

**Veld PV South Solar
Energy Facility and
associated
infrastructure near
Aggeneys in the
Northern Cape**

**Final Environmental
Management Programme
(EMPr)**

Veld PV South (Pty) Ltd

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VELD
RENEWABLES

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Abbreviations

Acronym	Abbreviation
BA	Basic Assessment
BAR	Basic Assessment Report
BLSA	Birdlife South Africa
BW	Bidding Window
CARA	Conservation of Agricultural Resources Act (Act 43 of 1983)
CBA	Critical Biodiversity Areas
CRR	Comments and Response Report

DEA	Department of Environmental Affairs
DEA&DP	Department of Environmental Affairs and Development Planning (Western Cape)
DENC	Department of Environment and Nature Conservation
DM	District Municipality
DoE	Department of Energy
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
HV	High Voltage
I&AP	Interested and Affected Party
IBA	Important Bird Area
IDP	Integrated Development Plan
NFEPA	National Freshwater Ecosystems Priority Areas
NEMA	National Environmental Management Act (Act No 107 of 1998)
NHRA	National Heritage Resources Act (Act No 25 of 1999)
NWA	National Water Act (Act No. 36 of 1998)
PPP	Public Participation Process
SANBI	South African National Biodiversity Institute

SABAP	Atlas of Southern African Birds
SDF	Spatial Development Framework

Requirements of Environmental Management Programmes

Appendix 4 of the NEMA EIA Regulations 2014 (as amended) specifies the requirements of an Environmental Management Programme. The table below serves as a map of how the requirements detailed in Appendix 4 has been adhered to.

Table 1 Requirements of an Environmental Management Programme (EMPr) as detailed in Appendix 4 of the NEMA EIA Regulations 2014 (as amended).

Requirement	Reference
Details of the EAP who prepared the EMPr and the expertise of the EAP, including a CV.	Appendix A
A detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description.	Section 1 and Section 2
A map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffers.	Appendix B for Layout Plans. Sensitive areas are avoided in the layout.
A description of the impact management outcomes, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development including: <ul style="list-style-type: none"> (i) Planning and design (ii) Pre-construction activities (iii) Construction activities (iv) rehabilitation of the environment after construction and where applicable post closure (v) where relevant, operation activities 	Section 4
A description of proposed impact management actions, identifying the manner in which the impact management outcomes will be achieved, and must, where applicable, include actions to: <ul style="list-style-type: none"> (i) avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation (ii) comply with any prescribed environmental management standards or practices (iii) comply with any applicable provisions of the Act regarding closure, where applicable (iv) comply with any provisions of the Act regarding financial provision for rehabilitation, where applicable 	Section 4 and Section 5

The method of monitoring the implementation of the impact management actions.	Section 3.4
The frequency of monitoring the implementation of the impact management actions.	Section 3.4
An indication of the persons who will be responsible for the implementation of the impact management actions.	Section 3
The time periods within which the impact management actions must be implemented.	Section 1.5
The mechanism for monitoring compliance with the impact management actions.	Section 3.4
A program for reporting on compliance, taking into account the requirements as prescribed by the Regulations.	Section 3.4
An environmental awareness plan describing the manner in which: <ul style="list-style-type: none"> (i) the applicant intends to inform his or her employees of any environmental risk which may result from their work (ii) risks must be dealt with in order to avoid pollution or the degradation of the environment 	Section 3.4
Any specific information that may be required by the competent authority.	None to date.

1 OVERVIEW

This chapter provides a general overview of this Environmental Management Programme (EMPr) and provides a summary of the purpose of this document and its structure. Relevant legislation pertaining to this document is also briefly discussed.

1.1 Purpose of this EMPr

The purpose of this document is to provide environmental management practices and recommendations to ensure that the known and possible unknown impacts associated with the Veld PV South Solar Energy Facility and Associated Infrastructure (hereafter “Veld PV South”) are avoided, managed, mitigated and kept to acceptable levels. The recommendations included herein are applicable to the following stages of the proposed development:

- Planning and design;
- Pre-construction and construction;
- Operation; and
- Closure and decommissioning.

A photovoltaic (PV) renewable energy facility with an anticipated life span of $\pm 20 - 25$ years is being proposed. It is therefore possible that the facility could be decommissioned in future to make the land available for a different land use (should other options for continuation not be feasible). The decommissioning scenario of the facility is therefore described in this EMPr.

This EMPr aims for alignment and optimisation of environmental management processes with conditions of authorisation that may arise. Any conditions of authorisation contained in the Environmental Authorisation (EA) that contradict the recommendations made in this EMPr, supersedes the recommendations of this document. The EMPr must be updated to contain all conditions of authorisation contained in the EA that area relevant to environmental management (should this be a condition of authorisation).

A hard copy of the EMPr must always be in the site office and made available to officials at request.

1.2 Legal Requirements of an EMPr

The content of the EMPr must meet the requirements outlined in Section 24N (2) and (3) of NEMA and Appendix 4 of the NEMA EIA Regulations 2014 (as amended).

The Department of Environmental Affairs & Development Planning (DEA&DP)'s¹ *Guideline for Environmental Management Plans* (2005) aims to inform and guide the preparation and implementation of EMPrs. The conditions of the guideline as well as the requirements specified in Appendix 4 of the EIA Regulations 2014 (as amended) (Table 1 above) have been considered in compiling this document. The DEA&DP guideline defines EMPrs as:

“an environmental management tool used to ensure that undue or reasonably avoidable adverse impacts of the construction, operation and decommissioning of a project are prevented; and that the positive benefits of the project are enhanced”

The EMPr must address the potential environmental impacts of the proposed activity on the environment throughout the project life-cycle including an assessment of the effectiveness of monitoring and management arrangements after implementation. The Department requires that the EMPr be submitted together with the Assessment Report so that it can be considered simultaneously.

Section 24N (2) and (3) of the NEMA listing the requirements of an EMPr are given in Table 2.

¹ Please note that DEA&DP's guideline is used even though the proposed project is based in the Northern Cape, as DEA has not compiled a guideline on EMP

Table 2: Section 24N (2) and (3) of the NEMA listing the requirements of an EMPr.

<p>24N.(2) <i>the environmental management programme must contain-</i></p> <p>(a) <i>information on any proposed management, mitigation, protection or remedial measures that will be undertaken to address the environmental impacts that have been identified in a report contemplated in subsection 24(1A), including environmental impacts or objectives in respect of –</i></p> <p style="margin-left: 40px;">(i) <i>planning and design;</i></p> <p style="margin-left: 40px;">(ii) <i>pre-construction and construction activities;</i></p> <p style="margin-left: 40px;">(iii) <i>the operation or undertaking of the activity in question;</i></p> <p style="margin-left: 40px;">(iv) <i>the rehabilitation of the environment; and</i></p> <p style="margin-left: 40px;">(v) <i>closure, where relevant.</i></p> <p>(b) <i>details of –</i></p> <p style="margin-left: 40px;">(i) <i>the person who prepared the environmental management programme; and</i></p> <p style="margin-left: 40px;">(ii) <i>the expertise of that person to prepare an environmental management programme</i></p> <p>(c) <i>a detailed description of the aspects of the activity that are covered by the draft environmental management plan;</i></p> <p>(d) <i>information identifying the persons who will be responsible for the implementation of the measures contemplated in paragraph (a);</i></p> <p>(e) <i>information in respect of the mechanisms proposed for monitoring compliance with the environmental management programme and for reporting on the compliance.</i></p> <p>(f) <i>as far as is reasonable practicable, measures to rehabilitate the environment affected by the undertaking of any listed activity or specified activity to its natural or predetermined state or to a land use which conforms to the generally accepted principle of sustainable development; and</i></p> <p>(g) <i>a description of the manner in which it intends to-</i></p> <p style="margin-left: 40px;">(i) <i>modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;</i></p> <p style="margin-left: 40px;">(ii) <i>remedy the cause of pollution or degradation and mitigation of pollutants; and</i></p> <p style="margin-left: 40px;">(iii) <i>comply with any prescribed environmental management standards or practices.</i></p> <p>(3) <i>the environmental management programme must, where appropriate-</i></p> <p>(a) <i>set out time periods within which the measures contemplated in the environmental management programme must be implemented;</i></p> <p>(b) <i>contain measures regulating responsibilities for any environmental damage, pollution, pumping and treatment of extraneous water or ecological degradation as a result of prospecting or mining operations or related mining activities which may occur inside and outside the boundaries of the prospecting area or mining area in question; and</i></p> <p>(c) <i>develop an environmental awareness plan describing the manner in which-</i></p> <p style="margin-left: 40px;">(i) <i>the applicant intends to inform his or her employees of any environmental risk which may result from their work; and</i></p> <p style="margin-left: 40px;">(ii) <i>risks must be dealt with in order to avoid pollution or the degradation of the environment.</i></p>

The EMPr aims to meet the EMPr requirements as legislated by the NEMA Regulations (Table 1 above) as well as falling in line with the DEA&DP guideline document for Environmental Management Plans². It should however be noted that no guideline or guidance exists in terms of best practice approach to EMPrs. This document should thus be seen in an iterative context allowing for amendments throughout the life-cycle of the project, allowing for adjustments as new information is made available, unforeseen situations arise or conditions warrant adaptation.

1.3 Structure of the EMPr

As discussed above, the EMPr aims to address environmental management throughout the project life-cycle, from planning and design, through construction, to operation and potential decommissioning. The EMPr has been structured to include the following sections:

² Lochner, P. 2005. *Guideline for Environmental Management Plans*. CSIR Report No ENV-S-C 2005-053 H. Republic of South Africa, Provincial Government of the Western Cape, Department of Environmental Affairs & Development Planning, Cape Town.

- Chapter 1: Description of project
- Chapter 2: Discussion summarising environmental management influencing the planning and design of the proposed project
- Chapter 3: Environmental impacts and specialist mitigation measures
- Chapter 4: The roles and responsibilities of the various role players involved in the implementation of this EMPr is discussed
- Chapter 5: Construction EMPr based on identified impacts and mitigation measures from the EIR
- Chapter 6: Operational Framework based on identified impacts and mitigation measures from the EIR
- Chapter 7: Decommissioning phase provisional requirements and recommendations.
- Chapter 8: Monitoring programmes
- Chapter 9: Decommissioning Framework providing guidance on key considerations to be considered during decommissioning/closure
- Chapter 10: Conclusion

1.4 Expertise of Environmental Assessment Practitioner

Section 33 of EIA Regulations and Section 24N (2) and (3) of the NEMA requires that an EMPr must include the details of the person(s) who prepared the EMPr, and the expertise of that person to prepare an EMPr. In this regard, the *Curriculum Vitae* of the Environmental Assessment Practitioner who compiled the EMPr are included in Appendix A.

