

## **DRAFT ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT**

**for**

### **Development of the Kiwano Solar Photovoltaic Facility and Battery Energy Storage System, including associated substation and 132kV loop-in loop-out powerlines**

**Report No : 21139-46-Rep-002-Kiwano Solar  
PV DEMPr-Rev0**

#### **Submitted to:**

Department of Forestry, Fisheries and the  
Environment  
Environment House,  
473 Steve Biko,  
Arcadia,  
Pretoria,  
0083  
South Africa

11 November 2022

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## DOCUMENT CONTROL SHEET

**Project Title:** Draft EMPr for the Development of the Kiwano Solar Photovoltaic Facility and Battery Energy Storage System, including associated substation and 132kV loop-in loop-out powerlines

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## DOCUMENT APPROVAL

ACTION	DESIGNATION	NAME	DATE	SIGNATURE
Prepared	Senior EAP	Ms. Natasha Lalie	18/10/2022	
Reviewed/ Approved	Project Manager	Dr. Mathys Vosloo	01/11/2022	

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**LIST OF ACRONYMS**

Acronym	Description
AC	Alternating Current
BA	Basic Assessment
BAR	Basic Assessment Report
BBB-EE	Broad Based Black Economic Empowerment
BESS	Battery Energy Storage System
CA	Competent Authority
CBA	Critical Biodiversity Area
DC	Direct Current
DFFE	Department of Forestry, Fisheries and the Environment
DM	District Municipality
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
EN	Endangered
EO	Environmental Officer
EPC	Engineering, Procurement and Construction
ESA	Ecological Support Area
GA	General Authorisation
GNR	Government Notice Regulation
LC	Least Concern
LM	Local Municipality
MS	Method Statement
MSA	Middle Stone Age
MSDS	Material Safety Data Sheet
MW	Megawatt
MWh	Megawatt per Hour
NEMA	National Environmental Management Act 107 of 1998 (as amended)
NEMBA	National Environmental Management: Biodiversity Act, 2004
NEMWA	National Environmental Management Waste Management Act 59 of 2008
NHRA	National Heritage Resources Act 25 of 1999
NLEPDS	Non-Lethal Energised Perimeter Detection System
NWA	National Water Act 36 of 1998
OEM	Original Equipment Manufacturers
OHS	Occupational Health and Safety Act 85 of 1993

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Acronym	Description
AC	Alternating Current
ONA	Other Natural Areas
O&M	Operation and Maintenance
PAIA	Promotion of Access to Information Act 2 of 2000
PM	Project Manager
POC	Points of Connection
PPE	Personal Protection Equipment
PPP	Public Participation Process
SACNASP	South African Council of Natural and Scientific Professions
SANRAL	Spatial Planning & Land Use Management
SAHRA	South African Heritage Resources Agency
SCC	Species of Conservation Concern
RAM	Risk Assessment Matrix
REDZ	Renewable Energy Development Zone
WULA	Water Use License Application
ZoR	Zone of Regulation

## GLOSSARY OF TERMS

Term	Description
<b>Alien species</b>	A species that is not indigenous to the area or out of its natural distribution range.
<b>Alternatives</b>	Alternatives are different means of meeting the general purpose and need of a proposed activity. Alternatives may include location or site alternatives, activity alternatives, process or technology alternatives, temporal alternatives or the 'do nothing' alternative.
<b>Alternatives</b>	Alternatives are different means of meeting the general purpose and need of a proposed activity. Alternatives may include location or site alternatives, activity alternatives, process or technology alternatives, temporal alternatives or the 'do nothing' alternative.
<b>Ambient sound level</b>	Background noise level already present in the environment (in the absence of noise generated by any other proposed development).
<b>Assessment</b>	The process of collecting, organising, analysing, interpreting and communicating information which is relevant.
<b>Commencement</b>	The start of any physical activity, including site preparation and any other activity on site resulting in the furtherance of a listed activity or specified activity, but does not include any activity required for the purposes of an investigation or feasibility study as long as such investigation or feasibility study does not constitute a listed activity or specified activity.
<b>Commissioning</b>	Commissioning commences once construction is completed. Commissioning covers all activities including testing after all components of the power station are installed.
<b>Construction</b>	Construction means the building, erection or establishment of a facility, structure or infrastructure that is necessary for the undertaking of a listed or specified activity. Construction begins with any activity which requires Environmental Authorisation.
<b>Construction Activity</b>	A Construction activity is any action taken by the Contractor, his subcontractors, suppliers or personnel during the Construction process.
<b>Contractor</b>	Any legal entity or consortium contracted to undertake the activity associated with the proposed project.
<b>Decommissioning</b>	Means to take out the active service permanently or dismantle partly or wholly, or closure of a facility to the extent that it cannot be readily re-commissioned.
<b>Development</b>	Means the building, erection, construction or establishment of a facility, structure or infrastructure, including associated earthwork or borrow pits, that is necessary or for the undertaking of a listed or specified activity but excludes any modification, alteration or expansion of such a facility, structure or infrastructure, including associated earthworks or borrow pits, and excluding the redevelopment of the same facility in the same location, with the same capacity and footprint.
<b>Development footprint</b>	Means any evidence of physical alteration as a result of the undertaking of any activity.
<b>Environment</b>	Environment means the surroundings within which humans exist and that are made up of – (i) the land, water and atmosphere of the earth; (ii) micro-organisms, plant and animal life; (iii) any part or combination of (i) and (ii) and the interrelationships among and between them; and (iv) the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.
<b>Environmental Aspect</b>	Element of an organization's activities or products or services that can interact with the environment.
<b>Environmental Control Officer (ECO)</b>	The person to be appointed by the Contractor, with the approval of the Engineer, to oversee the construction activities and to ensure that all environmental specifications and EMPr obligations are met during these



Term	Description
	phases. The ECO will be responsible for the monitoring, reviewing and verifying of compliance with the EMPr by the Contractor.
<b>Environmental Assessment Practitioner</b>	Individual responsible for the planning, management, coordination or review of Environmental Impact Assessments, Strategic Environmental Assessments, Environmental Management Programmes or any other appropriate environmental instruments introduced through regulations.
<b>Environmental Impact</b>	Any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organization's environmental aspects.
<b>Habitat</b>	The place in which a species or ecological community occurs naturally.
<b>Hazardous waste</b>	Any waste that contains organic or inorganic elements or compounds that may, owing to the inherent physical, chemical or toxicological characteristics of that waste, have a detrimental impact on health and the environment (Van der Linde and Feris, 2010; pg 185).
<b>Heritage</b>	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
<b>Indigenous</b>	All biological organisms that occurred naturally within the study area prior to 1800
<b>Interested and Affected Party</b>	Interested and Affected Party for the purposes of Chapter 5 of the NEMA and in relation to the assessment of the environmental impact of a listed activity or related activity, means an interested and affected party contemplated in Section 24(4)(a)(v) of the NEMA and which includes - a) Any person, group of persons or organisation interested in or affected by such operation or activity; and b) Any organ of state that may have jurisdiction over any aspect of the operation or activity.
<b>Maintenance</b>	Means actions performed to keep a structure or system functioning or in service on the same location, capacity and footprint.
<b>Pollution</b>	Pollution means any change in the environment caused by - (i) substances; (ii) radioactive or other waves; or (iii) noise, odours, dust or heat, emitted from any activity, including the storage or treatment of waste or substances, construction and the provision of services, whether engaged in by any person or an organ of state, where that change has an adverse effect on human health or well-being or on the composition, resilience and productivity of natural or managed ecosystems, or on materials useful to people, or will have such an effect in the future.
<b>Pre-construction</b>	The period prior to the commencement of construction, which may include activities (e.g. geotechnical surveys) which do not require Environmental Authorisation.
<b>Significant impact</b>	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.
<b>Waste</b>	Any substance, whether or not that substance can be reduced re-used, recycled and recovered; that is surplus, unwanted, rejected, discarded, abandoned or disposed of which the generator has no further use for the purposes of production. Any product which must be treated and disposed of, that is identified as waste by the minister of Environmental affairs (by notice in the Gazette) and includes waste generated by the mining, medical or other sectors, but: A by-product is not considered waste, and portion of waste, once re-used, recycled and recovered, ceases to be waste.

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## **1 INTRODUCTION AND BACKGROUND**

Eskom Holdings SOC Limited (“Eskom”) is proposing to develop, construct and operate a 58 Megawatt (MW) Solar Photovoltaic (PV) facility and a Battery Energy Storage System (BESS) with an envisaged capacity of 40 MW / 200 Megawatt Hour (MWh). The development further includes construction of the 132kV Kiwano substation with 5 feeder bays and a single Twin-Tern 132 kV overhead powerline on a double circuit support structure connecting Kiwano substation to the Upington substation. A pipeline and an access road are proposed on site. The proposed development occurs on the remainder of the Farm Keimoes 1080 in Upington, Northern Cape.

The project location is situated approximately 27 km southwest of the town of Upington in the Northern Cape Province. The project will be located within Ward 8 of the Dawid Kruiper Local Municipality (LM) and within the jurisdiction of the Z F Mgcawu District Municipality (DM). Refer to Figure 1-1. The project site can be accessed off the N14, southwest of Upington.

Two site alternatives have been assessed in the Basic Assessment Report (BAR) i.e. Site Alternative A and Site Alternative B. Site Alternative B is the preferred site for the proposed development, as per the findings of the Basic Assessment (BA) process. Refer to Figure 1-1 for the location of the site alternatives.

This Environmental Management Program (EMPr) details the specifications and requirements identified for the proposed development.

Refer to the standalone Generic EMPr for the proposed construction of a 132kV single twin-turn overhead powerline connecting the Kiwano substation to the Upington substation in Appendix 2.

Refer to the standalone Generic EMPr for the proposed on-site substation in Appendix 3.

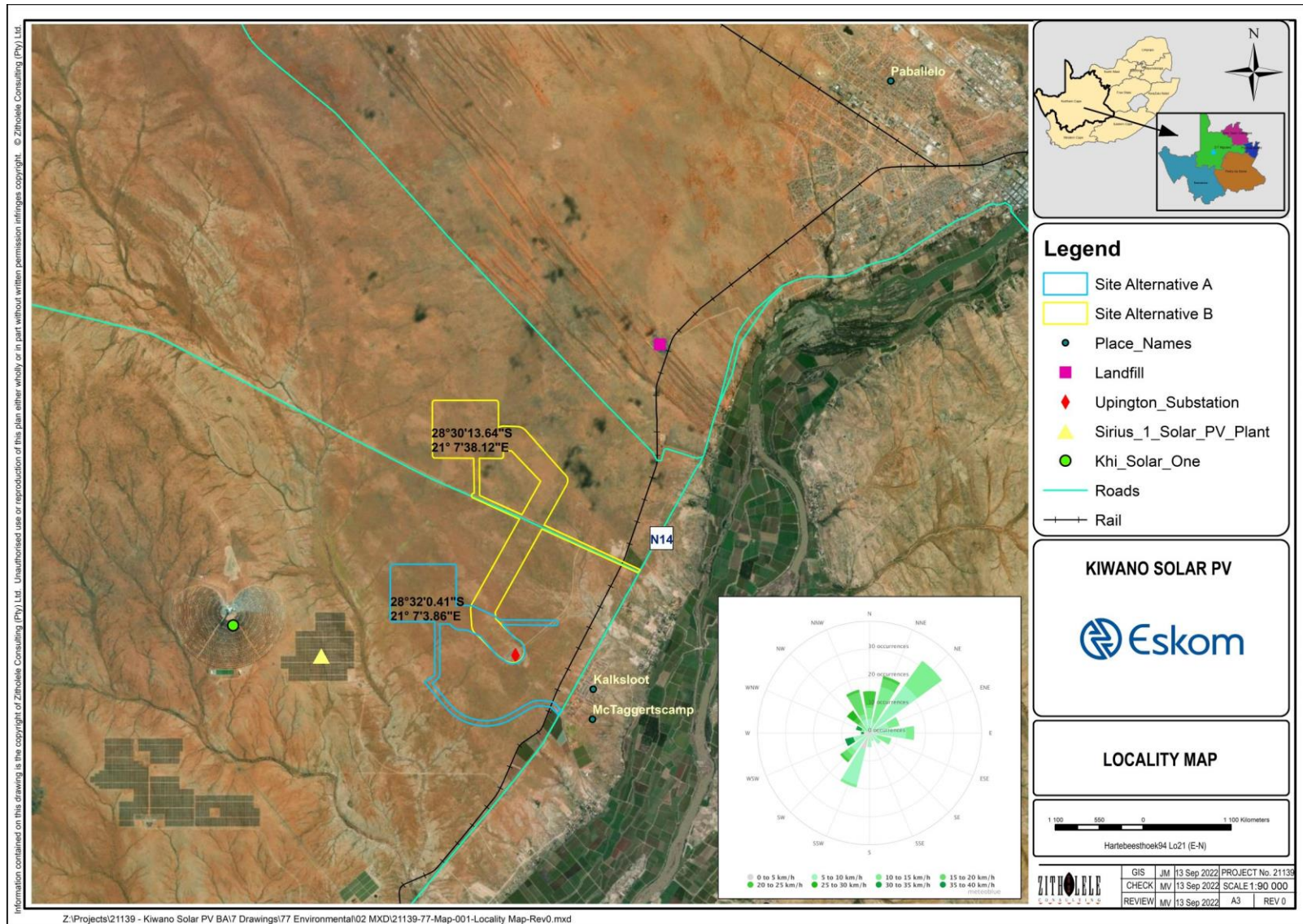


Figure 1-1: Locality Map

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## **1.1 Need and desirability**

The usage of renewable energy to generate electricity has become essential in reducing the emissions of greenhouse gases and to provide additional energy capacity to South Africa's energy grid. It has become a global trend to develop technologies that are sustainably friendly to the environment and also efficiently generating enough electricity that can power businesses and households. Eskom has invested in renewable energy technologies in their commitment to diversify their energy mix and also play their part in reducing the carbon emissions produced by their existing power generation fleet. The construction of the substation and powerline is intended to support the operation of the solar PV plant and BESS facility, which will be connected to Eskom's existing energy grid.

Electricity generation from renewable sources are limited by the intermittency and variability of wind and solar resources, i.e. when wind blows and sun shines. Energy storage allows for the storing of electricity for later use even when the renewable resource is unavailable. The process involves the conversion of electrical energy into another form of energy such as chemical or kinetic energy, store it temporarily and then converted back to electrical energy, therefore giving the utility considerable flexibility and control.

Eskom further proposes the development and operation of the BESS to provide ancillary support in terms of enhanced frequency control of the network, reactive power support and improved quality of supply performance near existing Distributed Generation Renewable Energy plants. The Battery Storage technology may enable the immediate levels of constraint to be addressed and provide continued access to potential customers to these networks. The battery storage technology will also improve the quality of supply and mitigate voltage related concerns on the networks.

## **1.2 General objectives and purpose of EMPR**

Eskom (Applicant) together with the Contractors appointed to undertake the development and installation activities will be required to do the following:

- Manage and operate their activities with due care and diligence;
- Avoid and/or limit any adverse impacts they may have on the environment by the proper design and construction of the proposed development;
- Control predicted impacts that may occur, so as to meet acceptable standards, both as a legal and a moral responsibility to the environment within which they operate; and
- Ensure transparency in their operation and environmental management of the site.

This Draft Environmental Management Programme (EMPr) serves as a stand-alone document to be issued to and used by Eskom (Applicant), the Contractor/s, sub-consultants and Project Managers (PMs) / Supervisors during the construction and operational phases of

the project. By its very nature, the EMPr is a dynamic document and updating may be required over the life of the development.

### 1.3 Details and expertise of Environmental Assessment Practitioner

In terms of the National Environmental Management Act, (Act 107 of 1998) as amended (NEMA) and EIA Regulations (2014), the proponent/developer must appoint an Environmental Assessment Practitioner (EAP) to undertake a BA and/or Public Participation Process (PPP) for listed activities regulated in terms of the aforementioned act. In this regard, Eskom has appointed Zitholele Consulting (Pty) Ltd as the EAP on this project to undertake the BA process for the proposed project, in accordance with the aforementioned regulations.

Zitholele is an empowerment company formed to provide specialist consulting services primarily to the public sector in the fields of Water Engineering, Integrated Water Resource Management, Environmental and Waste Services, Communication (public participation and awareness creation) and Livelihoods and Economic Development.

Zitholele Consulting has no vested interest in the proposed project and hereby declares its independence as required by the EIA Regulations (2014, as amended).

This EMPr report has been compiled by the following persons who have the relevant expertise and experience in environmental management (see attached CV in **Appendix A**):

**Table 1-1: Details of EAP on this project**

<b>Name and Surname</b>	<b>Ms. Natasha Lalie (EAP and Technical Reviewer)</b>
<b>Highest Qualification</b>	MSc (Environment and Society)
<b>Professional Registration</b>	Environmental Assessment Practitioners Association of South Africa (EAPASA) - Registration No: 2021/3611
<b>Company Represented</b>	Zitholele Consulting (Pty) Ltd
<b>Physical Address</b>	Building 1, Maxwell Office Park, Magwa Crescent West, Waterfall City, Midrand
<b>Postal Address</b>	P O Box 6002, Halfway House, 1685
<b>Contact Number</b>	011 207 2060
<b>Facsimile</b>	086 674 6121
<b>E-mail</b>	<a href="mailto:natashal@zitholele.co.za">natashal@zitholele.co.za</a>
<b>Name and Surname</b>	<b>Dr. Mathys Vosloo (Project Manager, Project Consultant)</b>
<b>Highest Qualification</b>	PhD Zoology
<b>Professional Registration</b>	Pr.Sci.Nat. (400136/12)
<b>Company Represented</b>	Zitholele Consulting (Pty) Ltd
<b>Physical Address</b>	Building 1, Maxwell Office Park, Magwa Crescent West, Waterfall City, Midrand
<b>Postal Address</b>	P O Box 6002, Halfway House, 1685
<b>Contact Number</b>	011 207 2079
<b>Facsimile</b>	086 674 6121
<b>E-mail</b>	<a href="mailto:mathysv@zitholele.co.za">mathysv@zitholele.co.za</a>
<b>Name and Surname</b>	<b>Jessica Morwasehla (EAP and author of the EMPr)</b>
<b>Highest Qualification</b>	BSc Environmental and Resource Studies
<b>Professional Registration</b>	SACNASP Candidate. (121840)
<b>Company Represented</b>	Zitholele Consulting (Pty) Ltd

<b>Physical Address</b>	Building 1, Maxwell Office Park, Magwa Crescent West, Waterfall City, Midrand
<b>Postal Address</b>	P O Box 6002, Halfway House, 1685
<b>Contact Number</b>	011 207 2060
<b>Facsimile</b>	086 674 6121
<b>E-mail</b>	<a href="mailto:jessicam@zitholele.co.za">jessicam@zitholele.co.za</a>

#### 1.4 Specialist Teams

Various Specialists were appointed by Zitholele to undertake the relevant assessments to identify and assess impacts, and propose appropriate mitigation and management measures for the identified impacts. The following specialists were commissioned:

- Terrestrial Biodiversity Impact Assessment – Ms. Leigh-Ann de Wet (Pr Sci Nat) of The Biodiversity Company
- Heritage Impact Assessment – Mr. Jaco van der Walt MA (Archaeology) of HCAC
- Wetland Baseline and Risk Assessment – Mr. Ivan Baker (Pr Sci Nat) of The Biodiversity Company
- Visual Impact Assessment – Mr. Leo Quayle (Pr Sci Nat) of Geonest GIS and Environmental Advisory

#### 1.5 Details of project proponent

The details of the project proponent/Developer are provided in Table 1-2 below.

**Table 1-2: Proponent's details**

<b>Applicant name:</b>	Eskom Holdings SOC Ltd
<b>Company Registration number:</b>	2002/015527/06
<b>Contact person:</b>	Ms. Nondwe Khanye
<b>Responsible position:</b>	Officer : Environmental Management
<b>Physical address:</b>	Eskom Distribution, DSC Building, Ground floor (C Block), 69 Memorial Road, Monument Heights, Kimberley, 8301
<b>Telephone:</b>	053 830 5924
<b>Cell:</b>	064 532 9525
<b>Fax:</b>	n/a
<b>E-mail:</b>	<a href="mailto:khanyen@eskom.co.za">khanyen@eskom.co.za</a>

#### 1.6 Document Roadmap

The Draft EMPr document has been structured and collated to conform to Section 19(4) read with Appendix 4 of the National Environmental Management Act 107 of 1998 (NEMA) (as amended) Environmental Impact Assessment (EIA) Regulations of 2014. The relevant document parts which address each of the aspects provided in Appendix 4 of the NEMA EIA Regulation 2014 is provided in Table 1-3. This has been done to ensure that the Competent



Authority (CA) (i.e. DFFE) is provided with a comprehensive document that can be translated into a working / dynamic document during the Construction and Operational Phases of the proposed project.

**Table 1-3: Document Roadmap**

Relevant regulation, stipulation or condition			Relevant Document Part
Appendix 4			
1. An EMPr must comply with section 24N of the Act and include-			
(a)	details of -		
	(i)	the EAP who prepared the EMPr; and	Section 1.3
	(ii)	the expertise of that EAP to prepare an EMPr, including curriculum vitae;	Section 1.3 and Appendix A
(b)	a detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description;		Section 2
(c)	prepared map at an appropriate scale which superimpose 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;		Section 2
(d)	assessment 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;	Section 6
	(ii)	Pre-construction activities;	Section 6
	(iii)	Construction activities	Section 6
	(iv)	Rehabilitation of the environment after construction and where applicable post closure; and	Section 13
	(v)	Where relevant, operational activities	Section 6
(e)	a description and identification of impact management outcomes required for the aspects contemplated in paragraph (d);		Section 6
(f)	a description of the proposed impact management actions, identifying the manner in which the impact management outcomes and outcomes contemplated in paragraphs (d) will be achieved, and must, where applicable, include actions to-		
	(i)	Avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;	Section 6 & 11
	(ii)	Comply with any prescribed environmental management standards or practices;	Section 3 & 11
	(iii)	Comply with any applicable provisions of the Act regarding closure, where applicable; and	Not applicable
	(iv)	Comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable;	Not applicable
(g)	the method of monitoring the implantation of the impact management actions contemplated in paragraph (f);		Section 11, 12 and 13
(h)	the frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);		Section 11
(i)	an indication of the persons who will be responsible for the implementation of the impact management actions;		Section 4, 5 & 11
(j)	the time periods within which the impact management actions contemplated in paragraph (f) must be implemented;		Section 11

Relevant regulation, stipulation or condition		Relevant Document Part
(k)	the mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);	Section 11
(l)	a program for reporting on compliance, taking into account the requirements as prescribed by the Regulations;	Section 12
(m)	an environmental awareness plan prescribing the manner in which-	
	(i) The applicant intends to inform his or her employees of any environmental risk which may result from their work; and	Section 9
	(ii) Risks must be dealt with in order to avoid pollution or the degradation of the environment; and	Section 11
(n)	any specific information that may be required by the competent authority	Not Applicable
(2)	Where a government notice gazetted by the Minister provides for a generic EMP <sub>r</sub> , such generic EMP <sub>r</sub> as indicated in such notice will apply.	<p>As per Government Notice Regulation (GNR) No. 435 of 22 March 2019, the generic Environmental Management Programme, contemplated in Regulations 19(4), 23(4) and Appendix 4 to the Environmental Impact Assessment Regulations, 2014, as amended has been used.</p> <p>Refer to the Generic EMP<sub>r</sub> for the proposed powerline associated with the solar PV plant.</p> <p>Refer to the Generic EMP<sub>r</sub> for the proposed substation associated with the solar PV plant.</p>

## 2 PROJECT DESCRIPTION

### 2.1 Study Area

#### 2.1.1 Description of the Study Area

Two site alternatives have been assessed for the proposed development. i.e. Site Alternative A and Site Alternative B.

The study area for Site Alternative A is depicted by the blue polygon outline in Figure 2-1, while the study area for Site Alternative B is depicted by the yellow polygon outline in the same figure.



The straight-line distance between the approximate centre points of Site Alternative A and B is approximately 4km and 4.3km northwest of the N14 National Road, respectively. As is evident from the map, the study areas wholly include all the proposed infrastructure for the Kiwano Solar PV and BESS development.

Alternative Site B is the preferred site for the proposed development and this EMP provides the mitigation and management measures for Alternative Site B.

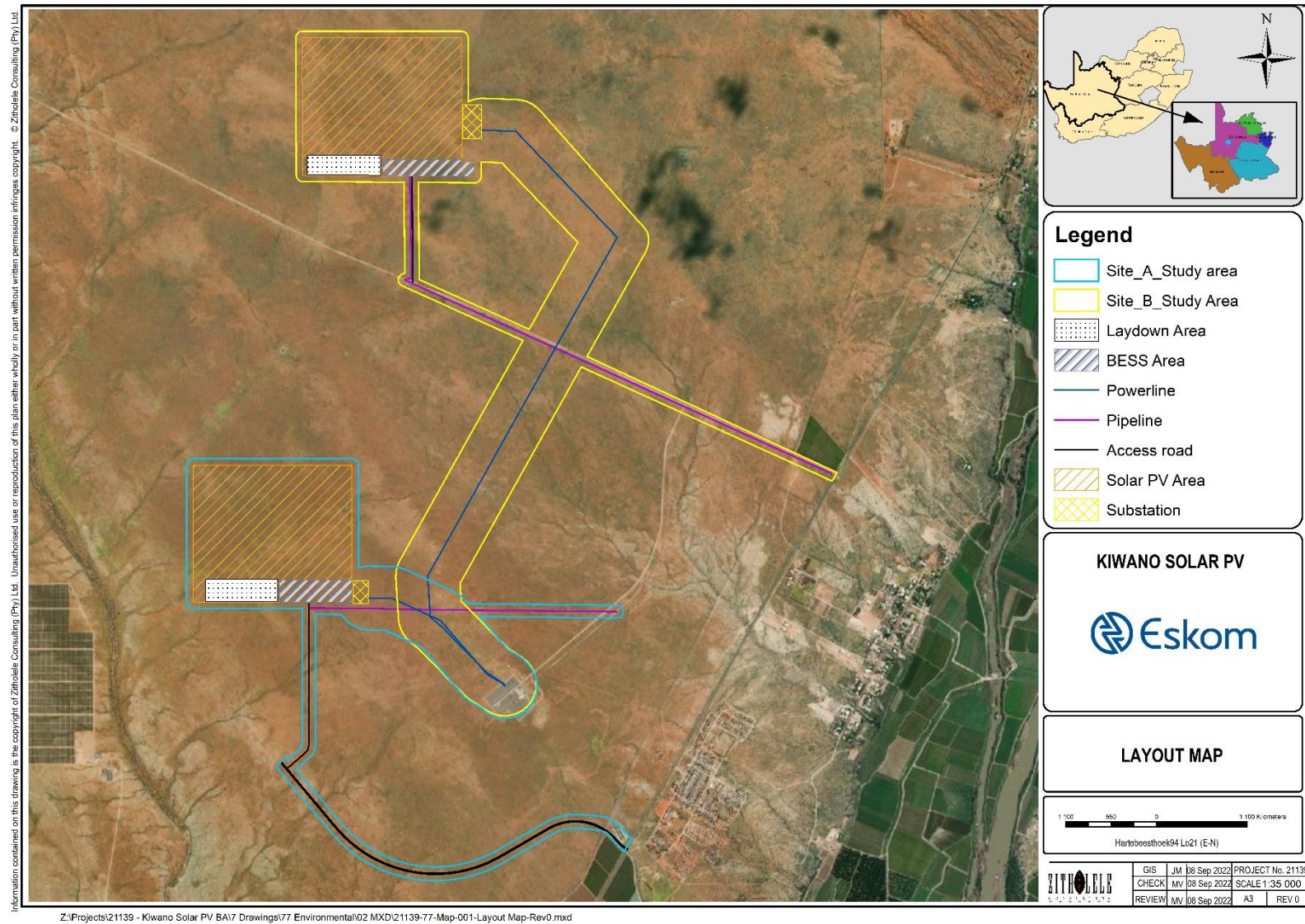


Figure 2-1: Kiwano Site Layout Alternatives

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## **2.2 Environmental Site Sensitivity**

The preferred site, i.e. Site Alternative B for the proposed solar PV facility, occurs within a medium ecological sensitivity area consisting of Karroid grassland. Several drainage lines occur across the central portion of the site. There are five stone age scatter sites located on the site and has low heritage significance.

The proposed pipeline and the proposed access road also consist of medium ecological sensitivity and consists of Karroid grassland. A possible grave marked by an oval cairn of river pebbles, measuring ~ 1.3 meters in diameter, is located some distance from the proposed pipeline. This grave has high social significance. Site B can be developed, if mitigation measures proposed are implemented around the potential burial site (K10), namely demarcation and avoidance with a 30m buffer. No adverse impact on heritage resources is expected by the project and it is recommended that the project can commence on the condition that the recommendations (Section 15) are implemented as part of the EMPr and based on approval from SAHRA.

Refer to the composite sensitivity map in Figure 2-2.



