
PROPOSED DEVELOPMENT OF THE 10MW_{AC} BECRUX TWO SOLAR PHOTOVOLTAIC (PV) ENERGY FACILITY NEAR SASOLBURG, FREE STATE PROVINCE

ENVIRONMENTAL MANAGEMENT PROGRAMME

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Prepared for

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PROJECT DETAILS

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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 requirements of a proposed activity. They may include location or site alternatives, activity alternatives, process or technology alternatives, temporal alternatives or the 'do nothing' alternative.

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

Biodiversity: 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, if such investigation or feasibility study does not constitute a listed activity or specified activity.

Commissioning: Commissioning commences once construction is completed and covers all activities.

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. It 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.

Development area: The development area is that identified area (located within the project site) where the Becrux Two Solar PV Energy Facility is planned to be located. This area has been selected as a practicable option for the facility, considering technical preference and constraints, and has been assessed within this BA Report and by the respective specialists. The development area is up to ~30ha in extent.

Development footprint: The development footprint is the defined area where the PV panel array and other associated infrastructure for the Becrux Two Solar PV Energy Facility is planned to be constructed. This is the anticipated actual footprint of the facility, and the area which would be disturbed. The exact size of this area is subject to finalisation of the layout. However, following initial layout optimisation, the footprint is up to ~19.99ha.

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

'Do nothing' alternative: The 'do nothing' alternative is the option of not undertaking the proposed activity or any of its alternatives. It 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.

Emergency: An undesired/ unplanned event that results in a significant environmental impact and requires the notification of the relevant statutory body, such as a local authority.

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:

- » The land, water and atmosphere of the earth;
- » Micro-organisms, plant and animal life;
- » Any part or combination of (i) and (ii) and the interrelationships among and between them; and
- » 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 (Free State Department of Economic, Small Business Development, Tourism and Environmental Affairs (FSDESTEA)) of a listed activity or specified activity in terms of the National Environmental Management Act (No 107 of 1998) (NEMA) and the EIA Regulations promulgated under the NEMA.

Environmental Assessment Practitioner (EAP): An individual responsible for the planning, management and coordinating of EMPRs 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 conditions of the EA.

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

Environmental Impact Assessment (EIA): 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 it 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, to guide the implementation of a project or facility and its ongoing maintenance after implementation, in accordance with section 24 of NEMA.

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 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.

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

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

Indigenous: All biological organisms that occurred naturally in a free state in nature but excludes a species that has been introduced in South Africa as a result of human activity.

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 (I&AP): Individuals or groups concerned with or affected by an activity and its consequences. These include the authorities, local communities, investors, work force, consumers, environmental interest groups, and the 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.

No-go areas: Areas of environmental sensitivity that should not be impacted on or utilised during the development of a project as identified in any environmental reports.

Photovoltaic effect: Electricity can be generated using photovoltaic panels (semiconductors), which are comprised of individual photovoltaic cells that absorb solar energy to produce electricity. The absorbed solar radiation excites the electrons inside the cells and produces what is referred to as the Photovoltaic Effect.

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

Project site: The project site is that identified area within which the development area and development footprint are located. It is the broader geographic area assessed as part of the BA process, within which direct effects of the proposed project may occur. The project site is ~339.87ha in extent.

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

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

Waste: Any substance, material or object, that is unwanted, rejected, abandoned, discarded or disposed of, or 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:

BAR	Basic Assessment Report
CEMP	Construction Environmental Management Plan
DM	District Municipality
DMRE	Department of Mineral Resources and Energy
DHSWS	Department of Human Settlements, Water and Sanitation
EAP	Environmental Assessment Practitioner
EHS	Environmental, Health and Safety
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
GA	General Authorisation
ha	Hectare
HIA	Heritage Impact Assessment
I&APs	Interested and Affected Parties
IBA	Important Bird Area
IDP	Integrated Development Plan
km	Kilometres
kV	Kilo Volt
FSDESTEA	Free State Department of Economic, Small Business Development, Tourism and Environmental Affairs
LM	Local Municipality
m	Metres
m ²	Square metres
MW	Mega Watt
NEMA	National Environmental Management Act
NEMAA	National Environmental Management Amendment Act
NEMBA	National Environmental Management: Biodiversity Act
NHRA	National Heritage Resources Act
NWA	National Water Act
SACAA	South African Civil Aviation Authority
SAHRA	South African National Heritage Resources Agency
SANBI	South Africa National Biodiversity Institute
SANS	South Africa National Standards
SDF	Spatial Development Framework
SMME	Small, Medium and Micro Enterprise

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CHAPTER 1: INTRODUCTION

This Environmental Management Programme (EMPr) has been compiled for the proposed 10MW_{ac} Becrux Two Solar Photovoltaic (PV) Energy Facility by Becrux Solar PV Project Two (Pty) Ltd. The PV Facility is to be developed on the Remaining Extent of Portion 1 of the Farm Saltberry Plain 137 and the Remaining Extent of Portion 1 of the Farm Roseberry Plan 250, located near the Sigma Colliery Mine Area, approximately 4km southeast of the town of Sasolburg and adjacent to the informal settlement of Zamdela. The project site falls within the jurisdiction of the Metsimaholo Local Municipality, which forms part of the Fezile Dabi District Municipality in the Free State Province.

This EMPr has been developed on the basis of the findings of the Basic Assessment (BA) undertaken for the project. It must be implemented to protect sensitive on-site and off-site features, through controlling construction, operation and decommissioning activities that could have a detrimental environmental effect; and avoiding or minimising potential impacts. This EMPr is applicable to all employees and contractors working on the project's pre-construction, construction, and operation and maintenance phases, and must be adhered to and updated as relevant throughout the project life cycle. This document fulfils the requirements of the EIA Regulations, 2014, as amended, and forms part of the BA Report for the project.

In terms of the Duty of Care provision in S28(1) of National Environmental Management Act (NEMA), Becrux Solar PV Project Two (Pty) Ltd 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 EMPr must therefore be adhered to and updated as relevant throughout the project life cycle. In terms of the NEMA, it has become the legal duty of a project proponent to consider a project holistically and the cumulative effect of a variety of impacts.

CHAPTER 2: PROJECT DETAILS

Becrux Solar PV Project Two (Pty) Ltd is proposing the development of a Photovoltaic (PV) Solar Energy Facility and associated infrastructure on the Remaining Extent of Portion 1 of the Farm Saltberry Plain 137 and the Remaining Extent of Portion 1 of the Farm Roseberry Plain 250 (refer to **Figure 2.1**). The project site is located near the Sigma Colliery Mine Area, approximately 4km southeast of the town of Sasolburg and adjacent to the informal settlement of Zamdela, between the R57 in the east and the R59 in the north, within jurisdiction of the Metsimaholo Local Municipality, which forms part of the Fezile Dabi District Municipality in the Free State Province.

The Solar PV Energy Facility will have a contracted capacity of up to 10MW_{ac}¹ and will use tracking or fixed-tilt PV technology to harness the solar resource on the project site. Power generated at the facility will be delivered to Sasol Limited by feeding into the grid through a Wheeling Agreement signed with Eskom and/or direct embedded generation. The purpose of the facility will be to generate electricity for exclusive use by Sasol Limited at its Sasolburg operations. The construction of the Solar PV Energy Facility aims to reduce Sasol's dependence on direct supply from Eskom's national grid for operation purposes and demonstrate Sasol's move towards a greener future through procurement of renewable energy from Independent Power Producers (IPPs).

A development area² of up to 30ha in extent and a much smaller development footprint³ of up to 19.99ha have been identified within the project site⁴ (~339.87ha) by Becrux Solar PV Project Two (Pty) Ltd for the development of the Becrux Two Solar PV Energy Facility.

Infrastructure associated with the Solar PV Energy Facility will include the following:

- » Solar PV array comprising PV modules and mounting structures.
- » Inverters and transformers.
- » Cabling between the panels.
- » 11kV onsite containerised/non-containerised substation.
- » 11kV overhead power line for the distribution of the generated power, which will be connected to the existing Sigma Substation.
- » Main access gravel road and internal gravel roads.
- » Operations and Maintenance (O&M) building, including a sewage/conservancy tank and water storage tanks.
- » Site office, workshop area, storage area, and laydown area.
- » Fire break and fencing around the site, including an access gate.

¹ Alternating Current (AC) - alternating current is an electric current that periodically reverses direction and changes its magnitude continuously with time in contrast to direct current which flows only in one direction.

² The development area is that identified area (located within the project site) where the Becrux Two Solar PV Energy Facility is planned to be located. This area has been selected as a practicable option for the facility, considering technical preference and constraints, and has been assessed within this BA Report and by the respective specialists. The development area is up to 30ha in extent.

³ The development footprint of the Becrux Two Solar PV Energy Facility will be located within the 30ha development area and will be a much smaller area within which the PV panels and associated infrastructure will be constructed and operated. The development footprint, which is up to 19.99ha in extent, has been subject to a detailed design by the developer through the consideration of sensitive environmental features identified by independent specialists, which need to be avoided by the PV Facility.

⁴ The project site is that identified area within which the development area and development footprint are located. It is the broader geographic area assessed as part of the BA process, within which direct effects of the proposed project may occur. The project site is ~339.87ha in extent.

A detailed description of the project site for the Becrux Two Solar Energy PV Facility is provided in **Table 2.1** below.

Table 2.1: Detailed description of the Becrux Two Solar PV Energy Facility project site

Province	Free State Province
District Municipality	Fezile Dabi District Municipality
Local Municipality	Metshimaholo Local Municipality
Ward number(s)	11, 14
Nearest town(s) (measured from the centre of the project site)	Sasolburg (~4km southeast)
Affected Properties: Farm name(s), number(s) and portion numbers SG 21 Digit Code (s)	<ul style="list-style-type: none"> • Remaining Extent of Portion 1 of the Farm Saltberry Plain 137 (F02500000000013700001) • Remaining Extent of Portion 1 of the Farm Roseberry Plain 250(F02500000000025000001)
Current zoning and Land Use	Mining
Site co-ordinates (centre of development area)	26°50'53.61"S, 27°50'17.38"E

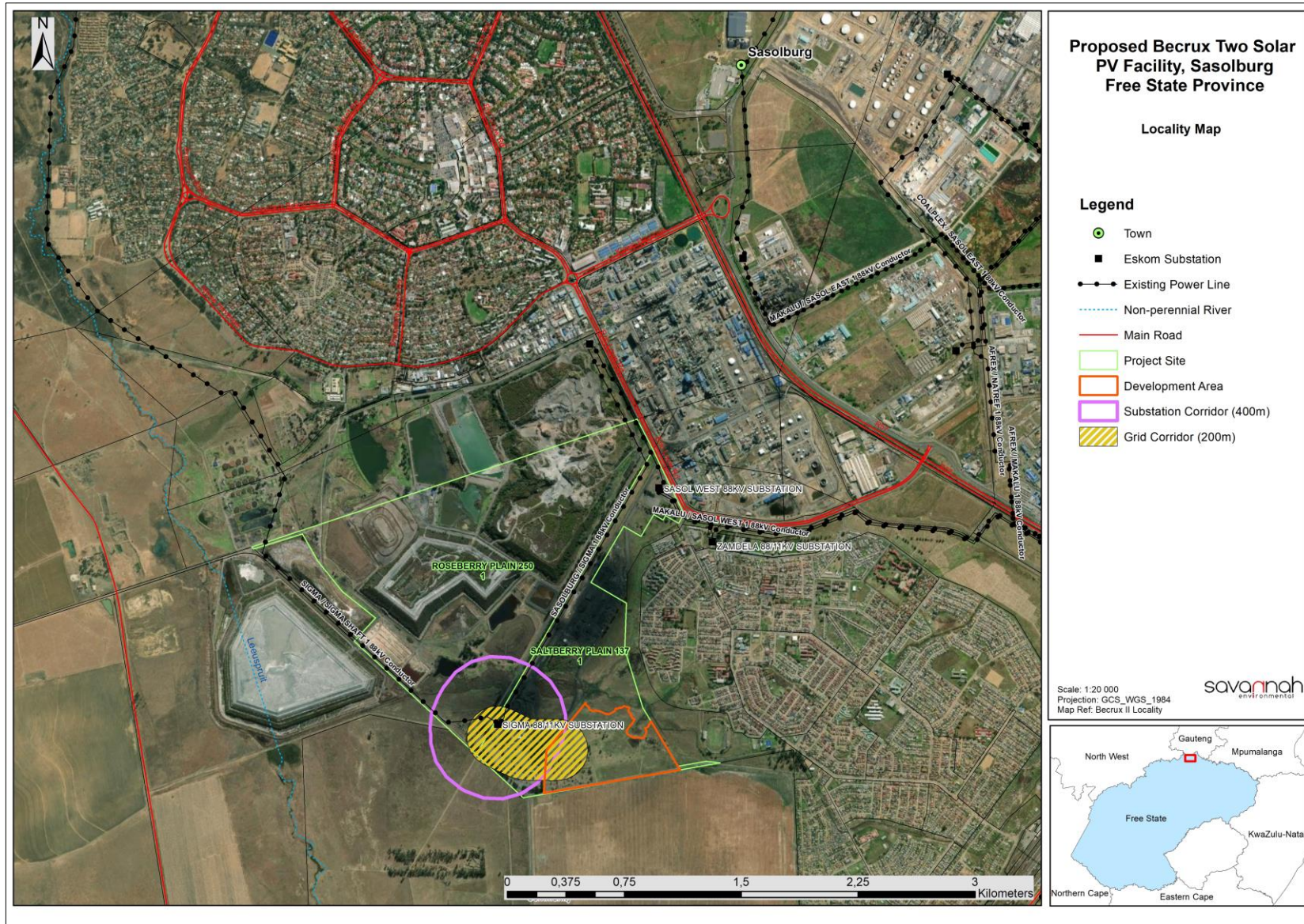


Figure 2.1: Locality map showing the location of the proposed 10MW_{ac} Becrux Two Solar PV Energy Facility

Table 2.2 provides the details and dimensions of typical infrastructure required for the Becrux Two Solar PV Energy Facility.

Table 2.2: Details or dimensions of typical infrastructure required for the Becrux Two Solar PV Energy Facility

Total extent of the Development area	Up to ~30ha
Total extent of the Development footprint	Up to ~19.99ha
Contracted capacity of the facility	Up to 10MW _{ac}
Technology	Tracking PV or fixed-tilt with bi-facial or mono-facial panels. Bi-facial panels with single-axis tracking are preferred over fixed-axis or double-axis tracking systems, and mono-facial panels due to the potential to achieve higher annual energy yields whilst minimising the balance of system (BOS) costs, resulting in the lowest levelized cost of energy (LCOE).
PV panels	Height: ~3m from ground level (installed).
Inverters and transformers	» Up to 54 string inverters or 2 central inverters with a maximum height of 3m.
On-site Facility Substation	» Located within the development Footprint. » Approximately 100m ² in extent. » The substation will connection to the existing Sigma Substation via a new 11kV overhead power line.
Access gravel roads and internal roads	» Access to the proposed development area is provided by a secondary road that traverses from the Eric Louw Road (at the Sasol Plant's west gate) to the Sigma Colliery. » A main gravel access road up to 8m in width and 200m in length will be constructed to provide direct access to the development area. » A network of 6m wide (with a total length of 200m) gravel internal access roads will be constructed to provide access to the various components of the facility.
Laydown area	Up to 10 000m ²
O&M building	Up to 200m ²
Fire break and fence area (including access gate)	Up to 12 000m ²
Services required	<i>Auxiliary Electricity</i> – electricity will either be sourced from Sasol Limited or directly from Eskom. <i>Water Supply</i> - water will be sourced from the Sigma Colliery Mine / procured from the Metsimaholo Local Municipality, or through a Contractor upon reaching a Service Level Agreement. <i>Waste Collection / Removal</i> - only refuse disposal will be required. Refuse will be collected by the municipality or by a contractor and be disposed of at a licensed waste disposal facility. <i>Sanitation</i> - No effluent will be generated by the project, except for normal sewage due to the presence of construction and O&M personnel on-site (during the construction and operations phase). The sewage will be collected and treated in accordance with the legislative framework using a septic or

conservancy tank. Should the Metsimaholo Local Municipality not permit the use of the conservancy / septic tank, the sewage will be kept in the conservancy tank and be collected by a Contractor with a honey-sucker truck.


The Metsimaholo Local Municipality will be engaged prior to Financial Close to determine if they have the capacity to render the above-mentioned services. If not, the applicant will go out to tender to obtain these services.

2.1. Activities and components associated with the construction, operation and decommissioning of the Proposed development of the 10MW_{ac} Becrux Two Solar PV Energy Facility

The main activities/components associated with the Becrux Solar PV Facility are detailed in **Table 2.3**.

Table 2.3 Details of the project development phases (i.e., construction, operation, and decommissioning)

<u>Pre-construction</u>	
Requirements	Planning and design of facility
Activities to be undertaken	
Site preparation	Confirming the integrity of site access to accommodate the required equipment. Preparation of the site (e.g., laydown area). Mobilisation of construction equipment.
Conduct surveys prior to construction	Including, but not limited to a detailed geotechnical survey, site survey and confirmation of the infrastructure micro-siting footprint, survey of the O&M building, workshop, storage and site office areas to determine and confirm the locations of all associated infrastructure.
<u>Construction Phase</u>	
Requirements	<ul style="list-style-type: none"> • Project requires Environmental Authorisation from Free State Department of Economic, Small Business Development, Tourism and Environmental Affairs (FSDESTEA) and a wheeling agreement secured with Eskom. • Duration expected to be up to 12 months for the Becrux Two Solar PV Energy Facility. • Create direct construction employment opportunities: Up to 150 jobs (at peak of construction) created and maintained for approximately up to 12 months. • No on-site labour camps will be established. Employees to be accommodated in the nearby towns such as Sasolburg and transported to and from site on a daily basis. • Overnight on-site worker presence would be mostly limited to security staff. • Security staff will also be present during the night-time of the construction phase.
Activities to be undertaken	
Establishment of access roads to the site	A new gravel access road up to 8m in width and 200m in length will be established to provide direct access to the development area. Internal access roads up 6m wide and 200m in length will be established to provide access to the various components of the facility.
Undertake site preparation	<ul style="list-style-type: none"> • Include walk-through of all areas to be developed prior to construction to ensure no nests or fauna species are present in the area. • Including the clearance of vegetation at the footprint of each support structure, establishment of a laydown area, the establishment of internal access roads 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.

<p>Establishment of laydown areas</p>	<p>A laydown area for the storage of project components, including the PV panels and civil engineering construction equipment. The laydown area will also accommodate building materials and equipment associated with the construction of buildings. No onsite borrow pits will be required. Infilling or depositing materials will be sourced from licenced borrow pits within the surrounding areas.</p>
<p>Transport of components and equipment to and within the site</p>	<p>Transportation will take place via appropriate National and Provincial roads, and the dedicated access/haul road to the site. Some of the components (i.e., substation transformer) may be defined as abnormal loads in terms of the Road Traffic Act (Act No. 29 of 1989) by virtue of the dimensional limitations. Typical civil engineering construction equipment will need to be brought to the site (e.g., excavators, trucks, graders, compaction equipment, cement trucks, etc.) as well as components required for the mounting of the PV support structures and site preparation.</p>
<p>Erect PV Panels</p>	<p>Installation of the solar PV panels and the structural and electrical infrastructure to make the plant operational. For array installation, typically vertical support posts/piles are driven into the ground. Depending on the results of the geotechnical investigation, a different foundation method may be required. Different options include a screw pile, helical pile, micro-pile or drilled post/pile which may or may not need to be cast in concrete underground at an appropriate depth as determined by the geotechnical investigation. The posts will hold the support structures (tables) on which PV arrays would be mounted. Brackets attach the PV modules to the tables. Trenches are dug for the underground AC and DC cabling and the foundations of the inverter enclosures and transformers are prepared. Wire harnesses connect the PV modules to the electrical collection systems.</p>
<p>Establishment of concrete platform and placement of the E-house containerized substation</p>	<p>The E-house containerised, or non-containerised substation will be assembled off-site and thereafter transported to site where it will be mounted on a concrete platform.</p> 
<p>Construction of overhead power line</p>	<p>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.</p>

	<p>Step 5: Assembly and erection of infrastructure on site.</p> <p>Step 6: Stringing of conductors.</p> <p>Step 7: Rehabilitation of disturbed areas.</p> <p>Step 8: Continued maintenance.</p>
Establishment of ancillary infrastructure	<p>Operation and Maintenance buildings, including a security booth, workshop, storage area and site office.</p> <p>Establishment will require levelling and the excavation of foundations prior to construction.</p>
Connection of PV facility to the E-house containerized substation	<p>Underground cables and overhead circuits connect the string inverters to the on-site AC electrical infrastructure (central inverter) and ultimately the project's E-house containerized substation.</p> <p>Excavation of trenches are required for the installation of the cables. Trenches will be approximately 1.2m deep.</p> <p>Underground cables are planned to follow the internal access roads, as far as possible.</p>
Connect E-house containerized substation to the power grid	<p>The proposed 11kV E-house containerised substation will be connected to the existing Sigma Substation via a new 11kV overhead power line.</p>
Undertake site rehabilitation	<p>Commence with rehabilitation efforts once construction is completed in an area, and all construction equipment is removed.</p> <p>On commissioning, access points to the site that will not be required for the operation phase will be closed and prepared for rehabilitation.</p>
<u>Operation Phase</u>	
Requirements	<p>Duration will be up to 30 years, or longer depending on the need for the project.</p> <p>Requirements for security and maintenance of the facility.</p> <p>Employment opportunities relating mainly to operation activities and maintenance. Up to 10 (full-time and temporary) employment opportunities will be available.</p>
Activities to be undertaken	
Operation and maintenance	<ul style="list-style-type: none"> • Full time security, maintenance, and control room staff. • PV facility will be operational except under circumstances of mechanical breakdown, inclement weather conditions, or maintenance activities. • PV facility to be subject to periodic maintenance and inspection. • Disposal of waste products (e.g., oil and other lubricants, etc) in accordance with relevant waste management legislation. • Areas which were disturbed during the construction phase to be utilised should a laydown area be required during operation. • PV panels will be washed during operation utilising clean water or non-hazardous biodegradable cleaning products. Wastewater generated by washing can be allowed to run-off under the panels.
<u>Decommissioning Phase</u>	
Requirements	<p>Decommissioning of the Becrux Two Solar PV Energy Facility infrastructure at the end of its economic life.</p> <p>Potential for repowering of the facility, depending on the condition of the facility at the time.</p> <p>Expected lifespan of up to 30 years (with maintenance) before decommissioning is required.</p>

Decommissioning activities to comply with legislation relevant at the time.	
Activities to be undertaken	
Site preparation	<p>Confirming the integrity of site access to accommodate the required equipment. Preparation of the site (e.g., laydown area and construction platform). Mobilisation of equipment required for decommissioning.</p>
Disconnect, disassemble, and remove solar facility components	<ul style="list-style-type: none"> • Disconnect the facility from the grid. • Dismantle all panels, mounting structures and foundations in line with all relevant legislation. • Recycle, repurpose and re-use as much of the decommissioned project components as possible in accordance with regulatory requirements. • Concrete foundations will be removed to a depth as defined by an agricultural specialist. • Backfill the mounting structure holes and rehabilitate the area appropriately. • Visible cables will be removed. • A final site walkthrough will be conducted to remove debris and/or waste generated within the site during the decommissioning process. • Rehabilitation may include top soiling, raking, and/or re-seeding (whichever is appropriate).

2.2 Findings of the Basic Assessment (BA)

The BA Report, together with the specialist studies contained within **Appendices D1 – D4** of the BA Report, provide a detailed assessment of the potential impacts that may result from the project.

No environmental fatal flaws were identified in the detailed specialist studies conducted, provided that the recommended mitigation and enhancement measures are implemented. These measures include, amongst others, the avoidance of features of high sensitivity within the development area, as specified by the specialists. As shown in **Figure 2.3**, areas of high sensitivity have been avoided by the appropriate placement of infrastructure planned for the facility

The potential environmental impacts associated with the project identified and assessed through the BA process are summarised below:

2.2.1. Impacts on Terrestrial Ecology (including flora and fauna)

The development area falls within the Central Free State vegetation type, which is characterised by undulating plains supporting short grassland, in natural conditions dominated by *Themeda triandra* while *Eragrostis curvula* and *E. chloromelas* become dominant in degraded habitats. It overlaps with a degraded area and other natural areas and is situated 2.2km from a National Protected Area Expansion Strategy (NPAES) focus area. Two red list plant species which are regarded as protected in terms of the South African National Biodiversity Institute (SANBI, 2017) were identified within development area. No plant species protected in terms of the Free State Nature Conservation Ordinance 8 of 1969 and the National Environmental Management: Biodiversity Act (No. 10 of 2004) (NEM:BA) were recorded during the field survey of the development area. In addition, no tree species protected in terms of the National Forest Act (No. 84 of 1998) were identified on site.

Six (6) habitats were identified within the development area and grid connection corridor, namely, transformed areas, degraded grassland, disturbed grassland, seepage wetlands, unchannelled valley bottom wetlands, and artificial wetlands. The identified habitats were allocated a sensitivity category using the guidelines for interpreting site ecological importance in the context of the proposed development activities. According to these guidelines, the natural wetlands (i.e., seep and unchannelled valley bottom) are regarded to be of high sensitivity, the degraded grassland and artificial wetlands are regarded to be of medium sensitivity, and the disturbed grassland and transformed areas are regarded to be of low and very low sensitivity, respectively.

No mammal, reptile, and amphibian species of conservation concern were recorded during the survey period for the development area.

The Terrestrial Ecology and Wetland Impact Assessment (**Appendix D1** of the BA Report) determined that no significant impacts from a terrestrial ecology perspective are expected subject to the implementation the recommended mitigation measures, especially pertaining to wetlands, as much of the areas have been found to be modified. Historically, mining and the land use has led to the deterioration of the six habitats identified within the development area and grid connection corridor. The classification of the development area as degraded and other natural area is therefore corroborated. Potential impacts on terrestrial biodiversity expected to occur with the development of the project include:

- » Destruction, further loss and fragmentation of habitats (including wetlands), ecosystems and vegetation community.
- » Introduction of alien species, especially plants.
- » Destruction of protected plant species.
- » Displacement of the faunal community due to habitat loss, direct mortalities and disturbance (road collisions, noise, dust, vibration and poaching).

2.2.2. Impacts on Wetlands

A total of three (3) wetland systems were identified and delineated within the 500m regulated area surrounding the development area. These comprised both natural and artificial systems, with the artificial systems consisting of impoundments/dams and drainage features. Of the three (3) wetland systems relevant to the development area, only two are classified as natural systems, namely, the unchanneled valley bottom wetland associated with an unnamed tributary of the Leeuspruit system, and hillslope seepage areas.

Both the unchannelled valley bottom wetland and seepage wetlands overall scored Moderately Low in terms of wetland ecosystem services. Overall, the Unchannelled valley bottom wetland and the seepage areas were determined to be in a critically modified (Class F) to seriously modified (Class E) state, respectively. The overall ecological importance and sensitivity of the systems was determined to be moderate. A 22m 'no-go' buffer around the identified wetland features was initially calculated assuming mitigation measures are applied. However, taking into consideration the Critically Endangered threat status of the wetlands, it is recommended that a conservative approach be opted for the wetland systems and a minimum buffer width of 30m be implemented.

The Terrestrial Ecology and Wetland Impact Assessment (**Appendix D1** of the BA Report) determined that there are no impacts associated with the project that cannot be mitigated to an acceptable level; and, as such, the development may proceed subject to the implementation of the prescribed mitigation measures. Potential impacts on the wetland systems expected to occur with the development of the project are:

- » Disturbance/degradation/loss to wetland soils or vegetation due to the construction of the solar facility.
- » Increased erosion and sedimentation.
- » Potential contamination of a wetland with machine oils and construction materials.
- » Potential for increased stormwater runoff, leading to increased erosion and sedimentation.
- » Potential for increased contaminants entering the wetland systems.
- » Potential loss or degradation of through inappropriate closure during the decommissioning phase.

2.2.3. Impacts on Avifauna

The development area is located ~45km from an Important Bird Area (IBA), namely, the Suikerbosrand Nature Reserve. Fifty-one (51) bird species were recorded during the survey of the development area and grid connection corridor. Of the identified bird species, the Laughing Doves has the highest abundance, followed by the Southern Red Bishops and the Cape Turtle Doves. None of the species recorded were of conservation concern.

Two types of nests were observed, namely, the nests of the Southern Masked Weavers and the White-browed Sparrow Weavers. It is therefore recommended that if feasible, construction activities take place during the breeding season (September to March).

Eleven species were found that would be regarded as high-risk species, namely, the Egyptian Goose, Red-billed Teal, African Black Duck, Yellow-billed Duck, Black-headed Heron, Hadedda Ibis, Steppe Buzzard, Helmeted Guineafowl, Spur-winged Goose, Glossy Ibis, and African Sacred Ibis. High risk species are species that are regarded as collision prone species and species that would have a high electrocution risk on powerlines.

Potential impacts on avifauna expected to occur with the development of the project are:

- » Collection of eggs, nest destruction and poaching.
- » Collisions with PV panels, associated powerlines, and fences.
- » Electrocution by solar plant connections and powerline.

2.2.4 Impacts on Soil, Land Capability and Agricultural Potential

A Pedology Assessment of the development area was undertaken as part of the BA process (refer to **Appendix D2** of the BA Report). The study found that the development area falls within Land Types Ca 1 and Dc 7. The Ca land type is characterised by plinthic catena. Upland duplex and/or marginalitic soils are common in this land type and is undifferentiated. The Dc land type is characterised by Prisma-cutanic and/or pedocutanic diagnostic horizons with the addition of one or more of the following: Vertic, melanic and red structured diagnostic horizons. Four soil forms were identified throughout the 50 m regulated area, namely, Avalon, Longlands, Westleigh and Rensburg, with the Avalon soil form being the most dominant soil form over the regulated area. Various hydromorphic soil forms were also identified throughout the 50 m regulated area, which were mostly dominated by the Rensburg soil form. The Avalon soil form is regarded to be most important in the development area as it demonstrates the most sensitive land capability. It consists of an orthic topsoil on top of a yellow-brown apedal horizon, which in turn is underlain by a soft plinthic horizon.

Three land potential levels were determined within the development area and grid connection corridor, namely, land potential level 5, level 'Vlei', and level 6. Five potential land capability classes are located within the development area and grid connection corridor, namely land capability classes 6 to 8, which are regarded to be of low/moderate and moderate sensitivity, and land capability classes 9 to 10, which are regarded to be of moderately high sensitivity.

Considering the primarily low sensitivities associated with the land potential resources, it is the specialist's opinion that the proposed activities will have an acceptable impact on soil resources and that the proposed activities should proceed as have been planned as no loss of land capability is evident. It is also expected that no segregation of high production agricultural resources will occur.

The following impacts were identified by the specialist:

- » Loss of land capability during the construction of the Solar PV Energy Facility, power line and substation.
- » Loss of land capability during the operation of the Solar PV Energy Facility, power line and substation.

2.2.5. Impacts on Heritage Resources (archaeological and palaeontological)

The development area was thoroughly assessed in the field assessment, as detailed in the Heritage Impact Assessment (refer to **Appendix D3** of the BA Report) (HIA). During the field survey, no heritage and archaeological resources of significance were identified within the development area. Therefore, no impacts to heritage resources are anticipated.

Based on the desktop assessment completed, it was noted that although the area proposed for the development of the Becrux Two Solar PV Energy Facility has been extensively previously disturbed, significant archaeological heritage is known from the broader area and as such, it is possible that the proposed development may negatively impact on similar archaeological heritage.

In terms of palaeontology, the development area is underlain by very highly sensitive rocks of the Vryheid Formation (Ecca Group, Karoo Supergroup) that could potentially preserve impression fossils of the *Glossopteris* flora. The site visit confirmed that there were no fossils visible on the site and along the route for the grid connection. Based on the nature of the project, surface activities may impact upon the fossil heritage if preserved in the development footprint.

The area proposed for development has been extensively previously disturbed through agriculture and mining infrastructure (Becrux Two Solar PV Energy Facility is proposed to be located adjacent to the Sigma Colliery).

The installation of a Solar PV Energy Facility is therefore in keeping with the broader development character of the immediate surroundings which lie on the peri-urban edge of Sasolburg and the massive Sigma coal mine nearby to the east and northwest. A number of monuments, burial grounds and significant historical structures are located within 10km of the development area; however, none, of these heritage resources are anticipated to be impacted directly or indirectly by the proposed development.

There is no objection to the development of the proposed project, on condition that:

- » The Chance Fossil Finds Procedure must be implemented for the duration of construction activities.
- » Should any previously unrecorded archaeological or palaeontological resources or possible burials be identified during the course of construction activities, work must cease in the immediate vicinity of the find, and SAHRA must be contacted regarding an appropriate way forward.

2.2.6. Visual Impacts

The construction and operation of the proposed Becrux Two Solar PV Energy Facility and its associated infrastructure may have a visual impact on the study area, especially within a 1km radius (and potentially up to a radius of 3km) of the proposed facility. The visual impact will differ amongst places, depending on the distance from the facility. It should also be noted that the study area is not considered to be pristine, due to the presence of existing mining and industrial activities, and infrastructure within the region. The visual amenity of the study areas has therefore already been compromised to a large degree.

The PV facility will primarily be visible to observers living along the western perimeter of the Zamdela residential area. There are no additional farm residences within a 1km radius of the proposed PV facility and a generally limited number of homesteads within a 1–3km (and up to 6km) radius.

Overall, the post mitigation significance of the visual impacts is expected to range from moderate to low. An additional mitigating factor for the proposed PV facility is the fact that it utilises a renewable source of energy (considered as an international priority) to generate electricity and is therefore generally perceived in a more favourable light. The PV Facility does not emit any harmful by-products or pollutants and is therefore not negatively associated with possible health risks to observers.

A number of mitigation measures have been proposed to reduce the significance of anticipated visual impacts. Regardless of whether or not mitigation measures will reduce the significance of the anticipated visual impacts, they are considered to be good practice and should all be implemented and maintained throughout the construction, operation and decommissioning phases of the proposed facility.

If mitigation is undertaken as recommended, it is concluded that the significance of most of the anticipated visual impacts will remain at or be managed to acceptable levels. As such, the PV facility and associated infrastructure would be considered to be acceptable from a visual impact perspective and can therefore be authorised.

The following impacts were identified from a visual perspective:

- » Visual impact of construction activities on sensitive visual receptors in close proximity to the proposed PV Facility.
- » Potential visual impact on sensitive visual receptors located within a 1km radius, and 1-3km radius of the PV Facility during the operation of facility.
- » Potential visual impact of operational, safety and security lighting of the facility at night on observers in close proximity to the proposed PV Facility.
- » Potential visual impact of solar glint and glare as a visual distraction and possible air/road travel hazard.
- » Potential visual impact of solar glint and glare on static ground-based receptors (residents of homesteads) in close proximity to the PV Facility.
- » Visual impact of the ancillary infrastructure during the operation phase on observers in close proximity to the structures.
- » The potential visual impact of the proposed PV facility on the sense of place of the region.

2.2.7. Social Impacts

Impacts are expected to occur with the development of the Becrux Two Solar PV Energy Facility during the construction, operation, and decommissioning phases. Both positive and negative impacts are identified and assessed.

Positive and negative impacts during construction include:

- » Direct employment and skills development.
- » Economic multiplier effects.
- » Safety and security risks.
- » Impacts on daily living and movement patterns.
- » Nuisance impact (noise and dust).

Positive and negative impacts during operation include:

- » Direct employment and skills development.
- » Development of clean, renewable energy infrastructure.
- » Visual and sense of place impacts.

From a social perspective, it is concluded that the project is supported, but that mitigation measures should be implemented and adhered to. The assessment of the key issues indicated that there are no negative impacts that can be classified as fatal flaws, and which are of such significance that they cannot be

successfully mitigated. Positive impacts could be enhanced by implementing appropriate enhancement measures and through careful planning. Based on the social assessment, the following general conclusions and findings can be made:

- » The potential negative social impacts associated with the construction phase are typical of construction related projects and not just focused on the construction of PV facilities and could be reduced with the implementation of the mitigation measures proposed.
- » Employment opportunities will be created in the construction and operation phases and the impact is rated as positive even if only a small number of individuals will benefit in this regard.
- » The proposed project could assist the local economy in creating entrepreneurial development, especially if local businesses could be involved in the provision of general material and services during the construction and operational phases.
- » Capacity building and skills training amongst employees are critical and would be highly beneficial to those involved, especially if they receive portable skills to enable them to also find work elsewhere and in other sectors.
- » The proposed development also represents an investment in infrastructure for the generation of clean, renewable energy, which, given the challenges created by climate change, represents a positive social benefit for society.

From a social perspective, it is concluded that the project could be developed subject to the implementation of the recommended mitigation measures, enhancement measures and management actions.

2.2.8. Assessment of Cumulative Impacts

Cumulative impacts are expected to occur with the development of the project throughout all phases of its lifecycle and within all areas of study considered as part of the BA Report. The main aim for the assessment of cumulative impacts is to test and determine whether the project will be acceptable within the landscape proposed for the development; and whether the impact, from an environmental and social perspective, will be acceptable without whole-scale change.

There is only one authorised solar energy facility proposed within a 30km radius of the project, namely, the 75MW Solar PV Energy Facility at the Lethabo Coal-Fired Power Station, located approximately 15km north-east of the proposed Becrux Two Solar PV Energy Facility. Based on the specialist cumulative assessment and findings, and consideration of the project's development and its contribution to the overall impact of all existing and proposed solar energy facilities within a 30km radius, it was concluded that cumulative impacts will be of a Low to Medium significance. The project will not result in unacceptable, high cumulative impacts nor a whole-scale change of the environment and is therefore considered acceptable from a cumulative impact perspective.

2.2.9. Environmental Sensitivity Mapping

As part of the specialist investigations undertaken within the development area, specific environmental features and areas were identified. The environmental features identified within and directly adjacent to the development area are illustrated in **Figure 2.2**. The following points provide a description of the sensitivities identified within the development area:

» **Terrestrial ecology and wetland features:**

- * Six (6) habitats were identified within development area and grid connection corridor, namely, transformed areas, degraded grassland, disturbed grassland, seepage wetlands, unchannelled valley bottom wetlands, and artificial wetlands.
- * The natural wetlands (i.e., seep and unchannelled valley bottom) are regarded to be of high sensitivity, the degraded grassland and artificial wetlands are regarded to be of medium sensitivity, and the disturbed grassland and transformed areas are regarded to be of low and very low sensitivity, respectively.
- * A 22m 'no-go' buffer around the identified wetland features was initially calculated assuming mitigation measures are applied. However, taking into consideration the Critically Endangered threat status of the wetlands, it is recommended that a conservative approach be opted for the wetland systems and a minimum buffer width of 30m be implemented.

» **Soil resources:**

- * Five land capability classes were identified within the development area and grid connection corridor, namely land capability classes 6 - 10. Land capability classes 6 to 8 are regarded to be of low/moderate and moderate sensitivity. Land capability classes 9 to 10 are regarded to be of moderately high sensitivity.

» **Heritage resources:**

- * No heritage resources of archaeological or palaeontological significance were identified within the development area proposed for the Becrux Two Solar PV Energy Facility Project.
- * It is confirmed that there were no fossils visible within the development area or along the route for the grid connection.
- * According to the SAHRIS Palaeosensitivity Map, the area proposed for development is underlain by sediments of very high and moderate palaeontological sensitivity.

The areas of high sensitivity (i.e., the natural wetland systems and their associated 30m buffer zones) have been avoided by the appropriate placement of infrastructure for the facility within the development footprint.

2.2.10. Overall Conclusion (Impact Statement)

A technically viable site for the project was proposed by Becrux Solar PV Project Two (Pty) Ltd and assessed as part of the BA process. The environmental assessment of the development area was undertaken by independent specialists and their findings have informed the results of the BA Report.

