidden_Valley_Sub
- Powerline adj to 132 KV
- Existing Power Line
- Karusa Wind Farm Boundary
- BESS Buffer 200m
- Hidden valley Substation Buffer 200m
- Powerline_adj132kv_buf100
- Powerline Buffer 100m
- Battery Energy Storage Facility

Environmental Sensitivities

- Recommended 15 m Buffer (minimal disturbance/ infrastructure)
- 32 m Regulated Area

Vegetation Sensitivity (Developable on Conditions of EMP)

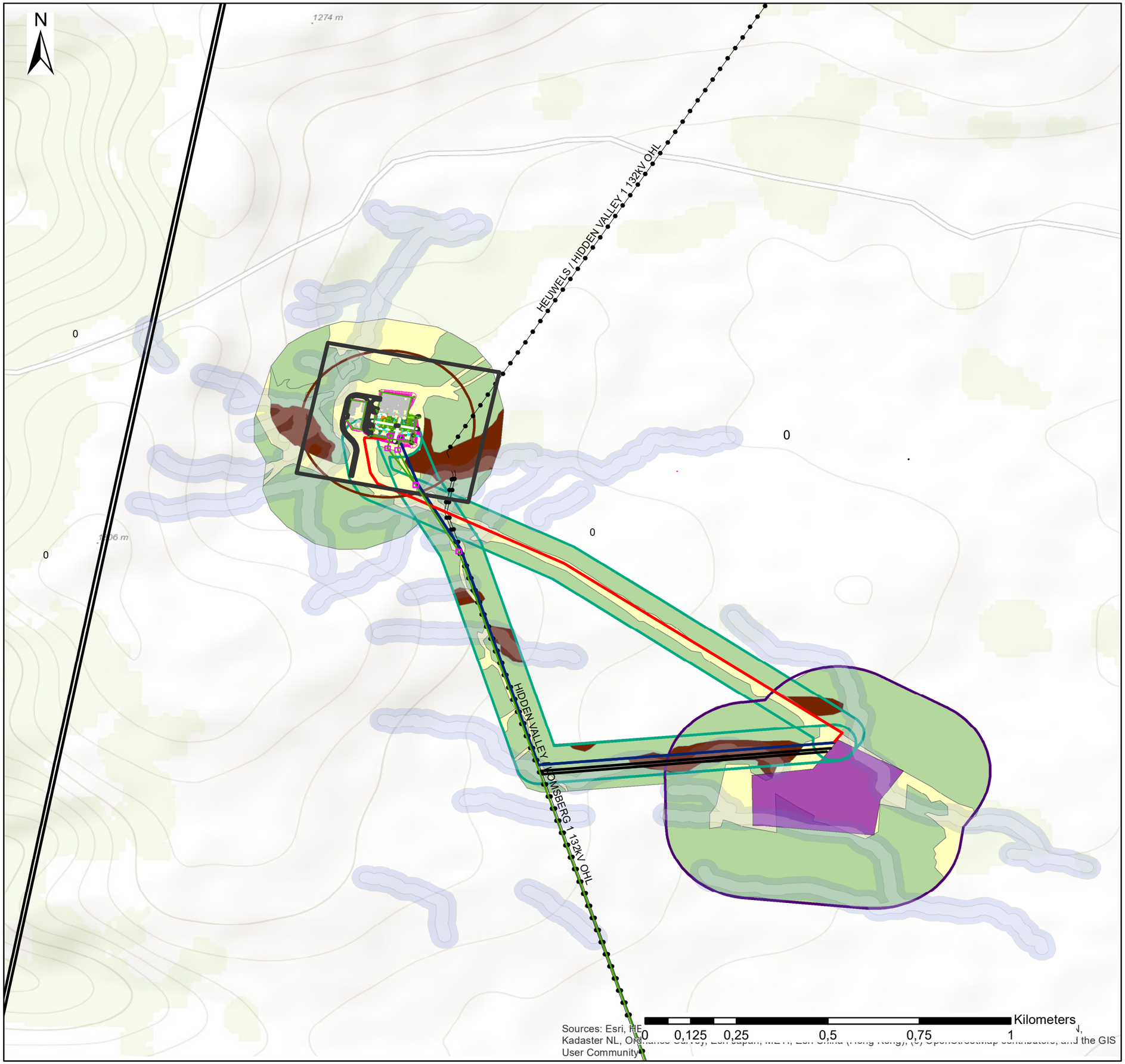
- Medium - developable
- Very high - developable
- Very low - developable

savannah environmental

Scale: 1:11 000
Projection: GCS_WGS_1984
Map ref: Karusa BESS_ Sensitivity

Karusa Battery Energy Storage System (BESS)
Northern Cape Province

Preferred Alternative Map



Legend

- Alternative 1 (Preferred Alternative)
- Alternative 2 (Loop in to currently constructed 132Kv)
- (Alternative 3 (Powerline adjacent to 132kv)
- Hidden_Valley Substation
- Existing Power Line
- Karusa Wind Farm Boundary
- BESS Buffer 200m
- Hidden valley Substation Buffer 200m
- Powerline_adj132kv_buf100
- Powerline Buffer 100m
- Battery Energy Storage Facility

Environmental Sensitivities

- Recommended 15 m Buffer (minimal disturbance/ infrastructure)
- 32 m Regulated Area

Vegetation Sensitivity (Developable on Conditions of EMP)

- Medium - developable
- Very high - developable
- Very low - developable

Sources: Esri, HE
Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

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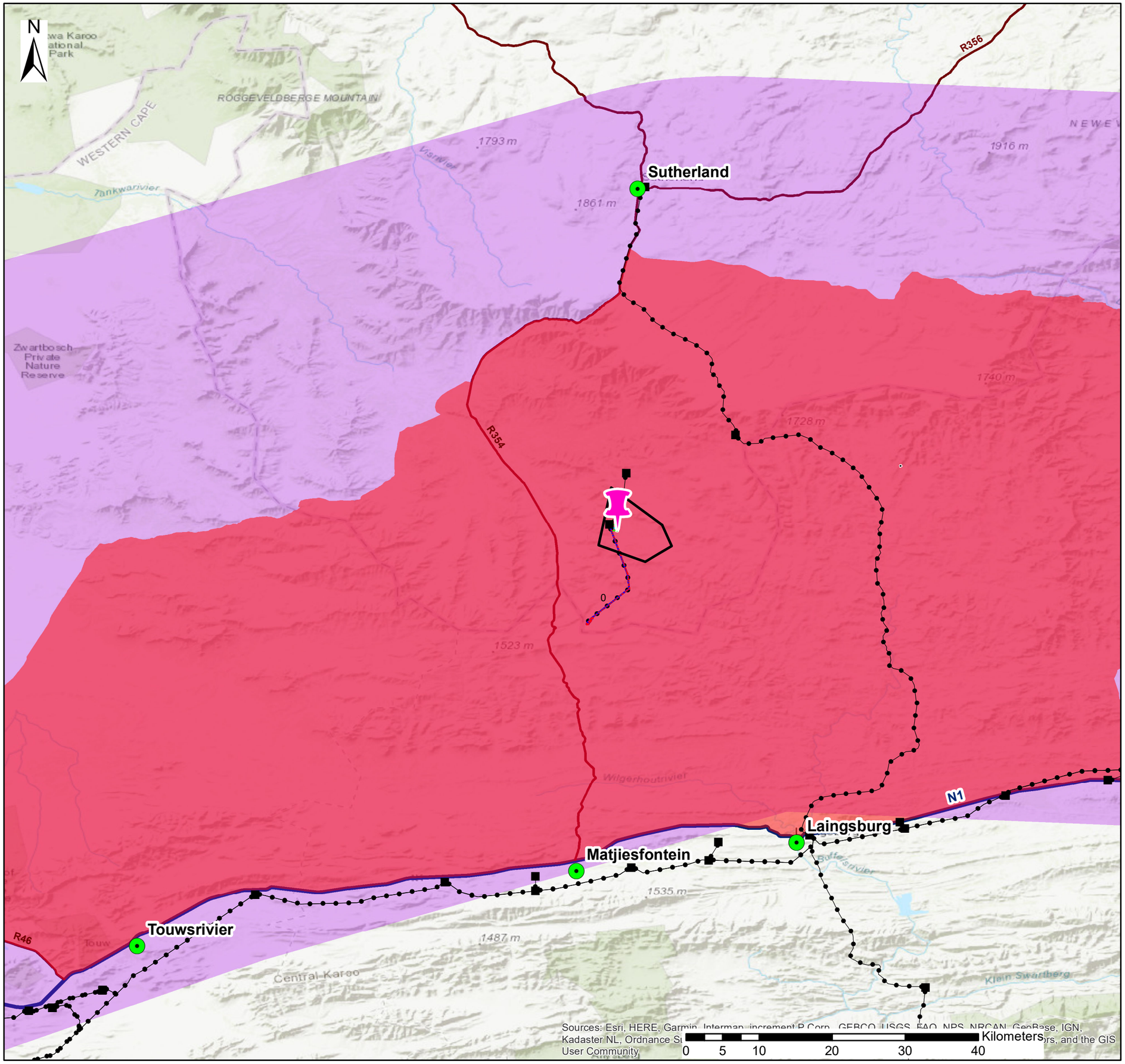
Scale: 1:11 000
Projection: GCS_WGS_1984
Map ref: Karusa BESS_ Sensitivity