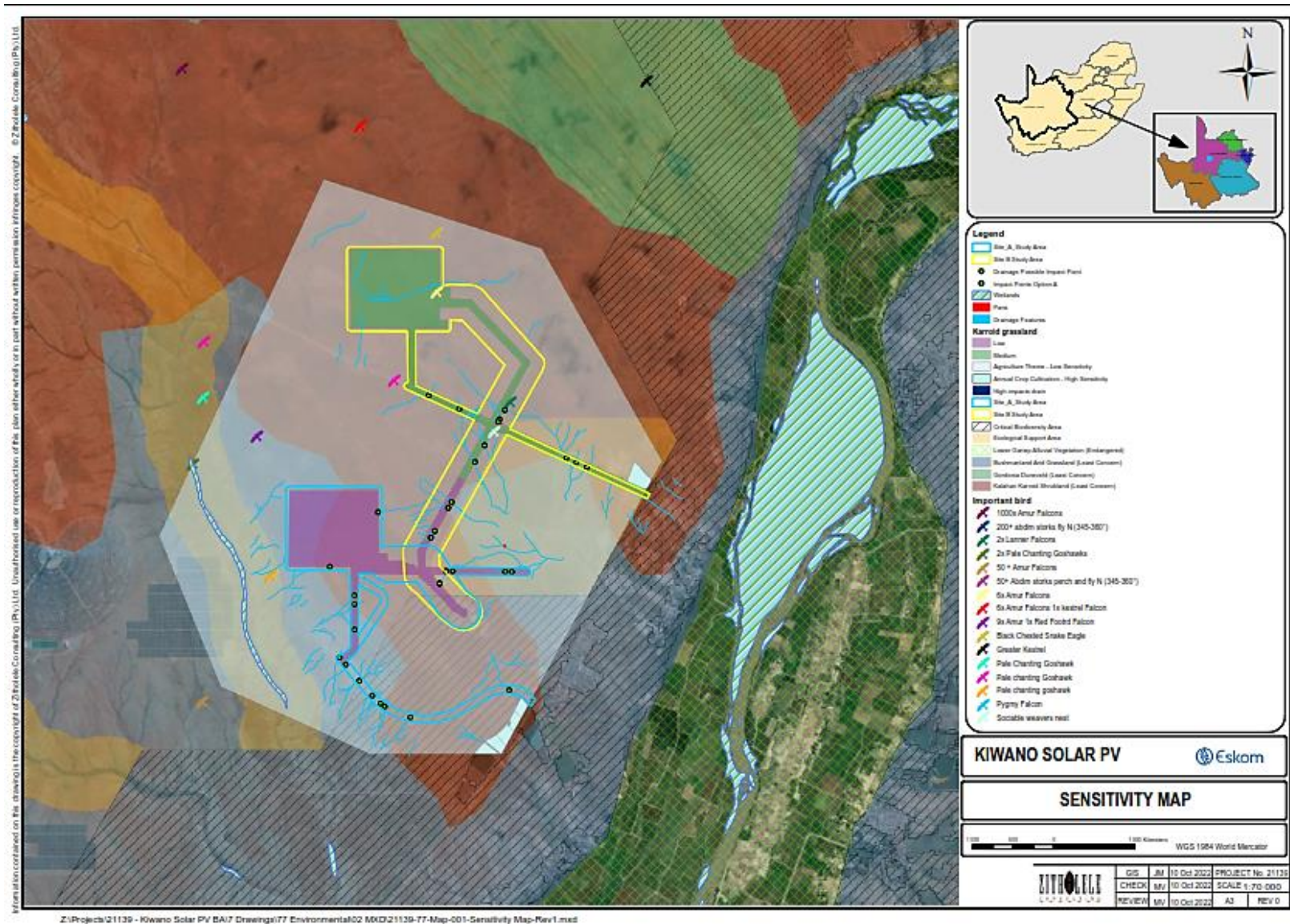


Figure 2-2: Composite Sensitivity Map

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## 2.3 Project Activities

Eskom proposes to install a Solar PV plant, grid-scale battery storage, substation, powerline, pipeline and an access road on the remainder of the Erf 1080 Olyvenhouts Drift Settlement (Gordonia) in Upington in Northern Cape. The proposed development aims to give an opportunity an Eskom to move to renewable energy, and storing energy to support the grid in any circumstance. The proposed development will also include the following infrastructure:

The proposed Kiwano BESS and PV facility will comprise of the following:

- PV installation with envisaged capacity of 58 MW.
- BESS installation with envisaged capacity of 40 MW / 200 MWh.
- Kiwano 132 kV substation with 5 feeder bays.
- Single Twin-Tern 132 kV overhead line on a double circuit support structure, connecting Kiwano substation to Upington substation.

The total site area envisaged for the PV installation will measure up to approximately 1 150 000m<sup>2</sup> (115 hectares). The Solar PV facility will include the following infrastructure:

- Two (2) x 40 MVA 132/22 kV transformers with associated 22 kV switchgear and control plant
- Solar PV plant with the output rating of 58 MW
- Establishment of the PV plant POC on the 132 kV between the PV plant and Kiwano 132kV busbar
- Separate statistical metering points to be commissioned for the BESS plant and the PV plant
- The BESS and solar PV plant are to be positioned and configured in isolation of each other, in terms of connections and dependency

The envisaged area for the solar PV modules, which will convert solar radiation directly into electricity, is expected to cover an area of approximately 450 000 m<sup>2</sup>. The solar PV modules will be elevated above the ground, and will be mounted on either fixed tilt systems, or tracking systems (comprised of galvanised steel and aluminium). The Solar PV modules will be placed in rows in such a way that there is allowance for a perimeter road and security fencing along the site boundary, and access roads in between the PV module rows.

### 2.3.1 Solar PV Plant

The Solar PV Plant generates electrical power by converting solar radiation through a process known as the photovoltaic effect. The Solar PV Plant consists of the following

components and configurations that will be further explored at conceptual design and specified in the functional specification:

- PV modules that are connected in series to form strings. These strings are further combined in parallel via combiner boxes to form PV arrays.
- PV ground mounting structures and foundations are used to fix the PV modules to the ground at the appropriate orientation to the sun.
- Inverter and transformer cabins which house the inverters that convert DC electricity from the PV arrays to AC electricity at grid frequency, and transformers to step-up the voltage as determined by the selected point of connection.
- Solar PV plant power collection switchgear, auxiliary transformers, and battery tripping units.
- AC cabling that will connect the Solar PV plant to the selected point of connection.
- Control and instrumentation equipment to monitor and configure plant operations.
- Infrastructure and associated utilities such as roads, storm water infrastructure, security fence, buildings, and meteorological measuring stations.

### **2.3.2 BESS Facility**

The BESS facility will be located in the south-eastern section of the development site (Figure 2-1) and will integrate at the proposed Kiwano substation together with the Solar PV facility. The BESS facility will include the following infrastructure:

- 2 x 40 MVA 132/22 kV transformers with associated 22 kV switchgear and control plant, and connect at Kiwano 132kV busbar
- Establish the BESS POC on the 132 kV between the BESS plant and Kiwano 132 kV busbar
- Build the BESS plant with an output rating of 40 MW / 200 MWh

The use cases for Kiwano BESS are ancillary services support and energy support. The custodian of ancillary services and energy support service is the System Operator. The BESS will have capability to charge from the proposed PV as well as from the grid. The dispatching of the BESS will be under the custodianship of the System Operator.

Generally, the BESS will be expected to charge during the low load period at night (23h00 to 04h59) and be available to provide ancillary and energy services during the day (05h00 to

22h59). The BESS is required to have flexibility for the System Operator to dispatch it for ancillary services and energy as and when required, for the good of the grid. The charging power will be limited by the capacity of the 2 x 40 MVA 132/22 kV transformation at Kiwano Substation. Thus the maximum charging rate of 80MW may not be exceeded (Eskom, 2020). It must be noted that the BESS must also be capable of charging outside the stated period when required by the System Operator.

To cater for the BESS round trip efficiency, the storage will be allowed to charge for durations longer than 5 hours to ensure that the required and contracted power and energy output of 40 MW / 200 MWh is available at the Points of Connection (POC). From the network capacity perspective, the assessments will be done such that the BESS is capable of discharging at any given time of the day via the Distribution network when dispatched to do so. The required BESS discharge capacity is 40 MW / 200 MWh for the Kiwano BESS.

In terms of the size requirements for the BESS facility, 63 m<sup>2</sup> containers are used to store BESS infrastructure within the plant. After the BESS densities per 63 m<sup>2</sup> container for a number of manufacturers were considered, the minimum BESS density per 63 m<sup>2</sup> container was found to be 2 MWh. Assuming the worst-case density of 2 MWh per 63m<sup>2</sup> container and 2 m spacing between containers, the required space for the 40 MW / 200 MWh BESS plant is 10 620 m<sup>2</sup>.

### **2.3.3 Kiwano 132 kV substation**

Eskom proposes to construct a 132 kV substation with 5 feeder bays on the eastern extent of the development site. This substation will be known as the Kiwano 132 kV substation and will include the following infrastructure:

- 132kV Double Bus-Bar
- 132kV Bus-Coupler
- 132kV incomer feeder bay
- Establish 2 x 132 kV feeder bays for the BESS connection
- Establish additional 2 x 132 kV feeder bays for the PV integration
- Spatial provision for a minimum of additional 4 x 132 kV feeder bays for future use

Kiwano Substation will be a dedicated substation to integrate the proposed BESS and PV projects into the network. No known local constraints that would prevent Kiwano BESS and PV from being able to export the 40 MW BESS and 58 MW PV were identified at the Kiwano site (Eskom, 2020).

It is further proposed that adequate space be allowed at Kiwano substation to accommodate additional 132kV line bays for future developments, should a need arise. It is envisioned that a total energy storage capacity of 340 MW / 1 360 MWh can be deployed at the proposed Kiwano substation without any additional network capacity upgrade on the Distribution

network through future upgrades as capacity requirements increase with future renewable energy developments.

For the substation site requirements, the dimensions of the neighbouring Upington MTS site were assumed for Kiwano substation. Upington MTS is a 300 m x 300 m substation, therefore the Kiwano substation site is proposed to be 90 000 m<sup>2</sup> (9 ha).

#### **2.3.4 Single Twin-Tern 132 kV overhead line**

The solar PV and BESS facility will include the construction of a 132kV single twin-turn overhead powerline on a double circuit support structure connecting the Kiwano substation to the Upington substation in order to evacuate power generated at the facility. Tower structures that will be utilised include S/C Angle Strain Structure at bend points along the powerline alignment, and S/C Suspension Structure for inline structures- between bend points. This line is rated at 408 MVA at 70°C templating.

The proposed line will be utilised in future to facilitate additional generation connections in the area from future and currently approved renewable projects and the Kiwano substation will be a collector substation. This will assist in avoiding having many lines running to and accessing Upington MTS which could lead to physical space constraints in future. Moreover, Upington/Kiwano 132kV line will accommodate future Kiwano BESS expansions. As such, a 132kV double circuit structure design with the provision of stringing only one circuit for the commissioning of Kiwano BESS and PV is proposed. The 2nd circuit is to be strung in future when the demand for more capacity at Kiwano materialises.

The powerline alignment has been proposed to follow existing infrastructure as closely as possible and to cover the shortest distance between the Kiwano and Upington substation as is technically feasible.

#### **2.3.5 Access, perimeter and internal roads**

The development will require the following roads to be constructed to service the solar PV and BESS facility:

- Access road from the nearest existing road to the facility. Where possible, existing roads that provide access to the Kiwano site will be used, upgraded, and extended as necessary. For Site A, an access road, approximately 6 m wide and estimated up to 5 km long, will be required to provide access to the PV site. For Site B, a new access road from the existing D3276 road to the site will be required, approximately 6 m wide and estimated up to 1 km long. The existing D3276 road will require upgrading, approximately 6 m wide and estimated up to 4 km long (from N14 to site access road).
- A perimeter road around the site, approximately 5 m wide and 4.5 km in length.



- Internal roads for access to the Inverter stations, approximately 5 m wide and 18 km total length.
- Internal roads/paths between the Solar PV module rows, approximately 2-3 m wide, to allow access to the Solar PV modules for operations and maintenance activities.

### **2.3.6 Infrastructure associated with the solar PV and BESS facility**

Supporting infrastructure is required to ensure effective operation of the solar PV and BESS facility. The associated infrastructure required include:

- Inverter stations: Each inverter station will occupy a footprint of up to approximately 30 m<sup>2</sup>, with up to 60 Inverter stations proposed to be installed on the site. Each Inverter station will contain an inverter, step-up transformer, and switchgear. The Inverter stations will be distributed on the site, located alongside its associated Solar PV module arrays. The Inverter station will perform conversion of direct current (DC) to alternating current (AC), and step-up the LV voltage of the inverter to 22 kV, to allow the electricity to be fed into the Kiwano substation. Inverter stations will connect several arrays of Solar PV modules and will be placed along the internal roads for easy accessibility and maintenance.
- Below ground electrical cables: Below ground electrical cables will be required to connect PV arrays, Inverter stations, Operational and Maintenance buildings, and 132kV Kiwano substation. Trenching will be required to excavate the trenches which will house the below ground electrical cables, before being closed and rehabilitated.
- Foundations and mounting structures: Adequately designed foundations and mounting structures will be required to support the Solar PV modules and Inverter stations.
- Operational and maintenance infrastructure: Infrastructure required for the operation and maintenance of the Kiwano Solar PV Plant will include:
  - Meteorological Station
  - Operation and Maintenance (O&M) Building, which will comprise a control room, server room, security equipment room, offices, boardroom, kitchen, and ablution facilities (including sewage infrastructure).
  - Spares Warehouse and Workshop
  - Hazardous Chemical Store
  - Security Building
  - Parking areas

### **2.3.7 Laydown area during construction**

A temporary laydown area occupying a footprint up to 100 000 m<sup>2</sup> (10 hectares) will be demarcated to the south of the Solar PV facility and west of the proposed BESS facility. The laydown area will be used during construction for the storage and handling of construction equipment and material. The laydown area will also accommodate water storage tanks or lined ponds, which is estimated to store- water for construction purposes measuring

approximately 815 kl/month for the first 3 months and 408 kl/month for the remaining 21 months, until construction is completed. The temporary laydown area will be rehabilitated once construction has been completed.

A temporary concrete batching plant will also be required and will occupy a footprint up to 10 000 m<sup>2</sup> (1 hectare). The concrete batching plant area will be used during construction and rehabilitated thereafter.

A temporary site construction office area, occupying a footprint up to 10 000 m<sup>2</sup> (1 hectare), will be constructed within the temporary laydown area footprint. This area will accommodate the offices for construction contractors during construction and rehabilitated thereafter.

### **2.3.8 Fencing**

It is recommended that the BESS area receive maximum physical protection in light of the fact that the site will be a target as a result of the batteries that will be stored on site. The following standards and standard drawings shall apply to the construction of the substation site perimeter and BESS perimeter barriers:

- All wire mesh fences shall be constructed in compliance with the Standard for High Security Mesh Fences (240-76368574).
- Energized fence to comply with the Standard for Non-lethal energized perimeter detection system (NLEPDS) for protection of Eskom installations and its subsidiaries (240-78980848)

The Substation perimeter barriers (3-tier) shall be constructed as follows:

- Outer perimeter:
  - The outer perimeter shall be constructed of a Category 2 High Security mesh Fence,
  - Fence height at 2.4m with double-V overhang with BTC installed at 600mm in diameter,
  - Access gate to match fence construction,
  - Anti-burrowing plinth as per standard (100mm wide by 600mm deep),
  - Galvanized coating as per standard,
  - Connected to station earth mat,
  - Pedestrian access gate to be provided with high security, all weather padlocks installed in protective sleeve (Sleeve required to prevent lock tampering).
- Energized fence:
  - Free standing 24 strand energized fence,
  - Fence height at 2.4m above ground level,
  - Gate to match fence construction and be energized with suitable contactor(s),
  - Minimum energy output at end-of –line to match 5 Joule,

- 
- Zones to be setup on the four sides, i.e. eastern side – Zone 1, southern side – Zone 2, western side – Zone 3, northern side – Zone 4,
    - Remote arming/disarming and alarming of the fence system with GUI for control room operator,
    - T-plinth installed under fence at 600mm wide by 100 high top slab with 100mm wide by 600mm deep anti burrowing plinth as per specification,
    - System integration with site PSIM.
    - Pedestrian access gate to be provided with high security, all weather padlock installed in protective sleeve (Sleeve required to prevent lock tampering),
    - Connected to station earth mat,
    - Energizer(s) to be installed in lockable enclosure within control room
  - Inner perimeter:
    - Fence height at 2.4m above ground level with V overhang with BTC installed at 600mm in diameter,
    - Pedestrian access gate to be provided with high security, all weather padlock installed in protective sleeve (Sleeve required to prevent lock tampering),
    - Foundation of concrete wall to cater for integrated sleeve for network infrastructure with appropriately positioned draw boxes and draw wires installed,
    - Connected to station earth mat,
  - Additional single-tier Category 1 High Security Fences will be constructed within the site to separate the BESS area and Solar PV area from the normal Substation. The fences shall be constructed as follows:
    - Category 1 High Security Mesh Fence,
    - Fence height at 2.4m
    - Vehicle Access Gates to match fence construction,
    - Galvanized coating as per standard,
    - Connected to station earth mat,
  - Gate access points
    - All gate access points to have required sleeves installed for electrical and communications services with construction to match security device positions.

## **2.4 Description of Project Component**

### **2.4.1 Pre-Construction and Construction process for the proposed development**

It is estimated that approximately 150-250 construction workers will be required on the site. Most of the unskilled labour will be sourced from the local towns nearby the site, and will be transported daily to site during construction.

The pre-construction and construction of the proposed development will be undertaken in the following steps:

- Undertaking and completion of proposed development concept. Eskom will execute the project utilising an Engineering, Procurement and Construction (EPC) Contractor. The final detailed designs, layout, and construction of the PV and BESS facility will be performed by the selected EPC Contractor.
- Obtain the relevant permits and siting approval (Undertake the BA Process, Water Use License Application (WULA/General Authorisation-GA), obtain permits from local authorities, landowners, fire department, etc.);
- Pre-construction site work, such as geotechnical investigations;
- Undertaking of, and compliance with pre-construction activities and conditions in terms of the Environmental Authorisation;
- Site preparation: Vegetation and topsoil will be cleared for the footprint of the infrastructure, as well as for the access roads to the solar PV site, internal roads and the laydown yard, etc. The topsoil removed will be stored for rehabilitation purposes of the site.
- Transportation of equipment: All equipment will be transported to site by means of national, provincial and district roads. This includes but is not limited to transformers, solar PV modules, inverters, excavators, towers, graders, trucks, compacting equipment, construction material, amongst others.
- Site Establishment Works: The site will have temporal laydown areas and offices for the construction contractors. This will include the contractor's chosen electricity supply infrastructure, e.g. use of generators and fuel storage, that will be required to conform to acceptable measures to ensure no harm to the environment. The laydown area will also be used for assembling of solar PV modules and structures. A concrete batching plant may also be required as part of the site establishment works.
- Construction of the Solar PV Facility and BESS: Trenches would need to be excavated for underground cabling to connect Solar PV arrays and Inverter stations. Foundations for the solar PV array mounting structures and Inverter stations will need to be excavated, with the final extent depending on the Geotechnical studies that will be conducted. The Geotechnical studies will determine the type of foundations that can be utilised at the PV site. Construction of access, perimeter, and internal gravel roads may require material to be imported from licenced material sources or a permitted quarry.
- Construction and/or installation of water supply and storm water management infrastructure.

- Construction and installation of underground electrical interconnection cables, connecting the Solar PV facility to the 132 kV Kiwano substation.

The construction phase for the proposed project will take approximately 2 years.

#### **2.4.2 Rehabilitation activities**

Once all the construction activities are completed, the site will be rehabilitated where possible and practical. All temporal structures and facilities will be removed from site and the area will be rehabilitated.

#### **2.4.3 Operational activities**

After the installation and commissioning, the responsibility for safe operation and asset management will be transferred to the operation team. The solar PV plant has a minimum design life of 25 years. Operational and maintenance activities associated with the Solar PV and BESS facility include:

- Normal maintenance of all electrical and mechanical components of the plant will occur during the life of the Solar PV facility.
- Periodic cleaning and washing of the solar PV modules will be required. This PV module cleaning will be performed when required, and it is estimated to occur 2-4 times a year, or when the reference cells show a difference greater than 50 W/m<sup>2</sup> between the clean and soiled cells.

A plan for systematic maintenance and function testing should be kept on location showing in detail how components and systems should be tested and what should be observed during testing. Visual periodical and mandatory services should be kept in place. Maintenance may be performed manually or automated. In case of manual maintenance, a higher level of safety precautions needs to be undertaken.

#### **2.4.4 Decommissioning activities**

The Solar PV plant has a minimum design life of 25 years. The extension of the life of the plant will be considered when assessing the plant's economic viability to remain operational after its end of life. The decommissioning of the plant will have similar activities to those that are performed during construction. The decommissioning activities anticipated once the facility reaches its end of life are as follows:

- Disassembling of the components of the facility, including but not limited to Solar PV modules, structures, foundations, inverters, cabling, etc.
- Site preparation, removal of all equipment for disposal and re-use.
- Site rehabilitation to acceptable level as per EMPr guidelines.

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### 3 LEGISLATIVE FRAMEWORK

#### 3.1 Legislative Requirements for the EMPr

In terms of Section 19(4) read with Appendix 4 of the Environmental Impact Assessment Regulations, 2014 as amended (EIA Regulations); the EMPr must comply with Section 24N of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) as amended and include.

**The implementation of the EMPr for the proposed activity is a requirement by the NEMA EIA Regulations (2014) and is likely to similarly be a condition in the Environmental Authorisation (assuming such), issued by the DFFE. As such, failure to comply with this EMPr will constitute an offence and the client and their Contractor may be liable to penalties and/or legal action. Therefore, it is important for all the responsible parties to understand their duties and undertake them with duty and care.**

#### 3.2 Applicable Legislation

The Applicant is responsible for compliance with the provisions for duty of care and remediation of damage in accordance with Section 28 of NEMA and its obligations regarding the control of emergency incidents in terms of Section 30 of NEMA. Accordingly, the DFFE must immediately be notified of an incident as defined in subsection 30(1) (a) of NEMA.

Environmental legislation in South Africa was promulgated with the aim of, at the very least, minimising and, at the most, preventing environmental degradation. The Acts and Regulations applicable to the proposed solar PV facility, BESS and associated infrastructure, are summarised in Table 3-1.

The list below was compiled to ensure that the Applicant is aware of their legal responsibilities and liabilities during the construction and operation of the proposed solar PV plant and associated infrastructure.

Eskom, and any agents or Contractor's acting on its behalf, should note that obligations imposed by the EMPr are legally binding in terms of environmental statutory legislation, and in terms of the additional conditions to the general conditions of contract that pertain to this project. Non-compliance to the National Water Act, 1998 (Act No. 36 of 1998) and applicable environmental laws are a criminal offence and if prosecuted, Eskom will be liable for any environmental damage incurred.

Various environmental legislation and policies relate to the proposed activities, including the following listed in Table 3-1.

**Table 3-1: List of Applicable Legislation**

Name of Act	Act No. and Year	Notes/remarks
The Constitution of the Republic of South Africa	108 of 1996	Includes the Bill of Rights, Environmental rights, Rights to property, administrative justice and Access to information, <i>inter alia</i> .
National Environmental Management Act	107 of 1998	List of activities and competent authorities identified in terms of Sections 24 and 24D. NEMA Environmental Impact Assessment (EIA) Regulations 2014 (GN R.982), as amended in April 2017 (published in Government Notice No. R.326).
National Environmental Management: Protected Areas Act	57 of 2003	Provide for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity, natural landscapes and seascapes.
National Environmental Management: Biodiversity Act	10 of 2004	Strategy for achieving the objectives of the United Nation's Convention on Biological Diversity, to which South Africa is a signatory.
National Heritage Resources Act (NHRA)	25 of 1999	The NHRA serves to introduce an integrated and interactive system for the identification, assessment and management of the heritage resources of South Africa. The NHRA promotes good governance and the empowerment of civil society to preserve their heritage for future generations and states the principles of heritage resource management while making provision for legislation protecting national heritage.
National Environmental Management: Air Quality Act	39 of 2004	Control of dust, noise and offensive odours.
Hazard Substances Act, and Regulations	15 of 1973 of	Provides for the definition, classification, use, operation, modification, disposal or dumping of hazardous substances.
Conservation of Agricultural Resources Act (CARA)	43 of 1983	To provide for control over the utilisation of the natural agricultural resources of the Republic in order to promote the conservation of the soil, the water sources and the vegetation and the combating of weeds and invader plants; and for matters connected therewith.
The Promotion of Administrative Justice Act	3 of 2000	<ul style="list-style-type: none"> <li>• Definitions (Section 1);</li> <li>• Procedural Fairness (Section 3, 4 and 6);</li> <li>• Right to Reasons for Decisions (Section 5); and</li> <li>• Judicial Review (Section 6 and 8).</li> </ul>
Occupational Health and Safety Act	85 of 1993	Prescribes health and safety measures necessary to adhere to for all construction workers
Promotion of Access to Information Act	2 of 2000	Right of access to any information held by the State or by another person and that is required for the exercise or protection of any rights
National Water Act, and regulations	36 of 1998	Prevention of effects of pollution, control of emergency incidents, and water use and licensing.
National Veld and Forest Fire Act	101 of 1998	While no permitting or licensing requirements arise from this legislation, this act will find application during the operational phase of the project. Due to the fire prone nature of the area, it must be ensured that the developer proactively manage risks associated with veld fires and provide cooperation to the local Fire Protection Agency.
National Building Regulations and Building Standards	103 of 1997	To promote the promotion of uniformity in the law relating to the erection of buildings in the areas of jurisdiction of local authorities for the prescribing of

Name of Act	Act No. and Year	Notes/remarks
		building standards and for matters connected therewith.
National Road Traffic Act (NRTA)	93 of 1996	To provide for road traffic matters which shall apply uniformly throughout the Republic and for matters connected therewith.
All other National and Provincial Legislation and any relevant Ordinance, Regulation, By-laws and relevant National Standards and Norms.		
All relevant Provincial and Municipal bylaws. The Dawid Kruiper Local Municipality may have certain requirements in terms of bylaws and trade permits, and a few of these may be applicable to this project: Water and Sanitation Bylaw Waste Management Bylaw Municipal Health Bylaw		
National Noise Control Regulations as outlined in the Environmental Conservation Act, 1989 (Act No. 73 of 1989).		
Construction Regulations of 2003, which applies to any persons involved in construction work and are therefore applicable to the construction phase. The regulations provide guidelines for safe operation during construction.		
Hazardous Chemical Substance Regulations of 1995, which stipulates the requirements for storage and handling of hazardous chemical substances and provide guidelines for the training of staff.		

### 3.3 List of activities associated with the project

The activities that are associated with the proposed project trigger activities listed in Government Notice No. R.983 (2014) as amended. As set out in Regulations 19 of the National Environmental Management Act (NEMA) Environmental Impact Assessment Regulations, 2014, the proposed project is subjected to a BA Process (Government Notice No. R.982). Zitholele Consulting (Pty) Ltd has therefore been appointed as the independent EAP to undertake the BA Process for the proposed Project.

The BAR will be submitted to the DFFE for licensing of the listed activity triggered as indicated in Table 3-2 below:

**Table 3-2: Detailed description of the listed activity associated with the project**

Activity No(s):	Basic Assessment activities as set out in Listing Notice 1 (GN R983) of the EIA Regulations, 2014, as amended	Applicability of listed activities to the proposed development
11	The development of facilities or infrastructure for the transmission and distribution of electricity— (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts.	Eskom proposes the construction and operation of a new on-site 132 kV substation with 5 feeder bays substation to facilitate the connection of the facility to the national grid. The development area is located outside of an urban area. Eskom further propose to develop 132kV loop-in loop-out powerlines from the Solar PV and BESS facility substation to the existing Upington substation. The powerline associated with Site Alternative A will be approximately 1 330m in length, while the powerline associated with Site Alternative B will be approximately 5 568m in length.
12	The development of (ii) infrastructure or structures with a physical footprint of 100 square	The development of the Solar PV and BESS facility will require the establishment of solar PV panels and other associated infrastructure within natural



Activity No(s):	Basic Assessment activities as set out in Listing Notice 1 (GN R983) of the EIA Regulations, 2014, as amended	Applicability of listed activities to the proposed development
	meters or more; where such development occurs (a) within a watercourse or © within 32 meters of a watercourse, measured from the edge of a watercourse.	drainage lines and within 32m of natural drainage lines identified within the study area. The solar PV panel area will be approximately 115ha in extent. The natural drainage features, although not strictly defined as a wetland or pan, is classified as a watercourse since it does channel water along its alignment during some periods of the year.
14	The development and related operations of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 m <sup>3</sup> .	The development of the BESS plant will include the installation of batteries that will contain substances and materials classified as dangerous goods. The development further includes the construction and use of a Hazardous chemical store with a 24m <sup>2</sup> footprint size where chemicals will be stored. The chemical store will include oils and lubricants which will be required for the operation and maintenance of plant and machinery, and other industrial applications during the construction and operation phase of the proposed development. Collectively, the combined capacity of all the battery units and content of the chemical store will be more than 80m <sup>3</sup> .
19	The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse.	The construction of the access road to Site Alternative A and B, as well as trenching associated with the construction of the potable water pipeline, will require dredging and construction across non-perennial drainage lines located within the development property. These non-perennial drainage lines are classified as watercourses by the Department of Water and Sanitation (DWS). The construction and installation of the Solar PV panels and BESS facility will result in a cumulative volume of infilling or dredging of more than 10 m <sup>3</sup> within the non-perennial drainage lines located across the development site.
28	Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development: (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare, excluding where such land has already been developed for residential, mixed, retail, commercial, industrial or institutional purposes.	The proposed development is considered an industrial use and is proposed on land that was previously used for agricultural purposes, occurs outside of an urban area and will cover an area of more than 20 ha on land zoned for agriculture.
Activity No(s):	Basic Assessment activities as set out in Listing Notice 3 (GN R985) of the EIA Regulations, 2014, as amended.	Applicability of listed activities to the proposed development
4	The development of a road wider than 4 metres with a reserve less than 13,5 metres.	The proposed development of Site Alternative A will require construction of an access road from the National Road (N14) to the boundary of the

Activity No(s):	Basic Assessment activities as set out in Listing Notice 1 (GN R983) of the EIA Regulations, 2014, as amended	Applicability of listed activities to the proposed development
	<b>g. Northern Cape:</b> ii. Outside urban areas: (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;	development property. This access road, which goes through a Critical Biodiversity Area (CBA) as identified in the Northern Cape Critical Biodiversity Areas of 2016, will be tarred and will be greater than 4m in width.
12	The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan. <b>g. Northern Cape</b> i. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004; ii. Within critical biodiversity areas identified in bioregional plans;	The proposed development of Site Alternative A will require construction of an access road from the National Road (N14) to the boundary of the development property. This access road alignment goes through a CBA as identified in the Northern Cape Critical Biodiversity Areas of 2016 and will result in the clearance of more than 300m <sup>2</sup> of indigenous vegetation.  The construction of the potable water pipeline for Site Alternative A and B will require trenching that will result in the clearance of more than 300m <sup>2</sup> of indigenous vegetation. The proposed Project is located outside an urban area and will not occur on existing infrastructure but on vacant land.
Activity No(s):	Scoping and EIR activities as set out in Listing Notice 2 (GN R984) of the EIA Regulations, 2014, as amended.	Applicability of listed activities to the proposed development
1	The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more, excluding where such development of facilities or infrastructure is for photovoltaic installations and occurs — (a) within an urban area; or (b) on existing infrastructure.	Eskom is proposing to develop a 58 MW Solar PV facility as well as a 40 MW / 200 MWh BESS facility.  In terms of section 3 of GN 114 of 2018, Solar projects that falls within a Renewable Energy Development Zone (REDZ) are exempted from following a full EIA process and may follow a Basic Assessment Process.
15	The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for— (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.	The proposed Solar PV and BESS development areas for Site Alternative A and B are approximately 134 ha and 136.5 ha in extent. Although not all areas with the development footprint will be cleared, cumulatively the combined clearance of more than 20 ha of indigenous vegetation will occur during the development of the facility.  The proposed Project is located outside an urban area and will not occur on existing infrastructure but on vacant land.

