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# PROPOSED SCUITDRIFT 10MW PV SOLAR ENERGY FACILITY, NORTHERN CAPE

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## ENVIRONMENTAL MANAGEMENT PROGRAMME

October 2016

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## PROJECT DETAILS

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- Title** : Environmental Assessment Process  
Environmental Management Programme: Proposed  
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Cape Province
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- Applicant** : **Scuitdrift Solar Project (Pty) Ltd**
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## **DEFINITIONS AND TERMINOLOGY**

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

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

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

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

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

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

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

**Construction:** Construction means the building, erection or establishment of a facility, structure or infrastructure that is necessary for the undertaking of a listed or specified activity as per Regulations GNR 983, 984 and 985 of December 2014. Construction begins with any activity which requires Environmental Authorisation.

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

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

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

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

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

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

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

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

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

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

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

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

**Environmental Control Officer (ECO):** An individual appointed by the Owner prior to the commencement of any authorised activities, responsible for monitoring, reviewing and

verifying compliance by the EPC Contractor with the environmental specifications of the EMPr and the conditions of the Environmental Authorisation

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

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

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

**Environmental management programme:** A plan that organises and co-ordinates mitigation, rehabilitation and monitoring measures in order to guide the implementation of a project or facility and its ongoing maintenance after implementation.

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

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

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

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

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

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

**Method Statement:** a written submission by the Contractor in response to the environmental specification or a request by the Site Manager, setting out the plant, materials, labour and method the Contractor proposes using to conduct an activity, in such

detail that the Site Manager is able to assess whether the Contractor's proposal is in accordance with the Specifications and/or will produce results in accordance with the Specifications.

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

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

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

**Project development property:** The project development areas considered through the EIA process in defining the area for the PV facility project include, and are defined as follows:

- » **Broader study area:** The broader study area refers to the 45ha of the Farm Skuitdrift 426. The entire 45ha of the project site was subjected to the basic assessment in order to provide the option of identifying more suitable positions for development of the PV facility, should any of the areas be found to be technically or environmentally constrained.
- » **Development footprint:** The development footprint of the proposed PV facility, including associated infrastructure is situated in the south eastern extent of the broader study area, and is ~19ha in extent.

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

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

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

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

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

## ABBREVIATIONS

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

AIA	Archaeological Impact Assessment
BGIS	Biodiversity Geographic Information System
CDSM	Chief Directorate Surveys and Mapping
CEMP	Construction Environmental Management Plan
DBAR	Draft Basic Assessment Report
DEA	Department of Environmental Affairs
DME	Department of Minerals and Energy
EAP	Environmental Impact Practitioner
EHS	Environmental, Health & Safety
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
EMPr	Environmental Management Programme
GPS	Global Positioning System
GWh	Giga Watt hour
HIA	Heritage Impact Assessment
I&APs	Interested and Affected Parties
IDP	Integrated Development Plan
IFC	International Finance Corporation
IPP	Independent Power Producer
KNP	Karoo National Park
KOP	Key Observation Point
kV	Kilo Volt
LAeq,T	Time interval to which an equivalent continuous A-weighted sound level
LLRC	Low Level River Crossing
LUDS	Land Use Decision Support
LUPO	Land Use Planning Ordinance
MW	Mega Watt
NEMA	National Environmental Management Act
NEMAA	National Environmental Management Amendment Act
NEMBA	National Environmental Management: Biodiversity Act
NERSA	National Energy Regulator of South Africa
NHRA	National Heritage Resources Act
NID	Notice of Intent to Develop
NSBA	National Spatial Biodiversity Assessment
NWA	National Water Act
PIA	Paleontological Impact Assessment
PM	Post Meridiem; "Afternoon"
SACAA	South African Civil Aviation Authority
SAHRA	South African National Heritage Resources Agency
SANBI	South Africa National Biodiversity Institute



SANS	South Africa National Standards
SDF	Spatial Development Framework
SMME	Small, Medium and Micro Enterprise
SAPD	South Africa Police Department

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## INTRODUCTION

## CHAPTER 1

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**Scuitdrift Solar Project Pty (Ltd)** (Herein referred to as “The Developer”), is proposing the development of a photovoltaic (PV) solar energy facility on a sub-leased portion of the Farm Skuitdrift 426 in the Northern Cape Province. The proposed project, referred to as the “Scuitdrift Solar Energy Facility”, will have a generating capacity of no more than 10 megawatts (MW). The proposed site is located approximately 50 km north west of Augrabies (refer to **Figure 1**) and falls under the jurisdiction of the Kai!-Garib Local Municipality and within the Siyanda District Municipality in the Northern Cape Province.

The EMPr has been developed on the basis of the findings of the EIA, and must be implemented to protect sensitive on-site and off-site features through controlling construction, operation and decommissioning activities that could have a detrimental effect on the environment, and through avoiding or minimising potential impacts. This EMPr is applicable to all **Scuitdrift Solar Project Pty (Ltd)**, employees and contractors working on the pre-construction, construction, and operation and maintenance phases of this project. The document will be adhered to, updated as relevant throughout the project life cycle. This document fulfils the requirement of the EIA Regulations and forms part of the EIA Report for the project.

## PROJECT DETAILS

## CHAPTER 2

### 2.1 Project Details

**Scuitdrift Solar Project (Pty) Ltd** is proposing the development of a photovoltaic (PV) solar energy facility on portion 0 of Farm Skuitdrift 426 in the Northern Cape Province. A previous basic assessment application was submitted by CAPE EAPrac Consultants in June 2012. The application was issued an environmental authorisation on 10 October 2012 (DEA ref: 14/12/16/3/3/1/359) however the project was not awarded a preferred bidder status and as a result the Environmental Authorisation dated 10 October 2012 lapsed. As such, Savannah Environmental (Pty) Ltd. have been appointed by **Scuitdrift Solar Project (Pty) Ltd** to obtain an environmental authorisation in terms of the EIA Regulations, 2014.

The broader study area (i.e. 45ha) has been considered through a basic assessment process of the EIA process, within which the development footprint for the PV facility (approximately 19ha in extent) has been appropriately located. Based on the specialist studies and limited field survey undertaken during the basic assessment process, sensitivities were identified within the project site which could potentially be impacted on by the development of the Scuitdrift Solar Energy Facility.

The proposed project will have a generating capacity of no more than 10MW. The Northern Cape is generally known to be one of the most preferred areas for the generation of solar energy in South Africa due to the abundant solar radiation. The purpose of this project is to generate electricity from a renewable energy source (i.e. solar radiation) to provide power to the national electricity grid. The proposed development site is located within the Kai!-Garib Municipality district, 50km north west of Augrabies, in the Northern Cape Province (refer to **Figure 1**).

The identified ~19ha development footprint is located on the Farm Skuitdrift 426, totalling an extent of ~9800ha. The area is located directly adjacent to the existing Schuitdrift 132/33kV Eskom substation, which is situated on the same farm. The Scuitdrift Solar Energy Facility is to be developed by **Scuitdrift Solar Project (Pty) Ltd** and will be bid into the Department of Energy (DoE) Renewable Energy Independent Power Producer Procurement Programme.

The identified development footprint will have permanent and temporary infrastructure with an approximate footprint of 2ha, including:

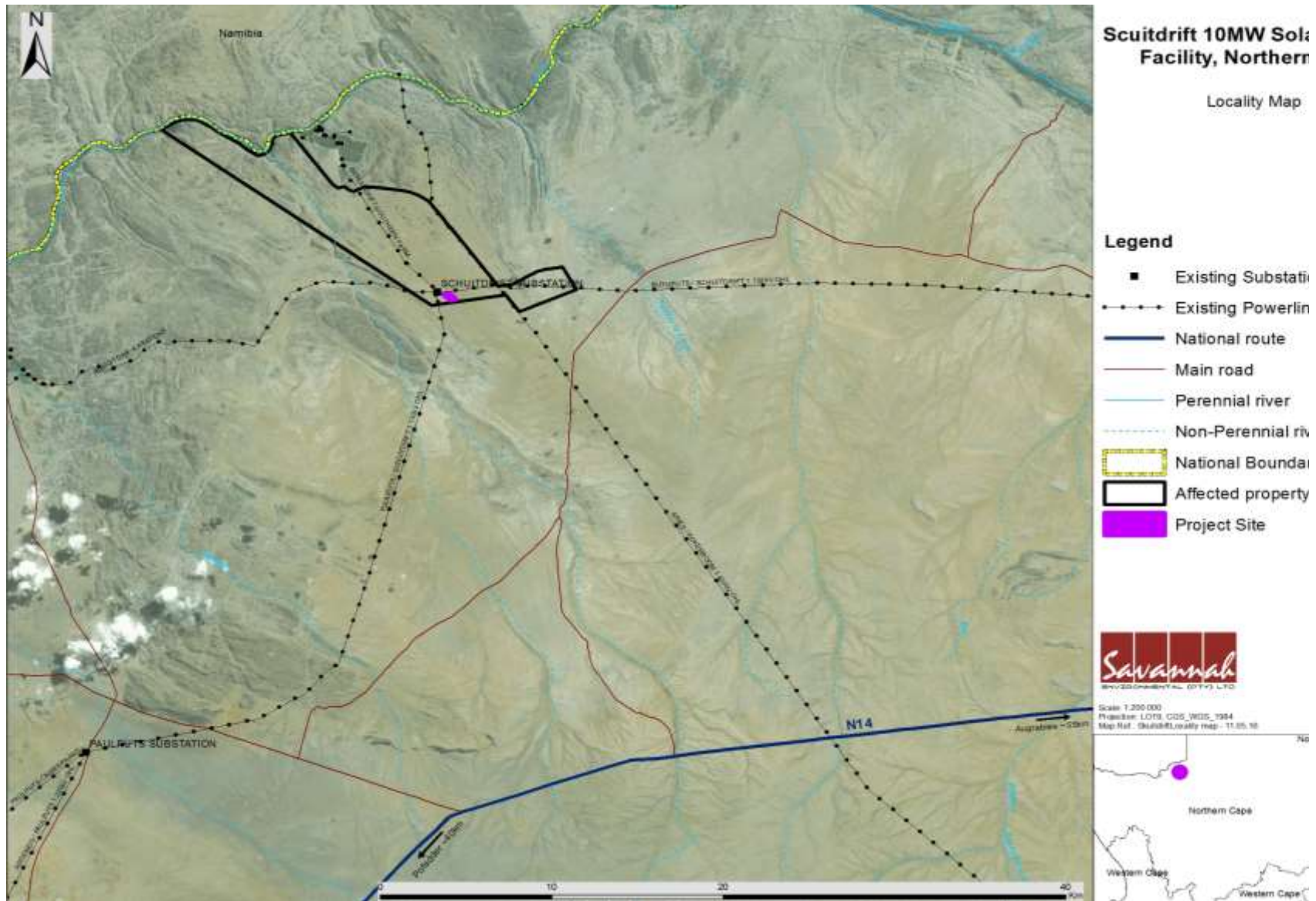
- » A small site office (10m x 10m), and storage facility (20m x 10m), including security and ablution facilities (20m x 20m);
- » A lay-down area;
- » 10kL rain water tanks;
- » Inverter stations (built within transporter containers, 25m<sup>2</sup> in size);

- » A grid connection substation and transformers;
- » A short overhead 33kV power line of ~ 630m;
- » Underground cabling to run the length of the arrays and link the arrays to inverters;
- » The main re-aligned access road;
- » Service roads which will run between the rows of arrays; and
- » Parameter fencing around the solar facility.

Additional auxiliary electrical equipment includes:

- » Diesel generator sets will supply power to security and monitoring systems in the event of a grid failure;
- » Security system, fence and access control;
- » Fire detection system;
- » Weather monitoring equipment (rainfall, wind speed/direction, solar irradiation, air moisture);
- » Plant monitoring equipment and associated telecommunication links; and
- » Air-conditioning equipment inside inverter/transformer enclosures which will regulate the operating temperature of the inverters.

A 150m wide corridor was investigated for the siting of the proposed 33kV power line (refer to **Appendix A2**) to allow for optimisation of the infrastructure layout, including laydown areas, in order to, inter alia, accommodate specialist findings where necessary. The overhead power line will have associated access tracks (approximately 4m in width) for its construction, operation and maintenance where these are required. This infrastructure will fall within this assessed corridor, the final placement of which will depend on local geotechnical, topographical conditions and potential environmental sensitivities.



**Figure 1:** Map indicating the locality of the Scuitdrift Solar Energy Facility. The proposed 19ha project site is indicated in purple.



A summary of the technical specification of the PV Facility is shown below.

<b>Component</b>	<b>Description/ Dimensions</b>
Location of the site	Eskom Sub-leased Portion 0 of Farm Skuitdrift 426
Municipal Jurisdiction	Kai-Garib Local Municipality which falls within the jurisdiction of the ZF Mgcawu District Municipality
Ward number	9
SG Code	C03600000000042600000
Nearest Town	~ 50km north west of Augrabies ~ 75km North East of Pofadder ~ 80km North West of Kakamas
Site Co-ordinates (centre of site)	28°36'51.75"S and 19°46'50.16"E
Installed capacity of the facility	10 MW
Details of the PV infrastructure	Panel dimensions: <u>1.956 x 0.992m (330WP)</u> Final Height of installed panels from the ground: 3 – 4 Height of inverters: 2.5m Height of transformers: 2.5m
Extent of broader study area	~45 ha
Extent of the development footprint	~19 ha
Internal access roads	< 4m wide and will be limited to the construction site only
Site access	Main Eskom access gate at co-ordinates 28°36'28.59"S and 19°48'33.88"E
Services required	<ul style="list-style-type: none"> <li>» Water will be sourced/from 3 Borehole pumps, 10kL Rain water tanks, and via a pipeline from Southern Farms (as an alternative measure should water become scarce).</li> <li>» Refuse material disposal - all refuse material generated from the proposed development will be collected by a contractor and will be disposed of at a licensed waste disposal site off site. This service will be arranged with the municipality and suitable contractors when required.</li> <li>» Sanitation – all sewage waste will be collected by a contractor and will be disposed of at a licensed waste disposal site during the construction phase. This service will be arranged with the municipality when required during the operational phase.</li> </ul>

The PV panels are designed to operate continuously for 25 – 30 years, unattended and with low maintenance.

During the planning phase of the project numerous layouts and technologies were taken into consideration before the preferred proposal was decided upon. Three of the major points which lead to the preferred proposal are:

- » Minimal disturbance to water washes and highly sensitive areas

- » 20 Hectare area limit
- » Minimum distance to the substation

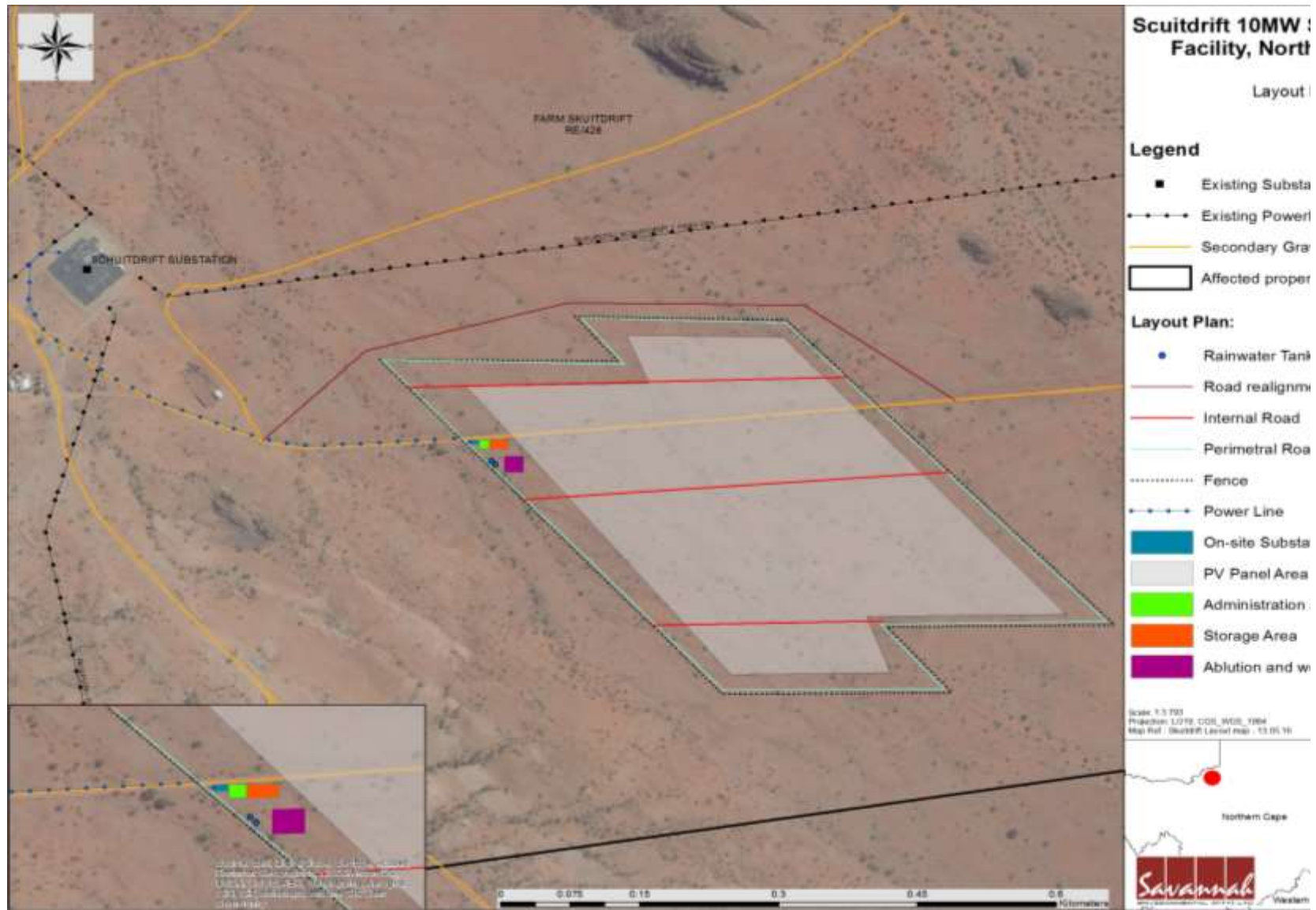
The factor having the single biggest influence on point number one is the mounting technology. The preferred technology allows arrays to be constructed over the wash lines while having a minimal effect on the vegetation mitigating the chances of erosion. The layouts below were done by keeping a 32m buffer around all the washes.

Two alternative locations were initially considered for this report: *Scattered layout Alternative and the Preferred Layout Alternative referred to in the Basic Assessment Report*, however upon further studies it was decided that the scattered layout would not be feasible, thus was not considered further. For the Preferred Layout, the solar arrays will be placed in such a way that it would have the least influence on the washes while keeping clear of the servitudes around the 33/132kV Eskom lines as well as avoiding the ecological boundaries set where practically possible.

The Preferred Layout Alternative has taken a road diversion into account which allows the solar arrays to form a more concentrated area in order to keep the overall footprint as small as possible. If the access road is allowed to pass through between the solar arrays, a substantial buffer would have to be established in order to keep the road safe, and the risk for electrocution to travellers as low as possible. Thus it was concluded that the road will be diverted in order to minimise these impacts.

In terms of the Environmental Impact Assessment (EIA) Regulations published in terms of Section 24(5) of the National Environmental Management Act (NEMA, Act No. 107 of 1998), **Scuitdrift Solar Project (Pty) Ltd.** requires authorisation for the construction of the 10MW solar PV facility, on-site substation, 33kV overhead power line and other associated infrastructure. In terms of Sections 24 and 24D of the National Environmental Management Act (No 107 of 1998), as read with the EIA Regulations of GN R982 – R985, a Basic Assessment process is required to be undertaken in support of the application for authorisation for the proposed project.

The EMPr has been developed on the basis of the findings of the Basic Assessment Report, and must be implemented to protect sensitive on-site and off-site features through controlling preconstruction, construction, operation and decommissioning activities that could have a detrimental effect on the environment, and through avoiding or minimising potential impacts. This EMPr is applicable to all **Scuitdrift Solar Project (Pty) Ltd** employees and contractors working on the pre-construction, construction, and operation and maintenance phases of the proposed 10MW solar PV facility as well as buildings and substation. The document will be adhered to and updated as relevant throughout the project life cycle.



**Figure 2:** Facility layout for the Scuitdrift Solar Energy Facility

## 2.2 Findings of the Basic Assessment Report

This section provides a summary of the environmental assessment and conclusions drawn for the proposed Scuitdrift Solar Energy Facility which will connect the existing on-site Eskom Schuitdrift substation, as well as to the national electricity grid via the existing Eskom 33/132kV power line. In doing so, it draws on the information gathered as part of the Basic Assessment process and the knowledge gained by the environmental consultants during the course of the process, and presents an informed opinion of the environmental impacts associated with the proposed project.

Based on the information contained in the Impact Assessment, it is evident that there are no High Negative Impacts post mitigation which should warrant the project from not proceeding or should warrant further specialist investigation. Furthermore, all impacts associated with the preferred development footprint can be easily mitigated to acceptable standards

**Ecology:** Overall, the site is not viewed as being highly ecologically sensitive, and with standard mitigation measures in place, the risk of significant environmental impact or degradation as a result of the development is very low. The final layout as proposed by the developer takes sufficient cognizance of the site sensitivities and the non-invasive construction approach proposed by the developer is viewed as a positive contributing factor to mitigating potential impacts at the site. As a result, **the project is considered acceptable from an ecological perspective.**

**Hydrology:** The proposed solar project and the associated infrastructure will occupy a total footprint area of 19 ha which amounts to 0.01% of the total quaternary catchment area. Any disturbance or alteration of runoff (if any) from this area will be very small and is considered negligible. The appropriate mitigation/management measures to prevent, and/or minimise the identified potential surface water impacts, should they occur have been provided. With the proposed mitigation and management measures in place, this project is unlikely to pose a insignificant threat to the natural water course and the hydrological features within and around the project area. The proposed development of the 10MW Scuitdrift Solar Energy Facility is **considered to be acceptable from an hydrological perspective.**

**Avifauna:** Recent bird atlas data reveals only 39 avian species recorded in or around development footprint, of which 2 were collision-prone (African Fish-Eagle *Haliaeetus vocifer*, and the *Vulnerable* Verreaux's Eagle *Aquila verreauxii*). However, older bird atlas data indicates two other red-data species are also likely on site: the collision-prone Ludwig's Bustard *Neotis ludwigii* and Sclater's Lark *Spizocorys sclateri*.

Due to the size of the development footprint, the site is likely to be of a low risk to the birds present. If appropriate mitigation measures are followed to minimize any impacts to

threatened species then the preferred development footprint is **considered acceptable from an avifaunal perspective.**

**Heritage, Archaeology and Palaeontology: No archival references** referring to these historic themes, which include the possibility of grave sites/ burial ground on proposed development site and/ or lands directly contiguous to it could be located. There was however a single grave (not older than 60 years) and at least two empty graves were noted just off a narrow track, directly north of the proposed development site, however they are not considered to be of cultural significance, are situated outside the proposed development footprint and would not be affected through the proposed development.

In terms of palaeontology, the overall impact significance of the proposed development on fossil heritage is considered to be very low since most of the study area is underlain by unfossiliferous metamorphic basement rocks (granite-gneisses etc.) or mantled by superficial sediments of low palaeontological sensitivity, and no extensive, deep excavations are unlikely to be undertaken during the project. Lastly, no significant archaeological occurrences were found on the site, however dense scattered quartz pieces were found outside the development site around the nearby ridgeline / koppie which will be demarcated as NO-GO and avoided by the solar installation.

If mitigation measures are implemented, the proposed development footprint **is considered acceptable from a heritage perspective.**

**Agricultural Potential:** Overall, the proposed development footprint does not have any agricultural value and has not for many years been utilized for any extensive agricultural purposes. The site is too small to generate noteworthy financial benefit from agricultural activities. Furthermore, the combination of poor soil quality, water scarcity and distance from the market hinders the possibility of the commercial production of grain, vegetables and horticultural products. Moreover, irrigation on this dry and arid area is excluded due to low availability of water.

The low agricultural potential of the site can be ascribed to a combination of the geology, climate and vegetation. Therefore, the development site is not economically productive, mainly due to the extreme nature of the climate and the low potential of the soil. As a result, **the project is considered acceptable from an ecological perspective.**

**Visual Impacts:** The proposed Scuitdrift Solar Energy Facility as assessed in this Basic Assessment Report is not likely to contribute significantly to the potential visual impacts associated with the authorised Eskom Schuitdrift substation and associated infrastructure. Furthermore, the isolated nature of the development is not a visual intrusion for the day-to-day life of the landowner and his family. Therefore, the potential visual impacts associated with the proposed development are expected to have a **low significance and should not alter/influence the outcome of the project decision-making.**

**Social Impact:** Social impacts are expected during all phases of the development and are expected to be both positive and negative. Impacts are expected to be of medium- low significance for the various issues. Impacts can be minimised or enhanced through the implementation of the recommended management measures. **From a social perspective, the proposed construction of the proposed Scuitdrift Solar Energy Facility is considered acceptable.**

### **Overall conclusion**

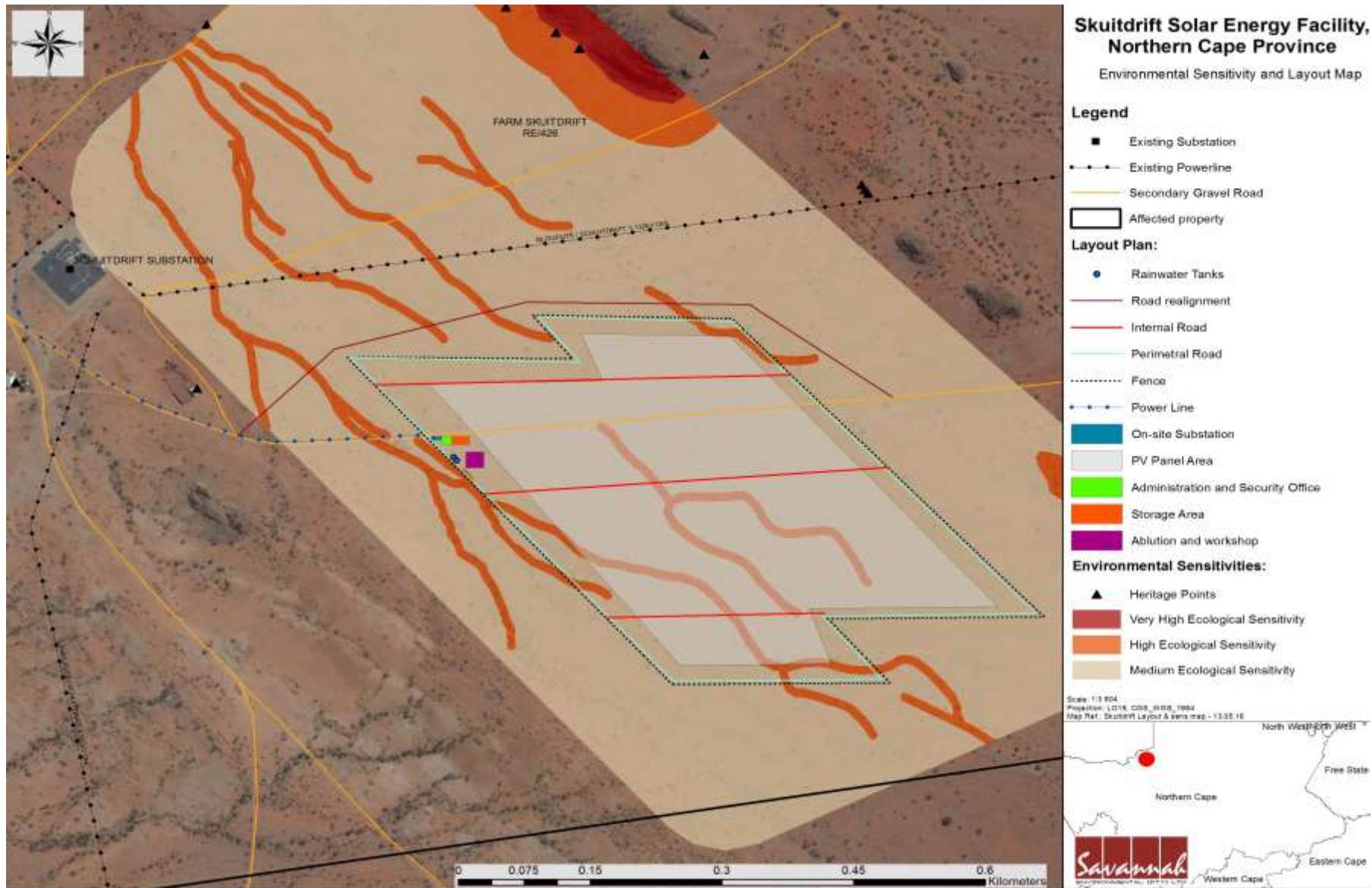
From the specialist studies undertaken, the preferred development footprint for the Scuitdrift Solar Energy Facility is considered to be acceptable from an environmental perspective. The proposed power line corridor and substation location is also considered technically and financially feasible.