Karusa Battery Energy Storage System (BESS)
Northern Cape Province

REDZ Map



Legend

- Town
- Karusa BESS
- Existing Power Line
- Regional Road
- National Road
- Farm De Hoop 202
- Komsberg REDZ2
- Central Power Corridor

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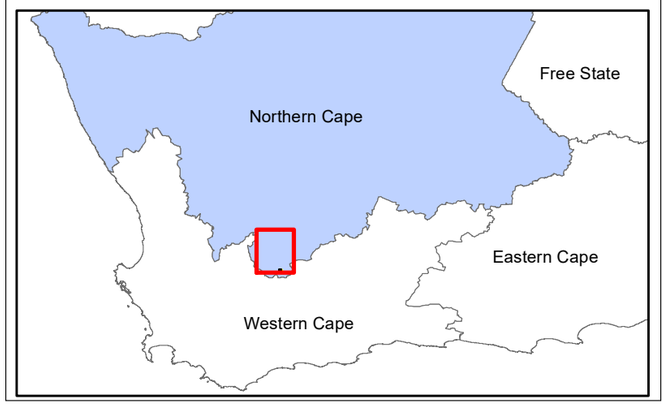
Scale: 1:500 000
Projection: GCS_WGS_1984
Map ref: Karusa BESS_REDZ



APPENDIX K

CVs OF THE PROJECT CONSULTING TEAM

savannah environmental

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Woodlands Drive, Woodmead
Johannesburg, South Africa

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Tel: +27 (11) 656 3237

CURRICULUM VITAE OF JO-ANNE THOMAS

Profession:	Environmental Management and Compliance Consultant; Environmental Assessment Practitioner
Specialisation:	Environmental Management; Strategic environmental advice; Environmental compliance advice & monitoring; Environmental Impact Assessments; Policy, strategy & guideline formulation; Project Management; General Ecology
Work experience:	Twenty four (24) years in the environmental field

VOCATIONAL EXPERIENCE

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

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

SKILLS BASE AND CORE COMPETENCIES

- Project management for a range of projects
- Identification and assessment of potential negative environmental impacts and benefits through the review and manipulation of data and specialist studies
- Identification of practical and achievable mitigation and management measures and the development of appropriate management plans
- Compilation of environmental reports in accordance with relevant environmental legislative requirements
- External and peer review of environmental reports & compliance advice and monitoring
- Formulation of environmental policies, strategies and guidelines
- Strategic and regional assessments; pre-feasibility & site selection
- Public participation processes for a variety of projects
- Strategic environmental advice to a wide variety of clients both in the public and private sectors
- Working knowledge of environmental planning processes, policies, regulatory frameworks and legislation

EDUCATION AND PROFESSIONAL STATUS

Degrees:

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

Short Courses:

- Environmental Impact Assessment, Potchefstroom University (1998)
- Environmental Law, Morgan University (2001)
- Environmental Legislation, IMBEWU (2017)
- Mining Legislation, Cameron Cross & Associates (2013)
- Environmental and Social Risk Management (ESRM), International Finance Corporation (2018)

Professional Society Affiliations:

- Registered EAP with the Environmental Assessment Practitioners Association of South Africa (EAPASA) (2019/726)
- Registered with the South African Council for Natural Scientific Professions as a Professional Natural Scientist: Environmental Scientist (400024/00)
- Registered with the International Associated for Impact Assessment South Africa (IAIAsa): 5601
- Member of the South African Wind Energy Association (SAWEA)

EMPLOYMENT

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

PROJECT EXPERIENCE

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

RENEWABLE POWER GENERATION PROJECTS: PHOTOVOLTAIC SOLAR ENERGY FACILITIES

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Christiana PV 2 SEF, North West	Solar Reserve South Africa	Project Manager & EAP
De Aar PV facility, Northern Cape	iNca Energy	Project Manager & EAP
Everest SEF near Hennenman, Free State	FRV Energy South Africa	Project Manager & EAP
Graafwater PV SEF, Western Cape	iNca Energy	Project Manager & EAP
Grootkop SEF near Allanridge, Free State	FRV Energy South Africa	Project Manager & EAP
Hertzogville PV 2 SEF with 2 phases, Free State	SunCorp / Solar Reserve	Project Manager & EAP

Project Name & Location	Client Name	Role
Karoshoek CPV facility on site 2 as part of the larger Karoshoek Solar Valley Development East of Upington, Northern Cape	FG Emvelo	Project Manager & EAP
Kgabalatsane SEF North-East for Brits, North West	Built Environment African Energy Services	Project Manager & EAP
Kleinbegin PV SEF West of Groblershoop, Northern Cape	MedEnergy Global	Project Manager & EAP
Lethabo Power Station PV Installation, Free State	Eskom Holdings SoC Limited	Project Manager & EAP
Majuba Power Station PV Installation, Mpumalanga	Eskom Holdings SoC Limited	Project Manager & EAP
Merapi PV SEF Phase 1 – 4 South-East of Excelsior, Free State	SolaireDirect Southern Africa	Project Manager & EAP
Sannaspos Solar Park, Free State	SolaireDirect Southern Africa	Project Manager & EAP
Ofir-Zx PV Plant near Keimoes, Northern Cape	S28 Degrees Energy	Project Manager & EAP
Oryx SEF near Virginia, Free State	FRV Energy South Africa	Project Manager & EAP
Project Blue SEF North of Kleinsee, Northern Cape	WWK Development	Project Manager & EAP
S-Kol PV Plant near Keimoes, Northern Cape	S28 Degrees Energy	Project Manager & EAP
Sonnenberg PV Plant near Keimoes, Northern Cape	S28 Degrees Energy	Project Manager & EAP
Tutuka Power Station PV Installation, Mpumalanga	Eskom Transmission	Project Manager & EAP
Two PV sites within the Northern Cape	MedEnergy Global	Project Manager & EAP
Two PV sites within the Western & Northern Cape	iNca Energy	Project Manager & EAP
Upington PV SEF, Northern Cape	MedEnergy Global	Project Manager & EAP
Vredendal PV facility, Western Cape	iNca Energy	Project Manager & EAP
Waterberg PV plant, Limpopo	Thupela Energy	Project Manager & EAP
Watershed Phase I & II SEF near Litchtenburg, North West	FRV Energy South Africa	Project Manager & EAP
Alldays PV & CPV SEF Phase 1, Limpopo	BioTherm Energy	Project Manager & EAP
Hyperion PV Solar Development 1, 2, 3, 4, 5 & 6, Northern Cape	Building Energy	Project Manager & EAP
Vrede & Rondavel PV, Free State	Mainstream Renewable Energy Developments	Project Manager & EAP