## 4 ORGANISATION STRUCTURE

The organisational structure identifies and defines the responsibilities and authority of the various role-players (individuals and organisations) involved in the project. All instructions and official communications regarding environmental matters shall follow the organisational structure shown in **Figure 4-1** below.

The organisational structure reflected in **Figure 4-1** has been developed to ensure that:

- There are clear channels of communication;
- There is an explicit organisational hierarchy for the integration project; and
- Potential conflicting or contradictory instructions are avoided.

In terms of the defined organisational structure reflected in **Figure 4-1** below, all instructions that relate to environmental matters will be communicated to the Contractor via the Environmental Officer (EO). The only exception to this rule would be in an emergency situation. An emergency is defined as a situation requiring immediate action and where failure to intervene timeously would, in the reasonable opinion of the Environmental Control Officer (ECO), result in unacceptable environmental degradation. In emergency situations instructions may be given directly to the Contractor. The detailed roles and responsibilities of the various role-players identified in the organisational structure are outlined in **Section 5**.

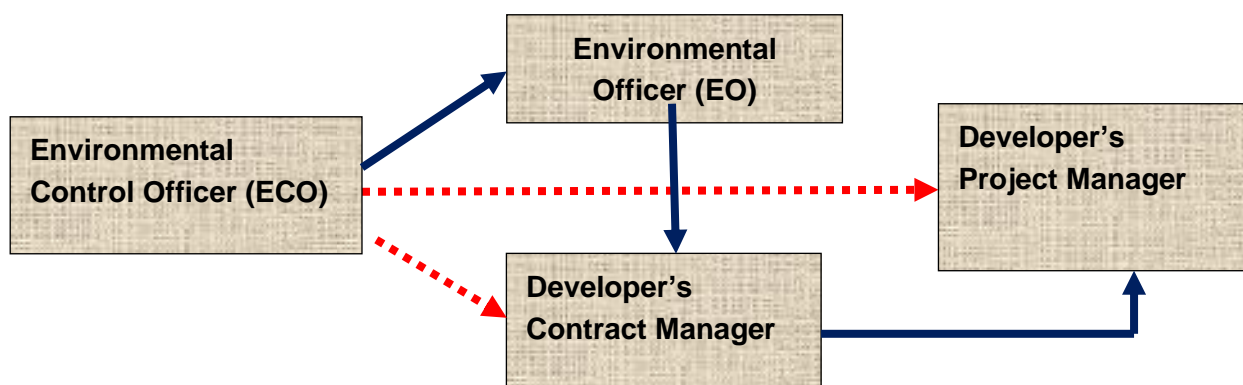


Figure 4-1: Organisation Structure for Environmental Reporting

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## **5 ENVIRONMENTAL ROLES AND RESPONSIBILITIES**

The Contractor, for the proposed development and installation, shall be responsible for ensuring compliance with the provisions contained in the EMPr, and shall be held accountable in terms of the EMPr. The detailed roles and responsibilities of each of these organisations are outlined below.

### **5.1 Department of Forestry, Fisheries and the Environment**

As the Competent Authority (CA), the DFFE has the responsibility to ensure that the developer complies with the conditions of the EA for this proposed project (once received) as well as the requirements of the broader environmental legislation, specifically the NEMA. Compliance would be confirmed via the following mechanisms:

- Receipt and review of the environmental reporting required in terms of the EA; and
- *Ad hoc* and planned site inspection by the DFFE Compliance and Enforcement.

The successful implementation of this EMPr requires cooperation between the Developer (Eskom Holdings SOC Ltd.), project manager, the appointed contractors and the appointed ECO.

### **5.2 General roles and responsibilities**

General roles and responsibilities have been outlined below (Table 5-1) and the project team is required to comply with the conditions defined herein.

**Table 5-1: Roles and Responsibilities**

Responsible Agent	Role/Responsibility
Monitoring Authority DFFE	<p>The National Department of Forestry, Fisheries and the Environment (DFFE) is the designated authority responsible for authorising this EMPr. DFFE has overall responsibility for ensuring that the Applicant complies with the conditions of Environmental Authorisation and the EMPr.</p> <p>DFFE shall also be responsible for approving any amendments to the EMPr (if required). DFFE may also perform random site inspections to check compliance with the EMPr.</p>
Developer	<p>The Developer has overall responsibility for ensuring that its operations are undertaken in an environmentally sound and responsible manner, and in particular, reflects the requirements and specifications of the EMPr and recommendations from the relevant authorities.</p> <p>The responsibilities of the Project Developer will be to:</p> <ul style="list-style-type: none"> <li>• appoint or designate a suitably qualified PM to manage the implementation of the proposed development;</li> <li>• Establish and maintain regular and proactive communications with the designated/ appointed PM, Contractor(s) and ECO; and</li> <li>• Ensure that the EMPr is reviewed and updated as necessary.</li> </ul> <p><u>Reporting Structure:</u></p> <p>The Developer will liaise with and/or take instruction from the following:</p> <ul style="list-style-type: none"> <li>• Authorities;</li> <li>• ECO; and</li> <li>• General Public.</li> </ul>
ECO	<p>ECO should be a suitably qualified person and should:</p> <ul style="list-style-type: none"> <li>• Ensure that contractors receive copies of the EMPr, Environmental Authorisation and all agreed Method Statements;</li> <li>• Provide on-site guidance, surveillance and reporting commensurate with the project phase/progress;</li> <li>• Undertake frequent site visits and record key findings. This includes photographic monitoring of the construction site and an evaluation of the implementation, effectiveness and level of compliance of on-site construction activities with the EMPr and associated plans and procedures;</li> <li>• Attend monthly project meetings;</li> <li>• Instruct EO or Contract Manager or Eskom's appointed PM on actions or issues impacting on the environment and provide appropriate site instructions to address and rectify these matters;</li> <li>• Record and provide written documentation of non-</li> </ul>

Responsible Agent	Role/Responsibility
	<p>conformances with the EMPr and require Eskom to undertake mitigation measures to avoid or minimise any adverse impacts on the environment or report required changes to the EMPr;</p> <ul style="list-style-type: none"> <li>• Review corrective and preventative actions to ensure implementation of recommendations made from audits and site inspections;</li> <li>• Order the Contractor to suspend part or all of the works if the Contractor and/or any sub-contractors, suppliers, etc. fail to comply with any aspect of either the EMPr or Environmental Authorisation (EA);</li> <li>• Identify possible areas of improvement;</li> <li>• Ongoing assessment of the suitability or effectiveness of the EMPr and make concomitant recommendations;</li> <li>• Submit monthly environmental audit reports to DFFE (or as per conditions of EA) during the construction phase;</li> <li>• Monitor and record the processing of public complaints and their resolution relating to the construction activities; and</li> <li>• Ensure that updates to the EMPr (as necessary) are implemented.</li> </ul>
Construction Contractor (CC) / Appointed EO	<p>The Construction Contractor must:</p> <ul style="list-style-type: none"> <li>• Appoint a EO to interpret the EA and EMPr on behalf of the Construction Contractor <i>inter alia</i> to ensure appropriate environmental awareness and training to achieve conditions of the EA and EMPr;</li> <li>• Ensure that all construction staff, sub-contractors, suppliers, etc. are familiar with, understand and adhere to the EMPr, EA and all agreed Method Statements (Environmental Awareness Plan) per their job function;</li> <li>• Ensure that all facets of the work undertaken are properly and competently directed, guided and executed during construction according to the EMPr;</li> <li>• Ensure construction of the facility to contractual environmental specifications; and</li> <li>• Adherence to laws and standards relevant to the construction of the facility.</li> </ul>
PM	<p>The primary role of the PM will to ensure that the Contractor and Developer comply with the environmental specifications in the EMPr. The PM shall further:</p> <ul style="list-style-type: none"> <li>• Oversee the general compliance of the Contractor with the EMPr and other pertinent site specifications; and</li> <li>• Liaise between and with the Contractor (including EO) and ECO on environmental matters, as well as any pertinent engineering matters where these may have environmental consequences.</li> </ul> <p>In addition, the PM shall:</p> <ul style="list-style-type: none"> <li>• Designate or appoint a suitably qualified Environmental Manager (EM) that will manage all environmental aspects on behalf of the PM and the Developer;</li> </ul>

Responsible Agent	Role/Responsibility
	<ul style="list-style-type: none"> <li>• Assume overall responsibility for the effective implementation and administration of the EMPr;</li> <li>• Be familiar with the contents of the EMPr, and his role and responsibilities as defined herein;</li> <li>• Ensure that the EMPr is included in the Contractor's contract;</li> <li>• Communicate to the Contractor, verbally and in writing, the advice of the ECO and the contents of the ECO reports;</li> <li>• In conjunction with the EO; undertake regular inspections of the Contractor's site as well as the installation works in order to check for compliance with the EMPr in terms of the specifications outlined therein. Inspections shall take place at least once a week during construction and copies of the weekly monitoring checklist will be contained in the file;</li> <li>• Issue site instructions giving effect to the ECO requirements where necessary;</li> <li>• Keep a register of all complaints and incidents (spills, injuries, complaints, legal transgressions, etc.) and other documentation related to the EMPr;</li> <li>• Report to the ECO any problems (or complaints) which cannot first be resolved in co-operation with the Contractor(s);</li> <li>• Implement recommendations of possible audits;</li> <li>• Implement Temporary Work Stoppages as advised by the ECO, where serious environmental infringements and non-compliances have occurred;</li> <li>• Facilitate proactive communication between all role-players in the interests of effective environmental management; and</li> <li>• Ensure that construction staff is trained in accordance with requirements of the EMPr.</li> </ul> <p><u>Reporting Structure:</u></p> <p>The PM will report to the Developer, as and when required.</p>

## 6 ENVIRONMENTAL ISSUES IDENTIFIED

A number of Specialist Studies were undertaken, and the summary of the key findings are included in the paragraphs below:

### 6.1 Terrestrial Biodiversity Assessment

During the field survey conducted, several indigenous floral species were observed. Four (4) of the recorded flora species are protected by legislation. Therefore, these species are not allowed to be collected, unless a permit from the Department of Environment and Nature Conservation, Kimberly (Northern Cape Province) is granted for their removal, and damage to these species by anthropogenic activities must be avoided.

One invasive plant species (*Datura* sp.) was present within the general area but not within the proposed footprint. Invasive Alien Plant (IAP) species that may colonize the area in the future, must be controlled by implementing an Invasive Alien Plant Management Programme, in compliance with Section 75 of the National Environmental Management: Biodiversity Act (Act 10 of 2004) (NEMBA). The monitoring of the area throughout the process is crucial in order to prevent IAPs growing and spreading out of control, thereby threatening the occurrence of indigenous flora and fauna.

No amphibian species were recorded during the survey period, accounting for 0% of the expected species. The lack of species richness was attributed to the arid nature of the site and lack of suitable habitat within the project area. The species expected to occur within the assessment area are provided in Appendix B of the Terrestrial Biodiversity Impact Assessment.

Two reptile species, representing two families were recorded within the assessment area during the survey periods (see Table 6-1). This accounts for 11% of the total expected species. The lack of species richness was likely due to the combination of the inherent secretive nature of reptile species, and limited time available for fieldwork (*a true representative sample requires an extensive sampling period over several surveys*). The presence of suitable habitat suggests that the area supports a diverse reptile community.

**Table 6-1: Summary of reptile species recorded within the assessment area during the survey period. \*LC = Least Concern**

Family	Scientific Name	Common Name	Conservation Status	
			Regional	Global
<b>Agamidae</b>	<i>Agama atra</i>	Southern Rock Agama	LC	LC
<b>Lacertidae</b>	<i>Pedioplanis lineocellata</i>	Spotted Sand Lizard	LC	LC

Ninety-eight (98) species of avifauna were recorded within the assessment area during the survey period, with three of the species regarded as being of conservation concern (list the names of them from the Specialist). A considerable portion of the species are regarded as typical karoo species, with some species associated with human settlements.



A total of one (1) mammal species was recorded within the assessment area during the survey period (Table 6-2), accounting for 4% of the expected mammal species. It is considered highly likely that additional mammal species would be recorded from the site with extensive sampling.

**Table 6-2: Mammal species recorded within the assessment area during the survey periods**

Family	Scientific Name	Common Name	Conservation Status
			Regional
<b>Bovidae</b>	<i>Raphicerus campestris</i>	Steenbok	<b>LC</b>

Although the habitat types of each of the alternative sites are overall the same, with the same dominant species as well as many of the same species, the numbers of geophytic species recorded from Site Alternative B were much higher, indicating that this site is somewhat more sensitive from a floristic perspective. No difference was noted in terms of faunal composition between the two alternatives. In such cases, areas with high numbers of potentially conservation important species should be avoided in favour of the site with the least number of conservation important species. In addition, sites closer to existing infrastructure (such as site alternative A) are preferred as fragmentation is thus kept to a smaller overall area.

Without mitigation measures, the destruction of Protected plant species will be a moderately high impact. With mitigation, the impact will be reduced to a low impact.

The following impacts that have been identified during the construction phase, are moderate without mitigation:

- Destruction, further loss and fragmentation of the vegetation community (including a portion of an area classified as an CBA-irreplaceable and Ecological Support Area (ESA) as well as Endangered (EN) vegetation type;
- Displacement of faunal community due to habitat loss, direct mortalities and disturbance (noise, dust and vibration).

With the implementation of mitigation measures, the impacts will be low.

The following impacts that have been identified during the operational phase, are moderately-high without mitigation:

- Continued encroachment and displacement of the vegetation community due to alien invasive plant species, particularly in previously disturbed areas.

With the implementation of mitigation measures, the impacts will be low.

The following impacts have been identified during the operational phase, are moderate without mitigation:

- Continued displacement and fragmentation of the faunal community due to ongoing anthropogenic disturbances (noise, traffic and dust);
- Loss of faunal species (road mortalities and/or poaching); and
- Habitat degradation (litter and alien vegetation encroachment).

## **6.2 Wetland Assessment**

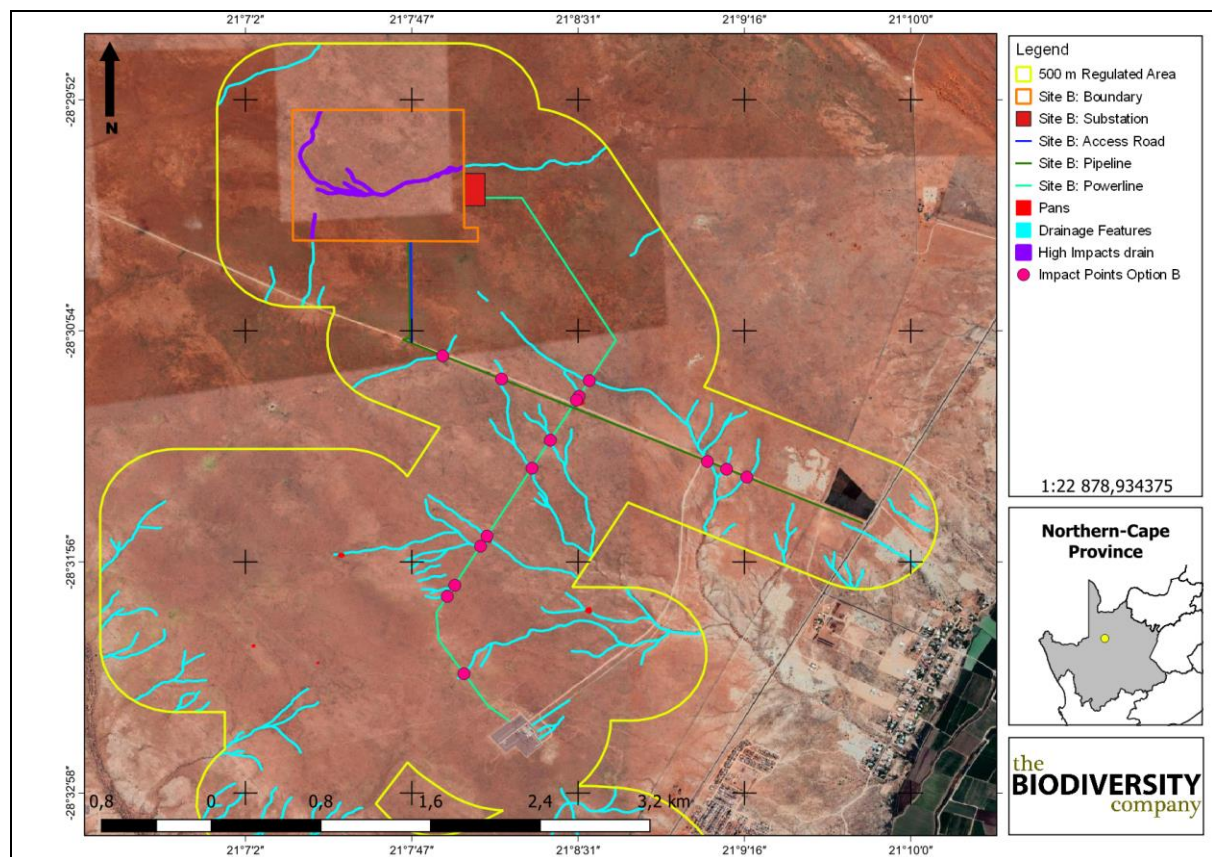
The wetland areas were delineated in accordance with the Department of Water Affairs and Forestry (DWAF) (2005) guidelines. Various drainage features and some more significant depressions/pans were identified throughout the 500m regulated area. None of these systems are characterised by hydromorphic signs of wetness, and therefore do not constitute wetland habitat. The drainage features are not characterised by riparian vegetation and grasses, and these systems represent bare surfaces with evidence of surface run-off. A large number of small drainage features were identified within the assessment area.

The following Zones of Regulation (ZoR) are applicable to the drainage features identified within the assessment area:

- A 32 m Zone of Regulation in accordance with the National Environmental Management Act, 1998 (Act No. 107 of 1998) should be assigned to the drainage lines; and
- A 100 m ZoR in accordance with the National Water Act, 1998 (Act No. 36 of 1998) should be assigned to the drainage lines.

Regardless, it is recommended that the depressions which bare some functionality as well as the drainage features be conserved throughout the construction and operational phase. Those drainage features and depressions which bare more relevance due to recent deposition and movement of water (therefore not smaller insignificant features) were delineated. The soils within these features are characterised by alluvial deposits rather than hydromorphic soils, which renders these systems non-wetland.

Site B, which is preferred for development, has multiple drainage systems running through the proposed PV facility area. The substation and BESS are located to the south of a drainage system and might have some indirect impacts on the system. The roads, pipeline and power line will have multiple crossings over the delineated drainage line, and will thus, have the highest impacts on the watercourses and in return have the most mitigation measure to adhere too (see Figure 6-1).



**Figure 6-1: Possible points where impacts may occur during development at Site Alternative B**

The following potential main impacts on the wetland were considered for the construction phase of the proposed development. This phase refers to the period during construction when the proposed features are constructed; and is considered to have the largest direct impact. The following potential impacts are anticipated during the construction phase:

- Destruction, further loss, and fragmentation of the watercourses;
- Clearing of vegetation;
- Removal of soils;
- Altering overland flows; and
- Dust suppressants.

Without mitigation, moderate risks were identified for the construction phase of the project, and these are largely attributed to the direct impact of these aspects on the watercourses. Implementation of the prescribed mitigation measures will reduce the level of risk posed by these aspects to low. The duration of these aspects is also expected to be short in duration.

The operational phase is the impacts of the daily activities when the development is functioning. These impacts are small impacts over a long-time frame. These impacts are associated with the movement of people to ensure that the facilities stay up to date. The

main impacts are thus the traffic through the project area. The following potential impacts are anticipated during the operational phase:

- Erosion within wetland due to overland flows;
- Water quality impairment;
- Drainage pattern changes; and
- Deposition of dust.

The erosion and water quality impairment impacts within the delineated watercourses are 'Low' pre-mitigation and 'Very Low' post-mitigation. To ensure that the water used to clean the PV panels does not impair the water quality, workers should use potable water without any chemicals.

All proposed activities are expected to be long term (> 15 years) and have been considered 'permanent' on this basis, which renders the decommissioning phase irrelevant.

As per the Risk Assessment Matrix (RAM) undertaken for the 500m regulatory area, the post-mitigation risks are low, and a General Authorisation (GA) is applicable for the proposed development.

### **6.3 Heritage Assessment**

According to Beaumont *et al* (1995) "thousands of square kilometres of Bushmanland are covered by a low-density lithic scatter" and are referred to as background scatter (Orton 2016), generally of low heritage significance. Stone Age scatters and isolated finds of low heritage significance were recorded during Heritage Impact Assessments (HIA's) in the area (e.g., Gaigher 2013, Fourie 2014, van der Walt 2015 and 2018). Isolated finds that can be attributed to background scatter were recorded on the preferred site. The site is marked by a mantle of Aeolean sand on top of a calcrete substrata and finds are mostly found where the calcrete protrudes through the sand cover. Few formal tools were noted but artefacts are mostly dating to the Middle Stone Age (MSA) with facettted striking platforms. One feature (K10) that could be a possible grave was recorded close to (~40 meters) the proposed pipeline for Site B. Recorded features were given the prefix K for Kiwano. The distribution of recorded features is indicated in Figure 10-2 and briefly described in Table 6-3.

**Table 6-3: Recorded features in the study area**

<b>LABEL</b>	<b>LONGITUDE</b>	<b>LATITUDE</b>	<b>DESCRIPTION</b>	<b>Field Rating and Heritage Significance</b>
<b>K4</b>	21° 07' 44.4972" E	28° 29' 57.4188" S	Calcrete with miscellaneous flake and end scraper.	GP C Low Significance
<b>K5</b>	21° 07' 40.8361" E	28° 29' 57.2676" S	Multidirectional core	GP C Low Significance
<b>K6</b>	21° 07' 21.7164" E	28° 30' 00.4537" S	MSA point, broken flake and chunk on top of calcrete	GP C Low Significance
<b>K7</b>	21° 07' 20.8199" E	28° 30' 00.4824" S	Broken flakes with dorsal removals	GP C Low Significance
<b>K8</b>	21° 07' 20.9928" E	28° 30' 25.4087" S	Irregular core	GP C Low Significance
<b>K9</b>	21° 07' 33.8880" E	28° 30' 25.3009" S	Miscellaneous flakes on Banded Iron Stone	GP C Low Significance
<b>K10</b>	21° 08' 58.4485" E	28° 31' 24.4451" S	Possible grave marked by a oval cairn of river pebbles, measuring ~ 1.3 meters in diameter	GP A High Social significance

The following impacts were identified during the construction phase of the project and have a low significance rating without mitigation:

- Destruction of isolated Stone Age scatters in the project area; and
- Damage or destruction to the possible grave at K10.

With the implementation of mitigation measures, the significance will remain low.

No adverse impact on heritage resources are expected by the project, and it is recommended that the project can commence on the condition that the recommendations by the Archaeologist are implemented as part of the EMP and based on approval from South African Heritage Resources Agency (SAHRA).

The overall impact of the project is considered to be low and residual impacts can be managed to an acceptable level through implementation of the recommendations made by the Archaeologist.



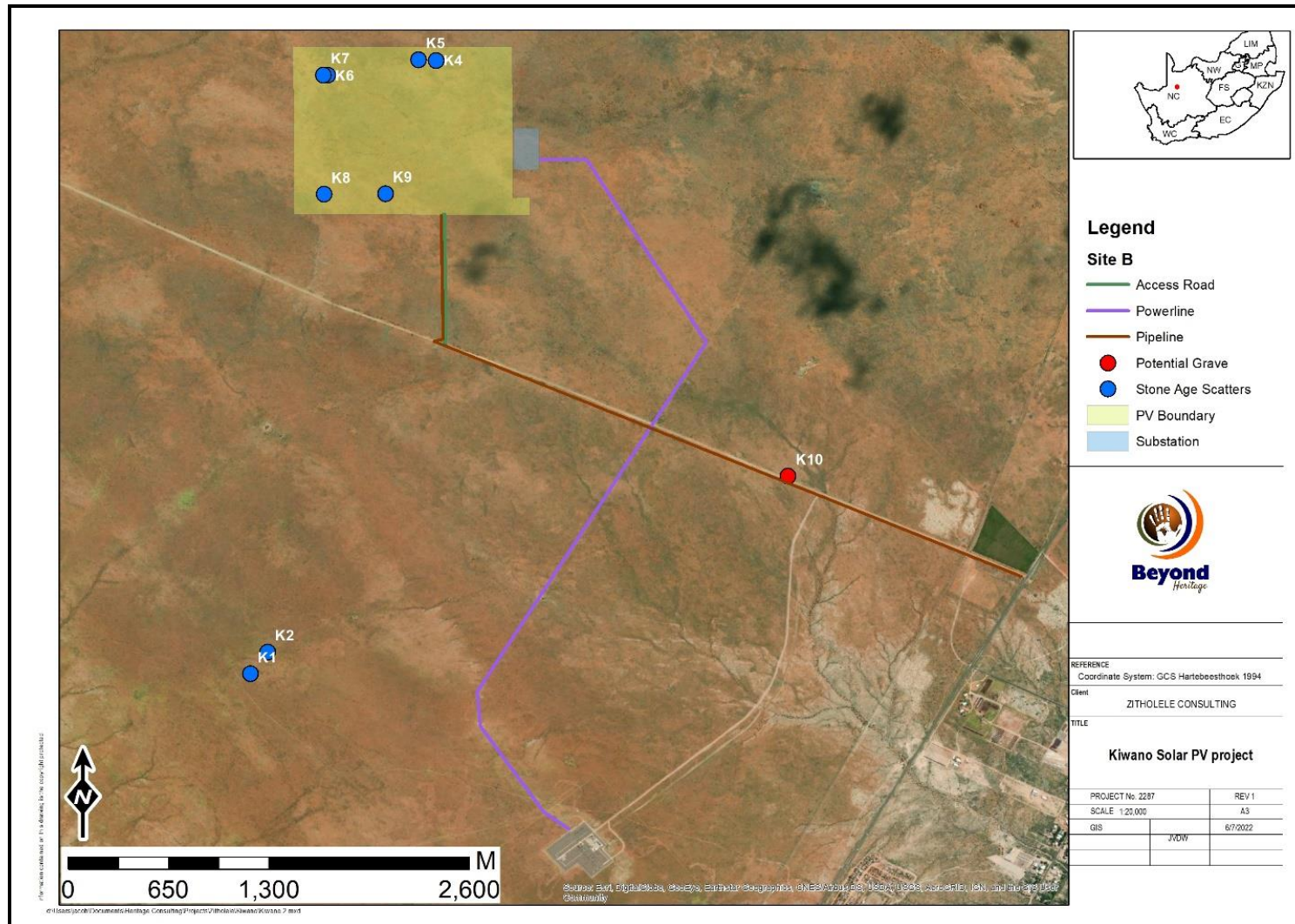


Figure 6-2: Recorded features in relation to Site B

## **6.4 Paleontological Assessment**

The Paleontological Sensitivity Map the study area is of moderate paleontological significance. The study concluded that it is extremely unlikely that any fossils would be preserved in the aeolian sands of the Gordonia Formation, Kalahari Group (Quaternary). There is a very small chance that fossils may have been trapped in features such as palaeo-pans or palaeo-springs, and buried by the aeolian sands, but no such feature is visible in the satellite imagery. Nonetheless, a Fossil Chance Find Protocol should be implemented.