Based on the findings of the studies undertaken, in terms of environmental constraints and opportunities identified through the Draft Environmental Basic Assessment process, no environmental fatal flaws were identified to be associated with the construction of the proposed power line and substation (refer to **Figure 3**).

Impacts are expected to be **medium - low** or **Very Low** after the implementation of the mitigation and monitoring measures which would allow for the minimisation and management of potential environmental impacts associated with the proposed development. These have been incorporated into the EMP for the project which will be further developed during the detailed planning and design phase of the project. It is therefore recommended that the proposed development can be implemented. With reference to the information available at this planning approval stage in the project cycle, the confidence in the environmental assessment undertaken is regarded as acceptable.

It is the conclusion of the Environmental Assessment Practitioner that the establishment of the Scuitdrift Solar Energy Facility is considered acceptable from an environmental perspective. The technically preferred Scuitdrift Solar Energy Facility should be authorised, provided that the recommended mitigation measures are implemented.





**Figure 3:** Map indicating the environmental sensitivities experienced at the 19ha site. The “washes” are indicated in Orange

## 2.3 Activities and Components associated with the proposed development of the Scuitdrift Solar Energy Facility and all associated infrastructure:

The main activities/components associated with the proposed Scuitdrift Solar Energy Facility are detailed in the sections below.

### 2.3.1. Pre-Construction Phase

Prior to initiating construction, a number of detailed surveys will be required including, but not limited to:

- » *Geotechnical survey*: a geotechnical survey has been completed as part of a detailed Engineering, Ecology and Agricultural report (refer to **Appendix J1, D1 and J6 of the BAR**) which details the landscape features, geology and topography of the development footprint. The geotechnical study considered flood potential, foundation conditions, and the potential for excavations. This study informs the Engineering, Procurement, and Construction (EPC) Contractors regarding soil conditions, required to specify foundations required for the support structures, and the extent of earthworks and compaction required in the establishment of any internal access roads.
- » *Ecological Walk-Through* – A full ecological walk-through of the site is to be conducted prior to commencement of construction. In compliance with the Department of Agriculture, Forestry and Fisheries (DAFF), The South African Heritage Resource Agency (SAHRA) and the Department of Environmental Affairs (DEA), the walk-through will critically analyse the project site and identify any other potential impacts on the available landscape.
- » *Site survey*: this will be required to finalise the design layout of the PV solar field and other associated infrastructure. The finalisation will need to be confirmed in line with the Environmental Authorisation issued for the facility.
- » *Environmental Permits*: Obtain any additional environmental permits required (e.g. water use license, and protected plant permits, etc.) Before the commencement of construction. Copies of permits/licenses must be submitted to the Director: Environmental Impact Evaluation at the DEA.
- » *Construction materials and equipment requirements*: 30-40% of construction material and equipment may be sourced locally (i.e. within South Africa), depending on technical capabilities and prices of local industry. The materials and equipment will be transported to site by road.
- » *Power line servitude survey*: Once the placement of the power line towers have been finalised, a walk through survey will be undertaken for archaeology and heritage resources which may necessitate certain towers to be moved to avoid sensitivities.
- » *Water requirements*: The water required for the project is approximately ~2000kL for the construction phase over 6 months and approximately 3 kl of water per day should be required for the cleaning of solar panels and for other requirements during the proposed operational phase of the project.



- » *Staff requirement:* On average, an estimated labour force the required will comprise of skilled (10%), semi-skilled (10%) and low skilled (80%) staff. The construction phase will generate job opportunities for roughly 100 people, whilst 5 – 20 people will be employed during the operation phase. Staff are expected to be sourced from Pofadder and Kakamas, and neighbouring communities such as Augrabies (i.e. as these skills are unlikely to be available within the local community). The specialists / foreigners forming part of the construction team are likely to make use of the local establishments for accommodation facilities. It is expected that most of the construction (i.e. civil works) will be done by local South African companies. The use of local contractors such as Small, Medium, and Micro Enterprises (SMMEs) operating in the area will be considered by the EPC partner, and will be driven largely by what skills and services could be sourced from local SMMEs (i.e. as part of a competitive tendering process). The EPC partner will determine the standards which all workers need to comply to and this will be in line with South African standards and laws applicable to the construction industry.
- » *Length of the construction phase:* Commencement of the construction phase is dependent on the project being approved by DEA, a generating license being issued by NERSA, and a Power Purchase Agreement being secured with Eskom/ Treasury or the designated buyer of renewable energy electricity and successfully reaching financial close. Construction is estimated to extend over a period of 6 months.

### 2.3.2. Construction Phase

The construction phase has an anticipated timeframe of 6 months. A facility consisting of several PV arrays with a generating capacity of 10 MW will take up to 6 months to construct and commission, and would require the expertise of skilled (10%), semi-skilled (10%) and low skilled (80%) staff. Solar PV technology is expected to employ roughly 100 people for the total construction period and 5 – 20 people for the operation phase. In order to construct the proposed facility and its associated infrastructure, a series of activities will need to be undertaken which is:

#### **Step 1: Site survey, survey of substation site, power line and road servitudes.**

##### **This will entail:**

- » Search Rescue and relocation of species of special concern
- » Site preparation activities will include:
  - \* Clearance of vegetation at the footprint of the area infrastructure (i.e. solar field and associated infrastructure);
  - \* Levelling of site (as necessary);
  - \* Clearance of vegetation at the footprint of the linear component (i.e. internal access roads);
  - \* The development of stormwater control management systems which may include drainage channels which will collect all rain water and lead it to the natural stormwater drainage system; and

- \* These activities will require the stripping of topsoil which will need to be backfilled as construction progresses and stockpiled for future rehabilitation.

**Step 2: Establishment of external and internal access roads:** The project site proposed for the development is accessible from the N14 from two divisional roads, the R359 and DR3256 which fall under the ZF Mgcawu District Municipality. Within the site itself, access will be required from new/existing roads for construction purposes (and limited access for maintenance during operation). Internal access roads of up to 4m in width will be required.

**Step 3: Establishment of construction equipment camps, storage facilities and laydown areas:**

- » Once the required equipment has been transported to site, dedicated construction camp(s), storage facilities, and laydown area/s will need to be established. These areas serve to confine activities to a designated area to limit potential site disturbance. The laydown area will be used as a logistical area for the contractors and as a prefabrication area.
- » The fuel required for on-site construction vehicles and equipment will need to be secured in a temporary bunded facility within the construction camp to prevent leakages and soil contamination.

**Step 4: Establishment of substation and power line:**

- » A new ~ 630m 33kV power line between the on-site substation and the Eskom grid connection point.
- » Cabling between the projects components, to be laid underground where practical.
- » A power line is constructed by surveying the power line route, construction of foundations for the towers, installation of the towers, stringing of conductors and finally the rehabilitation of disturbed area and protection of erosion sensitive areas.
- » The position of the inverters within the footprint will be informed by the final positioning of the PV components.
- » The construction of a substation would require a survey of the site, site clearing and levelling and construction of access road/s (where required), construction of a level terrace and foundations, assembly, erection, installation and connection of equipment, and rehabilitation of any disturbed areas and protection of erosion sensitive areas.

**Step 5: Assembly and erection of PV panels:**

- » The PV panels will be arranged in arrays, the mounting structure will be preferably fixed onto the ground with the use of rammed or screw anchor foundations.
- » Trenching would occur within each array to accommodate the electrical cables. The trenches would be up to ~ 1.8m in width and 2m deep and will run the length of the PV panels. Minimal ground disturbance may occur

within the trenched corridors to restore them after soil has been replaced in the trenches, so that the corridor can conform to the existing surface contours.

**Step 6: Extraction of water and development of possible pipeline to transport water from Southern Farms situated along the Orange River.**

**Step 7: Undertake site rehabilitation and establishment of the stormwater management plan:**

- » Areas requiring rehabilitation will include those areas disturbed during the construction phase and are not required for operation and maintenance operations. Rehabilitation should be undertaken in an area as soon as possible after the completion of construction activities within that area.
- » Where relevant disturbed areas must be rehabilitated/re-vegetated with appropriate natural vegetation and/or local seed mix. Re-vegetated areas may have to be protected from wind erosion and maintained until an acceptable plant cover has been achieved.
- » All temporary facilities, temporary equipment, and waste materials must be removed from site.
- » Erosion control measures (i.e. drainage works and anti-erosion measures) should be used in sensitive areas (i.e. steep slopes, hills, and washes), to minimise loss of topsoil and control erosion.
- » Any access points and/or access roads which are not required during the operational phase must be closed as part of the post-construction rehabilitation.

Areas requiring rehabilitation will include those natural areas disturbed during the construction phase and those that are not required for operation and maintenance operations. Rehabilitation should be undertaken in an area as soon as possible after the completion of construction activities within that area. Where relevant, disturbed areas must be rehabilitated/re-vegetated with appropriate natural vegetation and/or local seed mix. Re-vegetated areas may have to be protected from wind erosion and maintained until an acceptable plant cover has been achieved. All temporary facilities, equipment, and waste materials will be removed from site. Erosion control measures (i.e. drainage works and anti-erosion measures) should be used in sensitive areas (i.e. steep slopes, hills, and washes), to minimise loss of topsoil and control erosion. Any access points and/or access roads which are not required during the operational phase must be closed as part of the post-construction rehabilitation.

### 2.3.3. Operation and Maintenance Phase

The following activities to be undertaken during the operation phase:

**Step 1: Sourcing, treatment and use of water:**

- » Approximately 3 kl of water per day (~1100kL) should be required for the cleaning of solar panels and for other requirements during the proposed operational phase. The water is to be sourced from 3 boreholes within the property.

**Step 2: Treatment and disposal of waste water:**

- » Any water from ablution facilities will be collected in a septic tank. This tank will be emptied as required and sewage disposed of at the nearest municipal sewage waste facility.

**Step 3: Operation of the PV panels and the associated electrical infrastructure:**

- » The PV panels will convert the light energy from the incoming radiation into electrical energy (i.e. as direct current).
- » The inverters will convert the power from direct to alternating current.
- » A new 33kV power line ~630m long between the on-site substation and the Eskom grid connection point.
- » Occasional cleaning of the panels will be required throughout the life cycle of the facility when necessary.

**Step 4: Site operation and maintenance:**

- » Full-time security, maintenance, and control room staff will be required on site.
- » Each component within the solar energy facility will be operational except under circumstances of mechanical breakdown, unfavourable weather conditions, or routine maintenance activities.
- » The access to the site and the internal access roads will be maintained during the operational phase.
- » Vegetation maintenance and weed control measures will be undertaken as required.

The PV panels are designed to operate continuously, unattended and with low maintenance for approximately 25 - 30 years. The electricity that is generated from the PV panels will be converted from direct current (DC) to alternating current (AC) by inverters, and stepped up by the medium voltage transformers at each generating unit and the medium-high transformer the on-site substation. Thereafter the power will be evacuated from the onsite Eskom substation and supplemented into the national Eskom electricity grid. The solar facility will be operational during daylight hours, except during maintenance, poor weather conditions, breakdowns or interruption of the connection to the Eskom grid. Regular maintenance will typically include periodic cleaning, greasing of bearings and inspection. The solar panels will preferably be cleaned with water or alternatively with compressed air.

An estimated total of six (5) full-time staff members will typically be required during the operation phase of the project, which includes technicians, maintenance and security personnel. Approximately three (2) unskilled labourers will be needed for maintenance purposes and two (2) security personnel will be deployed on a shift basis. One (1) skilled staff member will be needed to manage and oversee the operations. From time to time additional contract staff (+/- 10) may be required for ad hoc ground cleaning or special panel cleaning. Therefore, a total of between 5 - 20 people will be employed during operation. Staff can be transported around the site using utility vehicles and a typical mini bus to transport staff from nearby towns of Pofadder and Kakamas as well as from the surrounding community of Augrabies

Summary of the operation and maintenance activities are expected to form part of the project scope of works:

- » Operation of the PV panels and associated infrastructure;
- » Cleaning of the PV panels; and
- » Site operation and maintenance.

#### 2.3.4. Decommissioning Phase

The PV facility is expected to have a lifespan of approximately 25-30 years. If economically feasible/desirable the decommissioning activities would comprise the disassembly and replacement of the individual components with more appropriate technology/ infrastructure available at that time. However, if not deemed so, then the facility would be completely decommissioned which would include the following decommissioning activities:

- » **Site Preparation:** Site preparation activities similar to those undertaken in the construction phase will be required during the decommissioning phase. This will include confirming the integrity of site access to the site in order to accommodate the required equipment (e.g. laydown areas and decommissioning camp) and the mobilisation of decommissioning equipment.
- » **Disassemble and/or replace existing components:** The components would be disassembled, and reused and recycled (where possible), or disposed of in accordance with regulatory requirements.

#### 2.3.5. Rehabilitation Phase

The components would be disassembled, reused and recycled where possible, or disposed of in accordance with regulatory requirements relevant at the time. The civil works for decommissioning a PV plant are considered to be simpler than during the construction phase and it is estimated that the sale of materials as scrap (e.g. steel, copper, aluminium

etc.) would be high enough to cover the costs for the whole decommissioning process. Functional components are planned to be donated to and installed at local schools and clinics to benefit the community. Site decommissioning activities will ensure integrity of access to the site and well as rehabilitation of site as necessary.

## KEY LEGISLATION APPLICABLE TO THE DEVELOPMENT

## CHAPTER 3

The following legislation and guidelines have informed the scope and content of this EMP Report:

- » National Environmental Management Act (Act No 107 of 1998).
- » EIA Regulations, published under Chapter 5 of the NEMA (GNR 984, GNR 985 in Government Gazette 38282 of 4 December 2014).
- » Guidelines published in terms of the NEMA EIA Regulations, in particular:
  - \* Companion to the National Environmental Management Act (NEMA) Environmental Impact Assessment (EIA) Regulations of 2010 (Draft Guideline; DEA, 2010).
  - \* Public Participation in the EIA Process (DEA, 2010).
  - \* Integrated Environmental Management Information Series (published by DEA)
- » International guidelines – the Equator Principles

Several other Acts, standards, or guidelines have also informed the project process and the scope of issues addressed and assessed in the Basic Assessment Report. A List all legislation, policies and/or guidelines of any sphere of government that are applicable to the application as contemplated in the EIA regulations, if applicable (refer to **Table 2** below

**Table 3.1:** Applicable Legislation, Policies and/or Guidelines

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
<b>National Legislation</b>			
<p>National Environmental Management Act (Act No. 107 of 1998)</p>	<p>The EIA Regulations have been promulgated in terms of Chapter 5 of the Act. Listed activities which may not commence without an environmental authorisation are identified within these Regulations.</p> <p>In terms of S24(1) of NEMA, the potential impact on the environment associated with these listed activities must be assessed and reported on to the competent authority charged by NEMA with granting of the relevant environmental authorisation.</p> <p>In terms of GNR 983 and 985 of June 2010 a Basic Assessment Process is required to be undertaken for the proposed project.</p>	<ul style="list-style-type: none"> <li>» National Department of Environmental Affairs (DEA)</li> <li>» Northern Cape Department of Environment and Nature Conservation (NC DENC) – commenting authority</li> </ul>	<p>The listed activities triggered by the proposed Project have been identified and assessed in the EIA process being undertaken (i.e. Basic Assessment).</p> <p>This Basic Assessment Report will be submitted to the competent and commenting authority in support of the application for authorisation.</p>
<p>National Environmental Management Act (Act No. 107 of 1998)</p>	<p>In terms of the Duty of Care provision in S28(1) the project proponent must ensure that reasonable measures are taken throughout the life cycle of this project to ensure that any pollution or degradation of the environment associated with a project is avoided, stopped or minimised.</p>	<p>DEA</p>	<p>While no permitting or licensing requirements arise directly, the holistic consideration of the potential impacts of the proposed project has found application in the EIA process.</p> <p>The implementation of mitigation measures are included as part of the EMP and will continue to apply throughout the life cycle of the Project.</p>



Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
<p>National Environmental Management: Biodiversity Act (Act No. 10 of 2004)</p>	<p>In terms of S57, the Minister of Environmental Affairs has published a list of critically endangered, endangered, vulnerable, and protected species in GNR 151 in Government Gazette 29657 of 23 February 2007 and the regulations associated therewith in GNR 152 in GG29657 of 23 February 2007, which came into effect on 1 June 2007.</p> <p>In terms of GNR 152 of 23 February 2007: Regulations relating to listed threatened and protected species, the relevant specialists must be employed during the EIA Phase of the project to incorporate the legal provisions as well as the regulations associated with listed threatened and protected species (GNR 152) into specialist reports in order to identify permitting requirements at an early stage of the EIA Phase.</p> <p>» The Act provides for listing threatened or protected ecosystems, in one of four categories: critically endangered (CR), endangered (EN), vulnerable (VU) or protected. The first national list of threatened terrestrial ecosystems has been gazetted, together with supporting information on the listing</p>	<p>» DEA » NC DENC</p>	<p><u>The relevant specialist reports have made reference to the presence of several <i>Acacia (Vachellia) erioloba</i> trees that were recorded within the site. Only four of these individuals are found within the development site (~19ha) and an additional two in close proximity to the development within the broader development region of ~45ha.</u></p> <p><u>Should any of the four affected Camel thorn trees contain bird nests, a Fauna Permit will be applied for in addition to an NFA License, prior to removal of such trees. A pre-construction walk-through will be conducted.</u></p> <p><u>Should this be applicable, the application for the NFA License must be submitted prior to construction, but after obtaining all relevant approvals such as the Environmental Authorisation, Preferred Bidder Status, etc.</u></p> <p><u>From a general ecological perspective, the site is not viewed as being highly sensitive. No endangered plant species were observed to occur within the proposed development area and there are no listed faunal species with a narrow distribution which occur at the site.</u></p>

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
	<p>process including the purpose and rationale for listing ecosystems, the criteria used to identify listed ecosystems, the implications of listing ecosystems, and summary statistics and national maps of listed ecosystems (National Environmental Management: Biodiversity Act: National list of ecosystems that are threatened and in need of protection, (GG 34809, GN 1002), 9 December 2011).</p>		
<p>National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)</p>	<p>The Minister may by notice in the <i>Gazette</i> publish a list of waste management activities that have, or are likely to have, a detrimental effect on the environment.</p> <p>The Minister may amend the list by –</p> <ul style="list-style-type: none"> <li>» Adding other waste management activities to the list.</li> <li>» Removing waste management activities from the list.</li> <li>» Making other changes to the particulars on the list.</li> </ul> <p>In terms of the Regulations published in terms of this Act (GN 921), A Basic Assessment or Environmental Impact Assessment is required to be undertaken for identified listed activities (Category A</p>	<ul style="list-style-type: none"> <li>» DEA</li> <li>» NC DENC</li> </ul>	<p>As no waste disposal site is to be associated with the proposed project, no permit is required in this regard.</p> <p>Waste handling, storage and disposal during construction and operation is required to be undertaken in accordance with the requirements of the Act, as detailed in the EMPr (refer to Appendix G).</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
	<p>and B) while Category C Activities (such as storage of waste) must be undertaken in accordance with the necessary norms and standards.</p> <p>Any person who stores waste must at least take steps, unless otherwise provided by this Act, to ensure that:</p> <ul style="list-style-type: none"> <li>» The containers in which any waste is stored, are intact and not corroded or in any other way rendered unfit for the safe storage of waste.</li> <li>» Adequate measures are taken to prevent accidental spillage or leaking.</li> <li>» The waste cannot be blown away.</li> <li>» Nuisances such as odour, visual impacts and breeding of vectors do not arise; and</li> <li>» Pollution of the environment and harm to health are prevented.</li> </ul>		
<p>National Environmental Management: Air Quality Act (Act No. 39 of 2004)</p>	<p>S18, S19, and S20 of the Act allow certain areas to be declared and managed as "priority areas."</p> <p>Declaration of controlled emitters (Part 3 of Act) and controlled fuels (Part 4 of Act) with relevant emission standards.</p>	<ul style="list-style-type: none"> <li>» DEA</li> <li>» Kai!-Garib Municipality</li> </ul> <p style="text-align: right;">Local</p>	<p>Dust Control Regulations describe the measures for control and monitoring of dust, including penalties. These regulations might be applicable during the construction phase of the project. Dust management have also been accounted for in this EMPr.</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
	<ul style="list-style-type: none"> <li>» GN R 827 – National Dust Control Regulations prescribes general measures for the control of dust in all areas</li> </ul>		<p>Please note that the access road to be used for the Scuitdrift Solar Energy Facility will be the same access road (re-aligned) to the existing Eskom Substation.</p>
<p>National Water Act (Act No. 36 of 1998)</p>	<p>Water uses under S21 of the Act must be licensed unless such water use falls into one of the categories listed in S22 of the Act or falls under the general authorisation.</p> <p>In terms of S19, the project proponent must ensure that reasonable measures are taken throughout the life cycle of this project to prevent and remedy the effects of pollution to water resources from occurring, continuing, or recurring.</p>	<ul style="list-style-type: none"> <li>» National Department of Water and Sanitation</li> <li>» Northern Cape Department of Water and Sanitation</li> </ul>	<p>A water use license (WUL) or General Authorisation might be required in terms of Section 21 of the Act.</p> <p>Should the option to use water from Southern Farm be taken, and the proposed pipeline or road alteration / upgrade cross any dry watercourses/washes/ washes, the Water Use Licence Application (WULA) should be supplemented to apply in terms of Section 21(c)&amp;(i).</p>
<p>Environment Conservation Act (Act No. 73 of 1989)</p>	<ul style="list-style-type: none"> <li>» National Noise Control Regulations (GN R154 dated 10 January 1992)</li> </ul>	<ul style="list-style-type: none"> <li>» DEA</li> <li>» NC DENC</li> </ul>	<p>Noise impacts are expected to be associated with the construction phase of the Project and are not likely to present a significant intrusion to the local community. There is no requirement for a noise permit in terms of the legislation.</p>
<p>Minerals and Petroleum Resources Development Act (Act No. 28 of 2002)</p>	<ul style="list-style-type: none"> <li>» A mining permit or mining right may be required where a mineral in question is to be mined (e.g. materials from a borrow pit) in accordance with the provisions of the Act.</li> <li>» Requirements for Environmental Management Programmes and Environmental Management Plans are set out in S39 of the Act.</li> </ul>	<ul style="list-style-type: none"> <li>» Department of Mineral Resources</li> </ul>	<p>As no borrow pits are expected to be required for project, no mining permit or right is required to be obtained.</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
	<ul style="list-style-type: none"> <li>» S18, S19, and S20 of the Act allow certain areas to be declared and managed as “priority areas.”</li> <li>» Declaration of controlled emitters (Part 3 of Act) and controlled fuels (Part 4 of Act) with relevant emission standards.</li> <li>» GN R 827 – National Dust Control Regulations prescribes general measures for the control of dust in all areas</li> </ul>		
<p>National Heritage Resources Act (Act No. 25 of 1999)</p>	<ul style="list-style-type: none"> <li>» S38 states that Heritage Impact Assessments (HIAs) are required for certain kinds of development including                             <ul style="list-style-type: none"> <li>» The construction of a road, power line, pipeline, canal or other similar linear development or barrier exceeding 300 m in length;</li> <li>» Any development or other activity which will change the character of a site exceeding 5 000 m<sup>2</sup> in extent</li> </ul> </li> <li>» The relevant Heritage Authority must be notified of developments such as linear developments (i.e. roads and power lines), bridges exceeding 50 m, or any development or other activity which will change the character of a site exceeding 5 000 m<sup>2</sup>; or the rezoning of a site exceeding 10 000 m<sup>2</sup> in extent. This notification must be provided in the early stages of</li> </ul>	<ul style="list-style-type: none"> <li>» South African Heritage Resources Agency (SAHRA)</li> <li>» Northern Cape Heritage Resources Authority</li> </ul>	<p>A permit may be required should any identified cultural/ heritage sites on site be required to be disturbed or destroyed as a result of the proposed development.</p> <p>The Heritage, Archaeological and palaeontological studies (refer to <b>Appendix J2, J3 and J4</b>) confirmed that: No buildings older than 60 years and heritage significance were identified within the solar development site.</p> <p>The grave sites found directly north of the solar development site are not considered to be of cultural significance.</p> <p>No archaeological occurrences identified to occur with the solar development site (occurrences found outside the site are to be avoided by all activities).</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
	<p>initiating that development, and details regarding the location, nature and extent of the proposed development must be provided.</p> <ul style="list-style-type: none"> <li>» Standalone HIAs are not required where an EIA is carried out as long as the EIA contains an adequate HIA component that fulfils the provisions of S38. In such cases only those components not addressed by the EIA should be covered by the heritage component.</li> <li>» In terms of Section 34(1), no person may alter or demolish any structure or part of a structure, which is older than 60 years</li> </ul>		<p>Furthermore, the sensitive areas near the koppies, although outside of the development area, should be avoided during construction activities. The <b>Environmental Control Officer</b> (ECO) should be made aware of the presence of archaeological resources there so that their safeguarding during construction can be ensured.</p>
<p>National Forests Act (Act No. 84 of 1998)</p>	<ul style="list-style-type: none"> <li>» In terms of S5(1) no person may cut, disturb, damage or destroy any protected tree or possess, collect, remove, transport, export, purchase, sell donate or in any other manner acquire or dispose of any protected tree or any forest product derived from a protected tree, except under a license granted by the Minister to an (applicant and subject to such period and conditions as may be stipulated”.</li> <li>» The list of protected tree species was published in GN 877 of 22 November 2013.</li> </ul>	<ul style="list-style-type: none"> <li>» Department of Agriculture, Forestry and Fisheries</li> <li>» NC DENC</li> </ul>	<p>It must be noted that The proposed development, in Blouputs Karroid Thornveld, may contain protected tree species. Any Relocation of protected plant species, such as <i>Hoodia gordonii</i> may require a permit. No protected plant species may be damaged or disturbed without the necessary license or permit. Identification of protected plant species should be included in the environment education</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
National Veld and Forest Fire Act (Act 101 of 1998)	<ul style="list-style-type: none"> <li>» In terms of S12 the landowner would be obliged to burn firebreaks to ensure that should a veldfire occur on the property, that it does not spread to adjoining land.</li> <li>» In terms of S12 the firebreak would need to be wide and long enough to have a reasonable chance of preventing the fire from spreading, not causing erosion, and is reasonably free of inflammable material.</li> <li>» In terms of S17, the applicant must have such equipment, protective clothing, and trained personnel for extinguishing fires.</li> </ul>	Department of Agriculture, Forestry and Fisheries	If any permitting or licensing requirements arise from this legislation, this Act will find application during the construction and operational phase of the project. The roles & responsibilities of landowner in terms of ensuring compliance must also be identified and assessed throughout the duration of the project life cycle.
Conservation of Agricultural Resources Act (CARA) (Act No 43 of 1983)	<ul style="list-style-type: none"> <li>» Prohibition of the spreading of weeds (S5).</li> <li>» Classification of categories of weeds &amp; invader plants (Regulation 15 of GN R1048) &amp; restrictions in terms of where these species may occur.</li> <li>» Requirement &amp; methods to implement control measures for alien and invasive plant species (Regulation 15E of GN R1048).</li> <li>» The Conservation of Agricultural Resources Act defines different categories of alien plants:                             <ul style="list-style-type: none"> <li>» <b>Category 1</b> - prohibited and must be controlled;</li> </ul> </li> </ul>	Department of Agriculture, Forestry and Fisheries	<p>An Ecology study was undertaken (refer to <b>Appendix D1</b>) and CARA was taken into account. The relevant mitigations measures were identified and are included in the EMPr (Appendix G).</p> <p>The Scuitdrift Solar Energy Facility development site is relatively free of alien plant species. Alien plants are however likely to become an issue if the site is highly disturbed during construction or if water runoff is not properly managed.</p> <p>Mitigation measures have been recommended to avoid the risk of</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
	<ul style="list-style-type: none"> <li>» <b>Category 2</b> – must be grown within a demarcated area under permit; and</li> <li>» <b>Category 3</b> - ornamental plants that may no longer be planted, but existing plants may remain provided that all reasonable steps are taken to prevent the spreading thereof, except within the floodlines of water courses and wetlands</li> </ul>		<p>increased alien invasion during construction and operation phases of the solar facility (see Section D and E of the BA below and Annexure D1 attached of the ecological specialist report).</p>
<p>Hazardous Substances Act (Act No. 15 of 1973)</p>	<p>This Act regulates the control of substances that may cause injury, or ill health, or death due to their toxic, corrosive, irritant, strongly sensitising, or inflammable nature or the generation of pressure thereby in certain instances and for the control of certain electronic products. To provide for the rating of such substances or products in relation to the degree of danger; to provide for the prohibition and control of the importation, manufacture, sale, use, operation, modification, disposal or dumping of such substances and products.</p> <ul style="list-style-type: none"> <li>» Group I and II: Any substance or mixture of a substance that might by reason of its toxic, corrosive etc., nature or because it generates pressure through decomposition, heat or other means, cause extreme risk of</li> </ul>	<ul style="list-style-type: none"> <li>» Department of Health</li> </ul>	<p>It is necessary to identify and list all the Group I, II, III, and IV hazardous substances that may be on the site and in what operational context they are used, stored or handled. If applicable, a license could be required to be obtained from the Department of Health.</p> <p>Take note that during construction, an estimated amount of less than 5m<sup>3</sup> non-hazardous solid construction waste will be produced per month, for the expected 6 month construction period.</p> <p>Compliance must take note that all construction waste must be safely stored in containers and be removed from site on an ad hoc basis by the appointed construction contractor, as and when</p>



Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
	<p>injury etc., can be declared to be Group I or Group II hazardous substance;</p> <ul style="list-style-type: none"> <li>» Group IV: any electronic product;</li> <li>» Group V: any radioactive material.</li> </ul> <p>The use, conveyance, or storage of any hazardous substance (such as distillate fuel) is prohibited without an appropriate license being in force.</p>		<p>deemed necessary. The construction waste will be disposed of at an appropriately licenced Municipal landfill site.</p>
<p>National Road Traffic Act (Act No 93 of 1996)</p>	<p>The technical recommendations for highways (TRH 11): "Draft Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads" outline the rules and conditions which apply to the transport of abnormal loads and vehicles on public roads and the detailed procedures to be followed in applying for exemption permits are described and discussed.</p> <p>Legal axle load limits and the restrictions imposed on abnormally heavy loads are discussed in relation to the damaging effect on road pavements, bridges and culverts.</p> <ul style="list-style-type: none"> <li>» The general conditions, limitations and escort requirements for abnormally dimensioned loads and vehicles are also discussed and reference is made to speed restrictions, power/mass ratio,</li> </ul>	<ul style="list-style-type: none"> <li>» Provincial Department of Transport (provincial roads)</li> <li>» South African National Roads Agency Limited (national roads)</li> </ul>	<p>An abnormal load/vehicle permit may be required to transport the various components to site for construction. These include route clearances and permits could be required for vehicles carrying abnormally heavy or abnormally dimensioned loads.</p> <p>Depending on the trailer configuration and height when loaded, some of the components may not meet specified dimensional limitations (height and width) and would need to apply for the relevant permit/ clearance.</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
	<p>mass distribution and general operating conditions for abnormal loads and vehicles. Provision is also made for the granting of permits for all other exemptions from the requirements of the National Road Traffic Act and the relevant Regulations.</p>		
<b>Provincial Legislation</b>			
<p>Northern Cape Nature Conservation Act (Act No. 9 of 2009)</p>	<p>» Provides inter alia for the sustainable utilisation of wild animals, aquatic biota and plants as well as permitting and trade regulations regarding wild fauna and flora within the province. In terms of this act the following section may be relevant with regards to any security fencing the development may require.</p> <p><b>Manipulation of boundary fences</b></p> <p>19. No Person may –</p> <p>(a) erect, alter remove or partly remove or cause to be erected, altered removed or partly removed, any fence, whether on a common boundary or on such person’s own property, in such a manner that any wild animal which as a result thereof gains access or may gain access to the property or a camp on the property, cannot escape or is</p>	<p>» NC DENC</p>	<p>A permit is required for any activities which involve species listed under schedule 1 or 2. The NC DENC permit office provides an integrated permit which can be used for all provincial and Threatened or Protected Species (TOPS)-related permit requirements.</p> <p>Provincially protected plant species were found within the study area. Therefore, a permit could be required for removal of such species. A permit could be required NC DENC to relocate protected plants and to clear natural vegetation mainly along the transmission line grid where poles would be planted.</p> <p>The parameter fencing of the Scuitdrift Solar Energy Facility will be constructed in a manner which allows for the passage of small and medium sized mammals through</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
	<p>likely not to be able to escape therefrom;</p> <p>The Act also lists protected fauna and flora under 3 schedules ranging from Specially protected (Schedule 1), protected (schedule 2) to common (schedule 3). The majority of mammals, reptiles and amphibians are listed under Schedule 2, except for listed species which are under Schedule 1.</p>		<p>or under the fence. During operation, all gates will be kept closed to ensure that no larger fauna enter and become trapped within the fenced-off area</p>

## PURPOSE AND OBJECTIVES OF THE EMPR

## CHAPTER 4

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

The EMPr provides specific environmental guidance for the construction and operation phases of a project, and is intended to manage and mitigate construction and operation activities so that unnecessary or preventable environmental impacts do not result. These impacts range from those incurred during start up (i.e. site clearing and site establishment), during the construction activities themselves (i.e. erosion, noise, dust, and visual impacts), during site rehabilitation (i.e. soil stabilisation, re-vegetation), during operation and during decommissioning (i.e. similar to construction phase activities).

This Construction and Operational Environmental Management Programme (CEMPR and OEMPR) has been compiled for the Scuitdrift Solar Facility. This EMPr is applicable to all employees and contractors working on the pre-construction, construction, and operation and maintenance phases of the project. The document will be adhered to, updated as relevant throughout the project life cycle.

This EMPr has been compiled in accordance with Appendix 4 of the EIA Regulations of December 2014. This document is a dynamic document and will be further developed in terms of specific requirements listed in any authorisations issued for the proposed project (if required) and/or as the project develops. The EMPr has been developed as a set of environmental specifications (i.e. principles of environmental management), which are appropriately contextualised to provide clear guidance in terms of the on-site implementation of these specifications (i.e. on-site contextualisation is provided through the inclusion of various monitoring and implementation tools).

This EMPr has the following objectives:

- » Outline mitigation measures and environmental specifications which are required to be implemented for the planning, construction and rehabilitation, operation, and decommissioning phases of the project in order to manage and minimise the extent of potential environmental impacts associated with the power line and on-site substation.

- » Ensure that all the phases of the project do not result in undue or reasonably avoidable adverse environmental impacts, and ensure that any potential environmental benefits are enhanced.
- » Identify entities responsible for the implementation of the measures and outline functions and responsibilities.
- » Propose mechanisms and frequency for monitoring compliance, and preventing long-term or permanent environmental degradation.
- » Facilitate appropriate and proactive responses to unforeseen events or changes in project implementation that was not considered in the EIA process.

The management and mitigation measures identified within Basic Assessment (BA) process are systematically addressed in this EMPr, and ensure the minimisation of adverse environmental impacts to an acceptable level.

**Scuitdrift Solar Project (Pty) Ltd** must ensure that the implementation of the project complies with the requirements of all environmental authorisations, permits issued for the proposed project, as well as to obligations emanating from relevant environmental legislation. This obligation is partly met through the development and the implementation of this EMP and through its integration into contract documentation for the construction and operation of the proposed PV facility. Since this EMP is part of the Basic Assessment process it is important that this document be read in conjunction with the Basic Assessment Report as well as with the Environmental Authorisation (once issued). This will contextualise the EMP and enable a thorough understanding of its role and purpose in the integrated environmental management process. Should there be a conflict of interpretation between this EMPr and the environmental authorisation (once issued), the stipulations in the environmental authorisation shall prevail over that of the EMPr, unless otherwise agreed by the authorities in writing. Similarly, any provisions in legislation overrule any provisions or interpretations within this EMPr.

To achieve effective environmental management, it is important that contractors are aware of the responsibilities in terms of the relevant environmental legislation and the contents of this EMP. The contractor is responsible for informing employees and sub-contractors of their environmental obligations in terms of the environmental specifications, and for ensuring that employees are adequately experienced and properly trained in order to execute the works in a manner that will minimise environmental impacts. The contractor's obligations in this regard include the following:

- » Ensuring that employees have a basic understanding of the key environmental features of the construction site and the surrounding environment.
- » Ensuring that a copy of the EMP is readily available on-site, and that all site staff are aware of the location and have access to the document. Employees will be familiar with the requirements of the EMPr and the environmental specifications as they apply to the construction of the power line.

- » Ensuring that, prior to commencing any site works, all employees and sub-contractors have attended an Environmental Awareness Training course. The course must provide the site staff with an appreciation of the project's environmental requirements, and how they are to be implemented.
- » Providing basic training in the identification of archaeological sites/objects, and protected flora and fauna that may be encountered on/off the site.
- » Ensuring awareness of any other environmental matters, which are deemed necessary by the ECO.

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

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**STRUCTURE OF THIS EMPR**

**CHAPTER 5**

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

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

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

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

<b>Project Component/s</b>	» List of project components affecting the objective.
<b>Potential Impact</b>	» Description of potential environmental impact if objective is not met.
<b>Activity/Risk Source</b>	» Description of activities which could affect achieving objective.
<b>Mitigation: Target/Objective</b>	» Description of the target and/or desired outcomes of mitigation.

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

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

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

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

**Table 3:** Management plans for the Scuitdrift Solar Energy Facility

Plans required	Location in report
Grievance Mechanism for Public Complaints and Issues	Appendix B
Erosion Management Plan	Appendix C
Waste Management Plan	Appendix D
Stormwater Management Plan	Appendix E
Emergency Management Plan	Appendix F
Traffic Management Plan	Appendix G
Plant Rescue and Protection Plan	Appendix H
Revegetation and Rehabilitation Plan	Appendix I
Alien Invasive Management Plan	Appendix J

### 5.1. Objectives

	Name	Company
<b>EMP Compilers:</b>	Ashleigh Blackwell	Savannah Environmental
	Tebogo Mapinga	
<b>Specialists:</b>  Attached as Appendix D of BAR	Rob Simmons - Avifaunal	Bats and Birds Limited
	Simon Todd - ecology	Simon Todd consulting
	<u>Afzelia- Visual</u>	<u>Jonathan Marshall</u>
	<u>Digby Wells Environmental</u>	<u>Mashudu Rafundisani</u>
	<u>Savannah Environmental</u>	<u>Pamela Sidambe</u>
	<u>Techso</u>	<u>Traffic</u>
Additional Information  Attached as Appendix J of BAR	Stephan De Kock – Heritage Report	Perception Heritage Planning
	Andrew B. Smith – Archaeology Report	University of Cape Town
	Hendri Beukes – Agricultural Potential	Solek Renewable Energy Engineers



	John E. Almond - Paleontology	Natura Viva cc
	Solek Renewable Energy Engineers - Engineering Report	Solek Renewable Energy Engineers

The Savannah Environmental team have extensive knowledge and experience in EIAs and environmental management, having been involved in EIA processes over the past years. They have managed and drafted EMPr for other power generation projects throughout South Africa, including numerous wind and solar energy facilities. Refer to **Appendix H** for CVs of project team.

## PLANNING AND DESIGN MANAGEMENT PROGRAMME

## CHAPTER 6

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

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

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

### 6.1. Objectives

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

No absolute '*no go*' areas were identified by the specialists during the EIA Phase within the development site. However, a number of potentially sensitive areas and *no go areas* were identified to be associated with the project area, which included:

- » *Areas of ecological sensitivity* – Overall the site is not viewed as being highly sensitive, however a buffer of 32m is required for the sensitive 'washes' occurring at the site. Permits will be obtained for the removal of the *Acacia erioloba* trees. Factors which contribute to the low risk associated with the development of the site, include the low slope, coarse sandy soils and homogenous nature of the plain which forms the site. In addition, the site is in close proximity to an existing Eskom Schuitdrift substation and transmission infrastructure.
- » *Areas of heritage sensitivity* – Although the 'Koppies' of High Sensitivity fall outside the proposed ~19ha development footprint, the area still needs to be demarcated and identified throughout the project lifecycle as a No-Go area. It must be noted that if in

the case of cultural or historical sites being exposed or disturbed and resources uncovered, this must be reported immediately to SAHRA.

<b>Project Component/s</b>	<ul style="list-style-type: none"> <li>» PV Panels.</li> <li>» Access roads (i.e. temporary single lane access tracks)</li> <li>» Short overhead distribution power line</li> <li>» Underground cabling.</li> <li>» Associated buildings (i.e. workshop).</li> </ul>
<b>Potential Impact</b>	<ul style="list-style-type: none"> <li>» Impact on identified sensitive areas.</li> </ul>
<b>Activities/Risk Sources</b>	<ul style="list-style-type: none"> <li>» Positioning of all the facilities components</li> <li>» Construction of the underground cabling</li> <li>» Connection to the on-site substation</li> <li>» Access road re-alignment</li> </ul>
<b>Mitigation: Target/Objective</b>	<ul style="list-style-type: none"> <li>» The design of the power line and on-site substation responds to the identified environmental constraints and opportunities.</li> <li>» Site sensitivities are taken into consideration and avoided as far as possible, thereby mitigating potential impacts.</li> </ul>

<b>Mitigation: Action/Control</b>	<b>Responsibility</b>	<b>Timeframe</b>
Plan and conduct pre-construction activities in an environmentally acceptable manner.	Developer/Owner Contractor	Pre-construction
Undertake a detailed geotechnical pre-construction survey.	Developer/Owner Geotechnical specialist	Pre-construction
<u>Conduct a final walk-down by a professional archaeologist before construction may commence.</u>	<u>Developer/Owner Specialist</u>	<u>Pre-construction</u>
<u>Apply for a Water Use License or a general authorisation in terms of the National Water Act (Act 36 of 1998).</u>	<u>Developer/Owner</u>	<u>Pre-construction</u>
Obtain any additional environmental permits required (e.g. water use license, and protected plant permits, etc.). Copies of permits/licenses must be submitted to the Director: Environmental Impact Evaluation at the DEA.	Developer/Owner	Project planning
Consider and incorporate design level mitigation measures recommended by the specialists as detailed within the Basic Assessment Report and relevant appendices.	Engineering design consultant, solar component supplier, and Developer	Design review
External access point and internal access road to be carefully planned to maximise road user safety and limit any intrusion on the neighbouring property owners and road users.	Developer/Owner Contractor	Design

<b>Mitigation: Action/Control</b>	<b>Responsibility</b>	<b>Timeframe</b>
The road network to access the panel arrays should be established first and then all vehicular movement must be restricted to within this road network. This will minimise the impact of construction traffic on the undeveloped portion of the property	Developer/Owner Contractor	Design and Planning
Demarcation of NO-GO areas which must reflect The exact footprint of the construction area, including panel foundations and all roads (including haul roads which must make use of the final road layout) and infrastructure which are to be surveyed and pegged before any physical construction commences on site.	Developer/Owner , Contractor and ECO	Prior to the commencement of construction
Compile a comprehensive storm water management plan for hard surfaces as part of the final design of the project. This must include appropriate means for the handling of storm water within the site (i.e. separate clean and dirty water streams, install stilling basins to capture large volumes of run-off, trapping sediments, and reduce flow velocities (i.e. water used when washing the mirrors), as well as appropriate drainage around the site.	Developer/Owner Contractor	Design
Plan and placement of light fixtures for the plant and the ancillary infrastructure in such a manner as to minimise glare and impacts on the surrounding area.	Developer/Owner Contractor	Planning.
Reduce the construction period as far as possible through careful planning and productive implementation of resources.	Developer/Owner Contractor	Pre-construction
Plan the placement of laydown areas and construction equipment camps in order to minimise vegetation clearing and impacts on identified sensitive areas.	Developer/Owner	Pre-construction
Should any amendment be made to the Layout, the revised layout plan for the entire PV facility must be submitted to the DEA for approval prior to commencement of construction.	Developer/Owner	Pre-construction
Fourteen (14) days written notice must be given to the Department that the activity will commence. The notification must include a date on which the activity will commence as well as the reference number.	Developer/Owner	Pre-construction
ECO to be appointed prior to the commencement of any authorised activities. Once appointed the	Developer/Owner	Pre-construction

Mitigation: Action/Control	Responsibility	Timeframe
name and contact details of the ECO must be submitted to the Director: Compliance Monitoring at the DEA.		
The terms of this EMP and the Environmental Authorisation must be included in all tender documentation and Contractors contracts.	Developer/Owner Contractor	Pre-construction
The procurement and design strategy of the project is required to implement technically feasible and cost-effective measures of reducing resource consumption and greenhouse gases, the measures of which should be communicated to all relevant staff members.	Developer/Owner Contractor	Planning & Design phase  Duration of project life cycle
All areas to be cleared should be clearly demarcated. Sensitive areas as demarcated on the sensitivity map should be avoided, and where such areas occur within or near the development area, they should be clearly demarcated as no-go areas. Only those individuals of protected plant species directly within the development footprint should be cleared. Sensitive areas with appropriate buffers at the site such as the washes should be demarcated at the site by an ecologist as part of the preconstruction activities for the site.	Developer/Owner ECO	Design review phase

<b>Performance Indicator</b>	<ul style="list-style-type: none"> <li>» The design meets the objectives and does not degrade the environment.</li> <li>» Demarcated sensitive areas are be avoided at all times</li> <li>» Design and layouts respond to the mitigation measures and recommendations in the Basic Assessment Report.</li> </ul>
<b>Monitoring</b>	<ul style="list-style-type: none"> <li>» Review of the design by the Project Manager and the Environmental Control Officer (ECO) prior to the commencement of construction.</li> </ul>

**OBJECTIVE 2: Ensure the selection of the best environmental option for the alignment of the, overhead power line, underground cabling and re-aligned access road**

Underground cables will be laid between the PV panels, the transformers, the switchgear. This will require the excavation of trenches within which they can then be laid. A new 33kV overhead power line linking the proposed on-site substation/operation building to the existing Eskom Schuitdrift Substation. The existing access road to the homestead and Eskom substation will be diverted to the immediate north and around the solar facility, outside the parameter security fence. This is done in order to avoid fragmenting the PV

arrays. The existing access roads do not need to be upgraded as they are in good condition. The site is directly accessible off the Southern Farm road, via farm access roads.

<b>Project Component/s</b>	<ul style="list-style-type: none"> <li>» Underground cabling.</li> <li>» Temporary internal access roads.</li> </ul>
<b>Potential Impact</b>	<ul style="list-style-type: none"> <li>» Routes that degrade the environment unnecessarily, particularly with respect to loss of indigenous flora, and erosion.</li> </ul>
<b>Activities/Risk Sources</b>	<ul style="list-style-type: none"> <li>» Alignment of underground cabling.</li> <li>» Alignment of power line.</li> <li>» Alignment of new temporary access roads.</li> </ul>
<b>Mitigation: Target/Objective</b>	<ul style="list-style-type: none"> <li>» Ensure selection of best environmental option for alignment for the linear infrastructure.</li> <li>» Environmental sensitivities are taken into consideration and avoided as far as possible, thereby mitigating potential impacts.</li> </ul>

<b>Mitigation: Action/Control</b>	<b>Responsibility</b>	<b>Timeframe</b>
Select an alignment for the underground cabling, overhead power line and any new temporary access roads that curtails environmental impacts and enhances environmental benefits.	The developer and Contractor	Prior to submission of the final construction layout plan
Consider design level mitigation measures recommended by the specialists as detailed within the Basic Assessment Report and relevant appendices.	Contractor	Design

<b>Performance Indicator</b>	<ul style="list-style-type: none"> <li>» Underground cabling, overhead power lines and new temporary access road alignments meet environmental objectives.</li> <li>» Selected linear alignments that minimise any negative environmental impacts and maximise any benefits.</li> </ul>
<b>Monitoring</b>	<ul style="list-style-type: none"> <li>» Ensure that the design implemented meets the objectives and mitigation measures in the Basic Assessment Report through review of the design by the Project Manager, and the ECO prior to the commencement of construction.</li> </ul>

### **OBJECTIVE 3: Minimise stormwater runoff and subsequent alteration of the local hydrological regime**

<b>Project Component/s</b>	<ul style="list-style-type: none"> <li>» Stormwater management components.</li> <li>» All hard engineered surfaces (i.e. new access roads).</li> </ul>
<b>Potential Impact</b>	<ul style="list-style-type: none"> <li>» Poor stormwater management and alteration of the hydrological regime..</li> </ul>
<b>Activities/Risk Sources</b>	<ul style="list-style-type: none"> <li>» Construction of the facility (i.e. placement of hard engineered surfaces).</li> </ul>
<b>Mitigation: Target/Objective</b>	<ul style="list-style-type: none"> <li>» Appropriate management of stormwater to minimise impacts on the environment.</li> </ul>

Mitigation: Action/Control	Responsibility	Timeframe
Appropriately plan hard-engineered erosion protection structures.	Developer/Owner Contractor	Planning and design
Design an appropriate storm water management plan for implementation during construction and operation. This plan must ensure the suitable handling of stormwater within the site (i.e. clean and dirty water streams around the PV facility).	The developer and Contractor	Planning and design
Construction must include appropriate design measures that allow surface and sub-surface movement of water along washes so as not to impede natural surface and subsurface flows. Drainage measures must promote the dissipation of stormwater runoff.	The developer and Contractor	Planning and design

<b>Performance Indicator</b>	» Appropriate storm water management plan developed for implementation prior to commencement of construction
<b>Monitoring</b>	» Surface water quality monitoring plan.

#### OBJECTIVE 4: To ensure effective communication mechanisms

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

<b>Project component/s</b>	<ul style="list-style-type: none"> <li>» PV Panels.</li> <li>» Access roads (i.e. temporary single lane access tracks)</li> <li>» Overhead distribution power line</li> <li>» Underground cabling.</li> <li>» Associated buildings (i.e. workshop).</li> </ul>
<b>Potential Impact</b>	» Impacts on affected and surrounding landowners and land uses
<b>Activity/risk source</b>	<ul style="list-style-type: none"> <li>» Activities associated with solar PV facility construction</li> <li>» Activities associated with solar PV facility operation</li> </ul>
<b>Mitigation: Target/Objective</b>	<ul style="list-style-type: none"> <li>» Effective communication with affected and surrounding landowners</li> <li>» Addressing of any issues and concerns raised as far as possible in as short a timeframe as possible</li> </ul>

Mitigation: Action/control	Responsibility	Timeframe
Compile and implement a grievance mechanism procedure for the public (following the guidelines of the grievance mechanism in <b>Appendix B</b> ) to be implemented during both	Developer/Owner Contractor O&M Contractor	Pre-construction

Mitigation: Action/control	Responsibility	Timeframe
the construction and operational phases of the facility. This procedure should include details of the contact person who will be receiving issues raised by interested and affected parties, and the process that will be followed to address issues.		(construction procedure) Pre-operation (operation procedure)
Develop and implement a grievance mechanism for the construction, operational and closure phases of the project for all employees, contractors, subcontractors and site personnel. This procedure should be in line with the South African Labour Law.	Developer/Owner Contractor O&M Contractor	Pre-construction (construction procedure) Pre-operation (operation procedure)
Liaison with landowners is to be undertaken prior to the commencement of construction in order to provide sufficient time for them to plan agricultural activities.	Developer/Owner Contractor O&M Contractor	Pre-construction
Before construction commences, representatives from the local municipality, community leaders, community-based organisations and the surrounding property owners (of the larger area), should be informed of the details of the contractors, size of the workforce and construction schedules.	Developer/Owner Contractor	Pre-construction and construction

<b>Performance Indicator</b>	» Effective communication procedures in place.
<b>Monitoring</b>	<ul style="list-style-type: none"> <li>» A Public Complaints register must be maintained, by the Contractor and monitored by the ECO, to record all complaints and queries relating to the project and the action taken to resolve the issue.</li> <li>» All correspondence should be in writing.</li> <li>» The developer and contractor must keep a record of local recruitments and information on local labour to be shared with the ECO for reporting purposes.</li> </ul>

**OBJECTIVE 5: Ensure that all relevant personnel and staff are familiar with the provisions of the EMP, as well as the conditions of the Environmental Authorisation and environmental preservation**

It is recommended that a pre-construction environmental compliance workshop be undertaken before any construction commences on site. This workshop can be combined with a site handover meeting, but must take place before any activities take place on site and before any plant is moved onto site. Furthermore, all construction workers should receive an induction presentation, as well as **on-going** environmental education,



awareness and training on the importance and implications of the EMP and the environmental requirements it prescribes. The presentation must be conducted, as far as is possible, in the employees' language of choice. The contractor should provide a translator from their staff for the purpose of translating should this be necessary.