The specialist findings have indicated that there are no identified environmental fatal flaws associated with the project's implementation. High sensitivity freshwater features (i.e., wetlands and their associated 30m buffer zones), which are regarded as no-go areas, were identified within the development area. Becrux Solar PV Project Two (Pty) Ltd has proposed a technically viable layout for the project and associated infrastructure, which avoids these areas of high sensitivity (refer to **Figure 2.3**).

The proposed layout is therefore considered as the most appropriate from an environmental perspective and acceptable within all fields of specialist study undertaken for the project. All impacts associated with the proposed project can be mitigated to acceptable levels through implementation of the recommended mitigation measures. The layout map included as **Figure 2.4** is considered the preferred facility layout for the project.

Through the assessment undertaken in the BA Report, the following can be concluded regarding the key environmental considerations in terms of the International Finance Corporation (IFC) Project Developers Guide for the project:

- » *Construction phase impacts* (i.e., OHS, temporary air emissions from dust and vehicle emissions, noise related to excavation, construction and vehicle transit, solid waste generation and wastewater generation from temporary building sites) will be local in extent and of a low magnitude. The significance of impacts associated with the construction phase will be of a low to medium rating post-mitigation.
- » *Water usage* (i.e., the cumulative water use requirements) will be kept to a minimum during the project's construction and operation. Appropriate water demand and conservation measures will be implemented.
- » *Landscape and visual impacts* (i.e., the solar panels' visibility within the wider landscape and associated impacts on landscape designations, character types and surrounding communities) for the construction and operation phases will mostly be of I medium significance due to the proximity of the site to the Zamdela residential area. It is however important to note that there is existing mining and industrial activities, and infrastructure within the region, and therefore, the visual quality of the area has already been compromised to a large degree.
- » *Land Matters* will be of low significance, as Sasol Limited, the exclusive offtaker of the power to be generated by the proposed Becrux Two Solar PV Energy Facility, is the owner of the affected properties. There will be no involuntary land acquisition / resettlement associated with this project.
- » *Ecology and natural resources* (i.e., habitat loss/fragmentation, impacts on designated areas and disturbance or displacement of protected or vulnerable species) will be impacted on by the project. The layout of the facility has been designed to avoid areas of high sensitivity, thereby reducing impacts on these resources.
- » *Cultural heritage* (i.e., impacts on possible buried archaeological and palaeontological resources and the cultural landscape) is of low impact significance, and no heritage and archaeological resources of significance are associated with the development area. Based on the nature of the project, surface activities may impact upon the fossil heritage if preserved in the development footprint. The geological structures suggest that the rocks are the correct age and type to contain fossils; however, no fossils were seen on the surface and there were no rocky outcrops that could preserve fossils. Since there is a small chance that fossils from the Vryheid Formation could occur below the surface and may be disturbed, the implementation of a Fossil Chance Find Protocol has been recommended.
- » *Transport and access* (i.e., impacts of transportation of materials and personnel) will be appropriately managed, and existing roads will be used during construction and operation. A gravel access road will be established to provide direct access to the site.
- » *Consultation and disclosure* (i.e., consulting with key authorities, statutory bodies, affected communities and other relevant stakeholders) is being undertaken for the project, and documented for inclusion in the assessment of the project. All identified stakeholders and interested and affected parties (I&APs) will be afforded the opportunity to participate in a meaningful way to the BA for the project.
- » An Environmental Management Programme (EMPr) (this report) has been compiled to ensure that mitigation measures, as identified by the specialist studies undertaken, are implemented during the project lifecycle.

Based on the conclusions of the specialist studies undertaken, it can be concluded that the development of the Becrux Two Solar PV Energy Facility based on the current layout as provided by the developer will not result in unacceptable environmental impacts (subject to the implementation of the recommended mitigation measures).

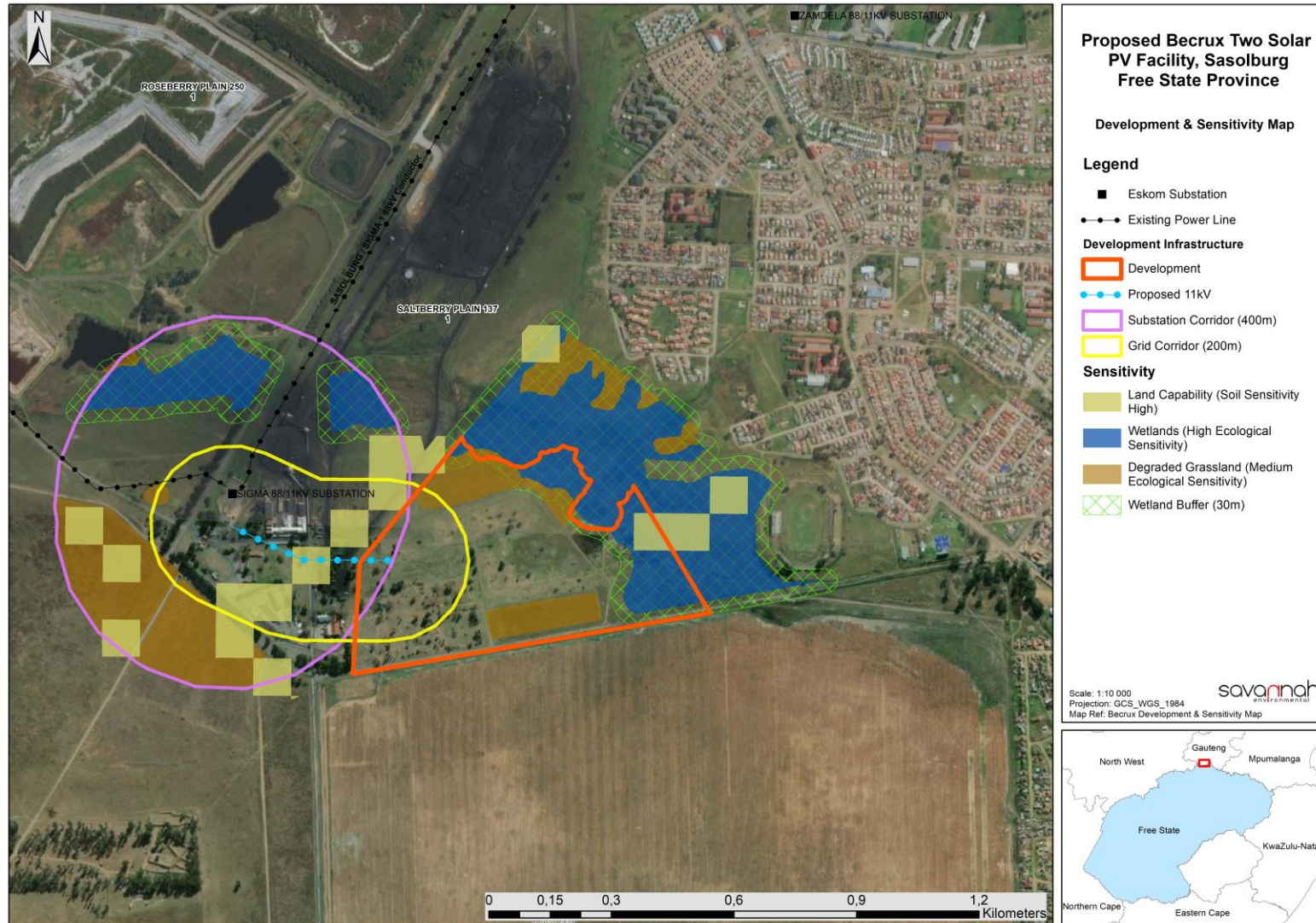


Figure 2.2: Sensitive environmental features identified within the development area and grid connection corridor assessed for the proposed 10MW_{ac} Becrux Two Solar PV Energy Facility

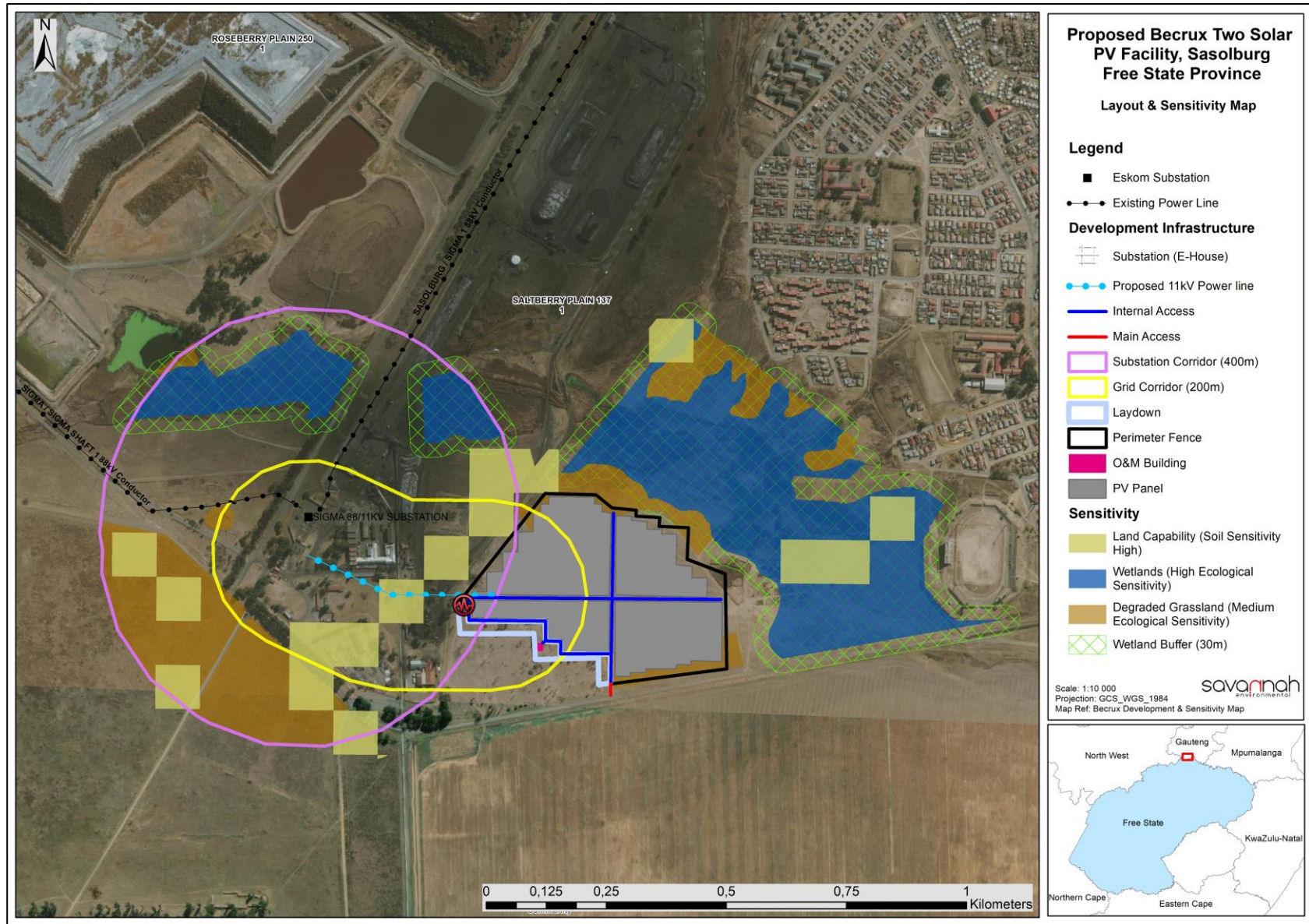


Figure 2.3: Environmental sensitivity map overlain with the facility layout

2.2.11. Overall Recommendation

Considering the findings of the independent specialist studies; the impacts identified; the proposed facility layout, which avoids all identified 'no-go'/highly sensitive environmental features within the development area; and the potential to further minimise the impacts to acceptable levels through mitigation, it is the reasoned opinion of the EAP that the development of the 10MW_{ac} Becrux Two Solar PV Energy Facility is acceptable within the landscape and can reasonably be authorised.

The preferred facility layout is illustrated in **Figure 2.4**. The period for which the Environmental Authorisation (EA) is required to remain valid is 10 years from the date of authorisation, with a period of 5 years for the design, planning, construction, and commissioning of the activity to be concluded.

The authorisation for the project would include the following key infrastructure and components:

- » Solar PV array comprising PV modules and mounting structures.
- » Inverters and transformers.
- » Cabling between the panels.
- » 11kV onsite containerised/non-containerised substation.
- » 11kV overhead power line for the distribution of the generated power, which will be connected to the existing Sigma Substation.
- » Main access gravel road and internal gravel roads.
- » Operations and Maintenance (O&M) building, including a sewage/conservancy tank and water storage tanks.
- » Site office, workshop area, storage area, and laydown area.
- » Fire break and fencing around the site, including an access gate.

The key conditions required to be included within an authorisation issued for the project are included under **Section E** of the BA Report.

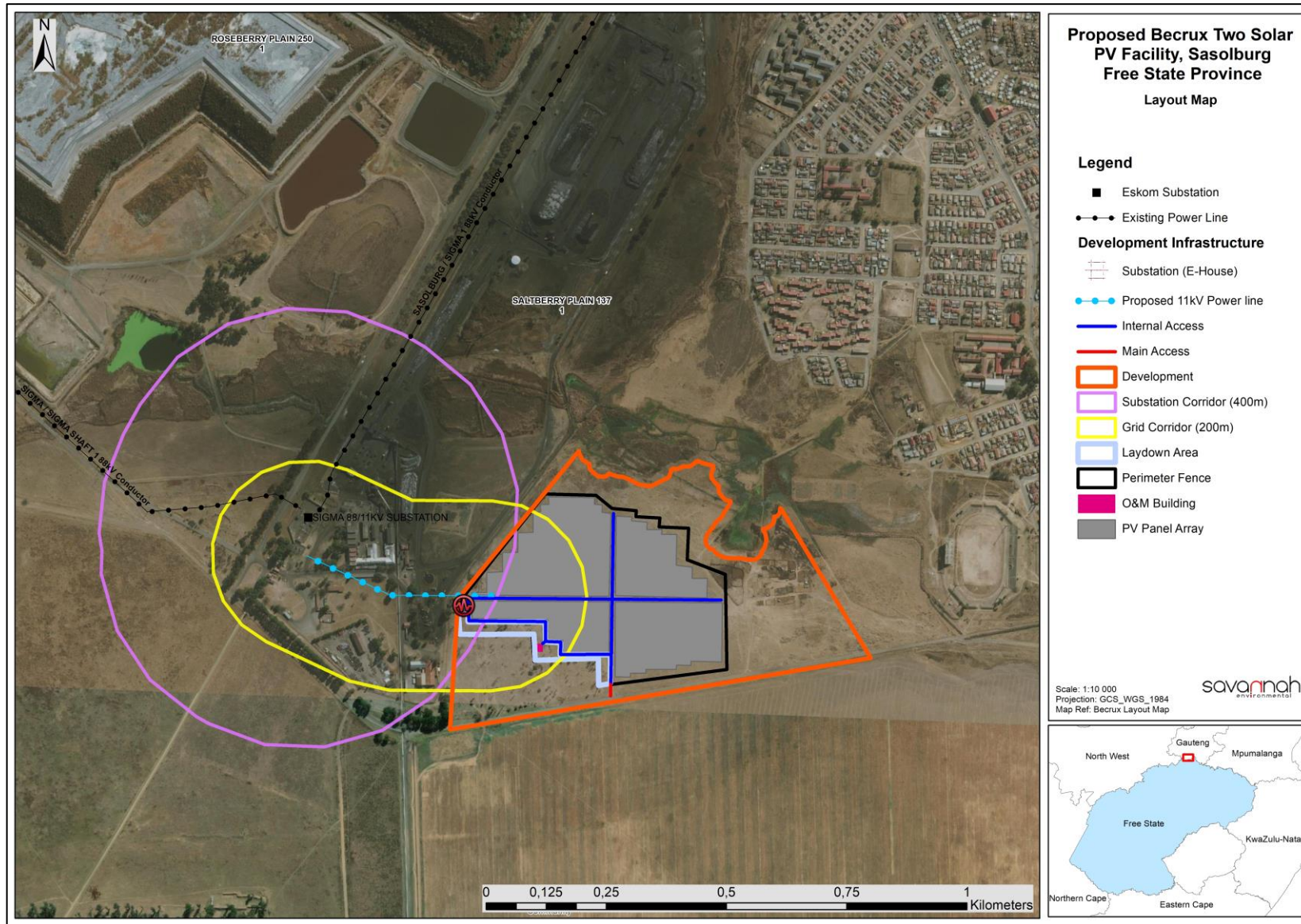


Figure 2.4: Layout for the Becrux Two Solar PV Energy Facility

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 the 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 project's immediate outcome and long-term impacts.

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); the construction activities themselves (erosion, noise, dust); site rehabilitation (soil stabilisation, re-vegetation) and operation. The EMPr also defines monitoring requirements 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 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). This is a dynamic document and will be further developed in terms of specific requirements listed in any authorisations issued for the project; or as it 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 project's planning, construction, rehabilitation and operation phases, to minimise the extent of environmental impacts; and manage environmental impacts associated with the project.
- » 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.

Becrux Solar PV Project Two (Pty) Ltd must ensure that the project's implementation complies with the requirements of all EAs, permits, and obligations emanating from relevant environmental legislation. This obligation is partly met through development and implementation of this EMPr, and through its integration into the relevant contract documentation provided to parties responsible for construction and/or operation activities. Since this EMPr is part of the BA process for the project, it is important that it 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 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 operational 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 lifecycle.

CHAPTER 4: STRUCTURE OF THIS EMPR

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

- » Planning and design activities.
- » Construction activities.
- » Operation activities.
- » 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 project implementation, an overarching environmental **goal** is stated. To meet this goal, a number of **objectives** are listed. The management programme has been structured in table format, to show the links between the goals for each phase and their associated objectives, activities/risk sources, mitigation actions, monitoring requirements and performance indicators. A specific EMPr table has been established for each environmental objective. The information provided within the EMPr table for each objective is illustrated below:

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

Project Component/s	List of project components affecting the objective, i.e.: <ul style="list-style-type: none"> » PV panels. » Power line and substation. » Access roads. » 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.
- » 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 proposed 10MW_{ac} Becrux Two Solar PV Energy Facility. This EMPr has been prepared in accordance with the requirements as contained in Appendix 4 of the 2014 EIA Regulations (GNR 326), and 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 –	Chapter 4 Appendix J
(i) The EAP who prepared the EMPr.	
(ii) The expertise of that EAP to prepare an EMPr, including a curriculum vitae.	
(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 Figure 2.1 to Figure 2.4 Appendix A
(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 6
(ii) Pre-construction activities.	Chapter 6
(iii) Construction activities.	Chapter 7
(iv) Rehabilitation of the environment after construction and where applicable post closure.	Chapter 7
(v) Where relevant, operation activities.	Chapter 8
(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 6 - 9

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 6 - 9
(h) The frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f).	Chapters 6 - 9
(i) An indication of the persons who will be responsible for the implementation of the impact management actions.	Chapters 6 - 9
(j) The time periods within which the impact management actions contemplated in paragraph (f) must be implemented.	Chapters 6 - 9
(k) The mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f).	Chapters 6 - 9
(l) A program for reporting on compliance, taking into account the requirements as prescribed by the Regulations.	Chapter 7
(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 7
(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

4.2 Project Team

In accordance with Regulation 12 of the 2014 EIA Regulations (GNR 326), 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 BA process is being managed in accordance with the requirements of NEMA, the 2014 EIA Regulations (GNR 326), 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. Savannah Environmental's team have been actively involved in undertaking environmental studies over the past 16 years, for a wide variety of

projects throughout South Africa, including those associated with electricity generation and infrastructure development.

The project team responsible for this BA process include:

- » **Kristen Shaw**, the principle author of this EMPr, holds BA in Psychology, Geography and Environmental Management, and a B.Sc. Honours degree from the North-West University in South Africa. Her key focus is on undertaking environmental impact assessments and environmental permitting and authorisations.
- » **Mmakoena Mmola**, the principle EAP on this project and co-author of this EMPr, holds a B.Sc. Honours in Geochemistry from the University of the Witwatersrand and is currently completing a B.Sc. Honours in Environmental Management with the University of South Africa. She has over 4 years of experience in the environmental management field. Her responsibilities for environmental studies include project management, review and integration of specialist studies, identification and assessment of potential negative environmental impacts and benefits, and the identification of mitigation measures, and compilation of reports in accordance with applicable environmental legislation. She is registered as a Professional Natural Scientist with the South African Council for Natural Scientific Professions (SACNASP), Registration Number: 126748.
- » **Lehlogonolo Mashego**, the Public Participation Consultant on this project, holds an M.Sc. in Environmental Science as obtained from the University of Witwatersrand. She is a Gauteng Branch Committee Member for International Association for Impact Assessment South Africa (IAIASA) facilitating the students and young professionals' division. She has 5 years of professional working experience in the public participation field; specializing in overall public facilitation, stakeholder engagement, public awareness, stakeholder liaison and project administration. She is responsible for project management of public involvement participation processes for a wide range of projects across South Africa in industries which include but not limited to mining, renewable energy, infrastructure, and recreation. Through her role as an environmental practitioner, she has facilitated a range of Screening Assessments, Basic Assessments, Scoping and Environmental Impact Assessments, Environmental Auditing and Environmental Training.

Savannah Environmental's team have been actively involved in undertaking environmental studies over the past 16 years, for a wide variety of projects throughout South Africa, including those associated with electricity generation and infrastructure development, and therefore have extensive knowledge and experience in EIAs and environmental management, having managed and drafted EMPrs for numerous other power generation projects throughout South Africa.

4.2.2 Details of the Specialist Consultants

A number of independent specialist consultants have been appointed as part of the BA project team, 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 and this EMPr.

Table 4.12: Specialist consultants which form part of the BA project team.

Specialist Study	Specialist Company	Specialist Name
Terrestrial Ecology and Wetland Impact Assessment	The Biodiversity Company	Lindi Steyn Marnus Erasmus Andrew Husted
Pedology Impact Assessment	The Biodiversity Company	Andrew Husted

		Ivan Baker Michael Douglas
Heritage Impact Assessment	CTS Heritage	Jenna Lavin Nicholas Wiltshire
Visual Impact Assessments	LOGIS	Lourens du Plessis
Social Impact Assessment	Savannah Environmental	Nodumiso Bulunga

CHAPTER 5: ROLES AND RESPONSIBILITIES

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

Formal responsibilities are necessary to ensure that key procedures are executed. Specific responsibilities of the Technical Director/Manager, Site Manager, Internal Environmental Officer, 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 5.1** provides an organogram indicating the organisational structure for the implementation of the EMPr.

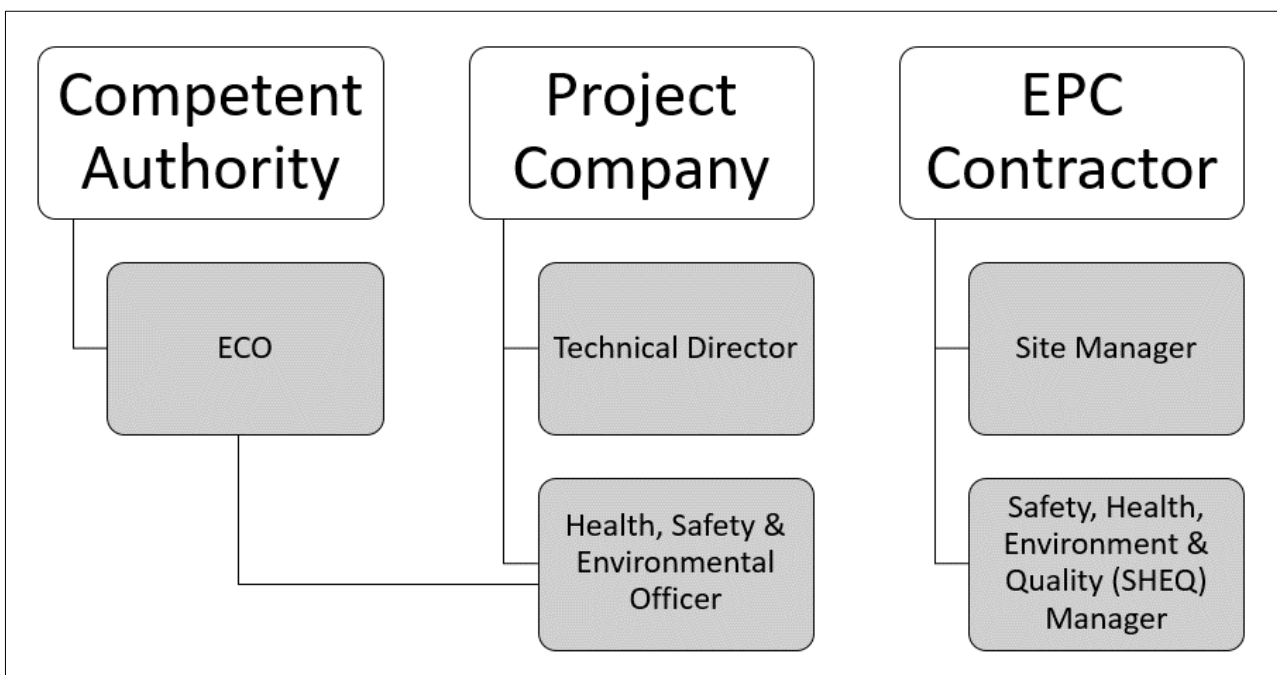


Figure 5.1: Organisational structure for the implementation of the EMPr

i) The Developer

As the Proponent, Becrux Solar PV Project Two (Pty) Ltd, must ensure that the project's implementation complies with the requirements of all EAs and all other permits, and obligations emanating from relevant environmental legislation.

ii) Construction Manager

The 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 Developer and its Contractor(s) are made aware of all stipulations within the EMPr.
- » 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 for the project, the EMPr, the conditions of the EA (once issued), and all relevant environmental legislation.
- » Be fully knowledgeable with the contents of all relevant licences and permits.

iii) Site Manager

The Project Manager/Site Manager is responsible for the overall management of the project and EMPr implementation. The following tasks will fall within his/her responsibilities:

- » Be fully conversant with the BA for the project, the EMPr, the EA conditions (once issued), and all relevant environmental legislation.
- » Be fully knowledgeable with the contents of all relevant licences and permits.
- » Be familiar with this EMPr's recommendations and mitigation measures; and implement these measures.
- » 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.
- » Monitor site activities on a daily basis for compliance.
- » Ensure that the EMPr is correctly implemented throughout the project through site inspections and meetings. This must be documented as part of the site meeting minutes.
- » Conduct internal audits of the construction site against the EMPr.
- » Confine the construction site to the demarcated area.
- » Rectify transgressions through the implementation of corrective action.

iv) Environmental Control Officer

A suitably qualified Environmental Control Officer (ECO)⁵ must be appointed by the project proponent 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.
- » 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 all the licences and permits issued to the site.
- » Be fully knowledgeable of the contents of all relevant environmental legislation.
- » 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 the compliance of the EMPr, EA and the legislation 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 or site-specific plans.
- » Ensure that if the EMPr, EA and/or the legislation conditions, regulations or specifications are not followed then appropriate measures are undertaken to address any non-compliances (for example an ECO may cease construction or an activity to prevent a non-compliance from continuing).
- » Ensure that any non-compliance or remedial measures that need to be applied are reported.

⁵ The ECO should have a relevant degree or technical diploma in environmental management and at least 2 years of experience in the field.

- » 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 FSDESTEA in terms of compliance with the specifications of the EMPr and conditions of the EA (once issued).
- » Keep records of all reports submitted to the FSDESTEA.

The ECO must be present full-time on site for the site preparation and initial clearing activities to ensure the correct demarcation of no-go areas, to facilitate environmental induction with construction staff and 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). Thereafter, monthly compliance audits can be undertaken, provided that adequate compliance with the EA, environmental permits and EMPr is achieved. The developer must appoint a designated Environmental Officer (EO) to be present on-site to deal with any environmental issues as they 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.

v) Contractors

The Lead Contractor is responsible for the following:

- » Ensure compliance with the EA, environmental permits and the EMPr at all times during construction.
- » Have the overall responsibility of the EMPr and its implementation.
- » Ensure that all appointed contractors and sub-contractors are aware of the EMPr and their respective responsibilities.
- » Provide all necessary supervision during the execution of the project.
- » Comply with any special conditions as stipulated by landowners.
- » Inform and educate all employees about the environmental risks associated with the various activities to be undertaken, and highlight those activities which must be avoided during the construction process in order to minimise significant impacts to the environment.
- » Maintain an environmental register which keeps a record of all incidents which occur on the site during construction. These incidents include:
 - * Public involvement / complaints;
 - * Health and safety incidents;
 - * Hazardous materials stored on site;
 - * Non-compliance incidents; and
 - * 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.
- » Conduct audits to ensure compliance to the EMPr.
- » Ensure there is communication with the Project Manager, the ECO, and relevant discipline engineers on matters concerning the environment.
- » Should the Contractor require clarity on any aspect of the EMPr, the Contractor must contact the Environmental Consultant/Officer for advice.

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

- » Employees must have a basic understanding of the key environmental features of the construction site and the surrounding environment.
- » A copy of the EMPr must be easily accessible to all on-site staff members.
- » Employees must be familiar with the requirements of this EMPr and the environmental specifications as they apply to the construction of the Solar PV Facility.
- » Prior to commencing any site works, all employees and sub-contractors must have attended an environmental awareness training course which must provide staff with an appreciation of the project's environmental requirements, and how they are to be implemented.
- » Staff will be informed of environmental issues as deemed necessary by the 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.
- » Any lack of adherence to the above will be considered as non-compliance to the specifications of the EMPr.
- » Ensuring that any instructions issued by the Site Manager on the advice of the ECO are adhered to.
- » Ensuring that a report is tabled at each site meeting, which 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 that they can constructively contribute towards the successful implementation of the EMPr (i.e. ensure their staff are appropriately trained as to the environmental obligations).

vi) Contractor's Safety, Health and Environment Representative/Environmental Officer

The Contractor's Safety, Health and Environment (SHE) Representative/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. In addition, the SHE/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.

The Contractor's SHE/EO should:

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

OBJECTIVE 2: Establish clear reporting, communication, and responsibilities during operation in relation to overall implementation of the EMPr during operation

Formal responsibilities are necessary to ensure that key procedures are executed during operation. Several professionals will form part of the operation team. For the purposes of the EMPr, the generic roles that need to be defined are those of the:

- » Operations Manager.
- » Environmental Manager.

It is acknowledged that the specific titles for these functions may vary once the project is implemented. The purpose of this section of the EMPr is to give a generic outline of what these roles typically entail. It is expected that this will be further defined during project implementation.

i) Operations Manager

The Plant 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 findings and recommendations in management reviews and audits.
- » Provide forums to communicate matters regarding environmental management.

ii) Environmental Manager Environmental Manager

The Environmental Manager will:

- » Develop and Implement an Environmental Management System (EMS) for the project.
- » Manage and report on the Solar PV Energy 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 FSDESTEA and conservation authorities) on environmental performance and other issues.
- » Conduct environmental training and awareness for the employees who operate and maintain the solar facility.
- » Compile environmental policies and procedures.
- » Liaise with interested and affected parties (I&APs) on environmental issues of common concern.
- » Track and control the lodging of any complaints regarding environmental matters.

The Environmental Manager must provide fourteen (14) days written notification to the FSDESTEA that the project's operation phase will commence.

CHAPTER 6: PLANNING AND DESIGN MANAGEMENT PROGRAMME

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

- » The preferred design and layout of the PV panels and associated infrastructure responds to the identified environmental constraints and opportunities.
- » The pre-construction activities are undertaken in accordance with all relevant legislative requirements.
- » Adequate regard has been taken of any landowner and community concerns and these are appropriately addressed through design and planning (where appropriate).
- » The best environmental options are selected for the linear components (underground cable network, short distribution power line), including the access roads.
- » The construction activities are undertaken without significant disruption to other land uses and activities in the area.

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

6.1 Objectives

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

Subject to approval by FSDESTEA, the proposed layout within the development area detailed in **Figure 2.4** must be implemented. Cognisance of sensitive areas defined in **Figure 2.3** and within the BA Report must be taken when undertaking the final design of the layout.

Project Component/s	Project components affecting the objective include all infrastructure including: <ul style="list-style-type: none"> » PV panels. » Inverters and transformers. » Cabling between panels. » E-house containerised or non-containerised substation. » Overhead power line. » Access road and internal roads. » Laydown area. » Associated buildings.
Potential Impact	<ul style="list-style-type: none"> » Impact on identified sensitive areas. » Design fails to respond optimally to the environmental considerations.
Activities/Risk Sources	<ul style="list-style-type: none"> » Positioning of all project components. » Pre-construction activities, e.g., geotechnical investigations, site surveys and environmental walk-through surveys. » Positioning of temporary sites.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » The design of the PV facility and grid connection infrastructure responds to the identified environmental constraints and opportunities, including the constraints identified through the BA process.

- » To ensure the pre-construction activities are undertaken in an environmentally friendly manner by, for example, avoiding identified sensitive areas.
- » Environmental sensitivities are taken into consideration and avoided as far as possible, thereby mitigation potential impacts.

Mitigation: Action/Control	Responsibility	Timeframe
Areas rated as High sensitivity and their buffers (as shown in Figure 2.3) in proximity to the development areas should be avoided as much is feasible. Avoided areas must be declared as 'no-go' areas during the life of the project, and all efforts must be made to prevent access to these areas from construction workers and machinery.	Developer Design Engineer Contractor	Design
The infrastructure should be realigned to prioritise development within very low/ low sensitivity areas. Mitigated development in medium sensitivity areas is permissible.	Design Engineer Developer	Design
All laydown, chemical toilets etc. should be restricted to medium sensitivity areas.	Design Engineer Developer	Design
The design of the proposed PV must be of a type or similar structure as endorsed by the Eskom-EWT Strategic Partnership on Birds and Energy, considering the mitigation guidelines recommended by Birdlife South Africa.	Design Engineer	Design Phase
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 11kV lines.	Design Engineer Developer	Design
Demarcate and avoid all wetlands and the associated 30 m buffer area.	Design Engineer Contractor	Design and Pre-construction
Plan the placement of laydown areas and temporary construction equipment camps in order to minimise vegetation clearing (i.e., in already disturbed areas), wherever possible.	Developer Contractor	Pre-construction Planning
Plan and conduct pre-construction activities in an environmentally acceptable manner that does not lead to unnecessary impacts and disturbance.	Developer Contractor	Pre-construction
The duration of the construction phase should be kept to a minimum to reduce the period of disturbance on fauna and must take place as much is feasible in the winter to avoid disturbing avifauna and to reduce the likelihood of concrete and sand washing into the wetlands.	Developer Contractor	Pre-construction Planning
A site walk through is recommended by a suitably qualified ecologist and/or avifauna specialist prior to	Developer Specialist	Pre-construction

Mitigation: Action/Control	Responsibility	Timeframe
any construction activities, preferably during the wet season to ensure no nests or fauna species are found in the area and any SSC should be noted. Should any Species of Conservation Concern/animals not move out of the area or their nest be found in the area a suitably qualified specialist must be consulted to advise on the correct actions to be taken.		
Outside lighting should be designed and limited to minimize impacts on fauna. All outside lighting should be directed away from highly sensitive areas. Fluorescent and mercury vapor lighting should be avoided, and sodium vapor (green/red) lights should be used wherever possible.	Developer Design engineer	Design and planning
Minimise disturbance of the surrounding landscape and maintain existing vegetation around the development.	Developer Design engineer	Design and planning

Performance Indicator	<ul style="list-style-type: none"> » The design meets the objectives and does not degrade the environment. » Design and layouts respond to the mitigation measures and recommendations in the BA Report.
Monitoring	<ul style="list-style-type: none"> » Ensure that the design implemented meets the objectives and mitigation measures in the BA Report through review of the facility design by the Project Manager and ECO prior to construction commencing.

OBJECTIVE 2: Ensure relevant permits and site-specific plans are in place to manage environmental impacts

Project Component/s	<p>Project components affecting the objective include all infrastructure including:</p> <ul style="list-style-type: none"> » PV panels. » Inverters and transformers. » Cabling between panels. » E-house containerised or non-containerised substation. » Overhead power line. » Access road and internal roads. » Laydown area. » Associated buildings.
Potential Impact	<ul style="list-style-type: none"> » Impact on identified sensitive areas.
Activities/Risk Sources	<ul style="list-style-type: none"> » Positioning of all project components. » Pre-construction activities, e.g., geotechnical investigations, site surveys and environmental walk-through surveys. » Positioning of temporary sites.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To ensure that pre-construction activities are undertaken in an environmentally friendly manner.

- » To ensure that the relevant permits and site-specific plans are in place prior to the commencement of construction.

Mitigation: Action/Control	Responsibility	Timeframe
A permit must be obtained from the relevant national or provincial department if any individuals of the protected plants that are present within the development area and grid connection corridor need to be relocated or destroyed due to the development.	Developer	Pre-construction
A hydrocarbon spill management plan must be compiled and implemented, to ensure that should there be any chemical spill out or over that it does not run into the surrounding areas.	Contractor	Pre-construction
A fire management plan must be compiled and implemented to restrict the impact fire might have on the surrounding areas.	Contractor	Pre-construction
A search, rescue and recovery program must be compiled for the site.	Specialists	Pre-construction
An alien vegetation management plan must be compiled and implemented.	Contractor	Pre-construction
A pest control plan must be compiled and implemented. It is imperative that poisons not be used due to the likely presence of SCC.	Contractor	Pre-construction
A stormwater management plan must be compiled and implemented.	Contractor	Pre-construction
Develop and implement a rehabilitation management and monitoring plan from the onset of construction.	Contractor	Pre-construction
Obtain abnormal load permits for transportation of project components to site (if required).	Contractor(s)	Pre-construction
Develop a detailed method statement for the implementation of the alien invasive management plan and open space management plan for the site (refer to Appendix C).	Developer	Pre-construction
Develop a detailed method statement for the implementation of the plant rescue and protection plan for the site (refer to Appendix E).	Developer	Pre-construction
Develop a detailed method statement for the implementation of the re-vegetation and habitat rehabilitation plan for the site (refer to Appendix D).	Developer	Pre-construction
Develop a detailed method statement for the implementation of the traffic and transportation management plan for the site (refer to Appendix F).	Developer	Pre-construction

Performance Indicator	<ul style="list-style-type: none"> » Permits are obtained and relevant conditions complied with. » Relevant management plans and method statements are prepared and implemented.
Monitoring	<ul style="list-style-type: none"> » Review of the design by the Project Manager and the ECO prior to construction commencing. » Monitor ongoing compliance with the EMPr and method statements.

OBJECTIVE 3: Ensure appropriate planning is undertaken by contractors and ensure compliance of required mitigation measures and recommendations by contractors

Project Component/s	<p>Project components affecting the objective include all infrastructure including:</p> <ul style="list-style-type: none"> » PV panels. » Inverters and transformers. » Cabling between panels. » E-house containerised or non-containerised substation. » Overhead power line. » Access road and internal roads. » Laydown area. » Associated buildings.
Potential Impact	<ul style="list-style-type: none"> » Impact on identified sensitive areas.
Activities/Risk Sources	<ul style="list-style-type: none"> » Positioning of all project components. » Pre-construction activities. » Positioning of temporary sites. »
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To ensure that pre-construction activities are undertaken in an environmentally friendly manner and in compliance with the EMPr, EA and other relevant permits/licenses.