It is recommended that no further Palaeontological Impact Assessment is required unless fossils are found by the Contractor, Developer, Environmental Officer or any other designated responsible person, once excavations/ drilling activities have commenced. Since the impact is low, as far as the palaeontology is concerned, the project should be authorised.

## **6.5 Visual Impact Assessment**

Whilst the landscape in the region of the proposed sites is potentially sensitive to visual impacts due to lack of visual contrast in the landscape and the lack of significant enclosure or relief, the specific sites chosen for the project, the limited number of visual receptors and sensitive views in the area and the low height and flat, linear nature of the development, mean that there will be limited impact on the visual and aesthetic environment. This is primarily due to the very subtle ridge of high lying ground located between the proposed sites and the N14 that screens the majority of receptors from any visual impacts.

During the design phase, the following impacts are applicable:

- Structures' colour and design potentially contrast vividly with the surrounding landscape enhancing visibility and increasing artificial contrast in the landscape. Without mitigation, the impact will be moderate and with mitigation, the impact will be low.
- PV panels will be visible in the landscape and will interrupt and fragment the natural monochromatic landscape. Without mitigation, the impact will be moderate and with mitigation, the impact will be low.
- Security and other operational lighting will introduce unnatural lighting into an unlit landscape. Without and with mitigation, the impact will be moderate.

During the construction phase, the following impacts are applicable:

- The construction activities may disturb the quiet sense of peaceful solitude of the Kalahari rangelands. This impact would be moderate to low given that there are few sensitive receptors. Without mitigation, the impact will be moderate and with mitigation, the impact will be low.

- Construction activities, particularly noise and dust, heavy vehicles and abnormal load vehicles, may impact the experience of tourists to the region and result in impacts to tourist sentiment and tourism revenue. Without and with mitigation, the impact will be low.
- The construction activities related to the construction of the proposed development may negatively affect the expansive views of the Kalahari Rangelands from the N14, D3257 and other sensitive viewpoints by introducing unnatural elements, movement and contrast. Without mitigation, the impact will be moderate and with mitigation, the impact will be low.

During the operational phase, the following impacts are applicable:

- The presence of the proposed development may negatively affect the expansive views of the Kalahari Rangelands from the D3276 due to reflection, glare, night lighting and contrast of buildings in the monochromatic landscape. Without mitigation, the impact will be moderate and with mitigation, the impact will be low.
- The presence of the proposed development may negatively affect the expansive views of the Kalahari Rangelands from the N14 due to reflection, glare and contrast of buildings in the monochromatic landscape. Without mitigation, the impact will be moderate and with mitigation, the impact will be low.
- The presence of the proposed development facility may negatively affect the experience of tourists visiting the Orange River Vineyards and resorts along the N14 corridor. Without mitigation, the impact will be moderate and with mitigation, the impact will be low.
- The presence of the proposed development facility may negatively affect the views and thus the quality of life of people in residential areas and businesses along the N14 corridor. Without mitigation, the impact will be moderate and with mitigation, the impact will be low.
- The presence of the proposed development facility may negatively affect the views and thus the quality of life of people in residential areas, tourist resorts and businesses on the opposite side of the Orange River. Without mitigation, the impact will be moderate and with mitigation, the impact will be low.

There are also a number of existing renewable energy facilities in the area which have asserted a change on the visual character of the area. The proposed development is in keeping with this character, and whilst further PV infrastructural development may be considered adding to the cumulative impact, the development is also consistent with local, regional and national planning policy.

The visual impact of this development is considered to be of low significance. Several mitigation measures are recommended by the Visual Specialist.



## 6.6 Soils and Agricultural Assessment

The most sensitive soil forms identified within the assessment area are the Hutton and Dundee soil forms. The land capability sensitivities (DAFF, 2017) indicate land capabilities with “Very low to Low” sensitivities, which correlates with the findings from the baseline assessment.

The assessment area is associated with non-arable lands, due to the type of soils in the area. The available climate limits crop production significantly. The harsh climatic conditions are associated with low annual rainfall and high evapotranspiration potential demands of the area, which consequently result into a very restricted choice of crops due to the heat and moisture stress. The area is not favourable for most cropping practices, which corresponds to the current agriculture (grazing) and renewable energy facilities activities.

It is the specialist’s opinion that the proposed project and associated infrastructure will have no impacts on the agricultural production ability of the land. However, with regard to crop fields with “High” sensitivity associated with Site B, the project layout should preferably be adjusted to avoid these areas. If these areas are actively cultivated and avoidance is not feasible, it is recommended that negotiations be facilitated for the suitable compensation afforded to the landowner.

Either of the two alternatives may be chosen as both are associated with land capabilities with “Very low to Low” sensitivities. Site A is preferred to Site B due to the presence of “High” sensitivity crop fields within the Site B pipeline corridor. It is the specialist’s recommendation that, the proposed project and associate infrastructure may be favourably considered.

## 6.7 Avifaunal Assessment

The assessment area consisted of one avifauna habitat; Karroid Grassland, these habitats were still mostly in a natural state with the exception of some areas that have been disturbed by livestock grazing. Habitats in the surrounding areas included drainage lines, the Orange River and associated vegetation and the cultivated areas surrounding the Orange River. Five species of conservation concern (SCC), Red-footed Falcon (*Falco vespertinus*), Abdim’s Stork (*Ciconia abdimii*), Lanner Falcon (*Falco biarmicus*), Kori Bustard (*Ardeotis kori*) and Secretarybird (*Sagittarius serpentarius*) were confirmed in the assessment area. The Lanner Falcon breeds on cliff ledges it is thus less likely to have a permanent nest in the assessment area. The Red-footed Falcon and Abdim’s Stork are migratory birds that do not breed in the region. Based on the nesting behaviour and the habitat type in the assessment area, it can be said that two of the five SCCs are permanent residents in the assessment area: the Kori Bustard (*Ardeotis kori*) and Secretarybird (*Sagittarius serpentarius*).

The project will result in habitat loss and degradation of an area where five species of conservation concern are known to occur. Two of which have a very high likelihood of breeding in the assessment area. The development will lead to the clearing of vegetation

and an altering in the undeveloped/isolated nature of the area. Based on the medium receptor resilience and the high functional integrity, the assessment area was given a high site ecological importance (SEI).

The development will also lead to sensory disturbance, collision and electrocution risks. Even though the latter three impacts can be effectively mitigated, the loss of habitat cannot be mitigated. Considering the number of applications and current solar plant developments in the area the cumulative impact is also regarded as being high.

The mitigation hierarchy implemented in this report is as per the information provided in section 2(4)(a)(i) of NEMA as well as the overall policy on Environmental offsetting (Biodiversity Offset Guidelines, section 24 J of NEMA, Sept 2021). The mitigation hierarchy includes first avoiding the impact, then minimising it, then rehabilitation and then offsetting. Where the residual impact, even after mitigation is high, then should offsetting only be considered. In this case only one impact is Moderately High post mitigation, and it is the loss of and displacement of SCCs. This may require offsetting to be reduced to an acceptable residual impact, especially considering the number of solar facilities approved within the general area (within 10 to 22 kilometres of the study Area of Influence).

In order to avoid fragmenting the current ecosystem, it is recommended that site A is preferred as this site is located closer to existing facilities and concentrating these may reduce overall fragmentation of the ecosystem. It is, however, important that natural corridors between these developments are maintained. Minimisation measures have resulted in the reduction of most impacts to a Moderate or Low, which is considered within the limits of acceptable change. Site B is also considered developable if all mitigation measures are out into place.

The anticipated pre-construction impacts on avifauna are as follows:

- Temporary disturbance of avifauna due to increased human presence and possible use of machinery and/or vehicles. Without mitigation, the significance of the impact is low. With mitigation, the significance of the impact is absent.

The anticipated construction impacts on avifauna are as follows:

- Habitat Loss (Destroy, fragment and degrade CBA, ESA and Other Natural Area (ONA) habitat, ultimately displacing avifauna). Without mitigation, the significance of the impact is moderately-high. With mitigation, the significance of the impact is moderate.
- Sensory disturbances (e.g. noise, dust, light, vibrations) on avifaunal species. Without mitigation, the significance of the impact is moderately-high. With mitigation, the significance of the impact is moderate.

- Collection of eggs and poaching by the construction crew may lead to a decline in avifaunal occurrence on site. Without mitigation, the significance of the impact is moderately-high. With mitigation, the significance of the impact is low.
- Roadkill may lead to a decline in avifaunal occurrence on site. Without mitigation, the significance of the impact is moderate. With mitigation, the significance of the impact is low.
- Chemical pollution associated with dust suppressants may lead to a decline in faunal species on site. Without mitigation, the significance of the impact is moderately-high. With mitigation, the significance of the impact is low.
- Construction activities may lead to a displacement or death of Species of Conservation Concern (SCC). Without mitigation, the significance of the impact is critical. With mitigation, the significance of the impact is moderately-high.

The anticipated operational phase impacts on avifauna are as follows:

- Continued Habitat Loss (Destroy, fragment and degrade CBA, ESA and ONA habitat, ultimately displacing avifauna). Without mitigation, the significance of the impact is moderately-high. With mitigation, the significance of the impact is moderate.
- Sensory disturbances (e.g. noise, dust, vibrations). Without mitigation, the significance of the impact is moderate. With mitigation, the significance of the impact is low.
- Collection of eggs and poaching (especially of SCCs). Without mitigation, the significance of the impact is moderately-high. With mitigation, the significance of the impact is low.
- Roadkill may lead to a decline in avifaunal occurrence on site. Without mitigation, the significance of the impact is moderately-high. With mitigation, the significance of the impact is low.
- Electrocution by infrastructure and connections to PV. Without mitigation, the significance of the impact is high. With mitigation, the significance of the impact is moderate.
- Chemical pollution associated with measures to keep PV clean. Without mitigation, the significance of the impact is high. With mitigation, the significance of the impact is moderate.
- Fencing of PV site. Without mitigation, the significance of the impact is high. With mitigation, the significance of the impact is low.

The anticipated impacts on avifauna during the decommissioning phase are as follows:

- Habitat Loss (Destroy, fragment and degrade habitat, ultimately displacing avifauna). Without mitigation, the significance of the impact is moderately-high. With mitigation, the significance of the impact is low.
- Sensory disturbances (e.g. noise, dust, vibrations). Without mitigation, the significance of the impact is moderately. With mitigation, the significance of the impact is low.
- Roadkill. Without mitigation, the significance of the impact is moderately-high. With mitigation, the significance of the impact is absent.
- Collisions with PV and associated infrastructure. Without mitigation, the significance of the impact is moderately-high. With mitigation, the significance of the impact is absent.
- Fencing of PV site, especially a risk for larger birds. Without mitigation, the significance of the impact is high. With mitigation, the significance of the impact is absent.

## **6.8 Socio-Economic Impact Assessment**

The area towards the north and west of the proposed project site is undeveloped and used predominantly for livestock grazing. To the south-east, along the N14 and down towards the banks of the Orange River, livestock grazing, cultivation of grapes and other crops are the predominant land use. Settlement patterns in this area are characterised by a number of farmsteads, farm employee accommodation and farming related infrastructure. Inhabitants of the study area are therefore likely to rely primarily on agriculture to support their livelihoods. The closest human settlement to the proposed project site is the rural agricultural settlement of Kalksloot which is located approximately 3.5 km from the Site A alternative. Oranjevallei is the next closest settlement located approximately 4.7 km from Site A. Other settlements within close proximity of the proposed project site include Louisvale (8.4 km); Dysons Klip (8.3 km); Raaswater (9.5 km); and Bloemsmond (12 km).

The anticipated socio-economic impacts during the construction phase are as follows:

- Creation of employment, skills development, procurement and business opportunities (positive impact).

Without mitigation measures, the impact is low and with mitigation measures, the impact will be moderate (positive).

- Increased demand for low-cost housing and municipal services (negative impact)

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Without and with mitigation measures, the impact is low (negative).

- Strain on community health & safety services (negative impact)

Without mitigation measures, the impact is high and with mitigation measures, the impact will be low (negative).

- Influx of jobseekers (negative impact)

Without and with mitigation measures, the impact is low (negative).

- Risk to livestock, crops, houses and farm infrastructure (negative impact)

Without mitigation measures, the impact is moderate and with mitigation measures, the impact will be low (negative).

- Impact on tourism (negative impact)

Without and with mitigation measures, the impact is low (negative).

- Loss of farmland (negative impact)

Without and with mitigation measures, the impact is low (negative).

The anticipated socio-economic impacts during the operational phase are as follows:

- Creation of employment, skills development, procurement and business opportunities (positive impact)

Without and with mitigation measures, the impact is low (positive).

- Strengthening energy supply (positive impact)

Without and with mitigation measures, the impact is moderate (positive).

- Strain on community health & safety services (negative impact)

Without mitigation measures, the impact is high and with mitigation measures, the impact will be low (negative).

- Creation of local employment opportunities associated with decommissioning activities (positive impact)

Without and with mitigation measures, the impact is low (positive).

- Loss of employment (negative impact)

Without and with mitigation measures, the impact is low (negative).

Table 6-4: Summary of Pre-Construction, Construction and Operation Phase Impacts

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented
<b>PRE-CONSTRUCTION</b>				
Appointment of construction contractor	<b>4 – Moderate (+)</b>	<ul style="list-style-type: none"> <li>Ensure that unskilled labour required for the construction and installation of equipment are predominately South Africans from the surrounding communities.</li> </ul>	<b>4 – Moderate (+)</b>	<ul style="list-style-type: none"> <li>No improvement on the unemployment conditions in the area and livelihood of the surrounding communities.</li> </ul>
Poor communication about the project creates high expectations about the potential of job opportunities.	<b>3 – Low (-)</b>	<ul style="list-style-type: none"> <li>Caution with communication so as not to create the expectation of massive job creation</li> </ul>	<b>2- Low (-)</b>	<ul style="list-style-type: none"> <li>Poor communication could lead to disappointment amongst community members, Labour and social unrest. While the project will create employment opportunities – the scale of the project means that not everyone will get employed</li> </ul>
Damage to equipment or containers transportation	<b>3 – Low (-)</b>	<ul style="list-style-type: none"> <li>Making use of accredited hazardous goods transportation companies.</li> <li>Equipment properly packaged in line with regulations to facilitate safe handling, transportation and placement.</li> <li>Inspection of packaging for damage.</li> <li>Risk assessment to be conducted.</li> <li>Route planning and obtaining all relevant permits from the local authorities.</li> <li>Adhere to OEM handling and transportation instructions.</li> <li>Agreement / contract with HazMat company for first response, site clean-up and rehabilitation.</li> <li>All MSDS available for the BESS.</li> </ul>	<b>2 – Low (-)</b>	<ul style="list-style-type: none"> <li>This could lead to road accident caused by driver or 3rd party; cargo not being properly secured.</li> <li>Spillage of electrolytes/ dangerous substances.</li> <li>Contamination of the soil, ground water and flora.</li> </ul>
Clearing of vegetation to accommodate infrastructure and services	<b>6 - Moderate</b>	<ul style="list-style-type: none"> <li>Limit the footprint to only areas necessary for the construction process.</li> <li>Utilise single access roads only.</li> <li>The footprint of the proposed development</li> </ul>	<b>6 - Moderate</b>	<ul style="list-style-type: none"> <li>Vegetation stripping of the infrastructure footprint will be necessary to allow for the establishment of infrastructure.</li> </ul>

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented
		<p>should be limited to the areas that already suffer transformation.</p> <ul style="list-style-type: none"> <li>Rehabilitation of the areas that are impacted by the development outside of the ultimate infrastructure footprint will aid in abating the ecological impacts.</li> </ul>		<ul style="list-style-type: none"> <li>This will have limited significance to the due to the site having already been historically subject to impacting features.</li> </ul>
Loss of RDL floral species during site clearing.	<b>0.6 - Low</b>	<ul style="list-style-type: none"> <li>The occurrence of RDL floral species is highly unlikely due to the transformation of the associated habitat throughout the site.</li> </ul>	<b>0.6 - Low</b>	<ul style="list-style-type: none"> <li>Site clearing will remove all vegetation to accommodate the infrastructure development. RDL or otherwise sensitive floral species may be included when vegetation is stripped, suffering loss of individuals.</li> <li>This is highly unlikely due to the transformed nature of the footprint area and therefore thought insignificant to the project.</li> </ul>
Loss and/or displacement of sensitive faunal species.	<b>0.6 - Low</b>	<ul style="list-style-type: none"> <li>Indiscriminate habitat destruction to be avoided and the proposed development should remain as localised as possible (including support areas and services);</li> <li>Unlikely to occur due to the transformed state of the proposed construction footprint and immediate surrounding areas</li> </ul>	<b>0.6 - Low</b>	<ul style="list-style-type: none"> <li>Site disturbances and vegetation (habitat) loss may lead to the loss of faunal species that are sensitive to disturbances.</li> <li>Again, the transformed nature of the footprint area assumes that only highly adaptable and generalist species would inhabit the site and therefore thought insignificant to the project.</li> </ul>
Destruction of nesting and/or roosting habitat for faunal species.	<b>4 - Moderate</b>	<ul style="list-style-type: none"> <li>Indiscriminate habitat destruction to be avoided and the proposed development should remain as localised as possible (including support areas and services).</li> <li>Unlikely to occur due to the transformed state of the proposed construction footprint and immediate surrounding areas.</li> </ul>	<b>0.6 - Low</b>	<ul style="list-style-type: none"> <li>Site clearing will remove all vegetation to accommodate the infrastructure development.</li> <li>The transformed nature of the footprint area assumes that only highly adaptable and generalist species would inhabit the site and therefore thought insignificant to the project.</li> </ul>
Destruction of ground-	<b>0.6 - Low</b>	<ul style="list-style-type: none"> <li>Limit the footprint to only areas necessary</li> </ul>	<b>0.6 - Low</b>	<ul style="list-style-type: none"> <li>Site clearing will remove all vegetation and</li> </ul>

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented
dwelling and/or sedentary fauna.		for the construction process. <ul style="list-style-type: none"> <li>Utilise single access roads only.</li> <li>Avoid indiscriminate destruction of habitat.</li> </ul>		habitat to accommodate the infrastructure development. Ground-dwelling fauna (e.g. Mygalomorph spiders) or ground-nesting birds may be included when vegetation is stripped, suffering loss of individuals. <ul style="list-style-type: none"> <li>Thought to have a low probability, however, due to the already-transformed nature of the proposed development site.</li> </ul>
Destruction of sensitive habitat	<b>0.6 - Low</b>	<ul style="list-style-type: none"> <li>Indiscriminate habitat destruction to be avoided and the proposed development should remain as localised as possible (including support areas and services).</li> <li>Unlikely to occur due to the transformed state of the proposed construction footprint and immediate surrounding areas.</li> </ul>	<b>0.6 - Low</b>	<ul style="list-style-type: none"> <li>Association that the site has with CBAs and ESAs indicates that sensitive habitat units occur at the site. The proposed development site has already suffered ecological and physical transformation and therefore this is thought to be an insignificant impact.</li> </ul>
Disturbance features that alter the vegetation structures	<b>0.6 - Low</b>	<ul style="list-style-type: none"> <li>Indiscriminate habitat destruction to be avoided and the proposed development should remain as localised as possible (including support areas and services).</li> <li>Unlikely to occur due to the transformed state of the proposed construction footprint and immediate surrounding areas.</li> </ul>	<b>0.7 - Low</b>	<ul style="list-style-type: none"> <li>Disturbances of soils will lead to altered state of vegetation structures. This will often lead to bush encroachment or establishment of exotic invasive species.</li> <li>The infrastructure footprint will be permanently stripped of vegetation and maintained as such. A perimeter area will also be maintained to avert fire risks.</li> </ul>
Habitat fragmentation resulting from infrastructure development.	<b>0.5 - Low</b>	<ul style="list-style-type: none"> <li>The habitat is already highly fragmented due to surrounding infrastructure development. The significance of this impact due to the proposed development is therefore insignificant.</li> </ul>	<b>0.4 - Low</b>	<ul style="list-style-type: none"> <li>The proposed development site is embedded within an industrial area and therefore already suffers relatively ecological isolation. An open area occurs to the southeast, but access is hindered by a railway line. This is therefore not thought to be a significant ecological impact emanating from the proposed</li> </ul>



Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented
				development.
Soil erosion.	<b>0.3 - Low</b>	<ul style="list-style-type: none"> <li>Topsoil stockpiles should be protected from erosion.</li> <li>Compile and implement the Stormwater Management Plan and the Erosion Management Plan once detailed design of the facility has been undertaken.</li> </ul>	<b>0.3 - Low</b>	<ul style="list-style-type: none"> <li>Soil erosion will take affect any unprotected soils that have suffered disturbances, including unprotected stockpiles of stored topsoil.</li> <li>Soil stripping, soil compaction and vegetation removal will increase rates of erosion and entry of sediment into the general environment and surrounding watercourses.</li> <li>The site is relatively flat, so there will be limited risk of erosion. Stockpiled soils will, however, be at risk of dispersal.</li> </ul>
<b>CONSTRUCTION PHASE</b>				
<b>➤ ECOLOGY</b>				
Damage to equipment or containers during storage and installation	<b>6-Moderate</b>	<ul style="list-style-type: none"> <li>Inspection of packaging for damage.</li> <li>Risk assessment to be conducted.</li> <li>Effective scheduling to limit onsite storage of equipment - site to be ready to readily accept BESS.</li> <li>Proper supervision is required.</li> <li>Adhere to OEM handling, transportation and storage instructions.</li> <li>Agreement / contract with HazMat company for first response, site clean-up and rehabilitation.</li> <li>All MSDS available for the BESS.</li> </ul>	<b>0.6- Low</b>	<ul style="list-style-type: none"> <li>This could lead to road accident caused by driver or 3rd party; cargo not being properly secured.</li> <li>Spillage of electrolytes/ dangerous substances.</li> <li>Contamination of the soil, ground water and flora.</li> </ul>

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented
Clearing of vegetation to accommodate infrastructure and services	<b>6 - Moderate</b>	<ul style="list-style-type: none"> <li>Limit the footprint to only areas necessary for the construction process.</li> <li>Utilise single access roads only.</li> <li>The footprint of the proposed development should be limited to the areas that already suffer transformation.</li> <li>Rehabilitation of the areas that are impacted by the development outside of the ultimate infrastructure footprint will aid in abating the ecological impacts.</li> </ul>	<b>6 - Moderate</b>	<ul style="list-style-type: none"> <li>Vegetation stripping of the infrastructure footprint will be necessary to allow for the establishment of infrastructure.</li> <li>This will have limited significance to the due to the site having already been historically subject to impacting features.</li> </ul>
Loss of RDL floral species during site clearing.	<b>0.6 - Low</b>	<ul style="list-style-type: none"> <li>The occurrence of RDL floral species is highly unlikely due to the transformation of the associated habitat throughout the site.</li> </ul>	<b>0.6 - Low</b>	<ul style="list-style-type: none"> <li>Site clearing will remove all vegetation to accommodate the infrastructure development. RDL or otherwise sensitive floral species may be included when vegetation is stripped, suffering loss of individuals.</li> <li>This is highly unlikely due to the transformed nature of the footprint area and therefore thought insignificant to the project.</li> </ul>
Loss and/or displacement of sensitive faunal species.	<b>0.6 - Low</b>	<ul style="list-style-type: none"> <li>Indiscriminate habitat destruction to be avoided and the proposed development should remain as localised as possible (including support areas and services).</li> <li>Unlikely to occur due to the transformed state of the proposed construction footprint and immediate surrounding areas</li> </ul>	<b>0.6 - Low</b>	<ul style="list-style-type: none"> <li>Site disturbances and vegetation (habitat) loss may lead to the loss of faunal species that are sensitive to disturbances.</li> <li>Again, the transformed nature of the footprint area assumes that only highly adaptable and generalist species would inhabit the site and therefore thought insignificant to the project.</li> </ul>
Destruction of nesting and/or roosting habitat for faunal species.	<b>4 - Moderate</b>	<ul style="list-style-type: none"> <li>Indiscriminate habitat destruction to be avoided and the proposed development should remain as localised as possible (including support areas and services).</li> <li>Unlikely to occur due to the transformed</li> </ul>	<b>0.6 - Low</b>	<ul style="list-style-type: none"> <li>Site clearing will remove all vegetation to accommodate the infrastructure development.</li> <li>The transformed nature of the footprint area assumes that only highly adaptable</li> </ul>

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented
		state of the proposed construction footprint and immediate surrounding areas.		and generalist species would inhabit the site and therefore thought insignificant to the project.
Destruction of ground-dwelling and/or sedentary fauna.	<b>0.6 - Low</b>	<ul style="list-style-type: none"> <li>Limit the footprint to only areas necessary for the construction process.</li> <li>Utilise single access roads only.</li> <li>Avoid indiscriminate destruction of habitat.</li> </ul>	<b>0.6 - Low</b>	<ul style="list-style-type: none"> <li>Site clearing will remove all vegetation and habitat to accommodate the infrastructure development. Ground-dwelling fauna (e.g. Mygalomorph spiders) or ground-nesting birds may be included when vegetation is stripped, suffering loss of individuals.</li> <li>Thought to have a low probability, however, due to the already-transformed nature of the proposed development site.</li> </ul>
Destruction of sensitive habitat	<b>0.6 - Low</b>	<ul style="list-style-type: none"> <li>Indiscriminate habitat destruction to be avoided and the proposed development should remain as localised as possible (including support areas and services).</li> <li>Unlikely to occur due to the transformed state of the proposed construction footprint and immediate surrounding areas.</li> </ul>	<b>0.6 - Low</b>	<ul style="list-style-type: none"> <li>Association that the site has with CBAs and ESAs indicates that sensitive habitat units occur at the site. The proposed development site has already suffered ecological and physical transformation and therefore this is thought to be an insignificant impact.</li> </ul>
Disturbance of features that alter the vegetation structures	<b>0.6 - Low</b>	<ul style="list-style-type: none"> <li>Indiscriminate habitat destruction to be avoided and the proposed development should remain as localised as possible (including support areas and services).</li> <li>Unlikely to occur due to the transformed state of the proposed construction footprint and immediate surrounding areas.</li> </ul>	<b>0.7 - Low</b>	<ul style="list-style-type: none"> <li>Disturbances of soils will lead to altered state of vegetation structures. This will often lead to bush encroachment or establishment of exotic invasive species.</li> <li>The infrastructure footprint will be permanently stripped of vegetation and maintained as such. A perimeter area will also be maintained to avert fire risks.</li> </ul>
Habitat fragmentation resulting from infrastructure	<b>0.5 - Low</b>	<ul style="list-style-type: none"> <li>The habitat is already highly fragmented due to surrounding infrastructure development. The significance of this impact due to the proposed development is</li> </ul>	<b>0.4 - Low</b>	<ul style="list-style-type: none"> <li>The proposed development site is embedded within an industrial area and therefore already suffers relatively ecological isolation. An open area occurs to the southeast, but access is hindered by</li> </ul>

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented
development.		therefore insignificant.		a railway line. This is therefore not thought to be a significant ecological impact emanating from the proposed development.
Soil erosion.	<b>0.3 - Low</b>	<ul style="list-style-type: none"> <li>Topsoil stockpiles should be protected from erosion.</li> </ul>	<b>0.3 - Low</b>	<ul style="list-style-type: none"> <li>Soil erosion will take affect any unprotected soils that have suffered disturbances, including unprotected stockpiles of stored topsoil.</li> <li>Soil stripping, soil compaction and vegetation removal will increase rates of erosion and entry of sediment into the general environment and surrounding watercourses.</li> <li>The site is relatively flat, so there will be limited risk of erosion. Stockpiled soils will, however, be at risk of dispersal.</li> </ul>
Soil contamination, vegetation loss and vegetation disturbance due to fuel and chemicals	<b>4 - Moderate</b>	<ul style="list-style-type: none"> <li>Mitigation measures as stipulated in the EMPr must be implemented in order to prevent potential soil pollution through fuel and oil leaks and spills and then compliance monitored by an Environmental Control Officer (ECO).</li> <li>Make sure construction vehicles are maintained and serviced to prevent oil and fuel leaks.</li> <li>Emergency on-site maintenance should be done over appropriate drip trays and all oil or fuel must be disposed of according to waste regulations. Drip-trays must be placed under vehicles and equipment when not in use.</li> <li>Implement suitable erosion control</li> </ul>	<b>0.3 - Low</b>	<ul style="list-style-type: none"> <li>Pollution of water resources and land.</li> <li>Loss of natural habitats for the biodiversity occurring in the area.</li> </ul>