<b>Project Component/s</b>	<ul style="list-style-type: none"> <li>» All components and activity impacts mentioned in the EMPr</li> <li>» All components and activity impacts mentioned in the Basic Assessment</li> </ul>
<b>Potential Impact</b>	<ul style="list-style-type: none"> <li>» Positive impact on creating project awareness</li> <li>» Skills improvement</li> <li>» Project compliance</li> </ul>
<b>Activities/Risk Sources</b>	<ul style="list-style-type: none"> <li>» Compliance workshop</li> <li>» Slide presentations</li> <li>» on-going environmental education &amp; awareness training</li> </ul>
<b>Mitigation: Target/Objective</b>	<ul style="list-style-type: none"> <li>» Ensure</li> <li>» Environmental sensitivities are taken into consideration and avoided as far as possible, thereby mitigating potential impacts.</li> </ul>

<b>Mitigation: Action/Control</b>	<b>Responsibility</b>	<b>Timeframe</b>
Provision should be made in contract and tender documentation to attend a 6 hour workshop that will be chaired by the ECO.	<ul style="list-style-type: none"> <li>» The ECO</li> <li>» The Main Civil Contractor (including contract manager, site agent and foreman)</li> <li>» The Electrical Contractor (including contract manager, site agent and foreman)</li> <li>» The Consulting Engineers (electrical, civil and structural, whichever applicable)</li> <li>» Project Management.</li> </ul>	Prior to submission of the final construction layout plan
Induction training must ensure that construction workers/staff understand that no form of wildlife poaching, collecting or other form of disturbance will be permitted on the construction site or the adjacent areas.	ECO	Prior to the commencement of construction

<b>Performance Indicator</b>	<ul style="list-style-type: none"> <li>» Staff Performance</li> <li>» Staff adherence</li> <li>» Staff attendance</li> <li>» Staff turn over</li> </ul>
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	<ul style="list-style-type: none"><li>» Ensure that the design implemented meets the objectives and mitigation measures in the Basic Assessment Report</li><li>» The contractor must keep records of all environmental training sessions, including names, dates and the information presented. Details of the environmental induction are also to be included in the environmental control reports.</li></ul>
<b>Monitoring</b>  <b>As a minimum, ongoing training should include:</b>	<ul style="list-style-type: none"><li>» Explanation of the importance of complying with the EMP;</li><li>» Explanation of the importance of complying with the Environmental Authorisation;</li><li>» Discussion of the potential environmental impacts of construction activities;</li><li>» The benefits of improved personal performance;</li><li>» Employees' roles and responsibilities, including emergency preparedness (this should be combined with this induction, but presented by the contractors Health and Safety Representative);</li><li>» Explanation of the mitigation measures that must be implemented when carrying out their activities; and</li><li>» Explanation of the specifics of this EMP and its specification (no-go areas, etc.)</li></ul>

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

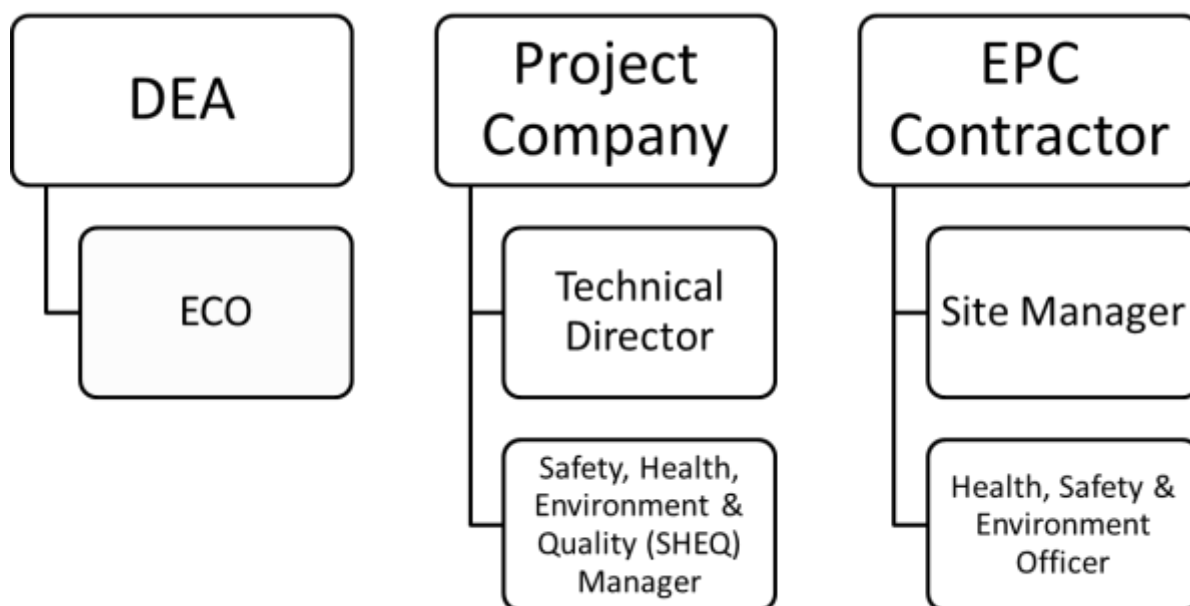
- » Ensures that construction activities are appropriately managed in respect of environmental aspects and impacts.
- » Enables construction activities to be undertaken without significant disruption to other land uses and activities in the area, in particular concerning noise impacts, farming practices, traffic and road use, and effects on local residents.
- » Minimises the impact on the indigenous natural vegetation, and habitats of ecological value.
- » Minimises impacts on fauna (including birds) in the study area.
- » Minimises the impact on heritage sites should they be uncovered.
- » Establishes an environmental baseline during construction activities on the site, where possible.

### **7.1. Institutional Arrangements: Roles and Responsibilities for the Construction Phase**

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

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

Formal responsibilities are necessary to ensure that key procedures are executed. Specific responsibilities of the Technical Director/Manager; Site Manager; Internal Environmental Officer, Safety and Health Representative; Independent Environmental Control Officer (ECO) and Contractor for the construction phase of this project are as detailed below. Formal responsibilities are necessary to ensure that key procedures are executed. **Figure 4** provides an organogram indicating the organisational structure for the implementation of the EMPr.



**Figure 4:** Organisational structure for the implementation of the EMPr

**Construction Manager** will:

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

**Site Manager** (The Contractors' on-site Representative) will:

- » Be fully knowledgeable with the contents of the EIA and risk management.
- » Be fully knowledgeable with the contents and conditions of the Environmental Authorisation.
- » Be fully knowledgeable with the contents of the EMPr.
- » Be fully knowledgeable with the contents of all relevant environmental legislation, and ensure compliance with these.
- » Have overall responsibility of the EMPr and its implementation.
- » Conduct audits to ensure compliance to the EMPr.

- » Ensure there is communication with the Technical Director, the ECO, the Internal Environmental Officer and relevant discipline engineers on matters concerning the environment.
- » Be fully knowledgeable with the contents of all relevant licences and permits.
- » Ensure that no actions are taken which will harm or may indirectly cause harm to the environment, and take steps to prevent pollution on the site.
- » Confine activities to the demarcated construction site.

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

- » Be fully knowledgeable with the contents with the EIA.
- » Be fully knowledgeable with the contents with the conditions of the Environmental Authorisation.
- » Be fully knowledgeable, maintain, update and review the EMPr.
- » Be fully knowledgeable of all the licences and permits issued to the site.
- » Be fully knowledgeable with the contents with all relevant environmental legislation, and ensure compliance with them.
- » Provide environmental induction training to contractors on site prior to commencing of construction activities
- » Engineers Representative (with input from the ECO) has the authority to stop work on site if he / she consider that any actions of excessive non-compliance of the EMP, authorisations or General Duty of Care are taking place
- » Ensure that the contents of this document are communicated to the Contractor site staff and that the Site Manager and Contractor are constantly made aware of the contents through discussion.
- » Ensure that the compliance of the EMPr, EA and the legislation is monitored through regular and comprehensive inspection of the site and surrounding areas.
- » Compilation of the Environmental Audit Report or Environmental Completion Statement, six months after completion of construction or at a frequency in compliance with the Environmental Authorisation. Reports should be submitted to the relevant authority and the Project Proponent
- » Monitoring and verification must be implemented to ensure that environmental impacts are kept to a minimum, as far as possible.
- » Ensure that the Site Manager has input into the review and acceptance of construction methods and method statements.
- » Keep record of all activities on site, problems identified, transgressions noted and a task schedule of tasks undertaken by the ECO. Reports should be submitted to the relevant authority on a monthly basis

- » Ensure that the compilation of progress reports for submission to the Technical Director, with input from the Site Manager, takes place on a regular basis, including a final post-construction audit.
- » Ensure that there is communication with the Site Manager regarding the monitoring of the site.
- » Attendance of contractors site meetings
- » ECO site inspections to be undertaken once a month to ensure compliance with the EMP. The duration of these visits may be increased or decreased at the discretion of the ECO in consultation with the Engineers Representative
- » Submit independent reports to the DEA and other regulating authorities regarding compliance with the requirements of the EMPr, EA and other environmental permits.

As a general mitigation strategy, the Environmental Control Officer (ECO) should be present for the site preparation and initial clearing activities to ensure the correct demarcation of no-go areas, facilitate environmental induction with construction staff and supervise any flora relocation and faunal rescue activities that may need to take place during the site clearing (i.e. during site establishment, and excavation of foundations). Thereafter weekly site compliance inspections would probably be sufficient. However, in the absence of the ECO there should be a designated owner's environmental officer present to deal with any environmental issues that may arise such as fuel or oil spills. The ECO shall remain employed until all rehabilitation measures, as required for implementation due to construction damage, are completed and the site handed over for operation.

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

- » Must be fully knowledgeable on all environmental features of the construction site and the surrounding environment.
- » Be fully knowledgeable with the contents with the conditions of the Environmental Authorisation.
- » Be fully knowledgeable with the contents with the EMPr.
- » Be fully knowledgeable of all the licences and permits issued to the site.
- » Ensure a copy of the Environmental Authorisation and EMPr must be easily accessible to all on-site staff members.
- » Ensure contractor employees are familiar with the requirements of this EMPr and the environmental specifications as they apply to the construction of the proposed facility.

- » Ensure that prior to commencing any site works, all contractor employees and sub-contractors must have attended an environmental awareness included in the induction training which must provide staff with an appreciation of the project's environmental requirements, and how they are to be implemented.
- » Ensure that any complaints received from the public are duly recorded and forwarded to the Site Manager and Contractor
- » Manage the day-to-day on-site implementation of this EMPr, and for the compilation of regular (usually weekly) Monitoring Reports.
- » Keep record of all activities on site, problems identified, transgressions noted and a task schedule of tasks undertaken, including those of the Independent ECO.
- » Staff will be informed of environmental issues as deemed necessary by the Independent ECO.

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

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

**Environmental Site Agent (ESA):** An environmental site agent should be appointed for the duration of the construction period of the Solar project. The Terms of Reference for the Environmental Site Agent (ESA) include, but are not limited to the following:

- » To ensure compliance with the Environmental Management Programme and Environmental Authorisation
- » The ESA is required to be on site for an estimated 4 hours per day, which may be reviewed by the ECO, ESA and the applicant as construction requirements dictate
- » Assisting the contractor with environmental induction of the contractors

- » Attending all on site construction meetings (including, but not limited to, technical and contractors meetings)
- » Providing the ECO with a weekly compliance report in a format defined by the ECO
- » Developing and maintaining a detailed photographic site record throughout the construction phase of the project
- » Maintaining a register of all site instructions
- » Maintaining file records of all method statements provided by the contractors;
- » Management and ensuring contractor implementation with the environmental rehabilitation plan (still to be developed)
- » Revision and updating the EMP in conjunction with the ECO, if and when required;
- » Maintain a record of environmental incidents (e.g. spills, impacts, legal transgressions etc.) as well as corrective and preventative measures taken. This information must also be included in the weekly reports
- » Maintain a public complaints register in which all complaints and action taken / responses must be recorded. This information must also be included in the ECR;
- » In the event that the ESA observes non-compliance that requires a "stop work" order, the ECO must immediately be informed and will request the Engineers Representative to issue such an order.



## 7.2. Objectives

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

### OBJECTIVE 2: Minimise impacts related to inappropriate site establishment

The Contractor must take all reasonable measures to ensure the safety of the public in the surrounding area. Where the public could be exposed to danger by any of the works or site activities, the contractor must, as appropriate, provide suitable flagmen, barriers and/or warning signs in English, Afrikaans and any other relevant local languages, all to the approval of the Site Manager.

All unattended open excavations shall be adequately demarcated and/or fenced (fencing shall consist of a minimum of three strands of wire wrapped with danger tape). Adequate protective measures must be implemented to prevent unauthorised access to the working area and the internal access/haul routes.

<b>Project Component/s</b>	<ul style="list-style-type: none"> <li>» Area infrastructure (i.e. PV panels, transformers, switchgear and ancillary buildings).</li> <li>» Linear infrastructure (i.e. underground cabling, overhead power lines and existing access road re-alignment and fencing).</li> </ul>
<b>Potential Impact</b>	<ul style="list-style-type: none"> <li>» Hazards to landowners and public.</li> <li>» Damage to indigenous natural vegetation, due largely to ignorance of where such areas are located.</li> <li>» Loss of threatened plant species.</li> </ul>
<b>Activities/Risk Sources</b>	<ul style="list-style-type: none"> <li>» Any unintended or intended open excavations (foundations and cable trenches).</li> <li>» Movement of construction vehicles in the area and on-site.</li> </ul>
<b>Mitigation: Target/Objective</b>	<ul style="list-style-type: none"> <li>» To secure the site against unauthorised entry.</li> <li>» To protect members of the public/landowners/residents.</li> <li>» No loss of or damage to sensitive vegetation in areas outside the immediate development footprint.</li> </ul>

<b>Mitigation: Action/Control</b>	<b>Responsibility</b>	<b>Timeframe</b>
Secure site, working areas and excavations in an appropriate manner, as agreed with the ECO.	Contractor	Site establishment, and duration of construction
Where necessary control access, fence, and secure area.	Contractor	Site establishment, and duration of construction

<b>Mitigation: Action/Control</b>	<b>Responsibility</b>	<b>Timeframe</b>
Adequate protective measures must be implemented to prevent unauthorised access to the working area and the internal access routes.	Contractor	Site establishment, and duration of construction
Fence and secure contractor's equipment camp.	Contractor	Site establishment
The electrical fencing should be constructed in manner which allows for the passage of small and medium sized mammals. Steel palisade fencing (20 cm gaps min) is a good option in this regard as it allows most medium-sized mammals to pass between the bars, but remains an effective obstacle for humans. Alternatively, the lowest strand or bottom of the fence should be elevated to 15 cm above the ground at least at strategic places to allow for fauna to pass under the fence	Contractor	Site establishment
If electrified strands are to be use, there should be no strands within 20 cm of the ground because tortoises retreat into their shells when electrocuted and eventually succumb from repeated shocks	Contractor	Site establishment
The construction camp used to house equipment must be located in a disturbed area and must be screened off as far as practical during the entire construction phase.	Contractor	Erection: during site establishment Maintenance: for duration of Contract
Establish appropriately banded areas for storage of hazardous materials (i.e. fuel to be required during construction).	Contractor	Site establishment
All development footprints should be appropriately fenced off and clearly demarcated.	Contractor	Site establishment, and duration of construction
Establish the necessary ablution facilities with chemical toilets and provide adequate sanitation facilities and ablutions for construction workers (at least one sanitary facility for each sex and for every 30 workers as per the 2014 Construction Regulations; Section 30(1) (b)) at appropriate locations on site).	Contractor	Site establishment, and duration of construction
Ablution or sanitation facilities should not be located within 100 m from a watercourse or within the 1:100 year flood line.	Contractor	Site establishment, and duration of construction
Supply adequate weather and vermin proof waste collection bins and skips (covered at minimum with secured netting or shade cloth) at site where construction is being undertaken. Separate bins should be provided for general and hazardous	Contractor	Site establishment, and duration of construction

Mitigation: Action/Control	Responsibility	Timeframe
waste. As far as possible, provision should be made for separation of waste for recycling.		

<b>Performance Indicator</b>	<ul style="list-style-type: none"> <li>» Site is secure and there is no unauthorised entry.</li> <li>» No members of the public/ landowners injured.</li> <li>» Appropriate and adequate waste management and sanitation facilities provided at construction site.</li> </ul>
<b>Monitoring</b>	<ul style="list-style-type: none"> <li>» An incident reporting system will be used to record non-conformances to the EMPr.</li> <li>» ECO to monitor all construction areas on a continuous basis until all construction is completed. Non-conformances will be immediately reported to the site manager.</li> </ul>

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

Approximately 100 people are expected to be required during the construction phase which is expected to take place over a period of 6 months. Of these 100 people, require the 10% are skilled experts, 10 % are semi-skilled and 80% are low skilled staff. Staff can be transported around the site using utility vehicles and a typical mini bus to transport staff from nearby towns of Pofadder and Kakamas as well as from the surrounding community of Augrabies which is closest to the site.

Only security personnel will be accommodated on site and will be deployed on a shift basis. Contractors and their employees are expected to be accommodated at existing accommodation facilities in the study area or within an appropriately sited construction camp. Construction equipment will need to be stored at appropriate locations on site.

In order to minimise impacts on the surrounding environment, contractors must be required to adopt a certain Code of Conduct and commit to restricting construction activities to areas within the development footprint. Contractors and their sub-contractors must be familiar with the conditions of the Environmental Authorisation, the BA Report, and this EMPr, as well as the requirements of all relevant environmental legislation.

<b>Project Component/s</b>	<ul style="list-style-type: none"> <li>» PV facility.</li> <li>» Contractors' camp.</li> <li>» Laydown areas.</li> <li>» Access roads</li> <li>» Power lines.</li> </ul>
<b>Potential Impact</b>	<ul style="list-style-type: none"> <li>» Damage to indigenous natural vegetation and sensitive areas.</li> <li>» Damage to and/or loss of topsoil (i.e. pollution, compaction etc.).</li> <li>» Impacts on the surrounding environment due to inadequate sanitation and waste removal facilities.</li> </ul>

	» Pollution/contamination of the environment.
<b>Activities/Risk Sources</b>	<ul style="list-style-type: none"> <li>» Vegetation clearing and levelling of equipment storage area/s.</li> <li>» Access to and from the equipment storage area/s.</li> <li>» Ablution facilities.</li> <li>» Accommodation facilities.</li> <li>» Contractors not aware of the requirements of the EMPr, leading to unnecessary impacts on the surrounding environment.</li> </ul>
<b>Mitigation: Target/Objective</b>	<ul style="list-style-type: none"> <li>» Limit equipment storage within demarcated designated areas.</li> <li>» Ensure adequate sanitation facilities and waste management practices.</li> <li>» Ensure appropriate management of actions by on-site personnel in order to minimise impacts to the surrounding environment.</li> </ul>

<b>Mitigation: Action/Control</b>	<b>Responsibility</b>	<b>Timeframe</b>
No vehicles to refuel within washes/ riparian vegetation.	Contractor	Construction
The siting of the construction equipment camp/s must take cognisance of any sensitive areas identified by the Basic Assessment studies. The location of this construction equipment camp/s must be approved by the project ECO.	Contractor	Pre-construction
As far as possible, minimise vegetation clearing and levelling for equipment storage areas.	Contractor	Site establishment, and during construction
Road borders must be regularly maintained to ensure that vegetation remains short to serve as an effective firebreak. An emergency fire plan (refer to <b>Appendix F</b> ) to be developed with emergency procedures in the event of a fire.	Contractor	Erection: during site establishment  Maintenance: duration of contract
Rehabilitate all disturbed areas at the construction equipment camp as soon as construction is complete within an area.	Contractor	Duration of Contract
Ensure waste storage facilities are maintained and emptied on a regular basis.	Contractor	Site establishment, and duration of construction
No liquid waste, including grey water, may be discharged into any water body or drainage line. All sewage disposal to take place at a registered and operational wastewater treatment works. Proof of disposal to be retained as proof of responsible disposal	Contractor	Maintenance: duration of contract within a particular area
The terms of this EMPr and the Environmental Authorisation (once issued) must be included in all tender documentation and Contractors contracts.	Proponent	Tender process
Ensure that all personnel have the appropriate level of environmental awareness and competence to ensure continued environmental due diligence and on-going minimisation of	Contractor	Duration of construction

Mitigation: Action/Control	Responsibility	Timeframe
environmental harm. This can be achieved through the provision of appropriate environmental awareness training to all personnel. Records of all training undertaken must be kept.		
Ensure compliance with all national, regional and local legislation with regard to the storage, handling and disposal of hydrocarbons, chemicals, solvents and any other harmful and hazardous substances and materials.	Contractor	During construction.
Ensure ablution facilities are appropriately maintained. Ablutions must be cleaned regularly and associated waste disposed of at a registered/permitted waste disposal site. Ablutions must be removed from site when construction is completed.	Contractor and sub-contractor/s	Duration of contract
Cooking and eating of meals must take place in a designated area. No fires are allowed on site. No firewood or kindling may be gathered from the site or surrounds.	Contractor and sub-contractor/s	Duration of contract
All litter must be deposited in a clearly marked, closed, animal-proof disposal bin in the construction area. Particular attention needs to be paid to food waste.	Contractor and sub-contractor/s	Duration of contract
Keep a record of all hazardous substances stored on site. Clearly label all the containers storing hazardous waste.	Contractor	Duration of contract
Ensure waste containers are maintained and emptied as and when required.	Contractor	Site establishment, and duration of construction
A Method Statement should be compiled for the management of pests and vermin within the site, specifically relating to the canteen area if applicable.	Contractor	Construction
No one other than the ECO or personnel authorised by the ECO may disturb flora or fauna outside of the demarcated construction area/s.	Contractor and sub-contractor/s	Duration of contract
No open fires are permitted on site and construction personnel must be made aware of the consequences of starting a fire on site to avoid damage to neighbouring farms.	Contractor and sub-contractor/s	Duration of contract
Fire-fighting equipment and training must be provided before the construction phase commences.	Contractor and sub-contractor/s	Duration of contract
Contractors must ensure that all workers are informed at the outset of the construction phase of the conditions contained on the Code of Conduct, specifically consequences of stock theft and trespassing on adjacent farms.	Contractor and sub-contractor/s	Pre-construction
On completion of the construction phase, all construction workers must leave the site within one week of their contract ending.	Contractor and sub-contractor/s	Construction

**Performance Indicator**

» The construction camps have avoided sensitive areas, as approved by the ECO.

	<ul style="list-style-type: none"> <li>» Ablution and waste removal facilities are in a good working order and do not pollute the environment due to mismanagement.</li> <li>» All areas are rehabilitated promptly after construction in an area is complete.</li> <li>» Excess vegetation clearing and levelling is not undertaken.</li> <li>» No complaints regarding contractor behaviour or habits.</li> <li>» Appropriate training of all staff is undertaken prior to them commencing work on the construction site.</li> <li>» Code of Conduct drafted before commencement of construction phase.</li> </ul>
<b>Monitoring</b>	<ul style="list-style-type: none"> <li>» Regular audits of the construction camps and areas of construction on site by the ECO.</li> <li>» Proof of disposal of sewage at an appropriate licensed wastewater treatment works.</li> <li>» Proof of disposal of waste at an appropriate licensed waste disposal facility.</li> <li>» An incident reporting system should be used to record non-conformances to the EMPr.</li> <li>» Observation and supervision of Contractor practices throughout construction phase by the ECO.</li> <li>» Complaints will be investigated and, if appropriate, acted upon.</li> <li>» An incident reporting system will be used to record non-conformances to the EMPr.</li> </ul>

**OBJECTIVE 4: Maximise local employment and business opportunities associated with the construction phase**

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

<b>Project Component/s</b>	» Construction activities associated with the establishment of the PV facility.
<b>Potential Impact</b>	» The opportunities and benefits associated with the creation of local employment and business should be maximised.
<b>Activities/Risk Sources</b>	<ul style="list-style-type: none"> <li>» Contractors who make use of their own labour for unskilled tasks, thereby reducing the employment and business opportunities for locals.</li> <li>» The inflow of various specialists from outside the study area and even abroad.</li> <li>» Sourcing of individuals with skills similar to the local labour pool outside the municipal area.</li> </ul>

<b>Enhancement: Target/Objective</b>	» The developer should aim to employ as many low-skilled and semi-skilled workers from the local area as possible. This should also be made a requirement for all contractors.
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Mitigation: Action/Control	Responsibility	Timeframe
Employment of local community members (i.e. source labour from within the municipal area focused on the communities in closest proximity to the site) should be undertaken where possible.	The developer, Local Municipality, Contractor	Duration of construction
A broad-based approach should be followed to identify and involve relevant organisations which could assist the main contractor and developer in identifying people whose skills may correspond with the required job specifications.	The developer, Local Municipality, Contractor	Pre-construction
An equitable process should be promoted whereby locals and previously disadvantaged individuals (including women) are considered for employment opportunities.	The developer, and Local Municipality	Duration of construction
Create conditions that are conducive for the involvement of entrepreneurs, small businesses, and SMMEs during the construction process.	The developer, Local Municipality, Contractor	Pre-construction
Identify potential opportunities for local businesses.	Proponent	Pre-construction
Tender documentation (if any are required) should contain guidelines for the involvement of labour, entrepreneurs, businesses, and SMMEs from the local sector.	The developer, Contractor	Pre-construction
A local labour desk should be set-up (if not already established) in the beneficiary communities to co-ordinate the process of involving local labour.	The developer, and Contractor	Pre-construction
Skills training and capacity building should be embarked upon from the onset of the construction phase and even prior to the construction phase if possible (as mentioned above)	The developer, and Contractor	Pre-construction and construction
Communication efforts concerning job creation opportunities should refrain from creating unrealistic expectations.	The developer	Pre-construction and construction

<b>Performance Indicator</b>	<ul style="list-style-type: none"> <li>» Job opportunities, especially of low to semi-skilled positions, are primarily awarded to members of local communities as appropriate.</li> <li>» Locals and previously disadvantaged individuals (including women) are considered during the hiring process.</li> <li>» SMMEs are awarded contracts, where possible, during the construction phase.</li> </ul>
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	<ul style="list-style-type: none"> <li>» Labour, entrepreneurs, businesses, and SMMEs from the local sector are awarded jobs, where possible, based on requirements in the tender documentation.</li> <li>» The involvement of local labour is promoted.</li> <li>» Reports are not made from members of the local communities regarding unrealistic employment opportunities or that only outsiders were employed.</li> <li>» Employment and business policy document that sets out local employment and targets completed before construction phase commences.</li> </ul>
<b>Monitoring</b>	<ul style="list-style-type: none"> <li>» Monitor indicators listed above to ensure that they have been met for the construction phase.</li> <li>» The developer and EPC contractor must keep a record of local recruitments and information on local labour to be shared with the ECO for reporting purposes.</li> </ul>

**OBJECTIVE 5: Maximise capacity building and skills training, and address economic inequities within the study area**

As the construction phase would involve unskilled, semi-skilled, and skilled workers, it is likely that locals could be sourced for the unskilled and semi-skilled positions. Due to the high unemployment figures in the study area, it is clear that there would be various unemployed persons in search of employment, even if they can only secure temporary positions. For the lower level skilled positions, outsiders would thus definitely not have to be externally sourced. Even though all that would be employed might not have the necessary applicable skills, this issue could be addressed through proper focussed skills training and capacity building initiatives after locals have been sourced, but prior to construction activities starting.