1.5 Project Phasing

1.5.1 Planning and Design Phase

This phase includes applications for amongst others environmental and town planning authorisations. The planning and design phase investigate the possible impact of the proposed development on the receiving environment and recommend mitigation measures. This phase would have been concluded once the contractor views this document.

1.5.2 Pre-Construction Phase/Activities

The pre-construction phase includes activities such as appointment of an ECO, pre-construction environmental workshop/induction training (conducted by the ECO), site demarcation, establishment of a site camp, demarcation of areas such as fuel storage and plant rescue (when applicable). Specifications for the aforementioned activities are included in this EMPr.

1.5.3 Construction Phase

The construction phase commences with earthworks and thereafter includes all activities relating to the construction of the proposed development e.g. installation of services, construction of internal roads, PV arrays, auxiliary buildings etc.

This phase also includes the application processes to obtain permits for e.g. permits required to remove any protected tree or plant species.

1.5.4 Operational Phase

The operational phase commences when the proposed development is being used for its intended purposes i.e. providing power into the national grid. It is possible that there will be a period in the project life cycle where the construction and operational phase will overlap. This phase will include ongoing operation, monitoring and maintenance of the PV facility, as well as ongoing environmental management requirements (e.g. removal of alien vegetation).

1.5.5 Decommissioning Phase

The decommissioning phase refers to the discontinuation of the PV facility should the option to upgrade the facility not be favourable at the end of its life-cycle (20 - 25 years). This would entail disconnecting the facility from the national grid, removing module components to be recycled / resold as far as possible and dismantling of the facility with all its associated structures and infrastructure. Rehabilitation of the site would also form part of the decommissioning phase.

2 BACKGROUND INFORMATION

This Chapter provides a description of the proposed activity and outlines how environmental considerations have informed and been incorporated into the planning and design phases of the proposed development.

2.1 Project Description

Veld PV South (Pty) Ltd (Veld PV South) proposes developing a 75 MW Photovoltaic (PV) solar energy facility on Haramoep (Remainder of Farm 53) in the Namakwa District Municipality approximately 20 km north-west of Aggeneys in the Northern Cape (Figure 1). The development has been designed with the intention that the Veld PV South solar facility would form part of a consolidated solar development which will consist of the proposed Veld PV South (75 MW) and the proposed Veld PV South (75 MW) PV facilities. These proposed facilities would utilise shared infrastructure where possible to minimise their overall footprint. To evacuate the power generated by the proposed Veld PV South (and South), a 132 kilovolt (kV) overhead grid connection is required between the solar farm project area and the Aggeneys substation.

This EMPr specifically relates to the Veld PV South facility. A separate EMPr has been developed for the proposed grid connection mentioned above.

The site was strategically selected as it falls within the Springbok Renewable Energy Development Zones (REDZ) identified as part of a Strategic Environmental Assessment (SEA). The aim of the SEA was to identify the most suitable areas from both an environmental and socio-economic perspective where large scale wind and solar PV energy facilities should be developed, referred to as REDZ. In addition, an Electricity Grid Infrastructure (EGI) SEA was commissioned in 2014 to identify power corridors that will enable the efficient and effective expansion of key strategic transmission infrastructure designed to satisfy national transmission requirements up to 2040.

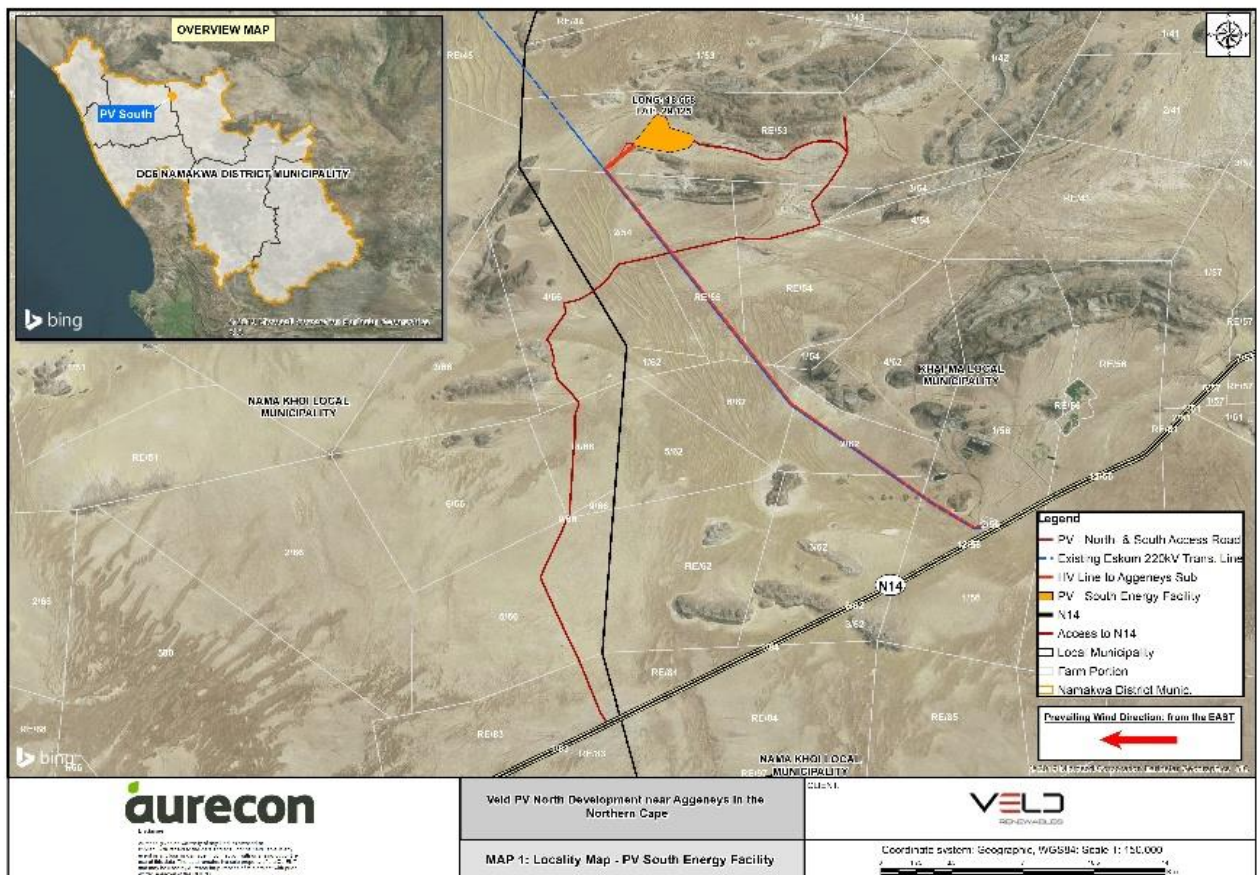


Figure 1: Veld PV South Locality Plan.

2.2 Legislative Framework

There are a host of legal and policy documents and guidelines to consider in undertaking such a Project. These have been detailed in the following sections below.

2.2.1 Relevant Legislation

An overview of the relevant legislation is provided in Table 3.

Table 3: Relevant legislation, policies and guidelines considered in preparation of the BAR

Title of legislation, policy or guideline	Applicability to the project	Administering authority
National Legislation		
Conservation of Agricultural Resources Act, No. 43 of 1983 (CARA)	The purpose of this Act is to ensure that natural agricultural resources of South Africa are conserved through maintaining the production potential of land, combating and preventing erosion, preventing the weakening or destruction of water sources, protecting vegetation, and combating weeds and invader plants. Veld PV South together with the relevant farmers should also ensure the control of any undesired aliens, declared weeds, and plant invaders listed in the Regulations that may pose a problem as a result of the proposed project. Measures to mitigate this potential impact will be included in the EMPr that will form an annexure to the Draft BAR.	Department of Agriculture, Forestry & Fisheries
Electricity Regulation Act, No. 4 of 2006 National Energy Act, No. 34 of 2008	The proposed Veld PV South facility would facilitate new generation capacity through renewable technologies, namely solar, as listed in the IRP and all REIPPPP which will be undertaken in accordance with the specified capacities and technologies as listed in the IRP.	Department of Energy (DoE)
National Environmental Management Act, No. 107 of 1998 (NEMA), as amended	Several listed activities (detailed in Section 2.2 below) have been triggered by the proposed Veld PV South facility in terms of the 2017 EIA Regulations (GN R326, as amended).	Department of Environmental Affairs
National Environmental Management: Biodiversity Act, No. 10 of 2004 (NEM:BA)	The Act calls for the management of all biodiversity within South Africa. As a number of listed species may occur on the site, it is imperative to ensure their long-term survival and conservation. The Threatened or Protected Species Regulations (2007) provides such protection through a permit system as well as through the identification of restricted activities. There is no part of the main Veld PV South that has any 'red flags' except for the requirement to relocate plants <i>Hoodia gordonii</i> . In addition, along the southern boundary of the site, care should be taken to avoid impact on trees of <i>Boscia albitrunca</i> . This should be possible because the trees are mostly within the area excluded due to freshwater ecological constraints. However, if disturbance of any <i>Boscia albitrunca</i> trees is unavoidable, a permit for disturbance or removal of such trees would be required from the Department of Environment, Forestry and Fisheries (DEFF). (Refer Botanical Impact Assessment, 2019)	Department of Environmental Affairs (DEA)
National Environmental Management: Waste Management Act, No. 59 of 2008 (NEM: WA)	During construction, the aim is to prevent and reduce pollution and ecological degradation by implementing waste management measures. By adhering to the regulations and schedules in terms of this Act, waste generated on site will be minimised and reused where possible and a waste licence will be obtained if any listed activities are triggered.	Department of Environmental Affairs (DEA)

National Forests Act, No. 84 of 1998, as amended (NFA)	There is no part of the main Veld PV South that has any 'red flags' except for the requirement to relocate plants <i>Hoodia gordonii</i> . In addition, along the southern boundary of the site, care should be taken to avoid impact on trees of <i>Boscia albitrunca</i> . This should be possible because the trees are mostly within the area excluded due to freshwater ecological constraints. However, if disturbance of any <i>Boscia albitrunca</i> trees is unavoidable, a permit for disturbance or removal of such trees would be required from the Department of Environment, Forestry and Fisheries (DEFF). (Refer Botanical Impact Assessment, 2019).	Department of Agriculture, Forestry & Fisheries (DAFF)
National Heritage Resources Act, No. 25 of 1999 (NHRA)	The proposed project will change the character of the site and will exceed 5,000 m ² in extent. The proposed roads will exceed 300 m in length. Section 38 of the NHRA is thus applicable. As such, it was proposed that a Heritage Impact Assessment (including an archaeological and palaeontological assessment) be undertaken for approval by SAHRA. The heritage study undertaken during the BA process found that heritage resources are very rare on the development site. Palaeontology was also not an issue for the proposed site.	South African Heritage Resources Agency (SAHRA)
National Water Act, No. 36 of 1998 (NWA)	Section 21 of the NWA recognises water uses that require authorisation by DWS before they commence. Water uses may be triggered by the following project activities: <ul style="list-style-type: none"> • Construction of infrastructure within 32 m of a drainage lines; and • The relevant approvals are being sought from DWS in parallel through a WULA process. 	Department of Water and Sanitation (DWS)
Occupational Health and Safety Act (No. 85 of 1993) (the OHS Act)	The health and safety of all people involved in the project before and after construction will be protected.	Department of Labour

2.2.2 Listed Activities in terms of NEMA

The National Environmental Management Act 107 of 1998 (NEMA) as amended, provides the framework for environmental decision-making in the country and specifically the EIA Regulations (GN No. R982 in the Government Gazette of 8 December 2014, as amended) serve as the instrument through which development decisions are made.