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented
		measures. <ul style="list-style-type: none"> <li>All liquid chemical must be stored in a bundled area with a capacity of at least 110% of maximum allowable volume.</li> </ul>		
Potential Impact Vegetation and habitat disturbance due to the accidental introduction of alien species	<b>4 - Moderate</b>	<ul style="list-style-type: none"> <li>The Contractor implements suitable methods during the construction phase to limit the introduction and spread of alien invasive plant species.</li> <li>Promote awareness of all personnel.</li> <li>The establishment of pioneer species should be considered with the natural cycle of rehabilitation of disturbed areas, which assists with erosion control, dust and establishment of more permanent species. This can be controlled during construction phase and thereafter more stringent measures should be implemented during the rehabilitation and post rehabilitation.</li> <li>Larger exotic species that are not included in the Category 1b list of invasive species could also be allowed to remain for aesthetic purposes.</li> </ul>	<b>0.3 - Low</b>	<ul style="list-style-type: none"> <li>Loss of natural habitats for the biodiversity occurring in the area.</li> </ul>
Vegetation and habitat disturbance due to pollution and littering during construction phase	<b>4 - Moderate</b>	<ul style="list-style-type: none"> <li>The Contractor should employ personnel on site responsible for preventing and controlling of litter.</li> <li>Promote good housekeeping with daily clean-ups on site.</li> <li>During construction, refresher training can be conducted to construction workers with regards to littering, ad hoc veld fires, and dumping.</li> <li>No fires are allowed on site.</li> </ul>	<b>0.3 - Low</b>	<ul style="list-style-type: none"> <li>Loss of natural habitats for the biodiversity occurring in the area.</li> </ul>
Loss of habitat of the	<b>4 - Moderate</b>	<ul style="list-style-type: none"> <li>Vehicles and construction workers should</li> </ul>	<b>0.3 - Low</b>	<ul style="list-style-type: none"> <li>Loss of natural habitats for the biodiversity</li> </ul>

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented
Leipoldtville Sand Fynbos and CBA region		<p>under no circumstances be allowed outside the site boundaries to prevent impact on the surrounding vegetation.</p> <ul style="list-style-type: none"> <li>• Where possible, natural vegetation must not be cleared and encouraged to grow.</li> <li>• All stockpiles, construction vehicles, equipment and machinery should be situated away from the natural vegetation.</li> <li>• Disturbance of vegetation must be limited only to areas of construction.</li> <li>• Prevent contamination of natural grasslands by any pollution.</li> <li>• Areas cleared of vegetation must be re-vegetated prior to contractor leaving the site</li> </ul>		occurring in the area.
Damage to plant life outside of the proposed development site	<b>4 - Moderate</b>	<ul style="list-style-type: none"> <li>• Construction activities should be restricted to the development footprint area and then the compliance in terms of footprint can be monitored by ECO.</li> <li>• Areas which could be deemed as no go should be clearly marked.</li> </ul>	<b>0.3 - Low</b>	<ul style="list-style-type: none"> <li>• Loss of natural habitats for the biodiversity occurring in the area.</li> </ul>
Disturbance to animals	<b>4 - Moderate</b>	<ul style="list-style-type: none"> <li>• Animals residing within the designated area shall not be unnecessarily disturbed.</li> <li>• During construction, refresher training can be conducted to construction workers with regards to littering and poaching.</li> <li>• The Contractor and his/her employees shall not bring any domestic animals onto site.</li> <li>• Toolbox talks should be provided to contractors regarding disturbance to animals. Particular emphasis should be placed on talks regarding snakes.</li> </ul>	<b>0.3 - Low</b>	<ul style="list-style-type: none"> <li>• Displacement of animals.</li> </ul>

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented
Animal passage out of construction site	<b>4 - Moderate</b>	<ul style="list-style-type: none"> <li>Allow for safe animal passage through and specifically out of the construction site.</li> </ul>	<b>0.3 - Low</b>	<ul style="list-style-type: none"> <li>Loss of animals within the proposed area.</li> </ul>
The proposed construction activities may affect biodiversity through the encroachment of exotic vegetation following soil disturbance, in addition the maintenance of the area would disturb naturalised species within the area	<b>4 - Moderate</b>	<ul style="list-style-type: none"> <li>Newly cleared soils will have to be re-vegetated and stabilised as soon as construction has been completed and there should be an on-going monitoring program to control and/or eradicate newly emerging invasive species.</li> </ul>	<b>0.3 - Low</b>	<ul style="list-style-type: none"> <li>The encroachment of exotic vegetation following soil disturbance.</li> </ul>
Increased employment opportunities and economic growth	<b>4 - Moderate</b>	<ul style="list-style-type: none"> <li>Leverage this through procurement policies that favour local suppliers and businesses.</li> </ul>	<b>2- Low</b>	<ul style="list-style-type: none"> <li>Infrastructure development drives economic growth and has a huge multiplier effect. Infrastructure development not only generates employment directly through construction and operations but also creates an industrial base around the development for goods and services to supply the construction workers and activities. These industries would get more entrepreneurs and employ more labour. These workers would purchase more goods from the markets, creating a virtuous cycle.</li> </ul>
Creation of temporary skilled and unskilled job opportunities	<b>4 - Moderate</b>	<ul style="list-style-type: none"> <li>It is recommended that if practical, a local employment policy is adopted to maximise the opportunities made available to the</li> </ul>	<b>2- Low</b>	<ul style="list-style-type: none"> <li>Creating temporary skilled and unskilled job opportunities.</li> </ul>

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented
directly on the project		<p>local labour force (Sourced from nearest towns or within the Cederberg Local Municipality).</p> <ul style="list-style-type: none"> <li>The recruitment selection process should seek to promote gender equality and should aim to optimise the employment of women wherever possible.</li> <li>Efforts need to be employed to enhance indirect local employment/entrepreneurship opportunities by supporting local entrepreneurs as far as possible, where appropriate.</li> </ul>		
Temporary increase in traffic disruptions and movement patterns during the construction phase	<b>6- Moderate</b>	<ul style="list-style-type: none"> <li>Standard working hours to be implemented during the construction phase, and/or as any deviation that is approved.</li> <li>Construction vehicles must be roadworthy, and drivers must be qualified, obey traffic rules, follow speed limits and made aware of the potential road safety issues.</li> <li>All construction vehicles should be inspected regularly to ensure their road worthiness.</li> <li>Provision of adequate and strategically placed traffic warning signs and control measures along the main access roads to warn road users of the construction activities taking place for the duration of the construction phase. Warning signs must be visible at all times.</li> <li>Implement penalties for reckless driving for the drivers of heavy vehicles as a way to enforce compliance to traffic rules.</li> <li>All roads used by the project Developer</li> </ul>	<b>1- Low</b>	<ul style="list-style-type: none"> <li>If mitigation measures are not implemented, the traffic disruptions will continue to impact the surrounding businesses and the nearby communities.</li> </ul>



Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented
		<p>and its contractors must be maintained in good working order during the construction phase.</p> <ul style="list-style-type: none"> <li>It is recommended that a Community Liaison Officer be appointed to implement as the proposed grievance mechanism. 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</li> </ul>		
Nuisance impacts in terms of temporary increase in noise and dust, or the wear and tear on access roads to the site	<b>5- Moderate</b>	<ul style="list-style-type: none"> <li>Dust suppression measures must be implemented for heavy vehicles on a regular basis and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers.</li> <li>Ensure all vehicles are road worthy, drivers are qualified and are made aware of the potential noise and dust issues.</li> <li>It is recommended that 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.</li> </ul>	<b>2- Moderate</b>	<ul style="list-style-type: none"> <li>If mitigation measures are not implemented the proposed development will generate dust and noise and will continue to impact the surrounding businesses and the nearby communities.</li> </ul>
Termination of temporary employment	<b>6 Moderate</b>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<b>6-Moderate</b>	<ul style="list-style-type: none"> <li>Loss of temporary employment.</li> </ul>
Safety and security	<b>4-Moderate</b>	<ul style="list-style-type: none"> <li>Waste streams must be identified and documented.</li> <li>Waste management plan must be</li> </ul>	<b>2- Low</b>	<ul style="list-style-type: none"> <li>This increase the risk of a fire outbreak which will have an impact on the substation and the personal working within the</li> </ul>

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented
		<p>implemented.</p> <ul style="list-style-type: none"> <li>• Accredited waste facilities to be contracted for accepting / recycling the waste.</li> <li>• Working hours should be kept between daylight hours during the construction phase, and/or as any deviation that is approved by the relevant authorities.</li> <li>• The perimeter of the construction site should be appropriately secured to prevent any unauthorised access to the site; the fencing of the site should be maintained throughout the construction periods.</li> <li>• Access in and out of the construction camp should be strictly controlled</li> <li>• No open fires are permitted outside of designated areas.</li> <li>• Contractor must provide adequate firefighting equipment on site and provide firefighting training to selected construction staff.</li> <li>• A comprehensive employee induction programme would cover land access protocols, fire management and road safety.</li> <li>• The contractor should have personnel trained in first aid on site to deal with smaller incidents that require medical attention</li> <li>• It is recommended that a Community Liaison Officer should be appointed to implement a grievance mechanism. A method of communication should be implemented whereby procedures to lodge</li> </ul>		premises.

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented
		<p>complaints are set out in order for the local community to express any complaints or grievances with the construction process</p> <ul style="list-style-type: none"> <li>It is recommended that a Stakeholder Engagement Plan be compiled and implemented for the construction phase of the project.</li> </ul>		
Disturbance, damage, destruction or sealing-in of fossil remains preserved at or beneath the ground surface within the development area, most notably by bedrock excavations during the construction phase.	<b>1-Low</b>	<ul style="list-style-type: none"> <li>Monitoring of all substantial bedrock excavations for fossil remains by ECO, with reporting of substantial new palaeontological finds to SAHRA for possible specialist mitigation.</li> </ul>	<b>1-Low</b>	<ul style="list-style-type: none"> <li>Will result in the permanent loss of any heritage features.</li> </ul>
During the construction phase activities resulting in disturbance of surfaces and/or sub-surfaces may destroy, damage, alter, or remove from its original position archaeological and paleontological material or objects.	<b>1-Low</b>	<ul style="list-style-type: none"> <li>No mitigation measures are required as no sites were identified. It is recommended that a chance find procedure should be implemented for the project.</li> </ul>	<b>1-Low</b>	<ul style="list-style-type: none"> <li>Will result in the permanent loss of archaeological and paleontological material or objects</li> </ul>
Soil and water contamination due to the handling and storage of dangerous goods during	<b>6-Moderate</b>	<ul style="list-style-type: none"> <li>Any spillages of dangerous substances must be contained as soon as possible, and remedial and clean-up actions initiated</li> </ul>	<b>1-Low</b>	<ul style="list-style-type: none"> <li>May result in a fire or explosion and the contamination of soil and ground water.</li> </ul>

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented
the construction and operation phases.		<p>immediately.</p> <ul style="list-style-type: none"> <li>Regular inspections of the permanent bunded areas for storage of dangerous goods must be undertaken throughout the life cycle of the project.</li> <li>Appropriate spill kits must be available on site.</li> <li>Maintenance vehicles must have access to spill kits.</li> <li>An emergency spill response plan must be developed for implementation during the construction and the operational phase. Personnel should be suitably trained to attend to any spills that may occur.</li> <li>A fire management plan must be developed for implementation during the construction and the operational phase. Personnel must be suitably trained to manage any fires which may occur on site.</li> <li>Flammable substances must be stored in enclosed containers away from heat, sparks, open flames, or oxidizing materials.</li> <li>Develop a monitoring and leak detection procedure for monitoring of the chemical spillages.</li> </ul>		
<b>OPERATION PHASE</b>				
Vegetation transformation for areas that are routinely maintained.	<b>1-Low</b>	<ul style="list-style-type: none"> <li>The peripheral area of the substation will be routinely maintained to avert the fire risks and therefore any emergent exotic vegetation can be simultaneously managed</li> </ul>	<b>0-Low</b>	<ul style="list-style-type: none"> <li>Routine disturbances of vegetation will result in transformation of the structures, with an expected increase in abundance of pioneering species.</li> <li>The relatively small spatial scale tends to render this impact insignificant.</li> </ul>
➤ <b>Storage and handling of Hazardous Substances</b>				

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented
Storing and handling of dangerous chemicals	<b>4 - Moderate</b>	<ul style="list-style-type: none"> <li>A spill response kit must be available at all times. The incident must be reported on and if necessary, a biodiversity specialist must investigate the extent of the impact and provide rehabilitation recommendations. Responsible and technology-specific prevention and response infrastructure must be in place.</li> <li>Storage of chemicals to be limited to appropriate and secure facilities on site and access limited to authorised personnel only.</li> <li>Storage in secure containers to ensure/limit the potential for the occurrence of leakages.</li> <li>Storage area to be bunded with an appropriate volume capacity to protect from environmental contamination should accidental leakages occur.</li> <li>Transfer of chemicals to batteries should be done according to best practice guidelines to limit spillage.</li> <li>A fire management plan must be developed for implementation during the construction and the operational phase. Personnel must be suitably trained to manage any fires which may occur on site.</li> <li>Should spillage occur, the ECO must be informed immediately, and a clean-up operation immediately commenced. Contaminated soils must be cleared and removed for disposal at a registered waste site capable of disposal of the chemicals.</li> </ul>	<b>3 - Moderate</b>	<ul style="list-style-type: none"> <li>Spills into the surrounding environment (including potential spills from the Battery Energy Storage System) could contaminate habitats as well as water resources associated with a spillage</li> <li>Spillages of dangerous chemicals from inadequate and unprotected storage facilities and/or spillages during routine operations will contaminate soils and lead to chemicals (heavy metals) becoming bio-available to enter into the food chain.</li> <li>Chemical leachates could contaminate groundwater and/or be transported to surface water ecosystems via surface water runoff.</li> </ul>

**Table 6-5: Summary of Decommissioning Phase Impacts**

NB: The impacts below have been determined for the decommissioning of the proposed construction site. All activities relating to the future decommissioning of the proposed development and the associated infrastructure does not form part of this application and as such would be subject to a separate Environmental Authorisation Process.

Id.	Impact	Description	Nature of Impact (Negative / Positive)	Management Objective / Principle	Level of Mitigation
<b>Decommissioning Phase</b>					
		Equipment associated with the proposed Project would only be decommissioned once it has reached the end of its economic life. It is most likely that decommissioning activities of the infrastructure of the facility would comprise the disassembly and replacement of the infrastructure with more appropriate technology/infrastructure available at that time.			
		» Site Preparation Site preparation activities will include confirming the integrity of the access to the site to accommodate required equipment, preparation of the site (e.g. lay down areas, construction platform) and the mobilisation of construction equipment.			
		» Disassemble and Remove Infrastructure Disassembled components will be reused, recycled, or disposed of in accordance with regulatory requirements or any other requirements deemed applicable by the Original Equipment Manufacturer. .			

## **7 APPROACH TO CORRECTIVE ACTION**

### **7.1 Implementation of Corrective Action**

Checking and corrective action forms part of the environmental management function and is aimed at ensuring that the necessary environmental management activities are being implemented and that the desired outcomes are achieved. When non-conformities do occur that have a negative impact on the environment, these should be rectified by the implementation of corrective actions issued by the ECO and PM within a reasonable or agreed period of time. All corrective actions need to be documented and the outcome photographed and included in the next report. Broadly, the mechanisms for addressing non-compliance that are provided for in the environmental specifications and associated contract documentation can be divided into the following categories:

- Controlling performance via the certification of payments;
- Requiring the Contractor to “make good”, at their own cost, any unjustifiable environmental degradation;
- Implementing a system of penalties to dissuade environmentally risky behaviours;
- Removing environmentally non-compliant staff/ plant from site, or suspending part or all of the activities on site;
- To confirm, upon receipt of the Tender, that the Contractor has made sufficient allowance in his Tender Price for meeting the various environmental requirements; and
- During the tender adjudication process for each Contract, each Contractor should be scored in terms of the aforementioned considerations and allocated an environmental competency score. This score should form a key consideration in the final decision-making regarding the award of the various contracts.

## **8 METHOD STATEMENTS**

A Method Statement (MS) must be compiled for every activity undertaken by the Contractor which poses a risk to the environment (natural, biophysical and social), and includes the following:

- The MS should be submitted at least 7 working days prior to the commencement of work to the ECO;
- A MS describes the scope of the intended work in a step by step description to ensure that the ECO / EO understand the Contractors intentions. This will enable them to assist in devising any mitigation measures which would minimise environmental impact during these tasks;
- The ECO may require changes to a MS if it does not comply with the specification or if, in the reasonable opinion of the ECO, the proposal may result in, or carries a greater than reasonable risk of damage to the environment in excess of that permitted by the EMPr or any legislation;
- The Contractor shall carry out the activities in accordance with the approved MS;

- Approved MS shall be readily available on the site and shall be communicated to all relevant personnel;
- Approval of the MS shall not absolve the Contractor from any of his obligations or responsibilities in terms of the contract;
- No claim for delay or additional cost incurred by the Contractor shall be entertained due to inadequacy of a MS;
- For each instance where it is requested that the Contractor submit a MS to the satisfaction of the ECO, the format should clearly indicate as a minimum the following:
  - Responsible person (Name and Identity Number) and an alternative (Name and Identity Number);
  - The applicable requirements provided in all legislation and policies which have a bearing on the proposed activities;
  - Training Requirements;
  - Timing of activities as per the Project / Construction Schedule;
  - Materials, plant and equipment to be used;
  - Proposed construction procedure, including the order in which the activities making up the procedure will be carried out, designed to implement the relevant environmental specifications;
  - The system to be implemented to ensure compliance with the above;
  - Person Protection Equipment (PPE) required;
  - A detailed description of the process of work, methods and materials;
  - Emergency Procedures;
  - Response in the case of a non-compliance; and
  - Other information deemed necessary by the ECO.
- All MS must be signed by the Engineer; and
- Work may not commence until the MS has been approved by the ECO. All MS will form part of the EMPr documentation and are subject to all terms and conditions contained within the EMPr main document.

The following MS shall be prepared by the Contractor for approval:

- **Site Layout:** The graphical representation with detailed notes of the location, layout and method of establishment of the construction camp must be provided and must include the following:
  - All Contractor's buildings, and/or offices;
  - Lay down areas;
  - Vehicle and plant storage areas, including wash areas;
  - Workshops, if required and approved by ECO;
  - Fuel storage and dispensing areas, if required and approved by ECO;
  - Cement/concrete batching areas, if required and approved by ECO (including the methods employed for the mixing of concrete and particularly the containment of runoff water from such areas and the method of transportation of concrete);
  - Other infrastructure required for the running of the project.
- **Access Routes:** Details, including a drawing, showing where and how the access points and routes will be located and managed must be provided in a MS. Details of fences and gates affected or used during the construction activities, including a drawing showing the location of fences and access gates must be provided.
- **Pollution control:** Expected solid waste types, quantities, methods and frequency of collection and disposal as well as location of disposal sites must be identified and



stated in a MS. The MS shall further include methods of minimising, controlling, collecting and disposing of contaminated water, and details of any hazardous substances/materials to be used, together with the transport, storage, handling and disposal procedures for the substances.

- **Safety considerations:** The Contractor shall provide details identifying what safety precautions will be implemented to ensure the safety of all staff, and the general public at large, on site during the life of the project. This will include protective clothing requirements for all types of construction activities on site, including protection against dust, noise, falling objects, and work associated with electricity and working at heights.
- **Emergency procedures:** The Contractor shall provide details regarding all relevant emergency procedures that will be implemented for fire control and accidental leaks and spillages of hazardous substances (including fuel and oil). The Contractor shall further include details of risk reduction measures to be implemented including firefighting equipment, fire prevention procedures and spill kits.
- **Waste management control:** The Contractor shall provide details regarding how solid and liquid waste generated on the construction site and site camp will be collected, stored, transported and disposed of. Details of any service provider(s) appointed to manage this task must also be provided.
- **Storm water and erosion control:** The Contractor shall provide details of how storm water emanating within or adjacent to the construction site may impact on construction activities. Details on how the Contractor will deal with storm water runoff and potential erosion within the construction footprint and servitude must be provided. Details of any service provider(s) appointed to manage this task must also be provided.

## 9 ENVIRONMENTAL AWARENESS PLAN

Environmental awareness training is required for all personnel involved in the proposed project. This includes all employees working on the site including temporary labourers, contractors and subcontractors. The Environmental Awareness Plan is intended to describe the method that will be adopted by the proponent to inform any person acting on their behalf, including an agent, sub-contractor, employee or any person rendering a service, of any environmental risk which may result from the implementation of the project activities and the manner in which risks must be managed in order to avoid adverse environmental consequences.

Environmental awareness training should cover:

- The importance of the EMPr;
- Specific details of the EMPr;
- Employees role in compliance with the EMPr;
- Environmental effects associated with the activities;
- Training targeted at specific personnel, e.g. example operators of heavy machinery;
- The environmental impacts, actual or potential, of their work activities;
- The environmental benefits of improved personal performance;

- 
- Their roles and responsibilities in achieving conformance with the environmental policy and procedures;
  - Emergency preparedness and response requirements;
  - The potential consequences of departure from specified operating procedures;
  - The mitigation measures required to be implemented when carrying out their work activities;
  - Environmental legal requirements and obligations;
  - The importance of not littering;
  - The importance of using supplied toilet facilities;
  - The need to use water and electricity sparingly; and
  - Details of and encouragement to minimise the production of waste and re-use, recover and recycle waste where possible.

Training should be conducted by a suitably qualified person and if necessary, in more than one language to ensure it is understood by all workers. Copies of the environmental training must be available on site in languages appropriate to the work force. Records of the training sessions including attendance registers, nature of training and date of training should be kept to ensure all parties have received the necessary training and for auditing purposes.

In addition to training, general environmental awareness must be fostered among the project's workforce to encourage the implementation of environmentally sound practices throughout its duration. Environmental awareness and training is an important aspect of the implementation of the EMP. Once the awareness plan and training material are available, the entire workforce and project management team should undergo an environmental awareness training course. Environmental awareness training is critical for the workforce to understand how they can play a role in achieving the objectives specified in the EMP. All visitors to the site (including project team members which are not based onsite), must undergo Environmental Induction before being permitted to the construction and associated area. The Environmental Induction should be structured so as to provide a condensed version of the comprehensive Environmental Awareness Training that will be provided to the workforce / onsite staff.

Environmental awareness could be fostered in the following manner:

- Induction for all workers on site, before commencing work;
- Refresher courses as and when required;
- Daily toolbox talks at the start of each day with all workers coming on site, where workers might be alerted to particular environmental concerns associated with their tasks for that day or the area/habitat in which they are working; and
- Courses must be given by suitably qualified personnel and in a language and medium understood by workers/employees.

The Environmental Awareness Plan should be drawn up by the PM, in consultation with the ECO and EO and should be kept for implementation and audit purposes. The Environmental Awareness Plan should be a dynamic document (or set of documents) which should be updated as changes to the project, environment, staff and *etc.* occur.

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## **10 TRAINING**

The applicable training will be as follows:

- The EO shall be appropriately trained in environmental management and shall possess the skills necessary to impart environmental management skills to all personnel involved in the construction of the proposed mixed business and residential development;
- The PM and EO shall ensure, on behalf of the Developer, that the employees (including construction workers, engineers, and long-term employees) are adequately trained and understand the management measures provided in the EMPr; and
- All employees shall have an induction presentation on environmental awareness. The cost, venue and logistics shall be for Eskom's account.

Where possible, training must be conducted in the predominant mother language spoken by the employees. The induction and training shall, as a minimum, include the following:

- The importance of conformance with all the specifications of the EMPr and other environmental policies and procedures;
- The significant environmental impacts, actual or potential, of their work activities;
- The environmental benefits of improved personal performance;
- Their roles and responsibilities in achieving conformance with the EMPr and other environmental policies and procedures;
- The potential consequences of departure from specified operating procedures; and
- The mitigation measures required to be implemented when carrying out their work activities.

### **10.1 Environmental Authorisation**

The ECO shall convey the contents of this EMPr and the conditions of the EA and discuss the contents in detail with the Developer's PM and Contractors. This formal induction training shall be done with all main and sub-contractors. Record of the training dates, people who attended and discussion points shall be kept by the ECO.

## 11 ENVIRONMENTAL IMPACT MANAGEMENT OUTCOMES AND ACTIONS

The management measures documented in each of the sub-sections below have been compiled using the following information:

- Impact Assessment and mitigation measures documented in the BAR for the proposed establishment of a mixed business and residential development and its operations; and
- Mitigation and management recommendations provided by the specialist studies and EAP.

The mitigation and management measures relating to each anticipated impact are described in Table 11-1.

In addition to the above-mentioned information sources, the EMPr should be updated to include the conditions documented in the EA to be received upon approval of the BAR. The Developer should appoint an EAP to amend the EMPr should amendments be required by DFFE.

### 11.1 Pre-Construction and Construction Phase

#### **Pre-construction -Planning and Design Phase**

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

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

#### **Construction Phase**

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

- » Ensures that construction activities are properly 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, traffic and road use, and effects on local businesses and residents.

- 
- » Minimises the impact on the indigenous natural vegetation, and habitats of ecological value (i.e. drainage lines).
  - » Minimises impacts on fauna using the site.
  - » Minimises the impact on heritage site should they be discovered.
  - » Establishes an environmental baseline during construction activities on the site, where possible.

In order to meet this goal, the following impacts, responsible person have been identified, together with necessary actions and monitoring requirements. Refer to Table 11-1.

**Table 11-1: Impacts, Management/ Mitigation Measures during Pre-Construction and Construction Phase**

<b>Impact management outcomes:</b> <ul style="list-style-type: none"> <li>• Ensure that environmental awareness training is implemented;</li> <li>• Undertake responsible water usage;</li> <li>• To ensure no pollution of surface and groundwater resources;</li> <li>• To ensure no instances of erosion on or adjacent to the site is reported or identified;</li> <li>• Ensure that the stormwater management plan is implemented;</li> <li>• Minimal impacts on vegetation and habitats;</li> <li>• Avoid displacement of faunal community;</li> <li>• Minimal visual impacts;</li> <li>• Minimal impacts on wetlands, streams and rivers; and</li> <li>• Prevent dust fallout exceedances from occurring within the dust monitoring network.</li> </ul>					
<b>Id.</b>	<b>Impact</b>	<b>Impact Management Actions</b>	<b>Responsible Person</b>	<b>Frequency and/or Time Period</b>	<b>Method of Monitoring</b>
1.	Appointment of construction contractor	<ul style="list-style-type: none"> <li>• Ensure that unskilled labour required for the construction and installation of equipment are predominately South Africans from the surrounding communities.</li> </ul>	Developer	Not applicable	Not applicable
2.	Environmental Awareness Training	<ul style="list-style-type: none"> <li>• 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 project area to inform contractors and site staff of the presence of species, their identification, conservation status and importance, biology, habitat requirements and management requirements within the EA;</li> <li>• All contractors and employees should undergo induction which is to include a component of environmental awareness. The induction is to include aspects such as the need to avoid littering, the reporting and cleaning of spills and leaks and general good "housekeeping".</li> </ul>	Developer, Health and Safety Officer, Contractor, ECO	Once-off, or as neccessary	Audit
3.	Economic benefit to local economy	<ul style="list-style-type: none"> <li>• Ensure that unskilled labour required for the construction and installation of equipment are predominately South Africans from the surrounding communities.</li> </ul>	Developer / Contractor	Not Applicable	Not Applicable.
4.	Increased employment opportunities and	<ul style="list-style-type: none"> <li>• Leverage this through procurement policies that favour local suppliers and businesses.</li> </ul>	Developer / Contractor	Duration of Construction Phase.	Monthly ECO Audits.

Id.	Impact	Impact Management Actions	Responsible Person	Frequency and/or Time Period	Method of Monitoring
	economic growth				
5.	Creation of temporary skilled and unskilled job opportunities directly on the project	<ul style="list-style-type: none"> <li>It is recommended that if practical, a local employment policy is adopted to maximise the opportunities made available to the local labour force (<i>Sourced from nearest towns or within the ZF Mgcawu District Municipality, and the Dawid Kruiper Local Municipality</i>).</li> <li>The recruitment selection process should seek to promote gender equality and should aim to optimise the employment of women wherever possible.</li> <li>Employment of youth and Black and Coloured people must be prioritized.</li> <li>Efforts need to be employed to enhance indirect local employment/entrepreneurship opportunities by supporting local entrepreneurs as far as possible, where appropriate.</li> <li>Implement training and on-the-job skills development programmes for temporary employees where feasible.</li> <li>Employ local contactors that are compliant with Broad Based Black Economic Empowerment (BBB EE) criteria to the extent possible.</li> <li>Recruitment and employment practises must be in accordance with all labour legislation in South Africa.</li> <li>Vacancies should be advertised in the local media when they become available.</li> </ul>	Developer / Contractor	Duration of Construction Phase.	Monthly ECO Audits.
6.	Increased demand for low-cost housing and municipal services	<ul style="list-style-type: none"> <li>Prioritise employment of local people.</li> <li>Provide suitable housing and living arrangements if temporary employees are brought in to undertake construction activities.</li> <li>Accommodation provided must not compromise safety of employees and surrounding communities. All applicable land-use agreements must be in place before construction commences.</li> <li>Adequate arrangements for daily transport to and from the construction site must be in place before commencement of construction phase activities.</li> <li>All non-local low and semi-skilled workers should be assisted with transport to return home when they are not required on site (i.e. weekends, etc.).</li> <li>All non-local construction workers should be assisted with transport back</li> </ul>	Developer / Contractor	Duration of Construction Phase.	Monthly ECO Audits.