Basic Assessments

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

Project Name & Location	Client Name	Role
Sannaspos PV SEF Phase 2 near Bloemfontein, Free State	SolaireDirect Southern Africa	Project Manager & EAP
Solar Park Expansion within the Rooiwal Power Station, Gauteng	AFRKO Energy	Project Manager & EAP
Steynsrus SEF, Free State	SunCorp	Project Manager & EAP
Sirius Solar PV Project Three and Sirius Solar PV Project Four (BA in terms of REDZ regulations), Northern Cape	SOLA Future Energy	Project Manager & EAP
Northam PV, Limpopo Province	Northam Platinum	Project Manager & EAP
Kolkies PV Suite (x 6 projects) and Sadawa PV Suite (x 4 projects), Western Cape	Mainstream Renewable Energy Developments	Project Manager & EAP

Screening Studies

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

Environmental Compliance, Auditing and ECO

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

Project Name & Location	Client Name	Role
Northern Cape		
ECO for the construction of the Kathu PV Facility, Northern Cape	REISA	Project Manager
ECO and bi-monthly auditing for the construction of the Pulida PV Facility, Free State	Enel Green Power	Project Manager
ECO for the construction of the RustMo1 SEF, North West	Momentous Energy	Project Manager
ECO for the construction of the Sishen SEF, Northern Cape	Windfall 59 Properties	Project Manager
ECO for the construction of the Upington Airport PV Facility, Northern Cape	Sublanary Trading	Project Manager
Quarterly compliance monitoring of compliance with all environmental licenses for the operation activities at the Kathu PV facility, Northern Cape	REISA	Project Manager
ECO for the construction of the Konkoonsies II PV SEF and associated infrastructure, Northern Cape	BioTherm Energy	Project Manager
ECO for the construction of the Aggeneys PV SEF and associated infrastructure, Northern Cape	BioTherm Energy	Project Manager

Compliance Advice and ESAP Reporting

Project Name & Location	Client Name	Role
Aggeneys Solar Farm, Northern Cape	BioTherm Energy	Environmental Advisor
Airies II PV Facility SW of Kenhardt, Northern Cape	BioTherm Energy	Environmental Advisor
Kalahari SEF Phase II in Kathu, Northern Cape	Engie	Environmental Advisor
Kathu PV Facility, Northern Cape	Building Energy	Environmental Advisor
Kenhardt PV Facility, Northern Cape	BioTherm Energy	Environmental Advisor
Kleinbegin PV SEF West of Groblershoop, Northern Cape	MedEnergy	Environmental Advisor
Konkoonises II SEF near Pofadder, Northern Cape	BioTherm Energy	Environmental Advisor
Konkoonsies Solar Farm, Northern Cape	BioTherm Energy	Environmental Advisor
Lephalale SEF, Limpopo	Exxaro	Environmental Advisor
Pixley ka Seme PV Park, South-East of De Aar, Northern Cape	African Clean Energy Developments (ACED)	Environmental Advisor
RustMo1 PV Plant near Buffelspoort, North West	Momentous Energy	Environmental Advisor
Scuitdrift 1 SEF & Scuitdrift 2 SEF, Limpopo	Building Energy	Environmental Advisor
Sirius PV Plants, Northern Cape	Aurora Power Solutions	Environmental Advisor
Upington Airport PV Power Project, Northern Cape	Sublunary Trading	Environmental Advisor
Upington SEF, Northern Cape	Abengoa Solar	Environmental Advisor
Ofir-ZX PV SEF near Keimoes, Northern Cape	Networx S28 Energy	Environmental Advisor
Environmental Permitting for the Steynsrus PV1 & PV2 SEF's, Northern Cape	Cronimet Power Solutions	Environmental Advisor
Environmental Permitting for the Heuningspruit PV SEF, Northern Cape	Cronimet Power Solutions	Environmental Advisor

Due Diligence Reporting

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

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

Project Name & Location	Client Name	Role
Biodiversity Permit & WULA for the Aggeneys SEF near Aggeneys, Northern Cape	BioTherm Energy	Project Manager & EAP
Biodiversity Permit for the Konkoonises II SEF near Pofadder, Northern Cape	BioTherm Energy	Project Manager & EAP
Biodiversity Permitting for the Lephalale SEF, Limpopo	Exxaro Resources	Project Manager & EAP
Environmental Permitting for the Kleinbegin PV SEF West of Groblershoop, Northern Cape	MedEnergy	Project Manager & EAP
Environmental Permitting for the Upington SEF, Northern Cape	Abengoa Solar	Project Manager & EAP
Environmental Permitting for the Kathu PV Facility, Northern Cape	Building Energy	Project Manager & EAP
Environmental Permitting for the Konkoonsies Solar Farm, Northern Cape	BioTherm Energy	Project Manager & EAP
Environmental Permitting for the Lephalale SEF, Limpopo	Exxaro Resources	Project Manager & EAP
Environmental Permitting for the Scuitdrift 1 SEF & Scuitdrift 2 SEF, Limpopo	Building Energy	Project Manager & EAP
Environmental Permitting for the Sirius PV Plant, Northern Cape	Aurora Power Solutions	Project Manager & EAP
Environmental Permitting for the Steynsrus PV1 & PV2 SEF's, Northern Cape	Cronimet Power Solutions	Project Manager & EAP
Environmental Permitting for the Heuningspruit PV SEF, Northern Cape	Cronimet Power Solutions	Project Manager & EAP
Permits for the Kleinbegin and UAP PV Plants, Northern Cape	MedEnergy Global	Project Manager & EAP
S53 Application for Arriesfontein Solar Park Phase 1 – 3 near Danielskuil, Northern Cape	Solar Reserve / SunCorp	Project Manager & EAP
S53 Application for Hertzogville PV1 & PV 2 SEFs, Free State	Solar Reserve / SunCorp	Project Manager & EAP
S53 Application for the Bloemfontein Airport PV Facility, Free State	Sublunary Trading	Project Manager & EAP
S53 Application for the Kimberley Airport PV Facility, Northern Cape	Sublunary Trading	Project Manager & EAP
S53 Application for the Project Blue SEF, Northern Cape	WWK Developments	Project Manager & EAP
S53 Application for the Upington Airport PV Facility, Free State	Sublunary Trading	Project Manager & EAP
WULA for the Kalahari SEF Phase II in Kathu, Northern Cape	Engie	Project Manager & EAP

RENEWABLE POWER GENERATION PROJECTS: CONCENTRATED SOLAR FACILITIES (CSP)

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Ilanga CSP 2, 3, 4, 5, 7 & 9 Facilities near Upington, Northern Cape	Emvelo Holdings	Project Manager & EAP
Ilanga CSP near Upington, Northern Cape	Ilangethu Energy	Project Manager & EAP