South Africa has rigorous and comprehensive environmental legislation aimed at preventing degradation of the environment. Section 28(1) of NEMA places a “*duty of care and remediation of environmental damage*” on every person who causes, has caused, or may cause, significant environmental degradation. This is a far-reaching obligation, and accordingly, those parties responsible for the degradation of the environment have a legal duty to avoid, minimise or mitigate such impacts.

This has resulted in a set of Listed Activities that can be triggered by developments taking place in sensitive environments, e.g. watercourses. If a development triggers a Listed Activity, it is required to undergo an Environmental Impact Assessment (EIA) or BA process in terms of the EIA Regulations (GN R982, as amended). The following listed activities, as shown in Table 4, have been identified as being applicable to this project:

Table 4: Listed activities triggered by the proposed Veld PV South facility

Activity No.	Relevant listed activity	Aspect of the project (Describe the portion of the proposed project to which the applicable listed activity relates).
Listing Notice 1: GN R983 of 8 December 2014 as amended on 7 April 2017 (GN R327)		
11	The development of facilities or infrastructure for the transmission and distribution of electricity—	The proposed grid connection will consist of a 132 kilovolt (kV) overhead powerline, approximately 25 km in length. The bulk of the power line will run in length within a rural and agricultural area, or alternatively would

Activity No.	Relevant listed activity	Aspect of the project (Describe the portion of the proposed project to which the applicable listed activity relates).
	(i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts; or (ii) inside urban areas or industrial complexes with a capacity of 275 kilovolts or more;	connect via a 220 kV LILLO line between the facility and an existing 220 kV transmission line, with the line being approximately 150 m in length.
12	The development of – (ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs— (a) within a watercourse; (c) if no development setback exists, within 32 m of a watercourse, measured from the edge of a watercourse; -	A few drainage lines are scattered across the proposed property and one or more roads and / or other infrastructure will cross these lines and be within 32 m thereof.
19	The infilling or depositing of any material of more than 10 m ³ into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 m ³ from (i) a watercourse;	The infilling or depositing of any material of more than 10 m ³ into a watercourse will likely be triggered with the construction of internal service roads or cables across drainage lines as well as the widening of the existing access road which crosses numerous small drainage lines.
24	The development of a road- (ii) a road with a reserve wider than 13.5 metres, or where no reserve exists where the road is wider than 8 metres; but excluding a road— (c) which is 1 kilometre or shorter	Permanent roads of sufficient width (~6 to 10 m) for delivery and construction vehicles will be required for the proposed project. While existing roads would be used as far as possible new sections of roads will be required in a few locations and will be over 1 kilometre in length.
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 1 April 1998 and where such development: (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 ha.	The farm on which the project is proposed is still being used for livestock grazing (mostly sheep).
Listing Notice 2: GN R984 of 8 December 2014 as amended on 7 April 2017 (GN R325)		
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;	The proposed project would have a maximum generation capacity of 75 MW.
15	The clearance of an area of 20 hectares or more of indigenous vegetation.	Physical alteration of undeveloped land for industrial use would take place. The total area to be transformed is approximately 300 ha.
Listing Notice 3: GN R985 of 8 December 2014 as amended on 7 April 2017 (GN R324)		
4	. The development of a road wider than 4 metres with reserve less than 13,5 metres. g. Northern Cape ii. Outside urban areas: (bb) National Protected Area Expansion Strategy Focus areas; (cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans.	The construction of a road wider than 4 m with a reserve less than 13.5 m (no reserve) might be required outside the urban area and within an area containing indigenous vegetation, as the existing road will need extension in some places. The project is located within a National Protected Area Expansion Strategy Focus as well as areas designated as Critical Biodiversity Areas. The project is also located within an Important Bird Area.
12	The clearance of an area of 300 square metres (m ²) 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. g. Northern Cape:	The clearance of more than 300 m ² of indigenous vegetation will likely be required for the project. The total area to be transformed is approximately 300 ha. The project is located within areas designated as Critical Biodiversity Areas.

Activity No.	Relevant listed activity	Aspect of the project (Describe the portion of the proposed project to which the applicable listed activity relates).
	(ii) Within critical biodiversity areas identified in bioregional plans;	
14	<p>The development of —</p> <p>(xii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs—</p> <p>(a) within a watercourse;</p> <p>(c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse;</p> <p>g. Northern Cape</p> <p>ii. Outside urban areas:</p> <p>(bb) National Protected Area Expansion Strategy Focus areas;</p> <p>(dd) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority;</p> <p>(ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;</p>	<p>Associated infrastructure (eg, fencing, substation, transmission lines, buildings, roads etc) may be located within or within proximity to a watercourse.</p> <p>The project is located within a National Protected Area Expansion Strategy Focus as well as areas designated as Critical Biodiversity Areas. The project is also located within an Important Bird Area.</p>
18	<p>The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre.</p> <p>g. Northern Cape</p> <p>ii. Outside urban areas:</p> <p>(bb) National Protected Area Expansion Strategy Focus areas;</p> <p>(cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority;</p> <p>(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;</p>	<p>Access roads of approximately 6 to 10 m in width would be required to develop the proposed project, the combination of which would exceed 1 km. Existing roads will be used as far as practically possible and feasible but would require widening by more than 4 m and new roads greater than 1 kilometre in length are likely to be required in some areas.</p> <p>The project is located within a National Protected Area Expansion Strategy Focus as well as areas designated as Critical Biodiversity Areas. The project is also located within an Important Bird Area.</p>

3 ROLES AND RESPONSIBILITIES

This Chapter provides a description of the roles and responsibilities of the various parties involved with the construction of the proposed development.

3.1 Contractor

The Contractor must ensure that all of its sub-contractors, employees, etc., are fully aware of the environmental issues detailed in this EMPr. The Contractor shall liaise closely with the Site Engineer (SE), Environmental Officer (EO) and the Environmental Control Officer (ECO) and must ensure that the works on site are conducted in an environmentally sensitive (prevent actions that may cause environmental harm) manner and fully in accordance with the requirements of the EMPr, at all times.

The contractor must ensure compliance of all site personnel/visitors to the EMPr and other conditions of approval where relevant.

3.2 Developer

The developer refers to the holder of the Environmental Authorisation (EA) who will assume overall responsibility for the administration and implementation of the EA and EMPr. The developer will be responsible for the following tasks amongst others:

- Ensure that all conditions of approval as contained in the EA are adhered to;
- Ensure that the requirements as set out in this EMPr are adhered to and implemented;
- Ensure all authorisations, permits, consents are in place and any other legal requirements are settled before construction commences;
- Allocate the responsibilities assigned to the ECO to an independent suitably qualified individual prior to the start of construction activities on site;
- Provide all principal contractors working on the project with a copy of this EMPr as part of tender contract documentation to allow the contractors to cost for its requirements within their respective construction contracts.

3.3 Site Engineer (SE)

The SE is responsible for ensuring that the contract is carried out to completion on time, in budget and that each Contractor fulfils his obligations in terms of conditions contained in the EA.

3.4 Environmental Control Officer (ECO)

The Developer shall appoint a suitably qualified ECO to monitor the Contractor's compliance in terms of this EMPr and the conditions contained in the EA, as well as address environmental site issues. The ECO shall work in close relation with the Contractor's appointed EO. The designation is reserved for a suitably qualified (National Diploma / Degree in Natural Science or an equivalent qualification), independent, environmental manager, with adequate environmental knowledge to understand and implement the EMPr.

The duties of the ECO include but are not limited to:

- Liaison with the Developer, Project Manager and/or Engineer and DEA;
- Update the EMPr to include relevant conditions of approval contained in the EA (if applicable);
- Conduct environmental induction training with the contractor prior to commencement of work (3.4.1);

- Undertake ECO site inspections. The frequency of site inspections can be determined between the ECO, SE, Environmental Site Agent (ESA) or any specific conditions of authorisation contained in the EA. It is recommended that the ECO be supported by a full-time ESA during the initial construction period/activities (see section 3.5 below) and that the ECO undertake monthly ECO inspections with the ESA. The ECO must attend/arrange a site meeting with the engineer, contractor and other relevant project team members during his/her site inspection to discuss any environmental matters;
- Compilation of ECO Reports that must be submitted to the project team, DEA, developer and Eskom (or any other authority/body deemed necessary by the project team). The ECO must liaise with the ESA to ensure that action items are carried out;
- Review ESA weekly compliance monitoring reports and include information in monthly ECO Reports;
- Monitoring compliance with the various environmental conditions/requirements contained in the EA and EMPr;
- Assist the ESA in reviewing of the Contractor's method statements;
- Ensuring that the requisite remedial action is implemented in the event of non-compliance;
- Ensuring the proactive and effective implementation and management of environmental protection measures;
- Ensuring that a register of public complaints is maintained by the Contractor and that any and all public comments or issues are appropriately reported and addressed;
- Attend monthly site meetings; and
- Recording and reporting of environmental incidents.