Id.	Impact	Impact Management Actions	Responsible Person	Frequency and/or Time Period	Method of Monitoring
		to their place of residence within one week of their temporary employment contracts coming to an end.			
7.	Strain on community health & safety services	<ul style="list-style-type: none"> <li>• Prioritise employment of local people from the various communities in ZF Mgcawu District Municipality, and the Dawid Kruiper Local Municipality.</li> <li>• The Applicant as well as any contractors that are appointed to undertake the construction phase activities should develop and agree a code of conduct which sets standards for acceptable behaviour and outlines behaviour and activities which could constitute grounds for dismissal. Any employee or contractor appointed by the Applicant to undertake construction phase activities that is found to be in breach of the code of conduct should be dismissed after following due process in accordance with prevailing labour legislation. Criminal activities should be reported to SAPS immediately for investigation and further action.</li> <li>• The Applicant and contractor should agree and implement an HIV/AIDS / TB awareness programme.</li> <li>• The Applicant should develop and implement an appropriate method of communication with the local community. A community liaison officer should be appointed during the construction phase to engage with local community members regarding any issues, complaints or grievances that they may have.</li> </ul>	Developer / Contractor	Duration of Construction Phase.	Monthly ECO Audits.
8.	Influx of jobseekers	<ul style="list-style-type: none"> <li>• Prioritise employment of local people from the various communities in ZF Mgcawu District Municipality, and the Dawid Kruiper Local Municipality.</li> <li>• In consultation with the ZF Mgcawu District Municipality, and the Dawid Kruiper Local Municipality, investigate the option of establishing a Monitoring Forum to monitor and identify potential influx related problems associated with the proposed project. The Monitoring Forum should include other renewable energy operators in the area.</li> <li>• Employment for 'walk-in' temporary / casual labourers at the proposed construction site should not be permitted.</li> </ul>	Developer / Contractor	Duration of Construction Phase.	Monthly ECO Audits.
9.	Risk to livestock, crops, houses and farm infrastructure	<ul style="list-style-type: none"> <li>• The construction site should be fenced off prior to commencement of the construction phase. Movement of construction workers should be restricted to the construction site during work hours.</li> <li>• A code of conduct that sets standards for acceptable behaviour and outlines behaviour and activities which could constitute grounds for</li> </ul>	Developer / Contractor	Duration of Construction Phase.	Monthly ECO Audits.



Id.	Impact	Impact Management Actions	Responsible Person	Frequency and/or Time Period	Method of Monitoring
		<p>dismissal must be in place prior to construction. Consequences for wilful or negligent damage to private property must be outlined, communicated with all employees and enforced accordingly when alleged infringements are reported.</p> <ul style="list-style-type: none"> <li>Any loss or damage associated with construction phase activities, or the actions of employees or contractors appointed by the Applicant must be compensated according to a value/scale agreed with the affected landowner.</li> <li>Movement of people and vehicles associated with construction phase activities should be confined to designated areas or public roads.</li> <li>A strict speed limit must be enforced.</li> <li>All farm gates must be closed after accessing/exiting a property.</li> <li>Daily transport for low and semi-skilled workers to and from site should be provided by the Applicant/EPC.</li> <li>EMPr must details measure to ensure proper storage and management of waste on site. In particular, plastic waste which could be ingested by livestock must be managed appropriately.</li> <li>The possibility and practicality of establishing firebreaks around the perimeter of the construction site prior to commencement of construction activities should be investigated.</li> <li>Smoking on site must be confined to designated areas.</li> <li>Construction related activities that could pose a potential fire risk must be managed in accordance with safety protocols and procedures outlined in the EMPr in compliance with prevailing fire, health and safety legislation.</li> <li>No construction phase employees should be permitted on site after work hours, with the exception of security staff.</li> </ul>			
10.	Dust nuisance	<ul style="list-style-type: none"> <li>Water sprays, especially on dry and windy days, on haul roads and where vegetation is being / has been cleared. Dust nuisance Complaints should be recorded in the complaints register at the construction site.</li> </ul>	Contractor / EO / Developer / ECO	Duration of Construction Phase.	Complaints register must be kept at the construction site. No. of dust complaints received will be

Id.	Impact	Impact Management Actions	Responsible Person	Frequency and/or Time Period	Method of Monitoring
					used to measure the effectiveness of the dust impact mitigation.
11.	Possible sedimentation from uncovered areas	<ul style="list-style-type: none"> <li>Vegetation clearance should be undertaken in phases, i.e. limited to working unit at a time.</li> </ul>	Contractor / EO / ECO	Monthly monitoring within the duration of Construction Phase.	Monthly ECO Audits.
12.	Destruction and further loss and fragmentation of the vegetation community	<ul style="list-style-type: none"> <li>All development areas must be clearly demarcated, and restricted to the proposed development areas/corridors;</li> <li>Areas of indigenous vegetation outside of the direct project footprint, should under no circumstances be fragmented or disturbed further;</li> <li>All activities must make use of existing roads and tracks as far as practically and feasibly possible;</li> <li>Apply for a permit to relocate protected plant species into the on-site relocation areas already used for transplantation of rescued plants or if not available, then to similar habitat recommended by a specialist (Refer to the guidelines for the rescue and relocation of Protected plant species on site in Appendix D: Plant Rescue and Protection Plan);</li> <li>Any materials may not be stored for extended periods of time and must be removed from the project area once the construction phase has been concluded. Use of re-usable/recyclable materials are recommended;</li> <li>The footprint area of the construction should be kept to a minimum. The footprint area must be clearly demarcated to avoid unnecessary disturbances to adjacent areas thereby causing further encroachment of invasive species.</li> </ul>	Not Applicable.	Not Applicable.	Not Applicable.
13.	Displacement of faunal community due to habitat loss, direct mortalities and disturbance	<ul style="list-style-type: none"> <li>The ECO must be on site when construction begins to identify fauna species that will be directly disturbed and to relocate protected fauna/flora that are found during the construction activities. The area must be walked through prior to construction to ensure no faunal species remain in the habitat and get killed. Should animals not move out of the area on their own relevant specialists must be contacted to advise on how the species</li> </ul>	Contractor / EO / ECO	Duration of Construction Phase.	Monthly ECO Audits

Id.	Impact	Impact Management Actions	Responsible Person	Frequency and/or Time Period	Method of Monitoring
		<ul style="list-style-type: none"> <li>can be relocated;</li> <li>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;</li> <li>No trapping, killing, or poisoning of any wildlife is to be allowed;</li> <li>The duration of the construction should be minimized to as short term as possible, to reduce the period of disturbance on fauna.</li> </ul>			
14.	Clearing of vegetation to accommodate infrastructure and services	<ul style="list-style-type: none"> <li>Limit the footprint to only areas necessary for the construction process;</li> <li>Utilise single access roads only;</li> <li>The footprint of the proposed development should be limited to the areas that already suffer transformation;</li> <li>All construction activities must be restricted to the development footprint area. This includes laydown and storage areas, ablutions, offices etc.;</li> <li>Rehabilitation of the areas that are impacted by the development outside of the ultimate infrastructure footprint will aid in abating the ecological impacts (Refer to the procedures to be undertaken and the monitoring of the revegetation and rehabilitation of the construction footprint post-construction activities in Appendix E: Revegetation and Rehabilitation Plan).</li> </ul>	Contractor / EO / ECO	Monthly monitoring within the duration of Construction Phase.	Monthly ECO Audits
15.	Damage to plant life outside of the proposed development site	<ul style="list-style-type: none"> <li>Construction activities should be restricted to the development footprint area and then the compliance in terms of footprint can be monitored by Environmental Control Officer (ECO).</li> <li>Areas which could be deemed as no go should be clearly marked.</li> </ul>	Contractor / EO / ECO	Duration of Construction Phase.	Monthly ECO Audits
16.	Construction of roads	<ul style="list-style-type: none"> <li>The footprint area of the road should be kept a minimum. The footprint area must be clearly demarcated to avoid unnecessary disturbances to adjacent areas;</li> <li>Exposed road surfaces awaiting grading must be stabilised to prevent the erosion of these surfaces. Signs of erosion must be addressed immediately to prevent further erosion of the road;</li> <li>Silt traps and fences must be placed in the preferential flow paths along the road to prevent sedimentation of the watercourse;</li> <li>Temporary stormwater channels should be filled with aggregate and/or</li> </ul>	Contractor / Developer	Duration of Construction Phase.	Monthly ECO Audits

Id.	Impact	Impact Management Actions	Responsible Person	Frequency and/or Time Period	Method of Monitoring
		<p>logs (branches included) to dissipate flows;</p> <ul style="list-style-type: none"> <li>• A suitable stormwater plan must be compiled for the road. This plan must attempt to displace and divert stormwater from the road and discharge the water into adjacent areas without eroding the receiving areas. It is preferable that run-off velocities be reduced with energy dissipaters and flows discharged into the local watercourses;</li> <li>• All areas outside of the demarcated areas should be declared a 'no-go' area during the construction phase and all efforts must be made to prevent access to this area from construction workers and machinery;</li> <li>• Dust-reducing mitigation measures must be put in place and must be strictly adhered to. This includes wetting of exposed soft soil surfaces and not conducting activities on windy days which will increase the likelihood of dust being generated;</li> <li>• Areas that are cleared during construction need to be re-vegetated with indigenous vegetation to prevent erosion and reduce the likelihood of encroachment by alien invasive plant species upon completion of the road (refer to the Alien Plant and Open Space Management Plan in Appendix F which provides guidelines and procedures for the prevention of the spread and clearance of alien invasive plant species);</li> <li>• Any topsoil that is removed during construction must be appropriately removed and stored. This includes on-going maintenance of such topsoil piles so that they can be utilised during decommissioning phases and re-vegetation.</li> </ul>			
17.	Conservation Drainage Systems of	<p>This section is critical to those drainage systems proposed to be crossed by means of roads:</p> <ul style="list-style-type: none"> <li>• Crossings are to be constructed during the low flow period;</li> <li>• Well-engineered, and wide enough culvert systems should be installed at all drainage systems, including those minor systems not identified during the site assessment;</li> <li>• It is critical to spread flows across the system, avoiding incisions in the landscape caused by concentrated flows. Temporary stormwater channels should be filled with aggregate and/or logs (branches included) to dissipate flows;</li> <li>• It is recommended that the material surrounding and holding the culverts</li> </ul>	Contractor / Developer	Duration of Construction Phase.	Monthly ECO Audits

Id.	Impact	Impact Management Actions	Responsible Person	Frequency and/or Time Period	Method of Monitoring
		<p>in place include a coarse rock layer that has been specifically incorporated to increase the porosity and permeability to accommodate flooding and very low flows;</p> <ul style="list-style-type: none"> <li>• The culverts used in the design should be as large as possible, partially sunken and energy dissipating material must be placed at the discharge area of each culvert to prevent erosion of these areas.</li> <li>• The use of larger culverts will prevent the build-up of debris by allowing the free movement of debris through the large culverts;</li> <li>• Culverts should avoid inundation (damming) of upstream areas by facilitating streamflow and catering properly for both low flows and high flows;</li> <li>• Surface run-off from the roads flowing down the embankments often scours the watercourse on the sides of the culvert causing sedimentation of the channel. This should be catered for with adequate concreted stormwater drainage depressions and channels with energy dissipaters that channel these flows into the river in a controlled manner;</li> <li>• The culvert installations should further consider the scouring action of high flows and gabion structures or similar should be placed on both sides of the culvert on the embankments both upstream and downstream. This will serve as retention of the soils from scouring around and underneath the culvert structures aiding in the protection of the structure;</li> <li>• Large aggregate outsourced or from the project area (if available) can be used for energy dissipation in the channel downstream of the culverts to reduce the likelihood of scouring the riverbed and sedimentation of the catchment. It is preferable that larger aggregate be used to avoid flows removing material from the site;</li> <li>• Signs of erosion must be addressed immediately to prevent further erosion;</li> <li>• Monthly erosion monitoring must take place from May to August to identify erosion alongside the proposed road;</li> <li>• Silt traps and fences must be placed in the preferential flow paths along the road to prevent sedimentation of the watercourse.</li> </ul>			
18.	Vehicle traffic	<ul style="list-style-type: none"> <li>• Standard working hours to be implemented during the construction phase, and/or as any deviation that is approved.</li> </ul>	Contractor / Developer	Monthly monitoring within the duration	Monthly ECO Audits.

Id.	Impact	Impact Management Actions	Responsible Person	Frequency and/or Time Period	Method of Monitoring
	congestion	<ul style="list-style-type: none"> <li>Construction vehicles must be roadworthy, and drivers must be qualified, obey traffic rules, follow speed limits and made aware of the potential road safety issues.</li> <li>All construction vehicles should be inspected regularly to ensure their road worthiness.</li> <li>Provision of adequate and strategically placed traffic warning signs and control measures along the main access roads to warn road users of the construction activities taking place for the duration of the construction phase. Warning signs must be visible at all times.</li> <li>Implement penalties for reckless driving for the drivers of heavy vehicles as a way to enforce compliance to traffic rules.</li> <li>All roads used by the project Developer and its contractors must be maintained in good working order during the construction phase.</li> <li>It is recommended that a Community Liaison Officer be appointed to implement as the proposed grievance mechanism. 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.</li> </ul>		of Construction Phase.	
19.	Destruction of vegetation and habitats/Land/soil pollution from chemical / hydrocarbon spills, litter and waste metals.	<ul style="list-style-type: none"> <li>Establish a chemical storage area that is suitably designed to contain all spills.</li> <li>Ensure that hydrocarbons are stored in a bunded area with a capacity of 110% of storage volume.</li> <li>Ensure that the bunded area is suitably designed to allow for cleaning and prevent spillage to the environment.</li> <li>Ensure that all vehicles, storage, and usage areas have suitable spill kits.</li> <li>Develop a chemical and hydrocarbon spill procedure.</li> <li>Ensure that chemical and hydrocarbon usage is controlled.</li> <li>No servicing of vehicles onsite.</li> <li>Regular inspection and servicing of vehicles.</li> <li>Develop a spill management procedure for vehicles that may leak accidentally.</li> <li>Develop a waste management plan.</li> <li>Ensure that concrete spills are cleaned up.</li> </ul>	Contractor / EO / ECO	Monthly monitoring within the duration of Construction Phase.	Monthly ECO Audits.

Id.	Impact	Impact Management Actions	Responsible Person	Frequency and/or Time Period	Method of Monitoring
20.	Pollution may enter ground / surface water	<ul style="list-style-type: none"> <li>• Ensure litter is cleared regularly to designated waste areas.</li> <li>• Establish a chemical storage area that is suitably designed to contain all spills.</li> <li>• Ensure that hydrocarbons are stored in a bunded area with a capacity of 110% of storage volume.</li> <li>• Ensure that the bunded area is suitably designed to allow for cleaning and prevent spillage to the environment.</li> <li>• Ensure that all vehicles, storage, and usage areas have suitable spill kits.</li> <li>• Develop a chemical and hydrocarbon spill procedure.</li> <li>• Ensure that chemical and hydrocarbon usage is controlled.</li> <li>• All machinery and equipment should be inspected regularly for faults and possible leaks, these should be serviced off-site.</li> <li>• Install spill trays under the BESS.</li> </ul>	Contractor / EO / ECO	Monthly monitoring within the duration of Construction Phase.	Monthly ECO Audits.
21.	Nuisance impacts in terms of temporary increase in noise and dust, or the wear and tear on access roads to the site	<ul style="list-style-type: none"> <li>• Dust suppression measures must be implemented for heavy vehicles on a regular basis and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers.</li> <li>• Ensure all vehicles are road worthy, drivers are qualified and are made aware of the potential noise and dust issues.</li> <li>• It is recommended that 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.</li> </ul>	Contractor / EO / ECO	Duration of Construction Phase.	Complaints register must be kept at the construction site. No. of dust complaints received will be used to measure the effectiveness of the dust impact mitigation.
22.	Erosion and loss of soil resources	<p>Develop a storm water management plan prior to commencement with construction, that incorporates the following principles in the design of the site:</p> <ul style="list-style-type: none"> <li>• Prevent concentration of stormwater flow at any point where the ground is susceptible to erosion;</li> <li>• Reduce stormwater flows as far as possible by the effective use of attenuating devices (such as swales, berms, silt fences). As construction</li> </ul>	Contractor / EO / ECO	Monthly monitoring within the duration of Construction Phase.	Monthly ECO Audits.

Id.	Impact	Impact Management Actions	Responsible Person	Frequency and/or Time Period	Method of Monitoring
		<p>progresses, the stormwater control measures must be monitored and adjusted to ensure complete erosion and pollution control at all times;</p> <ul style="list-style-type: none"> <li>• Minimise the area of exposure of bare soils to minimise the erosive forces of wind, water and all forms of traffic;</li> <li>• Plan and construct stormwater management systems to remove contaminants before they pollute surface waters or groundwater resources;</li> <li>• 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;</li> <li>• Avoid situations where natural or artificial slopes may become saturated and unstable, both during and after the construction process;</li> <li>• Design and construct roads to avoid concentration of flow along and off the road;</li> <li>• 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;</li> <li>• Design outlet culvert structures to dissipate flow energy. Any unlined downstream channel must be adequately protected against soil erosion.</li> <li>• Where construction 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; and</li> <li>• Preferably all drainage channels on site and contained within the larger area of the property (i.e. including buffer zone) should remain in the natural state so that the existing hydrology is not disturbed.</li> <li>• Use silt traps where necessary.</li> <li>• Use bumps, humps, and cut off drains to control water velocity of exposed soils.</li> <li>• Stockpile soils from footings in demarcated areas.</li> <li>• All removed soil and material stockpiles must be protected from erosion, stored on flat areas where run-off will be minimised, and be surrounded by</li> </ul>			



Id.	Impact	Impact Management Actions	Responsible Person	Frequency and/or Time Period	Method of Monitoring
		bunds. <ul style="list-style-type: none"> <li>Any exposed earth should be rehabilitated promptly by planting suitable vegetation (vigorous indigenous grasses) to protect the exposed soil.</li> <li>Use soil material from footings in rehabilitation of impacted areas wherever possible.</li> <li>Develop a spill management procedure for vehicles that may leak accidentally.</li> <li>Develop a waste management plan.</li> </ul>			
23.	Habitat fragmentation resulting from infrastructure development.	<ul style="list-style-type: none"> <li>The habitat is already highly fragmented due to surrounding infrastructure development. The significance of this impact due to the proposed development is therefore insignificant.</li> </ul>	Contractor / EO / ECO	Duration of Construction Phase.	Monthly ECO Audits.
24.	Damage to equipment or containers during storage and installation	<ul style="list-style-type: none"> <li>Inspection of packaging for damage.</li> <li>Risk assessment to be conducted.</li> <li>Effective scheduling to limit onsite storage of equipment - site to be ready to readily accept BESS.</li> <li>Proper supervision is required.</li> <li>Adhere to Original Equipment Manufacturer (OEM) handling, transportation and storage instructions.</li> <li>Agreement / contract with HazMat company for first response, site clean-up and rehabilitation.</li> <li>All Material Safety Data Sheet (MSDS) available for the BESS.</li> </ul>			
25.	Sedimentation, siltation, and increased turbidity in surface water	<ul style="list-style-type: none"> <li>Soil stock piling to be done at the designated area.</li> </ul>	Contractor / EO / ECO	Monthly monitoring within the duration of Construction Phase.	Monthly ECO Audits.
26.	Impact on heritage resources	<ul style="list-style-type: none"> <li>If during construction, any possible finds such as stone tool scatters, artefacts or bone and fossil remains are made, the operations must be stopped, and a qualified archaeologist must be contacted for an assessment of the find and therefore chance find procedures must be implemented.</li> <li>Construction crews must be properly inducted to ensure they are fully</li> </ul>	Contractors and Sub-contractors / EO / ECO	Duration of Construction Phase.	Monthly ECO Audits.

Id.	Impact	Impact Management Actions	Responsible Person	Frequency and/or Time Period	Method of Monitoring
		<p>aware of the procedures regarding chance finds as discussed below:</p> <ul style="list-style-type: none"> <li>○ If during the pre-construction phase, construction, operations or closure phases of this project, any person employed by the developer, one of its subsidiaries, contractors and subcontractors, or service provider, finds any artefact of cultural significance or heritage site, this person must cease work at the site of the find and report this find to their immediate supervisor, and through their supervisor to the senior on-site manager.</li> <li>○ It is the responsibility of the senior on-site Manager to make an initial assessment of the extent of the find and confirm the extent of the work stoppage in that area.</li> <li>○ The senior on-site Manager will inform the ECO of the chance find and its immediate impact on operations. The ECO will then contact a professional archaeologist for an assessment of the finds who will notify the SAHRA.</li> <li>○ The potential burial site (K10) should be indicated on development plans and avoided. The possible grave must be shielded (30m buffer) from potential construction-related impacts.</li> </ul>			
27.	Impact on palaeontological resources	<ul style="list-style-type: none"> <li>• There is a very small chance that fossils may have been trapped in features such as palaeo-pans or palaeo-springs, and buried by the aeolian sands, but no such feature is visible in the satellite imagery. Nonetheless, a Fossil Chance Find Protocol should be added to the EMPr (Bamford 2022).</li> <li>• The following procedure is only required if fossils are seen on the surface and when drilling/excavations commence.</li> <li>• When excavations begin the rocks 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.</li> <li>• Photographs of similar fossils must be provided to the developer to assist</li> </ul>	Contractor / EO / Developer / ECO	Duration of Construction Phase.	Monthly ECO Audits.

Id.	Impact	Impact Management Actions	Responsible Person	Frequency and/or Time Period	Method of Monitoring
		<p>in recognizing the fossil plants, vertebrates, invertebrates or trace fossils in the shales and mudstones.</p> <ul style="list-style-type: none"> <li>• Photographs of the putative fossils can be sent to the palaeontologist for a preliminary assessment.</li> <li>• 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.</li> <li>• 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.</li> <li>• 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.</li> <li>• If no fossils are found and the excavations have finished then no further monitoring is required.</li> </ul>			
28.	Uncontrolled activities may lead to fires	<ul style="list-style-type: none"> <li>• Undertake monitoring to determine if fires have any impact on the surrounding environment, suitable rehabilitation is to be undertaken where necessary. A fire management plan to be established prior to construction commencing.</li> <li>• Vegetation is to be cut back in areas where welding is undertaken to prevent fires from occurring.</li> <li>• Fire breaks along the servitude are to be established.</li> <li>• Suitable fire-fighting equipment and training is to be provided.</li> </ul>	Contractor / EO / Developer / ECO	Monthly monitoring within the duration of Construction Phase.	Monthly ECO Audits.
29.	Safety and security	<ul style="list-style-type: none"> <li>• Waste streams must be identified and documented.</li> <li>• Waste management plan must be implemented.</li> <li>• Accredited waste facilities to be contracted for accepting / recycling the waste.</li> <li>• Working hours should be kept between daylight hours during the</li> </ul>	Contractor / EO / Developer / ECO	Monthly monitoring within the duration of Construction Phase.	Monthly ECO Audits.

Id.	Impact	Impact Management Actions	Responsible Person	Frequency and/or Time Period	Method of Monitoring
		<p>construction phase, and/or as any deviation that is approved by the relevant authorities.</p> <ul style="list-style-type: none"> <li>• The perimeter of the construction site should be appropriately secured to prevent any unauthorised access to the site; the fencing of the site should be maintained throughout the construction periods.</li> <li>• Access in and out of the construction camp should be strictly controlled</li> <li>• No open fires are permitted outside of designated areas.</li> <li>• Contractor must provide adequate firefighting equipment on site and provide firefighting training to selected construction staff.</li> <li>• A comprehensive employee induction programme would cover land access protocols, fire management and road safety.</li> <li>• The contractor should have personnel trained in first aid on site to deal with smaller incidents that require medical attention.</li> <li>• It is recommended that a Community Liaison Officer should be appointed to implement a grievance mechanism. 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.</li> <li>• It is recommended that a Stakeholder Engagement Plan be compiled and implemented for the construction phase of the project.</li> </ul>			
30.	Destruction of avifaunal habitat and avifauna	<ul style="list-style-type: none"> <li>• Where possible, existing access routes and walking paths must be made use of.</li> <li>• The areas to be developed must be specifically demarcated to prevent movement of staff or any individual into the surrounding environments. Signs must be put up to enforce this.</li> <li>• The duration of the construction should be kept to a minimum to avoid disturbing avifauna.</li> <li>• 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 (red/green) motion detection lights should be used wherever possible.</li> <li>• Schedule or limit (where feasible) activities during least sensitive periods,</li> </ul>	Developer / Contractor	<p>Construction phase</p> <p>Pre-construction</p> <p>Construction</p> <p>Construction</p> <p>Construction</p>	<p>Monthly ECO Audits.</p>

Id.	Impact	Impact Management Actions	Responsible Person	Frequency and/or Time Period	Method of Monitoring
		<p>to avoid migration, nesting and breeding seasons (May – August).</p> <ul style="list-style-type: none"> <li>All project activities must be undertaken with appropriate noise mitigation measures to avoid disturbance to avifauna population in the region.</li> <li>All areas to be developed must be walked through prior to any activity to ensure no nests or avifauna species are found in the area. Should any Species of Conservation Concern be found and 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.</li> <li>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 (Jenkins et al., 2017).</li> <li>Infrastructure should be consolidated where possible in order to minimise the amount of ground and air space used.</li> <li>All the parts of the infrastructure must be nest proofed and anti-perch devices placed on areas that can lead to electrocution.</li> <li>Use environmentally friendly cleaning and dust suppressant products.</li> <li>As far as possible power cables within the project area should be thoroughly insulated and preferably buried.</li> <li>Any exposed parts must be covered (insulated) to reduce electrocution risk.</li> <li>White strips should be placed along the edges of the panels, to reduce similarity to water and deter birds and insects (Horvath et al, 2010). Consider the use of bird deterrent devices to limit collision risk.</li> </ul>		<p>Construction</p> <p>Pre-construction</p> <p>Pre-construction</p> <p>Construction</p> <p>Construction</p> <p>Construction</p> <p>Construction</p> <p>Construction</p>	
31.	Management of waste	<ul style="list-style-type: none"> <li>Waste management must be a priority and all waste must be collected and stored effectively. All solid waste collected shall be disposed of at a licensed disposal facility;</li> <li>Refuse bins will be emptied and secured. Temporary storage of domestic waste shall be in covered waste skips. Maximum domestic waste storage period will be 10 days. Recycling is encouraged;</li> <li>All waste generated on site during construction must be adequately managed. Separation and recycling of different waste materials should be supported.</li> </ul>	Developer / Health and Safety Officer / Contractor	Duration of Construction Phase.	Monthly ECO Audits.

Id.	Impact	Impact Management Actions	Responsible Person	Frequency and/or Time Period	Method of Monitoring
		<ul style="list-style-type: none"> <li>Adequate sanitary facilities and ablutions on the servitude must be provided for all personnel throughout the project area. Use of these facilities must be enforced (these facilities must be kept clean so that they are a desired alternative to the surrounding vegetation);</li> <li>Portable toilets must be pumped dry to ensure the system does not degrade over time and spill into the surrounding area;</li> <li>Where a registered disposal facility is not available close to the project area, the Contractor shall provide a method statement with regard to waste management. Under no circumstances may domestic waste be burned on site.</li> </ul>			
32.	Storage and Handling of Dangerous Goods: Soil and water contamination due to the handling and storage of dangerous goods during the construction and operation phases.	<ul style="list-style-type: none"> <li>Any spillages of dangerous substances must be contained as soon as possible, and remedial and clean-up actions initiated immediately.</li> <li>Regular inspections of the permanent bunded areas for storage of dangerous goods must be undertaken throughout the life cycle of the project.</li> <li>Appropriate spill kits must be available on site.</li> <li>Maintenance vehicles must have access to spill kits.</li> <li>An emergency spill response plan must be developed for implementation during the construction and the operational phase. Personnel should be suitably trained to attend to any spills that may occur.</li> <li>A fire management plan must be developed for implementation during the construction and the operational phase. Personnel must be suitably trained to manage any fires which may occur on site.</li> <li>Flammable substances must be stored in enclosed containers away from heat, sparks, open flames, or oxidizing materials.</li> <li>Develop a monitoring and leak detection procedure for monitoring of the chemical spillages.</li> </ul>	Contractor / EO / Developer / ECO	Monthly monitoring within the duration of Construction Phase.	Monthly ECO Audits.
33.	Visibility of PV panels in the landscape may interrupt and fragment the natural	<ul style="list-style-type: none"> <li>PV panels and their support structures must be designed with as low a profile as possible. This will minimise the visibility of the panels. All surfaces (exception of PV surfaces) should be painted using the selected colour palette to eliminate reflection and to match the natural surroundings.</li> </ul>	Contractor / Developer	Monthly monitoring within the duration of Construction Phase.	Monthly ECO Audits.
34.	monochromatic landscape	<ul style="list-style-type: none"> <li>A colour palette should be selected for the development that matches the surrounding landscape. This palette should be documented in the EMP</li> </ul>	Contractor / Developer	Monthly monitoring within the duration	Monthly ECO Audits.