<b>Project Component/s</b>	» Availability of required skills in the local communities.
<b>Potential Impact</b>	» The opportunities and benefits associated with the creation of local employment and business could be maximised.
<b>Activities/Risk Sources</b>	<ul style="list-style-type: none"> <li>» Unavailability of locals with the required skills resulting in locals not being employed and labour being sourced from outside the municipal area.</li> <li>» Higher skilled positions might be sourced internationally.</li> </ul>
<b>Mitigation: Target/Objective</b>	<ul style="list-style-type: none"> <li>» Employment of a maximum number of the low-skilled and/or semi-skilled workers from the local area where possible.</li> <li>» Appropriate skills training and capacity building</li> </ul>



Mitigation: Action/Control	Responsibility	Timeframe
The developer, in discussions with the local municipality, should aim to employ a maximum number of the low-skilled and/or semi-skilled workers from the local area where possible.	The developer, Contractor, and Local Municipality	Duration of construction
A broad-based approach should be followed to identify and involve relevant organisations in identifying people whose skills may correspond with the job specifications.	Contractor, and Local Municipality	Pre-construction
In cases for the semi-skilled jobs, where the relevant skills do not exist, training should be provided to willing local community members to enable them to fill the positions.	The developer, Contractor, and Local Municipality	Duration of construction
A proactive consultative skills-audit should be undertaken in the local communities where job creation is currently a significant need.	The developer, and Local Municipality	Pre-construction, and construction
Appropriate training should be provided as per a decided upon skills development plan (refer back to pre-construction objective to narrow the gap between skills and demand. It is preferable that training be of such a nature that the skills thereby acquired are transferable and of real benefit in other employment contexts.	The developer, and Local Municipality	Pre-construction, and construction

<b>Performance Indicator</b>	<ul style="list-style-type: none"> <li>» A skills development plan is developed.</li> <li>» Job opportunities, especially of lower skilled positions, are primarily awarded to members of local communities.</li> <li>» Skills training and capacity building initiatives are developed and implemented.</li> <li>» Local SMMEs and/or entrepreneurs awarded the opportunity to become involved in the tender process.</li> </ul>
<b>Monitoring</b>	<ul style="list-style-type: none"> <li>» Developer and or appointed ECO must monitor indicators listed above to ensure that they have been implemented.</li> </ul>

### OBJECTIVE 6: Minimise the impact of the inflow of an outside workforce and job seekers into the study area

The inflow of jobseekers to the proposed site would be the greatest during the peak construction period of the PV facility, but also when the construction activities of the other large construction projects are becoming less intensive. Other possible negative impacts due to the workforce's presence in the area and especially when jobseekers come to the area would include misconduct of workers, trespassing of workers on privately owned farms, the possible increase in crime, littering, increase in traffic, increase in noise, the development of informal vending stations, and poaching of livestock.

<b>Project Component/s</b>	» Inflow of an outside workforce and jobseekers.
<b>Potential Impact</b>	» The inflow of outsiders and jobseekers could result in negative impacts on the surrounding property owners and local communities, and could even lead to conflict between the locals and these outsiders.
<b>Activities/Risk Sources</b>	<p>» Outside workforce and jobseekers come into conflict with locals, their presence leads to environmental pollution and possibility of them remaining in the area (without proper housing facilities) after construction has ceased. This would put additional pressure on the existing infrastructure and services.</p> <p>» Locals are not employed, which would increase the probability of the impacts of conflict occurring.</p>
<b>Mitigation: Target/Objective</b>	<p>» A limited number of outsiders employed.</p> <p>» Pro-active measures in place to deal with possible jobseekers.</p>

<b>Mitigation: Action/Control</b>	<b>Responsibility</b>	<b>Timeframe</b>
Implement a transparent approach and open consultation with adjacent property owners, prior and throughout the construction period in order to provide a platform where grievances or requests can be addressed before issues become contentious.	Contractor	Pre-construction, construction
Construction workers falling within the semi-skilled to unskilled category should be sourced from the local population where possible.	Contractor	Construction
Local labourers should remain at their existing residences.	Contractor	Construction
Before construction commences, representatives from the local municipality, community leaders, community-based organisations and the surrounding property owners (of the larger area), should be informed of the details of the contractors, size of the workforce and construction schedules.	The developer	Pre-construction, construction
On-site security should be active prior to the construction phase.	The developer	Pre- construction
Construction workers should be easily identifiable by wearing uniforms and even identity tags.	Contractor	Construction
Sufficient water and sanitation facilities should be provided for the workers on site during the construction phase.	Contractor	Construction
The construction site should be properly managed to avoid any environmental pollution (due to inadequate water, sanitation and waste infrastructure and services) and littering.	Contractor	Construction
The construction site should be appropriately fenced.	Contractor	Pre-construction

Mitigation: Action/Control	Responsibility	Timeframe
The applicant, local leaders, and the Local Municipality should jointly develop a strategy to minimise the influx of jobseekers to the area.	The developer, local leaders and Local Municipality	Pre-construction, construction
Informal vending stations should not be allowed on or near the construction site. Construction workers should preferably receive daily meals and beverages to avoid the need for a vending station.	Contractor	Construction
Information distributed as part of the existing HIV/Aids awareness campaigns in the area should again be focused on and communicated to the local workforce.	The developer, and Contractor	Construction
Develop a transparent communication and recruitment process to minimise the influx of jobseekers to the area.	The developer, and Contractor	Pre-construction
The recruitment process and the use of contractors should be clearly communicated to the local communities.	The developer	Pre-construction
The communication strategy should ensure that unrealistic employment expectations are not created.	The developer, and Contractor	Pre-construction, construction

<b>Performance Indicator</b>	<ul style="list-style-type: none"> <li>» Locals are employed where possible.</li> <li>» Reports are not made from members of the local communities regarding unrealistic employment opportunities and/or negative intrusions or even possible increase in crime.</li> <li>» Sound environmental management of the construction site.</li> <li>» No conflict between outsiders, jobseekers, and local community members.</li> </ul>
<b>Monitoring</b>	<ul style="list-style-type: none"> <li>» KSE and or appointed ECO must monitor indicators listed above to ensure that they have been implemented.</li> </ul>

## OBJECTIVE 7: Minimise impacts related to traffic management and transportation of equipment and materials to site

The components will be transported to site (in sections and components). The following civil engineering construction equipment will be required on site (e.g. excavators, trucks, ready mix cement trucks, etc.) as well as components required for the establishment of the switchgear.

The impact of the heavy vehicles associated with the proposed PV facility could add to some of the pressure on the road capacity and road surface, although to a limited extent. The increase in heavy vehicle traffic during the construction phase is not anticipated to significantly impact on the daily living and movement patterns of residents or the

landowner when these vehicles move through town as the movement associated with this project would be of a limited and intermittent extent.

<b>Project Component/s</b>	» Delivery of any component required within the construction phase.
<b>Potential Impact</b>	<ul style="list-style-type: none"> <li>» Impact of heavy construction vehicles on road surfaces, and possible increased risk in accidents involving people and animals.</li> <li>» Traffic congestion, particularly on narrow roads or on road passes where overtaking is not permitted</li> <li>» Deterioration of road pavement conditions (both surfaced and gravel road) due to abnormal loads.</li> </ul>
<b>Activities/Risk Sources</b>	<ul style="list-style-type: none"> <li>» Construction vehicle movement.</li> <li>» Speeding on local roads.</li> <li>» Degradation of local road conditions.</li> <li>» Site preparation and earthworks.</li> <li>» Foundations or plant equipment installation.</li> <li>» Transportation of ready-mix concrete to the site.</li> <li>» Mobile construction equipment movement on-site.</li> </ul>
<b>Mitigation: Target/Objective</b>	<ul style="list-style-type: none"> <li>» Minimise impact of traffic associated with the construction of the facility on local traffic volumes, existing infrastructure, property owners, animals, and road users.</li> <li>» To minimise potential for negative interaction between pedestrians or sensitive users and traffic associated with the facility construction</li> <li>» To ensure all vehicles are roadworthy and all materials/equipment are transported appropriately and within any imposed permit/licence conditions</li> </ul>

<b>Mitigation: Action/Control</b>	<b>Responsibility</b>	<b>Timeframe</b>
<u>Compile and implement a construction period traffic management plan for the site access roads to ensure that no hazards would result from the increased truck traffic and that traffic flow would not be adversely impacted (refer to Appendix G). The plan must be submitted to the Department of Roads and Public Works prior to any construction activities</u>	<u>The developer and ECO</u>	<u>Pre-construction</u>
The traffic management plan is reflect (not necessarily all) the following: peak traffic levels expected during construction and include but not limited to: Normal dry/wet blading schedule, Special blading e.g. rip and recompact areas, Cutting of drainage swales areas, Regravelling of roads, Spot regravelling of powder potholes or mud potholes, Cleaning of drainage structures, Vegetational control, Road sign erection, replacement and washing if needed, and Maintenance of road signs	<u>The developer and ECO</u>	<u>Pre-construction</u>

<b>Mitigation: Action/Control</b>	<b>Responsibility</b>	<b>Timeframe</b>
The Applicant is to notify the Department prior to any execution. of any alterations and/or additional proposals		
Gravel roads should be sprayed with water to limit dust creation if economically feasible and reasonable from an environmental perspective (water scarce area), or an appropriate dust suppressant should be used.	Contractor and ECO	Construction
Access roads and entrances to the site should be carefully planned to limit any intrusion on the neighbouring property owners and road users.	The developer and ECO	Planning and design
Construction vehicles and those transporting materials and goods should be inspected by the contractor or a sub-contractor to ensure that these are in good working order and not overloaded.	Contractor	Construction
Strict vehicle safety standards should be implemented and monitored.	The developer, Contractor and ECO	Construction
A designated access to the proposed site must be used to ensure safe entry and exit.	Contractor	Pre-construction
No deviation from approved transportation routes must be allowed, unless roads are closed for whatever reason outside the control of the contractor.	Contractor	Duration of contract
Appropriate road management strategies must be implemented on external and internal roads with all employees and contractors required to abide by standard road and safety procedures.	Contractor (or appointed transportation contractor)	Pre-construction
Any traffic delays because of construction traffic must be co-ordinated with the appropriate authorities.	Contractor	Duration of contract
The movement of all vehicles within the site must be on designated roadways.	Contractor	Duration of contract
Signage must be established at appropriate points warning of turning traffic and the construction site (all signage to be in accordance with prescribed standards).	Contractor	Duration of contract
Appropriate maintenance of all vehicles of the contractor must be ensured.	Contractor	Duration of contract
All vehicles of the contractor travelling on public roads must adhere to the specified speed limits and all drivers must be in possession of an appropriate valid driver's license.	Contractor	Duration of contract
Keep any new hard road surfaces as narrow as possible.	Contractor	Duration of contract

<b>Performance Indicator</b>	<ul style="list-style-type: none"> <li>» Vehicles keeping to the speed limits.</li> <li>» Vehicles are in good working order and safety standards are implemented.</li> </ul>
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	<ul style="list-style-type: none"> <li>» Local residents and road users are aware of vehicle movements and schedules.</li> <li>» No construction traffic related accidents are experienced.</li> <li>» Local road conditions and road surfaces are up to standard.</li> <li>» Complaints of residents are not received (e.g. concerning the speeding of heavy vehicles).</li> </ul>
<b>Monitoring</b>	<ul style="list-style-type: none"> <li>» Developer and or appointed ECO must monitor indicators listed above to ensure that they have been implemented.</li> </ul>

### OBJECTIVE 8: Minimise the potential impact on health, safety and security

An inflow of workers could, as a worst case scenario and irrespective of the size of the workforce, pose some security risks. Criminals could also use the opportunity due to “outsiders” being in the area to undertake their criminal activities. Employing local community members could minimise the potential for criminal activity or perceived perception of an increase in criminal activity due to the presence of an outside workforce.

The actual safety of construction workers is also of concern. Further health and safety issues associated with the actual construction site include unauthorised entry to the site and construction areas, the usage of large equipment on site, the risks associated with the storage of equipment and material on site, as well as the increased risk of accidents due to the increased movement of construction vehicles on the local roads.

Other concerns relate to littering, unwanted behaviour of construction workers, transmission of Sexually Transmitted Diseases (STDs), environmental pollution, an increase risk in fires and so forth. Although such perceptions cannot be substantiated or be changed it should be sensitively dealt with. It is thus clear that even though the construction phase when these impacts could occur is only of a short duration, the effects of the impacts could remain in the medium term.

<b>Project Component/s</b>	<ul style="list-style-type: none"> <li>» Solar field.</li> <li>» Contractors’ camps.</li> <li>» Access roads</li> <li>» Laydown areas.</li> <li>» Inflow of workers could result in increased safety and security risks.</li> </ul>
<b>Potential Impact</b>	<ul style="list-style-type: none"> <li>» Outside workers are involved in criminal activities and/or fires occur.</li> </ul>
<b>Activities/Risk Sources</b>	<ul style="list-style-type: none"> <li>» Theft of construction material.</li> <li>» On-site accidents.</li> <li>» Spread of sexually transmitted diseases.</li> <li>» Littering and environmental pollution.</li> </ul>
<b>Mitigation: Target/Objective</b>	<ul style="list-style-type: none"> <li>» Employment of local labour should be maximised and strict security measures should be implemented at the construction site.</li> </ul>

<b>Mitigation: Action/Control</b>	<b>Responsibility</b>	<b>Timeframe</b>
Employing local community members could minimise the potential for criminal activity or perceived perception of an increase in criminal activity due to the presence of an outside workforce.	Contractor	Pre-construction
Screening of applicants could lessen perceived negative perceptions about the outside workforce.	Contractor	Pre- construction
On-site security should be active prior to the construction phase.	Contractor	Pre- construction
All staff should undergo a general Health and Safety induction and simplified environmental awareness training session	Contractor (and sub-contractor/s)	Duration of contract
Local community members and property owners should be informed of the presence of the outside workforce, the construction schedule, and movement of workers.	Developer/Owner and Contractor	Construction
Property owners, their workers, and local communities should be motivated to be involved in crime prevention and by reporting crimes.	Developer/Owner and Local communities	All phases of project
The construction site should be fenced and access to the area controlled.	Contractor	All phases of project
Informal vending stations should not be allowed on or near the construction site. Construction workers should preferably receive daily meals and beverages to avoid the need for a vending station.	Contractor	Construction
Procedures and measures to prevent, and in worst cases, attend to fires should be developed in consultation with the surrounding property owners and the Local Municipality	Developer/Owner, Local Municipality, and local communities	Pre- construction and when required
Contact details of emergency services should be prominently displayed on site.	Contractor	Construction
Appropriate fire-fighting equipment must be present on site and members of the workforce should be appropriately trained in using this equipment in the fighting of veld fires	Contractor	Construction
The construction site and accommodation facility should be properly managed to avoid any environmental pollution (due to inadequate water, sanitation and waste infrastructure and services) and littering.	Contractor	Construction
Construction activities should not interfere with the activities on surrounding properties.	Contractor	Construction

**Performance Indicator**

- » No criminal activities and theft of livestock attributable to the construction workforce are reported.'
- » Limited intrusions on surrounding property owners.

	<ul style="list-style-type: none"> <li>» No reports from property owners regarding problems with construction activities and workforce.</li> <li>» No fires or on-site accidents occur.</li> </ul>
<b>Monitoring</b>	<ul style="list-style-type: none"> <li>» The Owner, and appointed ECO must monitor indicators listed above to ensure that they have been implemented.</li> </ul>

### OBJECTIVE 9: Minimise the potential impact on the daily living and movement patterns

Changes or disruptions in the daily living and working activities of residents, especially the landowner (Stephanus Nel) is most likely to occur during the construction phase and are likely to include the following:

- » *Noise and dust pollution* - During the construction phase, limited gaseous or particulate emissions are anticipated from exhaust emissions from construction vehicles and equipment on-site, as well as vehicle entrained dust from the movement of vehicles on the site as well as main and internal access roads. The intensity of the negative impacts, would, however depend on the wind direction and timing of construction activities.
- » *Transportation routes* - The number of vehicular traffic resulting from the proposed project.

<b>Project Component/s</b>	<ul style="list-style-type: none"> <li>» Construction activities associated with the area and linear infrastructure.</li> <li>» Batching plant.</li> <li>» Vegetation clearing.</li> <li>» Delivery of any component required within the construction phase.</li> </ul>
<b>Potential Impact</b>	<ul style="list-style-type: none"> <li>» Impact of heavy construction vehicles on road surfaces, and possible increased risk in accidents involving people and animals.</li> <li>» Traffic congestion, particularly on narrow roads or on road passes where overtaking is not permitted.</li> <li>» Deterioration of road pavement conditions (both surfaced and gravel road) due to abnormal loads.</li> <li>» Possible increase in dust, noise, and general intrusion.</li> </ul>
<b>Activities/Risk Sources</b>	<ul style="list-style-type: none"> <li>» Clearing of vegetation and topsoil.</li> <li>» Excavation, grading, scraping, levelling, digging, drilling.</li> <li>» Transport of materials, equipment, and components on internal access roads.</li> <li>» Re-entrainment of deposited dust by vehicle movements.</li> <li>» Wind erosion from topsoil and spoil stockpiles and unsealed roads and surfaces.</li> </ul>



	» Fuel burning vehicle and construction engines.
<b>Mitigation: Target/Objective</b>	<ul style="list-style-type: none"> <li>» Limit any negative impacts on the surrounding property owners' daily living and movement patterns.</li> <li>» Minimise impact of traffic associated with the construction of the facility on local traffic volume, existing infrastructure, property owners, animals, and road users.</li> <li>» To minimise nuisance to the community from dust emissions and to comply with workplace health and safety requirements for the duration of the construction phase</li> </ul>

<b>Mitigation: Action/Control</b>	<b>Responsibility</b>	<b>Timeframe</b>
Adequate parking for all employees, contractors and sub-contractors will be made available and should not impact negatively on neighbouring farmers.	Contractor	Pre-construction and construction
Access roads and entrances to the site should be carefully planned to limit any intrusion on the neighbouring property owners and road users and to limit any accident risks. Additional access roads should be kept to a minimum.	Contractor	Pre-construction and construction
Source general construction material and goods locally where available to limit transportation over long distances.	Contractor	Construction
Local labourers should be used during the construction phase to limit the inflow of outsiders to the area.	Contractor	Construction
Construction activities should not interfere with the farming activities on surrounding properties.	Contractor	Construction
Compile and implement a traffic management plan (Refer to <b>Appendix G</b> for the site access roads to ensure that no hazards would result from the increased truck traffic and that traffic flow would not be adversely impacted.	Contractor	Pre-construction
Gravel roads and cleared areas should be sprayed with an appropriate dust suppressant, if deemed necessary, to limit dust creation.	Contractor	Construction
Construction vehicles and those transporting materials and goods should be inspected by the contractor or a sub-contractor to ensure that these are in good working order and not overloaded.	Contractor	Construction
Strict vehicle safety standards should be implemented and monitored.	Developer/Owner	Construction
All relevant permits for abnormal loads must be applied for from the relevant authority.	Contractor (or appointed transportation contractor)	Pre-construction

Mitigation: Action/Control	Responsibility	Timeframe
No deviation from approved transportation routes must be allowed, unless roads are closed for whatever reason outside the control of the contractor.	Contractor	Duration of contract
Appropriate road management strategies must be implemented on external and internal roads with all employees and contractors required to abide by standard road and safety procedures.	Contractor (or appointed transportation contractor)	Pre-construction
Any traffic delays because of construction traffic must be co-ordinated with the appropriate authorities.	Contractor	Duration of contract
The movement of all vehicles within the site must be on designated roadways.	Contractor	Duration of contract
Signage must be established at appropriate points warning of turning traffic and the construction site, identifying speed limits, travel restrictions, and other standard traffic control information. All signage to be in accordance with prescribed standards and must be appropriately maintained for the duration of the construction period.	Contractor	Duration of contract
Ensure that any damage to internal roads because of construction activities is repaired before completion of the construction phase.	Contractor	Duration of contract
Haul vehicles moving outside the construction site carrying material that can be wind-blown will be covered with suitable material.	Contractor	Duration of contract
Speed of construction vehicles must be restricted, as defined by the contractor.	Contractor	Duration of contract
Dust-generating activities or earthworks may need to be rescheduled or the frequency of application of dust control/suppressant increased during periods of high winds if visible dust is blowing toward nearby residences outside the site.	Contractor	Duration of contract

<b>Performance Indicator</b>	<ul style="list-style-type: none"> <li>» No complaints from affected residents or community regarding dust or vehicle emissions.</li> <li>» Dust does not cause health (inhaling, eye irritation) and safety risks (low visibility).</li> <li>» Dust suppression measures implemented for all heavy vehicles that require such measures during the construction phase commences.</li> <li>» Drivers made aware of the potential safety issues and enforcement of strict speed limits when they are employed.</li> <li>» All heavy vehicles equipped with speed monitors before they are used in the construction phase in accordance with South African vehicle legislation.</li> <li>» Road worthy certificates in place for all heavy vehicles at outset of construction phase and up-dated on a monthly basis.</li> </ul>
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	<ul style="list-style-type: none"> <li>» A complaints register must be maintained, in which any complaints from neighbouring farmers will be logged, and thereafter complaints will be investigated and, where appropriate, acted upon.</li> </ul>
<b>Monitoring</b>	<p>Monitoring must be undertaken to ensure emissions are not exceeding the prescribed levels via the following methods:</p> <ul style="list-style-type: none"> <li>» Immediate reporting by personnel of any potential or actual issues with nuisance dust or emissions to the Site Manager.</li> <li>» A complaints register must be maintained, in which any complaints from residents/the community will be logged, and thereafter complaints will be investigated and, where appropriate, acted upon.</li> <li>» An incident register and non-conformance must be used to record incidents and non-conformances to the EMPr.</li> <li>» A complaints register must be used to record grievances by the public.</li> </ul>

### OBJECTIVE 10: Minimisation of development footprint and disturbance of topsoil

In order to minimise impacts on flora, fauna, and ecological processes, the development footprint should be limited. In terms of best practice and for rehabilitation purposes, it is essential that a 150mm layer of topsoil from the building footprints (i.e. the on-site substation and contractor's site camp) be stripped and stockpiled **prior to the commencement of construction activities** in each area. For rehabilitation purposes, topsoil should be reused to mitigate disturbed areas and should therefore under no circumstances be mixed with sub-soils. Since the panels are to be installed using low impact pile installation, topsoil from underneath the panel arrays must be left in situ.

<b>Project Component/s</b>	<ul style="list-style-type: none"> <li>» PV Panels</li> <li>» Underground cabling</li> <li>» Ancillary buildings</li> <li>» Temporary access roads and the re-aligned road to the site</li> <li>» Short overhead power line connecting to the grid</li> </ul>
<b>Potential Impact</b>	<ul style="list-style-type: none"> <li>» Impacts on natural vegetation.</li> <li>» Loss of indigenous natural vegetation due to construction activities.</li> <li>» Impacts on soil.</li> <li>» Loss of topsoil</li> </ul>
<b>Activity/Risk Source</b>	<ul style="list-style-type: none"> <li>» Vegetation clearing</li> <li>» Site preparation and earthworks.</li> <li>» Excavation of foundations.</li> <li>» Construction during the re-alignment of the access road.</li> <li>» Construction of underground cabling.</li> <li>» Site preparation (e.g. compaction).</li> <li>» Foundations or PV panel equipment installation.</li> <li>» Stockpiling of topsoil, subsoil and spoil material.</li> </ul>

<b>Mitigation: Target/Objective</b>	<ul style="list-style-type: none"> <li>» To retain natural vegetation, where possible.</li> <li>» To minimise footprints of disturbance of vegetation/habitats on-site</li> <li>» Remove and store all topsoil on areas that are to be excavated; and use this topsoil in subsequent rehabilitation of disturbed areas.</li> <li>» Minimise loss of topsoil.</li> <li>» Minimise spoil material.</li> </ul>
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Mitigation: Action/Control	Responsibility	Timeframe
The extent of clearing and disturbance to the native vegetation must be kept to a minimum so that impact on flora and fauna is restricted.	Contractor	Site establishment & duration of contract
Areas to be cleared must be clearly marked on-site to eliminate the potential for unnecessary clearing.	Contractors in consultation with the ECO and ESA	Duration of Construction
Construction activities must be restricted to demarcated areas so that impact on flora and fauna is restricted.	Contractor	Site establishment & duration of contract
Mitigation measures must be implemented to reduce the risk of erosion and the invasion of alien species.	ESA, ECO and Contractor	Site establishment & duration of contract
No-Go areas are to be demarcated with tape and warning signs prohibiting access erected. Plant and vehicle operators must be instructed by the ESA and ECO on where these No-Go sites are.	ESA, ECO and Contractor	Construction
No vegetation removal must be allowed outside the designated project development footprint.	ESA, ECO and Contractor	Construction
All fill material must be sourced from a commercial off-site suitable/permitted source, quarry or borrow pit. Where possible, material from foundation excavations must be used as fill on-site.	Contractor	Duration of contract
Excavated topsoil must be stockpiled in designated areas separate from base material and covered until replaced during rehabilitation. As far as possible, topsoil must not be stored for longer than 3 months.	Contractor	Site establishment & duration of contract
Ridges and areas which include protected and red data species must be avoided at all costs during construction, unless the necessary permits are obtained.	ECO and ESA	Pre-construction; Site establishment
Topsoil must not be stripped or stockpiled when it is raining or when the soil is wet as compaction will occur.	Contractor	Site establishment Maintenance: for duration of contract

Mitigation: Action/Control	Responsibility	Timeframe
Topsoil must be stockpiled and managed in terms of the erosion management plan ( <b>refer to Appendix C.</b>	Contractor	Duration of contract
A site rehabilitation programme must be implemented.	ESA and Contractor in consultation with ECO/Ecologist	Duration of contract
Disturbed areas should be rehabilitated when construction in an area is completed. Rehabilitated areas must be inspected on a monthly basis and maintained, if necessary	ESA and Contractor	Rehabilitation; Post-construction

<b>Performance Indicator</b>	<ul style="list-style-type: none"> <li>» Zero disturbance outside of designated work areas.</li> <li>» Minimise clearing of existing vegetation.</li> <li>» Topsoil appropriately stored</li> </ul>
<b>Monitoring</b>	<ul style="list-style-type: none"> <li>» Observation of vegetation clearing activities by ECO and ESA throughout construction phase.</li> <li>» Supervision of all clearing and earthworks.</li> <li>» An incident reporting system will be used to record non-conformances to the EMPr.</li> </ul>

## OBJECTIVE 11: Minimise soil degradation and erosion

The soil on site may be impacted in terms of:

- » Uncontrolled run-off relating to construction activity (excessive wetting, uncontrolled discharge, etc.) will also lead to accelerated erosion;
- » Incorrect storage of topsoil;
- » Accidental spillages;
- » Poor rehabilitation;
- » Erosion from rainwater;
- » Soil degradation including erosion (by wind and water) and subsequent deposition elsewhere; and
- » Degradation of the natural soil profile due to excavation, stockpiling, compaction, pollution and other construction activities will affect soil forming processes and associated ecosystems. Degradation of parent rock is considered low as there are no deep excavations envisaged

<b>Project Component/s</b>	<ul style="list-style-type: none"> <li>» PV Panels.</li> <li>» Underground cabling.</li> <li>» Ancillary buildings.</li> <li>» Construction during the re-alignment of the access road</li> <li>» Overhead power lines.</li> </ul>
<b>Potential Impact</b>	<ul style="list-style-type: none"> <li>» Soil and rock degradation.</li> </ul>

	<ul style="list-style-type: none"> <li>» Soil erosion.</li> <li>» Increased deposition of soil into drainage systems.</li> <li>» Increased run-off over the site.</li> </ul>
<b>Activities/Risk Sources</b>	<ul style="list-style-type: none"> <li>» Removal of vegetation, excavation, stockpiling, compaction, and pollution of soil.</li> <li>» Rainfall - water erosion of disturbed areas.</li> <li>» Wind erosion of disturbed areas.</li> <li>» High velocity discharge of water from construction activity.</li> </ul>
<b>Mitigation: Target/Objective</b>	<ul style="list-style-type: none"> <li>» Minimise extent of disturbance areas.</li> <li>» Minimise activity within disturbance areas.</li> <li>» Minimise soil degradation (mixing, wetting, compaction, etc.).</li> <li>» Minimise soil erosion.</li> <li>» Minimise deposition of soil into washes as a result of runoff.</li> <li>» Minimise instability of embankments/excavations.</li> </ul>

<b>Mitigation: Action/Control</b>	<b>Responsibility</b>	<b>Timeframe</b>
Identify disturbance areas and restrict construction activity to these areas.	ECO/ESA and Contractor	Before and during construction
A method statement must be developed and submitted to the engineer to deal with erosion issues prior to bulk earthworks operations commencing	ECO/ESA and Contractor	Before and during construction
During construction the contractor shall protect areas susceptible to erosion by installing necessary temporary and permanent drainage works as soon as possible and by taking other measures necessary to prevent the surface water from being concentrated in streams and from scouring the slopes, banks or other areas	ECO/ESA and Contractor	During construction
No goods or equipment shall be stored in the washes (as identified by the biophysical specialist) that may accompany peak rainfall events	ECO/ESA and Contractor	Throughout the duration of the projec
Rehabilitate disturbance areas as soon as practicable when construction in an area is complete.	ECO/ESA and Contractor	During and after construction
Access roads to be carefully planned and constructed to minimise the impacted area and prevent unnecessary excavation, placement, and compaction of soil.	ECO/ESA and Contractor	Design and construction
Minimise removal of vegetation which adds stability to soil.	ECO/ESA and Contractor	Construction
Erosion and loss of soil must be prevented by minimizing the construction site exposed to surface water run-off. Where necessary erosion stabilizing actions such as gabions or re-vegetation must be implemented to prevent further habitat deterioration.	ECO/ESA and Contractor	Pre-Construction, Construction and throughout the duration of the project
Protective measures must be installed where there are possibilities of surface water sheet flow causing erosion.	ECO/ESA and Contractor	Erection: Before construction

Mitigation: Action/Control	Responsibility	Timeframe
		Maintenance: Duration of contract
Stabilisation of cleared areas to prevent and control erosion shall be actively managed this includes: Brush cut packing, Mulch or chip cover, Straw stabilising, Watering, Planting/sodding, Hand seed-sowing of locally-occurring indigenous species, Hydroseeding of locally-occurring indigenous species, Soil binders and anti-erosion compounds, Gabion bolsters & mattresses for flow attenuation, Geofabric, Hessian cover and Log/pole fencing	ECO/ESA and Contractor	Erection: Before construction Maintenance: Duration of contract
Erosion control measures: Run-off attenuation on slopes (sand bags, logs), silt fences, storm water catch-pits, shade nets, gabions or temporary mulching over denuded area as required.	ECO/ESA and Contractor	Erection: Before construction Maintenance: Duration of contract
No soil is to be stripped from areas within the site that the contractor does not require for construction works.	ECO/ESA and Contractor	Construction
Erosion control measures to be regularly maintained.	ECO/ESA and Contractor	Construction

<b>Performance Indicator</b>	<ul style="list-style-type: none"> <li>» No activity outside demarcated disturbance areas.</li> <li>» Limited soil erosion around site.</li> <li>» No increase in siltation in washes as a result of construction activities.</li> <li>» No activity in restricted areas.</li> </ul>
<b>Monitoring</b>	<ul style="list-style-type: none"> <li>» On-going inspections of the site by the ECO.</li> <li>» Acceptable level of soil erosion around site, as determined by the ECO.</li> <li>» Acceptable state of excavations, as determined by the ECO</li> <li>» Monthly inspections of sediment control devices by the ECO</li> <li>» Monthly inspections of surroundings, including washes (outside the development area) by the ECO.</li> <li>» An incident reporting system will record non-conformances.</li> </ul>

## OBJECTIVE 12: Minimise the impacts on and loss of indigenous vegetation

A number of protected species were observed at the site including *Hoodia gordonii*, *Aloe dichotoma* and *Acacia erioloba*. Within the proposed development area only *Acacia erioloba* was observed. Four individuals of *Acacia erioloba* were within the proposed development area and an additional two in close proximity to the development. A permit would be required for the destruction of the trees within the development footprint.