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

Environmental Compliance, Auditing and ECO

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

Screening Studies

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

Compliance Advice and ESAP reporting

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

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

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

RENEWABLE POWER GENERATION PROJECTS: WIND ENERGY FACILITIES

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Sere WEF, Western Cape	Eskom Holdings SoC Limited	EAP
Aberdeen WEF, Eastern Cape	Eskom Holdings SoC Limited	Project Manager & EAP
Amakhala Emoyeni WEF, Eastern Cape	Windlab Developments	Project Manager & EAP
EXXARO West Coast WEF, Western Cape	EXXARO Resources	Project Manager & EAP
Goereesoe Wind Farm near Swellendam, Western Cape	iNca Energy	Project Manager & EAP
Hartneest WEF, Western Cape	Juwi Renewable Energies	Project Manager & EAP
Hopefield WEF, Western Cape	Umoya Energy	EAP
Kleinsee WEF, Northern Cape	Eskom Holdings SoC Limited	Project Manager & EAP
Klipheuwel/Dassiesfontein WEF within the Overberg area, Western Cape	BioTherm Energy	Project Manager & EAP
Moorreesburg WEF, Western Cape	iNca Energy	Project Manager & EAP
Oyster Bay WEF, Eastern Cape	Renewable Energy Resources Southern Africa	Project Manager & EAP
Project Blue WEF, Northern Cape	Windy World	Project Manager & EAP
Rheboksfontein WEF, Western Cape	Moyeng Energy	Project Manager & EAP
Spitskop East WEF near Riebeeck East, Eastern Cape	Renewable Energy Resources Southern Africa	Project Manager & EAP
Suurplaat WEF, Western Cape	Moyeng Energy	Project Manager & EAP
Swellendam WEF, Western Cape	IE Swellendam	Project Manager & EAP
Tsitsikamma WEF, Eastern Cape	Exxarro	Project Manager & EAP
West Coast One WEF, Western Cape	Moyeng Energy	Project Manager & EAP

Basic Assessments

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

Screening Studies

Project Name & Location	Client Name	Role
Albertinia WEF, Western Cape	BioTherm Energy	Project Manager & EAP
Koingnaas WEF, Northern Cape	Just Pal Tree Power	Project Manager & EAP
Napier Region WEF Developments, Western Cape	BioTherm Energy	Project Manager & EAP
Tsitsikamma WEF, Eastern Cape	Exxarro Resources	Project Manager & EAP

Project Name & Location	Client Name	Role
Various WEFs within an identified area in the Overberg area, Western Cape	BioTherm Energy	Project Manager & EAP
Various WEFs within an identified area on the West Coast, Western Cape	Investec Bank Limited	Project Manager & EAP
Various WEFs within an identified area on the West Coast, Western Cape	Eskom Holdings Limited	Project Manager & EAP
Various WEFs within the Western Cape	Western Cape Department of Environmental Affairs and Development Planning	Project Manager & EAP
Velddrift WEF, Western Cape	VentuSA Energy	Project Manager & EAP
Wind 1000 Project	Thabo Consulting on behalf of Eskom Holdings	Project Manager & EAP
Wittekleibosch, Snylip & Doriskraal WEFs, Eastern Cape	Exxarro Resources	Project Manager & EAP

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
ECO for the construction of the West Coast One WEF, Western Cape	Aurora Wind Power	Project Manager
ECO for the construction of the Gouda WEF, Western Cape	Blue Falcon	Project Manager
EO for the Dassiesklip Wind Energy Facility, Western Cape	Group 5	Project Manager
Quarterly compliance monitoring of compliance with all environmental licenses for the operation activities at the Gouda Wind Energy facility near Gouda, Western Cape	Blue Falcon	Project Manager
Annual auditing of compliance with all environmental licenses for the operation activities at the West Coast One Wind Energy facility near Vredenburg, Western Cape	Aurora Wind Power	Project Manager
External environmental and social audit for the Amakhala Wind Farm, Eastern Cape	Cennergi	Project Manager
External environmental and social audit for the Tsitsikamma Wind Farm, Eastern Cape	Cennergi	Project Manager
ECO for the construction of the Excelsior Wind Farm and associated infrastructure, Northern Cape	BioTherm Energy	Project Manager
External compliance audit of the Dassiesklip Wind Energy Facility, Western Cape	BioTherm Energy	Project Manager

Compliance Advice

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

Rheboksfontein WEF, Western Cape	Moyeng Energy	Environmental Advisor
Tiqua WEF, Western Cape	Cennergi	Environmental Advisor
Tsitsikamma WEF, Eastern Cape	Cennergi	Environmental Advisor
West Coast One WEF, Western Cape	Moyeng Energy	Environmental Advisor

Due Diligence Reporting

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

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

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

CONVENTIONAL POWER GENERATION PROJECTS (COAL)

Environmental Impact Assessments and Environmental Management Programmes

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

Project Name & Location	Client Name	Role
Waterberg IPP Coal-Fired Power Station near Lephalale, Limpopo	Exxaro Resources	Project Manager & EAP

Basic Assessments

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

Screening Studies

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

Environmental Compliance, Auditing and ECO

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

Compliance Advice

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

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

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

CONVENTIONAL POWER GENERATION PROJECTS (GAS)

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Ankerlig OCGT to CCGT Conversion project &400 kV transmission power line between Ankerlig and the Omega Substation, Western Cape	Eskom Holdings SoC Limited	Project Manager & EAP
Gourikwa OCGT to CCGT Conversion project & 400kV transmission power line between Gourikwa & Proteus Substation, Western Cape	Eskom Holdings SoC Limited	Project Manager & EAP
Richards Bay Gas to Power Combined Cycle Power Station, KwaZulu-Natal	Eskom Holdings SoC Limited	Project Manager & EAP
Richards Bay Gas to Power Plant, KwaZulu-Natal	Richards Bay Gas Power 2	Project Manager & EAP
Decommissioning & Recommissioning of 3 Gas Turbine Units at Acacia Power Station & 1 Gas Turbine Unit at Port Rex Power Station to the existing	Eskom Holdings	Project Manager & EAP

Project Name & Location	Client Name	Role
Ankerlig Power Station in Atlantis Industria, Western Cape		
320MW gas-to-power station in Richards Bay, KwaZulu-Natal	Phinda Power Projects	Project Manager & EAP

Screening Studies

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

GRID INFRASTRUCTURE PROJECTS

Environmental Impact Assessments and Environmental Management Programmes

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

Basic Assessments

Project Name & Location	Client Name	Role
Dassenberg-Koeberg Power Line Deviation from the Koeberg to the Ankerlig Power Station, Western Cape	Eskom Holdings	Project Manager & EAP
Golden Valley II WEF Power Line & Substation near Cookhouse, Eastern Cape	BioTherm Energy	Project Manager & EAP
Golden Valley WEF Power Line near Cookhouse, Eastern Cape	BioTherm Energy	Project Manager & EAP
Karoshoek Grid Integration project as part of the Karoshoek Solar Valley Development East of Upington, Northern Cape	FG Emvelo	Project Manager & EAP

Project Name & Location	Client Name	Role
Konkoonsies II PV SEF Power Line to the Paulputs Substation near Pofadder, Northern Cape	BioTherm Energy	Project Manager & EAP
Perdekraal West WEF Powerline to the Eskom Kappa Substation, Westnern Cape	BioTherm Energy	Project Manager & EAP
Rheboksfontein WEF Powerline to the Aurora Substation, Western Cape	Moyeng Energy	Project Manager & EAP
Soetwater Switching Station near Sutherland, Northern Cape	African Clean Energy Developments (ACED)	Project Manager & EAP
Solis Power I Power Line & Switchyard Station near Upington, Northern Cape	Brightsource	Project Manager & EAP
Stormwater Canal System for the Ilanga CSP near Upington, Northern Cape	Karoshoek Solar One	Project Manager & EAP
Tsitsikamma Community WEF Powerline to the Diep River Substation, Eastern Cape	Eskom Holdings	Project Manager & EAP
Two 132kV Chickadee Lines to the new Zonnebloem Switching Station, Mpumalanga	Eskom Holdings	Project Manager & EAP
Electrical Grid Infrastructure for the Kolkies and Sadawa PV clusters, Western Cape	Mainstream Renewable Energy Developments	Project Manager & EAP
Sadawa Collector substation, Western Cape	Mainstream Renewable Energy Developments	Project Manager & EAP
Electrical Grid Infrastructure for the Vrede and Rondavel PV facilities, Free State	Mainstream Renewable Energy Developments	Project Manager & EAP