3.4.1 Environmental Induction/Awareness Training

The ECO shall arrange with the Engineer and Contractor to conduct environmental induction training with personnel and must address, amongst others:

- Explanation of the environmental process that preceded the EA and why it was important to conduct the environmental process;
- Explanation of the conditions of authorisation contained in the EA;
- The sensitive environmental features located within and around the site;
- The reasons why mitigation measures are required and the benefits of implementing these measures;
- The EMPr and its contents (e.g. no-go areas, animals, littering etc.); and
- The role of the ECO.

3.4.2 Permits and Authorisations

There are no protected trees or other species of conservation concern in the Veld PV South area.

The ECO must be knowledgeable of all licencing and permitting requirements (issued and required) applicable to the site and can assist the contractor with obtaining such permits should any be outstanding.

3.5 Environmental Site Agent (ESA)

It is recommended that an independent ESA be appointed for the duration of construction period (appointment must take place prior to commencement of any construction activities). The ESA will assist the ECO with day to day on-site monitoring of construction activities, compliance with this EMPr and any specific conditions contained in the EA. The ESA's terms of reference include, but are not limited to:

- Day to day monitoring of implementation of this EMPr;

- It is recommended that the ESA be on site daily when work is being undertaken in sensitive environments e.g. watercourses and during the initial construction activities which include amongst others site demarcation, identification of no-go areas, vegetation clearance and site camp establishment;
- The ESA must assist the contractor with environmental training of any new staff members or staff which did not attend the ECO's environmental induction training. On-going environmental awareness also falls within the responsibilities of the ESA;
- Submit weekly compliance reports to the ECO;
- Attend contractor and engineering site meetings where relevant or where attendance is requested;
- Maintain a detailed photographic record of construction activities;
- Maintain a register of site instruction, non-compliances and action items and submit weekly to the ECO;
- Keep all method statements on record/file.
- Liaise with the public should there be any complaints, keep a register of any complaints and report to the ECO on weekly basis; and
- The ESA must immediately consult with the SE and ECO should any non-compliances meriting a 'stop-work' instruction be observed.

3.6 Environmental Authority – National Department of Environmental Affairs

The National Department of Environmental Affairs (DEA) is the competent authority responsible for issuing the EA and compliance with the conditions of authorisation contained in the EA and relevant environmental legislation. Its responsibilities include amongst others:

- Overall enforcement of the EA and its conditions of authorisation;
- Review the EMPr and any required updates or revisions;
- May undertake compliance inspection site visits;
- Review ECO and audit reports;
- Review incident reports; and
- Enforce the applicable legal mechanisms should any contraventions of the EMPr or EA occur.

3.7 Working Area

The land and any other place on, under, over, in or through which the works are to be executed or carried out, and any other land or place made available by the developer in connection with the works. The Working Area shall include the site office, construction camp, stockpiles, batching areas, the construction area, all access routes and any additional areas to which the Engineer permits access. The construction footprint must be kept to a minimum.

The site needs to be clearly and appropriately demarcated and all no-go areas must be clearly identified with appropriate signage. The ECO must brief contractor staff regarding the requirements of no-go areas.

All works must be kept within the footprint of the site as far as practically possible. Areas disturbed outside of the site footprint must be rehabilitated through consultation with the ECO.

All areas outside of the approved development footprint are considered sensitive.

4 ENVIRONMENTAL IMPACTS AND SPECIALIST MITIGATIONS

During the environmental impact's assessment process, a number of impacts were identified, assessed and mitigatory measures proposed where impacts were found to be unacceptable. The outcome, and intent, of the impact management recommendations i.e. mitigation measures, is to reduce the level of an impact on the environment to acceptable levels. The preferred method would be to avoid impacts; however, this is not always possible.

Provided below is a short summary of the impacts that were assessed by the appointed specialists and their recommended mitigation measures.

4.1 Agriculture

The proposed PV South facility and grid connection infrastructure is likely to have potential direct and indirect impacts on agricultural potential. These are likely to include *inter alia*:

- Loss of agricultural land use (-) construction, operational and decommissioning
- Soil degradation (-) (construction, operational and decommissioning)
- Increased financial security for farming operations (+) operational

Overhead transmission lines have no agricultural impact because all agricultural activities that are viable in this environment (grazing) can continue completely unhindered underneath transmission lines. The only possible source of impact is minimal disturbance to the land during construction and decommissioning. This single agricultural impact is therefore a direct, negative impact that applies to two of the phases of the development (construction and decommissioning)

- Minimal soil and land degradation (erosion and topsoil loss) as a result of land disturbance (-)

4.1.1 Loss of agricultural land use: PV facility

Construction phase

- Implement an effective system of storm water run-off control, where it is required - that is at any points where run-off water might accumulate. The system must effectively collect and safely disseminate any run-off water from all hardened surfaces, and it must prevent any potential down slope erosion.
- If an activity will mechanically disturb the soil below surface in any way, then any available topsoil should first be stripped from the entire surface to be disturbed and stockpiled for re-spreading during rehabilitation. During rehabilitation, the stockpiled topsoil must be evenly spread over the entire disturbed surface.

Operational phase

- Maintain the storm water run-off control system. Monitor erosion and remedy the storm water control system in the event of any erosion occurring.

Decommissioning

- Implement an effective system of storm water run-off control, where it is required - that is at any points where run-off water might accumulate. The system must effectively collect and safely disseminate any run-off water from all hardened surfaces, and it must prevent any potential down slope erosion.
- Maintain where possible all vegetation cover and facilitate re-vegetation of denuded areas throughout the site, to stabilize disturbed soil against erosion.

If an activity will mechanically disturb the soil below surface in any way, then any available topsoil should first be stripped from the entire surface to be disturbed and stockpiled for re-spreading during rehabilitation. During rehabilitation, the stockpiled topsoil must be evenly spread over the entire disturbed surface.

4.1.2 Soil degradation: PV Facility

Construction phase

- Maintain where possible all vegetation cover and facilitate re-vegetation of denuded areas throughout the site, to stabilize disturbed soil against erosion.
- If an activity will mechanically disturb the soil below surface in any way, then any available topsoil should first be stripped from the entire surface to be disturbed and stockpiled for re-spreading during rehabilitation. During rehabilitation, the stockpiled topsoil must be evenly spread over the entire disturbed surface.

Operational phase

- Maintain the storm water run-off control system. Monitor erosion and remedy the storm water control system in the event of any erosion occurring.
- Facilitate re-vegetation of denuded areas throughout the site.

Decommissioning

- Implement an effective system of storm water run-off control, where it is required - that is at any points where run-off water might accumulate. The system must effectively collect and safely disseminate any run-off water from all hardened surfaces, and it must prevent any potential down slope erosion.
- Maintain where possible all vegetation cover and facilitate re-vegetation of denuded areas throughout the site, to stabilize disturbed soil against erosion.

If an activity will mechanically disturb the soil below surface in any way, then any available topsoil should first be stripped from the entire surface to be disturbed and stockpiled for re-spreading during rehabilitation. During rehabilitation, the stockpiled topsoil must be evenly spread over the entire disturbed surface.

4.1.3 Loss of agricultural land use: Grid connection, substation and access routes

Construction phase

- Implement an effective system of storm water run-off control, where it is required - that is at any points where run-off water might accumulate. The system must effectively collect and safely disseminate any run-off water from all hardened surfaces, and it must prevent any potential down slope erosion.
- If an activity will mechanically disturb the soil below surface in any way, then any available topsoil should first be stripped from the entire surface to be disturbed and stockpiled for re-spreading during rehabilitation. During rehabilitation, the stockpiled topsoil must be evenly spread over the entire disturbed surface.

Operational phase

- Maintain the storm water run-off control system. Monitor erosion and remedy the storm water control system in the event of any erosion occurring.

Decommissioning

- Implement an effective system of storm water run-off control, where it is required - that is at any points where run-off water might accumulate. The system must effectively collect and safely disseminate any run-off water from all hardened surfaces, and it must prevent any potential down slope erosion.
- Maintain where possible all vegetation cover and facilitate re-vegetation of denuded areas throughout the site, to stabilize disturbed soil against erosion.

If an activity will mechanically disturb the soil below surface in any way, then any available topsoil should first be stripped from the entire surface to be disturbed and stockpiled for re-spreading during rehabilitation. During rehabilitation, the stockpiled topsoil must be evenly spread over the entire disturbed surface.

4.1.4 Soil degradation: Grid connection, substation and access routes

Construction phase

- Maintain where possible all vegetation cover and facilitate re-vegetation of denuded areas throughout the site, to stabilize disturbed soil against erosion.
- If an activity will mechanically disturb the soil below surface in any way, then any available topsoil should first be stripped from the entire surface to be disturbed and stockpiled for re-spreading during rehabilitation. During rehabilitation, the stockpiled topsoil must be evenly spread over the entire disturbed surface.

Operational phase

- Maintain the storm water run-off control system. Monitor erosion and remedy the storm water control system in the event of any erosion occurring.
- Facilitate re-vegetation of denuded areas throughout the site.

Decommissioning

- Implement an effective system of storm water run-off control, where it is required - that is at any points where run-off water might accumulate. The system must effectively collect and safely disseminate any run-off water from all hardened surfaces, and it must prevent any potential down slope erosion.
- Maintain where possible all vegetation cover and facilitate re-vegetation of denuded areas throughout the site, to stabilize disturbed soil against erosion.

If an activity will mechanically disturb the soil below surface in any way, then any available topsoil should first be stripped from the entire surface to be disturbed and stockpiled for re-spreading during rehabilitation. During rehabilitation, the stockpiled topsoil must be evenly spread over the entire disturbed surface.

4.2 Aquatic Ecology

The proposed PV facility and grid connection infrastructure is likely to have potential direct and indirect impacts on freshwater ecology. These are likely to include *inter alia*:

- Clearance of natural vegetation adjacent to the ephemeral streams and drainage lines during the construction phase (-)
- Maintenance activities during the operational and decommissioning phases (-)
- Potential disturbance of aquatic habitat (-)

4.2.1 Clearance of natural vegetation adjacent to the ephemeral streams and drainage lines

Construction phase

- Smaller streams occur to the west and south-east of the proposed PV area. It is recommended that a buffer of approximately 100m from these streams be allowed for. There are not likely to be any constraints associated with the stream and its buffer to the west of the PV area. However, the stream to the south-east is wide and unconfined. It is recommended that the modules in this area be placed further away from the stream.
- On-site stormwater management to minimise the potential impact of modified stormwater runoff on the adjacent freshwater features;
- Limiting disturbance within freshwater features and buffers: The PV facilities should be moved to ensure that they are located outside of the freshwater features and recommended buffers.
- Construction activities should as far as possible be limited to the footprint of the proposed solar energy facilities
- The proposed buffers adjacent to the delineated freshwater features as indicated in the previous section should be adhered to.
- Rehabilitation of the cleared areas and control of alien vegetation growth within the site
- All materials on the construction sites should be properly stored and contained. Disposal of waste from the sites should also be properly managed.