Mitigation: Action/Control	Responsibility	Timeframe
The EMPr should form part of the contract with the Contractors appointed to construct the PV facility and associated infrastructure; and must be used to ensure compliance with environmental specifications and management measures. The implementation of this EMPr for all life cycle phases of the project is considered to be key in achieving the appropriate environmental management standards as detailed for this project.	Developer Contractor	Tender Design and Design Review Stage
A qualified Environmental Control Officer must be on site when construction begins.	Developer	Pre-construction/construction
All personnel and contractors must undergo Environmental Awareness Training. A signed register of attendance must be kept for proof. Discussions are required on sensitive environmental receptors within	Contractor EO	Pre-construction

Mitigation: Action/Control	Responsibility	Timeframe
the development area to inform contractors and site staff of the presence of Red / Orange List species, their identification, conservation status and importance, biology, habitat requirements and management requirements of the Environmental Authorisation and within the EMPr.		
The avoidance and protection of the wetland areas must be included into a site induction. Contractors and employees must all undergo the induction and made aware of the “no-go” areas to be avoided. The wetlands (which are ‘no-go’ areas) should be included on the overall master plan. The induction must also include a component of avifauna, and in particular awareness about not harming, collecting or hunting terrestrial species (e.g., guineafowl, fancolin), and owls, which are often persecuted for superstition. Further to this, the induction must also include aspects such as the need to avoid littering, the reporting and cleaning of spills and leaks and general good “housekeeping”.	Contractor EO	Pre-construction
Educate staff and relevant contractors on the location and importance of the identified wetlands through toolbox talk.	Contractor	Duration of contract

Performance Indicator	» Conditions of the EMPr and EA form part of all contracts. » No non-compliances are observed during the ECO audit.
Monitoring	» Monitor ongoing compliance with the EMPr and method statements.

OBJECTIVE 4: Ensure effective communication mechanisms

It is important to maintain ongoing communication with the public (including surrounding landowners) during the project's construction and operation phases. Any issues and concerns raised must be addressed as far as possible in as short a timeframe as possible.

Project component/s	Project components affecting the objective include all infrastructure including: <ul style="list-style-type: none"> » PV panels. » Inverters and transformers. » Cabling between panels. » E-house containerised or non-containerised substation. » Overhead power line. » Access road and internal roads. » Laydown area. <ul style="list-style-type: none"> » Associated buildings.
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Potential Impact	» Impacts on affected and surrounding landowners 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
<p>Compile and implement a grievance mechanism procedure for the public (including the affected and surrounding landowners) (using Appendix B) to be implemented during both the construction and operation phases of the solar facility and if applicable during decommissioning. This procedure must include the details of the contact person who will be receiving issues raised by I&APs; and the process that will be followed to address issues. The mechanism must also include procedures to lodge complaints, in order for the local community to express any complaints or grievances with the construction process. A Public Complaints register must be maintained by the Contractor, to record all complaints and queries relating to the project and actions taken to resolve the issue.</p> <p>A Project Specific Grievance Mechanism must be developed and implemented prior to construction.</p>	Developer EPC Contractor O&M Contractor	Pre-construction (construction procedure) Pre-operation (operation procedure)
Develop and implement a grievance mechanism for the project's construction, operation and closure phases for all employees, contractors, subcontractors and site personnel. This procedure should be in line with the South African Labour Law.	Developer EPC Contractor O&M Contractor	Pre-construction (construction procedure) Pre-operation (operation procedure)
Organise local community meetings to advise the local labour on the project that is planned to be established and the jobs that can potentially be applied for.	EPC Contractor	Pre-construction
Develop an incident reporting system to record non-conformances to the EMPr.	Contractor	Pre-construction Duration of construction
Clearly inform the local municipality of the potential impact of the proposed project in order for the necessary preparations to take place	Developer	Pre-construction
Consult adjacent landowners (if present) in order to inform them of the development and to identify any (valid) visual impact concerns.	Developer	Pre-construction

Mitigation: Action/control	Responsibility	Timeframe
A Community Liaison Officer should be appointed. A method of communication should be implemented whereby procedures to lodge complaints are set out in order for the local community to express any complaints or grievances with the construction process.	Developer	Pre-construction

Performance Indicator	» Effective communication procedures in place for all phases as required.
Monitoring	<ul style="list-style-type: none"> » A Public Complaints 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. » 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. » An incident reporting system used to record on-conformances to the EMPr. » Grievance mechanism procedures implemented.

OBJECTIVE 5: Stimulate and enhance positive socio-economic impacts

Project component/s	<p>Project components affecting the objective include all infrastructure including:</p> <ul style="list-style-type: none"> » PV panels. » Inverters and transformers. » Cabling between panels. » E-house containerised or non-containerised substation. » Overhead power line. » Access road and internal roads. » Laydown area. » Associated buildings.
Potential Impact	» High local economic benefits
Activities/risk sources	<ul style="list-style-type: none"> » Procurement practices. » Training and skills development.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » Employ local community members as far as possible » Stimulate the local economy

Mitigation: Action/control	Responsibility	Timeframe
Training and skills development programmes should be initiated prior to the commencement of the construction phase.	Developer	Pre-construction

Mitigation: Action/control	Responsibility	Timeframe
Becrux Solar PV Project Two (Pty) Ltd should develop a database of local companies, specifically Historically Disadvantaged (HD) companies, which qualify as potential service providers (e.g. construction companies, catering companies, waste collection companies, security companies etc.) prior to the commencement of the tender process for construction contractors. These companies should be notified of the tender process and invited to bid for project-related work, where applicable.	Developer	Pre-construction
Develop and implement a recruitment protocol in consultation with the municipality and local community leaders. Ensure that the procedures for applications for employment are clearly communicated.	Developer	Pre-construction
Develop a recruitment policy / process (to be implemented by contractors), which will ensure the sourcing of labour locally, where available.	Developer	Pre-construction

Performance Indicator	<ul style="list-style-type: none"> » Developer has engaged with local authorities and business organisations. » Percentage of labour force employed from local community.
Monitoring	<ul style="list-style-type: none"> » The contractors to provide the information on local labour to the ECO to report in ECO reports.

CHAPTER 7: 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 noise impacts; farming practices; traffic and road use; and effects on local residents.
- » Minimises the impact on the indigenous natural vegetation and habitats of ecological value.
- » Minimises impacts on fauna (including avifauna) in the study area.
- » Minimises the impact on heritage sites, should they be uncovered.
- » Ensures rehabilitation of disturbed areas following the execution of the works, such that residual environmental impacts are remediated or curtailed.

An environmental baseline must be established during the undertaking of construction activities, where possible.

7.1 Objectives

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

OBJECTIVE 1: Securing the site and minimising impacts related to inappropriate site establishment

Project component/s	Project components affecting the objective include all infrastructure including: <ul style="list-style-type: none"> » PV panels. » Inverters and transformers. » Cabling between panels. » E-house containerised or non-containerised substation. » Overhead power line. » Access road and internal roads. » Laydown area. » Associated buildings.
Potential Impact	<ul style="list-style-type: none"> » Hazards to construction employees. » Security of materials. » Substantially increased damage to natural vegetation. » Potential impact on fauna and avifauna habitat. » Potential scarring of the landscape, due to vegetation clearing and resulting erosion.
Activities/risk sources	<ul style="list-style-type: none"> » Open excavations (foundations and cable trenches). » Movement of construction employees, vehicles and plant equipment in the area and on-site.

Mitigation: Target/Objective	<ul style="list-style-type: none"> » To secure the development area against unauthorised entry. » To protect construction employees. » No loss of or damage to sensitive vegetation in areas outside the development area. » Intact vegetation cover outside of the immediate construction work areas.
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Mitigation: Action/control	Responsibility	Timeframe
Areas of indigenous vegetation, even secondary communities outside of the direct project footprint, should under no circumstances be fragmented or disturbed further.	Contractor	Construction
Areas to be developed must be demarcated so that during the construction phase, only the demarcated area be impacted upon.	Contractor	Construction
Access in and out of the construction area should be strictly controlled and no unauthorised persons must be allowed onto the site.	Contractor	Construction
The appointed EPC contractor must appoint a security company and appropriate security procedures are to be implemented to limit access to the site and surrounding areas.	Contractor	Construction
Have clear rules and regulations for access to the proposed site to control loitering.	Contractor	Construction
Contractors must undergo an induction programme that covers land access protocols.	Contractor EO	Construction
Secure the site, working areas and excavations in an appropriate manner.	Contractor EO	Construction
The areas to be developed must be specifically demarcated to prevent movement of staff or any individual into the surrounding environments.	Contractor	Construction
The Contractor must take all reasonable measures to ensure the safety of its employees. Where the construction employees personnel could be exposed to danger by any of the works or site activities, suitable flagmen, barriers and/or warning signs in English and any other relevant indigenous languages, all to the Site Manager's approval must be provided. All unattended open excavations shall be adequately demarcated and/or fenced.	Contractor	Construction
Ensure that vegetation is not unnecessarily cleared or removed during the construction phase.	Contractor	Site establishment, and duration of 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

Performance Indicator	<ul style="list-style-type: none"> » Site is secure and there is no unauthorised entry. » No construction employees injured as a result of construction activities. » Fauna (including avifauna) and flora is protected, as far as practically possible. » Appropriate and adequate waste management and sanitation facilities provided at construction site. » Vegetation cover on and in the vicinity of the site is intact (i.e., full cover as per natural vegetation within the environment), with no evidence of degradation or erosion.
Monitoring	<ul style="list-style-type: none"> » Regular visual inspection of the fence for signs of deterioration/forced access. » An incident reporting system must be used to record non-conformances to the EMPr. » A complaints register must be developed and maintained on site. » ECO/ EO to monitor all construction areas on a continuous basis until all construction is completed; immediate reporting back to the site manager. » ECO/ EO to address any infringements with responsible contractors as soon as these are recorded. » Monitoring of vegetation clearing during construction (by contractor as part of construction contract).

OBJECTIVE 2: Appropriate management of the construction site and construction workers

Project Component/s	<p>Project components affecting the objective include all infrastructure including:</p> <ul style="list-style-type: none"> » PV panels. » Inverters and transformers. » Cabling between panels. » E-house containerised or non-containerised substation. » Overhead power line. » Access road and internal roads. » Laydown area. » Associated buildings.
Potential Impact	<ul style="list-style-type: none"> » 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	<ul style="list-style-type: none"> » 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 EMPr's requirements, leading to unnecessary impacts on the surrounding environment.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » Limit equipment storage within demarcated designated areas. » Ensure adequate sanitation facilities and waste management practices.

- » Ensure appropriate management of actions by on-site personnel, to minimise impacts to the surrounding environment.

Mitigation: Action/Control	Responsibility	Timeframe
No storage of vehicles or equipment will be allowed outside of the designated development areas.	Contractor	Construction
Contractors and construction workers must be clearly informed of the 'no-go', very high and high sensitivity areas.	Developer Contractor	Prior to the commencement of construction
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 area. Contractors and their sub-contractors must be familiar with the conditions of the EA, the BA Report, this EMP, and the requirements of all relevant environmental legislation.	Contractors	Construction
Contractors must ensure that all workers are informed at the outset of the construction phase of the conditions contained on the Code of Conduct.	Contractor and sub-contractor/s	Pre-construction
Introduce an incident reporting system to be tabled at weekly/monthly project meetings.	Contractor and sub-contractor/s	Pre-construction
All construction vehicles must adhere to clearly defined and demarcated roads.	Contractor	Construction
Ensure all construction equipment and vehicles are properly maintained at all times.	Contractor	Construction
Ensure that construction workers are clearly identifiable. All workers should carry identification cards and wear identifiable clothing.	Contractor	Construction
Contact details of emergency services should be prominently displayed on site.	Contractor	Construction
The contractor must ensure that 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	Contractor	During construction.

Mitigation: Action/Control	Responsibility	Timeframe
disposal of hydrocarbons, chemicals, solvents and any other harmful and hazardous substances and materials.		
Ensure ablution facilities are appropriately maintained. Ablutions must be cleaned regularly, and associated waste disposed of at a registered/permited waste disposal site. They must be removed from site when construction is completed.	Contractor and sub-contractor/s	Duration of contract
Cooking and eating of meals must take place in a designated area.	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
Ensure proper health and safety plans in place during the construction period, to ensure safety on and around site during construction, including fencing of the development area and site access restriction.	Contractor and sub-contractor/s	Pre-construction

Performance Indicator	<ul style="list-style-type: none"> » 'No-go' and sensitive areas are avoided by construction activities. » Ablution and waste removal facilities are in a good working order and do not pollute the environment due to mismanagement. » All areas are rehabilitated promptly after construction in an area is complete. » Excess vegetation clearing and levelling is not undertaken. » No complaints regarding contractor behaviour or habits. » 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.
Monitoring	<ul style="list-style-type: none"> » Regular audits of the construction camps and areas of 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 must 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 3: Maximise benefits to the social environment associated with the construction phase

Employment opportunities will be created during the construction phase, specifically for semi-skilled and unskilled workers. Employment of locals and the involvement of local SMMEs would enhance the social benefits associated with the project, even if the opportunities are only temporary. The procurement of local goods could furthermore result in positive economic spin-offs.

Project Component/s	Construction activities associated with the establishment of the PV facility.
Potential Impact	The opportunities and benefits associated with the creation of local employment and business should be maximised.
Activities/Risk Sources	Contractors who make use of their own labour for unskilled tasks, thereby reducing the employment and business opportunities for locals. Sourcing of individuals with skills similar to the local labour pool outside the municipal area. Unavailability of locals with the required skills, resulting in locals not being employed and labour being sourced from outside the municipal area.
Enhancement: Target/Objective	The Contractor should aim to employ as many low-skilled and semi-skilled workers from the local area as possible. This should also be made a requirement for all contractors. Employment of a maximum number of the low-skilled and/or semi-skilled workers from the local area, where possible. Appropriate skills training and capacity building.

Mitigation: Action/Control	Responsibility	Timeframe
The proponent must make it a requirement for contractors to implement a 'locals first' policy, especially for semi and low skilled job categories.	Developer Contractor	Construction
Enhance employment opportunities for the immediate local area, i.e., Metsimaholo Local Municipality (MLM). If this is not possible, then the broader focus areas should be considered for sourcing workers.	Developer Contractor	Construction
The recruitment selection process should seek to promote gender equality and the employment of women wherever possible.	Developer Contractor	Construction
It is recommended that realistic local recruitment targets be set for the construction phase.	Developer	Construction
Engage with local authorities and business organisations to investigate the possibility of procurement of construction materials, goods and products from local suppliers, where feasible.	Developer	Construction
The proponent must liaise with the MLM to address potential impacts on local services.	Developer	Construction

Mitigation: Action/Control	Responsibility	Timeframe
The developer should where possible establish vocational training programs for the local employees to promote the development of skills.	Developer	Construction
Form joint ventures with community organisations, through Trusts, which can provide local communities with benefits, such as employment opportunities and services.		

Performance Indicator	Maximum number of semi and unskilled labour locally sourced where possible. Local suppliers and SMMEs contracted where possible. Skills transfer facilitated where required.
Monitoring	Contractors and appointed ECO must monitor indicators listed above, to ensure that they have been met for the construction phase.

OBJECTIVE 4: Protection of sensitive areas, flora, fauna and soils

Project Component/s	Construction of all infrastructure, including: <ul style="list-style-type: none"> » PV panels. » Inverters and transformers. » Cabling between panels. » E-house containerised or non-containerised substation. » Overhead power line. » Access road and internal roads. » Laydown area. » Associated buildings.
Potential Impact	<ul style="list-style-type: none"> » Impacts on natural vegetation, habitats and fauna. » Loss of indigenous natural vegetation due to construction activities and vegetation clearing. » Impacts on soil. » Loss of topsoil. » Erosion.
Activity/Risk Source	<ul style="list-style-type: none"> » Vegetation clearing. » Site preparation and earthworks. » Excavation of foundations. » Construction of infrastructure. » Stockpiling of topsoil, subsoil and spoil material.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To minimise the development area as far as possible. » To minimise impacts on surrounding sensitive areas. » To minimise impacts on soils. » To minimise impacts on fauna. » Minimise spoil material. » Minimise erosion potential.

Mitigation: Action/Control	Responsibility	Timeframe
Clearing of vegetation should be minimized and avoided where possible.	Contractor	Site establishment
Existing access routes, especially roads must be made use of.	Contractor	Construction
No materials may be stored for extended periods of time. Materials must be removed from the development area once the construction phase has been concluded. No permanent construction phase structures should be permitted.	Contractor	Construction
Construction buildings should preferably be prefabricated or constructed using re-usable/recyclable materials where possible.	Contractor	Construction
It should be made an offence for any staff to take/ bring any plant species into/out of any portion of the development area.	Contractor	Construction
No plant species whether indigenous or exotic should be brought into/taken from the development area, to prevent the spread of exotic or invasive species or the illegal collection of plants.	Contractor	Construction
High visibility flags must be placed near any protected plants in order to avoid any damage or destruction of the species. If left undisturbed the sensitivity and importance of these species needs to be part of the environmental awareness program.	Contractor	Construction
Infrastructure, development areas and routes where protected plants cannot be avoided, these plants many being geophytes or small succulents, should be removed from the soil and relocated/ re-planted in similar habitats where they should be able to resprout and flourish again. If the plants cannot be relocated seed must be collected and utilised as part of the rehabilitation process.	Contractor	Construction
A fire management plan must be implemented to restrict the impact fire might have on the surrounding areas.	Contractor	Construction
Environmentally friendly dust suppressants must be utilised.	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.	Contractor	Construction
No trapping, killing, or poisoning of any wildlife is to be allowed.	Contractor	Construction
Outside lighting should be designed and limited to minimize impacts on fauna. All outside lighting should be directed away from highly sensitive areas.	Contractor	Construction

Mitigation: Action/Control	Responsibility	Timeframe
All construction and maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply with speed limits, to respect all forms of wildlife. Speed limits must still be enforced to ensure that road killings and erosion is limited.	Contractor	Construction
Any holes/deep excavations must be dug and planned in a progressive manner and shouldn't be left open overnight unless appropriate demarcation is in place. Should the holes be left open overnight, they must be covered temporarily to ensure no small fauna species fall in.	Contractor	Construction
Ensure that cables and connections are insulated successfully to reduce electrocution risk and preferably buried.	Contractor	Construction
All vehicles (construction or other) accessing the site should adhere to a low-speed limit on site (40 km/h max) to reduce erosion.	Contractor	Construction
The establishment of large concrete areas should be avoided as far as possible.	Contractor	Construction
Vegetate where possible or cover all stockpiles after stripping/removing soils.	Contractor	Construction
Storage of potential contaminants should be undertaken in bunded areas.	Contractor	Construction
All contractors must have spill kits available and be trained in the correct use thereof.	Contractor	Construction
No cleaning or servicing of vehicles, machines and equipment may be undertaken in water resources.	Contractor	Construction
Have action plans on site, and training for contractors and employees in the event of spills, leaks and other impacts to the aquatic systems	Contractor	Construction
Continuously monitor erosion on site.	Contractor	Construction
Monitor compaction on site.	Contractor	Construction

Performance Indicator	<ul style="list-style-type: none"> » No disturbance outside of designated work areas. » Minimised clearing of existing vegetation. » Vegetation and habitat loss restricted to infrastructure footprint. » No poaching etc. of fauna by construction personnel during construction. » Removal to safety of fauna encountered during construction. » Low mortality of fauna due to construction machinery and activities. » Topsoil appropriately stored, managed and rehabilitated. » Limited soil erosion, compaction and pollution around site. » No activity in restricted areas.
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Monitoring	<ul style="list-style-type: none"> » Contractor's EO to provide supervision and oversight of vegetation clearing activities. » Supervision of all clearing and earthworks. » Ongoing monitoring of erosion management measures within the site. » An incident reporting system will be used to record non-conformances to the EMPr.
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OBJECTIVE 5: Minimise impacts to avifauna

Project Component/s	<ul style="list-style-type: none"> » Any infrastructure or activity that will result in disturbance to natural areas. » PV Panels. » Overhead power line, cabling and substation,
Potential Impact	<ul style="list-style-type: none"> » Vegetation clearance and associated impacts on avifaunal habitats. » Loss of avifauna due to interactions with humans and site infrastructure.
Activity/Risk Source	<ul style="list-style-type: none"> » Site preparation and earthworks. » Foundations or plant equipment installation. » Mobile construction equipment. » Grid infrastructure.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To minimise footprints of habitat destruction. » To minimise disturbance to (and death of) resident and visitor avifaunal species.

Mitigation: Action/Control	Responsibility	Timeframe
All vehicles (construction or other) accessing the site should adhere to a low-speed limit on site (40 km/h max) to avoid collisions with susceptible avifauna, such as nocturnal and crepuscular species (e.g. nightjars and owls) which sometimes forage or rest on roads, especially at night.	Contractor	Construction
Signs must be put up stating that should any person be found poaching any species they will be fined.	Contractor	Construction
Ensure that cables and connections are insulated successfully to reduce electrocution risk and preferably buried.	Contractor	Construction
All the parts of the infrastructure must be nest proofed and anti-perch devices placed on areas that can lead to electrocution.	Contractor	Construction
Fencing mitigations: <ul style="list-style-type: none"> • Top 2 strands must be smooth wire • Routinely retention loose wires • Minimum 30cm between wires • Place markers on fences 	Contractor	Construction
White strips should be placed along the edges of the panels, to reduce similarity to water and deter birds and	Contractor	Construction

Mitigation: Action/Control	Responsibility	Timeframe
insects. Consider the use of bird deterrent devices to limit collision risk.		
If any powerlines/connection lines from existing lines to the facility are to be placed above ground, they must be marked with industry standard bird flight diverters	Contractor	Construction

Performance Indicator	<ul style="list-style-type: none"> » Minimised clearing of existing/natural vegetation and habitats for avifauna. » Limited impacts on avifaunal species (i.e. noted/recorded fatalities). » Identification of avifauna carcasses.
Monitoring	<ul style="list-style-type: none"> » Avifaunal monitoring to detect movement through the 30ha development area. » Construction phase avifauna monitoring to record movement and abundance through the development area.

OBJECTIVE 6: Minimise the establishment and spread of alien invasive plants

Major factors contributing to invasion by AIPs include high disturbance activities and negative grazing practices. Consequences of this may include:

- » Loss of indigenous vegetation.
- » Change in vegetation structure leading to change in various habitat characteristics.
- » Change in plant species composition.
- » Change in soil chemical properties.
- » Loss of sensitive habitats.
- » Loss or disturbance to individuals of rare, endangered, endemic, and/or protected species.
- » Fragmentation of sensitive habitats.
- » Change in flammability of vegetation, depending on alien species.
- » Hydrological impacts due to increased transpiration and runoff.

Project Component/s	<p>Construction of all infrastructure, including:</p> <ul style="list-style-type: none"> » PV panels. » Inverters and transformers. » Cabling between panels. » E-house containerised or non-containerised substation. » Overhead power line. » Access road and internal roads. » Laydown area. » Associated buildings.
Potential Impact	<ul style="list-style-type: none"> » Invasion of natural vegetation surrounding the site by declared weeds or AIPs. » Impacts on soil. » Impact on faunal habitats. » Degradation and loss of agricultural potential.

Activities/Risk Sources	<ul style="list-style-type: none"> » Transport of construction materials to the development area. » Movement of construction machinery and personnel. » Site preparation and earthworks causing disturbance to indigenous vegetation. » Construction of main access road. » Stockpiling of topsoil, subsoil and spoil material. » Routine maintenance work – especially vehicle movement.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To significantly reduce the presence of weeds and eradicate AIPs. » To avoid the introduction of additional AIPs to the site. » To avoid distribution and thickening of existing AIPs in the site. » To complement existing alien plant eradication programs in gradually causing a significant reduction of AIPs throughout the site.

Mitigation: Action/Control	Responsibility	Timeframe
Avoid creating conditions in which alien plants may become established: <ul style="list-style-type: none"> » The footprint area should be kept to a minimum. The footprint area must be clearly demarcated to avoid unnecessary disturbances to adjacent areas. » Footprint of the roads must be kept to prescribed widths. » Rehabilitate disturbed areas as quickly as possible. » Do not import soil from areas with alien plants. 	Contractor	Construction
Implement an alien invasive species management plan.	Contractor	Construction
All alien vegetation along the transmission servitude should be managed in terms of Regulation GNR.1048 of 25 May 1984 (as amended) issued in terms of the Conservation of Agricultural Resources Act, Act 43 of 1983.	Contractor	Construction
When alien plants are detected, these must be controlled and cleared using the recommended control measures for each species, to ensure that the problem is not exacerbated or does not reoccur.	Contractor	Construction
No planting or importing any listed AIPs (all Category 1a, 1b and 2 invasive species) to the site for landscaping, rehabilitation or any other purpose must be undertaken.	Contractor	Construction
All alien plant re-growth must be monitored and should it occur, these plants should be eradicated.	Contractor	Construction
Any alien invasive plants removed should be taken to a registered landfill site, to prevent the proliferation of alien invasive plants.	Contractor	Construction
The use of herbicides and pesticides and other related horticultural chemicals should be carefully controlled and only applied by personnel adequately certified to apply pesticides and herbicides. It must be ensured that WHO Recommended Classification of Pesticides by Hazard Class 1a (extremely hazardous) or 1b (highly hazardous)	Contractor	Construction

Mitigation: Action/Control	Responsibility	Timeframe
are not purchased, stored or used on site along with any other nationally or internationally similarly restricted/banned products.		

Performance Indicator	» Low abundance of alien plants. For each alien species: number of plants and aerial cover of plants within the site and immediate surroundings.
Monitoring	<ul style="list-style-type: none"> » On-going monitoring of area by EO during construction. » Annual audit of development area and immediate surroundings by qualified botanist. » If any AIPs are detected, then the distribution of these should be mapped (GPS co-ordinates of plants or concentrations of plants), number of individuals (whole site or per unit area), age and/or size classes of plants and aerial cover of plants. » The results should be interpreted in terms of the risk posed to sensitive habitats within and surrounding the site. » The environmental manager/site agent should be responsible for driving this process. » Reporting frequency depends on legal compliance framework.

OBJECTIVE 7: Minimise impacts on Wetlands

Project component/s	<ul style="list-style-type: none"> » Construction activities. » Storage and handling of dangerous goods.
Potential Impact	<ul style="list-style-type: none"> » Pollutants such as lime-containing (high pH) construction materials (such as concrete, cement, grouts, etc.) could be harmful to aquatic biota, particularly during low flows when dilution is reduced. » Removal of wetland habitat. » Compaction of soils within and surrounding the wetlands. » Erosion of soils surrounding wetlands.
Activity/risk source	<ul style="list-style-type: none"> » Development of PV facility in proximity to wetlands. » Increased hardened surfaces.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » Reduce potential loss of habitat and ecological structure. » No incidents related to spills of chemicals and hazardous materials. » No release of contaminated water in wetlands.

Mitigation: Action/control	Responsibility	Timeframe
Demarcate and avoid all wetlands and the associated 30 m buffer area.	Contractor	Construction
Clearly demarcate the construction footprint, restrict all construction activities to within the proposed infrastructure area and minimise the unnecessary clearing of vegetation outside of this area.	Contractor	Construction

Mitigation: Action/control	Responsibility	Timeframe
When clearing vegetation, allow for some vegetation cover as opposed to bare areas.	Contractor	Construction
Use the wetland shapefiles to signpost the edge of the wetlands closest to site. Place the sign 30 m from the edge (this is the buffer zone). Label these areas as environmentally sensitive areas, keep out.	Contractor	Construction
Landscape and re-vegetate all denuded areas as soon as possible.	Contractor	Construction
Limit construction activities near (< 50m) the wetlands to winter where possible when rain is least likely to wash concrete and sand into the wetland. Activities in hydromorphic soils can become messy during the height of the rainy season and where possible, construction activities should be minimised during these times to minimise unnecessary soil disturbances.	Contractor	Construction
Ensure soil stockpiles and concrete / building sand are sufficiently safeguarded against rain wash.	Contractor	Construction
Make sure all excess consumables and building materials / rubble is removed from site and deposited at an appropriate waste facility.	Contractor	Construction
Appropriately contain any generator diesel storage tanks, machinery spills (e.g. accidental spills of hydrocarbons oils, diesel etc.) or construction materials on site (e.g. concrete) in such a way as to prevent them leaking and entering the wetlands.	Contractor	Construction
Release only clean water into the environment.	Contractor	Construction
Minimise the extent of concreted / paved / gravel areas.	Contractor	Construction

Performance Indicator	» No degradation and erosion of wetlands.
Monitoring	» Monitor management measures in place for protection of freshwater resources.

OBJECTIVE 8: Protection of heritage resources

Project Component/s	» Construction activities.
Potential Impact	» Heritage objects or artefacts found on site are inappropriately managed or destroyed.
Activity/Risk Source	» Site preparation and earthworks. » Foundations or plant equipment installation. » Mobile construction equipment movement on site.

Mitigation: Target/Objective	» To ensure that any heritage objects found on site are treated appropriately and in accordance with the relevant legislation.
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Mitigation: Action/control	Responsibility	Timeframe
Should any previously unrecorded archaeological and palaeontological resources or possible burials be identified during the course of construction activities, work must cease in the immediate vicinity of the find, and SAHRA must be contacted regarding an appropriate way forward.	Contractor EO	Duration of contract, particularly during excavations
<p>The Chance Fossils Finds procedure must be implemented during the course of construction:</p> <ul style="list-style-type: none"> » This procedure is only required if fossils are seen on the surface and when drilling/excavations commence. » When excavations begin the rocks and must be given a cursory inspection by the environmental officer or designated person. Any fossiliferous material (plants, insects, bone, coal) should be put aside in a suitably protected place. This way the project activities will not be interrupted. » Photographs of similar fossils must be provided to the developer to assist in recognizing the fossil plants, vertebrates, invertebrates or trace fossils in the shales and mudstones. This information will be built into the training and awareness plan and procedures. » Photographs of the putative fossils can be sent to the palaeontologist for a preliminary assessment. » If there is any possible fossil material found by the developer/environmental officer then the qualified palaeontologist sub-contracted for this project, should visit the site to inspect the selected material and check the dumps where feasible. » Fossil plants or vertebrates that are considered to be of good quality or scientific interest by the palaeontologist must be removed, catalogued and housed in a suitable institution where they can be made available for further study. Before the fossils are removed from the site a SAHRA permit must be obtained. Annual reports must be submitted to SAHRA as required by the relevant permits. » If no good fossil material is recovered then no site inspections by the palaeontologist will be necessary. A final report by the palaeontologist must be sent to SAHRA once the project has been completed and only if there are fossils. 	Contractor EO	Duration of contract, particularly during excavations

Mitigation: Action/control	Responsibility	Timeframe
» If no fossils are found and the excavations have finished then no further monitoring is required.		

Performance Indicator	<ul style="list-style-type: none"> » No disturbance outside of designated work areas. » All heritage items located are dealt with as per the legislative guidelines.
Monitoring	<ul style="list-style-type: none"> » Observation of excavation activities by the EO throughout the 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 Stormwater Management

Stormwater management is covered under the Pre-construction and Construction Phase management, but aspects thereof will also continue into the Operation Phase. It is important that the engineers and contractors responsible for the detailed design of the stormwater systems take into account this EMPr's requirements, and the participating specialists' recommendations.

Project Component/s	» Alteration of natural areas into hard surfaces, impacting on the local hydrological regime of the area.
Potential Impact	» Poor stormwater management and alteration of the hydrological regime.
Activities/Risk Sources	» Placement of hard engineered surfaces.
Mitigation: Target/Objective	» Reduce the potential increase in surface flow velocities and impact on localised drainage systems.

Mitigation: Action/Control	Responsibility	Timeframe
Implement an effective storm water management plan. Its effectiveness must be regularly assessed and revised if necessary.	Contractor	Construction
Stormwater leaving the site should not be concentrated in a single exit drain but spread across multiple drains around the site each fitted with energy dissipaters (e.g., slabs of concrete with rocks cemented in) and drains should be cleared regularly.	Contractor	Construction

Mitigation: Action/Control	Responsibility	Timeframe
Stormwater from hard stand areas, and roads must be managed using appropriate channels and swales when located within steep areas.	Contractor	Construction
Any stormwater within the site must be handled in a suitable manner, i.e., trap sediments, and reduce flow velocities	Contractor	Construction
Stormwater run-off infrastructure must be maintained to mitigate both the flow and water quality impacts of any stormwater leaving the site.	Contractor and Engineers	Construction
Stormwater control systems must be implemented to reduce erosion on the project site.	Contractor	Construction
Stormwater channels must be designed to minimise soil erosion risk resulting from surface water runoff.	Contractor	Construction

Performance Indicator	<ul style="list-style-type: none"> » No impacts due to runoff. » Minimise erosion as far as possible. » Appropriate stormwater management system in place.
Monitoring	<ul style="list-style-type: none"> » Ongoing monitoring of erosion management measures within the site. » Monthly inspections of sediment control devices by the EO. » An incident reporting system will be used to record non-conformances to the EMPr.

OBJECTIVE 10: Management of dust and emissions

During the construction phase, limited gaseous or particulate emissions are anticipated from exhaust emissions caused by construction vehicles and equipment on-site or vehicle entrained dust from vehicle movement on the main and internal access roads.

Project component/s	<p>Construction of all infrastructure, including:</p> <ul style="list-style-type: none"> » PV panels. » Inverters and transformers. » Cabling between panels. » E-house containerised or non-containerised substation. » Overhead power line. » Access road and internal roads. » Laydown area. <ul style="list-style-type: none"> » Associated buildings.
Potential Impact	<ul style="list-style-type: none"> » Dust impacts can occur from cleared areas and vehicle movement along gravel roads. » Release of minor amounts of air pollutants (for example NO₂, CO and SO₂) from vehicles and construction equipment.
Activity/risk source	<ul style="list-style-type: none"> » Clearing of vegetation and topsoil.

	<ul style="list-style-type: none"> » Excavation, grading, scraping. » Transport of materials, equipment, and components. » Vehicle movement on gravel roads. » Re-entrainment of deposited dust by vehicle movements. » Wind erosion from topsoil and spoil stockpiles and unsealed roads and surfaces. » Fuel burning vehicle and construction engines. » Construction vehicle movement and their activities on the site.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To ensure emissions from all vehicles are minimised, where possible, for the duration of the construction phase. » To avoid and or minimise the potential dust impacts associated with heavy vehicles, and also minimise damage to roads. » Suppression of dust, pollution control and minimise dust generation.

Mitigation: Action/control	Responsibility	Timeframe
Dust-reducing mitigation measures must be put in place and must be strictly adhered to. This includes wetting of exposed soft soil surfaces. No non environmentally friendly suppressants may be used as this could result in pollution of water sources.	Contractor	Construction
Ensure that vehicles used to transport sand and building materials are fitted with tarpaulins or covers.	Contractor	Duration of contract
Speed of construction vehicles must be restricted to 40km/hr on all roads within the site.	Contractor	Duration of contract
Disturbed areas must be re-vegetated as soon as practicable, in line with the progression of construction activities.	Contractor	Completion of construction
Vehicles and equipment must be maintained in a roadworthy condition at all times.	Contractor	Duration of contract
All vehicles and containers used for moving waste must encapsulate the waste, which prevents the waste from causing odours and escaping or blowing around the site. This will also prevent leachate material from spilling out of the containers, which is hazardous.	Contractor	Duration of contract

Performance Indicator	<ul style="list-style-type: none"> » Visual presence of dust. » Dust does not cause health (inhaling, eye irritation) and safety risks (low visibility). » Dust suppression measures implemented for all heavy vehicles that require such measures during the construction phase. » Drivers made aware of the potential safety issues and enforcement of strict speed limits when they are employed. » All heavy vehicles equipped with speed monitors before they are used in the construction phase, in accordance with South African vehicle legislation. » Roadworthy certificates in place for all heavy vehicles at outset of construction phase and updated on a monthly basis.
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Monitoring	<ul style="list-style-type: none"> » The appointed EO must monitor indicators listed above, to ensure that they have been met for the construction phase. » Immediate reporting by personnel of any potential or actual issues with nuisance dust or emissions to the Site Manager. » An incident register and non-conformance must be used to record incidents and non-conformances to the EMPr. » A complaints register must be used to record grievances by the public.
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OBJECTIVE 11: Minimise visual impacts associated with construction

During construction, heavy vehicles, components, cranes, equipment and construction crews will frequent the area and may cause, at the very least, a visual nuisance to landowners and residents in the area as well as road users.

Project component/s	<ul style="list-style-type: none"> » Construction site. » Transportation of staff and equipment.
Potential Impact	<ul style="list-style-type: none"> » Visual impact of general construction activities, and the potential scarring of the landscape due to vegetation clearing and the resulting erosion. » Construction traffic.
Activity/risk source	<ul style="list-style-type: none"> » The viewing of visual scarring by observers in the vicinity of the wind farm or from the roads in the surrounding area.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » Minimal disturbance to vegetation cover in close vicinity of the wind farm and its related infrastructure. » Minimised construction traffic, where possible. » Minimal visual intrusion by construction activities and intact vegetation cover outside of the immediate construction work areas.

Mitigation: Action/control	Responsibility	Timeframe
Retain and maintain natural vegetation (if present) immediately adjacent to the development footprint.	Contractor	Construction
Ensure that vegetation cover adjacent to the development footprint (if present) is not unnecessarily removed during the construction phase, where possible.	Contractor	Construction
Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads.	Contractor	Construction
Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed regularly at licensed waste facilities.	Contractor	Construction
Reduce and control construction dust using approved dust suppression techniques as and when required (i.e., whenever dust becomes apparent).	Contractor	Construction

Mitigation: Action/control	Responsibility	Timeframe
Restrict construction activities to daylight hours whenever possible in order to reduce lighting impacts.	Contractor	Construction

Performance Indicator	<ul style="list-style-type: none"> » Construction site maintained in a neat and tidy condition. » Site appropriately rehabilitated after construction is complete.
Monitoring	<ul style="list-style-type: none"> » Monitoring of vegetation clearing during construction by EO. » Monitoring of rehabilitated areas quarterly for at least a year following the end of construction (by contractor as part of construction contract).

OBJECTIVE 12: Traffic management and transportation of equipment and materials to site

The construction and decommissioning phases of the project will be the most significant in terms of traffic impacts resulting from the transport of equipment, materials and construction crews to the site and the return of the vehicles after delivery of materials. Potential impacts associated with transportation and access relate mostly to works within the site boundary and the external road network.

Project component/s	<ul style="list-style-type: none"> » Construction vehicles. » Construction work force.
Potential Impact	<ul style="list-style-type: none"> » Traffic congestion, particularly on narrow roads or on road passes where overtaking is not permitted. » Risk of accidents. » Deterioration of road pavement conditions (i.e. both surfaced and gravel road) due to abnormal loads.
Activity/risk source	<ul style="list-style-type: none"> » Construction vehicle movement. » Speeding on local roads. » Degradation of local road conditions. » Site preparation and earthworks. » Foundations or plant equipment installation. » Mobile construction equipment movement on-site.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » Minimise impact of traffic associated with the construction of the PV facility on the local traffic volume, existing infrastructure, animals, and road users. » To minimise the potential for negative interaction between pedestrians or sensitive users and traffic associated with the wind farm construction. » To ensure all vehicles are roadworthy and all materials/equipment are transported appropriately and within any imposed permit/licence conditions.

Mitigation: Action/control	Responsibility	Timeframe
All vehicles must be road worthy, and drivers must be qualified, obey traffic rules, follow speed limits, and be made aware of the potential road safety issues.	Contractor	Construction
Implement penalties for reckless driving for the drivers of heavy vehicles as a way to enforce compliance to traffic rules.	Contractor	Construction

Mitigation: Action/control	Responsibility	Timeframe
Avoid heavy vehicle activity during 'peak' hours (when people are driving to and from work).	Contractor	Construction
The developer and engineering, procurement and construction (EPC) contractors must ensure that any damage / wear and tear caused by construction related traffic to the roads is repaired.	Contractor	Construction
The movement of construction vehicles on the site should be confined to agreed access road/s.	Contractor	Construction
Heavy vehicles must be inspected regularly to ensure their road safety worthiness.	Contractor	Construction
The movement of heavy vehicles associated with the construction phase should be timed (where possible) to avoid times days of the week, such as weekends, when the volume of traffic travelling along the access roads may be higher.	Contractor	Construction
Stagger component delivery to the site where possible.	Contractor	Construction
Speed limits of 40km/h must be put in place and appropriate signage must be put up to raise awareness in this regard.	Contractor	Construction

Performance Indicator	No traffic incidents involving project personnel or appointed contractors. Appropriate signage in place. No complaints resulting from traffic congestion, delays or driver negligence associated with construction of the wind farm.
Monitoring	Visual monitoring of traffic control measures to ensure they are effective. A complaints register will be maintained, in which any complaints from the community will be logged. Complaints will be investigated and, if appropriate, acted upon. An incident reporting system will be used to record non-conformances to the EMPr.