Environmental Compliance, Auditing and ECO

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

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

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

MINING SECTOR PROJECTS

Environmental Impact Assessments and Environmental Management Programmes

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

Basic Assessments

Project Name & Location	Client Name	Role
Rare Earth Separation Plant in Vredendal, Western Cape	Rareco	Project Manager & EAP
Decommissioning and Demolition of Kilns 5 & 6 at the Slurry Plant, Kwa-Zulu Natal	PPC	Project Manager & EAP

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
ECO for the construction of the Duhva Mine Water Recovery Project, Mpumalanga	Eskom Holdings SoC Limited	Project Manager
External compliance audit of Palesa Coal Mine's Integrated Water Use License (IWUL), near KwaMhlanga, Mpumalanga	HCI Coal	Project Manager
External compliance audit of Palesa Coal Mine's Waste Management License (WML) and EMP, near KwaMhlanga, Mpumalanga	HCI Coal	Project Manager
External compliance audit of Mbali Coal Mine's Integrated Water Use License (IWUL), near Ogies, Mpumalanga	HCI Coal	Project Manager
Independent External Compliance Audit of Water Use License (WUL) for the Tronox Namakwa Sands (TNS) Mining Operations (Brand se Baai), Western Cape	Tronox Namakwa Sands	Project Manager
Independent External Compliance Audit of Water Use License (WUL) for the Tronox Namakwa Sands (TNS) Mineral Separation Plant (MSP), Western Cape	Tronox Namakwa Sands	Project Manager
Independent External Compliance Audit of Water Use License (WUL) for the Tronox Namakwa Sands (TNS) Smelter Operations (Saldanha), Western Cape	Tronox Namakwa Sands	Project Manager
Compliance Auditing of the Waste Management Licence for the PetroSA Landfill Site at the GTL Refinery, Western Cape	PetroSA	Project Manager

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

Project Name & Location	Client Name	Role
Waste Licence Application for the Rare Earth Separation Plant in Vredendal, Western Cape	Rareco	Project Manager & EAP

WULA for the Expansion of the Landfill site at Exxaro's Namakwa Sands Mineral Separation Plant, Western Cape	Exxaro Resources	Project Manager & EAP
S24G & WML for an Aluminium Plant, Gauteng	GfE-MIR Alloys & Minerals	Project Manager & EAP

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

Environmental Impact Assessments and Environmental Management Programmes

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

Basic Assessments

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

Project Name & Location	Client Name	Role
Kruisvallei Hydroelectric Power Generation Scheme, Free State	Building Energy	Project Manager & EAP
Masetjaba Water Reservoir, Pump Station and Bulk Supply Pipeline near Nigel, Gauteng	Naidu Consulting Engineers	Project Manager & EAP
Access Road for the Dwarsug Wind Farm, Northern Cape Province	South Africa Mainsteam Renewable Power	Project Manager & EAP

Screening Studies

Project Name & Location	Client Name	Role
Roodepoort Open Space Optimisation Programme (OSOP) Precinct, Gauteng	TIMAC Engineering Projects	Project Manager & EAP
Vegetable Oil Plant and Associated Pipeline, Kwa-Zulu Natal	Wilmar Oils and Fats Africa	Project Manager & EAP

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
ECO and bi-monthly auditing for the construction of the Olifants River Water Resources Development Project (ORWRDP) Phase 2A: De Hoop Dam, R555 realignment and housing infrastructure	Department of Water and Sanitation	Project Manager Auditor
ECO for the Rehabilitation of the Blaaupan & Storm Water Channel, Gauteng	Airports Company of South Africa (ACSA)	Project Manager
Due Diligence reporting for the Better Fuel Pyrolysis Facility, Gauteng	Better Fuels	Project Manager
ECO for the Construction of the Water Pipeline from Kendal Power Station to Kendal Pump Station, Mpumalanga	Transnet	Project Manager
ECO for the Replacement of Low-Level Bridge, Demolition and Removal of Artificial Pong, and Reinforcement the Banks of the Crocodile River at the Construction at Walter Sisulu National Botanical Gardens, Gauteng Province	South African National Biodiversity Institute (SANBI)	Project Manager
External Compliance Audit of the Air Emission Licence (AEL) for a depot in Bloemfontein, Free State Province and in Tzaneen, Mpumalanga Province	PetroSA	Project Manager

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

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

Project Name & Location	Client Name	Role
S24G and WULA for the Ilegal construction of structures within a watercourse on EFF 24 Ruimsig Agricultural Holdings, Gauteng	Sorror Language Services	Project Manager & EAP

HOUSING AND URBAN PROJECTS

Basic Assessments

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

Compliance Advice and reporting

Project Name & Location	Client Name	Role
Kampi ya Thude at the Olifants West Game Reserve, Limpopo	Nick Elliot	Environmental Advisor
External Compliance Audit of WUL for the Johannesburg Country Club, Gauteng	Johannesburg Country Club	Project Manager

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
Due Diligence Audit for the Due Diligence Audit Report, Gauteng	Delta BEC (on behalf of Johannesburg Development Agency (JDA))	Project Manager

ENVIRONMENTAL MANAGEMENT TOOLS

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

Project Name & Location	Client Name	Role
State of the Environment (SoE) for Emalahleni Local Municipality, Mpumalanga	Simo Consulting on behalf of Emalahleni Local Municipality	Project Manager & EAP
Aspects and Impacts Register for Salberg Concrete Products operations	Salberg Concrete Products	EAP
First State of Waste Report for South Africa	Golder on behalf of the Department of Environmental Affairs	Project Manager & EAP
Responsibilities Matrix and Gap Analysis for the Kruisvallei Hydroelectric Power Generation Scheme, Free State Province	Building Energy	Project Manager
Responsibilities Matrix and Gap Analysis for the Roggeveld Wind Farm, Northern & Western Cape Provinces	Building Energy	Project Manager

PROJECTS OUTSIDE OF SOUTH AFRICA

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

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CURRICULUM VITAE OF RAQUEL PETERS

Profession : Junior Environmental Consultant (Intern)

Profile :

A Bachelor of Arts (BA) Environmental Management graduate with an immense passion for the environment, sustainability, and the transition to a low-carbon economy. Raquel has completed short courses in green investments and climate change. She possesses a high level of integrity and professionalism. Her greatest strengths include time management and dedication.

VOCATIONAL EXPERIENCE

Raquel has a Bachelor of Arts degree in Environmental Management and is currently pursuing her Honours degree in the same field. She is currently employed as a Junior Environmental consultant at Savannah Environmental. She was chosen by the South African Wind Energy Association (SAWEA) to attend the Wind Ac Africa 2021 Conference and she has maintained a 75% average for her Honours degree. Throughout her studies she has gained experience in the following:

Renewable energy sector

Raquel was among 20 South African students selected to attend the Wind Ac Africa and Windaba 2021Conference.

This conference has granted her exposure to:

- The latest renewable energy technologies currently available on the market.
- Research papers on renewable energy development zones (REDz) that were in the peer review process.
- The available market for renewable energy and the barriers that the sector experience.

Waste Management

Raquel has participated in waste management operations as well as recycling initiatives as part of the requirements for her Honours degree. This comprised of her heading a team to assess one of Durban's most polluted beaches and compile a report thereof. Recycling initiatives involved researching companies that are solely involved in waste management, assessing their procedures and practices, compiling a report thereof and presenting it.