- Construction workers should be given ablution facilities at the construction sites that are located at least 100m away from the drainage lines/ephemeral streams and regularly serviced. These
- Due to the wide and unconfined nature of the stream to the north of the site, it is recommended that a buffer of approximately 175m from top of bank of the stream, (narrowing down to about 100m in the downstream extent at the site where the watercourse becomes less significant) be allowed for as a development setback (green polygons as per the Specialist Report). This riparian buffer zone of the stream contains a number of Shepherd trees, particularly on the stream's northern bank, that should also preferably remain. Some modules may need to be moved slightly to accommodate the recommended buffer.
- The smaller stream to the east of the PV site is much smaller in extent and a buffer of approximately 100m is recommended from the stream. The proposed access road and the powerline for PV South occur within this buffer and should be slightly realigned.
- Provided the PV facility is located outside of the freshwater features and recommended buffers, the technology alternatives would have limited potential freshwater impact. It is recommended that 1 in 50 year and 1 in 100 floodlines be determined for the site to ensure that the proposed infrastructure is located outside of these flood risk areas.
- No footprint impacts may occur on sensitive habitats and/or threatened species (especially also not range restricted species).

4.2.2 Maintenance

Operational and Decommissioning phase

- Operational activities should as far as possible be limited to the delineated site for the proposed development and the identified access routes.
- Invasive alien plant growth should be monitored on an ongoing basis to ensure that these disturbed areas do not become infested with invasive alien plants. Should any erosion features develop they should be stabilised.

4.2.3 Potential disturbance of aquatic habitat

Construction phase

- The Veld PV South powerline routes should be realigned to remain outside of the buffers. The pylons for the Aggenys transmission line should be placed at least 30m outside of the delineated stream channels.
- Where the access route for transmission lines needs to be constructed through the drainage channels, disturbance of the channels should be limited. These areas should be rehabilitated after construction is complete and the areas monitored for growth of invasive alien plants.
- Existing road infrastructure should be utilized as far as possible to minimize the overall disturbance created by the proposed project. Where crossings associated with the access routes need to be constructed through ephemeral streams, disturbance of the channel should be limited.
- All crossings over drainage channels or stream beds should be such that the flow within the drainage channel is not impeded. Road infrastructure and transmission lines should coincide as much as possible to minimize the road network and impact of these activities.
- Any disturbed areas should be rehabilitated to ensure that these areas do not become subject to erosion or invasive alien plant growth.
- No footprint impacts within the washes / drainage lines should occur.

Operational phase

- All crossings over drainage channels or stream beds after the construction phase should be rehabilitated and maintained such that the flow within the drainage channel is not impeded. Maintenance of

transmission lines should only take place via the designated access routes. Invasive alien plant growth should be controlled within the site.

- Maintenance of infrastructure related to the project should only take place via the designated access routes. Disturbed areas along the access routes should be monitored to ensure that these areas do not become subject to erosion or invasive alien plant growth.

4.3 Avifauna

The proposed PV facility and grid connection infrastructure is likely to have potential direct and indirect impacts on avifauna. These are likely to include *inter alia*:

- Displacement due to disturbance and habitat transformation associated with the construction of the solar PV plant and associated infrastructure (-)
- Collisions with the solar panels (-)
- Entrapment in perimeter fences (-) and
- Collisions with the associated power lines resulting in mortality (-)

4.3.1 Displacement due to disturbance and habitat transformation associated with the construction and operation phases of the solar PV plant and associated infrastructure

Construction

- Construction and decommissioning activity should be restricted to the immediate footprint of the infrastructure.
- Measures to control noise should be applied according to current best practice in the industry.
- Maximum use should be made of existing access roads and the construction of new roads should be kept to a minimum.
- Bird injuries and mortalities to be monitored.
- No footprint impacts may occur on sensitive habitats and/or threatened species (especially also not range restricted species).

Applicable to both the construction and operational phase:

The recommendations of the ecological and botanical specialist studies must be strictly implemented, especially as far as limitation of the construction footprint and rehabilitation of disturbed areas is concerned.

4.3.2 Collisions with solar panels

Construction

- Construction and decommissioning activity should be restricted to the immediate footprint of the infrastructure.
- Measures to control noise should be applied according to current best practice in the industry.
- Maximum use should be made of existing access roads and the construction of new roads should be kept to a minimum.
- Bird injuries and mortalities to be monitored.

Applicable to both the construction and operational phase:

The recommendations of the ecological and botanical specialist studies must be strictly implemented, especially as far as limitation of the construction footprint and rehabilitation of disturbed areas is concerned.

4.3.3 Displacement due to disturbance and habitat transformation associated with the construction phase of the grid connection and substation

Construction

- Construction activity should be restricted to the immediate footprint of the infrastructure.
- Access to the remainder of the site should be strictly controlled to prevent unnecessary disturbance to the avifauna.
- Measures to control noise should be applied according to current best practice in the industry.
- Maximum use should be made of existing access roads and the construction of new roads should be kept to a minimum.
- A walk through must be conducted with an avifaunal specialist to assess whether there are any Red Data species and/or large raptors breeding in the vicinity of the powerline which could be displaced. Should this be the case the appropriate measures must be put in place to prevent the displacement of the breeding birds, through the timing of construction.
- Bird injuries and mortalities to be monitored.
- No footprint impacts may occur on sensitive habitats and/or threatened species (especially also not range restricted species).

4.3.4 Mortality due to electrocution

Construction

- The final pole design must be signed off by the bird specialist to ensure that there no electrocution risk is present for the priority species.
- With regards to the infrastructure within the substation yard the hardware is too complex to warrant any mitigation for electrocution at this stage. It is rather recommended that if any impacts are recorded once operational, site specific mitigations are applied reactively.
- Bird injuries and mortalities to be monitored.
- No footprint impacts may occur on sensitive habitats and/or threatened species (especially also not range restricted species).

4.3.5 Collisions of priority species with the earthwire of the proposed grid connection

Construction

- A walk through must be conducted once the final pole positions have been pegged to demarcate the sections requiring marking with Bird Flight Diverters.
- Bird injuries and mortalities to be monitored.

4.4 Botany

4.4.1 Removal of Bushmanland Arid Grassland vegetation and minimal Bushmanland Sandy Grassland (PV)

Construction and operational phase

- Search and rescue of *Hoodia gordonii*

- Care should be taken during the construction and operational phases to not introduce this invasive species into the PV area.
- No footprint impacts may occur on sensitive habitats and/or threatened species (especially also not range restricted species).
-

4.5 Heritage Archaeology and Palaeontology

4.5.1 Destruction or damage to archaeological materials and unmarked graves

Construction

- The final layout must be examined by an archaeologist and any potentially sensitive areas must be checked on site prior to construction (applies mainly to the grid connection).
- If any archaeological material or human burials are uncovered during the course of development, then work in the immediate area should be halted. The find would need to be reported to the heritage authorities and may require inspection by an archaeologist. Such heritage is the property of the state and may require excavation and curation in an approved institution.

4.5.2 Destruction or damage to palaeontological materials

Construction

- Any fossils found during construction must be protected, recorded and reported using the fossil finds procedure.

4.5.3 Impacts to the cultural and natural landscape

Construction and operational phase

- Minimise damage to areas not required during operation.
- Minimise lighting at night.
- Minimise litter and keep site tidy.

4.6 Hydrology

4.6.1 Impact of PV technology alternatives in reference to erosion

Construction

- Mitigation measures should as far as possible minimum natural hydrology.
- Use of non-structural techniques

4.6.2 Impact of location alternatives in reference to flow and erosion

Construction

- Mitigation measures should as far as possible minim natural hydrology.
- Use of non-structural techniques

4.6.3 Increased runoff and erosion (roads)

Construction

- The gravel roads should have a crowned driving surface and a shoulder area that slopes directly away from the edge of the driving surface.
- Drifts should be used at watercourse crossing
- The drift should be designed so that the road surface follows the natural ground level, minimising the reduction in the cross- sectional area of the channel at the drift.

4.6.4 Localized erosion (powerline)

Construction

- Pylons should be place outside of watercourses

4.7 Social economic aspects

The proposed PV facility and grid connection infrastructure is likely to have potential direct and indirect impacts on the social environment. These are likely to include *inter alia*:

- Impact on production and gross domestic product (Construction, Operation) (+)
- Impact on employment and skills development (Construction, Operation) (-)
- Impact on household income (Construction, Operation) (-)
- Impact on government revenue (Construction, Operation (-)
- Impact on in-migration (Construction) (-)
- Impact on basic services, social and economic infrastructure (Construction)
- Impact of Investment in Local Communities and Economic Development Projects as Part of the Social Economic Development and Enterprise Development Plan (Operation) (-)
- Impact on supply of electricity (Operation)

4.7.1 Impact on production and gross domestic product

Construction phase:

- Establish a local skills desk in the study area to determine the potential skills that could be sourced in the area.
- Recruit local labour as far as feasible.
- Sub-contract to local construction companies where possible.
- Knowledge sharing and on-the-job- training should be viewed as a prerequisite, where feasible, for all service contractors/service providers working on the development and employing local labour.

Operational phase

- Where possible, local labour should be considered for employment to increase the positive impact of the local economy.
- If possible, goods and services should be procured from local small businesses, this will stimulate indirect job creation.

4.7.2 Impact on employment and skills development

Construction phase:

- Establish a local skills desk in the study area to determine the potential skills that could be sourced in the area.
- Recruit local labour as far as feasible.
- Sub-contract to local construction companies where possible.

- Knowledge sharing and on-the-job- training should be viewed as a prerequisite, where feasible, for all service contractors/service providers working on the development and employing local labour.

Operational phase

- Where possible, local labour should be considered for employment to increase the positive impact of the local economy.
- If possible, goods and services should be procured from local small businesses, this will stimulate indirect job creation.

4.7.3 Impact on household income

Construction phase:

- Recruit local labour as far as feasible.
- Sub-contract to local construction companies where possible.
- Use local suppliers where feasible for goods and services

Operational phase

- Where possible, the local labour supply should be considered for employment opportunities to increase the positive impact on the area's economy
- When feasible local procurement of goods and services should be implemented to further increase the benefit of local communities.