OBJECTIVE 13: Conservation of the soil resource within the site and in the adjacent areas

The natural soil on the site needs to be preserved as far as possible, to minimise impacts on the environment. Soil degradation, including erosion (by wind and water) and subsequent deposition elsewhere, is of a concern. Uncontrolled run-off relating to construction activities (excessive wetting, etc.) will also lead to accelerated erosion. Degradation of the natural soil profile due to excavation, stockpiling, compaction, pollution and other construction activities will affect soil forming processes and associated ecosystems.

A set of strictly adhered to mitigation measures are required to be implemented to effectively limit the impact on the environment. The disturbed areas where human impact is likely are the focus of the mitigation measures laid out below.

Project component/s	Construction of all infrastructure, including: <ul style="list-style-type: none"> » PV panels. » Inverters and transformers.
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	<ul style="list-style-type: none"> » Cabling between panels. » E-house containerised or non-containerised substation. » Overhead power line. » Access road and internal roads. » Laydown area. » Associated buildings.
Potential Impact	<ul style="list-style-type: none"> » Erosion and soil loss. » Increased runoff. » Downstream sedimentation.
Activities/risk sources	<ul style="list-style-type: none"> » Rainfall and wind erosion of disturbed areas. » Excavation, stockpiling and compaction of soil. » Concentrated discharge of water from construction activity. » Stormwater run-off from sealed surfaces. » Mobile construction equipment movement on site. » Roadside drainage ditches. » Project related infrastructure, such as buildings and fences.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To minimise erosion of soil from site during construction. » To minimise damage to vegetation by erosion or deposition. » To retain all topsoil with a stable soil surface

Mitigation: Action/control	Responsibility	Timeframe
Vegetation clearing must occur in a phased manner, to minimise erosion and/or run-off.	Contractor	Construction
Topsoil must be removed and stored separately from subsoil. It must be reapplied where appropriate as soon as possible, to encourage and facilitate rapid regeneration of the natural vegetation on cleared areas.	Contractor	Construction
Stockpile topsoil for re-use in rehabilitation phase. Maintain stockpile shape and protect from erosion.	Contractor	Construction
Vegetate or cover all stockpiles after stripping/removing soils.	Contractor	Construction
Storing topsoil: <ul style="list-style-type: none"> » Viability of stored topsoil depends on moisture, temperature, oxygen, nutrients and time stored. » Rapid decomposition of organic material in warm, moist topsoil rapidly decreases microbial activity necessary for nutrient cycling; and reduces the amount of beneficial micro-organisms in the soil. » Stockpile location must ideally be in a disturbed but weed-free area. » Storage of all topsoil that is disturbed must be of a maximum height of 2m and the maximum length of time before re-use is 18 months. » Topsoil handling must be reduced to stripping, piling (once), and re-application. Between the stockpiling 	Contractor	Construction

Mitigation: Action/control	Responsibility	Timeframe
<p>and reapplication, stored topsoil must not undergo any further handling except control of erosion and (alien) invasive vegetation.</p> <ul style="list-style-type: none"> » Where topsoil can be reapplied within six months to one year after excavation, it will be useful to store the topsoil as close as possible to the area of excavation and re-application, e.g. next to cabling trenches. » Do not mix overburden with topsoil stockpiles, as this will dilute the proportion of fertile soil (with less fertile subsoil or rock material). » Employ wind nets made from Hessian or similarly fibrous and biodegradable material, where required, to stabilise newly placed topsoil stockpiles and to reduce wind erosion. » In cases where topsoil has to be stored longer than 6 months or during the rainy season, soils must be kept as dry as possible and protected from erosion and degradation by: <ul style="list-style-type: none"> * Preventing ponding on or between heaps of topsoil. * Covering topsoil berms. * Preventing all forms of contamination or pollution. * Preventing any form of compaction. * Monitoring the establishment of all invasive vegetation and removing such if it appears. * Keeping slopes of topsoil at a maximal 2:1 ratio. * Monitoring and mitigating erosion where it appears. » Where topsoil needs to be stored in excess of one year, it is recommended to either cover the topsoil or allow an indigenous grass cover to grow on it – if this does not happen spontaneously, seeding must be considered. 		
<p>Regular monitoring of the site (minimum of twice annually) must be undertaken to identify possible areas of erosion, particularly after large summer thunderstorms have been experienced. Problem areas must receive follow-up monitoring by the EO, to assess the success of the remediation.</p>	<p>Contractor EO</p>	<p>Construction</p>
<p>Any erosion problems observed to be associated with the project infrastructure must be rectified as soon as possible and monitored thereafter to ensure that they do not re-occur.</p>	<p>Contractor</p>	<p>Construction</p>

Mitigation: Action/control	Responsibility	Timeframe
Reinstate as much of the eroded area to its pre-disturbed, "natural" geometry (no change in elevation and any banks not to be steepened) where possible.	Contractor	Construction
Practical phased development and vegetation clearing must be practiced so that cleared areas are not left unvegetated and vulnerable to erosion for extended periods of time.	Contractor	Construction
Erosion control measures, such as silt fences (for areas of works) and gravel strips, may be considered at the impact zone where water falls from the solar panels onto the soil surface (due to deterioration in natural grassland because of poor maintenance or lack of solar radiation).	Contractor	Construction
Silt traps must be used where there is a danger of topsoil eroding and entering lower lying wetland resources.	Contractor	Construction
Construction of gabions and other stabilisation features must be undertaken to prevent erosion, if deemed necessary.	Contractor	Construction
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	Construction
<p>Reapplying topsoil:</p> <ul style="list-style-type: none"> » Spoil materials and subsoil must be backfilled first, then covered with topsoil. » Immediate replacement of topsoil after the undertaking of construction activities within an area. » Generally, topsoil must be re-applied to a depth slightly greater than the topsoil horizon of a pre-selected undisturbed reference site. » The minimum depth of topsoil needed for revegetation to be successful is approximately 20 cm. » If the amount of topsoil available is limited, a strategy must be devised to optimise revegetation efforts with the topsoil available. » Reapplied topsoil must be landscaped in a way that creates a variable microtopography of small ridges and valleys that run parallel to existing contours of the landscape. The valleys become catch-basins for seeds and act as run-on zones for rainfall, increasing moisture levels where the seeds are likely to be more concentrated. This greatly improves the success rate of revegetation efforts. » To stabilise reapplied topsoil and minimise raindrop impact and erosion: <ul style="list-style-type: none"> * Use organic material from cleared and shredded woody vegetation, where possible. 	Contractor	Construction

Mitigation: Action/control	Responsibility	Timeframe
<ul style="list-style-type: none"> * Alternatively, suitable geotextiles or organic erosion mats can be used as necessary. » Continued monitoring will be necessary to detect any sign of erosion early enough to allow timeous mitigation. 		
Re-applied topsoil must be revegetated as soon as possible.	Contractor	Construction

Performance Indicator	<ul style="list-style-type: none"> » Minimal level of soil erosion around site. » Minimal level of soil degradation. » No activity outside demarcated areas. » Acceptable state of excavations. » No activity in restricted areas. » Acceptable state of excavations, as determined by EO and ECO. » No indications of visible topsoil loss.
Monitoring and Reporting	<ul style="list-style-type: none"> » Continual inspections of the site by the EO. » Reporting of ineffective sediment control systems and rectification as soon as possible. » If soil loss is suspected, acceleration of soil conservation and rehabilitation measures must be implemented.

OBJECTIVE 14: Appropriate handling and management of waste

The construction of the project will involve the generation of various wastes. 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 major waste stream during the Construction Phase are:

- » Cardboard waste from the panels.
- » Rubber caps placed on all eight corners of the PV panels – volumes uncertain.
- » Wooden pallets on which the PV boxes arrive.
- » Plastic wrap.

Other wastes include:

- » Other general solid waste.
- » Hazardous waste.
- » Inert waste (rock and soil).
- » Liquid waste (including grey water and sewage).

Project Component/s	» Storage and handling of waste.
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. » 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 disposal.

Mitigation: Action/Control	Responsibility	Timeframe
Construction method and materials should 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. This must be in line with the Sigma Colliery Mine's Waste Management Plan.	Contractor	Duration of contract
Ensure that no litter, refuse, wastes, rubbish, rubble, debris and builders wastes generated on the premises is placed, dumped or deposited on adjacent/surrounding properties, and that the waste is disposed of at an appropriately registered waste 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. The 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
Uncontaminated waste must be removed at least weekly for disposal, if feasible; 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. This must be regularly removed and recycled (where possible) or disposed of at an appropriately licensed landfill site.	Contractor	Duration of contract

Mitigation: Action/Control	Responsibility	Timeframe
Waste must be stored in accordance with the relevant legislative requirements.	Contractor	Construction
Waste must be kept to a minimum and be transported by approved waste transporters to sites designated for their disposal.	Contractor	Duration of contract
No liquid waste, including grey water, may be discharged into any water body or drainage line. All sewage disposal to take place at a registered and operational wastewater treatment works.	Contractor	Construction
All liquid wastes should be contained in appropriately sealed vessels/ponds within the project's footprint; and be disposed of at a designated waste management facility after use.	Contractor	Duration of contract
Ensure compliance with all national, regional and local legislation with regard to the storage, handling and disposal of hydrocarbons, chemicals, solvents and any other harmful and hazardous substances and materials. The onus is on the Contractor to identify and interpret the applicable legislation. Hazardous waste to be disposed of at a registered landfill site.	Contractor	During and post construction.
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
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
If 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
Ensure that the below ground storage of the septic tank can withstand the external forces of the surrounding pressure. The area above the tank must be demarcated to prevent any vehicles or heavy machinery from driving around the tank.	Contractor	Duration of construction
Under no circumstances may waste be burnt or buried on site.	Contractor	Duration of construction
Any waste generated during construction must be stored in designated containers and removed from the site by the construction teams.	Contractor	Construction
Waste management must be a priority and all waste must be collected and stored adequately.	Contractor	Construction

Mitigation: Action/Control	Responsibility	Timeframe
It is recommended that all waste be removed from site on a weekly basis, where feasible, to prevent rodents and pests entering the site.	Contractor	Construction
The Contractor should supply sealable and properly marked domestic waste collection bins and all solid waste collected shall be disposed of at a licensed disposal facility. Under no circumstances may domestic waste be burned on site.	Contractor	Construction
Refuse bins must be emptied and secured. Temporary storage of domestic waste must be in covered waste skips. Maximum domestic waste storage period must be 10 days.	Contractor	Construction

Performance Indicator	<ul style="list-style-type: none"> » 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	<ul style="list-style-type: none"> » 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. » An incident reporting system will be used to record non-conformances to the EMPr.

OBJECTIVE 15: Appropriate handling and storage of chemicals and/or 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	<ul style="list-style-type: none"> » Storage and handling of chemicals and hazardous substances.
Potential Impact	<ul style="list-style-type: none"> » Release of contaminated water from contact with spilled chemicals. » Generation of contaminated wastes from used chemical containers. » Soil pollution.
Activity/Risk Source	<ul style="list-style-type: none"> » Vehicles associated with site preparation and earthworks. » Construction activities of area and linear infrastructure. » Hydrocarbon spills by vehicles and machinery during levelling; vegetation clearance; transport of workers, materials and equipment; and fuel storage tanks. » Accidental spills of hazardous chemicals. » Polluted water from wash bays and workshops. » Pollution from concrete mixing.

Mitigation: Target/Objective	<ul style="list-style-type: none"> » To ensure that the storage and handling of chemicals and hydrocarbons on-site does not cause pollution to the environment or harm to persons. » To ensure that the storage and maintenance of machinery on-site does not cause pollution of the environment or harm to persons. » Prevent and contain hydrocarbon leaks. » Undertake proper waste management. » Store hazardous chemicals safely in a bunded area.
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Mitigation: Action/Control	Responsibility	Timeframe
Implement an emergency preparedness plan during the construction phase.	Contractor	Construction
A hydrocarbon 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.	Contractor	Construction
Have action plans on site, and training for contractors and employees in the event of spills, leaks and other impacts to the aquatic systems.	Contractor	Construction
Any liquids stored on site, including fuels and lubricants, should be stored in accordance with applicable legislation.	Contractor	Construction
The Contractor shall be in possession of an emergency spill kit that must always be complete and available on site.	Contractor	Construction
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
Establish an appropriate Hazardous Stores, which is in accordance with the Hazardous Substance Amendment Act, No. 53 of 1992. This should include but not be limited to: <ul style="list-style-type: none"> » Designated area; » All applicable safety signage; » Firefighting equipment; » Enclosed by an impermeable bund; » Protected from the elements; » Lockable; » Ventilated; and » Has adequate capacity to contain 110% of the largest container contents. 	Contractor	Construction
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	Contractor	Construction

Mitigation: Action/Control	Responsibility	Timeframe
NEMA Section 30 report must be submitted to FSDESTE A within 14 days of the incident.		
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	Construction
Spilled concrete must be cleaned up as soon as possible and disposed of at a suitably licensed waste disposal site.	Contractor	Construction
Check vehicles and machinery daily for oil, fuel and hydraulic fluid leaks and undertake regular high standard maintenance on vehicles.	Contractor	Construction
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	Construction
All contaminated soil / yard stone shall be treated in situ or removed and be placed in containers, and subsequently disposed of at a licensed hazardous waste disposal facility.	Contractor	Construction
Routine servicing and maintenance of vehicles and equipment must not take place on-site (except for emergencies). If repairs of vehicles and equipment must take place, an appropriate drip tray must be used to contain any fuel or oils.	Contractor	Construction
Fuel storage areas must be inspected regularly, to ensure bund stability, integrity, and function.	Contractor	Construction
Construction machinery must be stored in an appropriately sealed area.	Contractor	Construction
The storage of flammable and combustible liquids, such as oils, must be in designated areas which are appropriately bunded, and stored in compliance with Material Safety Data Sheets (MSDS) files.	Contractor	Construction
Any storage and disposal permits/approvals which may be required must be obtained, and the conditions attached to such permits and approvals complied with.	Contractor	Construction
Transport of all hazardous substances must be in accordance with the relevant legislation and regulations	Contractor	Construction
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 from entering the soil or clean stormwater system.	Contractor	Construction

Mitigation: Action/Control	Responsibility	Timeframe
As much material must be pre-fabricated and then transported to site, to avoid the risks of contamination associated with the mixing, pouring and storage of chemicals and compounds on site.	Contractor	Construction
Have appropriate action plans on site, and training for contractors and employees in the event of spills, leaks and other potential impacts to the aquatic systems. All waste generated on-site during construction must be adequately managed.	Contractor	Construction
Implement a contingency plan to handle spills, so that environmental damage is avoided.	Contractor	Construction
Drip trays must be used during all fuel/chemical dispensing.	Contractor	Construction
Drip trays or any form of oil absorbent material must be placed underneath vehicles/machinery and equipment when not in use.	Contractor	Construction
In the case of petrochemical spillages, the spill should 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
Appropriately contain any generator diesel storage tanks and machinery spills (e.g., accidental spills of hydrocarbons oils, diesel etc.) to prevent them leaking and entering the environment.	Contractor	Construction
All vehicles and equipment must be maintained, and all re-fuelling and servicing of equipment is to take place in demarcated areas outside of the development area.	Contractor	Construction

Performance Indicator	<ul style="list-style-type: none"> » 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	<ul style="list-style-type: none"> » Observation and supervision of chemical storage and handling practices and vehicle maintenance throughout construction phase. » An incident reporting system will be used to record non-conformances to the EMP. » On-going visual assessment to detect polluted areas and the application of clean-up and preventative procedures. » Monitor hydrocarbon spills from vehicles and machinery during construction continuously and record volume and nature of spill, location and clean-up actions. » Monitor maintenance of drains and intercept drains weekly.

- » Analyse soil samples for pollution in areas of known spills or where a breach of containment is evident when it occurs.
- » 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 16: Ensure appropriate rehabilitation of disturbed areas such that residual environmental impacts are remediated or curtailed

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

Project Component/s	<ul style="list-style-type: none"> » Construction camps. » Laydown areas. » Access roads. » Ancillary buildings.
Potential Impact	» Environmental integrity of the site undermined, resulting in reduced visual aesthetics, erosion and increased runoff, and the requirement for ongoing management intervention.
Activity/Risk Source	<ul style="list-style-type: none"> » Temporary construction areas. » Temporary access roads/tracks. » Other disturbed areas/footprints. » Site preparation and earthworks. » Excavation of foundations and trenches. » Temporary laydown areas.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » 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
A site rehabilitation programme must be compiled and implemented (refer to Appendix D).	Contractor	Following execution of the works
Areas that are denuded during construction need to be landscaped, and revegetated with indigenous vegetation, including seeds of the SCC found on site, to prevent erosion during flood and wind events. This will also reduce the likelihood of encroachment by alien invasive plant species.	Contractor	Construction

Mitigation: Action/Control	Responsibility	Timeframe
Any woody material removed can be shredded and used in conjunction with the topsoil to augment soil moisture and prevent further erosion.	Contractor	Construction
Landscape and revegetate all denuded areas as soon as possible.	Contractor	Construction
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 temporary fencing and danger tape must be removed once the construction phase has been completed.	Contractor	Following completion of construction activities in an area
All voids must be backfilled.	Contractor	Following completion of construction activities in an area
Where disturbed areas are not to be used during the operation of the PV facility, they must be rehabilitated/revegetated with appropriate natural indigenous vegetation and/or local seed mix. A seed mix must be applied to rehabilitated and bare areas. No exotic plants must be used for rehabilitation purposes.	Contractor in consultation with rehabilitation specialist	Following completion of construction activities in an area
The area must be shaped to a natural topography. Trees (or vegetation stands) removed must be replaced.	Contractor	Following completion of construction activities in an area
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
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
Revegetated areas may need to be protected from wind erosion and maintained until an acceptable plant cover has been achieved.	Proponent in consultation with rehabilitation specialist	Post-rehabilitation
Implement an alien invasive management plan and monitoring on an annual basis for 3 years post construction.	Proponent	Post-rehabilitation
Appropriately rehabilitate the development area by ripping, landscaping and revegetating with locally indigenous species.	Contractor	Following completion of construction activities in an area

Performance Indicator	» All portions of the site, including construction equipment camp and working areas, cleared of equipment and temporary facilities.
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	<ul style="list-style-type: none"> » Topsoil replaced on all areas and stabilised where practicable or required after construction and temporally utilised areas. » Disturbed areas rehabilitated and acceptable plant cover achieved on rehabilitated sites. » Completed site free of erosion and alien invasive plants.
Monitoring	<ul style="list-style-type: none"> » Rehabilitated areas should be monitored (responsibility of EO) on a weekly basis throughout the construction phase and on a monthly basis thereafter and to the point where the area has rehabilitated to a satisfactory level. » On-going inspection of rehabilitated, to determine 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.

7.2 Detailing Method Statements

OBJECTIVE 17: 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 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.
- » Any other information deemed necessary by the Site Manager.

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

- » Site establishment (which explains all activities from induction training to offloading; construction sequence for site establishment; and the different amenities and to be established etc., including a site camp plan indicating all of these).
- » Preparation of the site (i.e., clearing vegetation; compacting soils; and removing existing infrastructure and waste).
- » Soil management/stockpiling and erosion control.
- » Excavations and backfilling procedure.
- » Stipulate norms and standards for water supply and usage (i.e.: comply strictly to licence and legislation requirements and restrictions).
- » 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, and 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 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 its obligations or responsibilities in terms of their contract. Failure to submit a Method Statement may result in suspension of the activity concerned until such time as a method statement has been submitted and approved.

7.3 Awareness and Competence: Construction Phase

OBJECTIVE 18: 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 during construction and until rehabilitation is complete. The Contractor is responsible for informing employees and sub-contractors of their environmental obligations in terms of the environmental specifications; and ensuring that employees are adequately experienced and properly trained 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 its location and have access to its. 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 EMPr's contents and requirements; 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 should have a 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 site.

Therefore, prior to the commencement of construction activities on site and before any person commences with work on site thereafter, adequate environmental awareness and responsibility are to be appropriately presented to all staff present onsite, 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:

7.3.1 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 should 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 EA.
- » 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.
- » 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 should be aimed at all levels of management and construction workers within the contractor team. A record of attendance of this training must be maintained by the EO/ECO on site. Proof of awareness training should 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 the developer's environmental policy and values; the function of the EMPr and Contract Specifications; and the importance and reasons for compliance to these. The induction training must highlight overall do's and don'ts on site and clarify the repercussions of not complying with these. The non-conformance reporting system must be explained during the induction as well. Opportunity for questions and clarifications must form part of this training. A record of attendance of this training must be maintained by the EO/ECO on site.

7.3.2 Toolbox Talks

Toolbox talks should be held on a scheduled and regular basis (at least twice a month) where foremen; environmental and safety representatives of different components of the works; and sub-consultants hold talks relating to environmental practices and safety awareness on site. They should also include discussions on possible common incidents occurring on site and ones recommended by the onsite EO, and the

prevention of reoccurrence thereof. Records of attendance and the awareness talk subject must be kept on file.

7.4 Monitoring Programme: Construction Phase

OBJECTIVE 19: To monitor the performance of the control strategies employed against environmental objectives and standards

A monitoring programme must be in place, to ensure conformance with the EMPr; and monitor any environmental issues and impacts which have not been accounted for in the EMPr that 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 aim of the monitoring and auditing process would be to monitor the implementation of the specified environmental specifications, in order to:

- » Monitor and audit compliance with the prescriptive and procedural terms of the environmental specifications.
- » Ensure adequate and appropriate interventions to address non-compliance.
- » Ensure adequate and appropriate interventions to address environmental degradation.
- » Provide a mechanism for the lodging and resolution of public complaints.
- » Ensure appropriate and adequate record keeping related to environmental compliance.
- » Determine the effectiveness of the environmental specifications and recommend the requisite changes and updates based on audit outcomes, 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 must be submitted to the FSDESTEA in terms of the EA.

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 project.

7.4.1. Non-Conformance Reports

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

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

7.4.2. Monitoring Reports

A monitoring report will be compiled by the ECO on a monthly basis for the duration of the construction phase and must be submitted to the FSDESTEA for its records. This report should include details of the activities undertaken in the reporting period; any non-conformances or incidents recorded; corrective action required; and details of those non-conformances or incidents which have been closed out. The Contractor must ensure that all waste manifests are provided to the ECO on a monthly basis, to inform and update the FSDESTEA regarding waste related activities.

7.4.3. Audit Reports

The holder of the EA must, for the period during which EA and EMPr remain valid, ensure that project compliance with the EA conditions and EMPr are audited and that the audit reports are submitted to the FSDESTEA.

An environmental internal audit must be conducted and submitted every 3 months and an external audit must be conducted once a year. The annual audit report must be submitted to FSDESTEA until the completion of the construction and rehabilitation. This report must be compiled in accordance with Appendix 7 of the EIA Regulations, 2014, as amended, and indicate the date of the audit, name of the auditor and outcome of the audit in terms of compliance with the EA conditions and the requirements of the EMPr.

7.4.4. Final Audit Report

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

CHAPTER 8: OPERATION MANAGEMENT PROGRAMME

Overall Goal: To ensure that the operation of the PV1 does not have unforeseen environmental impacts; and that all impacts are monitored, and the necessary corrective action taken in all cases. 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 impacts.
- » Enables the operation activities to be undertaken without significant disruption to other land uses in the area.
- » Minimise impacts on fauna using the site.

8.1. Objectives

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

OBJECTIVE 1: Securing the site and general maintenance during operation

Safety issues may arise with public access to the solar facility (e.g., unauthorised entry to the site) or to the onsite substation. Prevention and control measures to manage public access are therefore important.

General maintenance at the Becrux Two Solar PV Energy Facility will be required during its operation. The maintenance required may also include the replacement of PV panels, if necessary, during the operation lifetime of the facility.

Project component/s	All infrastructure including: <ul style="list-style-type: none"> » PV panels. » Inverters and transformers. » Cabling between panels. » E-house containerised or non-containerised substation. » Overhead power line. » Access road and internal roads. » Laydown area. » Associated buildings.
Potential Impact	» Hazards to operation and maintenance staff.
Activities/risk sources	» Uncontrolled access to the solar facility and associated infrastructure.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To secure the site against unauthorised entry. » To protect operation and maintenance staff.

Mitigation: Action/control	Responsibility	Timeframe
Site access must be controlled, and no unauthorised persons allowed onto the site. A security company must be appointed in this regard.	O&M Operator	Operation

Mitigation: Action/control	Responsibility	Timeframe
Have clear rules and regulations for access to the proposed site to control loitering.	O&M Operator	Operation
The operation and maintenance staff must undergo an induction programme that covers land access protocols.	O&M Operator	Operation
General onsite maintenance of the solar facility during the operation phase must in no way impact or negatively affect the environment, and contractors or other service providers providing onsite maintenance must be made aware of this EMP and the content thereof.	O&M Operator	Operation
Post information boards about public safety hazards and emergency contact information.	O&M Operator	Operation
<p>A grievance and consultation plan must be developed and kept on the site at all times during the project's operation. All grievances must be recorded and dealt with in the appropriate grievance channels as outlined in the grievance plan which must be established.</p> <p>Community consultation with surrounding landowners and community members must continue through the project's lifecycle; and be reported on as such in the grievance and consultation plan.</p> <p>This will allow the receipt of and facilitate resolution of concerns and grievances about the project's social and environmental issues raised by individuals or groups during the project operational period.</p>	O&M Operator	Operation
<p>Should PV panels need to be replaced, the following will apply:</p> <ul style="list-style-type: none"> » Site access must be confirmed for the transportation of the required components and equipment to the site. » Materials and PV panels are to be stored within the previously disturbed construction laydown area. No disturbance of areas outside of these areas should occur. » Full clean-up of all materials must be undertaken after the removal and replacement of the PV panels and associated infrastructure is complete, and disturbed areas appropriately rehabilitated. » Recycle components as far as possible. No waste materials may be left on-site following the replacement. » Waste material which cannot be recycled shall be disposed of at an appropriately licensed waste disposal site or as required by the relevant legislation. 	O&M Operator	Operation

Performance Indicator	<ul style="list-style-type: none"> » Site is secure and there is no unauthorised entry. » No operational and maintenance staff are injured. » No complaints from adjacent landowners/ public.
Monitoring and Reporting	<ul style="list-style-type: none"> » Regular visual inspection of fence for signs of deterioration/forced access. » An incident reporting system must be used to record non-conformances to the EMPr. » A public complaints register must be developed and maintained on site.

OBJECTIVE 2: Protection of sensitive areas, indigenous natural vegetation, fauna (including avifauna), soils, wetland features and maintenance of rehabilitation

Indirect impacts on sensitive areas, vegetation, fauna (including avifauna), soils and wetland features during operation could result from maintenance activities and the movement of people and vehicles on site. To ensure the long-term environmental integrity of the site following the construction, maintenance of the areas rehabilitated post-construction must be undertaken until these areas have successfully re-established.

Project component/s	<ul style="list-style-type: none"> » Areas requiring regular maintenance. » Solar facility, including access road and grid connection. » Areas disturbed during the construction phase and subsequently rehabilitated at its completion.
Potential Impact	<ul style="list-style-type: none"> » Impacts on sensitive areas. » Disturbance to or loss of vegetation and/or habitat. » Alien plant invasion. » Soil erosion and pollution. » Impacts on wetland features. » Environmental integrity of site undermined resulting in erosion, compromised land capability and the requirement for on-going management intervention.
Activity/Risk Source	<ul style="list-style-type: none"> » Movement of employee vehicles within and around site.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » Maintain minimised footprints of disturbance of vegetation/ habitats on-site. » Ensure and encourage plant regrowth in non-operational areas of post-construction rehabilitation. » Minimise soil erosion and pollution.

Mitigation: Action/Control	Responsibility	Timeframe
Areas of indigenous vegetation, even secondary communities outside of the direct project footprint, should under no circumstances be fragmented or disturbed further.	O&M Operator	Operation
Existing access routes, especially roads must be made use of.	O&M Operator	Operation
No storage of vehicles or equipment will be allowed outside of the designated development areas.	O&M Operator	Operation

Mitigation: Action/Control	Responsibility	Timeframe
It should be made an offence for any staff to take/ bring any plant species into/out of any portion of the development area. No plant species whether indigenous or exotic should be brought into/taken from the development area, to prevent the spread of exotic or invasive species or the illegal collection of plants.	O&M Operator	Operation
A fire management plan must be implemented to restrict the impact fire might have on the surrounding areas.	O&M Operator	Operation
High visibility flags must be placed near any protected plants in order to avoid any damage or destruction of the species. If left undisturbed, the sensitivity and importance of these species needs to be part of the environmental awareness program.	O&M Operator	Operation
Environmentally friendly dust suppressants must be utilised.	O&M Operator	Operation
The facility must be appropriately fenced to prevent the movement of staff or any individual into the surrounding environments.	O&M Operator	Operation
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	O&M Operator	Operation
All outside lighting should be directed away from highly sensitive areas.	O&M Operator	Operation
All maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply with speed limits, to respect all forms of wildlife. Speed limits must still be enforced to ensure that road killings and erosion is limited. The induction is to also include aspects such as the need to avoid littering, the reporting and cleaning of spills and leaks and general good "housekeeping".	O&M Operator	Operation
Ensure that cables and connections are insulated successfully to reduce electrocution risk and preferably buried.	O&M Operator	Operation
Monitoring of the overhead power line route must be undertaken to detect bird carcasses, to enable the identification of any potential areas of high impact to be marked with bird flappers if not already done so. Monitoring should be undertaken at least once a month for the first year of operation.	O&M Operator	Operation
Fencing mitigations: Top 2 strands must be smooth wire Routinely retention loose wires Minimum 30cm between wires Place markers on fences	O&M Operator	Operation

Mitigation: Action/Control	Responsibility	Timeframe
Ensure that monitoring is sufficiently frequent (preferably monthly) to detect electrocutions reliably and that any areas where electrocutions occurred are repaired as soon as possible.	O&M Operator	Operation
During the first year of operation, quarterly reports summarizing interim findings should be compiled by the developer 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.	O&M Operator	Operation
Implement an alien invasive species management plan.	O&M Operator	Operation
All alien vegetation along the transmission servitude should be managed in terms of Regulation GNR.1048 of 25 May 1984 (as amended) issued in terms of the Conservation of Agricultural Resources Act, Act 43 of 1983.	O&M Operator	Operation
A pest control plan must be put in place and implemented. It is imperative that poisons not be used due to the likely presence of SCCs	O&M Operator	Operation
All personnel must undergo Environmental Awareness Training. A signed register of attendance must be kept for proof. Discussions are required on sensitive environmental receptors within the development area to inform contractors and site staff of the presence of Red / Orange List species, their identification, conservation status and importance, biology, habitat requirements and management requirements the Environmental Authorisation and within the EMP. The avoidance and protection of the wetland areas must be included in a site induction. Personnel must all undergo the induction and made aware of the "no-go" areas to be avoided.	O&M Operator	Operation
Speed limits of 40km/h must be put in place to reduce erosion.	O&M Operator	Operation
A stormwater management plan must be implemented.	O&M Operator	Operation
No cleaning or servicing of vehicles, machines and equipment may be undertaken in water resources.	O&M Operator	Operation
Continuously monitor erosion and compaction on site.	O&M Operator	Operation
Storage of potential contaminants should be undertaken in bunded areas.	O&M Operator	Operation
Promote water infiltration into the ground beneath the solar panels. A covering of soil and grass (regularly cut and maintained) below the solar panels is ideal for infiltration. If not feasible then gravel is preferable over concrete or paving.	O&M Operator	Operation

Mitigation: Action/Control	Responsibility	Timeframe
Stormwater leaving the site should not be concentrated in a single exit drain but spread across multiple drains around the site each fitted with energy dissipaters (e.g. slabs of concrete with rocks cemented in) and the drains must be regularly cleared.	O&M Operator	Operation
Re-vegetate denuded areas as soon as possible.	O&M Operator	Operation
Avoid excessively compacting the ground beneath the solar panels.	O&M Operator	Operation
Where possible, minimise the use surfactants to clean solar panels and herbicides to control vegetation beneath the panels. If surfactants and herbicides must be used do so well prior to any significant predicted rainfall events.	O&M Operator	Operation

Performance Indicator	<ul style="list-style-type: none"> » No further disturbance to vegetation or terrestrial faunal habitats. » No soil erosion and pollution problems resulting from operational activities within the solar facility. » Low abundance of alien plants within affected areas. » Maintenance of a ground cover that resists erosion. » Continued improvement of rehabilitation efforts. » No impacts to wetland features.
Monitoring	<ul style="list-style-type: none"> » Observation of vegetation on-site by environmental manager. » Regular inspections to monitor plant regrowth/performance of rehabilitation efforts and weed infestation compared to natural/undisturbed areas. » 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: Minimise dust and emissions to air

During the operation phase, limited gaseous or particulate emissions are anticipated from exhaust emissions (i.e., from operational vehicles). Windy conditions and the movement of vehicles on site may lead to dust creation.

Project Component/s	<ul style="list-style-type: none"> » Gravel roads and surfaces » On-site vehicle movement
Potential Impact	<ul style="list-style-type: none"> » Dust and particulates from vehicle movement to and on-site. » Release of minor amounts of air pollutants (for example NO₂, CO and SO₂) from vehicles.
Activities/Risk Sources	<ul style="list-style-type: none"> » Re-entrainment of deposited dust by vehicle movements. » Wind erosion from unsealed roads and surfaces. » Fuel burning vehicle engines.

Mitigation: Target/Objective	<ul style="list-style-type: none"> » To ensure emissions from all vehicles are minimised, where possible. » To minimise nuisance to the community from dust emissions and comply with workplace health and safety requirements. » To ensure emissions from the power generation process are minimised.
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Mitigation: Action/Control	Responsibility	Timeframe
Dust-reducing mitigation measures must be put in place and must be strictly adhered to. This includes wetting of exposed soft soil surfaces. No non environmentally friendly suppressants may be used as this could result in pollution of water sources.	O&M Operator	Operation
Revegetation of cleared areas as soon as practically feasible.	O&M Operator	Operation
Speed of vehicles must be restricted on site to 40km/hr.	O&M Operator	Operation
Vehicles and equipment must be maintained in a roadworthy condition at all times.	O&M Operator	Operation
All vehicles and containers used for moving waste must encapsulate the waste, which prevents the waste from causing odours and escaping or blowing around the site. This will also prevent leachate material from spilling out of the containers, which is hazardous.	O&M Operator	Operation

Performance Indicator	<ul style="list-style-type: none"> » No complaints regarding dust or vehicle emissions. » Dust suppression measures implemented, where required. » Drivers made aware of the potential safety issues and enforcement of strict speed limits when they are employed.
Monitoring	<ul style="list-style-type: none"> » Immediate reporting by personnel of any potential or actual issues with nuisance or dust to the Power Station Manager. » A complaints register must be maintained, in which any complaints will be logged, and thereafter investigated and, where appropriate, acted upon. » An incident reporting system must be used to record non-conformances to the EMPr.

OBJECTIVE 4: Minimise visual impacts during operation

The mitigation of secondary visual impacts, such as security and functional lighting, construction activities, etc. may be possible and should be implemented and maintained on an on-going basis.

Project component/s	<p>All infrastructure including:</p> <ul style="list-style-type: none"> » PV panels. » Inverters and transformers. » Cabling between panels.
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	<ul style="list-style-type: none"> » E-house containerised or non-containerised substation. » Overhead power line. » Access road and internal roads. » Laydown area. » Associated buildings.
Potential Impact	<ul style="list-style-type: none"> » Enhanced visual intrusion. » Visual impact of the PV facility degradation and vegetation rehabilitation failure.
Activity/risk source	<ul style="list-style-type: none"> » Size/scale of PV panels and power line. » Associated lighting. » Internal access roads. » Other associated infrastructure. » Viewing of the degradation and vegetation rehabilitation failure by observers on or near the site.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To minimise the potential for visual impact. » Minimise the contrast with the surrounding environment and visibility of the PV panels to humans. » The containment of light emitted from the facility in order to eliminate the risk of additional night-time visual impacts. » Well maintained and neat facility.

Mitigation: Action/control	Responsibility	Timeframe
Maintain the general appearance of the facility as a whole.	O&M Operator	Operation
Shield the sources of light by physical barriers (walls, vegetation, or the structure itself).	O&M Operator	Operation
If specific sensitive visual receptors are identified during operation, investigate screening at the receptor site, where possible.	O&M Operator	Operation

Performance Indicator	<ul style="list-style-type: none"> » Well maintained and neat facility with intact vegetation on and in the vicinity of the wind farm. » No complaints regarding visual impacts received from users of the Secunda secondary road.
Monitoring and Reporting	<ul style="list-style-type: none"> » Monitoring of the entire site on an ongoing basis by the operator.

OBJECTIVE 5: Ensure the implementation of an appropriate fire management plan and general management measures during the operation phase

The following recommendations below must be considered with regards to fire protection on site:

- » Cigarette butts may not be thrown in the veld but must be disposed of correctly. Designated smoking areas must be established, with suitable receptacles for disposal.
- » In case of a fire outbreak, contact details of the local fire and emergency services must be readily available.
- » Contractors must ensure that basic firefighting equipment is available on site, as per the specifications defined by the health and safety representative / consultant.
- » The fire risk on site is a point of discussion that must take place as part of the environmental induction training prior to construction commencing.
- » The Contractor must also comply with the requirements of the Occupational Health and Safety Act with regards to fire protection.

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

Project Component/s	» PV Array. » Associated buildings
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 PV 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
fire management plan must be implemented to restrict the impact fire might have on the surrounding areas.	O&M Operator	Operation
Provide adequate firefighting equipment on site and establish a fire-fighting management plan during operation.	O&M Operator	Operation
Provide fire-fighting training to selected operation and maintenance staff.	O&M Operator	Operation
Ensure that appropriate communication channels are established to be implemented in the event of a fire.	O&M Operator	Operation
Fire breaks should be established where and when required. Cognisance must be taken of the relevant legislation when planning and burning firebreaks (in terms of timing, etc.).	O&M Operator	Operation

Mitigation: Action/Control	Responsibility	Timeframe
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 Operator	Operation
Contact details of emergency services should be prominently displayed on site.	O&M Operator	Operation
A fire management plan must be implemented, to restrict the impact fire might have on the surrounding areas.	O&M Operator	Operation

Performance Indicator	<ul style="list-style-type: none"> » Firefighting equipment and training provided before the operation phase commences. » Appropriate fire breaks in place.
Monitoring	<ul style="list-style-type: none"> » The O&M Operator must monitor indicators listed above to ensure that they have been met.

OBJECTIVE 6: Maximise local employment, skills development and business opportunities associated with the construction phase

Project Component/s	<ul style="list-style-type: none"> » Operation and maintenance activities associated with the facility. » Availability of required skills in the local communities for the undertaking of the operation and maintenance activities.
Potential Impact	<ul style="list-style-type: none"> » The opportunities and benefits associated with the creation of local employment and business should be maximised.
Activities/Risk Sources	<ul style="list-style-type: none"> » Limited use of local labour, thereby reducing the employment and business opportunities for locals. » Sourcing of individuals with skills similar to the local labour pool outside the municipal area. » Unavailability of locals with the required skills resulting in locals not being employed and labour being sourced from outside the municipal area.
Enhancement: Target/Objective	<ul style="list-style-type: none"> » The Developer should aim to employ as many low-skilled and semi-skilled workers from the local area as possible. This should also be made a requirement for all contractors. » Employment of a maximum number of the low-skilled and/or semi-skilled workers from the local area where possible. » Appropriate skills training and capacity building.