Raquel has undertaken an audit for a park as a requirement for one of her Honours subjects. This comprised of assessing the condition of the park and determining whether environmental regulations were complied with. This process also involved stakeholder engagement where the perceptions of park users were recorded via face-to-face interviews.

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SKILLS BASE AND CORE COMPETENCIES

- Strong communication skills
- Planning and organisational resilience
- Proficient in English and Afrikaans
- Report writing
- Leadership potential (Team leader of a waste management project 2019, and leader of a University team debate 2022.

EDUCATION AND PROFESSIONAL STATUS

Degrees:

- BA Environmental Management (2019)
- BA (Hons) Environmental Management (In progress | to be completed in May 2022)

Short Courses:

- Green investments in renewable energy (ADBI Institute |2021)
- Climate change and human rights (UNCC | 2021

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EDUCATION AND PROFESSIONAL STATUS

Date	Company	Roles and Responsibilities
January 2022 – current	Savannah Environmental (Pty) Ltd	Tasks include: Environmental Impact Assessments (EIAs) in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), read with the EIA Regulations (2014), as amended. 1. Specific primary aspects of the including, inter alia: Environmental permitting, environmental authorisation applications, and associated public participation. 2. Understanding and applying applicable legislation, efficient and quality report writing, liaison with relevant environmental authorities, site visits, compilation of environmental management programmes (EMPrs), amendment applications, and public participation tasks. 3. Water use license applications, environmental compliance monitoring and any other related authorisation, permitting and licensing tasks. 4. Implementation of appropriate procedures and mechanisms to consolidate and complete a compliance check on project-related files with a view to enhance overall management of project documentation for all closed, live and future projects executed by the company, 5. Project-related GIS mapping. 6. Site visits and travel to project sites.

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CURRICULUM VITAE OF NONDUMISO BULUNGA

Comprehensive CV

Profession : Lead - Social, GIS and Stakeholder Engagement

Specialisation: Social, GIS and Stakeholder Engagement in the environmental field

Work Experience: 8 years in the Environmental field.

VOCATIONAL EXPERIENCE

Nondumiso Bulunga is a Social, GIS and Stakeholder Engagement Specialist at Savannah Environmental. Nondumiso has eight (8) years working experience in project management and facilitation in various industries such as environmental services field including but not limited to recycling, industrial, energy, mining and agriculture.

Working for small and large organisations, Nondumiso has gained exposure in research, collection of data, critical analysis, GIS, and environmental solutions. Nondumiso has worked on projects in South Africa and Malawi.

Nondumiso is very well versed in the IFC Environmental and Social Performance Standards (including IFC PS 2012) and the associated Equator Principles, which have informed the approach and standard for projects regarding ESIA. Nondumiso is skilled at organising and driving effective project teams at a scale relevant to the project's requirements. She has technical experience and can quickly identify the most pertinent issues of a particular project whilst focussing on driving project success by rigorously implementing project management tools.

Nondumiso has experience ranging over several aspects of social research, including the planning and execution of social surveys, participatory rural appraisal, sustainable livelihoods assessments, data management and statistical analysis, capturing and management of spatial data, stakeholder identification and community facilitation. She has worked in local and regional projects taking part in socioeconomic impact assessment, livelihood restoration plans and resettlement plans.

SKILLS BASE AND CORE COMPETENCIES

- Consultation
- Stakeholder Engagement
- Facilitation
- Social Impact Assessments
- Communication
- Project Management
- Project Coordination
- Research
- Training and Development
- Geographical Information Systems, Remote Sensing
- Stakeholder Engagement Plans
- Stakeholder Analysis and Mapping
- IFC Performance Standards
- Comments and Response Reports
- Grievance Mechanism
- Awarness Campaign

EDUCATION AND PROFESSIONAL STATUS

Degrees:

- 2018 : MSC GEOGRAPHICAL INFORMATION SYSTEM and REMOTE SENSING
- 2015 : BAHONS in GEOGRAPHY
- 2013 : BA in GEOGRAPHY AND SOCIOLOGY

Short Courses:

- 2015 One day information session on Modern Technologies and Pathways for the Energetic Use of Biomass
- 2015 One day Public lecture on Climate Change
- 2017 Accredited facilitation certification
- 2017 One day course on Office Management Training
- 2018 Resettlement as part of Impact Assessment

EMPLOYMENT

Duration	Position	Company	Roles and Responsibilities
May 2021 – current ●Permanent	Lead Consultant: Social, Stakeholder Engagement and GIS	Savannah Environmental (Pty) Ltd	Build, lead and manage a Stakeholder Consultation and Engagement team. Advance the Social Impact Assessment reporting service offering. Manage an in-house GIS team and upskill to improve and develop new deliverables for the EIA and Compliance teams. New business development, including development and driving the development of new products and/or services as part of the Savannah Environmental service offering. Manage and mentor staff and critically review and edit reporting/deliverables. Provide strategic input to business and project deliverables.

Duration	Position	Company	Roles and Responsibilities
October 2020 – February 2021 ●Contract	Data Analyst	Community Insights Groups (International)	Desk review of project documentation to inform data collection tools Contribute to the development of monitoring indicators Develop new databases of indicators and consolidate with existing databases from the client Develop household and focus group questionnaires Develop interview/ focus group guidelines Develop fieldwork plan Set up survey software Train local enumerators in the use of the survey software (over ZOOM) Provide remote support to the field team on the survey software Undertake phone KIIs Develop information campaign materials and visual aids for focus groups, KIIs Data organization and quality assurance during the field work (remote) Organize, clean and handover raw data to the client Desktop data analysis – qualitative and quantitative Produce and populate pivot and frequency distribution tables Produce narrative and graphic description of the data for the client report GIS Data Management and Handling Map creation and analysis
November 2019 – March 2021 ●Contract	Policy Coordinator Consultant	International Finance Corporation (International)	Support to the Agri-processing resource efficiency program Coordinate public and private stakeholders to propose specific policy Regulatory and procedural measures to promote improved water efficiency Convening a public-private dialogue process to reach consensus Manage partnerships with local authorities Due Diligence and risk assessment
April 2020 – October 2020 ●Contract	Project Manager	Pax Advisory (Pty) Ltd (South African)	Plan and implement projects Define project scope Help define goals Define deliverables Define tasks and required resources Create schedule Project timeline Manage budget Allocate project resources Track deliverables Support and direct team Lead quality assurance Monitor and report on project progress Present to stakeholders reports on progress as well as problems and solutions Implement and manage change Project data management

Duration	Position	Company	Roles and Responsibilities
March 2017- November 2019 ●Permanent	Environmental Stakeholder Consultant	Digby Wells Environmental (Pty) Ltd (South African)	Addressing issues and needs of communities' Public participation process and communicate Liaise with stakeholders Scientific report writing for social and stakeholder engagement inclusion Assistance is provided in maintaining and updating Interested and Affected database Print / photocopy and the deliver documents to various stakeholders Distribute information (placing posters, posting, mailing, emailing, sending SMS messages, etc.) Assist with the project administration on large and small projects Data collection and inclusion into scientific reports Assist with information material and report compilation material
February 2015 – February 2017 ●Permanent	Environmental Officer	EcoPartners (Pty) Ltd (South African)	Public participation for environmental legal authorisation applications Compiling legal registers and monthly legal update letter Supply all services required for I and APs Write and edit reports Research various environmental aspects. Environmental awareness training Creation of maps for all environmental applications Collection of spatial information Build and Maintain data and information libraries Data collection and analysis Environmental legal authorisation applications
February 2014- September 2014 ●Permanent	Graduate Researcher	Linkd Environmental Services (Pty) Ltd (South African)	Research for projects given as tenders Collecting data from the different forms of information Collecting data for the purpose of controlling it and reporting on it in order to formulate status quo Create reports based on the data, give recommendations for better quality data to be collected Participate in workshop strategy sessions. Help implement policies formulated in strategy sessions and approved by steerco.
October 2014 – December 2014 ●Contract	Researcher and Report Writer	South African Cities Network (Pty) Ltd (South African)	Research Project co-ordination and management Knowledge management Reporting and administrative support GIS support and map analysis Report writing and research gaps