4.7.4 Impact on in-migration

Construction phase:

- Set up a recruitment office in the nearby towns and adhere to strict labour recruitment practices that would reduce the desire of potential job seekers to loiter around the properties in hope to find temporary employment.
- Employ locals as far as feasible through the creation of the local skills database and recruitment of suitable candidates.
- Control the movement of workers between the site and areas of residence to minimise loitering around the proposed facility by providing scheduled transportation services between the urban areas and the construction site.
- Engage communities with respect to their possible involvement during construction in providing supporting services such as catering, temporary housing of workers, transportation, etc.
- Establish a proper fencing around the property to reduce the desire of workers to trespass between the construction site and adjacent properties.
- Set up a gate and controlled access system to monitor the movement of people to and from the property, as well as to reduce the influx of job seekers to the site itself.
- Ensure that any damages or losses to the nearby farms that can be linked to the conduct of the construction workers are adequately reimbursed.
- Assign a person to deal with complaints and concerns of the affected parties.

4.8 Visual Landscape

The proposed PV facility and grid connection infrastructure is likely to have potential direct and indirect impacts on the visual landscape. These are likely to include *inter alia*:

- Lights at night (Construction, Operation) (-)
- Windblown dust (Construction, Operation) (-)
- Landscape degradation (Construction, Operation) (-)
- Visual intrusion (Construction, Operation) (-)

4.8.1 Lights at night (PV)

Construction and operational phase

- For both the construction and operational phase generic light mitigations which limit the intensity and direction of lights at night spillage to the surrounding areas.

4.8.2 Windblown dust (PV)

Construction and operational phase

- Windblown dust suppression practice for both construction and operational phases.

4.8.3 Landscape Degradation (PV)

Construction

- The dune area that extends into the south-western portion of the project area should be retained and the development footprint amended to exclude this area from the development footprint.

4.8.4 Visual intrusion (PV)

Construction

- Restrict height of PV structure to 5m above ground level for both construction and operational phases.

4.8.5 Landscape Degradation (road)

Construction phase

- Retain existing alignment as much as possible and exclude any impacts to dunes.

Operational phase

- Continued maintenance of the road with ongoing water suppression.

4.8.6 Visual intrusion (road)

Construction phase

- Tar portions of the road that are adjacent to two farm settlements. Re-route road so as to not require loss of structures and follow existing road to reduce impact.

Operational phase

- Tar portions of the road that are adjacent to two farm settlements.
- Re-route road so as to not require loss of structures and follow existing road to reduce impact.

4.8.7 Visual intrusion and landscape degradation (powerline)

Construction phase

- Utilisation of existing 132 kV access route.

Operational phase

- Erosion maintenance.

4.9 PV Heat Island and monitoring

Monitoring

- PV heat island monitoring must take place to determine the extent of the heat island generated and associated climate / wind pattern impacts (e.g. twirl wind incidence and strength increase or decrease).
- Monitoring of the amphibian and reptile movement on the facility, with specific focus on sexual ratios present (to determine the impact of the PV heat island effect on cold blooded species).
- Monitoring of insects monitoring to determine if the plant attracts more insects and if there is a change in insect composition and movement (e.g. attracting night activities and insect seasonality shifts).

5 CONSTRUCTION PHASE EMPr

The Construction EMPr aims to address mitigation measures pertaining to the construction phase. This section includes General Specifications for the construction. Provided in this section are number of important management practices, full list is included in Appendix D.

General Specifications

The complete General Specifications have been included in Appendix D and include the following:

- Scope
- Normative References
 - Supporting Specifications
- Definitions
- Requirements
 - Material
 - Material handling, use and storage
 - Hazardous substances
 - Shutter oil and curing compound
 - Bitumen
 - Plant
 - Ablution facilities
 - Solid waste management
 - Contaminated water
 - Site structures
 - Noise control
 - Lights
 - Fuel (petrol and diesel) and oil
 - Workshop, equipment maintenance and storage
 - Dust
 - Methods and procedures
 - Environmental awareness training
 - Construction personnel information posters
 - Site clearance
 - Site division
 - Site demarcation
 - "No go" areas
 - Protection of natural features
 - Protection of flora and fauna
 - Protection of archaeological and paleontological remains
 - Access routes/ haul roads
 - Cement and concrete batching
 - Earthworks
 - Pumping
 - Fire control
 - Emergency procedures
 - Community relations
 - Erosion and sedimentation control
 - Aesthetics
 - Recreation
 - Access to site
 - Crane operations
 - Trenching
 - Demolition
 - Drilling and jack hammering
 - Stockpiling
 - Site closure and rehabilitation
 - Temporary re-vegetation of the areas disturbed by construction
 - Temporary site closure
- Compliance with requirements and penalties
 - Compliance
 - Penalties
 - Removal from site and suspension of Works
- Measurement and Payment
 - Basic principles
 - General
 - All requirements of the environmental management specification
 - Work "required by the Specification Data"
 - Billed items
 - Method Statements: Additional work
 - All requirements of the environmental management specification.

5.1 Establishment of Site Camp

The contractor must inform the Engineer of the area he intends to use for the establishment of a site camp and the actions and programme relating to site camp establishment. The following is applicable:

- The site camp must be situated within the proposed laydown area;
- The site camp may not be within 50m of a watercourse unless otherwise approved by the engineer;
- The site camp must be appropriately demarcated/fenced;
- The gate to the site camp must be locked at night and unauthorised persons must not be allowed within the site camp area; q
- Health and safety requirements must be adhered to; and
- Temporary fuel storage within the site camp must be in a demarcated and bunded area to minimise spillage and the area must be appropriately lined with an impermeable material.

5.2 No-Go Areas

All works to be undertaken shall be within the boundary of the site. A 'no go' area shall extend on either side of the working area i.e. all areas outside of the defined working area and designated access roads. The working area shall be demarcated in an appropriate manner determined by the Engineer.

No go areas shall be appropriately demarcated e.g. with fencing consisting of wooden or metal posts at 3 m centres with 1 plain wire strand tensioned horizontally at 900 mm from ground level. Commercially available danger tape shall be wrapped around the wire strand. The Contractor shall maintain the fence for the duration of construction and ensure that the danger tape does not become dislodged. The SE and ECO must be consulted to confirm the acceptability of the proposed no-go demarcation method.

5.3 Vegetation Clearance

The following mitigations and recommendations pertain to vegetation clearance activities associated with the proposed development (to be read in conjunction with the botanical specialist's specific proposed mitigation and management measures):

- Disturbances to any adjacent indigenous vegetation or habitat must be avoided and activities such as trampling, damage or collection of plants, other than for the purpose of plant rescue, are to be prohibited;
- Clearance activities should be restricted to the immediate footprint of the infrastructure and must be clearly demarcated;
- Maintain vegetation cover where possible and facilitate re-vegetation of cleared areas throughout the site;
- Where possible vegetation must ideally be trimmed, and the soil/grass layer be left intact (i.e. not disturbing the soil);
- As far as practically possible, the site must be cleared in sections as required for construction and not all at once;
- Areas to be cleared must have topsoil removed first which should be set aside and used for covering disturbed areas during rehabilitation activities;
- Any protected plant or tree species to be removed must be restricted to individuals falling directly within the development footprint; and
- The recommendations of the botanical specialist must be strictly implemented, especially as far as limitation of the footprint and clearance of vegetation is concerned.

5.4 Erosion Management

Excessive erosion can lead to land degradation and can impact the immediate, but also the downstream environment. Considering the fairly flat nature of the site erosion management is likely to be minimal, however signs of erosion must be monitored at all times. Erosion control measures must be informed by the ESA and ECO. Following the construction phase erosion management/monitoring must continue into the operational phase.

5.4.1 Soil Erosion Monitoring

Soil erosion shall be monitored visually by the appointed ESA and ECO:

- A photographic record of the on-site conditions shall be kept to aid in the identification of erosion problems; and
- Signs of erosion shall be remediated as soon as possible. Typical remediation techniques are provided below.

5.4.2 Soil Erosion Mitigatory Measures

The ESA and ECO shall monitor the site for signs of erosion and propose mitigatory measures to the Contractor where required.

- Clearing activities shall be kept to the demarcated work area and must only be undertaken during agreed working times, as well as permitted weather conditions. If heavy rains are expected clearing activities shall ideally be put on hold. In this regard, the contractor must be aware of weather forecasts;
- If clearing is to occur during the rainy season, measures are to be taken to reduce surface water channelling across any exposed soils;
- Unnecessary removal of vegetation shall not be allowed. Steep slopes in particular need to be monitored for erosion and should erosion occur, or the area is very likely to be susceptible to erosion, the slope or embankment must be armoured with a fascine³ like structure;
- Topsoil must be stripped (nominally 150-200mm) and stored to be used during rehabilitation. Topsoil stripping must ideally take place in a phased approach to minimise the soil's exposure time to the elements, however this is not always practical. Topsoil stockpile erosion must be monitored by the ESA and ECO;
- Only access roads specifically identified for operation may be used and these are to be properly maintained to reduce erosion. Additional access roads must not be created without prior permission from the Engineer and input from the ECO;
- Considering the proximity of watercourses to the proposed development, care must be taken to clearly identify these as no-go areas and staff or machinery must not be allowed inside these areas;
- Typical erosion control measures such as the installation of silt fences, hay bales, brush packing, EcoLogs™ and Bio Jute™ or similar are recommended if erosion problems are noted during construction and operation phases – consult the ECO; and
- Public open space areas and any areas disturbed outside of the development footprint must be stabilised and protected against erosion. This can be done using the measures above or by seeding the area with a fast-growing perennial indigenous grass species – consult the ECO.

³ A fascine structure usually consists of natural wood material and is used for the strengthening earthen structures or embankments

5.5 Animal Rescue and Protection

Animals (incl. snakes, tortoises and lizards) must be removed from the site should they be directly threatened by the vegetation clearance or construction activities. The ESA or ECO must be contacted for assistance in this regard. Snake handling must be done by an appropriately trained individual.

Excavations and trenches must be inspected daily (first thing in the morning) to check whether any animals have been trapped. Any trapped animals must be removed and relocated to a safe location outside of the development footprint.

In terms of fencing and movement of fauna, the following must be implemented:

- Small ground level openings, 20-30 cm in height, should be kept clear in electrical fencing, at least at strategic places, to facilitate the movement of small mammals and reptiles to move through the site;
- Fencing (e.g. palisade) must provide appropriate opening for animals to pass through – bars placed 20cm apart should provide sufficient space for the movement of small animals whilst deterring humans;
- If not electrified, the bottom wire of perimeter fence must be at least 15cm from the ground, 20cm if electrified (tortoises retreat into shell when shocked);

5.6 Material Handling, Use and Storage

The Engineer shall be advised of the areas that the Contractor intends to use for the stockpiling of both natural and manufactured materials. No stockpiling shall occur outside of the working or laydown area (as designated by the engineer) and without the Engineer's / ECO's prior approval of the proposed stockpiling areas. Imported material shall be free of litter, contaminants and / or exotic plant seed.