Mitigation: Action/Control	Responsibility	Timeframe
Where feasible, effort must be made to employ locally, to create maximum benefit for the communities.	Developer	Operation

Mitigation: Action/Control	Responsibility	Timeframe
A local employment policy must be by the developer to maximise the project opportunities being made available to the local community.	Developer	Operation
Enhance employment opportunities for the immediate local area, Metsimaholo Local Municipality, if this is not possible, then the broader focus areas should be considered for sourcing employees.	Developer	Operation
The recruitment selection process should seek to promote gender equality and the employment of women wherever possible	Developer	Operation
The developer should establish vocational training programs for the local employees to promote the development of skills	Developer	Operation
To maximise the positive impact, it is suggested that the Developer provide training courses for employees, where feasible, to ensure that employees gain as much as possible from the work experience.	Developer	Operation
Facilitate the transfer of knowledge between experienced employees and the staff.	Developer	Operation
Effort should be made to use locally sourced inputs where feasible, to maximize the benefit to the local economy.	Developer	Operation

Performance Indicator	<ul style="list-style-type: none"> » Job opportunities, especially of low to semi-skilled positions, are primarily awarded to members of local communities as appropriate. » Locals and previously disadvantaged individuals (including women) are considered during the hiring process. » Labour, entrepreneurs, businesses, and SMMEs from the local sector are awarded jobs, where possible, based on requirements in the tender documentation. » The involvement of local labour is promoted. » Reports are not made from members of the local communities regarding unrealistic employment opportunities or that only outsiders were employed. » Skills training and capacity building initiatives are developed and implemented.
Monitoring	<ul style="list-style-type: none"> » Developer must keep a record of local recruitments and information on local labour to be shared with the external auditor for reporting purposes.

OBJECTIVE 7: Appropriate handling and management of hazardous substances, waste and dangerous goods

The project's operation will involve the storage of chemicals and hazardous substances; and the generation of limited waste products. The main wastes expected to be generated by the operation activities includes general solid waste, hazardous waste and sewage waste.

Project Component/s	<ul style="list-style-type: none"> » PV facility. » Associated infrastructure.
Potential Impact	<ul style="list-style-type: none"> » Inefficient use of resources resulting in excessive waste generation. » Litter or contamination of the site or water through poor waste management practices. » Contamination of water or soil because of poor materials management.
Activity/Risk Source	<ul style="list-style-type: none"> » Transformers, switchgear and supporting equipment. » Fuel and oil storage.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » Comply with waste management legislation. » Minimise production of waste. » Ensure appropriate waste disposal. » Avoid environmental harm from waste disposal. » Ensure appropriate storage of chemicals and hazardous substances.

Mitigation: Action/Control	Responsibility	Timeframe
Hazardous substances (such as used/new transformer oils, etc.) must be stored in sealed containers, within a clearly demarcated designated area.	O&M Operator	Operation
A hydrocarbon spill management plan must be implemented, to ensure that any chemical spill out or over does not run into the surrounding areas.	O&M Operator	Operation
Drip trays or any form of oil absorbent material must be placed underneath vehicles/machinery and equipment when not in use.	O&M Operator	Operation
All contaminated soil / yard stone shall be treated in situ or removed and be placed in containers.	O&M Operator	Operation
Spill kits must be made available on-site for the clean-up of spills and leaks of contaminants.	O&M Operator	Operation and maintenance
Storage areas for hazardous substances must be appropriately sealed and bunded.	O&M Operator	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 Operator	Operation
All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill.	O&M Operator	Operation
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	O&M Operator	Operation and maintenance

Mitigation: Action/Control	Responsibility	Timeframe
according to specified standards regarding bioremediation.		
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 Operator	Operation
Waste handling, collection, and disposal operations must be managed and controlled by a waste management contractor.	O&M Operator	Operation
Used oils and chemicals: 1. Appropriate disposal must be arranged with a licensed facility, in consultation with the administering authority. 2. Waste must be stored and handled according to the relevant legislation and regulations.	O&M Operator	Operation
General waste must be recycled where possible or disposed of at an appropriately licensed landfill.	O&M Operator	Operation
Hazardous waste (including hydrocarbons) and general waste must be stored and disposed of separately.	O&M Operator	Operation
All servicing and re-fuelling of machines and equipment must either take place off-site, or in controlled and bunded working areas.	O&M Operator	Operation
Separation and recycling of different waste materials should be supported.	O&M Operator	Operation
Immediately report significant spillages and initiate an environmental site assessment for risk assessment and remediation if necessary.	O&M Operator	Operation
Suitable temporary solid waste facilities are to be incorporated into the design to prevent unsanitary conditions. These are to be weekly cleared and waste collected by the local waste management department.	Developer O&M Operator	Operation
Disposal of waste must be in accordance with relevant legislative requirements, including the use of licensed contractors.	O&M Operator/ waste management contractor	Operation phase
No waste may be burned or buried on site.	O&M Operator	Operation phase
Waste management must be a priority and all waste must be collected and stored adequately.	O&M Operator	Operation phase
Have action plans on site, and training for staff in the event of spills, leaks and other impacts to the aquatic systems.	O&M Operator	Operation phase

Performance Indicator	<ul style="list-style-type: none"> » No complaints received regarding waste on site or indiscriminate dumping. » Internal site audits identifying that waste segregation recycling and reuse is occurring appropriately. » Provision of all appropriate waste manifests. » No contamination of soil.
Monitoring	<ul style="list-style-type: none"> » Waste collection must be monitored on a regular basis.

- » Waste documentation must be completed and available for inspection.
- » An incidents/complaints 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 operator.
- » All appropriate waste disposal certificates accompany the monthly reports.

Monitoring Programme: Operation Phase of the Proposed development of the 10MWac Becrux Two Solar Photovoltaic (PV) Energy Facility

OBJECTIVE 8: To monitor the performance of the control strategies employed against environmental objectives and standards

A monitoring programme must be in place to ensure conformance with the EMPr; and monitor any environmental issues and impacts which have not been accounted for in the EMPr that could result in significant environmental impacts for which corrective action is required. An internal environmental audit must be conducted every 6 months and an external audit must be conducted once a year, to confirm compliance with the requirements of all environmental permits (including the EA, once issued) for the project, this EMPr, and all relevant legislation. The results of the audit reports must be made available to FSDESTEA and the relevant authorities on request and be part of monitoring and audit reports. An annual audit report must be compiled and submitted to FSDESTEA. The aim of the auditing process would be to routinely monitor the implementation of the specified environmental specifications, in order to:

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

CHAPTER 9: MANAGEMENT PROGRAMME: DECOMMISSIONING

The facility's lifespan is expected to be ~30 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. It could be extended depending on the condition of the infrastructure. An assessment will be undertaken prior to the end of the facility's lifecycle, to determine whether it should be decommissioned or if its operation should continue.

It is most likely that decommissioning activities of the infrastructure of the facility discussed in the BA process would comprise of its disassembly, removal and disposal. 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 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.

9.1. 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 Environmental Authority. 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 stormwater management systems.
- » Maintain and monitor all rehabilitated areas following revegetation and, if monitoring shows that the objectives have been met, apply for closure.

9.2. Approach to the Decommissioning Phase

It is recommended that planning of the decommissioning of the project and rehabilitation of the development area 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 PV 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 the PV facility i.e. panels, support structures etc.
- » The holes where the panel support structures are removed must be levelled and covered with subsoil and topsoil.
- » Infrastructure not required for the post-decommissioning use of the site must be removed and appropriately disposed of.
- » Access roads 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 (cables, PV Panels etc.) must be re-used or recycled wherever possible.
- » The competent authority may grant approval to the owner not to remove the landscaping and underground foundations.
- » The development area must be seeded with locally sourced indigenous vegetation (unless otherwise dictated by the future land use) to allow revegetation.
- » Monitor rehabilitated areas quarterly for at least three years (expected) following decommissioning and implement remedial action as and when required.

SCENARIO 2: PARTIAL DECOMMISSIONING OF ENERGY FACILITY

Should more advanced technology become available, it may be decided to continue to use the site as a PV facility. 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.

9.2.1. Identification of structures for post-closure use

Access roads should be assessed to determine if these could be used post-closure. Where not required, these access roads should be decommissioned and rehabilitated.

9.2.2. 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 PV 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.

9.2.3. 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.
- » Incorporate the immobile fertilisers into the plant rooting zone before ripping.
- » Apply maintenance dressing of fertilisers on an annual basis until the soil fertility cycle has been restored.

9.2.4. 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 ecosystem processes to ensure that a sustainable land use can be established without requiring fertilizer additions.
- » Restore the biodiversity of the area as far as possible.

9.2.5. 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.

9.2.6. Monitoring

The purpose of monitoring is to ensure that the objectives of rehabilitation are met and 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.
- » Vegetation species diversity.
- » Faunal re-colonisation.

**APPENDIX A:
FACILITY LAYOUT AND SENSITIVITY MAPS**



Proposed Becrux Two Solar PV Facility, Sasolburg Free State Province

Locality Map

Legend

- Town
- Eskom Substation
- Existing Power Line
- Non-perennial River
- Main Road
- Project Site
- Development Area
- Substation Corridor (400m)
- Grid Corridor (200m)



Scale: 1:20 000
Projection: GCS_WGS_1984
Map Ref: Becrux II Locality





ROSEBERRY PLAIN 250
1

SALTBERRY PLAIN 137
1

SASOLBURG / SIGMA 1 88kV Conductor

SIGMA / SIGMA SHAFT 1 88kV Conductor

SIGMA 88/11kV SUBSTATION

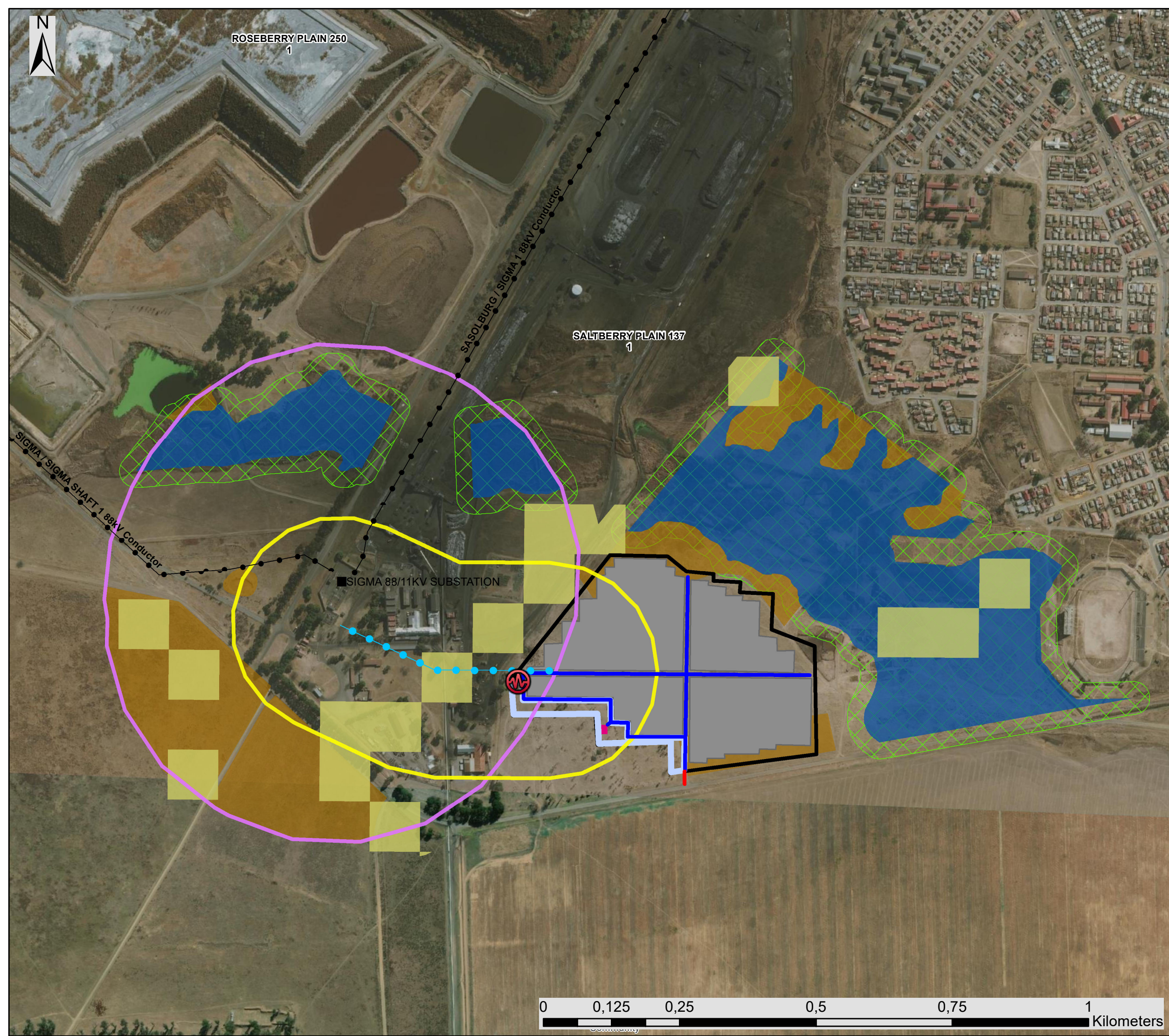
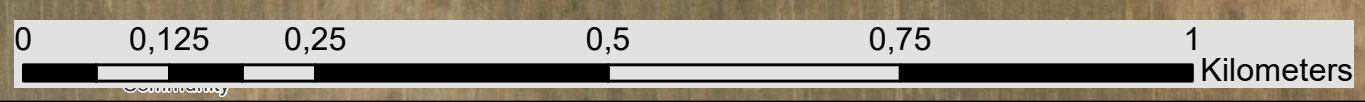
Proposed Becrux Two Solar PV Facility, Sasolburg Free State Province

Development & Sensitivity Map

Legend

- Eskom Substation
- Existing Power Line
- Development Infrastructure**
- ▤ Substation (E-House)
- Proposed 11kV Power line
- Internal Access
- Main Access
- ▭ Substation Corridor (400m)
- ▭ Grid Corridor (200m)
- ▭ Laydown
- ▭ Perimeter Fence
- ▭ O&M Building
- ▭ PV Panel
- Sensitivity**
- ▭ Land Capability (Soil Sensitivity High)
- ▭ Wetlands (High Ecological Sensitivity)
- ▭ Degraded Grassland (Medium Ecological Sensitivity)
- ▤ Wetland Buffer (30m)

Scale: 1:10 000
Projection: GCS_WGS_1984
Map Ref: Becrux Development & Sensitivity Map





ROSEBERRY PLAIN 250
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SALTBERRY PLAIN 137
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SASOLBURG / SIGMA 1 88KV Conductor

SIGMA / SIGMA SHAFT 1 88KV Conductor

SIGMA 88/11KV SUBSTATION

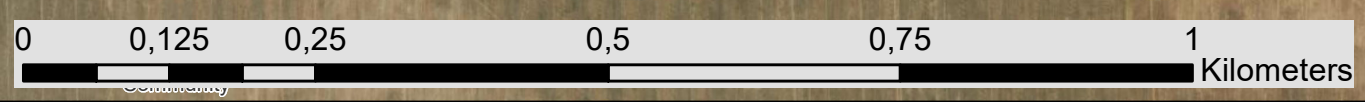
Proposed Becrux Two Solar PV Facility, Sasolburg Free State Province

Layout Map

Legend

- Eskom Substation
- Existing Power Line
- Development Infrastructure**
- ⊞ Substation (E-House)
- Proposed 11kV Power line
- Internal Access
- Main Access
- ▭ Development
- ▭ Substation Corridor (400m)
- ▭ Grid Corridor (200m)
- ▭ Laydown Area
- ▭ Perimeter Fence
- ▭ O&M Building
- ▭ PV Panel Array

Scale: 1:10 000
Projection: GCS_WGS_1984
Map Ref: Becrux Layout Map





ROSEBERRY PLAIN 250
1

SALTBERRY PLAIN 137
1

SASOLBURG / SIGMA 1 88kV Conductor

SIGMA / SIGMA SHAFT 1 88kV Conductor

SIGMA 88/11kV SUBSTATION

Proposed Becrux Two Solar PV Facility, Sasolburg Free State Province

Layout & Sensitivity Map

Legend

- Eskom Substation
- Existing Power Line

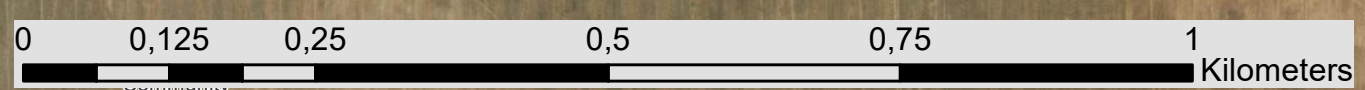
Development Infrastructure

- ⊞ Substation (E-House)
- Proposed 11kV Power line
- Internal Access
- Main Access
- ▭ Substation Corridor (400m)
- ▭ Grid Corridor (200m)
- ▭ Laydown
- ▭ Perimeter Fence
- O&M Building
- PV Panel

Sensitivity

- Land Capability (Soil Sensitivity High)
- Wetlands (High Ecological Sensitivity)
- Degraded Grassland (Medium Ecological Sensitivity)
- ▭ Wetland Buffer (30m)

Scale: 1:10 000
Projection: GCS_WGS_1984
Map Ref: Becrux Development & Sensitivity Map



APPENDIX B:
GRIEVANCE MECHANISM FOR COMPLAINTS AND ISSUES

GRIEVANCE MECHANISM / PROCESS

1. 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. The aim of the Grievance Mechanism is to ensure that grievances or concerns raised by 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.

2. 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 was arranged.
 - d. Persons elected to attend the meeting (which will depend on the grievance).
 - 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 a 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.

- » The contact person must draft a letter to be sent to the Complainant acknowledging receipt of the grievance, the name and contact details of Complainant, the nature of the grievance, the date that the grievance was raised, and the date and venue for the meeting (once agreed 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 be primarily 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, 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 Curriculum Vitae (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 the 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.

**APPENDIX C:
ALIEN PLANT AND OPEN SPACE MANAGEMENT PLAN**

ALIEN PLANT AND OPEN SPACE MANAGEMENT PLAN

1. PURPOSE

Invasive alien plant species pose the second largest threat to biodiversity after direct habitat destruction. The purpose of this Alien Plant and Open Space Management Plan is to provide a framework for the management of alien and invasive plant species during the construction and operation of the proposed 10MW_{ac} Becrux Two Solar PV Energy Facility. The broad objectives of the plan include the following:

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

This plan should be updated throughout the lifecycle of the project, as required in order to ensure that appropriate measures are in place to manage and control the establishment of alien and invasive plant species and to ensure compliance with relevant legislation. This plan should be implemented with a specific focus on sensitive areas.

2. LEGISLATIVE CONTEXT

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

In terms of the amendments to the regulations under the Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983) (CARA), all declared alien plant species must be effectively controlled. Landowners are legally responsible for the control of invasive alien plants on their properties. In terms of this Act, alien invasive plant species are 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, 2004 (Act No.10 of 2004) (NEM:BA) regulates all invasive organisms in South Africa, including a wide range of fauna and flora. Regulations have been published in Government Notices GNR 506, 507, 508 and 509 of 2013 under NEM:BA. According to this Act and the regulations, any species designated under Section 70 cannot be propagated, grown, bought, or sold without a permit. Below is an explanation of the three categories:

- » **Category 1a:** Invasive species requiring compulsory control. Any specimens of Category 1a listed species need, by law, to be eradicated from the environment. No permits will be issued.

- » **Category 1b:** Invasive species requiring compulsory control as part of an invasive species control programme. Remove and destroy. These plants are deemed to have such a high invasive potential that infestations can qualify to be placed under a government sponsored invasive species management programme. No permits will be issued.
- » **Category 2:** Invasive species regulated by area. A demarcation permit is required to import, possess, grow, breed, move, sell, buy or accept as a gift any plants listed as Category 2 plants. No permits will be issued for Category 2 plants to exist in riparian zones.
- » **Category 3:** Invasive species regulated by activity. An individual plant permit is required to undertake any of the following restricted activities (import, possess, grow, breed, move, sell, buy or accept as a gift) involving a Category 3 species. No permits will be issued for Category 3 plants to exist in riparian zones.

The following guide is a useful starting point for the identification of alien plant species: Bromilow, C. 2010. Problem Plants and Alien Weeds of South Africa. Briza, Pretoria.

It is important to note that alien plant species that are regulated in terms of the 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.

3. ALIEN PLANT MANAGEMENT PRINCIPLES

3.1. Prevention and early eradication

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

Monitoring plans should be developed which are designed to identify Invasive Alien Plant Species already on site, as well as those that are introduced to the site by the construction activities. 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 additional 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 (where permissible only) should be planned. It is, however, better to monitor regularly and act swiftly than to allow invasive alien plants to become established on site.

3.2. Containment and control

If any alien invasive plants are found to become established on-site, action plans for their control should be developed, depending on the size of the infestations, budgets, manpower considerations and time. Separate plans of control actions should be developed for each location and/or each species. Appropriately registered chemicals and other possible control agents should be considered in the action plans for each site/species. The use of chemicals is not recommended for any wetland areas. Herbicides should be applied directly to the plant and not to the soil. The key is to ensure that no invasions get out of control. Effective containment and control will ensure that the least amount of energy and resources are required to maintain this status over the long term. This will also be an indicator that natural systems are impacted to the smallest degree possible.

3.3. General Clearing and Guiding Principles

Alien species control programmes are long-term management projects and should consist of 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 will not increase in density or pose a greater threat than they are currently. Collective management and planning with neighbours may be required in the case of large woody invaders as seeds of alien species are easily dispersed across boundaries by wind or watercourses. All clearing actions should be monitored and documented to keep records of which areas are due for follow-up clearing.

i. Clearing Methods

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

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

» Mechanical control

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

» Chemical Control

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

- * Area contamination must be minimised by careful, accurate application with a minimum amount of herbicide to achieve good control.
- * All care must be taken to prevent contamination of any water bodies. This includes due care in storage, application, cleaning equipment and disposal of containers, products, and spray mixtures.
- * Equipment should be washed where there is no danger of contaminating water sources and washings carefully disposed of at a suitable site.
- * To avoid damage to indigenous or other desirable vegetation, products should be selected that will have the least effect on non-target vegetation.
- * Coarse droplet nozzles should be fitted to avoid drift onto neighbouring vegetation.
- * The appropriate health and safety procedures should also be followed regarding the storage, handling, and disposal of herbicides.
- * The use of chemicals is not recommended for wetland areas.

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) (ARSRA)– GNR 1120 of 2010.
- * South African Bureau of Standards (SABS), South African National 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, ARSRA. This is regulated by the Department of Agriculture, Forestry and Fisheries (DAFF).

» **Biological control**

Biological weed control consists of the use of natural enemies to reduce the vigour or reproductive potential of an 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 the plant's 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), DAFF can be contacted.

3.4. General management practices

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

- » Establish an ongoing monitoring programme for the construction phase to detect and quantify any alien species that may become established.
- » Alien vegetation regrowth on areas disturbed by construction must be immediately controlled.
- » 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 herbicides 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 plant management is an iterative process, and it may require repeated control efforts to significantly reduce the abundance of a species. This is often due to the presence of large and persistent seed banks. However, repeated control usually results in rapid decline once seed banks become depleted.
- » Some alien species are best individually pulled by hand. Regular vegetation control to reduce plant biomass within the site should be conducted. This should be timed so as to coincide with the critical growth phases of the most important alien species on site. This will significantly reduce the cost of alien plant 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. It is recommended that this be undertaken every 6 months for the first two years after construction and annually thereafter. All alien plants identified should be cleared using appropriate means.

3.5. Monitoring

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

Construction Phase

Monitoring Action	Indicator	Timeframe
Document alien species present at the site	List of alien plant species	Pre-construction Monthly during Summer and Autumn (Middle November to end of March) 3 Monthly during Winter and Spring
Document alien plant distribution	Alien plant distribution map within priority areas	3 Monthly
Document & record alien plant control measures implemented	Record of clearing activities	3 Monthly

Operation Phase

Monitoring Action	Indicator	Timeframe
Document alien plant 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

**APPENDIX D:
RE-VEGETATION AND HABITAT REHABILITATION PLAN**

REVEGETATION AND HABITAT REHABILITATION PLAN

1. PURPOSE

The purpose of the Rehabilitation Plan is to ensure that areas cleared or impacted during construction activities within the development footprint for the Becrux Two Solar PV Energy Facility that are not required for operation are rehabilitated to their original state before the operation phase commences, and that the risk of erosion from these areas is reduced. The purpose of the Rehabilitation Plan for the development footprint can be summarised as follows:

- » Achieve long-term stabilisation of all disturbed areas.
- » Re-vegetate all disturbed areas with suitable local plant species.
- » Minimise visual impact of disturbed areas.
- » Ensure that disturbed areas are rehabilitated to a condition similar to that found prior to disturbance.

This Rehabilitation Plan should be read in conjunction with other site-specific plans, including the Erosion Management Plan, Alien Invasive Management Plan and Plant Rescue and Protection Plan. Prior to the commencement of construction, a detailed Rehabilitation Plan and Method Statement for the site should be compiled with the aid of a suitably qualified, professionally registered specialist (with a botanical or equivalent qualification).

2. RELEVANT ASPECTS OF THE SITE

The project site is situated within the Grassland Biome, which is centrally located in southern Africa and adjoins all except the desert, fynbos and the succulent Karoo biomes. The grassland biome comprises many different vegetation types. According to Mucina and Rutherford (2006), the project site is situated within The Central Free State Grassland.

The Central Free State Grassland

The Central Free State Grassland comprises undulating plains supporting short grassland, in natural conditions dominated by *Themeda triandra*, while *Eragrostis curvula* and *E. chloromelas* become dominant in degraded habitats.

Important taxa:

Important plant taxa are those species that have a high abundance, a frequent occurrence or are prominent in the landscape within a particular vegetation type (Mucina & Rutherford, 2006).

The following species are important in the **Central Free State Grassland** vegetation type (d= dominant):

Graminoids: *Aristida adscensionis* (d), *A. congesta* (d), *Cynodon dactylon* (d), *Eragrostis chloromelas* (d), *E. curvula* (d), *E. plana* (d), *Panicum coloratum* (d), *Setaria sphacelata* (d), *Themeda triandra* (d), *Tragus koelerioides* (d), *Agrostis lachnantha*, *Andropogon appendiculatus*, *Aristida bipartita*, *A. canescens*, *Cymbopogon pospischilii*, *Cynodon transvaalensis*, *Digitaria argyrograpta*, *Elionurus muticus*, *Eragrostis lehmanniana*, *E. micrantha*, *E. obtusa*, *E. racemosa*, *E. trichophora*, *Heteropogon contortus*, *Microchloa caffra*, *Setaria incrassata*, *Sporobolus discosporus*.

Herbs: *Berkheya onopordifolia* var. *onopordifolia*, *Chamaesyce inaequilatera*, *Conyza pinnata*, *Crabbea acaulis*, *Geigeria aspera* var. *aspera*, *Hermannia depressa*, *Hibiscus pusillus*, *Pseudognaphalium luteoalbum*, *Salvia stenophylla*, *Selago densiflora*, *Sonchus dregeanus*.

Geophytic Herbs: *Oxalis depressa*, *Raphionacme dyeri*.

Succulent Herb: *Tripteris aghillana* var. *integrifolia*.

Low Shrubs: *Felicia muricata* (d), *Anthospermum rigidum* subsp. *Pumilum*, *Helichrysum dregeanum*, *Melolobium candicans*, *Pentzia globosa*.

3. REHABILITATION METHODS AND PRACTICES

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

- » Clearing of invaded areas should be conducted as per the Alien Management Plan, included in the Environmental Management Programme (EMPr).
- » No harvesting of vegetation may be undertaken outside the area to be disturbed by construction activities.
- » Indigenous plant material must be kept separate from alien material.
- » Indigenous seeds may be harvested for purposes of revegetation in areas that are free of alien invasive vegetation, either at the project area prior to clearance or from suitable neighbouring sites.
- » Topsoil should be reserved wherever possible on the project area, to be utilised during rehabilitation.
- » Sods used for revegetation should be obtained directly from the project area, but not from the sensitive areas. Sods should contain at least a 50mm topsoil layer and be minimally disturbed, in particular to existing root systems. Sods must ideally be obtained from areas as close as possible to the region that is to be rehabilitated.
- » Water used for the irrigation of re-vegetated areas should be free of chlorine and other pollutants that might have a detrimental effect on the plants.
- » All seeded, planted, or sodded grass areas and all shrubs or trees planted are to be irrigated at regular intervals.
- » On steep slopes and areas where seed and organic matter retention is low, it is recommended that soil savers are used to stabilise the soil surface. Soil savers are man-made materials, usually constructed of organic material such as hemp or jute and are usually applied in areas where traditional rehabilitation techniques are not likely to succeed.
- » In areas where soil saver is used, it should be pegged down to ensure that it captures soil and organic matter flowing over the surface.
- » The final rehabilitated area should resemble the current composition and structure of the soil as far as practicably possible.
- » Progressive rehabilitation is an important element of the rehabilitation strategy and should be implemented where feasible.
- » No construction equipment, vehicles or unauthorised personnel should be allowed onto areas that have been rehabilitated.
- » Where rehabilitation sites are located within actively grazed areas, they should be fenced off, this must be undertaken in consultation with the landowner.
- » Any runnels, erosion channels or wash-aways developing after revegetation should be backfilled and consolidated and the areas restored to a proper stable condition.

- » Re-vegetated areas should be monitored frequently. Where signs of inadequate surface coverage are evident after two growing seasons, re-vegetation should be done from scratch. Adequate recovery must be assessed by a qualified botanist or rehabilitation specialist.
- » The stockpiled vegetation from the clearing operations should be reduced to mulch where possible and retained along with topsoil to encourage seed bank regrowth and soil fertility.
- » Mulches must be collected in such a manner as to restrict the loss of seed.
- » Mulch must be stored for as short a period as possible.
- » Mulch is to be harvested from areas that are to be denuded of vegetation during construction activities, provided that they are free of seed-bearing alien invasive plants.
- » Where herbicides are used to clear vegetation, species-specific chemicals should be applied to individual plants only. General spraying should be strictly prohibited, and only the correct herbicide type should be applied.
- » Once rehabilitated, areas should be protected to prevent trampling and erosion.
- » Fencing should be removed once a sound vegetative cover has been achieved.

4. 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 Environmental Office (EO) and Engineering, Procurement and Construction (EPC) Contractor will be responsible for initiating and maintaining a suitable monitoring system. Once the development is operational, the Developer / O&M Operator 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:

- » Associated nature and stability of surface soils.
- » Re-emergence of alien and invasive plant species. If noted, remedial action must be taken immediately, as per the alien management plan and mitigation measures contained within the EMPr.

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

- » Rehabilitated areas should be monitored (responsibility of the EO) on a weekly basis throughout the construction phase and on a monthly basis thereafter and to the point where the area has been rehabilitated to a satisfactory level.
- » Ensure that steep slopes are not de-vegetated unnecessarily 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 timeframe between construction activities and rehabilitation should be minimised. Phased construction and progressive rehabilitation, where practically possible, are therefore important elements of the erosion control and rehabilitation strategy.
- » Any areas showing erosion, should be adaptively managed with particular erosion control measures, depending on the extent of the erosion.

If the current state of the environment prior to construction (which will be disturbed during the construction phase) is not achieved post impact, within the specified rehabilitation period, maintenance of these areas

must continue until an acceptable state is achieved (excluding alien plant species or weeds). Additional rehabilitation methods may be necessary to achieve the current state before construction commenced.

Monitoring of the rehabilitation success, as well as follow-up adaptive management, combined with the clearing of emerging alien plant species should all continue for as long as is considered necessary, depending on regrowth rates.

**APPENDIX E:
PLANT RESCUE AND PROTECTION PLAN**

PLANT RESCUE AND PROTECTION PLAN

1. PURPOSE

The purpose of the Search and Rescue and Protection Plan is to implement avoidance and mitigation measures, in addition to the mitigations included in the Environmental Management Programme (EMPr) to reduce the impact of the establishment of the Solar PV Energy Facility on listed and protected plant species and their habitats during construction and operation. This subplan is required in order to ensure compliance with national and provincial legislation for vegetation clearing and any required destruction or translocation of provincially and nationally protected species within the development area and grid connection corridor.

The Plan first provides some legislative background on the regulations relevant to listed and protected species, under the Threatened or Protected Species (TOPS) Regulations, the Free State Nature Conservation Ordinance 8 of 1969, and trees protected under the National Forests Act: List of Protected Tree Species. This is followed by an identification of protected species present within the development area and actions that should be implemented to minimise impact on these species and comply with legislative requirements.

2. IDENTIFICATION OF SPECIES OF CONSERVATION CONCERN

Plant species are protected at the national level as well as the provincial level and different permits may be required for different species depending on their protection level. At the national level, protected trees are listed by the Department of Forestry, Fisheries and the Environment (DFFE) under the National Forests Act: List of Protected Trees, which is updated on a regular basis. Any clearing of nationally protected trees requires a permit from DFFE. At the provincial level, all species red-listed under the Red List of South African plants (<http://redlist.sanbi.org/>) as well as species listed under the Free State Nature Conservation Ordinance 8 of 1969 are protected and require provincial permits. The Free State Nature Conservation Ordinance 8 of 1969 lists a variety of species as protected but also several whole families and genera as protected.

3. IDENTIFICATION OF LISTED SPECIES

Based on the Plants of southern Africa (POSA) database, 574 species of indigenous plants are expected to occur within the project site. Of the 574 species expected to occur within the project site, 4 are regarded to be species of conservation concern as per the International Union for Conservation of Nature (IUCN), based on their conservation status, namely, *Alepidea attenuate*, *Kniphofia typhoides*, *Stenostelma umbelluliferum*, and *Indigofera hybrida*.

A Terrestrial Ecology and Wetland Impact Assessment has been undertaken as part of the Basic Assessment (BA) Process (refer to **Appendix D1** of the BA Report). The assessment identified two red data plant species listed under the Red List of South African plants (SANBI, 2017) which occur frequently within the development area and grid connection corridor and may therefore require a permit from the provincial Department.

4. MITIGATION & AVOIDANCE OPTIONS

The primary mitigation and avoidance measure that must be implemented at the pre-construction phase is the pre-construction walk-through of the development area and grid connection corridor. This defines which and how many individuals of listed and protected species are found within the development area and grid connection corridor. This information is required for the permits which must be obtained before construction can commence.

Where listed species fall within the development area and grid connection corridor and avoidance is not possible, then it may be possible to translocate the affected individuals outside of the development area and grid connection corridor. However, not all species are suitable for translocation as only certain types of plants are able to survive the disturbance. Suitable candidates for translocation include most geophytes and succulents. Although there are exceptions, the majority of woody species do not survive translocation well and it is generally not recommended to try and attempt to translocate such species. Recommendations in this regard would be made following the walk-through of the development area and grid connection corridor before construction, where all listed and protected species within the development area and grid connection corridor will be identified and located.

5. RESCUE AND PROTECTION PLAN

5.1. Pre-construction

- » Identification of all listed species which may occur within the development area and grid connection corridor, based on the South African National Biodiversity Institute (SANBI) POSA database as well as the specialist study for the development area and grid connection corridor and any other relevant literature.
- » Before construction commences at the development area and grid connection corridor, the following actions should be taken:
 - A walk-through of the development area and grid connection corridor by a suitably qualified botanist/ecologist to locate and identify all listed and protected species that fall within the project area. This should happen during the flowering season at the development area and grid connection corridor which, depending on rainfall, is likely to be during spring to early summer (August-October).
 - A walk-through report following the walk-through which identifies areas where minor deviations to roads and other infrastructure can be made to avoid sensitive areas and important populations of listed species must be compiled. The report should also contain a full list of localities where listed species occur within the development area and grid connection corridor and the number of affected individuals in each instance so that this information can be used to comply with the permit conditions required by the relevant legislation. Those species suitable for search and rescue should be identified in the walk-through report.
 - A permit to clear the site and relocate species of concern is required from the Free State Department of Economic, Small Business Development, Tourism and Environmental Affairs (FSDESTEA) before construction commences. A tree clearing permit is also required from DFFE to clear protected trees from the site.
 - Once the permits have been issued, there should be a search and rescue operation of all listed species that cannot be avoided, which have been identified in the walk-through report as being suitable for search and rescue within the development area and grid connection corridor. Affected individuals should be translocated to a similar habitat outside of the development area and grid connection corridor and marked for monitoring purposes.

5.2. Construction

- » Vegetation clearing should take place in a phased manner so that large cleared areas are not left standing with no activity for long periods of time and pose a wind and water erosion risk. This will require coordination between the contractor and Environmental Officer (EO), to ensure that the EO is able to monitor activities appropriately.

- » All cleared material should be handled according to the Revegetation and Rehabilitation Plan and used to encourage the recovery of disturbed areas.
- » The EO should monitor vegetation clearing at the development area and grid connection corridor. Any deviations from the plans that may be required should first be checked for listed species by the EO and any listed species present which are able to survive translocation should be translocated to a safe site.
- » All areas to be cleared should be demarcated with construction tape, survey markers or similar. All construction vehicles should work only within the designated area.
- » Plants suitable for translocation or for use in the rehabilitation of already cleared areas should be identified and relocated before general clearing takes place.
- » Any listed species observed within the development area and grid connection corridor that were missed during the pre-construction plant sweeps should be translocated to a safe site before clearing commences.
- » Many listed species are also sought after for traditional medicine or by collectors and so the EO and Environmental Control Officer (ECO) should ensure that all staff attend environmental induction training in which the legal and conservation aspects of harvesting plants from the wild are discussed.
- » The EO should monitor construction activities in sensitive habitats such as in dune areas carefully to ensure that impacts to these areas are minimised.

5.3. Operation

- » Access to the development area should be strictly controlled and all personnel entering or leaving the development area should be required to sign in and out with the security officers.
- » The collecting of plants or their parts should be strictly forbidden and signs stating so should be placed at the entrance gates to the development area.

6. MONITORING & REPORTING REQUIREMENTS

The following reporting and monitoring requirements are recommended as part of the plant rescue and protection plan:

- » Pre-construction walk-through report detailing the location and distribution of all listed and protected species must be compiled. This should include a walk-through of all infrastructure including all new access roads, cables, buildings and substations. The report should include recommendations of route adjustments where necessary, as well as provide a full account of how many individuals of each listed species will be impacted by the development. Details of plants suitable for search and rescue must also be included.
- » Permit applications to FSDESTEA and DFFE. This requires the walk-through report as well as the identification and quantification of all listed and protected species within the development area. The permit is required before any search and rescue or vegetation clearance can take place. Where large numbers of listed species are affected, a site inspection and additional requirements may be imposed by FSDESTEA and DFFE as part of the permit conditions. All documentation associated with this process needs to be retained and the final clearing permit should be kept at the development area.
- » Active daily monitoring of clearing during construction by the EO must be undertaken to ensure that listed species and sensitive habitats are avoided. All incidents should be recorded along with the remedial measures implemented.
- » Post-construction monitoring of plants translocated during search and rescue to evaluate the success of the intervention. Monitoring for a year post-transplant should be sufficient to gauge success.
- »

APPENDIX F:
TRAFFIC AND TRANSPORTATION MANAGEMENT PLAN

TRAFFIC AND TRANSPORTATION GUIDING PRINCIPLES

1. PURPOSE

The purpose of this Traffic and Transportation Management Guide is to address regulatory compliance, traffic management practices, and protection measures to help reduce impacts related to transportation and the construction of temporary and long-term access within the vicinity of the Becrux Solar PV Facility development area. The objectives of these guiding principles include the following:

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

2. TRAFFIC AND TRANSPORTATION MANAGEMENT PRINCIPLES

- » Prior to the commencement of construction, the contractor must develop a detailed Transport Management Plan (TMP) based on relevant traffic volumes and road carry capacity.
- » The transport contractor must ensure that all required permits for the transportation of abnormal loads are in place prior to the transportation of equipment and project components to the project area. Specific abnormal load routes must be developed with environmental factors taken into consideration.
- » Before construction commences, authorised access routes must be clearly marked in the field with signs or flagging. The Construction Contractor must review the location of designated access and will be responsible for ensuring construction travel is limited to designated routes.
- » All employees must attend an environmental training program (e.g., toolbox talks) by the Environmental Officer (EO). Through this program, employees will be instructed to use only approved access roads, drive within the delineated road limits, and obey jurisdictional and posted speed limits to minimise potential impacts to the environment and other road users.
- » The contractor will be responsible for making sure that their suppliers, vendors, and subcontractors strictly comply with the principles of this TMP and the contractor's TMP.
- » Adjacent landowners must be notified of the construction schedule.
- » Access roads and entrances to the site should be carefully planned to limit any intrusion on the neighbouring property owners and road users.
- » Signs must be posted in the project area to notify landowners and others of the construction activity.
- » Flagging must be provided at access points to the site and must be maintained until construction is completed on the site.
- » Speed limits must be established prior to commencement of construction and enforced over all construction traffic.
- » Speed controls and implementation of appropriate dust suppression measures must be enforced to minimise dust pollution.