Id.	Impact	Impact Management Actions	Responsible Person	Frequency and/or Time Period	Method of Monitoring
		and all structures and roofs (faces of PV panels obviously excluded) should be colour treated / painted to conform to this colour palette. This includes small surfaces such as the reverse side of signs, fence poles and fencing mesh, etc. No reflective metal surfaces should be left exposed.		of Construction Phase.	
35.	Construction of the proposed development may negatively affect the expansive views of the Kalahari Rangelands from the N14, D3257 and other sensitive view points by introducing unnatural elements, movement and contrast	<ul style="list-style-type: none"> <li>The area of land cleared of vegetation must be kept to a minimum. Wherever possible, existing natural vegetation must be left <i>in-situ</i>, to maintain some level of natural screening.</li> <li>Areas that are temporarily cleared must be rehabilitated as soon as the need for the use of that area ends.</li> </ul>	Contractor / Developer	Monthly monitoring within the duration of Construction Phase.	Monthly ECO Audits.
36.	Impact of change of sense of place of Kalahari Rangelands	<ul style="list-style-type: none"> <li>This impact would be moderate to low given that there are few sensitive receptors. However, the following mitigation measures must be implemented:</li> <li>Reversing of construction vehicles should be kept to a minimum to minimise the use of reverse warning sounds and wherever possible vehicles should be turned around without using reverse gear.</li> </ul>	Contractor / Developer	Monthly monitoring within the duration of Construction Phase.	Monthly ECO Audits.
37.	Construction activities may impact on tourism in the region.	<ul style="list-style-type: none"> <li>The extent of land cleared of vegetation at any one time must be kept to a minimum. A dust suppression plan must be implemented during construction phase on all bare areas. Transportation of any abnormal loads and high volumes of heavy trucks must be scheduled for low traffic times on the N14 to limit the impact of this on tourists and people travelling for work.</li> </ul>	Contractor / Developer	Monthly monitoring within the duration of Construction Phase.	Monthly ECO Audits.

### 11.1.1 Operational Phase

**Overall Goal:** To ensure that the operation of the Project does not have unforeseen impacts on the environment and to ensure that all impacts are monitored, and the necessary corrective action taken in all cases. To address this goal, it is necessary to operate the proposed development in a way that:

- » Ensures that operation activities are properly managed in respect of environmental aspects and impacts.
- » Enables the proposed operation activities to be undertaken without significant disruption to other land uses in the area, regarding traffic and road use, and effects on local community.
- » Minimises impacts on fauna/avifauna using the site.

An operations manager must be appointed during operation whose duty it will be to ensure the implementation of the operation EMP for operation activities and all infrastructure under the control of the facility owner. For all Eskom Holdings SOC Limited infrastructure, Eskom manages its operations through the implementation of the Environmental Management System ISO 14001:2004 and relevant in-house procedures. For any public road infrastructure, the Provincial Roads Authority and/or SANRAL manage their infrastructure through the implementation of relevant departmental environmental management procedures

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**Table 11-2: Impacts, Management/ Mitigation Measures during Operational Phase**

<b>Impact management outcomes:</b> <ul style="list-style-type: none"> <li>• Undertake responsible water usage;</li> <li>• To ensure no pollution of surface and groundwater resources;</li> <li>• To ensure no instances of erosion on or adjacent to the site is reported or identified;</li> <li>• Ensure that the stormwater management plan is implemented;</li> <li>• Minimal impacts on wetlands, streams and rivers;</li> <li>• Minimal impacts on vegetation and habitats;</li> <li>• Minimal visual impacts;</li> <li>• Prevent dust fallout exceedances from occurring within the dust monitoring network; and</li> <li>• Prevent air emission exceedances of the National Ambient Air Quality Standards.</li> </ul>					
<b>Id.</b>	<b>Impact</b>	<b>Impact Management Actions</b>	<b>Responsible Person</b>	<b>Frequency and/or Time Period</b>	<b>Method of Monitoring</b>
1.	Creation of employment, skills development, procurement and business opportunities	<ul style="list-style-type: none"> <li>• Prioritise employment of local people from ZF Mgcawu District Municipality, and the Dawid Kruiper Local Municipality, particularly for semi and unskilled job categories as far as possible.</li> <li>• Employment of Coloured and Black African people; women; and youth should be prioritised.</li> <li>• Engage with ZF Mgcawu District and the Dawid Kruiper Local Municipality to enquire about any district or local skills databases.</li> <li>• Implement training and on-the-job skills development programmes for temporary employees where feasible.</li> <li>• Employ local contactors that are compliant with Broad Based Black Economic Empowerment (BBB EE) criteria to the extent possible.</li> <li>• Recruitment and employment practises must be in accordance with all labour legislation in South Africa.</li> <li>• Vacancies should be advertised in the local media when they become available.</li> </ul>	Developer / Operations Manager	Duration of Operational Phase.	Compliance inspection by the authority.
2.	Strain on	<ul style="list-style-type: none"> <li>• Prioritise employment of local people from the various communities in ZF</li> </ul>	Developer /	Duration of	Compliance

Id.	Impact	Impact Management Actions	Responsible Person	Frequency and/or Time Period	Method of Monitoring
	community health & safety services	<p>Mgcawu District Municipality, and the Dawid Kruiper Local Municipality.</p> <ul style="list-style-type: none"> <li>The Applicant as well as any contractors that are appointed to undertake the construction phase activities should develop and agree a code of conduct which sets standards for acceptable behaviour and outlines behaviour and activities which could constitute grounds for dismissal. Any employee or contractor appointed by the Applicant to undertake construction phase activities that is found to be in breach of the code of conduct should be dismissed after following due process in accordance with prevailing labour legislation. Criminal activities should be reported to SAPS immediately for investigation and further action.</li> <li>The Applicant and contractor should agree and implement an HIV/AIDS/TB awareness programme.</li> <li>The Applicant should develop and implement an appropriate method of communication with the local community.</li> <li>A community liaison officer should be appointed during the construction phase to engage with local community members regarding any issues, complaints or grievances that they may have.</li> </ul>	Operations Manager	Operational Phase.	inspection by the authority.
3.	Change of sense of place post-construction activities	<ul style="list-style-type: none"> <li>This impact would be moderate to low given that there are few sensitive receptors.</li> <li>As with construction activities, reversing of site vehicles should be kept to a minimum to minimise the use of reverse warning sounds and wherever possible vehicles should be turned around without using reverse gear.</li> </ul>	Developer / Operations Manager	Duration of Operational Phase.	Compliance inspection by the authority.
4.	Decommissioning activities may impact the experience of tourists to the region and result in impacts to tourist sentiment and tourism revenue.	<ul style="list-style-type: none"> <li>The extent of land cleared of vegetation at any one time must be kept to a minimum and the site must be completely re-vegetated with appropriate locally indigenous vegetation as soon as possible.</li> <li>A dust suppression plan must be implemented during the decommissioning phase on all bare areas.</li> <li>Transportation of any abnormal loads away from site and high volumes of heavy trucks must be scheduled for low traffic times on the N14 to limit the impact of this on tourists and people travelling for work.</li> </ul>	Developer / Operations Manager	Duration of Operational Phase.	Compliance inspection by the authority.
5.	Pollution from litter, waste metals,	<ul style="list-style-type: none"> <li>Ensure that a site clean-up is undertaken at the end of every maintenance cycle to ensure that no pollution has occurred. Where this has happened,</li> </ul>	Developer / Operations	Duration of Operational	Compliance inspection by the

Id.	Impact	Impact Management Actions	Responsible Person	Frequency and/or Time Period	Method of Monitoring
	vehicle spills / hydrocarbon spills during maintenance activities	appropriate remedial action is to be taken.	Manager	Phase.	authority.
6.	Pollution may enter ground / surface water	<ul style="list-style-type: none"> <li>• Ensure that all vehicles, storage, and usage areas have suitable spill kits.</li> <li>• Develop a chemical and hydrocarbon spill procedure.</li> <li>• Ensure that chemical and hydrocarbon usage is controlled.</li> </ul>	Operations Manager / Developer	Duration of Operational Phase.	Compliance inspection by the authority.
7.	Improvement on livelihood of the local communities (positive)	<ul style="list-style-type: none"> <li>• No Mitigation proposed</li> </ul>	Developer	Duration of Operational Phase.	Not Applicable.
8.	Storing and handling of dangerous chemicals	<ul style="list-style-type: none"> <li>• Storage of chemicals to be limited to appropriate and secure facilities on site and access limited to authorised personnel only;</li> <li>• Storage in secure containers to ensure/limit the potential for the occurrence of leakages;</li> <li>• Storage area to be bunded with an appropriate volume capacity to protect from environmental contamination should accidental leakages occur;</li> <li>• Transferal of chemicals to batteries should be done according to best practice guidelines to limit spillage.</li> <li>• A fire management plan must be developed for implementation during the construction and the operational phase. Personnel must be suitably trained to manage any fires which may occur on site.</li> <li>• Should spillage occur, the ECO must be informed immediately, and a clean-up operation immediately commenced. Contaminated soils must be cleared and removed for disposal at a registered waste site capable of disposal of the chemicals.</li> </ul>	Operations Manager / Developer	Duration of Operational Phase.	Compliance inspection by the authority.
9.	Contribution to the Local Economic Development and Infrastructural Development (Positive)	<ul style="list-style-type: none"> <li>• None required</li> </ul>	Developer	Duration of Operational Phase.	Not applicable

Id.	Impact	Impact Management Actions	Responsible Person	Frequency and/or Time Period	Method of Monitoring
10.	Destruction of vegetation and habitats	<ul style="list-style-type: none"> <li>Progressive rehabilitation of areas that have been cleared of invasive plants will enable topsoil to be returned more rapidly, thus ensuring more recruitment from the existing seedbank Any woody material removed can be shredded and used in conjunction with the topsoil to augment soil moisture and prevent further erosion;</li> <li>The Alien Plant and Open Space Management System (Appendix F) must be implemented to ensure that prevention of spread and clearance of alien invasive plant species on site.</li> <li>Areas that have been disturbed but will not undergo development must be revegetated with indigenous vegetation;</li> <li>Eroded areas must be rehabilitated using the appropriate techniques and re-vegetated using indigenous flora (refer to the guidelines for revegetation and rehabilitation of the construction areas in Appendix E);</li> <li>A spill response kit must be available at all times. The incident of accidental spillage of contaminants from the BESS must be reported on, and if necessary, a Biodiversity Specialist must investigate the extent of the impact and provide rehabilitation recommendations;</li> <li>Responsible and technology-specific prevention and response infrastructure must be in place;</li> <li>An appropriate/adequate fire management plan must be implemented to ensure that the surrounding natural vegetation is unaffected.</li> </ul>	Developer	Duration of Operational Phase.	Compliance inspection by the authority.
11.	Destruction of avifaunal habitats	<ul style="list-style-type: none"> <li>Areas of already fragmented indigenous vegetation, even secondary communities outside of the direct project footprint, must under no circumstances, be fragmented or disturbed further. Clearing of vegetation must be minimized and avoided where possible. Clearing beneath panels must be avoided.</li> <li>The site ecological importance for SCCs is rated as high, and therefore should be avoided where possible. The extent should be minimised, with drainage lines avoided where possible. Clearing of vegetation beneath panels should be avoided and roads kept to a minimum.</li> <li>Where possible, existing access routes and walking paths must be made use of.</li> <li>Rehabilitation of the disturbed areas existing in the project area must be made</li> </ul>	Developer/ Maintenance crew / Contractor	Duration of Operational Phase / Post-construction	Compliance inspection by the authority.

Id.	Impact	Impact Management Actions	Responsible Person	Frequency and/or Time Period	Method of Monitoring
		<p>a priority.</p> <ul style="list-style-type: none"> <li>• Topsoil must also be utilised, and any disturbed area must be re-vegetated with plant and grass species which are endemic to this vegetation type.</li> <li>• Erosion control and alien invasive management plan must be compiled.</li> <li>• Environmentally friendly dust suppressants need to be utilised.</li> <li>• A fire management plan needs to be compiled and implemented to restrict the impact fire might have on the surrounding areas.</li> </ul>			
12.	Impact on avifauna	<ul style="list-style-type: none"> <li>• All maintenance personnel should undergo environmental induction with regards to avifauna and in particular awareness about not harming, collecting, or hunting terrestrial species (e.g., guineafowl and francolin), and owls, which are often persecuted out of superstition. Signs must be put up to enforce this.</li> <li>• 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 (red/green) motion detection lights should be used wherever possible.</li> <li>• All maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply with speed limit (40km/h), to respect all forms of wildlife. Speed limits must still be enforced to ensure that road killings and erosion is limited.</li> <li>• All project activities must be undertaken with appropriate noise mitigation measures to avoid disturbance to avifauna population in the region.</li> <li>• Use environmentally friendly cleaning and dust suppressant products.</li> <li>• Fencing mitigations must be implemented as follows: <ul style="list-style-type: none"> <li>• Top 2 strands must be smooth wire</li> <li>• Routinely retention loose wires</li> <li>• Minimum 30cm between wires</li> <li>• Place markers on fences</li> </ul> </li> </ul>	Developer	Operational phase	Compliance inspection by the authority.
13.	Impact of the proposed development on the views of the Kalahari	<ul style="list-style-type: none"> <li>• Non-reflective materials must be used in construction of roofs, fences and other infrastructure. Any walls or reflective surfaces must be painted in dull earthen colours in keeping with the colour palette selected.</li> <li>• A lighting plan should be drawn up to identify the minimum number and</li> </ul>	Developer	Duration of Operational Phase.	Compliance inspection by the authority.

Id.	Impact	Impact Management Actions	Responsible Person	Frequency and/or Time Period	Method of Monitoring
	Rangelands from the D3276 due to reflection, glare and contrast of buildings in the monochromatic landscape.	locations of required lights. <ul style="list-style-type: none"> <li>• Lighting must be kept to a functional minimum and all lighting should be fully shielded, focused downward and should be mounted as low as possible to achieve its function.</li> <li>• Mobile lighting must be used to conduct night-time maintenance activities and permanent lighting must not be used for this purpose.</li> </ul>			
14.	Impact of the proposed development on the views of the Kalahari Rangelands from the N14 due to reflection, glare and contrast of buildings in the monochromatic landscape	<ul style="list-style-type: none"> <li>• All lights should be fully shielded to ensure no escape of uplight and sky glow.</li> <li>• All lights should be amber or warm colours as opposed to blueish white lights. Locally indigenous shrubs must be encouraged / planted along the outside perimeter and indigenous vegetation (grasses) should be retained beneath and in between the solar panels.</li> </ul>			
15.	Impact of the proposed development on the experience of tourists visiting the Orange River Vineyards and resorts.				
16.	Impact of the proposed development on views and quality of life of people in residential areas				

Id.	Impact	Impact Management Actions	Responsible Person	Frequency and/or Time Period	Method of Monitoring
	and businesses along the N14 corridor.				
17.	Impact of the proposed development views and the quality of life of people in residential areas, tourist resorts and businesses on the opposite side of the Orange River.				

### 11.1.2 Decommissioning Phase

Similar to construction, the removal of the infrastructure associated with the project would involve the preparation of the area, given the amount of machinery and workers that will remain and work on the decommissioning. The following decommissioning activities are relevant:

- Operational access roads are expected to be in good condition and be appropriate for the transit of decommissioning equipment (heavy cranes, special trucks, etc.).
- A small temporary decommissioning camp may be established with associated staff facilities.
- Laydown areas will be prepared as required. In this regard vegetation may require stripping and topsoil may be stockpiled for use in rehabilitation.
- All waste materials and chemicals will be removed for reuse in other facilities or proper management through authorised waste management service providers.
- The elimination of all lubricants and chemical products stored in the plant will be carried out. These products may be sold or turned over to an authorised waste management service provider, as they are not the plant's main components.
- Reusable elements are components that can be used again, i.e., are not waste. It is advantageous to find a use for these so-called sub-products, due to the reduced costs involved with the consequent economic and environmental benefits. The possible sub-products from the BESS will be multiple in terms of type, quantity and volume. Thus, certain substances are not considered "usable". Other materials from the plant may be reusable in other such facilities, depending on their condition.
- Concrete structures and buildings (including foundations) will be demolished and the rubble will be disposed of at appropriate facilities, unless otherwise agreed for an alternative use in line with the decommissioning and closure plan.

#### **a) Rehabilitation**

Following decommissioning and removal of all project material from the site, the disturbed areas will be rehabilitated to pre-project land capability. Where possible, rehabilitation will be conducted concurrently with decommissioning. The following rehabilitation activities are relevant:

- The existing profiles of the land affected will be improved and stabilised thereby leaving profiles not incompatible with the topography of the area, which is essentially flat.
- Ripping of compacted soils will be done prior to adding topsoil, which will be done by mechanical means. It is expected that there will be a sufficient amount of topsoil and/or subsoil moved and stockpiled during the construction phase to facilitate rehabilitation.
- If required, potential areas or land for extracting topsoil or subsoil will be identified. The land capability characteristics of such areas should be similar to the affected soils (same texture, colour, permeability, etc.).



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- Vegetation will be re-established. The plant species used will match those naturally occurring in the area. This will be conducted in consultation with a biodiversity specialist.

**b)     *Aftercare and Maintenance***

Following rehabilitation, a period of maintenance and aftercare will be required to ensure that rehabilitation is successful. In this regard, the following activities are relevant:

- Fertilisation of soil depending on soil fertility test results.
- Control and removal alien/invasive species.
- Implementation of erosion controls (if required).
- Auditing of vegetation recover and adaption of strategies where necessary.

**Table 11-3: Impacts, Management/ Mitigation Measures during Decommissioning Phase**

<b>Impact management outcomes:</b> <ul style="list-style-type: none"> <li>• Undertake responsible water usage;</li> <li>• To ensure no pollution of surface and groundwater resources;</li> <li>• To ensure no instances of erosion on or adjacent to the site is reported or identified;</li> <li>• Minimal impacts on vegetation and habitats;</li> <li>• Avoid displacement of faunal community;</li> <li>• Minimal visual impacts;</li> <li>• Minimal impacts on wetlands, streams and rivers; and</li> <li>• Prevent dust fallout exceedances from occurring within the dust monitoring network.</li> </ul>					
<b>Id.</b>	<b>Impact</b>	<b>Mitigation / Management Measures</b>	<b>Responsible Person</b>	<b>Frequency and/or Time Period</b>	<b>Method of Monitoring</b>
<b>Decommissioning Phase</b>					
<p>Equipment associated with the proposed Project would only be decommissioned once it has reached the end of its economic life. It is most likely that decommissioning activities of the infrastructure of the facility would comprise the disassembly and replacement of the infrastructure with more appropriate technology/infrastructure available at that time.</p> <p>» Site Preparation Site preparation activities will include confirming the integrity of the access to the site to accommodate required equipment, preparation of the site (e.g. lay down areas, construction platform) and the mobilisation of construction equipment.</p> <p>» Disassemble and Remove Infrastructure Disassembled components will be reused, recycled, or disposed of in accordance with regulatory requirements or any other requirements deemed applicable by the Original Equipment Manufacturer.</p> <p>As with construction activities, reversing of site vehicles should be kept to a minimum to minimise the use of reverse warning sounds and wherever possible vehicles should be turned around without using reverse gear.</p> <p>The extent of land cleared of vegetation at any one time should be kept to a minimum. A dust suppression plan should be implemented during the decommissioning phase on all bare areas. Transportation of any abnormal loads away from site and high volumes of heavy trucks should be scheduled for low traffic times on the N14 to limit the impact of this on tourists and people travelling for work. The site should be re-vegetated with appropriate locally indigenous vegetation as soon as possible.</p> <p>» Creation of local employment associated with decommissioning activities</p> <ul style="list-style-type: none"> <li>○ Prioritise employment of local people from ZF Mgcawu District and the Dawid Kruiper Local Municipality, particularly for semi and unskilled job categories as far as possible.</li> </ul>					

Id.	Impact	Mitigation / Management Measures	Responsible Person	Frequency and/or Time Period	Method of Monitoring
<b>Decommissioning Phase</b>					
		<ul style="list-style-type: none"> <li>○ Employment of Coloured and Black African people; women; and youth should be prioritised.</li> <li>○ Engage with ZF Mgcawu District and the Dawid Kruiper Local Municipality to enquire about any district or local skills databases.</li> <li>○ Implement training and on-the-job skills development programmes for temporary employees where feasible.</li> <li>○ Employ local contactors that are compliant with Broad Based Black Economic Empowerment (BBB-EE) criteria to the extent possible.</li> <li>○ Recruitment and employment practises must be in accordance with all labour legislation in South Africa.</li> <li>○ Vacancies should be advertised in the local media when they become available.</li> </ul>			
	» Loss of employment	<ul style="list-style-type: none"> <li>○ Prior to a scheduled closure, engage with all relevant stakeholders such as the ZF Mgcawu District, the Dawid Kruiper Local Municipality and Labour Unions regarding the proposed closure and decommissioning timeframes and possible socio-economic interventions to ameliorate the impact on individuals and the broader community.</li> <li>○ Provide counselling and guidance to employees who will need to be retrenched.</li> <li>○ Provide assistance with claiming UIF and other state assistance if required.</li> <li>○ Assistance with registering as a jobseeker (with the relevant local and district municipalities, employment agencies or other solar PV operators).</li> </ul>			

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## 12 MONITORING

This chapter deals with Compliance Monitoring as well as specific monitoring requirements, as per the Specialist Studies, during construction and operational phases. The key to a successful EMPr is appropriate monitoring and review to ensure effective functioning of the EMPr and to identify and implement corrective measures in a timely manner. An audit of the environmental monitoring and management actions undertaken is essential to ensure that it is effective in operation, is meeting specified goals, and performs in accordance with relevant regulations and standards.

Regular monitoring of all the environmental management measures and components shall be carried out by the Developer's PM and independent ECO to ensure that the provisions of this plan are adhered to. Ongoing and regular reporting of the progress of implementation of this Programme should be done. Various points of compliance will be identified with regard to the various impacts that the construction will have on the environment.

Prior to the start of construction activities, an audit schedule should be drawn up, on basis of the environmental authorisation requirements and with input from ECO. The audit schedule should include target dates for implementation of recommendations and timeframes for submission to the Developer's EM, Developer's appointed PM and DEA. The audits should be timed to coincide with scheduled project meetings, where possible.

### 12.1 Compliance Auditing

The key to a successful EMPr is appropriate monitoring and review to ensure effective functioning of the EMPr and to identify and implement corrective measures in a timely manner. An audit of the environmental monitoring and management actions undertaken is essential to ensure that it is effective in operation, is meeting specified goals, and performs in accordance with relevant regulations and standards.

Regular monitoring of all the environmental management measures and components shall be carried out by the Developer (Eskom) and the ECO to ensure that the provisions of this plan are adhered to. Ongoing and regular reporting of the progress of implementation of this Programme should be done. Various points of compliance will be identified with regard to the various impacts that the construction will have on the environment.

**The following conditions must be included in the EA with regards to the Environmental Auditing:**

- **An Environmental Compliance Audit of the development must be undertaken annually to audit the level of compliance of the licence holder to the conditions of the EA and EMPr. Audits shall commence once construction has been initiated and the first audit must be undertaken within 365 days of the start date of construction as communicated to the Competent Authority.**

- **An independent environmental auditor must be appointed with the relevant experience and qualifications in the field of Environmental Management**
- **The Environmental Compliance Audit must be submitted to the Competent Authorities Compliance Monitoring Directorate within 30 days of concluding the site audit**

## **12.2 Site Documentation or Reporting**

Site documentation standard shall be used to keep records on site. In addition, all non-compliances to the EA will be reported to the assigned PM within 24 hours. All documents as listed below shall be kept on site and be available for monitoring and auditing purposes. Site inspections by an Environmental Audit team may require access to this documentation for auditing purposes. The documentation shall be signed by all parties to ensure that such documents are legitimate. Regular monitoring of all site works by the ECO is imperative to ensure that all problems encountered are solved punctually and amicably. When the ECO is not available, the PM shall keep abreast of all works to ensure no problems arise.

The following documents must be kept on site:

- Access negotiations and physical access plans;
- Site instructions;
- Pre-construction audit report undertaken by ECO;
- Complaints register;
- Records of all remediation / rehabilitation activities;
- Copy of this EMPr;
- Copy of the Environmental Authorisation;
- Environmental Awareness Plan;
- Monthly compliance report;
- Environmental training records; and
- Emergency response procedures.

The monthly compliance report should include:

- Complaints received from I&APs and details of the actions taken;
- Environmental incidents, spills of hazardous substances, *etc.*
- Environmental damage which requires rehabilitation; and
- Damages of private property such as buildings or crops.

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## **12.3 Compliance Monitoring**

### **12.3.1 Undertaking Compliance Monitoring Inspections**

The Developer or PM shall appoint a qualified and experienced ECO to ensure the licence holder and contractor's implementation of and adherence to the EMPr.

The ECO shall conduct regular compliance monitoring inspections to ensure that the system for implementation of the EMPr is operating effectively. The compliance monitoring inspections shall check that a procedure is in place to ensure that:

- The EMPr and the Method Statements being used are the up-to-date versions;
- Variations to the EMPr, Method Statements and non-compliances and corrective actions are documented; and
- Emergency procedures are in place and effectively communicated to personnel.

**The audit programme shall consist of the following at a minimum:**

- **First audit no later than 1 month after the commencement of construction activities; and**
- **Thereafter audits at monthly intervals, at a minimum or as per EA requirement.**

### **12.3.2 Compliance with the EMPr**

The Developer and/or its agents are deemed not to have complied with the EMPr and remedial action if:

- There is evidence of contravention of the EMPr clauses within the boundaries of the site or extensions;
- Environmental damage ensues due to negligence; and
- The Developer fails to comply with corrective or other instructions issued by the PM, within a time period specified by the PM.

## **12.4 Environmental Contact Person**

To be confirmed prior commencement of the proposed development should DFFE grant an EA to proceed with the project.

## **12.5 Emergency Numbers**

- Police: 10111
- Ambulance 10177

- 
- Netcare 911 082 911

## **13 SITE REHABILITATION**

### **13.1 Removal of structures and infrastructure**

During and following the completion of the construction activities, the area must be rehabilitated by appropriate landscaping, levelling, topsoil dressing, land preparation, alien plant eradication and vegetation establishment. All construction plant, equipment, storage containers and temporary fencing must be removed from site.

### **13.2 Waste and pollution control**

- Waste minimisation, the re-use, recycling and recovery of waste must be promoted;
- Rubble, including surplus rock, foundations and batching plant aggregates will be removed from the construction site and firstly recycled and re-used, where possible, before disposed of at a registered landfill site;
- All waste storage containers will be removed from site on a regular basis;
- All portable sanitation facilities will be removed by a certified contractor. It must be ensured that no leaks or spillage from sanitation facilities occurs during the removal thereof; and
- All hazardous waste which is temporary stored on site, including the storage containers must be removed from site and disposed of at a registered hazardous landfill site.

### **13.3 Topsoil replacement and soil amelioration**

- The principle of Progressive Reinstatement must be followed wherever possible. This includes the reinstatement of disturbed areas on an ongoing basis, immediately after the specified construction activities for that area are concluded;
- Execute top soiling activity prior to the rainy season or any expected wet weather conditions;
- Execute topsoil placement concurrently with construction where possible, or as soon as construction in an area has ceased;
- Replace and redistribute stockpiled topsoil together with herbaceous vegetation, overlying grass and other fine organic matter in all disturbed areas of the construction site, including temporary access routes and roads. Replace topsoil to the original depth. These areas will be quantified by the ECO;
- Place topsoil in the same area from where it was stripped. If there is insufficient topsoil available from a particular soil zone to produce the minimum specified depth, topsoil of similar quality may be brought from other areas of similar quality;
- The suitability of substitute material will be determined by means of a soil analysis addressing soil fraction, fertility, pH and drainage, and approved by the ECO; and
- Do not use topsoil suspected to be contaminated with the seed of alien vegetation.

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## 14 CONCLUSION

It is the opinion of the EAP that the implementation of the management and mitigation measures provided in the EMPr is sufficient to manage the environmental impacts associated with the proposed project. This EMPr will furthermore contribute to realizing the following over-arching objectives set out to be reached using the document as an environmental management tool:

- Ensure that sufficient monetary provision, aligned with the significance of the environmental impact and scale of the project, is made to remediate and rehabilitate the environment impacted on by the construction activities;
- Verify environmental performance through information on impacts as they occur;
- Respond to unforeseen events and environmental incidents; and
- Provide feedback to drive continual improvement in environmental performance.

The effectiveness of this EMPr will to a large degree rest on adherence to and fulfilling the roles and responsibilities of each role player and stakeholder. The roles and responsibilities for management actions contained in the EMPr (refer to Section 5 of this document) and arrangements for coordination among the role players are clearly defined in this document.

### **ZITHOLELE CONSULTING (PTY) LTD**

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## APPENDIX A: EAP's CV

### Details of Independent Environmental Assessment Practitioner (EAP)

Zitholele Consulting offers Specialist Consulting Services in the fields of Engineering, Environmental Management, Waste Management, and Strategic Communication. The Zitholele team comprises of highly-skilled, experienced, professionally registered technical personnel and senior management members that are capable of undertaking large, complex, and multi-disciplinary assignments in both the public and private sectors. Zitholele is one of the top Environmental Management consultancies in South Africa, having undertaken Impact Assessments and other Environmental Management Services in the Industrial, Power, Agricultural, Water, and Waste sectors. Zitholele utilises international best practice methodologies for quantitative impact assessment, risk assessment and consideration of alternatives.