PROJECT EXPERIENCE

Project Name & Location	Client Name	Role
EIA for the Buffelspoort Solar Project, North West Province	Total Eren/Chariot Transitional Power	Social Impact Assessor and Public Participation Consultant
Environmental, Social & Governance (ESG) assessment	Richards Bay Coal Terminal (Pty) Ltd	Social Assessor
To Conduct Study of Sanitation Systems at Two Health Facilities, Swaziland	Ministry of Health, Swaziland	Environmental, Social and Health Specialist

Project Name & Location	**Client Name**	**Role**
Social Impact Assessment - Doornhoek PV Cluster including 132kV line to the Hermes MTS	Atlantic Energy Partners (Pty) Ltd	Social Impact Assessor
Stakeholder engagement for the Socio-economic Impact Assessment for the closure of 3 Eskom power stations	Urban Econ on behalf of Eskom	Project Manager
Exxaro 22-month Resettlement Monitoring Proposal for Phumulani Agri-Village, Mpumalanga	CSG Water & Environmental Consultants on behalf of Exxaro	Report Writer Reviewer, Quality Assurance & Project Support
Environmental Impact Assessment for Agricultural and Pivot Development on various farm portions, Free State Province	Venter Boerdery (Pty) Ltd	Project Manager
Scoping and environmental Impact Report for 175 MW PV, North West	Sibanye Stillwater	Report Writer Reviewer, Quality Assurance & Project Support
EIA Process for Siyanda PV Facilities & BESS	SoLink	Social Impact Assessor and Public Participation Consultant
BA for Hopefield Watercourse Crossing	Umoya Energy (Pty) Ltd	Reviewer & Quality Assurance
BAR for the 10MW Sigma PV Project, Free State	SOLA Group	Social Impact Assessor
SIAs for 2x EIAs for PV & BESS at Siyanda Bakgatla Mine, Limpopo	SoLink	Social Impact Assessor
SIA for 2x 100MW PV south of Hartebeesfontein, North West - in Klerksdorp REDZ	Cape EPrac	Social Impact Assessor
Socio-economic impact assessments (Scoping/EIA) for Pofadder Wind farm cluster, Northern Cape	Atlantic Energy Partners (Pty) Ltd	Social Impact Assessor
Socio-economic impact assessments (Scoping/EIA) for Pofadder Wind farm cluster, Northern Cape	Engie Solar	Reviewer & Quality Assurance
BA for additional area for Grootspruit Solar PV facility, Free State Province	Engie Solar	Reviewer & Quality Assurance
EIA for additional area for Graspan Solar PV facility, Northern Cape Province	Engie Solar	Reviewer & Quality Assurance
EIA for additional area for Sannaspos Solar PV facility, Free State Province	Engie Solar	Reviewer & Quality Assurance
EIA for 225MW San Solar PV on a site north west of Kathu, Northern Cape Province	San Solar Energy (Pty) Ltd	Social Impact Assessor
SIA for a Battery Energy Storage System (BESS) within the authorised footprint of Hotazel Solar - amendment application	Cape EPrac	Social Impact Assessor
BA processes for 3x Kheis PV facilities	AGV Projects	Social Impact Assessor
Screening of sites for the placement of PV facilities near Northam, Limpopo Province	SoLink	GIS Specialist
BAR for the 10MW Sigma PV Project, Free State	SOLA Group	Social Impact Assessor
Land sensitivity analysis on the identified land for the Merafong Solar Farm Cluster Project	Gauteng Infrastructure Financing Agency	Social and GIS Specialist
EIA/WML for Majuba waste disposal facility	Eskom – Majuba Power Station	Reviewer & Quality Assurance
P2 amendment for Poortjies Wind Energy Facility	Mainstream Renewable Power	Reviewer & Quality Assurance
EIAs for 2x 100MW PV on a site west of Lichtenburg, North West	Atlantic Energy Partners (Pty) Ltd	Reviewer & Quality Assurance
EIA processes for the Great Karoo Renewable Energy Cluster	Great Karoo Renewable Energy	Reviewer & Quality Assurance
Proposed Grid Connection Infrastructure for the Woodhouse 1 and Woodhouse 2 Solar Energy Facilities	Genesis Eco-Energy Developments (Pty) Ltd	Report Writer Reviewer, Quality Assurance & Project Support
Environmental Impact Assessment And Public Participation Process For The Proposed Development Of The Nama Solar East Facility And Nama Solar West Solar Facility With Associated	Nama Solar East (Pty) Ltd and Nama Solar West (Pty) Ltd.	Reviewer, Quality Assurance & Project Support

Project Name & Location	**Client Name**	**Role**
Infrastructure, Northern Cape		
Proposed Development of a New Waste Disposal Site at the Eskom Majuba Power Station near Amersfoort, Dr Pixley Ka Seme Local Municipality, Mpumalanga Province	Eskom Holdings Ltd	Report Writer, Quality Assurance & GIS Support
The Construction of the 100MW Nku Solar Photovoltaic Facility (PV1), on portion 96 of the Farm Rondavel 85 and Farm Annex Rondavel, near Richmond, Northern Cape Province	Great Karoo Renewable Energy (Pty) Ltd	Reviewer, Quality Assurance & Project Support
Environment, Social & Governance (ESG) Assessment and Development of ESG Policy	Richards Bay Coal Terminal Proprietary Limited	Report Writer and Assessment Practitioner
Environmental Impact Assessment Process for 2X 100MW Solar PV Facilities	Atlantic Energy Partners (Pty) Ltd	Report Writer - Social Impact Assessment Quality Assurance/Reviewer
Moeding Solar PV Facility and Tiger Kloof Solar Facility with nearby settlements	Kabi (Pty) Ltd	Geographical Information Systems Specialist (GIS) & Reviewer/Quality Assurance
Solar PV Screening, Kathu Northern Cape Province	AGV Projects (Pty) Ltd	Report Writer, Researcher & Quality Assurance & GIS Support
Solar PV Screening/and or Wind Projects, Vredendal Western Cape Province	ABO Wind (Pty) Ltd	Report Writer, Researcher & Quality Assurance & GIS Support
Komsberg West Wind Energy Northern and Western Cape Provinces Revised Environmental Management Programme and Final Layout	Gunstfontein Wind Farm (Pty) Ltd,	Reviewer, Quality Assurance & Project Support
Grid Connection Infrastructure for the Namas Wind Farm	Genesis Namas Wind (Pty) Ltd	Reviewer, Quality Assurance & Project Support
Grid Connection Infrastructure for the Zonnequa Wind Farm	Gensis Zonnequa Wind (Pty) Ltd	Reviewer, Quality Assurance & Project Support
Proposed 10mw Northam Solar Pv Facility Near Thabazimbi, Limpopo Province	Northam Platinum Limited	Reviewer, Quality Assurance & Project Support
Amendment of the Environmental Authorisation for the Proposed Construction of The Gunstfontein Switching Station, 132kv Overhead Power Line And Ancillary Infrastructure For The Proposed Gunstfontein Wind Farm	Gunstfontein Wind Farm (Pty) Ltd	Geographical Information Systems Specialist (GIS) & Reviewer/Quality Assurance
Grid Connection Infrastructure, including 132kv Overhead Powerline, Switching Station And Ancillaries, For The Great Karoo Wind Farm, Northern Cape	Great Karoo Wind Farm (Pty) Ltd	Geographical Information Systems Specialist (GIS)
Perdekraal West Wind Energy Facility and Associated Infrastructure, Located in the Witzenburg Local Municipality Within The Western Cape Province	Perdekraal West Wind Farm (Pty) Ltd	Reviewer, Quality Assurance & Project Support
Pienaarspoort Wind Energy Facility 1, Western Cape Province	Pienaarspoort Wind Energy Facility 1 (Pty)	Reviewer, Quality Assurance & Project Support
Environmental Impact Assessment And Public Participation Process Bergriver Wind Farm, Western Cape Province	FE Berg River (Pty) Ltd	Stakeholder Engagement and Reviewer, Quality Assurance
Construction and operation of the 100MW Rondavel PV facility, BESS and associated infrastructure near Kroonstad, Free State Province	South Africa Mainstream Renewable Power Developments (Pty) Ltd	Reviewer, Quality Assurance & Project Support
Kolkies and Sadawa PV and EGI Suite of projects, Western Cape	South Africa Mainstream Renewable Power Developments (Pty) Ltd	Reviewer, Quality Assurance & Project Support
Cluster Of Renewable Energy Facilities And Redz 3 Power Corridor 400 Main Transmission Substation Between Somerset East And Makhanda, Eastern Cape Province	Wind Relic (Pty) Ltd	Reviewer, Quality Assurance & Project Support