- » Throughout construction, the contractor will be responsible for monitoring the condition of roads used by project traffic and for ensuring that roads are maintained in a condition that is comparable to the condition they were in before the construction began.
- » Drivers must have an appropriate valid driver's license and other operation licences required by applicable legislation.
- » All vehicles must be maintained in good mechanical, electrical, and electronic condition, including but not limited to the brake systems, steering, tires, windshield wipers, side mirrors and rear-view mirror, safety belts, signal indicators, and lenses.
- » Any traffic delays attributable to construction traffic must be co-ordinated with the appropriate authorities.
- » No deviation from approved transportation routes must be allowed unless roads are closed for reasons outside the control of the contractor.
- » Impacts on local communities must be minimised. Consideration where possible should be given to limiting construction vehicles travelling on public roadways during the morning and late afternoon commute time.

3. MONITORING

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

**APPENDIX G:
STORMWATER AND EROSION MANAGEMENT PLAN**

STORMWATER MANAGEMENT GUIDE

1. PURPOSE

By taking greater cognisance of natural hydrological patterns and processes, it is possible to develop storm water management systems in a manner that reduces these potentially negative impacts and mimic nature. The main risks associated with inappropriate storm water management are increased erosion risk and risks associated with flooding. Therefore, this Stormwater Management Guide and the Erosion Management Plan are closely linked to one another and should be managed together.

This Stormwater Management Guide addresses the management of stormwater runoff from the development area 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.
- » Rainfall intensities.

The objective of these guiding principles is therefore to provide measures to address runoff from disturbed portions of the development area, such that they:

- » Do not result in concentrated flows into natural watercourses i.e., provision should be made for temporary or permanent measures that allow for attenuation, control of velocities and capturing of sediment upstream of natural watercourses.
- » Do not result in any necessity for concrete or other lining of natural watercourses to protect them from concentrated flows off the development if not necessary.
- » Do not divert flows out of their natural flow pathways, thus depriving downstream watercourses of water.

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

2. RELEVANT ASPECTS OF THE SITE

The topography of the broader region within which the Becrux Two Solar PV Energy Facility is proposed is described as *slightly undulating plains* with an even (flat) slope and a gradual drop (approximately 90m) from the south to the Vaal River to the north-west. The proposed development site itself is located at an average elevation of 1 470m above sea level and has an even slope to the north.

The slope percentage of the development area and immediate surrounds was determined and ranges from 0 to 5%, with some smaller patches within the development area characterised by a slope percentage up to 30%.

Strategic Water Source Areas

Strategic Water Source Areas (SWSAs) are defined as areas of land that:

- » Supply a disproportionate (i.e., relatively large) quantity of mean annual surface water runoff in relation to their size and so are considered nationally important.
- » Have high groundwater recharge and where the groundwater forms a nationally important resource.
- » Meet both criteria mentioned above.

They include transboundary Water Source Areas that extend into Lesotho and Swaziland. The development area is noted located in a SWSA.

Freshwater Features:

A total of three (3) wetland systems were identified and delineated within the 500m regulated area surrounding the development area. These comprised both natural and artificial systems, with the artificial systems consisting of impoundments/dams and drainage features. Of the three (3) wetland systems relevant to the development area, only two are classified as natural systems, namely, the unchanneled valley bottom wetland associated with an unnamed tributary of the Leeuspruit system, and hillslope seepage areas. The drainage features are also numerous and are located across the catchment area.

3. STORMWATER MANAGEMENT PRINCIPLES

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

- » Prevent concentration of stormwater flow at any point where the ground is susceptible to erosion.
- » Reduce stormwater flows as far as possible by the effective use of attenuating devices (such as swales, berms, and silt fences). As construction progresses, the stormwater control measures are to be monitored and adjusted to ensure complete erosion and pollution control at all times.
- » 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.
- » Minimise the area of exposed 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% cross fall 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 on the project area.

- » Design culvert inlet structures to ensure that the capacity of the culvert does not exceed the pre-development stormwater flow at that point. Provide detention storage on the road and/or upstream of the stormwater culvert.
- » 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 the project area and contained within the larger area of the property (i.e., including buffer zone) should remain in the natural state so that the existing hydrology is not disturbed.

3.1. 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 Guide. 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 project area should be designed to specifications that can adequately deal with a 1:50 year intensity rainfall event or more to ensure sufficient capacity for carrying stormwater around and away from infrastructure.
- » Procedures for stormwater flow through a project area 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 (EO) is to be responsible for ensuring implementation of the erosion control measures on site during the construction period.
- » The Engineering, Procurement and Construction (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 the project area do not cause, or precipitate soil erosion and shall take adequate steps to ensure that the requirements of the Stormwater Management Plan are met before, during and after construction. The designated responsible person on the project area, 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.

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.

PRINCIPLES FOR EROSION MANAGEMENT

1. PURPOSE

Exposed and unprotected soils are the main cause of erosion in most situations. Therefore, this Erosion Management Plan, the Storm water Management Plan and the Revegetation and Habitat 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 potential 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 is likely to be accelerated by construction related activities.
- » An outline of general methods to monitor, manage and rehabilitate erosion prone areas, ensuring that all erosion resulting from all phases of the development is addressed.

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

2. RELEVANT ASPECTS OF THE SITE

The topography of the broader region within which the Becrux Two Solar PV Energy Facility is proposed is described as slightly undulating plains with an even (flat) slope and a gradual drop (approximately 90m) from the south to the Vaal River to the north-west. The proposed development site itself is located at an average elevation of 1 470m above sea level and has an even slope to the north.

Soil erosion is a frequent risk associated with solar facilities on account of the vegetation clearing and disturbance associated with the construction phase of the development and may continue occurring throughout the operation phase. All areas where vegetation is removed from the soil surface in preparation for the infrastructure construction will result in exposed soil surfaces that will be prone to erosion. Both wind and water erosion are a risk, as the development area falls within a region that is characterised by a mean annual precipitation that reaches approximately 560mm.

During the operation phase, the areas where vegetation was cleared will remain at risk of soil erosion, especially during a rainfall event when runoff from the cleared surfaces will increase the risk of soil erosion in the areas directly surrounding the project area.

3. EROSION AND SEDIMENT CONTROL PRINCIPLES

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

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

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

3.1. On-Site Erosion Management

General factors to consider regarding erosion risk at the project area include the following:

- » Reduction of a stable vegetation cover and associated below-ground biomass that currently increases soil surface porosity, water infiltration rates and thus improves the soil moisture availability. Without the vegetation, the soil will be prone to extensive surface capping, leading to accelerated erosion and further loss of organic material and soil seed reserves from the local environment.
- » 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, where practically possible, 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 all at once, 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 natural 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 with energy dissipation features present to slow and disperse the water into the receiving area.
- » Roads used for project-related activities 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.
- » Runoff may have to be specifically channelled or storm water adequately controlled to prevent localised rill and gully erosion.
- » 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 must be used on steep slopes and other areas vulnerable to erosion to minimise erosion risk as far as possible.
- » Activity at the project area after large rainfall events when the soils are wet and erosion risk is increased should be reduced. No driving off of hardened roads should occur at any time, and particularly immediately following large rainfall events.
- » Topsoil should be removed and stored in a designated area separately from subsoil and away from construction activities. Topsoil should be reapplied where appropriate as soon as possible in order to encourage and facilitate rapid regeneration of the natural vegetation in cleared areas.
- » Regular monitoring of the project area for erosion problems during construction (on-going) and operation (at least twice annually) is recommended, particularly after large summer thunderstorms have been experienced. The Environmental Control Officer (ECO) will determine the frequency of monitoring based on the severity of the impacts in the erosion prone areas.

3.1.1 Erosion control mechanisms

The contractor may use the following mechanisms (whichever proves more appropriate/ effective) 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 Storm water Management Plan 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 storm water control measures (post construction).
- » All temporary and permanent water management structures or stabilisation methods must be indicated within the Storm water Management Plan.
- » An on-site Engineer or EO/ Safety, Health and Environment (SHE) Representative to be responsible for ensuring implementation of the erosion control measures on the project area during the construction period. The ECO should monitor the effectiveness of these measures on the interval agreed upon with the Site Manager and EO.
- » The EPC Contractor holds ultimate responsibility for remedial action in the event that the approved Storm water Management Plan is not correctly or appropriately implemented and damage to the environment is caused.

3.3 Monitoring

The project area 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 EO/ SHE Representative (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 to be approved by the Site/Environmental Manager in conjunction with the ECO.
- » Monitor that the contractor/operator is taking action to stop the erosion and assist them where needed.
- » Report and monitor the progress of rehabilitation weekly and record all the findings in a site register (during construction).
- » All actions with regards to the incidents must be reported on a monthly compliance report which should be kept on file for if/when the Competent Authority requests to see it (during construction) and kept on file for consideration during the annual audits (during construction and operation).

The Contractor (in consultation with an appropriate specialist, e.g., an engineer) 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 adapted or adjusted to ensure the accelerated erosion is controlled.
- » Continue monitoring until the area has been stabilised.

3 CONCLUSION

The Erosion Management Plan is a document to assist the Proponent/ EPC Contractor with guidelines on how to manage erosion during all phases of the project. 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 Environmental Management Programme (EMPr) and is required to be considered and adhered to during the design, construction, operation, and decommissioning phases of the project (if and where applicable). During the construction phase, the contractor must prepare an Erosion Control Method Statement to ensure that all construction methods adopted on the project area do not cause, or precipitate soil erosion and shall take adequate steps to ensure that the requirements of this plan are met before, during and after construction. The designated responsible person on the project area, must be indicated in the Method Statement and shall ensure that relevant erosion control measures are in place throughout the construction phase.

An operation phase Erosion 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 H:
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.

This WMP has been compiled as part of the project Environmental Management Programme (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 further detail regarding waste quantities and categorisation become available, during the construction and/or operation stages. This plan should be updated throughout the lifecycle of the Becrux Two Solar PV Energy 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 for the project should be compiled by the Contractor.

2. RELEVANT ASPECTS OF THE SITE

It is expected that the development of the Becrux Two Solar PV Energy Facility will generate construction solid waste, general waste and hazardous waste during the lifetime of the facility.

Waste generated 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, fluorescent tubes, used hydrocarbon containers, and waste ink cartridges.
- » Recyclable waste in the form of paper, glass, steel, aluminium, wood/ wood pallets, plastic (PET bottles, Polyvinyl chloride (PVC), Low-density polyethylene (LDPE)) and cardboard.
- » Organic waste from food waste as well as alien and endemic vegetation removal.
- » Sewage from portable toilets.
- » Inert waste from spoil material from site clearance and trenching works.

2.1 Panel Cleaning

It is anticipated that the PV panels will be washed four times a year during operation. Only clean water (i.e., with no cleaning products), or non-hazardous biodegradable cleaning products, will be utilised for the washing of panels. Wastewater generated by washing panels will be collected and recycled for future use, or alternatively, in the event that an environmentally friendly non-hazardous biodegradable cleaning product is utilised, wastewater can be allowed to run-off under the panels.

2.2 Effluent and Wastewater

During the construction and operation phases, mobile chemical toilets or a conservancy tank will be placed within the development area for use by contractors. These facilities will be maintained and serviced regularly by an appropriate waste contractor. Any other effluent discharge during construction and operation will be collected in sealed containers/tanks and collected by a registered service provider (i.e., the Local Municipality/Contractor) to be disposed of at an approved facility off-site.

Alternatively, employees may be requested to utilise existing ablution facilities in close proximity to the PV Facility.

2.3 Waste

All waste generated on site will be handled in accordance with the contractor's Waste Management Plan. Solid waste generated during construction will mainly be in the form of construction material, excavated substrate and domestic solid waste. Cardboard waste will be produced from panel packaging, which will be compacted on site prior to removal. Other wastes include rubber caps on panel edges, wooden pallets, and plastic wrapping (all related to the panel packaging). Waste will be disposed of in either waste skips and/or scavenger proof recycling bins (where possible) and temporarily placed in a central location for removal by an appropriate contractor. Where possible, waste will be recycled. Non-recyclable solid construction waste will be temporarily held in skips or other appropriate waste containers to be disposed of at an appropriately licensed landfill site. Any other waste and excess material will be removed once construction is complete and disposed of at a registered waste facility.

During construction, use of the following hazardous substances is anticipated: paint, grease, petrol / diesel for trucks, cranes, bulldozers etc. Limited amounts of transformer oils and chemicals will be used. Dangerous goods required to be stored during construction (e.g., limited quantities of fuel, oil, lubricants etc.) will be stored in compliance with relevant legislation (i.e., stored on covered and bunded areas / bin, and disposed of at a registered hazardous waste site). Hazardous waste will be appropriately stored and disposed of.

3. LEGISLATIVE REQUIREMENTS

Waste in South Africa is currently governed by several regulations, 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).
- » 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 Government Notice Regulation (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.
- » Waste that cannot be recycled is to be disposed of in the most environmentally responsible manner.

The Integrated Waste Management Approach to Waste

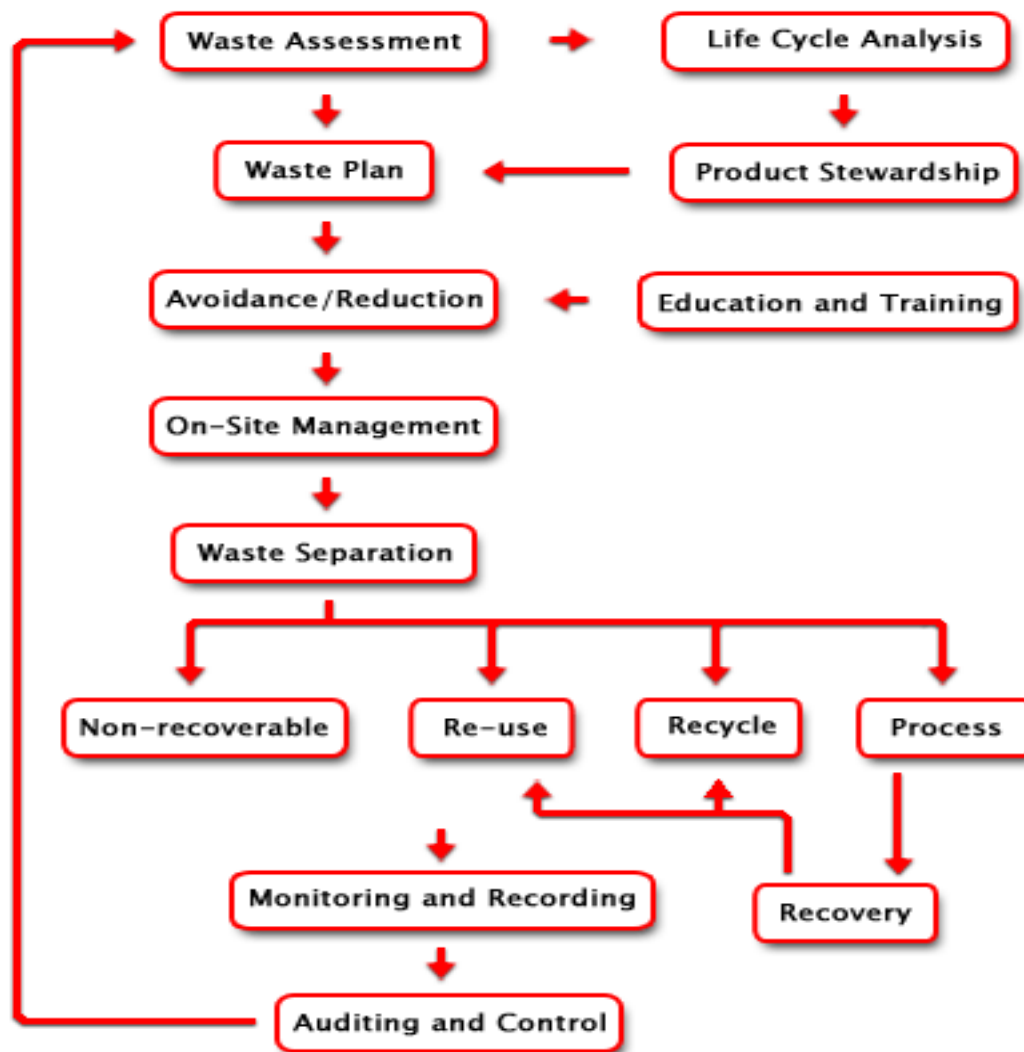


Figure 1: Integrated Waste Management Flow Diagram

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

4.1. Construction phase

A plan for the management of waste during the construction phase is detailed below. A Method Statement detailing specific waste management practices during construction should be prepared by the Contractor prior to the commencement of construction, for approval by the Resident 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 South African National Standard (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.
- » 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 the project area for the storage of all waste streams before removal from area. 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 South African Bureau of Standards (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 120% of the net capacity of the largest tank.
- » Take into consideration the capacity displaced by other tanks within the same bunded area and any foundations.
- » 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 and under no circumstances may waste be burnt on site.
- » A dedicated waste management team must be appointed by the principal contractors' Safety, Health and Environment (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.

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 project area and at subcontractors' camps (if at a different location than the main site camp) must be maintained and emptied on a regular basis by the principal contractor 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 containers and not 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 the project area 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 Environmental Control Officer (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 ECO.

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) will also be generated. All waste generated will be required to be temporarily stored at the facility in appropriate sealed containers prior to disposal at a permitted landfill site 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 wet 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.

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 form part of the EO's reports to the ECO on a monthly basis.

**APPENDIX I:
EMERGENCY PREPAREDNESS, RESPONSE 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. 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 also reflect conditions of the IFC Performance Standard 1 and include the following:

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

2. PROJECT-SPECIFIC DETAILS

Becrux Solar PV Project Two (Pty) Ltd is proposing the development of a Photovoltaic (PV) Solar Energy Facility and associated infrastructure on the Remaining Extent of Portion 1 of the Farm Saltberry Plain 137 and the Remaining Extent of Portion 1 of the Farm Roseberry Plain 250). The project site is located near the Sigma Colliery Mine Area, approximately 4km southeast of the town of Sasolburg and adjacent to the township of Zamdela, between the R57 in the east and the R59 in the north, within jurisdiction of the Metsimaholo Local Municipality, which forms part of the Fezile Dabi District Municipality in the Free State Province.

The Solar PV Energy Facility will have a contracted capacity of up to 10MW_{ac} and will use bi-facial panels with single axis tracking or fixed tilt systems to harness the solar resource on the project site. The purpose of

the facility will be to generate electricity for exclusive use by Sasol Limited at its Sasolburg operations. Power generated at the facility will be delivered to Sasol Limited by feeding into the grid through a Wheeling Agreement signed with Eskom and/or direct embedded generation. The construction of the Solar PV Energy Facility aims to reduce Sasol's dependence on direct supply from Eskom's national grid for operation purposes and demonstrate Sasol's move towards a greener future through procurement of renewable energy from Independent Power Producers (IPPs).

A development area of up to ~30ha and a development footprint of up to ~19.99ha have been identified within the project site (~339ha) by Becrux Solar PV Project Two (Pty) Ltd for the development of the Becrux Two Solar PV Energy Facility. Infrastructure associated with the Solar PV Energy Facility will include the following:

- » Solar PV array comprising PV modules and mounting structures.
- » Inverters and transformers.
- » Cabling between the panels.
- » 11kV onsite containerised/non-containerised substation.
- » 11kV overhead power line for the distribution of the generated power, which will be connected to the existing Sigma Substation.
- » Main access gravel road and internal gravel roads.
- » Operations and Maintenance (O&M) building, including a sewage/conservancy tank and water storage tanks.
- » Site office, workshop area, storage area, and laydown area.
- » Fire break and fencing around the site, including an access gate

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

- » Fires.
- » Leakage of hazardous substances.
- » Storage of flammable materials and substances.
- » Flood events.
- » Accidents.
- » Natural disasters.

3. EMERGENCY RESPONSE PLAN

There are three levels of emergency as follows:

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

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

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

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 Environmental Control Officer (ECO). In order to reduce the risk of spills and associated contamination, the following principles should be considered during construction and operation activities:

- » All equipment refuelling, servicing and maintenance activities should only be undertaken within appropriately sealed/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 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 project site. 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 for future disposal. All materials mentioned in this section are to be available in the spill kits. Following clean up, any tools or equipment used must be properly washed and decontaminated, or replaced if this is not possible.

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

c) Procedures for restoring affected areas

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

3.1.2. Scenario: Fire (and fire water handling)

i. Action Plan

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

1. Quantify risk.
2. Assess 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.

ii. 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 National Environmental Management Act, 1998 (Act No. 107 of 1998) (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

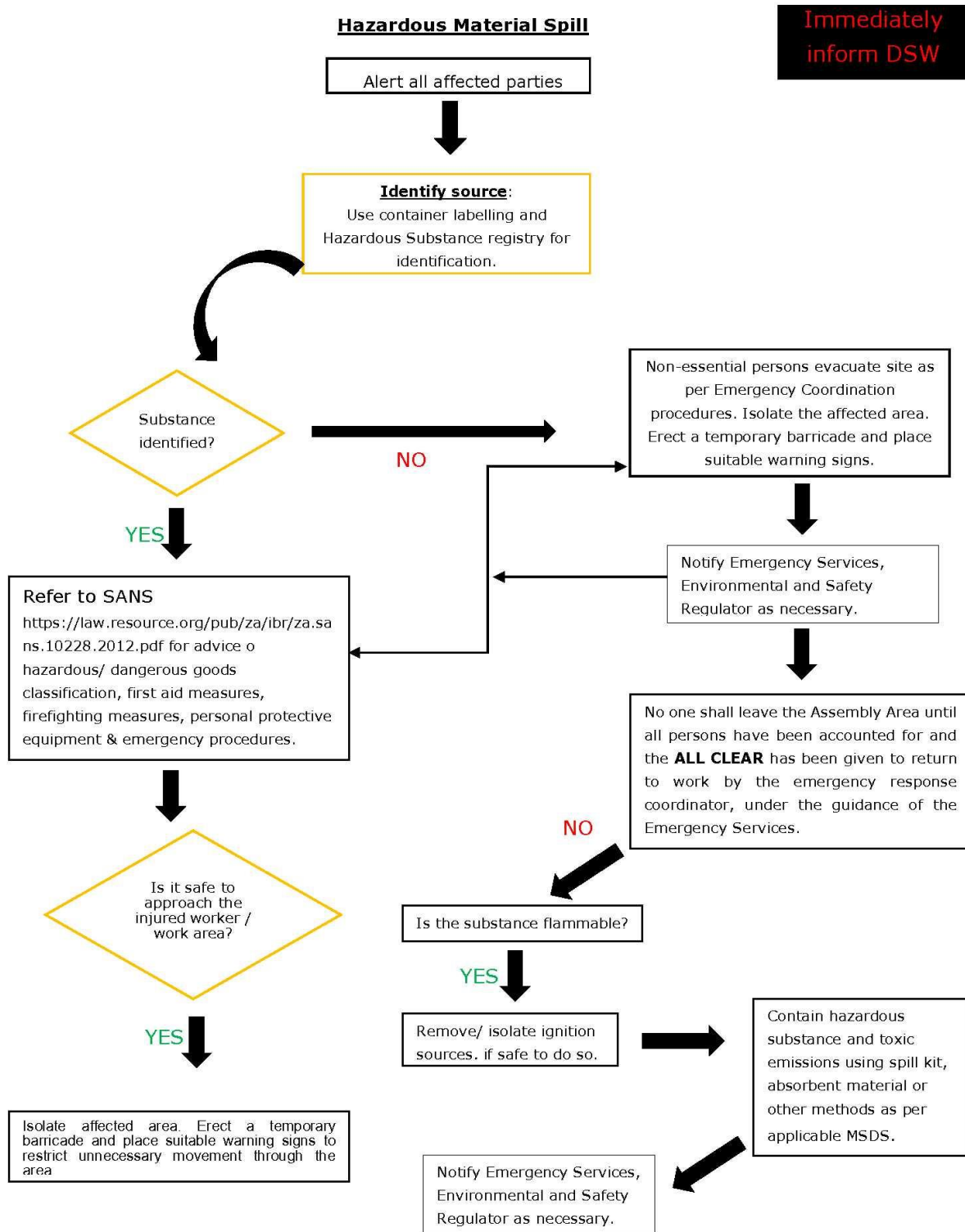


Figure 1: Hazardous Material Spill

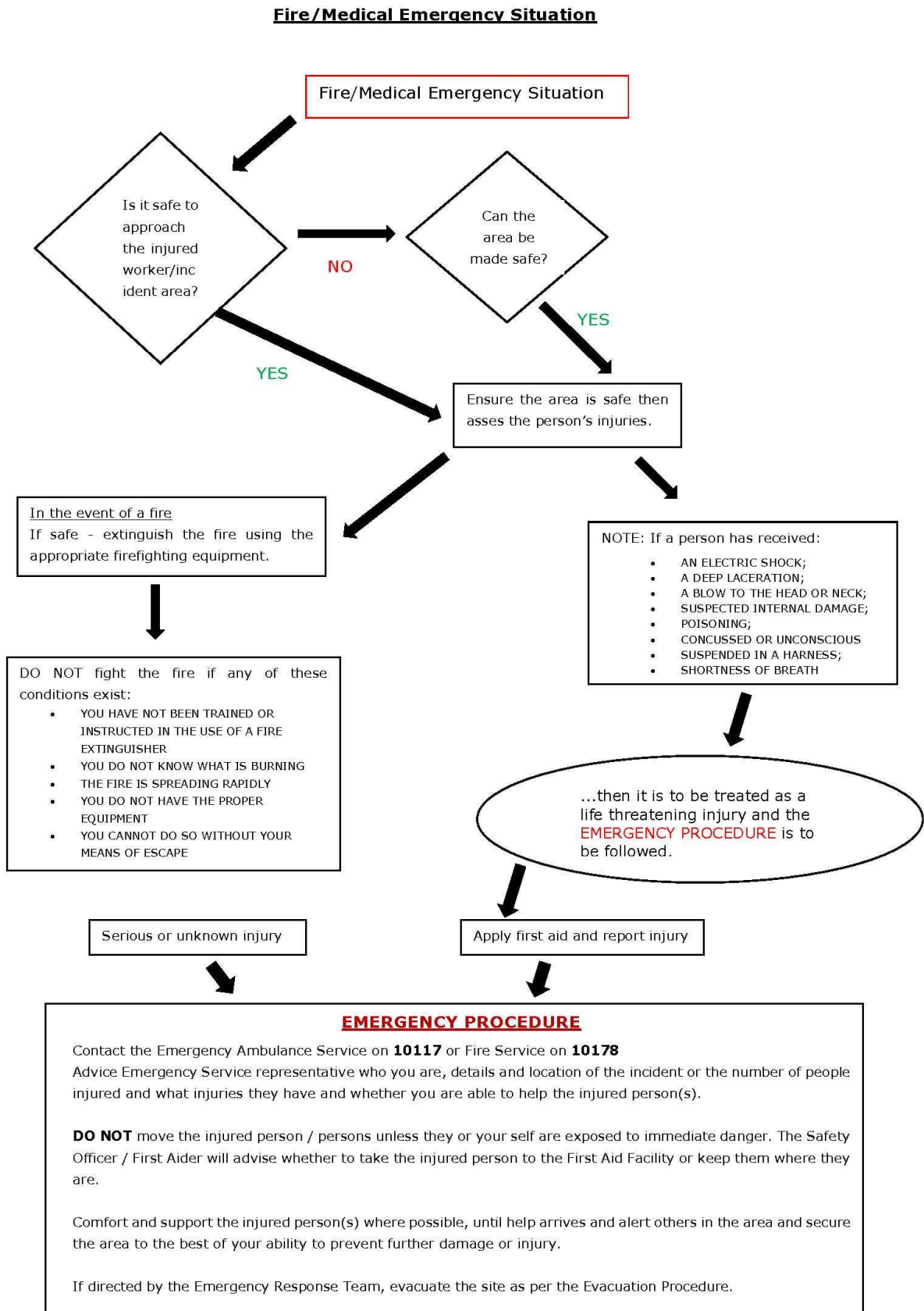


Figure 2: Emergency Fire/Medical

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.

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 J:
CURRICULCUM VITAE OF THE PROJECT TEAM

CURRICULUM VITAE OF MMAKOENA MMOLA

Profession :	Environmental Assessment Practitioner
Specialisation:	Environmental Permitting, Environmental Assessments, and Compliance
Work Experience:	4 years

VOCATIONAL EXPERIENCE

Mmakoena is an Environmental Consultant with 4 years of experience in the environmental field. She holds a B.Sc. (Hons) in Geochemistry from the University of the Witwatersrand and is currently completing her B.Sc. (Hons) in Environmental Management with the University of South Africa.

Mmakoena's experience includes undertaking environmental permitting and environmental authorisation applications, compiling basic assessment reports, scoping and environmental impact assessment reports and environmental management programmes, executing the public participation process, undertaking environmental compliance audits, providing environmental control officer services, conducting environmental screening assessments, managing sub-consultants, project management and preparing proposals and budgets in response to requests for quotations.

SKILLS BASE AND CORE COMPETENCIES

- Well-developed communication and report writing skills
- Adaptability and ability to handle pressure
- Organisational skills
- Ability to build and maintain client relationships
- Loyalty, dedication and dependability
- Ability to coordinate and synthesize environmental information
- Ability to work to tight deadlines and on multiple projects
- Thorough knowledge of environmental legislation and the environmental impact assessment process
- Quality focus and attention to detail
- Ability to deliver high quality work to agreed budgets
- MS Office Package (Word, PowerPoint and Excel)
- Adobe Acrobat
- Google Earth
- ArcGIS (basic)

EDUCATION AND PROFESSIONAL STATUS

Degrees:

- Bachelor of Science (Hons) Environmental Management, in progress, University of South Africa
- Bachelor of Science (Hons) Geochemistry, 2016, University of the Witwatersrand
- Bachelor of Science Geology, 2015, University of the Witwatersrand

Short Courses:

- Environmental Management and Regulations, 2018, Kuvimbika
- Research Methodology and Report Writing, 2017, Imsimbi Training

Professional Society Affiliations:

- Professional Natural Scientist, Environmental Science, South African Council for Natural and Scientific Professions – Registration Number: 126748

EMPLOYMENT

Date	Company	Roles and Responsibilities
2021 - Current:	Savannah Environmental (Pty) Ltd	<p><i>Environmental Assessment Practitioner</i></p> <p><u>Tasks include:</u></p> <ul style="list-style-type: none"> • Undertake environmental screening assessments, environmental permitting and environmental authorisation applications. • Undertake water use authorisation applications on the e-WULAA system. • Complete Part 1 and Part 2 EA amendment applications and prepare motivation reports in support of applications for Part 2 EA amendments. • Undertake environmental compliance audits and provide ECO services. • Efficient and quality report writing to execute and manage the delivery of environmental impact assessment (EIA) reports and Environmental Management Programmes in line with the requirements of the National Environmental Management Act and EIA Regulations. • Liaison with relevant environmental authorities. • Execution of the public participation process. • Professional client liaison. • Project management. • Manage third parties or sub-consultants to which functions have been outsourced. • Preparation of proposals and budgets.
2019 - 2020	Golder Associates Africa (Pty) Ltd	<p><i>Junior Environmental Consultant</i></p> <p><u>Tasks included:</u></p> <ul style="list-style-type: none"> • Water use license applications • Environmental compliance and water use license audits

Date	Company	Roles and Responsibilities
		<ul style="list-style-type: none"> • Environmental control officer services • Annual integrated water and waste management plan updates • Assist with wetland assessments • Assist with mine closure and rehabilitation plans • Liaise with clients and competent authorities • Provide assistance on local environmental and social impact assessments • Undertake site visits • Compile environmental reports • Generate environmental screening reports • Undertake administrative tasks
2017 - 2019	Shango Solutions	<p>Junior Consultant</p> <p><u>Tasks included:</u></p> <ul style="list-style-type: none"> • Conduct environmental compliance and financial provision audits for prospecting sites as per the MPRDA • Environmental authorisation applications • Prospecting right and mining permit applications • Basic assessment reports • Environmental management programmes/plans • Execute the public participation process • Section 102 amendment applications as per the MPRDA • Prepare maps • Liaise with sub-consultants/specialists • Undertake administrative tasks

PROJECT EXPERIENCE

RENEWABLE POWER GENERATION PROJECTS: SOLAR ENERGY FACILITIES AND WIND ENERGY FACILITIES

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
700MW (7x 100MW) Mutsho Solar PV, Limpopo Province	CRI Eagle	EAP
Angora Wind Energy Facility, Northern Cape Province	Great Karoo Renewable Energy (Pty) Ltd	EAP
Merino Wind Energy Facility, Northern Cape Province	Great Karoo Renewable Energy (Pty) Ltd	EAP
Vrede and Rondavel Solar PV Facilities, Free State Province	Mainstream Renewable Energy Developments (Pty) Ltd	Assistant EAP
400MW (4x 100MW) Pixley Park Solar PV, Northern Cape Province	Mullilo Energy Holdings	EAP

Basic Assessments

Project Name & Location	Client Name	Role
Northam Solar Photovoltaic (PV) Facility, Limpopo Province	Northam Platinum Limited	EAP

Hamlett Wind Energy Facility, Eastern Cape Province (project in progress)	Hamlett (Pty) Ltd	EAP
Becrux Solar PV Facility, Mpumalanga Province	The SOLA Group	EAP

Screening Studies

Project Name & Location	Client Name	Role
Environmental Screening for the Proposed Secunda and Sasolburg Solar PV Facilities, Free State Province and Mpumalanga Province	The SOLA Group	EAP

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

Project Name & Location	Client Name	Role
Biodiversity Permitting and General Authorisation Applications for the Harmony Tshepong, Nyala and Eland Solar PV Facilities, Free State Province	Nyala Photovoltaic (Pty) Ltd Tshepong Photovoltaic (Pty) Ltd Eland Photovoltaic (Pty) Ltd	EAP
General Authorisation Application for the Northam Solar PV Facility, Limpopo Province	Northam Platinum Limited	EAP

Environmental Authorisation Amendment Applications

Project Name & Location	Client Name	Role
Part I Amendment: Proposed 75MW Sannaspos PV Plant (Phase 1) and its associated infrastructure, Free State Province	ENGIE BU Africa	EAP
Part I Amendment: Construction of the 140MW Korana Wind Energy Facility, Northern Cape Province	Mainstream Renewable Energy Developments (Pty) Ltd	EAP
Part I Amendment: Construction of the 75MW Korana Solar Energy Facility, Northern Cape Province	Mainstream Renewable Energy Developments (Pty) Ltd	EAP
Part I Amendment: Construction of the 140MW Khai-Ma Wind Energy Facility, Northern Cape Province	Mainstream Renewable Energy Developments (Pty) Ltd	EAP

GRID INFRASTRUCTURE PROJECTS

Basic Assessments

Project Name & Location	Client Name	Role
Electrical Grid Infrastructure for the Kolkies and Sadawa PV clusters, Western Cape Province	Mainstream Renewable Energy Developments (Pty) Ltd	EAP
Electrical Grid Infrastructure for the Vrede and Rondavel Solar PV Facilities, Free State Province	Mainstream Renewable Energy Developments (Pty) Ltd	EAP
Sadawa Collector Substation, Western Cape Province	Mainstream Renewable Energy Developments (Pty) Ltd	EAP
Main Transmission Substation (MTS) associated with the Choje Wind Farm cluster, Eastern Cape Province (project in progress)	Wind Relic (Pty) Ltd	EAP

Environmental Authorisation Amendment Applications

Project Name & Location	Client Name	Role
<i>Part I Amendment: Construction of a 132kV power lines associated with the Poortjies Wind Energy Facility, Northern Cape Province</i>	<i>Mainstream Renewable Energy Developments (Pty) Ltd</i>	<i>EAP</i>
<i>Part I Amendment: Construction of a 132kV power lines associated with the Khai-Ma Wind Energy Facility, Northern Cape Province</i>	<i>Mainstream Renewable Energy Developments (Pty) Ltd</i>	<i>EAP</i>

GAS EXPLORATION PROJECTS

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
<i>Kroonstad Gas Exploration Right and Environmental Authorisation, Free State Province</i>	<i>Western Allen Ridge Gold Mines (Pty) Ltd</i>	<i>Assistant EAP and Public Participation Consultant</i>

MINING PROJECTS

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
<i>Pure Source Mine Mining Right Application, Free State Province</i>	<i>Monte Cristo Commercial Park (Pty) Ltd</i>	<i>Assistant EAP and Public Participation Consultant</i>

Basic Assessments

Project Name & Location	Client Name	Role
<i>Basic Assessment for the Western Margin Gap West Prospecting Right, Free State Province</i>	<i>White Rivers Exploration (Pty) Ltd</i>	<i>Assistant EAP</i>
<i>Basic Assessment for the Ventersburg Consolidated Prospecting Right, Free State Province</i>	<i>White Rivers Exploration (Pty) Ltd</i>	<i>Assistant EAP</i>
<i>Basic Assessment for the Nkunzana Prospecting Right, KwaZulu-Natal Province</i>	<i>WRE Base Metals (Pty) Ltd</i>	<i>Junior EAP</i>
<i>Basic Assessment for the Kroonstad North Prospecting Right, Free State Province</i>	<i>White Rivers Exploration (Pty) Ltd</i>	<i>Junior EAP</i>
<i>Basic Assessment for the Vredefort West Extension Prospecting Right, Free State Province</i>	<i>White Rivers Exploration (Pty) Ltd</i>	<i>Junior EAP</i>
<i>Basic Assessment for the Beisa North Prospecting Right, Free State Province</i>	<i>Sunshine Mineral Reserves (Pty) Ltd</i>	<i>EAP</i>
<i>Basic Assessment for the Palmietfontein Mining Permit, North-West Province</i>	<i>Palm Chrome (Py) Ltd</i>	<i>Assistant EAP</i>

Specialist Studies

Project Name & Location	Client Name	Role
<i>New Largo Mine Closure and Rehabilitation Plan, Mpumalanga Province</i>	<i>Seriti Coal</i>	<i>Junior Environmental Consultant</i>
<i>Smarty Minerals Integrated Environmental Authorisation: Wetland Impact Assessment Report, Limpopo Province</i>	<i>Smarty Minerals Investment (Pty) Ltd</i>	<i>Junior Environmental Consultant</i>
<i>Glencore Water Treatment Plant Pipeline: Wetland Monitoring, Mpumalanga Province</i>	<i>Glencore</i>	<i>Junior Environmental Consultant</i>

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
Glencore Merafe Wonderkop Smelter, Regulation 34 Audit, North West Province	Glencore	Auditor
Tshipi Borwa Mine Water Use Licence Audit, Northern Cape Province	Tshipi Borwa Mine	Auditor
Samancor Middelburg Ferrochrome: Construction of ore dryer, Mpumalanga Province	Samancor Middelburg Ferrochrome	ECO
Various Annual Financial Provision and Environmental Compliance Audits for prospecting sites as per the MPRDA, Free State and KwaZulu-Natal Province	White River's Exploration (Pty) Ltd	Auditor
Impala Platinum Limited – Springs annual external Water Use Licence Audit, Gauteng Province	Impala Platinum Limited	Auditor

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

Project Name & Location	Client Name	Role
Closure cost model estimate and closure cost report for the Proposed Surface Pipeline and Associated Infrastructure, Gauteng Province	AngloGold Ashanti	Junior Environmental Consultant
Wetland Impact Assessment report for Proposed Surface Pipeline and Associated Infrastructure, Gauteng Province	AngloGold Ashanti	Junior Environmental Consultant

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
MWCAP-2A Environmental Management Audit, Limpopo Province	Nexia SAB&T	Auditor

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

Project Name & Location	Client Name	Role
Dew Crisp Water Use Licence Application, Gauteng Province	Dew Crisp (Pty) Ltd	Junior Environmental Consultant (providing assistance)

OTHER**Environmental Impact Assessments and Environmental Management Programmes**

Project Name & Location	Client Name	Role
Anglo African Metals Zero Waste Recovery Solution, Mpumalanga Province	Anglo African Metals (Pty) Ltd	EAP
Eskom Majuba Landfill, Mpumalanga Province (project in progress)	Eskom	EAP
Expansion of Recreational and Sports Facilities at the Country Club Johannesburg	Country Club Johannesburg	EAP

CURRICULUM VITAE OF KRISTEN SHAW

Profession :	Junior Environmental Consultant
Specialisation:	Environmental Assessments, report writing, GIS, Basic Assessments, Environmental Impact Assessments
Work Experience:	1.5 Years' experience in GIS, Data Analysis and Environmental Assessment

VOCATIONAL EXPERIENCE

Kristen Shaw holds a BA in Psychology, Geography and Environmental Management, and a B.Sc. Honours degree which she passed with distinction from the North-West University in South Africa. She is passionate about the environment and the movement of people and therefore specialised in Air Quality specifically PM_{2.5} as pollutant.