<b>Project Component/s</b>	» Any infrastructure or activity that will result in disturbance to natural areas.
<b>Potential Impact</b>	» Loss of indigenous natural vegetation due to construction activities, or poor behaviour on the part of the construction team.
<b>Activity/Risk Source</b>	<ul style="list-style-type: none"> <li>» Vegetation clearing.</li> <li>» Construction during road re-alignment.</li> <li>» Construction of overhead power lines.</li> <li>» Chemical contamination of the soil by vehicles and machinery.</li> <li>» Operation of construction camps.</li> <li>» Storage of materials required for construction.</li> </ul>
<b>Mitigation: Target/Objective</b>	<ul style="list-style-type: none"> <li>» Minimise footprints of disturbance of vegetation/habitats.</li> <li>» Minimise loss of protected and indigenous vegetation.</li> <li>» Minimise loss of species of conservation concern.</li> </ul>

<b>Mitigation: Action/Control</b>	<b>Responsibility</b>	<b>Timeframe</b>
Areas to be cleared must be clearly marked in the field to eliminate unnecessary clearing.	Contractor	Construction
Limit unnecessary impacts on surrounding natural vegetation, e.g. driving around in the veld, use access roads only.	Contractor	Construction
<p>Search and Rescue (S&amp;R) of all protected plants that will be affected by the development (<b>Appendix H</b>), especially species occurring in long term and permanent, hard surface development footprints (i.e. all buildings, new roads and tracks, laydown areas, and panel positions) should take place. The necessary permits must be in place</p> <ul style="list-style-type: none"> <li>» All development footprints must be surveyed and pegged out as soon as possible, after which a local horticulturist with Search and Rescue experience should be appointed to undertake the S&amp;R.</li> <li>» All rescued species should be transplanted immediately to a suitable habitat. b. Replanting should occur in spring to early summer once sufficient rains have fallen, in order to facilitate establishment</li> </ul>	Contractor	Duration of construction
<p>Obtain permits for protected plant removal and relocation prior to commencement of any activity related to this development:</p> <ul style="list-style-type: none"> <li>» As a minimum, permits will be required to remove all or some of the <i>Acacia erioloba</i>. Four individuals of <i>Acacia erioloba</i> were within the proposed development area and an additional two in close proximity to the development.</li> </ul>	Developer	Pre-construction
Monitor and control declared weeds and invader species. Continually monitor the re-emergence of these	Contractor	Duration of construction



Mitigation: Action/Control	Responsibility	Timeframe
species and manage according to the invasive species management plan ( <b>Appendix J</b> ).		

<b>Performance Indicator</b>	<ul style="list-style-type: none"> <li>» No disturbance outside of designated work areas.</li> <li>» Minimised clearing of existing/natural vegetation.</li> <li>» Limited impacts on areas of identified and demarcated sensitive habitats/vegetation</li> <li>» Ecosystem fragmentation is kept to a minimum.</li> <li>» Ecosystem functionality is retained and any degradation prevented.</li> <li>» Re-establishment of rescued species.</li> </ul>
<b>Monitoring</b>	<ul style="list-style-type: none"> <li>» Observation of vegetation clearing activities by ECO throughout construction phase.</li> <li>» Monitoring of vegetation clearing activities in terms of permit conditions.</li> <li>» Supervision of all clearing and earthworks.</li> <li>» An incident reporting system will be used to record non-conformances to the EMPr.</li> </ul>

### OBJECTIVE 13: Prevent damage to drainage areas (Washes)

In order to prevent damage to the washes in the development footprint the final layout and construction should be planned carefully and the detailed design to avoid impacts on the washes which occur on the site.

<b>Project Component/s</b>	» Any activity that could result in a disturbance or loss of the washes, natural vegetation and change soil properties e.g construction of solar facility infrastructure, access road re-alignment, power line.
<b>Potential Impact</b>	» Disturbance or loss of drainage areas during the construction and operational phase results in a loss of biodiversity and habitat; increases declared weed and alien invasive plant species; increases soil erosion; and disrupts natural faunal populations.
<b>Activities/Risk Sources</b>	» Construction and operational phases.
<b>Mitigation: Target/Objective</b>	» No damage to wetlands and washes.

Mitigation: Action/Control	Responsibility	Timeframe
The larger washes at the site should not be built over, and a <u>32m buffer</u> , which would provide 30m corridors around the larger washes are deemed adequate. If the short overhead power line or development footprint	Contractor	<u>Construction Phase</u>

Mitigation: Action/Control	Responsibility	Timeframe
traverses the washes this would require a Water Use Licence from the Department of Water Affairs.		
<u>If possible, construction activities must be prioritised to the dry months of the year (June - August) to limit mobilisation of sediments or hazardous substances from construction vehicles used during site clearing</u>	Contractor	<u>Construction Phase</u>
<u>Any construction work that involves site clearance, digging or trenching during installation services should be suspended during heavy rains to avoid erosion and sedimentation of the water course</u>	Contractor	<u>Construction Phase</u>
<u>When wet season construction cannot be avoided, sedimentation control measures, such as hay bales, sedimentation basins or any silt trap method should be in place during digging and the installation of service infrastructure</u>	Contractor	<u>Construction Phase</u>
The denuded and disturbed site should be re-vegetated as soon as possible.	Contractor	<u>Construction Phase</u>

<b>Performance Indicator</b>	The continued presence of drainage areas within the development area and the absence of surface impacts within these parts.
<b>Monitoring</b>	<p>Implement a monitoring programme of which the aims and objectives should be to monitor:</p> <ul style="list-style-type: none"> <li>» Compliance to the approved EMPr;</li> <li>» Status of hydrological features on site;</li> <li>» Status of impacts within sensitive areas; and</li> <li>» Seasonal biodiversity (species richness) surveys.</li> </ul>

## OBJECTIVE 14: Minimise the establishment and spread of alien invasive plants

Major factors contributing to invasion by alien invader plants include high disturbance activities and negative grazing practices (Zachariades et al. 2005). Consequences of this may include:

- » Loss of indigenous vegetation;
- » Change in vegetation structure leading to change in various habitat characteristics;
- » Change in plant species composition;
- » Change in soil chemical properties;
- » Loss of sensitive habitats;
- » Loss or disturbance to individuals of rare, endangered, endemic, and/or protected species;

- » Fragmentation of sensitive habitats;
- » Change in flammability of vegetation, depending on alien species;
- » Hydrological impacts due to increased transpiration and runoff; and
- » Impairment of wetland function.

The Scuitdrift Solar Facility development site is relatively free of alien plant species, which can be ascribed firstly to the aridity of the site, as well as the low rainfall in the period preceding the site visit. Alien plants are however likely to become an issue if the site is highly disturbed during construction or if water runoff is not properly managed. Mitigation measures have been recommended to avoid the risk of increased alien invasion during construction and operation phases of the solar facility.

An integrated Alien Invasive Management Plan is attached as **Appendix J**

<b>Project Component/s</b>	<ul style="list-style-type: none"> <li>» Solar facility.</li> <li>» Subcontractor’s camps.</li> <li>» Laydown areas.</li> <li>» Temporary access roads.</li> </ul>
<b>Potential Impact</b>	<ul style="list-style-type: none"> <li>» Invasion of natural vegetation surrounding the site by declared weeds or invasive alien species.</li> <li>» Impacts on soil.</li> <li>» Impact on faunal habitats.</li> <li>» Degradation and loss of agricultural potential.</li> </ul>
<b>Activities/Risk Sources</b>	<ul style="list-style-type: none"> <li>» Transport of construction materials to site</li> <li>» Movement of construction machinery and personnel</li> <li>» Site preparation and earthworks causing disturbance to indigenous vegetation</li> <li>» Construction of site access road</li> <li>» Stockpiling of topsoil, subsoil and spoil material</li> <li>» Routine maintenance work – especially vehicle movement</li> </ul>
<b>Mitigation: Target/Objective</b>	<ul style="list-style-type: none"> <li>» To significantly reduce the presence of weeds and eradicate alien invasive species</li> <li>» To avoid the introduction of additional alien invasive plants to the project control area</li> <li>» To avoid further distribution and thickening of existing alien plants on the project area</li> <li>» To complement existing alien plant eradication programs in gradually causing a significant reduction of alien plant species throughout the project control area</li> </ul>

Mitigation: Action/Control	Responsibility	Timeframe
Avoid creating conditions in which alien plants may become established: <ul style="list-style-type: none"> <li>» Keep disturbance of indigenous vegetation to a minimum.</li> <li>» Rehabilitate disturbed areas as quickly as possible.</li> </ul>	Contractor	Construction and operation

Mitigation: Action/Control	Responsibility	Timeframe
» Do not import soil from areas with alien plants.		
Establish an ongoing monitoring programme to detect and quantify any alien species that may become established and identify the problem species (as per Conservation of Agricultural Resources Act and Biodiversity Act)	Contractor	Construction and operation
Immediately control any alien plants that become established using registered control methods.	Contractor	Construction and operation

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

## OBJECTIVE 15: Minimise the impacts on fauna

Faunal species are indirectly affected by the overall loss of habitat as direct construction impacts can often be avoided due to the movement of individuals from the path of construction.

With respect to any threatened species (refer to **Appendix D1 of the DBAR**), the loss of individuals or localised populations is unlikely to lead to a change in the conservation status of the species, unless they are classified as threatened. In the case of threatened animal species, the loss of a population or individual could lead to a direct change in its conservation status. This may arise if the proposed infrastructure is located where it will affect such individuals or populations or the habitat that they depend on. Consequences may include fragmentation of populations of affected species; reduction in area of occupancy of affected species; and loss of genetic variation within affected species.

<b>Project Component/s</b>	<ul style="list-style-type: none"> <li>» Solar facility.</li> <li>» Contractor's camp and laydown area.</li> </ul>
<b>Potential Impact</b>	<ul style="list-style-type: none"> <li>» Loss or displacement of fauna</li> <li>» Vegetation clearance and associated impacts on faunal habitats.</li> <li>» Traffic to and from site.</li> </ul>
<b>Activity/Risk Source</b>	<ul style="list-style-type: none"> <li>» Site preparation and earthworks.</li> <li>» Construction-related traffic.</li> <li>» Foundations or PV equipment installation.</li> <li>» Mobile construction equipment.</li> <li>» Underground cabling and road construction activities.</li> </ul>
<b>Mitigation: Target/Objective</b>	<ul style="list-style-type: none"> <li>» To minimise footprints of habitat destruction</li> <li>» To minimise disturbance to (and death of) resident and visitor faunal and avifaunal species</li> </ul>

<b>Mitigation: Action/Control</b>	<b>Responsibility</b>	<b>Timeframe</b>
Areas to be cleared must be clearly marked in the field to eliminate unnecessary clearing/disturbance.	Contractor in consultation with the ECO or ESA	Pre-construction
The extent of clearing and disturbance to the native vegetation must be kept to a minimum so that impact on fauna and their habitats is restricted.	Contractor	Site establishment & duration of contract
Animals that cannot flee from the affected areas by themselves (if any) must be removed from the affected areas before the start of site clearing/construction and relocated to safe areas.	Contractor in consultation with the ECO and ecologist	
Vehicles to adhere to speed limits at all times	Contractor	Construction Operation
The intentional harming or killing of animals will be prohibited through on-site supervision and worksite rules.	Contractor	Construction Operation
Ensure storage water reservoirs are covered, or bird deterrent measures are used.	Contractor in consultation with Specialist	Duration of contract
Implement a faunal removal plan/ rescue plan with designated/ trained personnel and contact numbers.	Contractor	Duration of contract
<p>All cable trenches, excavations, etc., through sensitive areas should be excavated carefully in order to minimise damage to surrounding areas and biodiversity.</p> <ul style="list-style-type: none"> <li>» The trenches must be checked on a daily basis for the presence of trapped animals.</li> <li>» Any animals found must be removed by a suitably qualified person in a safe manner, unharmed, and placed in an area where the animal will be comfortable.</li> </ul> <p>All mammal, large reptiles and avifauna species found injured during construction must be taken to a suitably</p>	Contractor	Duration of construction

Mitigation: Action/Control	Responsibility	Timeframe
qualified veterinarian or rehabilitation centre to either be euthanized in a humane manner or cared for until it can be released again.		
A site rehabilitation programme should be implemented and this will be developed in collaboration with specialists following completion of construction	Contractor in consultation with Specialist	Duration of contract

<b>Performance Indicator</b>	<ul style="list-style-type: none"> <li>» No disturbance outside of designated work areas</li> <li>» Minimised clearing of existing/natural vegetation and habitats for fauna</li> <li>» Limited impacts on faunal species (i.e. noted/recorded fatalities)</li> </ul>
<b>Monitoring</b>	<ul style="list-style-type: none"> <li>» Observation of vegetation clearing activities by ECO throughout construction phase.</li> <li>» Supervision of all clearing and earthworks.</li> <li>» Recording faunal fatalities to monitor success of relocation efforts.</li> <li>» An incident reporting system will be used to record non-conformances to the EMPr.</li> </ul>

## OBJECTIVE 16: Minimise impacts on water resources

<b>Project Component/s</b>	<ul style="list-style-type: none"> <li>» Construction activities</li> <li>» Storage of chemicals and hazardous materials.</li> <li>» Ablution facilities.</li> </ul>
<b>Potential Impact</b>	» Pollutants such hydrocarbons could be harmful to aquatic biota, particularly during low flows when dilution is reduced.
<b>Activity/Risk Source</b>	<ul style="list-style-type: none"> <li>» Fuelling, usage and maintenance of construction vehicles.</li> <li>» Labourer using ablution facilities.</li> <li>» Use of any chemicals or hazardous materials during construction.</li> </ul>
<b>Mitigation: Target/Objective</b>	<ul style="list-style-type: none"> <li>» No incidents related to spills of chemicals and hazardous materials.</li> <li>» No release of contaminated water in washes.</li> <li>» No misbehaviour of construction workers (i.e. ablution activities, washing)</li> <li>» Minimise dust disturbance.</li> </ul>

Mitigation: Action/Control	Responsibility	Timeframe
A <u>buffer zone of 32 m</u> must be maintained around the washes at all times	Contractor	Pre-construction
Implement strict management of all hazardous materials used on site.	Contractor	Construction
Ensure strict management of potential sources of pollution (hydrocarbons from vehicles and machinery, cement during construction, etc.).	Contractor	Construction
No potable water may be used for damping haul roads	Contractor	Construction

Mitigation: Action/Control	Responsibility	Timeframe
In order to avoid resource contamination concrete batching should not be located within 60m of a watercourse, within a watercourse flood plain, near a wetland area or where there is a potential for any spilled concrete to enter a watercourse or groundwater (boreholes)	Contractor in consultation with the ECO or ESA	Construction
Should water be used for dust suppression on gravel roads, it must be of a quality compliant with the General Special Effluent Standards (31/03/2009): Temperature: max.25C, pH: between 5.5 & 7.5 and conductivity: not be increased more than 15% above the intake water & not exceed 250 milli-Siemens per metre (determined at 25C). The water used for dust suppression is likely to be borehole water / water from Southern Farms, and not treated effluent. However the water quality standards mentioned will be taken note of.	Contractor in consultation with the ECO or ESA	Construction
No unauthorised groundwater abstraction may occur on site.	Contractor	Construction
Should any water be discharged from the site, the water is to comply with national effluent standards. No contaminated water may be discharged from site.	Contractor	Construction
Potentially contaminated water originating from site must be directed through an oil and water separator. Oil is to be removed and/or recycled from site by a licensed contractor.	Contractor	Construction
Proper use of chemical toilets should be strictly enforced.	Contractor	Construction
No activities shall be allowed to encroach into a water course or wetland/pan without a Water Use License being in place from the Department of Water and Sanitation (DWS).	Contractor Developer/Owner	Design Construction

<b>Performance Indicator</b>	<ul style="list-style-type: none"> <li>» No spillages are recorded</li> <li>» No unauthorised use of water is conducted</li> <li>» Where water is extracted and requires a licence, one must be applied for</li> </ul>
<b>Monitoring</b>	<ul style="list-style-type: none"> <li>» Monitor management measures in place for potentially hazardous materials</li> <li>» No excess or unauthorised use of water sources</li> </ul>

## OBJECTIVE 17: Appropriate Stormwater Management

The stormwater management is covered under the Pre-construction and construction phase management, but aspects thereof will also continue into the Operational Phase. It is important that the engineers and contractors responsible for the detailed design of the

Stormwater Systems must take into account the requirements of this EMP, as well as the recommendations by the participating specialists.

Due to the extremely low annual rainfall the risk of water erosion is very low. The condition of the ground for the site as well as broader Scuitdrift areas is such that any surface water is very quickly absorbed into the soil, as such this substantiates that water build up on the surface is minimal to none and practically eliminates any water flow which might cause water erosion.

An integrated Stormwater Management Plan is attached as **Appendix E**

<b>Project Component/s</b>	» Alteration of sandy substrata into hard surfaces impacting on the local hydrological regime
<b>Potential Impact</b>	» Poor stormwater management and the alteration hydrological regime
<b>Activities/Risk Sources</b>	» Placement of hard engineered surfaces
<b>Mitigation: Target/Objective</b>	» Reduce the potential increase in surface flow velocities and the impact on dry riverbeds and the localised drainage systems

<b>Mitigation: Action/Control</b>	<b>Responsibility</b>	<b>Timeframe</b>
Any stormwater within the site must be handled in a suitable manner, i.e. clean and dirty water streams around the plant and install stilling basins to capture large volumes of run-off, shade nets, or gabions trapping sediments and reduce flow velocities.	Contractor/ Operator and Engineers	Planning, design and operation
All storm water runoff drains alongside the access road network and channel runoff into nearby drainages must be constructed with "erosion-proof" outlets as designed by the engineer with input from the ECO – The engineer is to determine whether formal drainage is in fact necessary	Contractor and ECO in consultation with specialist	Planning, design and operation
No goods or equipment shall be stored in the washes (as identified by the biophysical specialist) that may accompany peak rainfall events	Contractor	Design Construction and operation
Stormwater structures should as far as possible not concentrate runoff by piped systems or similar	Contractor	Design Construction
Stormwater control systems must be implemented to reduce erosion on the project site.	Contractor	Design Construction
New access roads within the site are to be constructed according to design and contract specifications. The access routes must have suitable stormwater management plans and erosion control measures.	Contractor	Design Construction
Drainage measures must promote the dissipation of storm water run-off.	Contractor/Operator Owner	Design Construction



Mitigation: Action/Control	Responsibility	Timeframe
All stormwater mitigation measures must be implemented according a Stormwater Management Plan.	Contractor	Construction

<b>Performance Indicator</b>	<ul style="list-style-type: none"> <li>» No impacts on water quality, water quantity, riparian vegetation, natural status of watercourses</li> <li>» Minimise erosion as far as possible</li> </ul>
<b>Monitoring</b>	<ul style="list-style-type: none"> <li>» Appropriate stormwater management system in place</li> </ul>

## OBJECTIVE 18: Protection of heritage resources

Despite falling outside of the site area, the Koppies must be avoided during construction activities. The ECO should be made aware of the presence of archaeological resources there so that their safeguarding during construction can be ensured. The presence of a grave to the north of the development area should be demarcated as a No-Go area. The easily recognisable quarts scatter's present near the Koppies, must be avoided during the period of construction, so as to prevent any destruction of the sites.

Should any heritage remains be exposed during excavations, these must be immediately reported to the Provincial Heritage Resource Authority of the Northern Cape, in terms of the national Heritage Resources Act (Act No. 25 of 1999). Heritage remains uncovered or disturbed during earthworks may not be disturbed further until the necessary guidance and approval have been obtained from the relevant Heritage Authority.

Should any archaeological remains including (but not limited to) fossil bones, fossil shells, coins, indigenous ceramics, colonial ceramics, marine shell heaps, stone artefacts, bone remains, rock art, rock engravings and any antiquity be discovered during construction, they must be immediately reported to South African Heritage Resources Agency and not disturbed further until the necessary guidance and approval have been obtained.

The main cause of impacts to archaeological sites is physical disturbance of the material itself and its context. The heritage and scientific potential of an archaeological site is highly dependent on its geological and spatial context. This means that even though, for example a deep excavation may expose archaeological artefacts, the artefacts are relatively meaningless once removed from the area in which they were found. Large-scale excavations for foundations will damage archaeological sites, as will road construction activities.

<b>Project Component/s</b>	<ul style="list-style-type: none"> <li>» PV Panels.</li> <li>» Transformers and switchgear etc.</li> <li>» Underground cabling.</li> <li>» Ancillary buildings.</li> <li>» Re-aligned access road</li> </ul>
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	» Overhead power lines.
<b>Potential Impact</b>	» Heritage objects or artefacts found on site are inappropriately managed or destroyed
<b>Activity/Risk Source</b>	» Site preparation and earthworks » Foundations or plant equipment installation » Mobile construction equipment movement on site » Power line construction activities.
<b>Mitigation: Target/Objective</b>	» To ensure that any heritage objects found on site are treated appropriately and in accordance with the relevant legislation

<b>Mitigation: Action/control</b>	<b>Responsibility</b>	<b>Timeframe</b>
Areas required to be cleared during construction must be clearly marked in the field to avoid unnecessary disturbance of adjacent areas (which will not be surveyed in detail by a heritage specialist).	Contractor in consultation with Heritage Specialist	Pre-construction
Contractors must be informed before construction starts on the possible types of heritage sites and cultural material they may encounter and the procedures to follow when they find sites. All staff should also be familiarised with procedures for dealing with heritage objects/sites.	Contractor, ECO/ESA and heritage specialist	Duration of contract, particularly during excavations
Familiarise all staff and contractors with procedures for dealing with heritage objects/sites.	Heritage Specialist	Pre-construction
Project employees and any contract staff must maintain, at all times, a high level of awareness of the possibility of discovering heritage sites.	Contractor	Duration of contract
<u>If any evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils (e.g. trace fossils or stromatolites) or other categories of heritage resources are found during the proposed development, SAHRA APM Unit (Natasha Higgitt/John Gribble 021 462 5402) must be alerted. If unmarked human burials are uncovered, the SAHRA Burial Grounds and Graves (BGG) Unit (Itumeleng Masiteng/Mimi Seetelo 012 320 8490), must be alerted immediately. A professional archaeologist or palaeontologist, depending on the nature of the finds, must be contracted as soon as possible to inspect the findings. If the newly discovered heritage resources prove to be of archaeological or palaeontological significance, a Phase 2 rescue operation may be required.</u>	Contractor in consultation with Heritage Specialist	Duration of contract
In the event that fossils resources are discovered during excavations, immediately stop excavation in the vicinity of the potential material. Mark (flag) the position and also spoil that may contain fossils. Inform the site foreman and the ECO. ECO to inform the developer,	Contractor and ECO and/or ESA	Construction

Mitigation: Action/control	Responsibility	Timeframe
the developer contacts the standby archaeologist and/or palaeontologist. ECO to describe the occurrence and provide images by email.		