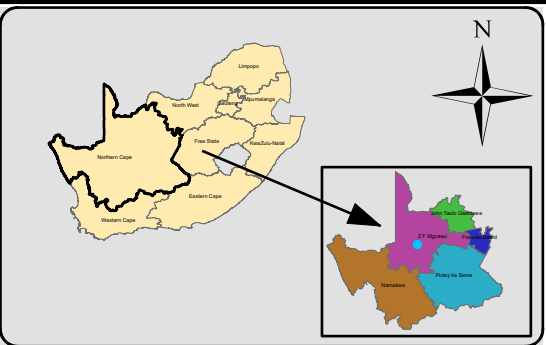
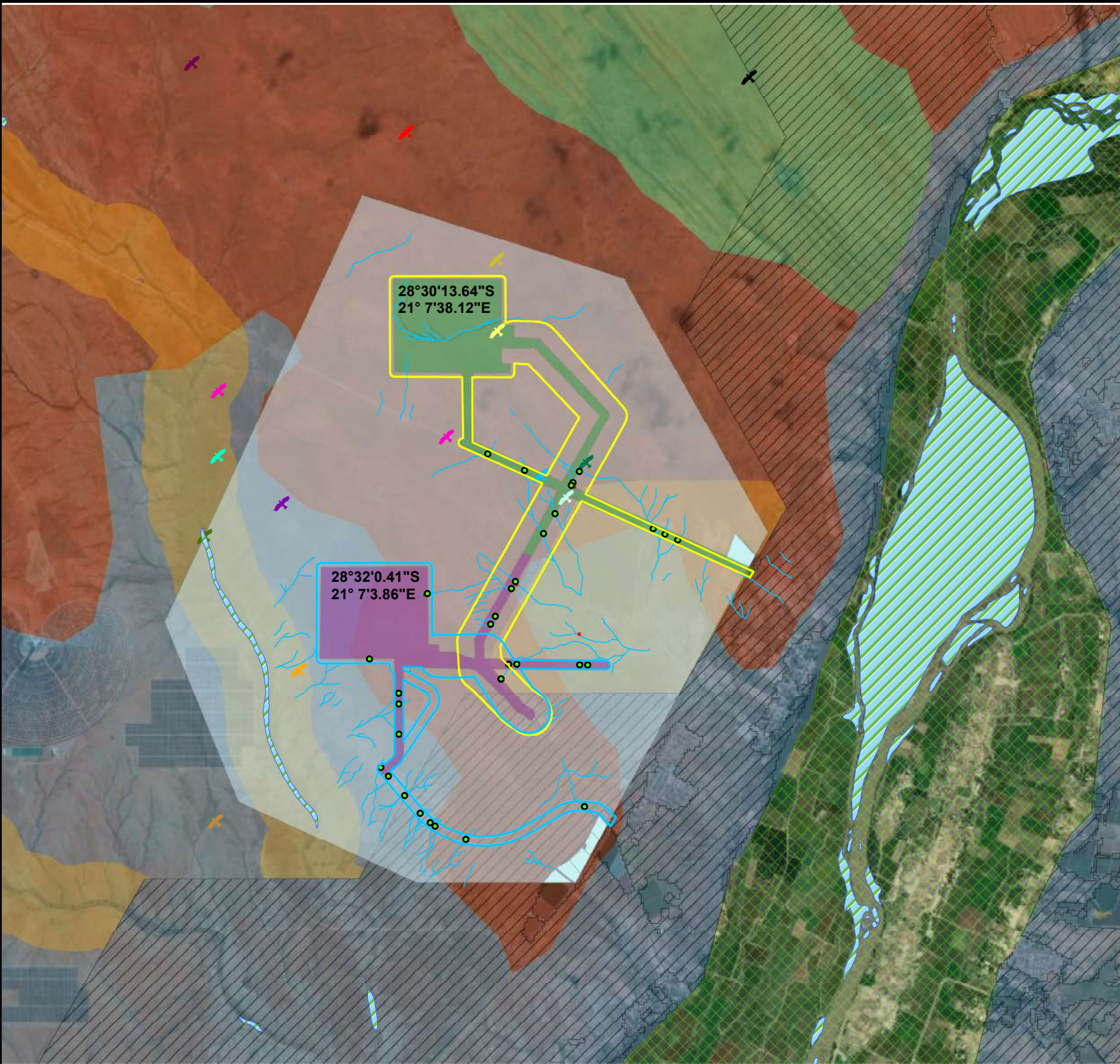
Zitholele has a formidable track record and comprises highly qualified and experienced technical staff viz, Environmental Scientists and Environmental Control Officers (ECO's). The team members have broad experience in terms of working on a range of environmental projects within the public and private sector across South Africa. Refer to the table below for the contact details of the EAP who prepared the amended EMPr.

### Details of the Independent Environmental Assessment Practitioner (EAP)

<b>Project EAP:</b>	<b>Zitholele Consulting (Pty) Ltd</b>		
<b>Contact Person:</b>	Ms. Natasha Lalie		
<b>Qualifications</b>	Master of Science (Environment and Society), IAIASa Member (Member No: 6920) and Professional Registered EAP with Environmental Assessment Practitioners Association of South Africa (EAPASA) (Registration No: 2021/3611)		
<b>Role in Project:</b>	Project management and coordination Process management Specialist team management Public Participation Co-Ordinator and liaisons Compilation of Amended EMPr		
<b>Physical Address:</b>	Building 1, Maxwell Office Park, Magwa Crescent West, Waterfall City, Midrand		
<b>Postal Address:</b>	P.O. Box 6002, Halfway House, 1685		
<b>Postal code:</b>	1685	<b>Fax:</b>	+27 86 674 6121
<b>Telephone:</b>	011 207 2060	<b>Cell:</b>	-
<b>Email:</b>	natashal@zitholele.co.za		
<b>Expertise to undertake the EMPr amendment process:</b>	Ms. Natasha Lalie has been an Environmental Assessment Practitioner (EAP) for nineteen years. She has undertaken numerous Screening and Feasibility Studies, Basic Assessment Reports, Scoping Reports, Environmental Impact Reports (EIR's), Environmental Management Programmes (EMPr's) and Public Participation Processes, as required by the National Environmental Management Act, 1998 (Act No. 107 of 1998) as amended and the EIA Regulations of 2006, 2010 and 2014. She has also undertaken Integrated Water Use Licence Applications (IWULA's) for a number of projects, as required by the National Water Act, 1998 (Act No. 36 of 1998). She has been involved in a wide range of projects, which included Waste Management License Applications, industrial, township establishments, mixed-use development, solar PV developments, transmission power lines, road upgrades, infrastructure developments, change of land use, lodge developments, proposed bulk water pipelines, proposed transmission power lines, public transportation, proposed filling stations, shopping centre developments and so on. She has worked extensively in South Africa, particularly in KwaZulu-Natal, Eastern Cape and Gauteng.		

## **APPENDIX B: MAPS**

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**Legend**

- Site\_A\_Study Area
- Site B Study Area
- Drainage Possible Impact Point
- Impact Points Option A
- Wetlands
- Pans
- Drainage Features

**Karroid grassland**

- Low Site Sensitivity
- Medium Medium Site Sensitivity
- Agriculture Theme - Low Sensitivity
- Annual Crop Cultivation - High Sensitivity
- High impacts drain

- Site\_A\_Study Area
- Site B Study Area
- Critical Biodiversity Area
- Ecological Support Area
- Lower Gariep Alluvial Vegetation (Endangered)
- Bushmanland Arid Grassland (Least Concern)
- Gordonia Duneveld (Least Concern)
- Kalahari Karroid Shrubland (Least Concern)

**Important bird**

- 1000x Amur Falcons
- 200+ abdim storks fly N (345-360°)
- 2x Lanner Falcons
- 2x Pale Chanting Goshawks
- 50 + Amur Falcons
- 50+ Abdim storks perch and fly N (345-360°)
- 6x Amur Falcons
- 6x Amur Falcons 1x kestrel Falcon
- 9x Amur 1x Red Footrd Falcon
- Black Chested Snake Eagle
- Greater Kestrel
- Pale Chanting Goshawk
- Pale chanting Goshawk
- Pale chanting goshawk
- Pygmy Falcon
- Sociable weavers nest

KIWANO SOLAR PV

SENSITIVITY MAP

1 00050001 000 Kilometers

WGS 1984 World Mercator

GIS	JM	10 Oct 2022	PROJECT No. 21139
CHECK	MV	10 Oct 2022	SCALE 1:70 000
REVIEW	MV	10 Oct 2022	A3 REV 0

## **APPENDIX C: GRIEVANCE MECHANISM GUIDELINE**

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# GRIEVANCE MECHANISM AND PROCESS

## 1. Purpose

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.

This plan should be updated through the project development process to ensure relevance at all project stages.

## 2. Procedure for receiving and resolving grievances

The process of receiving and resolving grievances must be handled in a courteous and respectful manner by all parties involved in the process at all times. These procedures should be updated as and when required to ensure that the Grievance Mechanism remain relevant for the project and effective in providing the required processes throughout the construction, operation and decommissioning phases of the project. The proposed procedure for receiving and resolving grievances are stipulated below:

- 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:
  - The name and contact details of the complainant;
  - The nature of the grievance;
  - Date raised, received, and for which the meeting was arranged;
  - Persons elected to attend the meeting (which will depend on the grievance); and
  - A clear statement that the grievance procedure is, in itself, not a legal process. Should such avenues be desired, they must be conducted in a separate process and do not form part of this grievance mechanism.



- The grievance must be registered with the contact person who, within 2 working days of receipt of the grievance, must contact the Complainant to discuss the grievance and, if required, agree on suitable date and venue for a meeting in order to discuss the grievances raised. Unless otherwise agreed, the meeting should be held within 2 weeks of receipt of the grievance.
- 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 managing the grievance resolution process within 5 working days of receipt of the draft minutes.
- The meeting agenda must contain agenda points addressing 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 that the grievance is resolved to the satisfaction of all 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, an independent mediator must be appointed to assist with resolving the issue. The record of the meeting/s must note that a dispute has arisen and that the grievance has not been resolved to the satisfaction of all the parties concerned.
- In the event that the parties agree to appoint a mediator, the Developer will be required to identify three (3) mediators and forward the names and CVs to the Complainant within 2 weeks of the dispute being declared. The Complainant, in consultation with the Developer, must identify the preferred mediator and agree on a date for the next meeting. The cost of the mediator must be borne by the Developer. The Developer must supply and nominate a representative to capture minutes and record the meeting/s.
- In the event of the grievance, with the assistance of the mediator, is 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.

- If the dispute is not 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 possible. Closure status must be classified and captured following mediation or successful resolution in the Complaints Register as follows:
  - Resolved. Complaints where a resolution has been agreed and implemented and the Complainant has signed the Confirmation Form.
  - Unresolved. Complaints where it has not been possible to reach an agreed resolution despite mediation.
  - Abandoned. Complaints where the Complainant is not contactable after one month following receipt of a Complaint and efforts to trace his or her whereabouts have been unsuccessful.

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

## **APPENDIX D: PLANT RESCUE AND PROTECTION PLAN**



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## PLANT RESCUE AND PROTECTION PLAN

### 1. PURPOSE

The purpose of the plant 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 development of the PV Facility on listed and protected plant species and their habitats and to provide guidance on search and rescue of species of conservation concern.

### 2. RELEVANT ASPECTS OF THE SITE

The selected study area falls within the original extent of the Kalahari Karroid Shrubland (Unit Nkb 5) and the Bushmanland Arid Grassland (Unit Nkb 3) as defined by Mucina and Rutherford (2006). The former unit consists of flat, gravel plains, while the latter unit consists of Extensive to irregular plains on a slightly sloping plateau. In terms of vegetation structure, the Kalahari Karroid Shrubland has Karoo-related elements (shrubs) mixed with northern floristic elements, while the Bushmanland Arid Grassland is sparsely vegetated by grassland dominated by *Stipagrostis* species (Mucina and Rutherford 2006).

A total of 295 indigenous plant species have been recorded in the Kiwano Area according to the BODATSA database. Only 52 indigenous species could be confirmed to be present on site. A large portion of the study site is homogenous in terms of floristic structure and species composition. Some areas of interest include flat rocky areas, which, although searched, did not support a different assemblage of species. Only some drainage lines were found on site, with species that do not vary from the surrounding vegetation but are rather the same species growing more densely.

No red data species (species regarded as threatened by the SANBI Red List of South African Species (2017)) were recorded in the study site.

The following plants encountered on the study site are protected:

#### **Northern Cape Nature Conservation Act no. 9 of 2009:**

- » *Boscia albitrunca* (Schedule 2)
- » *Boscia foetida* (Schedule 2)
- » *Euphorbia braunsii* (Schedule 2)
- » Family Iridaceae (Schedule 2)

#### **Protected Trees (National Forest Act no. 84 of 1998)**

- » *Boscia albitrunca* (National Tree no.: 122)
- » *Boscia foetida*

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### **3. PRINCIPLES FOR SEARCH AND RESCUE**

Successful plant rescue can only be achieved if:

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

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

- » A permit is required from the Northern Cape Department of Environment and Nature Conservation to translocate (including gathering, collecting and plucking flora and their seeds) or destroy (including picking, cutting, chopping, damaging or destroying flora) any listed and protected species identified by the ecological walkthrough survey undertaken for the optimised final Kiwano Battery Energy Storage System and Solar Photovoltaic Project layout, even if they do not leave the property. This permit should be obtained prior to any search and rescue operations being undertaken.
- » Where suitable species are identified, a search and rescue operation of these species should be undertaken within the development footprint, where these species would be affected, and prior to the commencement of construction.
- » As far as possible, timing of search and rescue activities should be planned with the onset of the growing season.
- » Affected individuals should be translocated to a similar habitat outside of the development footprint and marked and recorded for monitoring purposes. For each individual plant that is rescued, the plant must be photographed before removal, tagged with a unique number or code and a latitude longitude position recorded using a hand-held GPS device.
- » The rescued plants must be planted into a container to be housed within a temporary nursery on site or immediately planted into the target habitat.
- » Rescued plants, if re-planted back in the wild, should be placed as close as possible to where they were originally removed. Re-planting into the wild

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must cause as little disturbance as possible to existing natural ecosystems. The position of the rescued individual/s must be recorded to aid in future monitoring of that plant as noted earlier.

- » During construction, the Environmental Control Officer (ECO)/ Contractor's Environmental Officer (EO)/ Environmental Representative must monitor vegetation clearing at the site. Any deviations from the plans that may be required should first be checked for listed species by the Environmental Control Officer (ECO)/ Contractor's Environmental Officer (EO/ SHE Representative) and any listed species present which are able to survive translocation should be translocated to a safe site.
- » Any listed species suitable for translocation observed within the development footprint, and that would be affected, that were not previously observed be translocated to a safe site.
- » The collecting of plants or their parts should be strictly forbidden. Staff should be informed of the legal and conservation aspects of harvesting plants from the wild as part of the environmental induction training.
- » Sensitive habitats and area outside project development should be clearly demarcated as no go areas during the construction and operational phase to avoid accidental impacts.

The following principles apply in terms of the translocation of provincially protected trees:

- » A permit for protected trees is required from the Department of Agriculture and Forestry to translocate (including gathering, collecting and plucking flora and their seeds) any listed protected tree species identified by the ecological walkthrough survey undertaken for the optimised final Kiwano Battery Energy Storage System and Solar Photovoltaic Project layout, even if they do not leave the property. This permit should be obtained prior to any search and rescue operations being undertaken.
- » The establishment of a healthy layer of organic material over the surface of the expected root ball, including the use of earthworms and earthworm castings. It should be noted that the use of earthworms castings during the relocation process has been scientifically proven as an effective additive to increase root development.
- » The organic material on the root ball will be inspected on a regular basis and additional materials may be added as needed. The inspection of the organic material should be included in a monthly or quarterly report.
- » Irrigation of the outer root ball will be required to encourage new root development. The irrigation frequency will be a weekly/ monthly basis depending to the water requirement and available through rainfall events. This may be adjusted during the continuous monitoring.

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- » Irrigation will be monitored on a monthly basis. Monitoring may be done using the soil probe or using moisture metering.
  - » The preparation of the relocation site will be required to be made ready before cutting of the tree root balls.
  - » Small specimens of the protected trees must also be relocated.
  - » Seeds from protected trees must be harvested and then germinated and grown in a controlled environment. Thereafter, the seedlings must be translocated to a nursery that is set up for the purpose of plant relocation.
  - » The relocated trees must be irrigated consistently, thoroughly and regularly without breaks in the schedule regardless of the season and stoppages in the work schedule throughout the relocation process for a lengthy period of time (i.e. 1 year to 2 years), depending on the size of the tree. The larger trees require longer time to develop new roots. A single lapse in the irrigation schedule during this period may result in a dead tree.
  - » The volume of water applied during each irrigation schedule on each tree must be inspected for consistency and be adjusted if needed throughout the duration of the project. The individual tree inspected at each monitoring must be identified and recorded. If an individual tree appears to be suffering, it must be monitored separately from the other trees.
  - » The entire root balls of the relocated trees must be mulched with wood chips at an initial depth of about 15 cm, thereafter this mulch must be maintained at a depth of about 10 cm for a minimum of 5 years following the relocation.
  - » The root balls of the relocated trees must be monitored with a soil probe by trained individual or with at least moisture meters set at different depths of the ball (one set at about 30 cm in depth and other one set at 60-91 cm depth depending on the size of the tree) during the entire transplant period;.
  - » It is recommended that the relocated trees be fertilised on an annual basis (March/September) with fertilizer containing Nitrogen, Phosphorus and Potassium in order to promote root development and growth.
  - » Following the transplanting, weekly records of monitoring must be kept for the period of the first 3 months.
  - » The volumes of water applied on the protected trees must be adjusted based on this monitoring. After 3 months records must be kept and made available for review for a minimum of 2 years for smaller trees at the time of transplant.
  - » For larger trees at the time of transplant, the volume of water applied must be monitored and records must be maintained for 5 years.
  - » An annual report on the survival status of the relocated trees must be done for 5 years.
  - » The report at the end of the 5th year, must be done by the competent personnel and must include a recommendation concerning any continuing monitoring or special care.

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#### **4. PRINCIPLES FOR THE DESTRUCTION OF PROTECTED TREES**

A permit for protected trees is required from the Department of Agriculture and Forestry to destroy (including picking, cutting, chopping, damaging or destroying flora) any listed and protected species identified by the ecological walkthrough survey undertaken for the optimised final Kiwano Battery Energy Storage System and Solar Photovoltaic Project layout, even if they do not leave the property. This permit should be obtained prior to any destruction operations being undertaken.

The permit for protected trees form is designed to provide for the following categories of cutting, destruction or damage of protected trees:

- » Deforestation for change of land use: This can be for infrastructure development (e.g. a new urban development in a natural environment like a woodland, or for agricultural land use change (e.g. conversion of woodland into cultivated lands), or mining.
- » Selective cutting/destruction or transplanting of individual trees or seedlings: This includes the cutting/destruction of single trees from amongst other trees, and the control of bush encroachment by herbicides, which is also a selective destruction process.
- » The disturbance of a tree: This includes for instance the undercutting of the root system by earth removal works, e.g. for excavations, road-building, construction of buildings, etc.
- » The pruning or delimbing (debranching) of trees: This category provides for instance for pruning of branches, or the removal of parts of the tree for some or other reason, e.g. where a branch is dangerous to a building

## **APPENDIX E: REVEGETATION AND REHABILITATION PLAN**

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## REVEGETATION AND REHABILITATION PLAN

### 1. PURPOSE

The purpose of the rehabilitation plan is to ensure that areas cleared or impacted during construction activities of the Kiwano Battery Energy Storage System and Solar Photovoltaic Project are rehabilitated with a plant cover that reduces the risk of erosion from these areas as well as restores some ecosystem function. The purpose of the rehabilitation plan for the site can be summarised as follows:

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

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

### 2. RELEVANT ASPECTS OF THE SITE

The selected study area falls within the original extent of the Kalahari Karroid Shrubland (Unit Nkb 5) and the Bushmanland Arid Grassland (Unit Nkb 3) as defined by Mucina and Rutherford (2006). The former unit consists of flat, gravel plains, while the latter unit consists of Extensive to irregular plains on a slightly sloping plateau. In terms of vegetation structure, the Kalahari Karroid Shrubland has Karoo-related elements (shrubs) mixed with northern floristic elements, while the Bushmanland Arid Grassland is sparsely vegetated by grassland dominated by *Stipagrostis* species (Mucina and Rutherford 2006). Although the two habitat types (Transformed, Karroid Grassland (Site Alternative A) and Karroid Grassland (Site Alternative B)) of each of the alternative sites are overall the same, with the same dominant species as well as many of the same species, the numbers of geophytic species recorded from Site Alternative B were much higher, indicating that this site is somewhat more sensitive from a floristic perspective. No difference was noted in terms of faunal composition between the two alternatives. In such cases, areas with high numbers of potentially conservation important species should be avoided in favour of the site with the least number of conservation important species. In addition, sites closer to existing infrastructure (such as site alternative A) are preferred as fragmentation is thus kept to a smaller overall area.

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A total of 295 indigenous plant species have been recorded in the Kiwano area according to the BODATSA database. Only 52 indigenous species could be confirmed to be present on site. A large portion of the study site is homogenous, in terms of floristic structure and species composition. Some areas of interest include flat rocky areas, which, although searched, did not support a different assemblage of species. Drainage lines were found, with species that do not vary from the surrounding vegetation but are rather the same species growing more densely.

Considering the anthropogenic activities and influences within the landscape, several negative impacts to biodiversity were observed within the assessment area. These include soil erosion and loss of habitat as a result of runoff; overgrazing; litter; and loss of indigenous flora and associated edge effects from existing infrastructure.



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### 3. REHABILITATION METHODS

- » Immediately after replacing topsoils in disturbed areas, the soil surface must be revegetated with a suitable plant cover.
- » It is expected that soil seed banks of indigenous vegetation will be present to initiate initial vegetation cover. However, simply applying this topsoil to a well prepared rehabilitation site does not result in the same species richness and diversity as the surrounding areas. In some areas the natural regeneration of the vegetation may be poor and the application relevant of seed to enhance vegetation recovery may be required.
- » Where possible, seed should be collected from plants present at the site during plant rescue operations. Indigenous seeds may also be harvested for purposes of re-vegetation in areas that are free of alien or invasive vegetation, either at the site prior to clearance or from suitable neighbouring sites.
- » Seed collection should be undertaken by a suitably qualified specialist who is familiar with the various seed types associated with the plant species and rehabilitation in the area.
- » Seed collection may be done throughout the year as seed ripens, but can also be restricted to summer, when a large amount of the perennial seed should have ripened. The collection of unripe seeds will reduce the percentage germination thereby reducing the effectiveness of the rehabilitation efforts. Seeds should be stored in paper or canvas bags dusted with insecticide, and sown at the onset of the rainy season.
- » Seed can be sown onto the soil, but should preferably be applied in conjunction with measures to improve seedling survival such as scarification of the soil surface or simultaneous application of mulch. Additional organic material may be added to the soil mix, if required, to assist with water retention during the early stages of seedling establishment.
- » It should be ensured that the seed mix is as diverse as possible in the first season. After the first season, when pioneer plant communities have successfully established, attempts should be made to re-sow and replant the area with more perennial and woody species. It is a process that will require several follow-ups.
- » Planting is dependent on species involved. Planting of species recommended for rehabilitation should be carried out as far as is practicable to coincide with the onset of the first significant rains. In general however, planting should

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commence as soon as possible after construction is completed in order to minimise the potential for erosion.

- » The final vegetation cover should resemble the original (non-encroached and indigenous) vegetation composition and structure as far as practicably possible.
- » Progressive rehabilitation is an important element of the rehabilitation strategy and should be implemented where feasible. Re-vegetation of disturbed surfaces must occur immediately after construction activities are completed.
- » Once revegetated, areas should be protected to prevent trampling and erosion.
- » No construction equipment, vehicles or unauthorised personnel should be allowed onto areas that have been vegetated.
- » Where rehabilitation sites are located within actively grazed areas, they should be fenced, this must be undertaken in consultation with the landowner.
- » Fencing should be removed once a sound vegetative cover has been achieved.
- » Any runnels, erosion channels or wash ways developing after revegetation should be backfilled and consolidated and the areas restored to a proper stable condition.

#### **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 Officer (EO) and EPC Contractor will be responsible for initiating and maintaining a suitable monitoring system. Once the development is operational, the Proponent will need to identify a suitable entity that will be able to take over and maintain the monitoring cycle and initiate adaptive management as soon as it is required. Monitoring personnel must be adequately trained.

The following are the minimum criteria that should be monitored:

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

The initial revegetation period post construction is estimated to be over a period of 6 months (minimum) to 12 months (maximum), or a time period specified by the rehabilitation specialist, particularly if planting of trees and shrubs occurs. The rehabilitation phase (including post seeding maintenance) should be at least

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12 months (depending on time of seeding and rainfall) to ensure establishment of an acceptable plant cover is achieved (excluding invasive plant species or weeds).

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

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

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

Monitoring of rehabilitation success and follow-up adaptive management, together with clearing of emerging alien plant species should continue for as long as considered necessary.

## **APPENDIX F: ALIEN PLANT AND OPEN SPACE MANAGEMENT PLAN**

## **ALIEN PLANT AND OPEN SPACE MANAGEMENT PLAN**

### **1. PURPOSE**

Invasive alien species pose the second largest threat to biodiversity after direct habitat destruction. The purpose of this Alien Plant Management Plan is to provide a framework for the management of alien and invasive plant species during the construction and operation of the Kiwano Battery Energy Storage System and Solar Photovoltaic Project. The broad objectives of the plan includes the following:

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

### **2. RELEVANT ASPECTS OF THE SITE**

Within the project area invasive species – indigenous and alien - occur, which all have a potential of reproducing to such an extent that the ecosystem within and beyond the project area could be impaired.

The POSA database, along with the iNaturalist list of species for the area (research grade identifications) and the Mucina and Rutherford (2006) diagnostic species indicate that 295 species of indigenous plants are expected to occur within the project area and surrounding landscape. Fifteen alien invasive plants are expected to occur within the project area. A total of 52 species, representing 22 families of flora species were recorded during fieldwork within the assessment area.

The following listed alien invasive species was recorded near the study area:

#### **Category 1b:**

- » *Datura* sp.

### 3. LEGISLATIVE CONTEXT

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

In terms of the amendments to the regulations under the Conservation of Agricultural Resources Act (Act No. 43 of 1983), all declared aliens must be effectively controlled. Landowners are legally responsible for the control of invasive alien plants on their properties. Over 80 alien invasive plant species have been recorded up to date within the grid representative of the Kiwano Battery Energy Storage System and Solar Photovoltaic Project, according to the POSA Database. One of these species was recorded near the site and ascribed to one of the following categories:

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

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

The National Environmental Management: Biodiversity Act (NEMBA) is the most recent legislation pertaining to alien invasive plant species. In August 2014, the list of Alien Invasive Species was published in terms of the National Environmental Management: Biodiversity Act (Act 10 of 2004) (Government Gazette No 78 of 2014). The Alien and Invasive Species Regulations were published in the Government Gazette No. 43726, 18 September 2020 (updated in 24 February 2021). The legislation calls for the removal and / or control of alien invasive plant species (Category 1 species). In addition, unless authorised thereto in terms of the National Water Act, 1998 (Act No. 36 of 1998), no land user shall allow Category 2 plants to occur within 30 meters of the 1:50 year flood line of a river, stream, spring, natural channel in which water flows regularly or intermittently, lake, dam or wetland. Category 3 plants are also prohibited from occurring within proximity to a watercourse. Below is a brief explanation of the three categories in terms of the National Environmental Management: Biodiversity Act (Act 10 of 2004) (NEMBA):

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

government sponsored invasive species management programme. No permits will be issued.

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

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

It is important to note that alien species that are regulated in terms of the the National Environmental Management: Biodiversity Act, 2004 (Act no. 10 of 2004), which supercedes the Conservation of Agricultural Resources Act (Act 43 of 1983) (CARA). As a result, The Alien and Invasive Species (AIS) Regulations became law on 1 October 2014 and has since been updated on 18 September 2020.

## **4. ALIEN PLANT MANAGEMENT PRINCIPLES**

### **4.1. Prevention and early eradication**

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

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

### **4.2. Containment and control**

If any alien invasive plants are found to become established on site, action plans for their control should be developed, depending on the size of the infestations, budgets, manpower considerations and time. Separate plans of control actions should be developed for each location and/or each species. Appropriate registered chemicals and

other possible control agents should be considered in the action plans for each site/species. The key is to ensure that no invasions get out of control. Effective containment and control will ensure that the least energy and resources are required to maintain this status over the long-term. This will also be an indicator that natural systems are impacted to the smallest degree possible.

### **4.3. General Clearing & Guiding Principles**

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

#### **i. Clearing Methods**

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

##### **» Mechanical control**

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

##### **» Chemical Control**

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



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

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

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

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

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

» **Biological control**

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

zero and the population is effectively sterilised. All of these outcomes will help to reduce the spread of the species.

To obtain biocontrol agents, provincial representatives of the Working for Water Programme or the Directorate: Land Use and Soil Management (LUSM), Department of Agriculture, Forestry and Fisheries (DAFF) can be contacted. Biocontrol should not be performed without the input from the department as it can result in long-term damage to the surrounding habitat and vegetation.

#### **4.4. General management practices**

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

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

- » No alien species should be cultivated on-site. If vegetation is required for aesthetic purposes, then non-invasive, water-wise locally-occurring species should be used.
- » During operation, surveys for alien species should be conducted regularly. It is recommended that this be undertaken every 6 months for the first two years after construction and annually thereafter. All aliens identified should be cleared using appropriate means.

#### **4.5. Monitoring**

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

In general, the following principles apply for monitoring:

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

The following monitoring should be implemented to ensure management of alien invasive plant species.

#### **Construction Phase**

<b>Monitoring Action</b>	<b>Indicator</b>	<b>Timeframe</b>
Document alien species present at the site	List of alien species	Preconstruction & monthly thereafter
Document alien plant distribution	Alien plant distribution map within priority areas	3 Monthly
Document & record alien control measures implemented	Record of clearing activities	3 Monthly
Review & evaluation of control success rate	Decline in documented alien abundance over time	Biannually

### **Operation Phase**

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