Kristen has One Year Experience in Air Quality monitoring, data analysis and stack emission sampling for the North West University's CRG (Climatology Research Group). She has experience with environmental authorisation applications, compiling basic assessment reports, scoping and environmental impact assessment reports and environmental management programmes, executing the public participation process, undertaking environmental compliance audits, providing environmental control officer services, conducting environmental screening assessments. GIS mapping and screening assessments as per project specifications.

Honours subjects were the following:

- Environmental Management (Introduction to Environmental law and regulation, ISO 14001 Environmental Management Systems, EMS Auditing (ISO 19011 and ISO 17021), Integrated Reporting)
- Earth Observation (Earth observation systems, Observation uncertainty, Analytical procedures, and Integrative sensing)
- Air Pollution (Emissions, Chemistry, Transport, Monitoring, Modeling, Managing)
- Introduction to Environmental Management
- Applications in GIS (ArcMap & ArcPro)
- Research Methodology

Kristen is an enthusiastic person with a positive, energetic attitude and have good communication skills. She has served on various leadership platforms throughout the years attending leadership and communication summits. In 2021 she was elected as the Chairperson (Primaria) of 252 ladies for her Residence. She balanced her leadership responsibilities with Academic, Sport and cultural activities. She has always had a passion for the environment and trying to help where she can, hosting formal events and initiatives to raise awareness of environmental issues. She is very confident that the experience and skills that she built up with, leadership, communication, writing, and research skills, do assist her to deliver quality work.

SKILLS BASE AND CORE COMPETENCIES

- » Excellent Communication Skills
- » Highly Experienced in Jupyter Python, ArcMap, ArcPro, GIS, Aermid, Aermid Microsoft, Excel, Word, and PowerPoint
- » Esri Training certificates (ArcMap & ArcPro)
- » Experience in Leadership roles
- » Professionalism
- » Strong Work Ethic
- » Adaptability
- » Great Attention to Detail

EDUCATION AND PROFESSIONAL STATUS

Degrees:

- B.S.c Honours Geography, Environmental sciences and Environmental management North West University 2021
- BA in Psychology, Geography and Environmental management North West University 2018-2020

Short Courses:

- ArcGIS Esri Training
 - ArcMap
 - ArcPro
- Esri Certificates
 - Basics of Map Projections
 - Basics of Geographic Coordinate Systems
 - Preparing for Network Analyses
 - Working with Geodatabase Domains and Subtypes
 - Getting started with Geodatabase Topology
 - 3D Analyses of Surfaces and Features using ArcGIS
 - Creating 3D Data using ArcGIS
 - 3D Visualization techniques using ArcGIS
 - Building Models for GIS Analysis using ArcGIS
 - Introduction to Surface Modelling using ArcGIS

Other Relevant Skills:

- Air quality Dispersion Monitoring
- Data analysis

EMPLOYMENT

Date	Company	Roles and Responsibilities
January 2022 - Current:	Savannah Environmental (Pty) Ltd	<p>Environmental Assessment Practitioner & GIS Consultant</p> <p><u>Tasks include:</u></p> <p><i>The position will primarily include undertaking tasks related to 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. Specific primary aspects of the role during the contract period will include, inter alia:</i></p> <p><i>1.1 Environmental permitting, environmental authorisation applications, and associated public participation, as may be required. Tasks will include understanding and applying applicable legislation, research of related environmental policy documentation required for EIAs, efficient and quality report writing, liaison with relevant environmental authorities, site visits, compilation of environmental management programmes (EMPrs), amendment applications, and assistance</i></p>

Date	Company	Roles and Responsibilities
		<p>with public participation tasks. Other related tasks can also include undertaking water use license applications, environmental compliance monitoring and any other related authorisation, permitting and licensing tasks.</p> <p>1.2 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.</p> <p>1.3 Project-related GIS mapping, as may be required. The role will be based in Savannah's Environmental's offices in Woodmead, Gauteng. Travel may be required within South Africa and other countries within southern Africa.</p>

Basic Assessments

Project Name & Location	Client Name	Role
Proposed construction and operation of the 10MWac Becrux Solar Photovoltaic (PV) Project Two and associated infrastructure located 4km south-east of the town Sasolburg within the Metsimaholo Local Municipality with the Fezile Dabi Local Municipality	Becrux Solar PV Project Two (Pty) Ltd SOLA (Pty) Ltd	Junior EAP (Principal Author) GIS
BA processes for 3x Kheis PV facilities	AGV Projects	GIS
Kleinzee Solar PV Cluster BARs	Genesis Eco-Energy (Pty) Ltd	Junior EAP (Principal author) GIS
Orkney Solar BAR for gridline and substation connection	Genesis Eco-Energy Developments	Junior EAP (Principal author) GIS
Castle WEF Financial Close & BA Assessment	Juwi/ACED	GIS
EIA for Pixley Park PV complex (4x PV) and BAs for associated grid connection infrastructure	Genesis Eco-Energy (Pty) Ltd	Junior EAP (Principal author) GIS
Basic Assessment for the Wolf WEF access road, Eastern Cape	Red Rocket South Africa (Pty) Ltd	GIS

Environmental Impact Assessments

Project Name & Location	Client Name	Role

EIAs for 2x 100MW PV on a site west of Lichtenburg, North West	Mulilo	Junior EAP (Principal Author) GIS Public Participation
EIA for Bergriver Wind Farm, Western Cape	EnergyTeam	Public Participation
Environmental Impact Assessment processes for PV facilities within various clusters within Harmony project sites: Free State, North West and Gauteng	Harmony	Junior EAP (Principal author) GIS
Sibanye Stillwater 3X S&EIR for 175 MW PV, North West	Sibanye Stillwater	GIS
Environmental Impact Assessment for Agricultural and Pivot Development on various farm portions, Free State Province	Venter Boerdery (PTY) Ltd	GIS
Scoping/EIA process for Seekoei 4x 100MW Solar PV Facilities & BESS, plus 1x grid BAR, near Noupoort, Northern Cape	WKN Windcurrent	Junior EAP (Principal author) GIS
BAR process for Highveld PV cluster - 4x 100MW Solar PV Facilities & BESS, plus 1x grid BAR, near Stilfontein, North West province	WKN Windcurrent	Junior EAP (Principal author) GIS

Screening Assessments

Project Name & Location	Client Name	Role
Screening study for a wind farm site south of Hankey, Eastern cape plus site visit	DunoAir (Christoph Bauer)	GIS
Pre-feasibility Desktop Screening and Fatal Flaw Scan for wind project near Saldanha, Western Cape	Saldawind	GIS

OTHER SECTORS

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Exxaro 22-month Resettlement Monitoring Proposal for Phumulani Agri-Village, Mpumalanga	Exxaro	GIS

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
External Environmental and Social Compliance Audit Services for the construction of the DRDLR head office complex Berea, Pretoria	WBHO	Assistant Auditor

CURRICULUM VITAE OF LEHLOGONOLO MASHEGO

Profession: Public Participation and Environmental Consultant
Specialisation: Environmental Assessment Practitioner
Work Experience: Four (4) years and ten (10) months

VOCATIONAL EXPERIENCE

Professional experience lies mainly in the environmental consulting field specialising in environmental impact assessments, public participation processes and facilitation, environmental planning, environmental research, environmental training, rehabilitation, . Having served the mining, construction and infrastructure industries.

SKILLS BASE AND CORE COMPETENCIES

- Project management,
 - Microsoft Office,
 - Interpersonal and communication skills,
 - Presenting,
 - Report writing and formatting,
 - Environmental legislative interpretation,
 - Planning and organising, • Leading, coaching and mentoring,
 - Research,
 - Networking and marketing,
 - Data analysis, interpretation and management, and
- Quality management systems and document control.

EDUCATION AND PROFESSIONAL STATUS

Degrees:

- Masters in Environmental Science, University of Witwatersrand, 2021
- BSocSci Hons in Geographical and Environmental Science, University of Pretoria, 2016
- BA Geography, University of Johannesburg, 2015

Short Courses:

- Rethinking Integrated Environmental Management in Pursuit of the Sustainable Development Goals, IAIAsa National Conference, 2021
- Proposed Amendments to the Financial Provisioning Regulations 2015, IAIAsa, 2021
- Towards Sustainable and Responsible Mine Closure, IAIAsa, 2021
- Comprehensive Safety File Compilation Training Course, MAB Consultancy, 2019
- Monitor the Application of Health, Safety and Environmental Protection Procedures OHS Act 85 of 1993, Shesha Management Services, 2019
- Project Management, Africa International Advisors, 2017

Professional Society Affiliations:

- International Association of Impact Assessment – South Africa (IAIAsa); 5579

Other Relevant Skills:

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EMPLOYMENT

Date	Company	Roles and Responsibilities
Jan 2022 - Current:	Savannah Environmental (Pty) Ltd	<i>Public Participation and Environmental Consultant</i> <u>Tasks include:</u> <ul style="list-style-type: none"> • <i>Public participation</i> • <i>Technical writing</i> • <i>Research</i>
Apr 2019 – Current	International Association of Impact Assessment – South Africa	<i>Branch Committee Member – Students and Young Professionals</i> <u>Tasks include:</u> <ul style="list-style-type: none"> • <i>Marketing</i> • <i>Strategic development</i> • <i>Events management</i> • <i>Stakeholder engagement</i> • <i>Student empowerment</i> • <i>Risk Assessment</i>
Jan 2020 – Dec 2021	GCS Water and Environmental Consultants	<i>Environmental Liaison Officer</i> <u>Tasks included:</u> <ul style="list-style-type: none"> • <i>Public participation and facilitation</i> • <i>Authority and client liaison</i> • <i>Report writing</i> • <i>Environmental authorisation applications</i> • <i>Marketing</i> • <i>Tendering and proposal compilation</i> • <i>Project administration</i> • <i>Project management</i>

Date	Company	Roles and Responsibilities
		<ul style="list-style-type: none"> • Application of environmental management systems • Maintenance of ISO systems • Environmental control officer, auditing and compliance monitoring • Internal and external training • Health and safety, risk identification and risk management • Project management • Project organisation and planning • Human Resources Management and marketing • Mentoring and coaching • Team continual development representative with the duty of assigning fundamental tasks for continuous growth and development
April 2018 – Dec 2019	Myezo Environmental Management Services	<p>Junior Environmental Consultant</p> <p><u>Tasks included:</u></p> <ul style="list-style-type: none"> • Project assistance • Project administration • Project support • Report writing • Research • Document control • Quality management system management
April 2017 – Mar 2018	Myezo Environmental Management Services	<p>Environmental Intern and Project Assistant</p> <p><u>Tasks included:</u></p> <ul style="list-style-type: none"> • Project assistance • Project administration • Project support • Report writing • Research • Document control • Quality management system management
2016	University of Pretoria – Department of Geography and Environmental Sciences	<p>Student mentor</p> <p><u>Tasks included:</u></p> <ul style="list-style-type: none"> • Academic mentoring and coaching • Academic support and guidance • Academic recommendations • Research assistance • Personal guidance
Oct 2013 – Sep 2014	University of Johannesburg – Annirand Dayhouse	<p>Hawker/Leader</p> <p><u>Tasks included:</u></p> <ul style="list-style-type: none"> • Head of Communication • Secretary • Head of Community Service • Mentoring and academic guidance • Overseeing all administration tasks

Date	Company	Roles and Responsibilities
		<ul style="list-style-type: none"> In-charge of social media platforms

PROJECT EXPERIENCE

Project experience primarily lies in the mining industry having worked extensively in Mpumalanga, North West and Gauteng Province with an averaged four (4) and a half work experience acquired. Construction and housing development projects in and around the Gauteng Province with an averaged three (3) years work experience acquired.

RENEWABLE POWER GENERATION PROJECTS: SOLAR ENERGY FACILITIES

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Lephalale Solar Project – Limpopo Province	Grootgeluk Mine – Exxaro Coal	Public Participation Lead

CONVENTIONAL POWER GENERATION PROJECTS (COAL)

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
EMPr Amendment Application for Voorspoed Coal Mine, Free State	De Beers Consolidated Mines	Public Participation Lead

GRID INFRASTRUCTURE PROJECTS

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Proposed Donatello Substation, Gauteng Province	MDT Environmental	Junior PPP

MINING SECTOR PROJECTS

Screening Studies

Project Name & Location	Client Name	Role
Feasibility Study of Pitlakes as a Mine Closure Option.	Coaltech Research Association	Public participation lead

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
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Annual Environment Performance Assessment for Tharisa Mine, North West Province	Tharisa Minerals	ECO
Monthly Audit for Arbor Railway Siding, Mpumalanga Province	Gijima Supply Chain Management	ECO
Monthly Audit for Forfar Railway Siding	Aplorox (Pty) Ltd	ECO
Annual EMPr and IWUL Audit for Hawerklip Railway Siding	Brazen Alger	ECO

Due Diligence Reporting

Project Name & Location	Client Name	Role
Annual Rehabilitation Strategy and Implementation Programme (RSIP) for Mafube Mine, Mpumalanga Province	Exxaro Coal, Mpumalanga	Junior EAP and report writer
Annual Rehabilitation Strategy and Implementation Programme (RSIP) for Belfast Mine, Mpumalanga Province	Exxaro Coal, Mpumalanga	Junior EAP and report writer
Annual Rehabilitation Strategy and Implementation Programme (RSIP) for Rietkuil Siding, Mpumalanga Province	Exxaro Coal, Mpumalanga	Junior EAP and report writer
Annual Rehabilitation Strategy and Implementation Programme (RSIP) for Tharisa Mine, North West Province	Tharisa Minerals	Junior EAP and report writer

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

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Basic Assessment Report for the proposed development of the K11 Road, Gauteng Province	Vuka-Afrika Consulting Engineers and Project Managers	Junior EAP
Decommissioning of a Transnet pipeline running from Durban to Johannesburg	Hydro Science	Junior EAP

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
12 th Avenue Bridge Rehabilitation, Gauteng Province	E-Square Engineering	ECO
Oxford Road Road Rehabilitation, Gauteng Province	E-Square Engineering	ECO
Chaplin Stormwater Infrastructure Rehabilitation, Gauteng Province	E-Square Engineering	ECO

HOUSING AND URBAN PROJECTS

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
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<i>Gauteng Rapid Land Release Programme, Unitas Park and Evaton West, Gauteng Province</i>	<i>Department of Human Settlements</i>	<i>Junior EAP</i>
<i>Matsulu Waste Transfer Station, Mpumalanga Province</i>	<i>Zethu Consulting Services</i>	<i>Junior EAP</i>



Andrew Husted

M.Sc Aquatic Health (Pr Sci Nat)

Cell: +27 81 319 1225

Email: andrew@thebiodiversitycompany.com

Identity Number: 7904195054081

Date of birth: 19 April 1979

Profile Summary

Extensive experience with many mining projects in South Africa, parts of Africa and also Europe, providing specialist input into ESHIAs and EMPs.

Considerable experience with the project management of national and international multi-disciplinary projects.

Specialist guidance, support and facilitation for the compliance with legislative processes, in South Africa as well as with IFC and the Equator principles.

Expertise with Instream Flow and Ecological Water Requirements.

Provide specialist and technical input for faunal, aquatic ecology and wetland studies.

Areas of Interest

Mining, Renewable Energy & Infrastructure Development Projects, Sustainability and Conservation.

Publication of scientific journals and articles.

Key Experience

- Familiar with World Bank, Equator Principles and the International Finance Corporation requirements
- Environmental, Social and Health Impact Assessments (ESHIA)
- Environmental Management Programmes (EMP)
- Ecological Water Requirement determination experience
- Fish population structure assessments
- The use of macroinvertebrates to determine water quality
- Aquatic Ecological Assessments
- Aquaculture
- Monitoring Programmes

Countries worked in

Botswana
Cameroon
Democratic Republic of Congo
Ghana
Ivory Coast
Liberia
Mali
Mozambique
Republic of Armenia
Senegal
Sierra Leone
South Africa

Nationality

South African

Qualifications

- MSc (University of Johannesburg) – Aquatic Health.
 - BSc Honours (Rand Afrikaans University) – Aquatic Health
 - BSc Natural Science
 - Pr Sci Nat (400213/11)
 - Certificate of Competence: Mondri Wetland Assessments
 - Certificate of Competence: Wetland WET-Management
 - SASS 5 Accredited – Department of Water Affairs and Forestry for the River Health Programme
 - EcoStatus application for rivers and streams
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RELEVANT PROJECT EXPERIENCE

Project Name: The ecological constraints mapping and Critical Habitat re-evaluation for the Anadarko LNG project: Specialist Consultant to conduct Ecological Studies (Fauna and Habitat) and the delineation of wetland systems.

Client: Anadarko.

Personal position / role on project: Wetland Specialist.

Location: Afungi, Mozambique (2015).

Main project features: To identify and map the ecological constraints is to support contractor activities. To redefine the critical habitats within the project area

Project Name: A Joint Basin Survey of the Upper Orange, Lower Orange and Vaal catchments to determine the current status of the systems: Specialist Consultants to conduct Ecological Studies (Fish, Macroinvertebrate, Diatoms, Water Quality and Habitat) and report on the current status (defining system trends).

Client: ORASECOM.

Personal position / role on project: Specialist Ichthyologist.

Location: South Africa (including Namibia, Botswana & Lesotho) (2015).

Main project features: To determine the current status of the catchments and to discuss the temporal and spatial trends of the monitoring reaches.

Project Name: Ecological baseline assessment of local river systems for the Ntem Iron Ore Mine: Specialist Consultants to Undertake Baseline Studies (Fish, Macroinvertebrate, Water Quality and Habitat).

Client: IMIC.

Personal position / role on project: Senior Ichthyologist.

Location: Cameroon (2013).

Main project features: Establishment of the ecological baseline status and functioning assessment of the local river systems.

Project Name: Instream Flow Requirement determination study for the Kibali River hydropower project: Specialist Consultants to Undertake Baseline Studies (Flow, Water Quality and Geomorphology) and Instream Flow Requirement (IFR) Assessment.

Client: Randgold Resources.

Personal position / role on project: Ichthyologist and IFR.

Location: DRC (2012).

Main project features: Establishment of the ecological flow requirements of fishes within the Kibali River.

Project Name: Cost analysis, including the current and potential earning potential of an aquaculture facility: Specialist Consultants to determine the Cost (Current & Potential Earnings) and the Construction of an identical facility (Physical Costs).

Client: Goldstone Resources.

Personal position / role on project: Ichthyologist.

Location: Ghana (2012).

Main project features: Conduct a detailed costs analysis of an aquaculture facility for the compensation for the removal of the operation.

Project Name: Instream Flow Requirement determination study for the Nzoro River hydropower project: Specialist Consultants to Undertake Baseline Studies (Flow, Water Quality and Geomorphology) and Instream Flow Requirement (IFR) Assessment.

Client: Randgold Resources.

Personal position / role on project: Ichthyologist and IFR.

Location: DRC (2011).

Main project features: Establishment of the ecological flow requirements of fishes within the Nzoro River.

Project Name: Environmental study to establish the baseline biological and physical conditions of the Letsibogo Dam.

Client: European Union

Personal position / role on project: Ichthyologist.

Location: Selebi-Phikwe, Botswana (2007 - 2009).

Main project features: Evaluation of the existing fish communities within the Letsibogo Man-made lake with specific consideration of the threats of alien invasive fishes in the lake. The study resulted in the publication of two peer-reviewed papers titled: Comparative behavioural assessment of an established and a new Tigerfish *Hydrocynus vittatus* population in two man-made lakes in the Limpopo (O'Brien et al., 2013) and First observation of Africa Tigerfish (*Hydrocynus vittatus*) predating on Barn Swallows (*Hirundo rustica*) in flight (O'Brien et al., in press).

Project Name: Environmental and Social Impact Assessment of the Kazungula Bridge on the Zambezi River.

Client: Loci on behalf of the Government of Botswana.

Personal position / role on project: Ichthyologist.

Location: Botswana, Zambia, Namibia and Zimbabwe (2009-2010).

Main project features: Evaluation of the current ecological integrity status of various living and non-living components of the Zambezi River ecosystem and the potential ecological and social consequences of the construction and use of the Kazungula Bridge. The study showed that although water quality and habitat modification impacts will occur as a result of the construction and use of the bridge the long term impacts associated with the operation of the bridge should not result in any major impacts to the local aquatic ecosystem.

ACHIEVEMENTS

- Co-founded The Biodiversity Company in 2015 to provide scientific technical services and policy advice to various sectors.
- Successfully tasked by Digby Wells Environmental to establish and develop a company presence in the United Kingdom. This included the staffing and development of offices in London and Jersey.
- Designed and implemented numerous "specific" turnkey items for clients, these have included the design of plant nurseries, aquaculture projects, search and rescue of select flora, re-introduction of fish species into systems and tree marking and counting.
- Managed and developed the Biophysical Department at Digby Wells Environmental to consist of four specialist units, namely: Fauna & Flora, Pedology, Wetlands & Aquatics as well as Rehabilitation.
- The establishment and growth of the Rehabilitation Unit at Digby Wells Environmental which now offers specialist services for all levels of rehabilitation, from management plans, off-set strategies to implementation.

OVERVIEW

An overview of the specialist technical expertise include the following:

- Aquatic ecological state and functional assessments of rivers and dams.
 - Instream Flow Requirement or Ecological Water Requirement studies for river systems.
 - Ecological wetland assessment studies, including the integrity (health) and functioning of the wetland systems.
 - Wetland offset strategy designs.
 - Wetland rehabilitation plans.
 - Monitoring plans for rivers and other wetland systems.
 - Toxicity and metal analysis of water, sediment and biota.
 - Bioaccumulation assessment of fish communities.
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- Fish telemetry assessment that included the translocation of fish as well as the monitoring of fish in order to determine the suitability of the hosting system.
 - Faunal surveys which includes mammals, birds, amphibians and reptiles.
 - The design, compilation and implementation of Biodiversity and Land Management Plans and strategies.

TRAINING

Some of the more pertinent training undergone include the following:

- Wetland and Riparian Delineation Course for Consultants (Certificate of Competence) – DWAF 2008
- The threats and impacts posed on wetlands by infrastructure and development: Mitigation and rehabilitation thereof – Gauteng Wetland Forum 2010
- Ecological State Assessment of Lentic Systems using Fish Population Dynamics – University of Johannesburg/Rivers of Life 2010
- Soil Classification and Wetland Delineation – Terra Soil Science 2010
- Wetland Rehabilitation Methods and Techniques - Gauteng Wetland Forum 2011
- Application of the Fish Response Assessment Index (FRAI) and Macroinvertebrate Response Assessment Index (MIRAI) for the River Health Programme 2011
- Tools for a Wetland Assessment (Certificate of Competence) – Rhodes University 2011

EMPLOYMENT EXPERIENCE

CURRENT EMPLOYMENT: The Biodiversity Company (December 2014 – Present)

I co-founded The Biodiversity Company in 2015, consisting of experienced ecologists who provide technical expertise and policy advice to numerous sectors, such as mining, agriculture, construction and natural resources. The team at The Biodiversity Company have conducted stand-alone specialist studies, and provided overall guidance of studies with a pragmatic approach for the management of biodiversity that takes into account all the relevant stakeholders, most importantly the environment that is potentially affected. We manage risks to the environment to reduce impacts with practical, relevant and measurable methods.

EMPLOYMENT: Digby Wells Environmental (October 2013 – December 2014)

Digby Wells assigned me to the role of Country Manager for the United Kingdom. This was a new endeavour for the company as the company's global footprint continues to increase. The primary responsibilities for the role included the following:

- **Clint liaison** to be able to interact more efficiently and personally with current mining clients, mining industry service providers, legal firms and banking institutions in order to introduce Digby Wells as a services provider with the aim of securing work.
- **Project management** for international projects which may require a presence in the United Kingdom, this was dependent on the location and needs of the client. These projects would mostly be based on the Equator Principles (EP) and International Finance Corporation (IFC) Performance Standards.
- **Technical input** to provide specialist technical expertise for projects, this included fauna, aquatic ecology, wetlands and rehabilitation. Continued with the design and implementation of Biodiversity and Land Management Plans to assist clients with managing the natural resources. Responsibilities also included the mentorship and management (including reviewing and guiding) other expertise such as flora, fauna and pedology.

EMPLOYMENT: Digby Wells Environmental (March 2012 – September 2013)

Manager of a multi-disciplinary department of scientists providing specialist services in support of national and international requirements as well as best practice guidelines, primarily focussing on the mining sector. In addition to managing the department, I was also expected to contribute specialist services, most notably focusing on water resources. Further responsibilities also included the management of numerous projects on a national or international scale. A general overview of the required responsibilities are as follows:

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- **Project management** for single as well as multi-disciplinary studies on a national and international scale. This included legislation and commitments for the respective country being operated in, as well as included the World Bank (WB), EP and IFC requirements.
 - **Individual and/or team management** in order to provide mentoring and supportive structures for development and growth in support of the company's strategic objectives.
 - **Scientific report writing** to ensure that the relevant standards and requirements have been attained, namely local country legislation, as well as WB, EP and IFC requirements.
 - **Report reviewing** in order to ensure compliance and consideration of relevant legislation and guidelines and also quality control.
 - **Specialist management** to facilitate the collaboration and integration of specialist skills for the respective projects. This also included the development of Biodiversity and Land Management Plan for clients.
 - **Client Resource Manager** for numerous clients in order to establish as well as maintain working relationships.

An overview of the tenure working with the company is provided below:

- **October 2013 – December 2014: London Operations Manager** – Deployed to establish a presence for the company (remote office) in the United Kingdom by means of generating project work to support the employment of staff and operation of a business structure.
- **March 2012 – September 2013: Biophysical Department Manager** – Responsible for the development and growth of the department to consist of four specialist units. This included the development of a new specialist unit, namely Rehabilitation.
- **January 2011 - February 2012: Ecological Unit Manager** – In addition to implementing aquatic and wetland specialist services, the role required the overall management of additional specialist services which included fauna & flora.
- **June 2010 - December 2010: Aquatic Services Manager** – This required the marketing and implementation of specialist programmes for the client base such as biomonitoring and wetland off-set strategies. In addition to this, this also included expanding on the existing skill set to include services such as toxicity, bioaccumulation and ecological flow assessments.
- **August 2008: Aquatic ecologist** – Employed as a specialist to establish the aquatic services within the company. In addition to this, wetland specialist services were added to the existing portfolio.

PREVIOUS EMPLOYMENT: Econ@UJ (University of Johannesburg)

- June 2007 – July 2008: Junior aquatic ecologist
 - Researcher
 - Technical assistant for fieldwork
 - Reporting writing
 - Project management

GENERAL SKILLS

Literacy	Read, write and speak English fluently. Read, write and speak Afrikaans. Basic German.
Generic	Advanced user of Microsoft Office applications.
Mapping	Introductory skill level for ArcGIS and Quantum GIS.

ADDITIONAL EXPERIENCE

Compliance audits	Conducting site investigations in order to determine the level of compliance attained, ensuring that the client maintains an appropriate measure of compliance with environmental regulations by means of a
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	legislative approach
Control officer	Acting as an independent Environmental Control Officer (ECO), acting as a quality controller and monitoring agent regarding all environmental concerns and associated environmental impacts
Screening studies	Project investigations in order to determine the level of complexity for the environmental and social studies required for a project. This is a form of risk assessment to guide the advancement of the project.
Public consultation	The provision of specialist input in order to communicate project findings as well as assist with providing feedback if and when required.
Water use licenses	Consultation with the relevant authorities in order to establish the project requirements, as well as provide specialist (aquatics/wetland) input for the application in order to achieve authorisation.
Closure	Primarily the review of closure projects, with emphasis on the closure cost calculations. Support was also provided by assisting with the measurements of structures during fieldwork.
Visual	The review of visual studies as well as the collation of field data to be considered for the visual interpretation for the project.

ACADEMIC QUALIFICATIONS

University of Johannesburg, Johannesburg, South Africa (2009): MAGISTER SCIENTIAE (MSc) - Aquatic Health:

Title: *Aspects of the biology of the Bushveld Smallscale Yellowfish (Labeobarbus polylepis): Feeding biology and metal bioaccumulation in five populations.*

Rand Afrikaans University (RAU), Johannesburg, South Africa (2004): BACCALAUREUS SCIENTIAE CUM HONORIBUS (Hons) – Zoology

Rand Afrikaans University (RAU), Johannesburg, South Africa (2001 - 2004): BACCALAUREUS SCIENTIAE IN NATURAL AND ENVIRONMENTAL SCIENCES. Majors: Zoology and Botany.

PUBLICATIONS

Tate RB and Husted, A. 2015. Aquatic Biomonitoring in the upper reaches of the Boesmanspruit, Carolina, Mpumalanga, South Africa. African Journal of Aquatic Science.

Tate RB and Husted A. 2013. Bioaccumulation of metals in *Tilapia zillii* (Gervai, 1848) from an impoundment on the Badeni River, Cote D'Ivoire. African Journal of Aquatic Science.

O'Brien GC, Bulfin JB, Husted A. and Smit NJ. 2012. Comparative behavioural assessment of an established and new Tigerfish (*Hydrocynus vittatus*) population in two manmade lakes in the Limpopo catchment, Southern Africa. African Journal of Aquatic Science.

Tomschi, H, Husted, A, O'Brien, GC, Cloete, Y, Van Dyk C, Pieterse GM, Wepener V, Nel A and Reisinger U. 2009. Environmental study to establish the baseline biological and physical conditions of the Letsibogo Dam near Selebi Phikwe, Botswana. EC Multiple Framework Contract Beneficiaries.8 ACP BT 13 – Mining Sector (EDMS). Specific Contract N° 2008/166788. Beneficiary Country: Botswana. By: HPC HARRESS PICKEL CONSULT AG

Husted A. 2009. Aspects of the biology of the Bushveld Smallscale Yellowfish (*Labeobarbus polylepis*): Feeding biology and metal bioaccumulation in five populations. The University of Johannesburg (Thesis).

CURRICULUM VITAE LOURENS DU PLESSIS

PERSONAL INFORMATION AND CONTACT DETAILS

Name: Lourens Martinus du Plessis
Date of birth: 1969-11-13
Marital status: Married
Nationality: South African
Profession/specialisation: Geographer/environmental GIS specialist
Company: MetroGIS (Pty) Ltd
Years with firm: 11 years
Position: Director
Experience: 20 years
Postal address: PO Box 384, La Montagne, 0184
Telephone/fax: 012 349 2884/5 (w) 082 922 9019 (cell) 012 349 2880 (fax)
E-mail: lourens@metrogis.co.za

KEY QUALIFICATIONS AND EXPERIENCE

Primary function

The application of Geographic Information Systems (GIS) in environmental planning and management, impact assessments and spatial modeling.

Experience and expertise

- Data sourcing and acquisition
- Data capture
- Data evaluation
- Data conversion and transfer
- GIS database development, implementation and maintenance
- Spatial analysis/modelling (visibility, slope, aspect, shadow, surface, raster, proximity, etc.)
- Digital terrain/elevation modeling
- Terrain evaluation
- Image processing
- Impact assessment and impact management
- Environmental management
- Decision support systems interface development
- Project management
- Map production, display, queries and reporting
- Environmental sciences expertise
- Process development
- Visual impact assessment

Technological (software) expertise

- Arc/Info and ArcGIS
- ArcView
- PlanetGIS
- Vistapro (virtual landscape rendering software)
- Various GIS support software packages and applications
- Range of Microsoft standard applications (including Microsoft Word/Excel/Access, etc.)

Awards

Award: Best South African Environmental Technical Paper
Awarded for: National Environmental Potential Atlas (ENPAT National)
Awarded by: Environmental Planning Professions Interdisciplinary Committee (EPPIC)
Date: 1995

Award: Map Gallery Most Analytical Competition - 3rd Place
Awarded for: Environmental Potential Atlas for South Africa
Awarded by: Environmental Systems Research Institute (ESRI)
Date: 1997 International ESRI User Conference

Award: Best Cartographic Map Gallery Competition - 3rd Place
Awarded for: Environmental Potential Atlas for South Africa (Publication)
Awarded by: Environmental Systems Research Institute (ESRI)
Date: 1998 International ESRI User Conference

Award: QDC Performance Award
Awarded for: ENPAT Development
Awarded by: Q Data Consulting
Date: 1998

Award: Best South African Environmental Technical Paper
Awarded for: Environmental Potential Atlas for South Africa (Publication)
Awarded by: Environmental Planning Professions Interdisciplinary Committee (EPPIC)
Date: 1998

Publications/maps featured in publications

Name: Environmental Potential Atlas for South Africa
Authors: W. van Riet, J. van Rensburg, P. Claassen, L. du Plessis and T. van Viegen
Publisher: J.L. van Schaik
Date: 1997

Name: ESRI Map Book (Volume 13)
Authors: Various
Publisher: Environmental Systems Research Institute (ESRI)
Date: 1998

Name: Pilanesberg Official Map and Park Guide
Authors: North-West Parks & Tourism Board and Jacana
Publisher: Jacana Media (Pty) Ltd
Date: 2001

Name: KwaZulu-Natal - A celebration of biodiversity
Authors: Jacana
Publisher: Jacana Media (Pty) Ltd
Date: 2001

Name: Garden Route - Still Bay to Storms River (Discover the Magic)
Authors: Jacana
Publisher: Jacana Media (Pty) Ltd
Date: 2003

Name: Lowveld and Kruger Guide

Authors: High Branching Team
Publisher: Jacana Media (Pty) Ltd
Date: 2004

Name: Heights to Homes to Oceans (H₂O) Water Wise information poster
Authors: Rand Water
Publisher: Rand Water
Date: 2004

Name: Kruger National Park Map and Photographic Guide
Authors: Andy Tinker Photography
Publisher: Andy Tinker Photography
Date: 2007

WORK EXPERIENCE/EMPLOYMENT DETAILS

GisLAB CC (Geographic Information Systems Laboratory - University of Pretoria)
Period: 4/1990 - 9/1997
Position: Member / Project Manager

GISBS (Geographic Information Systems Business Solutions - Q Data Consulting)
Period: 10/1997 - 10/1999
Position: Project Manager

MetroGIS (Pty) Ltd
Period: 11/1999 - to date
Position: Director / Project Manager

EDUCATION/QUALIFICATIONS

Degree: BA (University of Pretoria) Geography and Anthropology (Majors)
Other Subjects: Archaeology, Philosophy and Political Science
Date Received: 1993

PROJECTS SUMMARY

*(A brief description of **some** prominent and relevant projects)*

General projects

GIS mapping and database for Black Eagle habitats and flight patterns in the Karoo National Park

Environmental planning and development control schemes for the Drakensberg *Babangibone, Cathkin Peak and Garden Castle* development nodes

Goukou River (Stilbaai) Environmental Structure Plan

Conservation and open space proposals for the Umhlanga Forest

Grootvlei mine water pumping operation (Blesbokspruit sub-catchment)

GIS services for the Saldannah steel plant

ENPAT Provincial (1:250,000 scale GIS decision support systems) based on an inventory of environmental and socio-economic geographic data

- ENPAT Northern Province (Limpopo Province)
- ENPAT Mpumalanga
- ENPAT North-West

ENPAT Metropolitan (1:50,000 scale GIS decision support systems) containing environmental and socio-economic geographic data that were evaluated for conservation opportunities, development constraints and agricultural constraints

- ENPAT Gauteng
- ENPAT Cape Town
- ENPAT Durban Functional Region (DFR)
- ENPAT Bloemfontein/Botshabello
- ENPAT Port Elizabeth

ENPAT National (1:1,000,000 scale GIS decision support system) and ENPAT publication

Environmental Management Frameworks (EMF). Frameworks of spatially represented information connected to environmental management parameters designed to aid in the pro-active identification of potential conflict between development proposals and critical and/or sensitive environments

- EMF Northern Province (Limpopo Province)
- EMF Mpumalanga
- EMF North-West

Spatial Development Initiatives (SDI). The fast tracking of the EMF concept for priority SDI's

- Lubombo Corridor SDI
- Coega Industrial Development Zone (IDZ)
- Wild Coast SDI
- West Coast Investment Initiative

Sigma colliery: North-West strip operation

Development masterplan for the Tswaing Crater Museum

Conservation plan for the Rietvlei Nature Reserve

GIS services for the planning and management of the Chobe National Park (Botswana)

GIS services for an environmental overview of South Africa

Demarcation/delineation of regions in South Africa

Orange-Vaal (ORVAAL) transfer scheme - Caledon cascades scheme

ENPAT Provincial (1:250,000 scale GIS decision support systems) based on an inventory of environmental and socio-economic geographic data

- ENPAT Eastern Cape
- ENPAT Free State
- ENPAT Kwa-Zulu Natal

Environmental Management Frameworks (EMF). Frameworks of spatially represented information connected to environmental management parameters designed to aid in the pro-active

identification of potential conflict between development proposals and critical and/or sensitive environments

- EMF Eastern Cape
- EMF Free State
- EMF Kwa-Zulu Natal

Hennops River EMF (environmental inventory and management proposals in Centurion)

The Important Bird Areas (IBA) of South Africa map and database

Centurion Metropolitan Substructure Environmental Management Framework (EMF)

Alexandra renewal project EMF

Carbon Sinks and Sequestration - Eastern Cape Wild Coast. Information maps for the "*Carbon Sinks - A Rehabilitation Option for South Africa's Natural Environment*" report

Prince Edward and Marion Islands. Maps for the World Heritage Site (WHS) bid document

Theewaterskloof and Genadendal - Integrated spatial data management system

Gauteng Communication Network Strategy (GAUCONS). Environmental zones for the control of the construction of telecommunication structures

Gauteng Industries Buffer Zones. The mapping of industrial and mining activities, the creation of buffer control zones and the development of a GIS-based decision support system for the Gauteng Province

Limpopo National Park (LNP) Mozambique. Base maps for fieldwork and planning

Schmidtsdrift Environmental Management Program Report (EMPR)

Loch Vaal Environmental Management Framework (EMF)

Rustenburg - Strategic Environmental Assessment (SEA). The creation of environmental control zones, a GIS-based decision support system and information poster

Faerie Glen Nature Reserve Strategic Environmental Assessment (SEA)

Willow Quarries - Environmental Impact Assessment (EIA). Modeling of mining expansion plan and the potential impact on Golden Mole habitats

Ekurhuleni Metropolitan Municipality (EMM) Environmental Management Framework (EMF)

Limpopo - State of the Environment Report (SoER)

Windhoek (Namibia) - Environmental Structure Plan (ESP)

Gauteng Supplementation and Implementation of EIA Regulations Project (EIA SIP)

Siyanda District Municipality Environmental Management Framework (EMF)

Olifants and Letaba River Catchments Environmental Management Framework (EMF)

Regional Strategic Environmental Assessments (Regional Assessments)

Regional assessment for the Eskom Wind Energy Facility (Sere) in the Western Cape

Regional assessments for the Eskom Wind Integration Project (WIP)

- Area 1: West Coast (Saldanha to Garies)
- Area 2: Overberg Region
- Area 3: Beaufort West region
- Area 4: Eastern Cape (Tsitsikamma to Port Elizabeth)
- Area 5: Northern Cape (Hondeklipbaai to Port Nolloth)

Sandveld wind energy Regional Assessment

West Coast National Park (Saldanha area) Regional Assessment

Regional Assessment for the Theewaterskloof Municipal area

Brand-se-Baai (Exxaro) wind energy regional assessment

Overberg (BioTherm) wind energy regional assessments

- Area 1: Gordons Bay to Pearly Beach)
- Area 2: Napier RA (Agulhas NP/Swellendal region)

Suurplaat/Sutherland (Investec Wind Energy Development) Regional Assessment

Waterberg (Limpopo) Concentrating Solar Power (CSP) Regional Assessment (Exxaro)

Visual Impact Assessments (VIA), viewshed analyses and visual assessments

Some recent or current projects include:

- Coal strip mining in Zimbabwe viewshed analyses
- Viewshed analyses and sensitivity mapping for telecommunication masts in the northern provinces (Limpopo, Mpumalanga and North-West)
- Siemens 3rd license cellular communications infrastructure EIAs. Viewshed analyses and sensitivity mapping for over 4,000 telecommunication mast sites in all major metropolitan areas of South Africa.
- CSIR high mast viewshed analysis and sensitivity mapping
- Atlantis Open Cycle Gas Turbine power station VIA
- Kynoch Gypsum Tailings dam extension VIA
- N1 Western Bypass Shell service station VIA
- Coega regional hazardous waste processing facility VIA
- Robinson Deep landfill extension VIA
- Hazardous waste blending platform VIA
- Mercury-Ferrum-Garona transmission line integration VIA
- Matimba B (Medupi) coal-fired power station VIA
- Concentrating Solar Power (CSP) plant in Upington VIA
- Zeus to Mercury transmission line (comparative viewshed analyses)
- Mmamabula (Botswana) transmission line and power station viewshed analyses
- Petronet new multi-products pipeline VIA
- Wind energy facility (Sere) in the Western Cape province VIA
- Ankerlig power station conversion and transmission line VIA
- Gourikwa power station conversion and transmission line VIA
- Kyalami strengthening project VIA
- Steelpoort integration project VIA
- Medupi reservoir and telecommunication mast VIA
- Cookhouse wind monitoring masts VIA for a Basic Assessment Report
- Hopefield wind monitoring masts VIA for a Basic Assessment Report
- Amakhala wind monitoring masts VIA for a Basic Assessment Report
- Caledon, Worcester and Tulbach wind monitoring masts VIAs for Basic Assessment

Reports

- Overberg masts VIA for a Basic Assessment Report
- Britannia Bay wind monitoring mast VIA for a Basic Assessment Report
- Brand-se-Baai wind monitoring masts VIA for a Basic Assessment Report
- Deep River wind monitoring masts VIA for a Basic Assessment Report
- Happy Valley wind monitoring masts VIA for a Basic Assessment Report
- River Bank wind monitoring mast VIA for a Basic Assessment Report
- Uiekraal wind monitoring masts VIA for a Basic Assessment Report
- Beaufort West wind monitoring masts VIA for a Basic Assessment Report
- Laingsburg Wind monitoring masts VIA for a Basic Assessment Report
- Rheboksfontein, Suurplaat and West Coast wind monitoring masts VIAs for Basic Assessment Reports
- Cookhouse wind energy facility VIA
- Hopefield wind energy facility VIA
- Mokopane Integration Project VIA
- Cradle of Humankind World Heritage Site (WHS) viewshed protection zone, visual character assessment and visual zonation plan
- Proposed Indwe wind energy facility VIA
- Proposed Amakhala wind energy facility VIA
- Proposed Boontjieskraal wind energy facility VIA
- Proposed Britannia Bay wind energy facility VIA
- Proposed Brand-se-Baai wind energy facility VIA
- Proposed Upington and Pofadder solar thermal facilities VIAs
- Proposed Dorper wind energy facility VIA
- Proposed Flagging Trees wind energy facility VIA
- Proposed Rheboksfontein, Suurplaat and West Coast wind energy facilities VIAs
- Proposed Riverbank wind energy facility VIA
- Proposed Waterberg photovoltaic plant VIA
- Eskom wind intergration projects VIAs (current)
- Welgedacht water care works VIA

PROFESSIONAL AFFILIATIONS

Application for *Geographical Information Sciences (GISc) Professional Practitioner* submitted to (and currently under review by) The South African Council for Professional and Technical Surveyors (PLATO).