The Contractor shall ensure that material is not stockpiled along the border of any water body (permanent or seasonal), including pans, or within close proximity to no-go areas. Location and treatment of material stockpiles shall take consideration of prevailing wind directions. Dust suppression measures shall be used particularly during dry periods.

5.7 Hazardous Substances

Procedures detailed in the Materials Safety Data Sheets (MSDS) shall be followed in the event of an emergency situation.

Potentially hazardous substances shall be stored, handled and disposed of as prescribed by the Engineer. An effective monitoring system to detect any leakage or spillage of all hazardous substances during their transportation, handling, use and storage shall be compiled and implemented. This shall include precautionary measures to limit the possibility of oil and other toxic liquids from entering the soil or storm water systems.

- Hazardous wastes e.g. mixed cement shall only be disposed at landfill sites registered for hazardous wastes.
- All hazardous waste materials must be carefully stored as advised by the ECO, and then disposed of at a licensed landfill site.
- All necessary precaution measures shall be taken to prevent soil or surface water pollution from hazardous materials used during construction.
- No hazardous waste may be buried or burned under any circumstances.
- The contractor must ensure that the employees are informed on how to responsibly dispose of any containers containing hazardous substances.
- All major spills of any materials, chemicals, fuels or other potentially hazardous or pollutant substances must be cleaned immediately, and the cause of the spill investigated.
- Spill kits must be available on site.
- Shutter oil and curing compound shall be stored and dispensed within a bunded area, and not located closer than 50m from river banks / water courses / drainage lines.

- Appoint appropriate contractors to remove any residue from spillages from site. Handling, storage and disposal of excess or containers of potentially hazardous materials shall be in accordance with the requirements of pertinent Regulations and Acts (e.g. Hazardous Substances Act, Number 15 of 1973; National Water Act, Number 36 of 1998).

5.8 Ablution Facilities

A sufficient number of chemical toilets shall be provided by the Contractor in the construction camp area and at appropriate locations approved by the Engineer. Temporary / portable toilets shall not be located within 50m from the top of the river banks / water courses / drainage lines. The ratio of ablution facilities for workers shall not be less than that required by the Health and Safety Act (OHSA) and relevant construction Regulations. All temporary / portable toilets shall be secured to the ground to prevent them from toppling due to wind or any other cause.

Site staff shall not be permitted to use any stream, river, other open water body or natural water source adjacent to or within the designated site for the purposes of bathing, washing of clothing or as ablution facilities.

5.9 Solid Waste Management

Solid non-hazardous waste and litter shall be disposed of into scavenger- and weatherproof bins (with a lid / cover) that are secured from blowing over. The bins must be placed at strategic locations and emptied daily if not located in the site camp.

The Contractor shall remove the refuse collected from the working areas from site at least once per week. Refuse must be disposed of at a registered landfill site and disposal certificates kept on file. The Contractor shall make provision for workers to pick up solid waste from the site on a daily basis. Burying or burning of solid waste is prohibited on site.

5.10 Contaminated Water

The Contractor shall take reasonable measures to prevent the contamination of water and where this is not possible will set up a contaminated water management system, which shall include collection facilities to be used to prevent pollution, as well as suitable methods of disposal of contaminated water. The Contractor shall prevent the discharge of water contaminated with any pollutants, such as soaps, detergent, cements, concrete, lime, chemicals, glues, solvents, paints and fuels, into the environment.

The Contractor shall notify the Engineer immediately of any pollution incidents on Site. The Engineer's approval is required prior to the discharge of contaminated water to the Municipal sewer system.

5.11 Site Structures

No site structures shall be located within 50m from the top of the river banks / water courses / drainage lines.

Ensure the camp is neat and tidy at all times.

5.12 Noise Control

Measures to control noise should be applied according to current best practice in the industry and applicable OHSA regulations.

Construction site yards, workshops, concrete batching plants, and other noisy fixed facilities should be located well away from noise sensitive areas.

All diesel-powered equipment must be regularly maintained and kept at a high level of maintenance. This must particularly include the regular inspection and, if necessary, replacement of intake and exhaust silencers. Any change in the noise emission characteristics of equipment must serve as trigger for withdrawing it for maintenance

With the exception of warning and emergency sirens and public-address systems used during an emergency, no sound is to be broadcast across the site with approval from the Engineer.

5.13 Lighting

Security and perimeter lighting must be shielded so that no light falls outside the area needing to be lit. Unnecessarily tall light poles are to be avoided (lights must be of low-UV emitting kind). All other lighting is to be kept to a minimum, within the requirements of safety and efficiency.

5.14 Fuel (petrol and diesel) and Oil

Fuels in the form of diesel and petrol shall not be stored within 50m from the top of the river banks / water courses / drainage lines. The fuel storage area shall adorn the appropriate warning signage so as to notify all onlookers of the associated risks and hazards.

Where reasonably practical, equipment shall be refuelled at the fuel storage area. If it is not reasonably practical, then the surface under the refuelling area shall be protected against pollution to the satisfaction of the Engineer and ECO and prior to any refuelling activities. Should a mobile fuel bowser be used, all refuelling shall occur with appropriate measures in place to prevent spillages; these may include the use of drip trays, funnels, non-drip dispensing nozzles, and any other similar device. Regardless of the preventative measures in place, all fuel browsers shall carry a spill-kit that is sufficient in size to contain at least a 200-litre spill at all times.

5.15 Dust Control

The Contractor shall take all reasonable measures to minimise the generation of dust as a result of construction activities to the satisfaction of the Engineer. The most successful measure would be to limited vegetation clearance as far as possible to maintain the natural crust on the soil and allow the vegetation to keep the soil intact. The Contractor's dust management planning should, as a minimum, take cognisance of the mechanisms that can be used for dust management:

- Sprays to be applied at the area to be cleared should significant amounts of dust be generated. Moist or bound topsoil will reduce the potential for dust generation when tipped onto stockpiles. Potable water should not be used to moisten access roads;
- Chemical soil binding agents must be utilised on gravel roads to reduce dust if deemed required by the engineer (this also serves to reduce water consumption);
- Ensure travel distance between clearing area and topsoil piles to be at a minimum;
- Ensure exposed areas remain moist or bound through regular spraying during dry, windy periods;
- Location and treatment of material stockpiles taking into consideration prevailing wind directions. Stockpiles must ideally be covered;
- Dust fallout monitoring buckets must be considered should excessive levels of dust occur;
- Cover disturbed areas with previously collected topsoil and replant native species;
- Measures to control dust should be applied according to current best practice in the industry;
- Minimise the time that stripped areas are exposed;
- Haulage vehicles may not leave the access roads or dedicated turning circles, as this may cause excessive dust generation;
- Adhere to a 40km/h speed limit when travelling on gravel roads and 20km/h when traversing cleared/non-vegetated areas;
- Material loads must be covered properly during transport and storage thereof (using 60% shade cloth netting); and

- The Engineer shall be advised of the areas that the Contractor intends to use for the stockpiling of both natural and manufactured materials.

The ECO must continually monitor dust at the site and recommend mitigation measure where and when required.

5.16 Concrete Batching

Where applicable, the location of the batching area (including the location of cement stores, sand and aggregate stockpiles) shall be as approved by the Engineer. The concrete/cement batching area shall be kept neat and clean at all times. Concrete batching may not be within 50m of a watercourse. Spilled and dried concrete within the batching area must be disposed of at an appropriate facility.

No batching activities shall occur directly on unprotected ground and the area must be bunded and lined with an impermeable lining such as concrete or 250 µm plastic sheet. If small satellite batching is required it must be carried out on batch plates.

Empty cement bags shall be stored in weatherproof containers to prevent windblown cement dust and water contamination and be disposed of at a regular basis.

Where “readymix” concrete is used, the Contractor shall ensure that the delivery vehicles do not wash their chutes directly onto the ground. Any spillage resulting from the “readymix” delivery shall be immediately cleared and disposed of via the solid waste management system. “Readymix” trucks shall not be permitted to dump drum wash on site unless into a contaminated water pond which must be fully rehabilitated at completion and the sediment collected for disposal.

5.17 Site Closure and Rehabilitation

All construction debris found within the disturbed areas shall be removed and disposed of at a registered landfill site. No remaining rubble shall be buried on site. The site shall be free of litter, and surfaces are to be checked and cleared of waste products resulting from activities such as concrete batching or pouring.

All works must remain within the demarcated work area however, it is likely that there will be a measure of disturbance around the boundary of the where rehabilitation must be implemented.

Any areas that the Engineer believes may have been impacted upon or disturbed, shall be rehabilitated to the satisfaction of the Engineer and ECO, which includes all areas where top-material has been stripped or compacted. The area to be rehabilitated shall first be landscaped to match the topography of the surrounding area as it was prior to construction. The composition of vegetation to be used for any rehabilitation shall be recommended by the ECO. Only indigenous species may be used in rehabilitation and cognisance must be taken of the final use of the site and the most appropriate plants for rehabilitation.

5.18 Labour Requirements

A local-first employment policy shall be developed together with a training programme. Furthermore, recruitment shall be based on sound labour practices and with gender equality in mind.

Worker employment must be in line and adhere to the Municipality’s specific requirements pertaining to this.

5.19 Temporary Site Closure

If the site is closed for a period exceeding one week, the contractor, in consultation with the Engineer and ECO, must be guided by the checklist procedure:

- Hazardous materials stores
 - Outlet secured/locked
 - Bund empty (where applicable)

- Fire extinguishers serviced and accessible
- Secure area from accidental damage e.g. vehicle collision
- Emergency and contact details displayed
- Adequate ventilation
- Safety
 - All trenches and manholes secured
 - Fencing and barriers are in place and secure
 - Emergency and management contact details displayed
 - Stockpiles are secured
- Erosion
 - Wind and dust mitigation in place
 - Slopes and stockpiles are stable and at acceptable slope
- Water contamination and pollution
 - Cement/bitumen and materials stores secured
 - Toilets empty and secured
 - Refuse bins empty and secured
 - Structures vulnerable to high winds secure

5.20 Non-Compliance and Penalties

Non-compliance with this EMPr must be monitored by the ECO and reported on in monthly ECO Reports. Any non-compliance must be reported to the competent authority.