<b>Performance Indicator</b>	<ul style="list-style-type: none"> <li>» No disturbance outside of designated work areas</li> <li>» All heritage items located are dealt with as per the legislative guidelines</li> </ul>
<b>Monitoring</b>	<ul style="list-style-type: none"> <li>» Observation of excavation activities by SHE throughout construction phase</li> <li>» Supervision of all clearing and earthworks</li> <li>» Due care taken during earthworks and disturbance of land by all staff and any heritage objects found reported.</li> <li>» Appropriate permits obtained from SAHRA prior to the disturbance or destruction of heritage sites (if required).</li> <li>» An incident reporting system will be used to record non-conformances to the EMPr.</li> </ul>

### OBJECTIVE 19: Appropriate handling and management of waste

The construction of the PV facility will involve the generation of various wastes. In order to manage the wastes effectively, guidelines for the assessment, classification, and management of wastes, along with industry principles for minimising construction wastes must be implemented. The main wastes expected to be generated by the construction of the solar energy facility will include:

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

An integrated Waste Management Plan is attached as **Appendix D**

<b>Project Component/s</b>	<ul style="list-style-type: none"> <li>» PV Facility.</li> <li>» Underground cabling.</li> <li>» Ancillary buildings.</li> <li>» Access roads</li> <li>» Overhead power line</li> </ul>
<b>Potential Impact</b>	<ul style="list-style-type: none"> <li>» Inefficient use of resources resulting in excessive waste generation.</li> <li>» Litter or contamination of the site or water through poor waste management practices.</li> </ul>
<b>Activity/Risk Source</b>	<ul style="list-style-type: none"> <li>» Packaging</li> <li>» Other construction wastes</li> <li>» Hydrocarbon use and storage</li> </ul>

	» Spoil material from excavation, earthworks and site preparation
<b>Mitigation: Target/Objective</b>	<ul style="list-style-type: none"> <li>» To comply with waste management legislation</li> <li>» To minimise production of waste</li> <li>» To ensure appropriate waste storage and disposal</li> <li>» To avoid environmental harm from waste disposal.</li> <li>» A waste manifests should be developed for the ablutions showing proof of disposal of sewage at appropriate water treatment works.</li> <li>» Any permits obtained for other ablutions installed (i.e. French drains) obtained prior to commencement of construction</li> </ul>

<b>Mitigation: Action/Control</b>	<b>Responsibility</b>	<b>Timeframe</b>
Construction method and materials should be carefully considered in view of waste reduction, re-use, and recycling opportunities.	Contractor	Duration of contract
Construction contractors must provide specific detailed waste management plans to deal with all waste streams.	Contractor	Duration of contract
Specific areas must be designated on-site for the temporary management of various waste streams, i.e. general refuse, construction waste (wood and metal scrap), and contaminated waste as required. Location of such areas must seek to minimise the potential for impact on the surrounding environment, including prevention of contaminated runoff, seepage, and vermin control.	Contractor	Duration of contract
Where practically possible, construction and general wastes on-site must be reused or recycled. Bins and skips must be available on-site for collection, separation, and storage of waste streams (such as wood, metals, general refuse etc.).	Contractor	Duration of contract
Disposal of waste must be in accordance with relevant legislative requirements, including the use of licensed contractors.	Contractor	Duration of contract
Uncontaminated waste must be removed at least weekly for disposal, if feasible; other wastes must be removed for recycling/ disposal at an appropriate frequency.	Contractor	Duration of contract
Hydrocarbon waste must be contained and stored in sealed containers within an appropriately bunded area and clearly labelled.	Contractor	Duration of contract
Waste must be kept to a minimum and must be transported by approved waste transporters to sites designated for their disposal.	Contractor	Duration of contract
No liquid waste, including grey water, may be discharged into any water body or drainage line. All sewage disposal to take place at a registered and operational wastewater treatment works. Slips of disposal to be retained as proof of responsible disposal	Contractor	Maintenance: duration of contract within a particular area

<b>Mitigation: Action/Control</b>	<b>Responsibility</b>	<b>Timeframe</b>
Ensure compliance with all national, regional and local legislation with regard to the storage, handling and disposal of hydrocarbons, chemicals, solvents and any other harmful and hazardous substances and materials. The onus is on the Contractor to identify and interpret the applicable legislation. Hazardous waste to be disposed of at a registered landfill site.	Contractor	During and post construction.
Documentation (waste manifest) must be maintained detailing the quantity, nature, and fate of any regulated waste. Waste disposal records must be available for review at any time.	Contractor	Duration of contract
SABS approved spill kits to be available and easily accessible.	Contractor	Duration of contract
Regularly serviced chemical toilets facilities and/or septic tank must be used to ensure appropriate control of sewage.		
Daily inspection of all portable toilets and septic tanks must be performed by environmental representatives on site.	Contractor	Duration of contract
In the event where sewage is discharged into the environment, all contaminated vegetation/ rock and soil must be removed immediately and treated as hazardous waste.	Contractor	Duration of construction
Ensure that the below ground storage of the septic tank can withstand the external forces of the surrounding pressure. The area above the tank must be demarcated to prevent any vehicles or heavy machinery from driving around the tank.	Contractor	Duration of construction
Under no circumstances may waste be burnt on site.	Contractor	Duration of construction
Where a registered waste site is not available close to the construction site, provide a method statement with regard to waste management.	Contractor	Duration of construction
Waste manifests must be provided for all waste streams generated on site, and must be kept on site.	Contractor	Duration of construction
Implement an integrated waste management approach that is based on waste minimisation and incorporates reduction, recycling, re-use and disposal where appropriate.	Contractor	Duration of construction
Upon the completion of construction, the area must be cleared of potentially polluting materials. Spoil stockpiles must also be removed and appropriately disposed of or the material re-used for an appropriate purpose.	Contractor	Completion of construction

<b>Performance Indicator</b>	<ul style="list-style-type: none"> <li>» No complaints received regarding waste on site or indiscriminate dumping.</li> <li>» Internal site audits ensuring that waste segregation, recycling and reuse is occurring appropriately.</li> <li>» Provision of all appropriate waste manifests for all waste streams.</li> </ul>
<b>Monitoring</b>	<ul style="list-style-type: none"> <li>» Observation and supervision of waste management practices throughout construction phase.</li> <li>» Waste collection will be monitored on a regular basis.</li> <li>» Waste documentation completed.</li> <li>» Proof of disposal of sewage at an appropriate waste water treatment works.</li> <li>» A complaints register will be maintained, in which any complaints from the community will be logged. Complaints will be investigated and, if appropriate, acted upon.</li> <li>» An incident reporting system will be used to record non-conformances to the EMPr.</li> </ul>

## OBJECTIVE 20: Appropriate handling and storage of chemicals, hazardous substances

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

<b>Project Component/s</b>	<ul style="list-style-type: none"> <li>» Laydown areas.</li> <li>» Subcontractors' camps.</li> <li>» Temporary hydrocarbon and chemical storage areas.</li> </ul>
<b>Potential Impact</b>	<ul style="list-style-type: none"> <li>» Release of contaminated water from contact with spilled chemicals.</li> <li>» Generation of contaminated wastes from used chemical containers.</li> </ul>
<b>Activity/Risk Source</b>	<ul style="list-style-type: none"> <li>» Vehicles associated with site preparation and earthworks.</li> <li>» Construction activities of area and linear infrastructure.</li> <li>» Hydrocarbon use and storage.</li> </ul>
<b>Mitigation: Target/Objective</b>	<ul style="list-style-type: none"> <li>» To ensure that the storage and handling of chemicals and hydrocarbons on-site does not cause pollution to the environment or harm to persons.</li> <li>» To ensure that the storage and maintenance of machinery on-site does not cause pollution of the environment or harm to persons.</li> </ul>

<b>Mitigation: Action/Control</b>	<b>Responsibility</b>	<b>Timeframe</b>
Any liquids stored on site, including admixtures, fuels and lubricants, should be stored in accordance with applicable legislation.	Contractor	Pre-construction and implement for duration of Contract
Spill kits must be made available on-site for the clean-up of spills and leaks of contaminants.	Contractor	Duration of contract

Mitigation: Action/Control	Responsibility	Timeframe
<p>Establish an appropriate Hazardous Stores which is in accordance with the Hazardous Substance Amendment Act, No. 53 of 1992. This should include but not be limited to:</p> <ul style="list-style-type: none"> <li>» Designated area;</li> <li>» All applicable safety signage;</li> <li>» Firefighting equipment;</li> <li>» Enclosed by an impermeable bund;</li> <li>» Protected from the elements,</li> <li>» Lockable;</li> <li>» Ventilated; and</li> </ul> <p>Has adequate capacity to contain 110% of the largest container contents.</p>	Contractor	Pre-construction and implement for duration of Contract
<p>Corrective action must be undertaken immediately if a complaint is made, or potential/actual leak or spill of polluting substance identified. This includes stopping the contaminant from further escaping, cleaning up the affected environment as much as practically possible and implementing preventive measures. Where required, a NEMA Section 30 report must be submitted to DEA within 14 days of the incident.</p>	Contractor	Duration of contract
<p>In the event of a major spill or leak of contaminants, the relevant administering authority must be immediately notified as per the notification of emergencies/incidents.</p>	Contractor	Duration of contract
<p>Spilled concrete must be cleaned up as soon as possible and disposed of at a suitably licensed waste disposal site.</p>	Contractor	Duration of contract
<p>Any contaminated/polluted soil removed from the site must be disposed of at a licensed hazardous waste disposal facility.</p>	Contractor	Duration of contract
<p>Routine servicing and maintenance of vehicles must not to take place on-site (except for emergencies). If repairs of vehicles must take place, an appropriate drip tray must be used to contain any fuel or oils.</p>	Contractor	Duration of contract
<p>All stored fuels to be maintained within a bund and on a sealed surface as per the requirements of SABS 089:1999 Part 1.</p>	Contractor	Duration of contract
<p>Fuel storage areas must be inspected regularly to ensure bund stability, integrity, and function.</p>	Contractor	Duration of contract
<p>Construction machinery must be stored in an appropriately sealed area.</p>	Contractor	Duration of contract
<p>Oily water from bunds at the substations must be removed from site by licensed contractors.</p>	Contractor	Duration of contract
<p>Fuel storage areas must be inspected regularly to ensure bund stability, integrity, and function.</p>	Contractor	Duration of contract
<p>The storage of flammable and combustible liquids such as oils will be in designated areas which are appropriately</p>	Contractor	Duration of contract

Mitigation: Action/Control	Responsibility	Timeframe
bunded, and stored in compliance with Material Safety Data Sheets (MSDS) files.		
Any storage and disposal permits/approvals which may be required must be obtained, and the conditions attached to such permits and approvals will be compiled with.	Contractor	Duration of contract
Transport of all hazardous substances must be in accordance with the relevant legislation and regulations	Contractor	Duration of contract
The sediment control and water quality structures used on-site must be monitored and maintained in an operational state at all times.	Contractor	Duration of contract
An effective monitoring system must be put in place to detect any leakage or spillage of all hazardous substances during their transportation, handling, installation and storage.	Contractor	Construction
Precautions must be in place to limit the possibility of oil and other toxic liquids from entering the soil or clean stormwater system.	Contractor	Construction
Upon the completion of construction, the area must be cleared of potentially polluting materials.	Contractor	Completion of construction

<b>Performance Indicator</b>	<ul style="list-style-type: none"> <li>» No chemical spills outside of designated storage areas.</li> <li>» No unattended water or soil contamination by spills.</li> <li>» No complaints received regarding waste on site or indiscriminate dumping.</li> </ul>
<b>Monitoring</b>	<ul style="list-style-type: none"> <li>» Observation and supervision of chemical storage and handling practices and vehicle maintenance throughout construction phase.</li> <li>» A complaints register must be maintained, in which any complaints from the community will be logged.</li> <li>» An incident reporting system will be used to record non-conformances to the EMP.</li> </ul>

## OBJECTIVE 21: Limit direct and indirect terrestrial faunal and avifaunal impacts

<b>Project component/s</b>	Construction activities, operational activities and human presence
<b>Potential Impact</b>	Disturbance of faunal communities due to construction as well as poaching and hunting risk from construction staff.
<b>Activity/risk source</b>	Habitat transformation during construction; site fencing, presence of construction and operation personnel.
<b>Mitigation: Target/Objective</b>	Low faunal impact, during construction and operation.



Mitigation: Action/control	Responsibility	Timeframe
Environmental induction for all staff	Contractor	Construction & Operation
ECO to monitor and enforce ban on hunting, collecting etc. of all plants and animals or their products.	ECO	Construction & Operation
Any fauna encountered during construction should be removed to safety by the ECO or other suitably qualified person.	Contractor	Construction & Operation
Regular surveys of large collision-prone species, especially cranes, flamingos and raptors within the study area to determine the relative importance of local populations of priority taxa.	Contractor	Construction & Operation
The effectiveness or otherwise of bird diverters and especially any hot spots of collisions along the power lines.	Contractor	Construction & Operation
Conduct a pre-construction avifaunal walk-through survey to identify the risks imposed by the section of the overhead powerline	Contractor with a avifaunal specialist	Pre-construction planning and design and

<b>Performance Indicator</b>	<ul style="list-style-type: none"> <li>» Minimum disturbance outside of designated work areas.</li> <li>» Minimised clearing of existing/natural vegetation and habitats for fauna and avifauna.</li> <li>» Limited impacts on faunal species (i.e. noted/recorded fatalities), especially those of conservation concern.</li> </ul>
<b>Monitoring</b>	<ul style="list-style-type: none"> <li>» Monitoring for compliance during the construction phase. All incidents to be noted.</li> </ul>

## OBJECTIVE 22: Limit damage to washes

The hydrological features, or “washes”, which occur within the Scuitdrift Solar Energy Facility development footprint, are not considered to be drainage lines or water courses as they do not have a defined flood plain areas nor associated soil or vegetation. However, construction within where ‘washes’ are present must be minimised as far as possible. Where impacts are unavoidable, mitigation measures are required to minimise impacts on these systems.

<b>Project Component/s</b>	<ul style="list-style-type: none"> <li>» Power line</li> <li>» PV Panels</li> <li>» Pipeline</li> <li>» Underground cabling</li> </ul>
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<b>Potential Impact</b>	» Damage to water course areas by any means that will result in hydrological changes (includes erosion, siltation, dust, direct removal of soil of vegetation, dumping of material within wetlands). The focus should be on the functioning of the watercourse as a natural system.
<b>Activities/Risk Sources</b>	» Construction and operation of the overhead power lines and PV panels » Excavation for underground cabling and new pipeline from Southern Farms
<b>Mitigation: Target/Objective</b>	» No damage to the delineated watercourses within project footprint (i.e. no-go area). » Minimise damage to watercourse areas where crossings are to be built or upgraded.

<b>Mitigation: Action/Control</b>	<b>Responsibility</b>	<b>Timeframe</b>
Rehabilitate any disturbed areas as soon as possible once construction is completed in an area.	Proponent and contractors, ECO	Duration of construction
Control storm water and runoff water through the implementation of a storm water management plan for the site.	Contractors, ECO	Duration of construction
Obtain a permit as required in terms of the National Water Act from DWS to impact on any wetland or water resource.	Proponent	Duration of construction

<b>Performance Indicator</b>	» No impacts on water quality, water quantity, riparian vegetation, natural status of watercourses
<b>Monitoring</b>	» Habitat loss in watercourses should be monitored before and after construction. » The presence and development of erosion features downstream of any construction through wetlands must be monitored. » The ECO should be responsible for driving this process. » An incident reporting system must be used to record non-conformances to the EMPr. » Public complaints register must be developed and maintained on site.

### OBJECTIVE 23: Effective management of concrete batching plants

A considerable amount of concrete is required during the construction of the Solar Facility. In this regard there could be a need to establish a batching plant within the site. Turbid and highly alkaline wastewater, dust emissions and noise are the key potential impacts associated with concrete batching plants. Concrete batching plants, cement, sand and aggregates can produce dust. Potential pollutants in batching plant wastewater and stormwater include cement, sand, aggregates, chemical additive mixtures, fuels and lubricants.

<b>Project component/s</b>	<ul style="list-style-type: none"> <li>» Batching plant.</li> <li>» Contaminated stormwater system.</li> </ul>
<b>Potential Impact</b>	<ul style="list-style-type: none"> <li>» Dust emissions</li> <li>» Release of contaminated water</li> <li>» Generation of contaminated wastes from used chemical containers</li> <li>» Inefficient use of resources resulting in excessive waste generation</li> </ul>
<b>Activity/risk source</b>	<ul style="list-style-type: none"> <li>» Operation of the batching plant</li> <li>» Packaging and other construction wastes</li> <li>» Hydrocarbon use and storage</li> </ul>
<b>Mitigation: Target/Objective</b>	<ul style="list-style-type: none"> <li>» To ensure that the operation of the batching plant does not cause pollution to the environment or harm to persons</li> </ul>

<b>Mitigation: Action/control</b>	<b>Responsibility</b>	<b>Timeframe</b>
Concrete batching plants should be sited such that impacts on the environment or the amenity of the local community from noise, odour or polluting emissions are minimised	EPC Contractor	Construction phase
Where there is a regular movement of vehicles, access and exit routes for heavy transport vehicles should be planned to minimise noise and dust impacts on the environment	EPC Contractor	Construction phase
Good maintenance practices must be implemented, including regular sweeping to prevent dust build-up	EPC Contractor	Construction phase
The prevailing wind direction should be considered to ensure that bunkers and conveyors are sited in a sheltered position to minimise the effects of the wind.	EPC Contractor	Construction phase
Aggregate material should be delivered in a damp condition, and water sprays or a dust suppression agent should be correctly applied to reduce dust emissions and reduce water usage	EPC Contractor	Construction phase
Process wastewater collected from the entire batching plant area should be diverted to an impervious settling tank or pond. Water should be reused in the concrete batching process, where possible.	EPC Contractor	Construction phase
A contaminated stormwater system must be specifically designed for the batching plant to ensure effective control of contaminated stormwater originating from the batching plant and prevent contamination to the surrounding environment.	EPC Contractor	Construction phase
Where possible, waste concrete should be used for construction purposes at the batching plant or project site.	EPC Contractor	Construction phase
Artificial wind barriers must be installed around the batching plant to minimise air, land and water pollution. Wind barriers must enclose the entire batching plant and be at least 2.5m from the NGL and	EPC Contractor	Pre-construction/ construction

Mitigation: Action/control	Responsibility	Timeframe
not allow fly ash and other dusts from moving through the barrier. The artificial barrier must be maintained daily for any defects and corrected when necessary.		
The concrete wash bay structure must be constructed in a double brick arrangement or be reinforced to maintain its integrity throughout operation.	EPC Contractor	Construction phase

<b>Performance Indicator</b>	<ul style="list-style-type: none"> <li>» No complaints on dust</li> <li>» No water or soil contamination by chemical spills</li> <li>» No complaints received regarding waste on site or indiscriminate dumping</li> </ul>
<b>Monitoring</b>	<ul style="list-style-type: none"> <li>» Observation and supervision of chemical storage and handling practices and vehicle maintenance throughout construction phase</li> <li>» A complaints register will be maintained, in which any complaints from the community will be logged. Complaints will be investigated and, if appropriate, acted upon.</li> <li>» An incident and non-conformance register will be used to record incidents and non-conformances to the EMPr.</li> <li>» The appointed ECO must monitor indicators listed above to ensure that they have been met for the construction phase</li> </ul>

### 7.3. Detailing Method Statements

#### **OBJECTIVE 24: Ensure all construction activities are undertaken with the appropriate level of environmental awareness to minimise environmental risk**

The environmental specifications are required to be underpinned by a series of Method Statements, within which the Contractors and Service Providers are required to outline how any identified environmental risks will practically be mitigated and managed for the duration of the contract, and how specifications within this EMP will be met. That is, the Contractor will be required to describe how specified requirements will be achieved through the submission of written Method Statements to the Site Manager and ECO.

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

- » Responsible person/s;
- » Construction procedures;
- » Materials and equipment to be used;

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

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

- » Site establishment (which explains all activities from induction training to offloading, construction sequence for site establishment and the different amenities and to be established etc. Including a site camp plan indicating all of these).
- » Preparation of the site (i.e. clearing vegetation, compacting soils and removing existing infrastructure and waste).
- » Soil management/stockpiling and erosion control.
- » Excavations and backfilling procedure.
- » Stipulate norms and standards for water supply and usage (i.e.: comply strictly to licence and legislation requirements and restrictions)
- » Stormwater method statement.
- » Ablution facilities (placement, maintenance, management and servicing)
- » Solid Waste Management:
  - \* Description of the waste storage facilities (on site and accumulative).
  - \* Placement of waste stored (on site and accumulative).
  - \* Management and collection of waste process.
  - \* Recycle, re-use and removal process and procedure.
- » Liquid waste management:
- » The design, establish, maintain and operate suitable pollution control facilities necessary to prevent discharge of water containing polluting matter or visible suspended materials into the surrounding environment Should grey water (i.e. water from basins, showers, baths, kitchen sinks etc.) need to be disposed of, link into an existing facilities where possible. Where no facilities are available, grey water runoff must be controlled to ensure there is no seepage into the surrounding environment occurs. Dust and noise pollution
  - \* Describe necessary measures to ensure that noise from construction activities is maintained within lawfully acceptable levels.
  - \* Procedure to control dust at all times on the site, access roads, borrow pits and spoil sites (dust control shall be sufficient so as not to have significant impacts in terms of the biophysical and social environments). These impacts include visual pollution, decreased safety due to reduced visibility, negative effects on human health and the ecology due to dust particle accumulation.

- » Hazardous substance storage (Ensure compliance with all national, regional and local legislation with regard to the storage of oils, fuels, lubricants, solvents, wood treatments, bitumen, cement, pesticides and any other harmful and hazardous substances and materials. South African National Standards apply).
  - \* Lists of all potentially hazardous substances to be used.
  - \* Appropriate handling, storage and disposal procedures.
  - \* Prevention protocol of accidental contamination of soil at storage and handling areas.
  - \* All storage areas, (i.e.: for harmful substances appropriately banded with a suitable collection point for accidental spills must be implemented and drip trays underneath dispensing mechanisms including leaking engines/machinery).
- » Fire prevention and management measures on site.
- » Fauna and flora protection process on and off site (i.e. removal to reintroduction or replanting, if necessary).
  - \* Rehabilitation, re-vegetation process and bush clearing.
- » Incident and accident reporting protocol.
- » General administration
- » Designate access road and the protocol on while roads are in use.
- » Requirements on gate control protocols.

The Contractor may not commence the activity covered by the Method Statement until it has been approved by the ECO and Site Manager, except in the case of emergency activities and then only with the consent of the Site Manager. Approval of the Method Statement will not absolve the Contractor from their obligations or responsibilities in terms of their contract.

Failure to submit a method statement may result in suspension of the activity concerned until such time as a method statement has been submitted and approved.

#### 7.4. Awareness and Competence: Construction Phase

**OBJECTIVE 25: To ensure all construction personnel have the appropriate level of environmental awareness and competence to ensure continued environmental due diligence and on-going minimisation of environmental harm**

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

The Contractors obligations in this regard include the following:

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

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

#### **7.4.1 Environmental Awareness and Induction Training**

The ECO, in consultation with the contractor, shall ensure that all construction workers receive an induction presentation, as well as on-going environmental education &

awareness, on the importance and implications of the EMP and the environmental requirements it prescribes. The presentation shall be conducted, as far as is possible, in the employees' language of choice. The contractor should provide a translator from their staff for the purpose of translating should this be necessary.

There are a number of protected and conservation-worthy plant species on and in proximity to the solar development site, including ***Hoodia gordonii*, *Boscia sp.*, *Aloe dichotoma* and *Acacia erioloba***. It is important that the ECO is knowledgeable on these species and is able to identify and inform construction staff be aware of these species and how to identify them, so that they can be suitably avoided and/or protected. It is the ECO's responsibility to print enlarged posters of these photographs and description for use in the Environmental Induction / Education training sessions.

Of the protected plants mentioned above, only four *Acacia erioloba* trees fall within the development area and two outside the area - a **permit for their relocation / removal must be sought prior to commencement of construction**. In any case of ***Hoodia gordonii*** being found within the site area, the species must be carefully removed and transplanted outside the development area in proximity to other *Hoodia* plants.

As further plant species of conservation, as well as archaeological occurrences, are likely to occur in proximity of the koppies nearby. As mentioned above, the koppie areas are thus to be demarcated as NO-GO areas and must be avoided by all staff.

As a minimum, induction training should include:

- » Explanation of the importance of complying with the EMP;
- » Explanation of the importance of complying with the Environmental Authorisation;
- » Discussion of the potential environmental impacts of construction activities;
- » The benefits of improved personal performance;
- » Employees' roles and responsibilities, including emergency preparedness (this should be combined with this induction, but presented by the contractors Health and Safety Representative);
- » Explanation of the mitigation measures that must be implemented when carrying out their activities;
- » Explanation of the specifics of this EMP and its specification (no-go areas, etc.); and

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



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

### **7.4.3 Toolbox Talks**

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

## **7.5. Monitoring Programme: Construction Phase**

### **OBJECTIVE 25: To monitor the performance of the control strategies employed against environmental objectives and standards**

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

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

- » Monitor and audit compliance with the prescriptive and procedural terms of the environmental specifications
- » Ensure adequate and appropriate interventions to address non-compliance
- » Ensure adequate and appropriate interventions to address environmental degradation

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

#### **7.5.1. Non-Conformance Reports**

All supervisory staff including Foremen, Engineers, and the ECO must be provided the means to be able to submit non-conformance reports to the Site Manager. Non-conformance reports will describe, in detail, the cause, nature and effects of any environmental non-conformance by the Contractor. Records of penalties imposed may be required by the relevant authority within 48 (forty eight) hours.

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

#### **7.5.2. Monitoring Reports**

A monitoring report will be compiled by the ECO on a monthly basis and must be submitted to the Director: Compliance Monitoring at DEA for their records. This report should include details of the activities undertaken in the reporting period, any non-conformances or incidents recorded, corrective action required, and details of those non-conformances or incidents which have been closed out. The contractor must ensure that all waste manifests are provided to the ECO on a monthly basis in order to inform and update the DEA regarding waste related activities.

#### **7.5.3. Audit Reports**

An environmental internal audit must be conducted every 3 months and an external audit must be conducted once a year. An annual audit report must be compiled and submitted to DEA until the completion of the construction and rehabilitation. This report must indicate the date of the audit, the name of the auditor and the outcome of the each audit in terms of compliance with the environmental authorisation conditions and the requirements of the EMPr.

#### **7.5.4. Final Audit Report**

A final environmental audit report must be compiled by the independent ECO and be submitted to DEA upon completion of the construction and rehabilitation activities (within 30 days of completion of the construction phase i.e. within 30 days of site handover) and within 30 days of completion of rehabilitation activities. This report must indicate the date

of the audit, the name of the auditor and the outcome of the audit in terms of compliance with the environmental authorisation conditions and the requirements of the EMPr.