Project Name & Location	**Client Name**	**Role**
Wind Garden Wind Farm And Fronteer Wind Farm Near Makhanda, Eastern Cape Province	Wind Garden (Pty) Ltd & Fronteer (Pty) Ltd	Reviewer, Quality Assurance & Project Support
Environmental Authorisation required for Prospecting Right Application on various Portions of the Farm Schaapkopje 194 HT, 5km North of Vryheid Town in the AbaQulusi Local Municipality, KwaZulu Natal	Tuutuuka Resources Proprietary Limited	Report Writer and Project Administrator, Stakeholder Engagement & GIS Support
Social Impact Assessment for the Proposed Infrastructure Amendments Environmental Authorisation and Water Use License	Seriti Power (Pty) Ltd	Report Writer- Stakeholder Engagement & GIS Support
Social Impact Assessment for the Proposed Middelburg Mining Services (MMS) Boschmanskrans Section Implementation of Wetland Mitigation and Offset Strategy	Seriti Power (Pty) Ltd	Report Writer- Stakeholder Engagement & GIS Support
Environmental Authorisation And Integrated Water Use Licence Application For The Proposed Liquid Mist Trading Beneficiation Plant Expansion Project	Liquid Mist (Pty) Ltd	Report Writer and GIS Support
Basic Assessment Process In Support Of The Proposed The Construction Of Doornpoort Pumping Main And Pumpstation, Emalahleni Local Municipality In The Mpumalanga Province	Lefatshe Infrastructure Services (Pty) Ltd	Report Writer and Project Administrator & GIS Support
Water Use Licence Renewal Application for the Inyanda Coal Wash Plant, on the Portions 2, 20 And 21 Of Farm Kalbasfontein 284 JS & Portion 4 of Farm Mooifontein 285 JS Near Witbank in the eMalahleni Local Municipality, Mpumalanga	Inyanda Mining Holdings	Report Writer and Project Administrator
Social Impact Assessment for the Proposed Ikwezi Vanadium Mining Project	Ikwezi Vanadium (Pty) Ltd	Report Writer – Social Impact & Project Administrator
Environmental Authorisation (EIA) for the proposed Giyani Renewable Energy Solar Photovoltaic Power	Giyani Renewable Energy	Report Writer- Stakeholder Engagement & GIS Support
Environmental Authorisation required for Prospecting Right Application on farm Mooihoek and various farm portions of farm Pivaanspoort	Pivaanspoort (Pty) Ltd	Report Writer
Draft Basic Assessment Report For The Proposed Upgrade Of Weltevreden Wetland Interventions	Seriti Power (Pty) Ltd	Report Writer
Social and Labour Plan for the Straffontein Colliery	Mnambithi Mining (Pty) Ltd	Report Writer – Social Impact and Social Labour Plans & GIS Support
Social and Labour Plan for the existing operational expansion Leeuwfontein Colliery Mining Right Amendment Applications	Zomhlaba Resources (Pty) Ltd	Report Writer – Social Impact and Social Labour Plans & GIS Support
Social and Labour Plan for the existing operational expansion Lakeside Colliery Mining Right Amendment Applications	Zomhlaba Resources (Pty) Ltd	Report Writer – Social Impact and Social Labour Plans & GIS Support
Social Impact Assessment for the Proposed Aangewys Coal Mine Mining Right Application	National Treasure Minerals (Pty) Ltd	Report Writer – Social Impact and Social Labour Plans & GIS Support
Environmental Impact Assessment And Water Use Licence Application In Support Of The Proposed Grootlaagte Open Cast Mining, Mpumalanga – Arnot Opco (Pty) Ltd	Arnot OpCo	Report Writer- Stakeholder Engagement & GIS Support
Malawi Solar Projects, Livelihood restoration and social performance monitoring and planning	JCM Power	Data Analyst
750 AMPED Campaign	Health Wellness SETA	Project Manager
Integrity Due Diligence Reports	Various (South African Poultry Industry, Centre of Industrial Scientific Research; SA Milk Producers	Policy Coordinator/ Report Writer
Policy Component for agri-processing projects	eThekwini Municipality	Policy Coordinator/ Report Writer

Project Name & Location	**Client Name**	**Role**
Alignment of EIA's and WUL's	South 32	Social Specialist/Report Writer
Environmental Authorisation for Klipspruit Colliery	South 32	Social Specialist/Report Writer
Expansion and Development of Sun City Resorts	Sun International	Social Specialist/Report Writer
Environmental Authorisation for a Regulatory Environmental Process	Blyvoor Gold	Social Specialist/Report Writer
Mooikraal Road Diversion Project	Sasol (Pty) Ltd	Social Specialist/Report Writer
Pretorius Park Housing Development	Luengo Consulting	Social Specialist/Report Writer
Grave Relocation Project	Exxaro Resources	Social Specialist/Report Writer
Syferfontein Housing Development	LTE Consulting	Social Specialist/Report Writer
Leeuwpan Lifex Project	Exxaro Resources	Social Specialist/Report Writer
Environmental Authorisation required for Proposed Palmietkuilen Colliery near Springs	Canyon Resources (Pty) Ltd	Social Specialist/Report Writer
Environmental Authorisation required for the Agnes Gold Mine, Barberton	Galaxy Gold Reefs (Pty) Limited	Social Specialist/Report Writer
Environmental Authorisation for the Proposed Hendrina Underground Coal Mine, Mpumalanga	Glencore Operations South Africa (Pty) Ltd	Social Specialist/Report Writer
Environmental authorisation applications(Waste management, Water use license, EMP)	Various	Social Specialist/Report Writer
Environmental Authorisation Applications related to the Construction of Power Station, Associated Infrastructure, and Coal Mine near Colenso, KZN	Dunrose Investments 244 for Colenso Power (Pty) Ltd	Project Administrator/ Social Specialist
Environmental Awareness Training	Various	Facilitator
Legal register	Various	Report Compiler
Dynamics and Incidence of Child Abuse, Neglect and Exploitation(DICANE)	Department of Social Development	Facilitator
The Alexandra Environment Public Upgrade-management of the public participation process	Johannesburg Development Agency	Project Administrator
Cities Green Transport Programme	South African Cities Network	Project Researcher
Project Management of the EPWP Construction of the Mvoti Regional Landfill	Department of Environmental Affairs	Project Researcher
Development of climate change adaptation and mitigation programme	Department of Agriculture Forestry and Fisheries	Project Researcher
Capacity Building in spatial transformation	South African Cities Network	Project Researcher