Penalties/fines must be issued at the discretion of the Engineer as per the penalties agreement between the Engineer and Contractor. The ECO to take up any non-compliance issues that may result in a fine/penalty with the Engineer.

It should however be noted that the nature of the activities associated with the project, even with the best of intentions, will inevitably cause some form of environmental degradation. The costs of having to make good on such environmental degradation is usually sufficient punishment without the need to look to other punitive measures. The implementation of a penalty system therefore requires careful consideration:

- Penalties would typically be warranted by persistent negligence on the part of the Contractor or failure to respond adequately to environmental considerations;
- Removal from site would typically be warranted where a particular staff member or piece of equipment is the cause of persistent environmental damage following previous warnings; and
- Suspension of the Works would only be warranted under rare circumstances where the Contractor's actions have caused or are likely to cause significant environmental degradation.

The type and extent of the corrective measures required to address non-compliance would depend on the nature of the transgression and the Contractor's history in terms of compliance with their environmental obligations. When deciding on the nature of any punitive actions, however, it is important to recognise that the effective implementation of the Construction EMPr is highly dependent on the quality of the working relationships that develop between the key role-players. Accordingly, an excessive response to non-compliance, particularly for a minor or unintentional transgression, may cause significant environmental degradation in the long term due to its effect in eroding the Contractor commitment to meeting their environmental responsibilities. Moreover, other mechanisms, such as an expanded environmental induction programme, may prove more effective than purely punitive measures in controlling non-compliance in the long-term. This is an important consideration that must be borne in mind by the Engineer and the Contractor when responding to non-compliances.

6 OPERATIONAL PHASE EMPr

The operational phase commences when the proposed development is being used for its intended purposes i.e. renewable energy generation. It is possible that there will be a period in the project life cycle where the construction and operational phase will overlap.

The operational specifications detailed in this section must be updated to include any conditions of authorisation contained in the EA relating to the operational phase (if applicable). All conditions of the EA must be adhered to and measures to promote efficient use of resources like water must be put in place as far as possible (e.g. energy efficient lighting and re-use of wash water). Here we provide a general overview of the known operational requirements that has been identified during the environmental process and are also best practice environmental management recommendations during operation.

6.1 PV Panel Maintenance

Clean solar panels from the ground

For safety reasons, it's also wise to clean your panels from the ground if possible. A good quality soft brush and a squeegee with a plastic blade on one side and a cloth covered sponge on the other coupled with a long extension can make for the perfect tools allowing you to stay on the ground.

Optimally time the cleaning of the solar panels

Clean the solar panels on an overcast day, early in the morning or in the evening. If the sun is beating down on the panels, any water used can quickly evaporate and dirt will become smeared.

Early morning can be a particularly good time for cleaning as dew that has settled on the panels overnight will likely have softened grime. That means you'll need to use less water and less energy to clean your solar panels.

Materials and methods for cleaning solar panels

If the panels are dry, before tackling the modules with water, brush off any loose materials first – this will make cleaning easier and faster.

Don't use metal objects or harsh abrasive products for removing caked on materials. Scratching the glass on a solar panel can affect its performance as scratches will cast shadows. Avoid using detergents if possible as these may streak the glass of the panel. Use of abrasive powders also risks scratching the panels.

6.2 Alien Plant Management Plan

Alien vegetation management must be an ongoing practice within the development area as well as the public open space areas. The following is recommendations are applicable:

- Cleared alien plant biomass may not be dumped in open areas and must be disposed of at an appropriate garden refuse dumping site;
- Clearing must be done by hand (e.g. chainsaw, hand saw, hand pulling or slashers) and the topsoil may not be disturbed. No heavy machinery shall be used to clear alien plants;
- The stumps are to be treated with the appropriate herbicide to prevent re-growth and coppicing;
- Clearing activities must not result in the further spread of alien plants through spreading seeds at new locations;
- Suitably qualified personnel e.g. chainsaw operators and herbicide use must be used; and
- An on-going alien plant management plan must ideally be developed for the long-term management of alien plants at the facility. The 'Working for Water framework for Invasive Species Control Plans' must be consulted and the control plan need to comply with the requirements of the National Environmental Management: Biodiversity Act (NEMBA).

- Invasive alien plant growth should be monitored on an ongoing basis to ensure that these disturbed areas do not become infested with invasive alien plants. Should any erosion features develop they should be stabilised.

6.3 Erosion Control

The areas surrounding the sites, particularly the watercourses must be monitored for signs of erosion and remedial actions implemented where required. The erosion management specifications described under the construction phase EMPr must be implemented where applicable.

6.4 Waste Management

The incorrect management of solid waste can result in the pollution of soil, groundwater and the general the environment. Windblown litter can contribute to negative visual impacts and if consumed by grazing animals could result in fatality. The following waste management practices must be implemented during the operational phase:

- Provide adequate scavenger proof waste bins at facility buildings;
- Set up a system for regular waste removal from approved facility – preferably weekly;
- All solid and liquid waste must be removed from the operational areas and not discarded in the natural vegetation/veld;
- Minimise waste by sorting wastes into recyclable and non-recyclable waste types (an independent contractor can be appointed to conduct this recycling if practical);
- No waste may be buried or burned under any circumstances;
- Hazardous waste must be removed from the site by an approved service provider e.g. used oil – certificates of disposal should be maintained on file;
- No hazardous waste may be spoiled at the facility;
- A housekeeping team should be appointed to regularly maintain the litter and rubble situation on the facility; and
- Littering by the employees shall not be allowed under any circumstances.

7 DECOMMISSIONING PHASE

The Veld PV South facility would potentially be decommissioned after 20 - 25 years from the date of commissioning. The possibility of upgrading the proposed facility to more advantageous technologies would be investigated at the end of this period. Should the facility undergo expansion or significant upgrading an environmental process may be required at that time, in accordance with the prevailing legislation at the time.

Should decommissioning be the favourable option, it would potentially take between 6 to 12 months. After disconnecting the PV infrastructure from the network, module components would be removed and recycled / resold as far as possible. The structures would be dismantled, and the concrete foundations would be removed. All underground cables would be excavated and removed. The buildings would be demolished and removed. Where materials and infrastructure are not resold or recycled they would be disposed of at an approved landfill site. Any hazardous substances shall be removed and disposed of in terms of the requirements of the relevant legislation (e.g. Hazardous Substances Act, No. 15 of 1973) and SANS specifications.

The rehabilitation of the disturbed areas would form part of the decommissioning phase and must take cognisance of the future proposed land use of the area. Disturbed areas must be rehabilitated in accordance to the specifications of a suitably qualified rehabilitation specialist. The aim would be to restore the land to its original substratum characteristics (or as near as possible). If the land is to be used for an alternative land use the usefulness of existing infrastructure must be considered i.e. use of control buildings as office or working space or roads. The restoration activities would include the following:

- Removal of all foreign materials and debris;
- Reshaping of the land to conform with natural topography;
- Breaking up compaction (ripping / scarifying) where required and loosening the soil, redistribution of topsoil;
- Re-vegetation of the disturbed areas; and
- Removal of alien vegetation for a period of no less than 1 year, or as otherwise prescribed by a rehabilitation specialist.

Since the PV facility comprises largely of recyclable or reusable materials, the residual risks associated with decommissioning would be minor. Should the need arise to decommission the PV facility, the foundations would need to be demolished and disposed of. Roads which are no longer required after decommissioning should be scarified and the areas rehabilitated with the assistance of a rehabilitation specialist.

A detailed decommissioning plan will be developed approximately 24 months before closure of the facility. The construction phase EMPr could be used as a guideline to facilitate the detailed decommission phase EMPr. Mitigation measures listed below are only provisional mitigation measures:

- All PV structures, associated structures, fencing and cables should be removed, and resold or recycled, as far as possible;
- Building structures should be broken down (including foundations);
- The rubble should be managed according to National Environmental Management Waste Act (No. 59 of 2008) and deposited at a registered landfill if it cannot be recycled or reused;
- All compacted areas should be rehabilitated according to a rehabilitation specialist;
- Monitoring for soil erosion should be undertaken on a bi-annual basis for a year following the completion of closure phase;
- Shape footprint area to reflect natural landscape;
- Wind-blown rubble and dust management needs to be implemented as required;
- Restoration of vegetation on any disturbed areas shall involve the following:
 - Re-vegetate with suitable native grass species (as determined by rehabilitation specialist); and

- Allow low shrubs to colonise naturally amongst the grass.
 - Although time-consuming, this would be the most effective restoration process in the long-term.
- Maintain where possible all vegetation cover and facilitate re-vegetation of denuded areas to stabilise the soil against erosion;
- After cessation of disturbance, re-spread topsoil over the surface and re-vegetate. Any additional overburden (uncontaminated) must be re-spread below the topsoil layer, not mixed with it;
- Dispose of any sub-surface spoils from excavations where they will not impact on agricultural land (for example use as road surfacing), or where they can't be effectively covered with topsoil;
- Control dust as per standard construction site measures;
- Disturbance of any stream channels should be limited to the designated access roads;
- Activities should as far as possible be limited to the delineated site for the proposed development;
- All disturbed areas should be rehabilitated and monitored to ensure that these areas do not become subject to erosion or invasive alien plant growth;
- The rehabilitated area must be monitored as per the specification contained in the rehabilitation plan and must consider amongst others erosion, alien vegetation, re-establishment of indigenous vegetation and indigenous fauna moving back to the site; and
- Implement an effective system of stormwater run-off control where it is required.

8 MONITORING

Environmental monitoring responsibilities for the ECO and ESA are described in Section 3.4 and 3.5. This EMPr must be updated to include any specific monitoring and/or auditing requirements contained in the EA or proposed and agreed upon by the specialists.

8.1 Avifaunal Monitoring

It should be noted that while no eagle nests were recorded in close proximity to Veld PV South the initial site visit, further nests searches will be conducted during the ongoing pre-construction monitoring which commenced in January 2017. In addition, and more importantly, is the length of the high voltage powerline which is significantly longer in the case of the original alternative thereby increasing the risk of collision mortality, which is a further factor in favour of Veld PV South.

9 CONCLUSION

The EMPr must be regarded as a living document and changes must be made to the EMPr as required by project evolution, while retaining the underlying principles and objectives on which the document is based.

The compilation of the EMPr has incorporated impacts and mitigation measures from the Basic Assessment Report and environmental specialist assessments. It also incorporates principles of best practice in terms of environmental management.

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