LANGUAGES

	Reading	Writing	Speaking
Afrikaans	Excellent	Excellent	Excellent
English	Excellent	Excellent	Excellent

Ivan Baker

M.Sc Environmental Science and
Hydropedology (*Pr Sci Nat pending*)

Cell: +27 79 898 4056

Email: ivan@thebiodiversitycompany.com

Identity Number: 9401105251087

Date of birth: 10 January 1994



Profile Summary

Working experience throughout Southern Africa

Working experience in West-Africa

Specialist experience with mining, construction and agriculture.

Specialist expertise include hydropedology, pedology, land contamination, agricultural potential, land rehabilitation, rehabilitation management and wetlands resources.

Experience hydropedological modelling (HYDRUS model)

Areas of Interest

Mining, Oil & Gas, Renewable Energy & Bulk Services Infrastructure Development, Farming, Land contamination, Sustainability and Conservation.

Key Experience

- Environmental Impact Assessments (EIA)
- Environmental Management Programmes (EMP)
- Wetland delineations and ecological assessments
- Rehabilitation Plans and Monitoring
- Soil-and rock classification
- Level 1, 2 and 3 hydropedology assessments
- Agriculture potential assessments
- Land contamination assessments
- Modulation of surface- and subsurface flows (HYDRUS model)

Country Experience

South Africa	Mozambique
Swaziland	Zimbabwe
Guinea	Zambia

Nationality

South African

Languages

English – Proficient

Afrikaans – Proficient

Qualifications

- MSc (North-West University of Potchefstroom) – Hydropedology
- BSc Honours (North-West University of Potchefstroom) – Environmental geology- Pedology and rehabilitation
- BSc Environmental sciences
- Cand Sci Nat (Pr Sci Nat Pending)
- Certificate of Competence: Fertiliser Society of South Africa
- Certificate of Competence: Tools for Wetland Assessments

SELECTED PROJECT EXPERIENCE

Project Name: Environmental impact assessment for the construction of Road DR08606 leading to Mlamli Hospital, Sterkspruit

Personal position / role on project: Wetland ecologist

Location: Sterkspruit, Eastern Cape Province, South Africa

Main project features: To conduct a wetland assessment, as a component of the environmental authorisation process and Water Use Licence Application (WULA) for the construction of Road DR08606 leading to Mlamli Hospital

Project Name: Biodiversity Baseline & Impact Assessment Report for the proposed Nondvo Dam Project

Personal position / role on project: Wetland ecologist

Location: Mbabane, Swaziland

Main project features: To conduct various assessments according to IFC standards in regard to delineation of wetlands and assessing ecosystem services.

Project Name: Agricultural Potential Assessment - Proposed Kalabasfontein Coal Mining Project Extension

Personal position / role on project: Project Manager and Soil Specialist.

Location: Bethal, Mpumalanga, South Africa

Main project features: To conduct a soil assessment to identify any sensitive resources that might be affected by the proposed mining activities and associated infrastructure as part of an environmental impact assessment.

Project Name: Soil assessment for the closure of the St Helena Shaft, Harmony

Personal position / role on project: Soil specialist

Location: Welkom, Free State, South Africa

Main project features: To conduct a thorough soil and fertility assessment to recommend relevant mitigation and rehabilitation measures to finalise closure at the relevant mine

Project Name: Wetland Functionality Assessment for the Environmental, Health and Socio-Economic Baseline Studies for Block 2 at Siguiri Gold Mine

Personal position / role on project: Wetland ecologist

Location: Siguiri, Guinea, West-Africa

Main project features: To conduct various assessments according to IUCN standards in regard to delineation of wetlands and assessing ecosystem services.

Project Name: Level 3 Hydropedological Assessment for the Sara Buffels Mining Project

Personal position / role on project: Hydropedologist

Location: Ermelo, Mpumalanga, South-Africa

Main project features: To conduct various assessments to determine the hillslope hydrology and to acquire information relevant to the vadose zone's hydraulic properties to quantify sub-surface flows by means of modelling.

Project Name: Level 3 Hydropedological Assessment for the Buffalo Coal Mining Project

Personal position / role on project: Hydropedologist

Location: Dundee, KwaZulu-Natal, South-Africa

Main project features: To conduct various assessments to determine the hillslope hydrology and to acquire information relevant to the vadose zone's hydraulic properties to quantify sub-surface flows by means of modelling

Project Name: Biodiversity Baseline & Impact Assessment for the proposed Tereane 15MW Solar PV Plant

Personal position / role on project: Ecosystem Services Specialist

Location: Cuamba, Mozambique, Southern-Africa

Main project features: To conduct various assessments according to IUCN standards in regard to ecosystem services

Project Name: Land contamination assessment for the proposed Fleurhof Development

Personal position / role on project: Soil Specialist

Location: Fleurhof, South Africa

Main project features: To conduct assessments relevant to the determination of land contamination, including recommendations, mitigations and risk assessments.

OVERVIEW

An overview of the specialist technical expertise include the following:

- Ecological wetland assessment studies, including the integrity (health) and functioning of the wetland systems.
- Wetland offset strategy designs.
- Wetland rehabilitation plans.
- Monitoring plans for wetland systems.
- Soil classification and agricultural assessments.
- Stripping and stockpiling guidelines.
- Soil rehabilitation plans.
- Soil and stockpile monitoring plans.
- Hydropedological assessments.

TRAINING

Some of the more pertinent training undergone includes the following:

- Tools for a Wetland Assessment (Certificate of Competence) – Rhodes University 2018; and
- Workshop on digital soil mapping.

EMPLOYMENT EXPERIENCE

Internship at SRK consulting (January 2017-August 2017)

- **Field assistant** for SRK consulting during 2017 included the sampling of surface and groundwater as well as on site tests, the accumulation of various different data sets from field loggers, presenting and arranging the relevant data and ultimately using it for my own personal post-graduate studies.

Internship at The Biodiversity Company (August 2017-December 2017)

Employed as an intern (wetland and soil scientist) during the last few months of 2017. During this period, I was part of a variety of soil- and wetland projects, both as report writer and/or field assistant.

CURRENT EMPLOYMENT: The Biodiversity Company (January 2018 – Present)

- **Scientific report writing** to ensure that the relevant standards and requirements have been attained, namely local country legislation, as well as WB, EP and IFC requirements.

ACADEMIC QUALIFICATIONS

North-West University of Potchefstroom: MAGISTER SCIENTIAE (MSc) - Hydropedology:

Title: *Characterisation of vadose zone processes in a tailings facility*

North-West University of Potchefstroom (2016): BACCALAUREUS SCIENTIAE HONORIBUS (Hons) – Environmental Geology- Pedology and rehabilitation

North-West University of Potchefstroom (2015): BACCALAUREUS SCIENTIAE IN NATURAL AND ENVIRONMENTAL SCIENCES. Majors: Geology and Geography



CEDAR TOWER
SERVICES

CURRICULUM VITAE



Jenna Lavin

Tel: 083 619 0854 (c); 013 0131 (w)
E-mail address: jenna.lavin@cedartower.co.za
ID number: 8512050014089

EDUCATION:

Tertiary

- 2014 - M.Phil in Conservation of the Built Environment (University of Cape Town)
Ongoing - expected to graduate in 2015
- 2011 Continued Professional Development Course in Urban Conservation Management (University of Cape Town) Part I and Part II
- 2010 M.Sc. with Distinction in Archaeology (University of Cape Town)
Title: *Palaeoecology of the KBS member of the Koobi Fora Formation: Implications for Pleistocene Hominin Behaviour.*
- 2007 B.Sc. Honours in Archaeology (University of Cape Town)
Title: *The Lost Tribes of the Peninsula: An Investigation into the historical distribution of Chacma baboons (*Papio ursinus*) at the Cape Peninsula, South Africa.*
Koobi Fora Field School, Rutgers University (U.S.A.)/ National Museums of Kenya
- 2006 B.Sc. Archaeology (University of Cape Town)
B.Sc. Environmental and Geographic Science (University of Cape Town)

Secondary

- 1999-2003 Rustenburg High School for Girls
Firsts in English, Afrikaans, Mathematics HG, Biology HG, History HG, Entrepreneurship.



CEDAR TOWER
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EMPLOYMENT HISTORY:

PROFESSIONAL DEVELOPMENT

Environmental and Heritage Management:

- Head of Heritage Operations for Heritage CTS Consultants and member of OpenHeritage NPC.
July 2016 to present
- Assistant Director for Policy, Research and Planning at Heritage Western Cape.
August 2014 to June 2016

Responsibilities include drafting of new heritage related policy, the grading and declaration of Provincial Heritage Sites, the development of Conservation Management Plans, facilitating the development of inventories of heritage resources through local authorities as well as managing the development of the Western Cape's Heritage Information Management System (HIMS).

Acting Deputy Director from April to December 2015.

- Heritage Officer for Palaeontology and for the Mpumalanga Province at the South African Heritage Resources Agency (SAHRA).
January 2013 to June 2014

Responsibilities include dealing with palaeontological permit applications in terms of Section 35 of the NHRA and development applications in terms of Section 38 of the NHRA. Projects included the development of a National Palaeotechnic Report identifying significant palaeontological deposits throughout SA, as well as developing professional relationships between SAHRA and the Palaeontological Society of South Africa (PSSA) and the Geological Society of South Africa (GSSA). During this time, I was part of the team that developed the digitised National Palaeontological Sensitivity Map (<http://www.sahra.org.za/about/news/nov2013/palaeosensitivitymap>), the first of its kind in the world.

- Heritage Officer for Archaeology, Palaeontology and Meteorites at Heritage Western Cape (HWC).
September 2010 to December 2012

HWC is a Public Entity that forms part of the Heritage Resource Management Component of the Provincial Governments' Department of Cultural Affairs and Sport (DCAS). Projects included the declaration of Pinnacle Point and the West Coast Fossil Park as Provincial Heritage Sites (PHS), the management of the development of the Baboon Point PHS Conservation Management Plan as well as an educational outreach program as part of the DCAS MOD Centre Project.



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- Heritage Officer for the Archaeology, Palaeontology and Meteorites Unit of the South African Heritage Resources Agency (SAHRA) as part of a three month contract.
January 2010 to March 2010
- Environmental Control Officer, Amathemba Environmental Management Consulting
Part time: 2007 to 2009

Other

My private experience as a traveler in South Africa, Tanzania, Kenya, Namibia, Zambia, Malawi and Mozambique has inspired a passion for the conservation of environmental and heritage resources. I am passionate about sustainable living, with my Bachelor of Science in Environmental and Geographical Science providing a framework on which to base my values.

With a friend, I established the fundraising initiative, Chicks4Change, through which we managed to organize a number of successful events and raise R40 000 for Project Rhino to assist with anti-poaching initiatives.

In 2013 I was asked to join the panel of judges for the Ministerial awards for Heritage in the Western Cape. From 2013 to July 2014, I was a member of the Heritage Western Cape Archaeology, Palaeontology and Meteorites Committee. In July 2014, I presented at the Conference for the Palaeontological Society of South Africa on the use of GIS in the management of palaeontological resources in the face of increased development pressures. In April 2015 I participated in a conference on Landscape Archaeology hosted by the Leakey Foundation in San Fransisco, presenting on the management of archaeological landscapes in South Africa. In April 2016, I presented at the ICAHM Conference in Salalah, Oman on the management of archaeological heritage in South Africa.

In November 2013, I was awarded a bursary from the Department of Arts and Culture to complete the Masters in Philosophy in Conservation of the Built Environment through the UCT Faculty of Engineering and the Built Environment in 2014 and 2015.

I am a paid up member of the Association for Southern African Professional Archaeologists (ASAPA), the Association of Professional Heritage Practitioners (APHP), the Palaeontological Society of South Africa (PSSA) and ICOMOS South Africa, for which I am Vice-President of the Board. I am also a member of the International Committee for Archaeological Heritage Management (ICAHM).

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
- Awareness 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)	<ul style="list-style-type: none"> 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 KIs Develop information campaign materials and visual aids for focus groups, KIs 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)	<ul style="list-style-type: none"> 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)	<ul style="list-style-type: none"> 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
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	Nama Solar East (Pty) Ltd and Nama Solar West (Pty)	Reviewer, Quality Assurance & Project Support

Project Name & Location	Client Name	Role
Development Of The Nama Solar East Facility And Nama Solar West Solar Facility With Associated Infrastructure, Northern Cape	Ltd.	
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	Wind Relic (Pty) Ltd	Reviewer, Quality Assurance & Project Support

Project Name & Location	Client Name	Role
Between Somerset East And Makhanda, Eastern Cape Province		
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

Project Name & Location	Client Name	Role
Policy Component for agri-processing projects	eThekweni Municipality	Policy Coordinator/ Report Writer
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

**APPENDIX K:
APPLICABLE LEGISLATION**

Legislation	Applicable Requirements	Administering Authority	Compliance Requirements
<p>National Legislation</p> <p>Constitution of the Republic of South Africa (No. 108 of 1996)</p>	<p>In terms of Section 24, the State has an obligation to give effect to the environmental right. The environmental right states that:</p> <p><i>“Everyone has the right –</i></p> <ul style="list-style-type: none"> » <i>To an environment that is not harmful to their health or well-being, and</i> » <i>To have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that:</i> <ul style="list-style-type: none"> ○ <i>Prevent pollution and ecological degradation,</i> ○ <i>Promote conservation, and</i> <p><i>Secure ecologically sustainable development and use of natural resources, while promoting justifiable economic and social development.”</i></p>	<p>Applicable to all authorities</p>	<p>The Constitution has no permitting requirements. The application of the Environmental Right however implies that environmental impacts associated with proposed developments are considered separately and cumulatively. It is also important to note that the “right to an environment clause” includes the notion that justifiable economic and social development should be promoted, through using natural resources and ecologically sustainable development.</p>
<p>National Environmental Management Act (Act No 107 of 1998)</p>	<p>In terms of the Duty of Care Provision in section 28(1), Becrux Solar PV Project Two (Pty) Ltd must ensure that reasonable measures are taken throughout the lifecycle of this project, to ensure that any pollution or degradation of the environment associated with it is avoided, stopped or minimised.</p>	<p>Free State Department of Economic, Small Business Development, Tourism and Environmental Affairs (FSDESTEA) – competent authority</p>	<p>The listed activities triggered by the proposed Solar PV Facility have been identified and are being assessed as part of the BA process currently underway for the project. The BA process will culminate in the submission of a final BA Report to FSDESTEA for approval.</p>

Legislation	Applicable Requirements	Administering Authority	Compliance Requirements
	<p>In terms of NEMA, it is the legal duty of a project proponent to consider a project holistically, and the cumulative effect of a variety of impacts.</p> <p>Considering the capacity of the proposed solar PV facility (i.e., contracted capacity of 10MW) and the triggering of Activity 1 of Listing Notice 1 (GN R.983), a Basic Assessment process is required in support of the application for EA.</p>		
<p>National Environmental Management Act (Act No 107 of 1998)</p>	<p>In terms of the “Duty of Care and Remediation of Environmental Damage” provision in Section 28(1) of NEMA, every person who causes, has caused or may cause significant pollution or environmental degradation must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment.</p> <p>Under NEMA, it is the legal duty of a project proponent to consider a project holistically, and to consider the cumulative effect of a variety of impacts.</p>	<p>FSDESTEA</p>	<p>While no permitting or licensing requirements arise directly by virtue of the proposed project through this section, it finds application through the consideration of potential cumulative, direct, and indirect impacts. It will continue to apply throughout the lifecycle of the project.</p>

Legislation	Applicable Requirements	Administering Authority	Compliance Requirements
<p>Environment Conservation Act (Act No 73 of 1989) (ECA)</p>	<p>The Noise Control Regulations in terms of Section 25 of the ECA are applicable for noise control in the Free State Province.</p>	<p>FSDESTEA</p>	<p>Noise impacts are expected to be associated with the project's construction phase. Considering the project area's location in relation to residential areas and provided that appropriate mitigation measures are implemented, construction noise is unlikely to present a significant intrusion to the local community. There is therefore no requirement for a noise permit in terms of this legislation.</p>
<p>National Water Act (Act No 36 of 1998)</p>	<p>A water use listed under Section 21 of the NWA must be licensed with the Regional DHSWS, unless it is listed in Schedule 1 of the NWA (i.e. is an existing lawful use); is permissible under a General Authorisation (GA); or if a responsible authority waives the need for a water use licence (WUL).</p> <p>Water use is defined broadly and includes consumptive and non-consumptive water uses; taking and storing water; activities which reduce stream flow; waste discharges and disposals; controlled activities (activities which impact detrimentally on a water resource); altering a watercourse; removing water found underground for certain purposes; and recreation.</p> <p>Consumptive water uses may include taking water from a water resource</p>	<p>Regional Department of Human Settlements, Water and Sanitation (DHSWS)</p>	<p>A WUL or GA is required to be obtained if water resources are impacted on. The project area is located within the 500m regulated area of wetland features (i.e., seepage and unchanneled valley bottom wetlands). A General Authorisation for the project will therefore need to be registered with the DHSWS for water uses 21(c)&21(i); however, the process will only be completed once a positive EA has been received.</p>

Legislation	Applicable Requirements	Administering Authority	Compliance Requirements
	<p>(Section 21(a)) and storing water (Section 21(b)).</p> <p>Non-consumptive water uses may include impeding or diverting of flow in a watercourse (Section 21(c)); and altering of bed, banks or characteristics of a watercourse (Section 21(i)).</p>		
National Water Act (Act No 36 of 1998) (NWA)	In terms of Section 19, Becrux Solar PV Project Two (Pty) Ltd must ensure that reasonable measures are taken throughout the project's lifecycle to prevent and remedy pollution to water resources from occurring, continuing, or recurring.	Regional DHSWS	This section will apply with respect to the potential impact on the wetland features located within the 500m regulated area of the development area, primarily during the construction phase (i.e., pollution from construction vehicles).
Minerals and Petroleum Resources Development Act (Act No 28 of 2002) (MPRDA)	<p>In accordance with the MPRDA, a mining right permit is required where a mineral in question is to be mined, including the mining of materials from a borrow pit.</p> <p>Section 53 of the MPRDA states that any person who intends to use the surface of any land in any way which may be contrary to any object of the Act, or which is likely to impede any such object must apply to the Minister for approval in the prescribed manner.</p>	Department of Mineral Resources and Energy (DMRE)	<p>Any person who wishes to apply for a mining permit in accordance with Section 27(6) must simultaneously apply for an Environmental Authorisation in terms of NEMA. No borrow pits are expected to be required for the construction of the project, and as a result a mining permit or EA in this regard is not required to be obtained.</p> <p>In terms of Section 53 of the MPRDA, approval is required from the Minister of Mineral Resources and Energy to ensure that the proposed development does not sterilise a mineral resource that might occur on site.</p>

Legislation	Applicable Requirements	Administering Authority	Compliance Requirements
<p>National Environmental Management: Air Quality Act (Act No 39 of 2004) (NEM:AQA)</p>	<p>The National Dust Control Regulations (GNR 827), published under Section 32 of NEM:AQA, prescribe the general measures for dust control in all areas, and a standard for acceptable dustfall rates in residential and non-residential areas.</p> <p>In accordance with these Regulations any person who conducts any activity in such a way as to give rise to dust in quantities and concentrations that may exceed the dustfall standard set out in Regulation 3 must, upon receipt of a notice from the air quality officer, implement a dustfall monitoring programme.</p> <p>Any person who has exceeded the dustfall standard must, within three months after submission of the dustfall monitoring report, develop and submit a dust management plan to the air quality officer for approval.</p>	<p>FSDESTEA</p> <p>Fezile Dabi District Municipality</p>	<p>If the project results in the generation of excessive levels of dust, a dustfall monitoring programme would be required for the project. Dustfall monitoring results from the dustfall monitoring programme would then need to be included in a dust monitoring report, and a dust management plan would need to be developed.</p>
<p>National Heritage Resources Act (Act No 25 of 1999) (NHRA)</p>	<p>Relevant sections include- Section 7 stipulates assessment criteria and categories of heritage resources according to their significance. Section 35 of the NHRA provides for the protection of all archaeological and palaeontological sites, and meteorites.</p>	<p>South African Heritage Resources Agency (SAHRA)</p> <p>Free State Heritage Resources Authority</p>	<p>A Heritage Impact Assessment (including palaeontology) was undertaken for the project as per the requirements of Section 38 of the NHRA (refer to Appendix D4 of the BA Report).</p> <p>During the field survey, no heritage and archaeological resources of significance were identified within the development area.</p>

Legislation	Applicable Requirements	Administering Authority	Compliance Requirements
	<p>Section 36 provides for the conservation and care of cemeteries and graves by SAHRA where this is not the responsibility of any other authority.</p> <p>Section 38(1) lists activities which require developers or any person who intends to undertake a listed activity to obtain consent from the responsible heritage resources authority through the procedure set out in section 38. This is not required where a basic assessment is undertaken under NEMA, including a HIA, and SAHRA's requirements are considered the competent authority when granting the EA.</p> <p>Section 44 requires the compilation of a Conservation Management Plan and a permit from SAHRA for the presentation of archaeological sites as part of public enjoyment, education, research, tourism attraction.</p>		<p>In terms of palaeontology, the proposed site lies on the palaeontologically very highly sensitive rocks of the Vryheid Formation (Ecca Group, Karoo Supergroup) that could potentially preserve impression fossils of the Glossopteris flora. The site visit however confirmed that there were no fossils visible on the site and along the route for the grid connection.</p> <p>Should a heritage resource be impacted upon, a permit may be required from SAHRA or Free State Heritage Resources Authority, in accordance with of Section 48 of the NHRA, and the SAHRA Permit Regulations (GN R668).</p>
National Environmental Management: Biodiversity Act (Act No 10 of 2004) (NEM:BA)	<p>Section 53 of NEM:BA provides for the MEC / Minister to identify any process or activity in a listed ecosystem as a threatening process.</p> <p>Three government notices have been published in terms of Section 56(1) of NEM:BA as follows:</p>	DFFE and FSDESTEA	<p>Under NEM:BA, a permit would be required for any activity that is of a nature that may negatively impact on the survival of a listed protected species.</p> <p>A Terrestrial Ecology and Wetland Impact Assessment has been undertaken as part of the BA process (refer to Appendix D1 of the BA Report). No protected species which require a permit under</p>

Legislation	Applicable Requirements	Administering Authority	Compliance Requirements
	<ul style="list-style-type: none"> » Commencement of TOPS Regulations, 2007 (GNR 150). » Lists of critically endangered, vulnerable, and protected species (GNR 151), as amended in 2020 (GN627). » TOPS Regulations (GNR 152). <p>NEM:BA provides for listing threatened or protected ecosystems in one of four categories: critically endangered (CR), endangered (EN), and vulnerable (VU) or protected. The first national list of threatened terrestrial ecosystems has been gazetted, together with supporting information on the listing process, including the: purpose and rationale for listing ecosystems; criteria used to identify listed ecosystems; implications of listing ecosystems, and summary statistics and national maps of listed ecosystems (NEM:BA: National list of ecosystems that are threatened and in need of protection, (Government Gazette 1002, 9 December 2011, GG 34809.</p>		<p>NEM:BA were identified within the development area.</p>
<p>National Environmental Management: Biodiversity Act (Act No 10 of 2004)</p>	<p>Chapter 5 of NEM:BA pertains to alien and invasive species, and states that a person may not carry out a restricted activity involving a specimen of an AIP without a permit issued in terms of Chapter 7 of NEM:BA; and that a permit may only be issued after a</p>	<p>DFFE and FSDESTEA</p>	<p>A Terrestrial Ecology and Wetland Impact Assessment (refer to Appendix D1 of the BA Report) was undertaken as part of the BA process to identify any alien invasive plants present on site. Sixteen (16) alien invasive plants were recorded within the development area, namely, <i>Argemone ochroleuca</i>, <i>Canna indica</i>, <i>Cestrum parqui</i>,</p>

Legislation	Applicable Requirements	Administering Authority	Compliance Requirements
	<p>prescribed assessment of risks and potential impacts on biodiversity is carried out.</p> <p>Applicable, and exempted AIP are contained within the Alien and Invasive Species List 2020, GNR 1003 of Government Gazette No. 43726.</p>		<p><i>Cirsium vulgare, Datura ferox, Eucalyptus camaldulensis, Flaveria bidentis, Melia azedarach, Mirabilis jalapa Nerium oleander, Pennisetum clandestinum, Pinus pinaster, Robinia pseudoacacia, Tamarix ramosissima Verbena bonariensis, and Verbena brasiliensis.</i> These species are listed under the Alien and Invasive Species List 2020, Government Gazette No. GN1003 as Category 1b. Category 1b species must be controlled by implementing an invasive alien plants Management Programme, in compliance with section 75 of the NEMBA, as stated above.</p>
<p>Conservation of Agricultural Resources Act (Act No 43 of 1983) (CARA) and</p> <p>Regulations (GN R1048) (CARA Regulations)</p>	<p>Section 5 of CARA provides for the prohibition of the spreading of weeds.</p> <p>Relevant sections include:</p> <p>Regulation 15 provides for the classification of categories of weeds and invader plants, and restrictions in terms of where these species may occur.</p> <p>Regulation 15E provides requirements and methods to implement control measures for different categories of AIPs.</p>	<p>Department of Agriculture, Land Reform and Rural Development (DALRD)</p>	<p>CARA will apply throughout the project's lifecycle. In this regard, soil erosion prevention and soil conservation strategies need to be developed and implemented. In addition, a weed control and management plan must be implemented.</p> <p>In terms of Regulation 15E, where Category 1, 2 or 3 plants occur a land user is required to control them by means of one or more of the following methods:</p> <ul style="list-style-type: none"> » Uprooting, felling, cutting or burning. » Treatment with a weed killer that is registered for use in connection with such plants, in accordance with the directions for the use of such a weed killer. » Biological control, carried out in accordance with the stipulations of the Agricultural Pests Act (No. 36 of 1983), the ECA and any other applicable legislation. » Any other method of treatment recognised by the executive officer that has as its object the

Legislation	Applicable Requirements	Administering Authority	Compliance Requirements
			<p>control of plants concerned, subject to the provisions of sub-regulation 4.</p> <p>» A combination of one or more of the methods prescribed, save that biological control reserves and areas where biological control agents are effective shall not be disturbed by other control methods if the agents are destroyed or become ineffective.</p>
<p>National Forests Act (Act No. 84 of 1998) (NFA)</p>	<p>According to the NFA, the Minister may declare a tree, group of trees, woodland or a species of trees as protected. Notice of the List of Protected Tree Species under the NFA was published in GNR 536.</p> <p>The prohibitions provide that <i>"no person may cut, damage, disturb, destroy or remove any protected tree, or collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a licence granted by the Minister"</i>.</p>	<p>DFFE</p>	<p>A permit would need to be obtained for any protected trees that are affected by the project.</p> <p>The Terrestrial Ecology and Wetland Impact Assessment included a site visit which allowed for the identification of protected trees that may require a license in terms of the NFA within the project area (refer to Appendix D1 of the BA Report). The Terrestrial Ecology and Wetland Impact Assessment (Appendix D1 of the BA Report) identified no protected trees that may require a license in terms of the NFA within the development area.</p>
<p>National Veld and Forest Fire Act (Act 101 of 1998) (NVFFA)</p>	<p>Chapter 4 places a duty on owners to prepare and maintain firebreaks; the procedure in this regard; and the role of adjoining owners and the fire protection association. The applicant must ensure that: firebreaks are wide and long enough to have a reasonable chance of preventing a veldfire from spreading to or from</p>	<p>DFFE</p>	<p>Whilst the NVFFA has no permitting or licensing requirements, it will be applicable during the construction and operation of the project for the preparation and maintenance of firebreaks; and provision of appropriate equipment and trained personnel for firefighting purposes.</p>

Legislation	Applicable Requirements	Administering Authority	Compliance Requirements
	<p>neighbouring land; it does not cause soil erosion; and it is reasonably free of inflammable material capable of carrying a veldfire across it.</p> <p>Chapter 5 places a duty on all owners to acquire equipment and have available personnel to fight fires. Every owner on whose land a veldfire may start or burn, or from whose land it may spread, must have such equipment; protective clothing; and trained personnel for extinguishing fires. Such owners must ensure that in their absence responsible persons are present on or near their land who, in the event of fire, will extinguish it, or assist in doing so, and take all reasonable steps to alert adjoining landowners and the relevant fire protection association, if any.</p>		
Hazardous Substances Act (Act No 15 of 1973)	This Act regulates the control of: (i) substances that may cause injury, ill health, or death (due to their toxic, corrosive, irritant, strongly sensitising or inflammable nature or the generation of pressure thereby in certain instances); and (ii) certain electronic products. It provides for the: rating of such substances or products by the degree of danger; and prohibition and control of the importation, manufacture, sale, use, operation,	Department of Health	It is necessary to identify and list all Group I, II, III, and IV hazardous substances that may be on the project area and in what operational context they are used, stored or handled. If applicable, a licence would be required to be obtained from the Department of Health.

Legislation	Applicable Requirements	Administering Authority	Compliance Requirements
	<p>modification, disposal or dumping of such substances and products.</p> <ul style="list-style-type: none"> » <i>Group I and II:</i> Any substance or mixture of a substance that might by reason of its toxic, corrosive etc., nature or because it generates pressure through decomposition, heat or other means, cause extreme risk of injury etc., can be declared as Group I or Group II substance. » <i>Group IV:</i> any electronic product, and » <i>Group V:</i> any radioactive material. <p>The use, conveyance, or storage of any hazardous substance (such as distillate fuel) is prohibited without an appropriate licence being in force.</p>		
<p>National Environmental Management: Waste Act, 2008 (Act No 59 of 2008) (NEMWA)</p>	<p>The Minister may by notice in the <i>Gazette</i> publish a list of waste management activities that have, or are likely to have, a detrimental effect on the environment.</p> <p>The Minister may amend the list by –</p> <ul style="list-style-type: none"> » adding other waste management activities to the list; » removing waste management activities from the list; and 	<p>DFFE (hazardous waste)</p> <p>FSDESTEA (general waste)</p>	<p>No waste listed activities are triggered by proposed project, therefore, no Waste Management Licence is required to be obtained.</p> <p>General and hazardous waste handling, storage and disposal will be required during construction and operation. The National Norms and Standards for the Storage of Waste (GNR 926), published under Section 7(1)(c) of NEM:WA, will need to be considered in this regard.</p>

Legislation	Applicable Requirements	Administering Authority	Compliance Requirements
	<ul style="list-style-type: none"> » making other changes to the particulars on the list. <p>In terms of the Regulations published in terms of NEMWA (GN 921), a basic assessment or EIA is required to be undertaken for identified listed waste management activities.</p> <p>Any person who stores waste must at least take steps, unless otherwise provided by this NEMWA, to ensure that:</p> <ul style="list-style-type: none"> » the containers in which any waste are stored are intact and not corroded or in any other way rendered unfit for the safe storage of waste; » adequate measures are taken to prevent accidental spillage or leaking. » the waste cannot be blown away; » nuisances, such as odour, visual impacts and breeding of vectors, do not arise; and » environmental pollution and harm to health are prevented. 		
National Road Traffic Act (Act No 93 of 1996) (NRTA)	The technical recommendations for highways (TRH 11): " <i>Draft Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads</i> " outline the rules and conditions which	South African National Roads Agency Limited (national roads) Free State Department of Roads and Transport	An abnormal load/vehicle permit may be required to transport the various components to site for construction. These include route clearances and permits for vehicles carrying abnormally heavy or abnormally dimensioned loads; and transport vehicles exceeding the dimensional limitations

Legislation	Applicable Requirements	Administering Authority	Compliance Requirements
	<p>apply to the transport of abnormal loads and vehicles on public roads; and the prescribed procedures in applying for exemption permits are described and discussed.</p> <p>Legal axle load limits and the restrictions imposed on abnormally heavy loads are discussed in relation to the damaging effect on road pavements, bridges, and culverts.</p> <p>The general conditions, limitations, and escort requirements for abnormally dimensioned loads and vehicles are also discussed and reference is made to speed restrictions, power/mass ratio, mass distribution, and general operating conditions for abnormal loads and vehicles. Provision is also made for the granting of permits for all other exemptions from the requirements of the NRTA and its relevant Regulations.</p>		<p>(length) of 22m. Depending on the trailer configuration and height when loaded, some of the on-site substation components may not meet specified dimensional limitations (height and width).</p>
<p>Astronomy Geographic Advantage Act (Act No. 21 of 2007) (AGA)</p>	<p>The AGA provides for: the preservation and protection of areas within South Africa that are uniquely suited for optical and radio astronomy; intergovernmental co-operation and public consultation on matters concerning nationally significant astronomy advantage areas; and matters connected thereto.</p>	<p>Department of Science and Technology.</p>	<p>The project site is located within the Free State Province and well outside of those areas considered as nationally significant astronomy advantage areas. Therefore, the requirements of AGA are not considered applicable.</p>

Legislation	Applicable Requirements	Administering Authority	Compliance Requirements
	<p>Chapter 2 of the AGA allows for the declaration of astronomy advantage areas. Chapter 3 pertains to the management and control of astronomy advantage areas, which includes the following:</p> <ul style="list-style-type: none"> » Restrictions on use of radio frequency spectrum in astronomy advantage areas; » Declared activities in core or central astronomy advantage area; » Identified activities in coordinated astronomy advantage area; and » Authorisation to undertake identified activities. 		
<p>Aviation Act (Act No 74 of 1962) 13th amendment of the Civil Aviation Regulations (CARS) 1997</p>	<p>Any communications structure, building or other structure, whether temporary or permanent, which has the potential to endanger aviation in navigable airspace or interfere with the operation of navigation or surveillance systems or Instrument Landing Systems, including meteorological systems for aeronautical purposes, is considered an obstacle and must be submitted to the Commissioner for Civil Aviation for evaluation (refer SA-CAR Part 139.01.33).</p> <p>The following structures require markings:</p>	<p>South African Civil Aviation Authority (CAA)</p>	<p>This Act will find application during the operation phase of the project. Appropriate marking of project infrastructure >45m above ground level is required to meet the specifications, as detailed in the CAR Regulations Part 139.01.33. An obstacle approval (or confirmation that no approval is required) would be obtained from the South African CAA.</p>

Legislation	Applicable Requirements	Administering Authority	Compliance Requirements
	<ul style="list-style-type: none"> » Any structure exceeding 45m above ground level or structures where the top of the structure exceeds 150m above the mean ground level, the mean ground level considered to be the lowest point in a 3km radius around such structure. » Structures lower than 45m, which are considered as a danger to aviation shall be marked as such when specified. » Overhead wires, cables etc., crossing a river, valley or major roads shall be marked; and, in addition, their supporting towers marked and lighted if an aeronautical study indicates it could constitute a hazard to aircraft. 		
Provincial Legislation			
Free State Nature Conservation Ordinance 8 of 1969	Lists plant and animal species as protected	FSDESTEA	A Terrestrial Ecology and Wetland Impact Assessment has been undertaken as part of the BA process (refer to Appendix D1 of the BA Report). No protected flora and fauna species which require a permit under the Free State Nature Conservation Ordinance were identified within the development area.