## MANAGEMENT PROGRAMME: REHABILITATION

## CHAPTER 8

**Overall Goal:** Undertake the rehabilitation measures in a way that:

- » Ensures rehabilitation of disturbed areas following the execution of the works, such that residual environmental impacts are remediated or curtailed

### 8.1. Objectives

In order to meet this goal, the following objective, actions and monitoring requirements are relevant:

**OBJECTIVE 1: Ensure appropriate rehabilitation of disturbed areas such that residual environmental impacts are remediated or curtailed**

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

<b>Project Component/s</b>	<ul style="list-style-type: none"> <li>» Construction camps.</li> <li>» Laydown areas.</li> <li>» Access roads.</li> <li>» Ancillary buildings.</li> <li>» Overhead Powerline.</li> </ul>
<b>Potential Impact</b>	» Environmental integrity of site undermined resulting in reduced visual aesthetics, erosion and increased runoff, and the requirement for on-going management intervention.
<b>Activity/Risk Source</b>	<ul style="list-style-type: none"> <li>» Temporary construction areas</li> <li>» Temporary access roads/tracks</li> <li>» Other disturbed areas/footprints</li> </ul>
<b>Mitigation: Target/Objective</b>	<ul style="list-style-type: none"> <li>» Ensure and encourage site rehabilitation of disturbed areas.</li> <li>» Ensure that the site is appropriately rehabilitated following the execution of the works, such that residual environmental impacts (including erosion) are remediated or curtailed.</li> </ul>

Mitigation: Action/Control	Responsibility	Timeframe
Implement revegetation and rehabilitation plan ( <b>refer to Appendix I</b> ).	Contractor	Following execution of the works

<b>Mitigation: Action/Control</b>	<b>Responsibility</b>	<b>Timeframe</b>
All temporary facilities, equipment, and waste materials must be removed from site as soon as construction is completed.	Contractor	Following execution of the works
All temporary fencing and danger tape must be removed once the construction phase has been completed.	Contractor	Following completion of construction activities in an area
Fencing requirements mentioned in Objective 7 must be adhered to at all times	Contractor	Following completion of construction activities in an area
The area that previously housed the construction equipment camp is to be checked for spills of substances such as oil, paint, etc. and these should be cleaned up.	Contractor	Following completion of construction activities in an area
All hardened surfaces within the construction equipment camp area should be ripped, all imported materials removed, and the area shall be top soiled and re-vegetated.	Contractor	Following completion of construction activities in an area
Temporary roads must be closed and access across these blocked.	Contractor	Following completion of construction activities in an area
Necessary drainage works and anti-erosion measures must be installed, where required, to minimise loss of topsoil and control erosion.	Contractor	Following completion of construction activities in an area
Where disturbed areas are not to be used during the operation of the proposed power line and on-site substation, these areas must be rehabilitated/re-vegetated with appropriate natural vegetation and/or local seed mix. Re-use of native/indigenous plant species removed from disturbance areas in the rehabilitation phase to be determined by a botanist, as applicable.	Contractor in consultation with rehabilitation specialist	Following completion of construction activities in an area
Re-vegetated areas may need to be protected from wind erosion and maintained until an acceptable plant cover has been achieved.	Proponent in consultation with	Post-rehabilitation

Mitigation: Action/Control	Responsibility	Timeframe
	rehabilitation specialist	
Erosion control measures should be used in sensitive areas such as areas with steep slopes.	Proponent in consultation with ECO and rehabilitation specialist (if required)	Post-rehabilitation
On-going alien plant monitoring and removal must be undertaken on all areas of natural vegetation on an annual basis.	Proponent	Post-rehabilitation
<p>Weeding: It can be anticipated that invasive species and weeds will germinate on rehabilitated soils</p> <ul style="list-style-type: none"> <li>o These need to be hand-pulled before they are fully established and/or reaching a mature stage where they can regenerate</li> </ul> <p>Where invasive shrubs re-grow, they will have to be eradicated according to the Working for Water specifications</p>	Contractor/ Owner	Construction/ Operation

<b>Performance Indicator</b>	<ul style="list-style-type: none"> <li>» All portions of site, including construction equipment camp and working areas, cleared of equipment and temporary facilities.</li> <li>» Topsoil replaced on all areas and stabilised where practicable or required after construction and temporally utilised areas.</li> <li>» Disturbed areas rehabilitated and acceptable plant cover achieved on rehabilitated sites.</li> <li>» Completed site free of erosion and alien invasive plants.</li> </ul>
<b>Monitoring</b>	<ul style="list-style-type: none"> <li>» On-going inspection of rehabilitated areas in order to determine effectiveness of rehabilitation measures implemented during the operational lifespan of the facility.</li> <li>» On-going alien plant monitoring and removal should be undertaken on an annual basis.</li> </ul>

## OPERATION MANAGEMENT PROGRAMME

## CHAPTER 9

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

- » Ensures that operation activities are properly managed in respect of environmental aspects and impacts.
- » Enables the operation activities to be undertaken without significant disruption to other land uses in the area, in particular with regard to farming practices, traffic and road use, and effects on local residents.
- » Minimises impacts on fauna using the site.
- » Establishes an environmental baseline for solar energy sites in South Africa.

An environmental manager must be appointed during operation whose duty it will be to ensure the implementation of the operational EMPr

### 9.1. Objectives

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

**OBJECTIVE 1: Establish clear reporting, communication, and responsibilities in relation to overall implementation of environmental management programme during operation**

Formal responsibilities are necessary to ensure that key procedures are executed. Specific responsibilities of the Operations Manager, and Environmental Manager for the operation phase of this project are detailed below.

The **Operations Manager** will:

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

The **Technical/SHEQ Manager** will:

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

The Technical/SHEQ Manager must provide fourteen (14) days written notification to the DEA that the activity operational phase will commence.

## **OBJECTIVE 2: Protection of indigenous natural vegetation, fauna and maintenance of rehabilitation**

Indirect impacts on vegetation and terrestrial fauna during operation could result from maintenance activities and the movement of people and vehicles on site. In order to ensure the long-term environmental integrity of the site following construction, maintenance of the areas rehabilitated post-construction must be undertaken until these areas have successfully re-established.

It may be necessary to routinely trim vegetation growing between the PV panel rows and/or the plant screens planted along the development site fencing. This is to avoid shading of the panels and reduce fire risks. Due to stunted nature of the xerophytic vegetation, it is unlikely that this will need to be done often. Biomass produced from these trimming activities could be chipped and used as mulch under the PV panels (to increase stormwater infiltration and reduce erosion).

<b>Project Component/s</b>	<ul style="list-style-type: none"><li>» Rehabilitated areas.</li><li>» Areas along the perimeter fence.</li><li>» Topsoil stockpile areas.</li></ul>
<b>Potential Impact</b>	<ul style="list-style-type: none"><li>» Disturbance to or loss of vegetation and/or habitat.</li><li>» Environmental integrity of site undermined resulting in reduced visual aesthetics, erosion, compromised land capability and the requirement for on-going management intervention.</li></ul>



<b>Activities/Risk Sources</b>	» Movement of employee vehicles within and around site
<b>Mitigation: Target/Objective</b>	» Maintain minimised footprints of disturbance of vegetation/habitats on-site. » Ensure and encourage plant regrowth in non-operational areas of post-construction rehabilitation

<b>Mitigation: Action/Control</b>	<b>Responsibility</b>	<b>Timeframe</b>
Rehabilitate disturbance areas should the previous attempt be unsuccessful.	O&M Operator	Operation
Vehicle movements must be restricted to designated access roads	O&M Operator	Operation
Existing roads and re-aligned access road must be maintained to ensure limited erosion and impact on areas adjacent to roadways.	O&M Operator	Operation
Maintain erosion control measures implemented during the construction phase (i.e. run-off attenuation on slopes (bags, logs), silt fences, storm water catch-pits, and shade nets).	O&M Operator	Operation
Develop and implement an appropriate stormwater management plan for the operational phase of the power line and on-site substation	O&M Operator	Operation
Site access should be controlled and only authorized staff and contractors should be allowed on-site.	O&M Operator	Operation
Notice boards stating that fauna and flora may not be collected, harvested etc. should be placed at the entrances to the site.	O&M Operator	Operation
Any maintenance activities should avoid listed plant species and strive to keep the footprint as low as possible.	O&M Operator	Operation
No herbicides should be used and if vegetation clearing needs to take place, this should be done by hand.	O&M Operator	Operation
An on-going alien plant monitoring and eradication programme must be implemented, where necessary.	O&M Operator	Operation
The collection, hunting or harvesting of any plants or animals at the site should be strictly forbidden.	O&M Operator	Operation
A botanist and/or ecologist familiar with the vegetation of the area should monitor the rehabilitation success and alien plant removal on an annual basis.	The developer and Specialist	Annual monitoring until successful re-establishment of vegetation in an area
All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill.	O&M Operator	Operation

Mitigation: Action/Control	Responsibility	Timeframe
Spill kits must be kept on-site.	O&M Operator	Operation
A botanist familiar with the vegetation of the area should monitor the rehabilitation success and alien plant removal on an annual basis.	Owner in consultation with Specialist	Annual monitoring until successful re-establishment of vegetation in an area
Monitor avifaunal movement along the power line and within the solar field, to assess the integrity of mitigation measures in place. Further relevant mitigation measures must be implemented if carcasses and/ or injuries are being recorded.	Owner O&M Operator	Operation
A faunal/ avifauna incident register must be maintained on site.	Owner O&M Operator SHEQ Manager	Operation
Implement an animal removal plan to ensure safety of workers and fauna.	Owner O&M Operator	Operation
Regular monitoring for erosion post-construction to ensure that no erosion problems have developed as result of the past disturbance.	O&M Operator	Operation
Regular monitoring must be undertaken for alien plant invasion, which is likely to occur in previously disturbed areas or in areas receiving runoff from the hardened surfaces of the infrastructure.	O&M Operator	Operation

<b>Performance Indicator</b>	<ul style="list-style-type: none"> <li>» Acceptable level of soil erosion around site, as determined by the site manager.</li> <li>» Acceptable level of increased siltation in washes, as determined by the site manager.</li> <li>» No further disturbance to vegetation or terrestrial faunal habitats.</li> <li>» Continued improvement of rehabilitation efforts</li> </ul>
<b>Monitoring</b>	<ul style="list-style-type: none"> <li>» Observation of vegetation on-site by facility manager and environmental manager.</li> <li>» Regular inspections to monitor plant regrowth/performance of rehabilitation efforts and weed infestation compared to natural/undisturbed areas.</li> <li>» Inspections of site on a bi-annual basis.</li> <li>» Water management plan.</li> </ul>

## OBJECTIVE 2: Protection of avifauna from collision and electrocution

During the operation, the threat of collision with the pre-existing 33/132kV Eskom power line, as well as proposed short overhead distribution power line, is the biggest potential

threat to avifauna, particularly sensitive, collision prone species that may occur in the study area. The threat of electrocution while perching on the power line and associated infrastructure serves as a threat to certain sensitive species, depending on the power line structures implemented.

<b>Project Component/s</b>	» Power line.
<b>Potential Impact</b>	» Collision and electrocution events with the overhead power line.
<b>Activities/Risk Sources</b>	» Operation of the power line without appropriate mitigation measures.
<b>Mitigation: Target/Objective</b>	» Maintain a low number of collision, and electrocution events.

<b>Mitigation: Action/Control</b>	<b>Responsibility</b>	<b>Timeframe</b>
Any electrocution and collision events that occur should be recorded, including the species affected and the date. If repeated collisions occur within the same area, then further mitigation and avoidance measures may need to be implemented.	O&M Operator	Operation
Insulate live components at support structures.	O&M Operator	Operation
Conduct a pre-construction avifaunal walk-through to identify any risks posed by the section of the powerlines	O&M Operator with a avifaunal specialist	Operation

<b>Performance Indicator</b>	» Minimal collision, or electrocution events.
<b>Monitoring</b>	» Observation of electrocution or collision events with the power line. » Monitor power line servitude for mortalities.

### OBJECTIVE 3: Minimise soil degradation and erosion

The soil on site may be impacted in terms of:

- » *Soil degradation including erosion* - by wind and water and subsequent deposition elsewhere is of a concern across the entire site which is underlain by fine grained soil which can be mobilised when disturbed, even on relatively low slope gradients (accelerated erosion).
- » *Uncontrolled run-off* - relating to construction activity (excessive wetting, uncontrolled discharge, etc.) will also lead to accelerated erosion and possible sedimentation of drainage systems.
- » *Degradation* - of the natural soil profile due to pollution.

<b>Project Component/s</b>	<ul style="list-style-type: none"> <li>» Underground cabling.</li> <li>» Ancillary buildings.</li> <li>» Access roads.</li> </ul>
<b>Potential Impact</b>	<ul style="list-style-type: none"> <li>» Soil degradation.</li> <li>» Soil erosion.</li> <li>» Increased deposition of soil into drainage systems.</li> <li>» Increased run-off over the site.</li> </ul>
<b>Activities/Risk Sources</b>	<ul style="list-style-type: none"> <li>» Poor rehabilitation of cleared areas.</li> <li>» Rainfall - water erosion of disturbed areas.</li> <li>» Wind erosion of disturbed areas.</li> <li>» Concentrated discharge of water from construction activity.</li> </ul>
<b>Mitigation: Target/Objective</b>	<ul style="list-style-type: none"> <li>» Ensure rehabilitation of disturbed areas is maintained.</li> <li>» Minimise soil degradation (i.e. wetting).</li> <li>» Minimise soil erosion.</li> <li>» Ensure continued stability of embankments/excavations.</li> </ul>

<b>Mitigation: Action/Control</b>	<b>Responsibility</b>	<b>Timeframe</b>
Rehabilitate disturbance areas should the previous attempt be unsuccessful.	O&M Operator	Operation
Ensure dust control on site through wetting of denuded areas or the use of an appropriate dust suppression measure.	O&M Operator	Operation
<u>Sedimentation control measures, such as hay bales, gabions or a layer of rocks sedimentation basins or any silt trap method should be placed at the outlet of the drainage line along the project boundary to trap and contain eroded soil materials from reporting into the main drainage which eventually reports into the Orange River.</u>	<u>O&amp;M Operator</u>	<u>Operation</u>
Maintain erosion control measures implemented during the construction phase (i.e. run-off attenuation on slopes (sand bags, logs), silt fences, storm water catch-pits, and shade nets).	O&M Operator	Operation
Control depth of excavations and stability of cut faces/sidewalls.	O&M Operator	Operation

<b>Performance Indicator</b>	» Acceptable level of soil erosion around site, as determined by the site manager.
<b>Monitoring</b>	<ul style="list-style-type: none"> <li>» Inspections of site on a bi-annual basis.</li> <li>» Water management plan developed and implemented.</li> </ul>

#### OBJECTIVE 4: Minimise dust and air emissions

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

<b>Project Component/s</b>	<ul style="list-style-type: none"> <li>» Hard engineered surfaces.</li> <li>» On-site vehicles.</li> </ul>
<b>Potential Impact</b>	<ul style="list-style-type: none"> <li>» Dust and particulates from vehicle movement to and on-site.</li> <li>» Release of minor amounts of air pollutants (for example NO<sub>2</sub>, CO and SO<sub>2</sub>) from vehicles and the augmentation plant.</li> </ul>
<b>Activities/Risk Sources</b>	<ul style="list-style-type: none"> <li>» Re-entrainment of deposited dust by vehicle movements.</li> <li>» Wind erosion from unsealed roads and surfaces.</li> <li>» Fuel burning vehicle and construction engines.</li> </ul>
<b>Mitigation: Target/Objective</b>	<ul style="list-style-type: none"> <li>» To ensure emissions from all vehicles are minimised, where possible.</li> <li>» To minimise nuisance to the community from dust emissions and to comply with workplace health and safety requirements.</li> </ul>

<b>Mitigation: Action/Control</b>	<b>Responsibility</b>	<b>Timeframe</b>
Roads must be maintained to a manner that will ensure that nuisance to the community from dust is not visibly excessive.	O&M Operator	Operation
Appropriate dust suppression must be applied to the roads as required to minimise/control airborne dust.	O&M Operator	Operation
Speed of vehicles must be restricted on site, as defined by the Environmental Manager.	O&M Operator	Operation
Vehicles and equipment must be maintained in a road-worthy condition at all times.	O&M Operator	Operation

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

### **OBJECTIVE 5: Ensure the implementation of an appropriate fire management plan during the operation phase**

Due to the low extent and presence of the vegetation biomass, site will not require burning to maintain ecological functioning. The fire risks associated with uncontrolled

wildfires is therefore considered to be very low. During the wet months, vegetation biomass may increase and thus the fire risk will also increase, yet it will still not be considered high.

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

- » Alien Invasive species should be completely eradicated in order to decrease the fire risk associated with the site. No invasive plants identified at the site, however they may establish to a lesser degree through disturbance of the site .
- » Cigarette butts may not be thrown in the veld, but must be disposed of correctly. Designated smoking areas must be established with suitable receptacles for disposal.
- » In case of an fire outbreak, contact details of the local fire and emergency services must be readily available.
- » Contractors must ensure that basic firefighting equipment is available on site as per the specifications defined by the health and safety representative / consultant.
- » The fire risk on site is a point of discussion that must take place as part of the environmental induction training prior to commencement of construction.
- » The contractor must also comply with the requirements of the Occupational Health and Safety Act with regards to fire protection.

The following below can be used as a guide for appropriate fire management:

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

<b>Mitigation: Action/Control</b>	<b>Responsibility</b>	<b>Timeframe</b>
Provide adequate firefighting equipment on site and establish a fire fighting management plan during operation ( <b>refer to Appendix F</b> ).	Owner O&M Operator	Operation
Provide fire-fighting training to selected operation and maintenance staff.	O&M Contractor	Operation
Ensure that appropriate communication channels are established to be implemented in the event of a fire.	O&M Contractor	Operation
Fire breaks should be established where and when required. Cognisance must be taken of the relevant	Contractor	Operation

Mitigation: Action/Control	Responsibility	Timeframe
legislation when planning and burning firebreaks (in terms of timing, etc.).		
Upon completion of the construction phase, an emergency evacuation plan must be drawn up to ensure the safety of the staff and surrounding land users in the case of an emergency.	O&M Contractor	Operation
Contact details of emergency services should be prominently displayed on site.	O&M Contractor	Operation

<b>Performance Indicator</b>	<ul style="list-style-type: none"> <li>» Firefighting equipment and training provided before the construction phase commences.</li> <li>» Appropriate fire breaks in place.</li> </ul>
<b>Monitoring</b>	<ul style="list-style-type: none"> <li>» The project developer must monitor indicators listed above to ensure that they have been met.</li> </ul>

## OBJECTIVE 6: Minimise the potential impact on farming activities and on the surrounding landowners

Once operational, the impact on the daily living and movement patterns of neighbouring residents is expected to be minimal and intermittent (i.e. the increase in traffic to and from site, possible dust creation of vehicle movement on gravel roads on site and possible increase in criminal activities). The number of workers on site is anticipated to have minimal negative social impacts in this regard.

Employing outsiders on the other hand and accommodating them at the planned accommodation facility on site could also affect the community's social dealings with each other as well as the traditional character of the area. In worst cases it could result in social conflict between the various groupings. The recruitment and employment process would thus have to be sensitively dealt with to limit any possible negative impacts on the daily living patterns of the existing farming community and other community members.

The operations at the facility, however is not anticipated to have severe negative impacts on the neighbouring farmers' living and movement patterns, apart from a limited increase in the movement of people to and from the site, as well as the presence of these employees on-site on a permanent basis. Concerns about rental agreements should be considered. Vehicle movement to and from the site (e.g. transportation of workers and goods) could influence road users' daily movement patterns, although it is anticipated that this impact would only materialise intermittently.

<b>Project Component/s</b>	<ul style="list-style-type: none"> <li>» Possible negative impacts of activities undertaken on site on the activities of surrounding property owners.</li> </ul>
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	» Impact on farming activities on site.
<b>Potential Impact</b>	» Possible limited intrusion impact on surrounding land owners.
<b>Activities/Risk Sources</b>	» Increase in traffic to and from site could affect daily living and movement patterns of surrounding residents.
<b>Mitigation: Target/Objective</b>	» Effective management of the facility. » Mitigation of intrusion impacts on property owners. » Mitigation of impact on farming activities.

<b>Mitigation: Action/Control</b>	<b>Responsibility</b>	<b>Timeframe</b>
Effective management of the facility and accommodation facility to avoid any environmental pollution focusing on water, waste and sanitation infrastructure and services.	Contractor and Security Contractor	Operation
Vehicle movement to and from the site should be minimised as far as possible.	Contractor and Security Contractor	Operation
Limit the development of new access roads on site as far as possible.	Contractor and Security Contractor	Operation
Infrastructure such as fencing and/or gates along access route must be maintained in the present condition or repaired if disturbed due to project activities	Owner/ O&M Contractor	

<b>Performance Indicator</b>	» No environmental pollution occurs (i.e. waste, water, and sanitation). » No intrusion on private properties and on the activities undertaken on the surrounding properties. » Continuation of farming activities in surrounding areas.
<b>Monitoring</b>	» The Developer should be able to demonstrate that facility is well managed without environmental pollution and that the above requirements have been met.

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

The operation of the PV facility will involve the storage of chemicals and hazardous substances, as well as the generation of limited waste products. The main wastes expected to be generated by the operation activities includes general solid waste, hazardous waste and sewage waste.

<b>Project Component/s</b>	» Substation. » PV facility. » Operation and maintenance staff. » Workshop.
<b>Potential Impact</b>	» Inefficient use of resources resulting in excessive waste generation.



	<ul style="list-style-type: none"> <li>» Litter or contamination of the site or water through poor waste management practices.</li> <li>» Contamination of water or soil because of poor materials management.</li> </ul>
<b>Activity/Risk Source</b>	<ul style="list-style-type: none"> <li>» Transformers and switchgear.</li> <li>» Workshop.</li> </ul>
<b>Mitigation: Target/Objective</b>	<ul style="list-style-type: none"> <li>» Comply with waste management legislation.</li> <li>» Minimise production of waste.</li> <li>» Ensure appropriate waste disposal.</li> <li>» Avoid environmental harm from waste disposal.</li> <li>» Ensure appropriate storage of chemicals and hazardous substances.</li> </ul>

<b>Mitigation: Action/Control</b>	<b>Responsibility</b>	<b>Timeframe</b>
Hazardous substances (such as used/new transformer oils, etc.) must be stored in sealed containers within a clearly demarcated designated area.	Owner	Operation
Storage areas for hazardous substances must be appropriately sealed and bunded.	O&M Operator	Operation
All structures and/or components replaced during maintenance activities must be appropriately disposed of at an appropriately licensed waste disposal site or sold to a recycling merchant for recycling.	Owner	Operation
Care must be taken to ensure that spillage of oils and other hazardous substances are limited during maintenance. Handling of these materials should take place within an appropriately sealed and bunded area. Should any accidental spillage take place, it must be cleaned up according to specified standards regarding bioremediation.	O&M Operator	Operation and maintenance
Spill kits must be made available on-site for the clean-up of spills and leaks of contaminants.	Owner O&M Operator	Operation and maintenance
Disposal of waste must be in accordance with relevant legislative requirements, including the use of licensed contractors.	Contractor, The developer / waste management contractor	Operation
Waste handling, collection, and disposal operations must be managed and controlled by a waste management contractor.	Contractor, waste management contractor	Operation
Used oils and chemicals: <ul style="list-style-type: none"> <li>» Appropriate disposal must be arranged with a licensed facility in consultation with the administering authority</li> <li>» Waste must be stored and handled according to the relevant legislation and regulations</li> </ul>	Owner O&M Operator	Operation
General waste must be recycled where possible or disposed of at an appropriately licensed landfill.	Owner	Operation
Hazardous waste (including hydrocarbons) and general waste must be stored and disposed of separately.	Owner	Operation

Mitigation: Action/Control	Responsibility	Timeframe
Disposal of waste must be in accordance with relevant legislative requirements, including the use of licensed contractors.	Owner	Operation

<b>Performance Indicator</b>	<ul style="list-style-type: none"> <li>» No complaints received regarding waste on site or indiscriminate dumping.</li> <li>» Internal site audits identifying that waste segregation recycling and reuse is occurring appropriately.</li> <li>» Provision of all appropriate waste manifests.</li> <li>» No contamination of soil or water.</li> </ul>
<b>Monitoring</b>	<ul style="list-style-type: none"> <li>» Waste collection must be monitored on a regular basis.</li> <li>» Waste documentation must be completed and available for inspection</li> <li>» An incidents/complaints register must be maintained, in which any complaints from the community must be logged.</li> <li>» Complaints must be investigated and, if appropriate, acted upon.</li> <li>» Regular reports on exact quantities of all waste streams exiting the site must be compiled by the waste management contractor and monitored by the ECO.</li> <li>» All appropriate waste disposal certificates accompany the monthly reports.</li> </ul>

## PROGRAMME: DECOMMISSIONING

## CHAPTER 10

The PV plant is expected to have a lifespan of 25 - 30 years (i.e. with routine maintenance). The power plant infrastructure would only be decommissioned and rehabilitated once it has reached the end of its economic life. It is most likely that decommissioning activities of the infrastructure of the PV plant considered in this Basic Assessment process would comprise the disassembly and replacement of the individual components with more appropriate technology/infrastructure available at that time.

*The relevant mitigation measures contained under the construction section should be applied during decommissioning and therefore is not repeated in this section.*

### » **Site Preparation**

Site preparation activities will include confirming the integrity of the access to the site to accommodate required equipment, preparation of the site (e.g. lay down areas, construction platform) and the mobilisation of construction equipment.

### » **Disassemble and Remove Infrastructure**

Disassembled components will be reused, recycled, or disposed of in accordance with regulatory requirements.

## 10.1. Objectives

Within a period of at least 12 months prior to the decommissioning of the site a Decommissioning Method Statement must be prepared and submitted to the Local Planning Authority, as well as the Provincial and National Environmental Authority. This method statement must cover site restoration, soil replacement, landscaping, creative conservation, and a timeframe for implementation. Furthermore, this decommissioning must comply with any legislation and guidelines that may be applicable at the time.

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

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

- » Maintain and monitor all rehabilitated areas following re-vegetation, and if monitoring shows that the objectives have been met, apply for closure.

## 10.2. Approach to the Decommissioning Phase

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

Two possible scenarios for this decommissioning phase are detailed below:

### **SCENARIO 1: TOTAL DECOMMISSIONING OF ENERGY FACILITY.**

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

- » All concrete and imported foreign material must be removed from the solar facility i.e. panels, support structures etc.
- » The holes where the panel support structures are removed must be levelled and covered with subsoil and topsoil
- » Tracks that are to be utilised for the future land use operations should be left in-situ. The remainder of the tracks to be removed (ripped) and topsoil replaced;
- » All ancillary buildings and access points are to be removed unless they can be used for the future land use
- » The underground electric cables are to be removed if they cannot be used in the future land use
- » All material (cables, CPV Panels etc.) must be re-used or recycled wherever possible. Panels that still produce sufficient output should be considered for donation to rural schools and clinics upon decommissioning
- » The competent authority may grant approval to the owner not to remove the landscaping and underground foundations.  
The site must be seeded with locally sourced indigenous vegetation to allow revegetation of site (see plant species list attached).

### **SCENARIO 2: PARTIAL DECOMMISSIONING OF ENERGY FACILITY.**

Should more advanced technology become available it may be decided to continue to use the site as a photovoltaic / solar facility. Much of the existing infrastructure is likely to be re-used in the upgraded facility. In this case, all infrastructure that will no longer be required for the upgraded facility must be removed as described for scenario 1. The remainder of the infrastructure should remain in place or upgraded depending on the requirements of the new facility. As described for scenario one above, the PV panels that are still capable of

producing sufficient output, could be donated to rural schools and clinics. Any upgrades to the facility at this stage must comply with relevant legislation

#### **10.2.1. Identification of structures for post-closure use**

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

#### **10.2.2. Removal of infrastructure**

All infrastructure must be dismantled and removed. Inert material must be removed from site and disposed of at a registered landfill site. All foundations must be removed to a depth of 1m. Hard surfaced must be ripped to a depth of 1m and vegetated.

#### **10.2.3. Soil amelioration**

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

- » The deposited soils must be ripped to ensure reduced compaction;
- » An acceptable seed bed should be produced by surface tillage;
- » Restore soil fertility;
- » Incorporate the immobile fertilisers in to the plant rooting zone before ripping; and
- » Apply maintenance dressing of fertilisers on an annual basis until the soil fertility cycle has been restored.

#### **10.2.4. Establishment of vegetation**

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

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

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

#### **10.2.5. Maintenance**

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

#### **10.2.6. Monitoring**

The purpose of monitoring is to ensure that the objectives of rehabilitation are met and that the rehabilitation process is followed. The physical aspects of rehabilitation should be carefully monitored during the progress of establishment of desired final ecosystems.

The following items should be monitored continuously:

- » Erosion status;
- » Surface drainage systems and surface water quality;
- » Vegetation species diversity; and
- » Faunal re-colonisation.

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## **REVISION OF THE EMPR**

## **CHAPTER 11**

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The EMPr is a dynamic document, which must be updated to include any additional specifications as and when required. It is considered critical that this draft EMPr be updated to include site-specific information and specifications following the final walk-through survey by specialists of the proposed PV development project as a whole. This will ensure that the construction and operation activities are planned and implemented considering sensitive environmental features. Any amendments must be approved by the Competent Authority (i.e. DEA) prior to implementation, unless these are required to address an emergency situation.

**Appendix G(a):  
Final Layout and Sensitivity  
Maps**





# Scuitdrift 10MW Solar Energy Facility, Northern Cape

## Layout Map

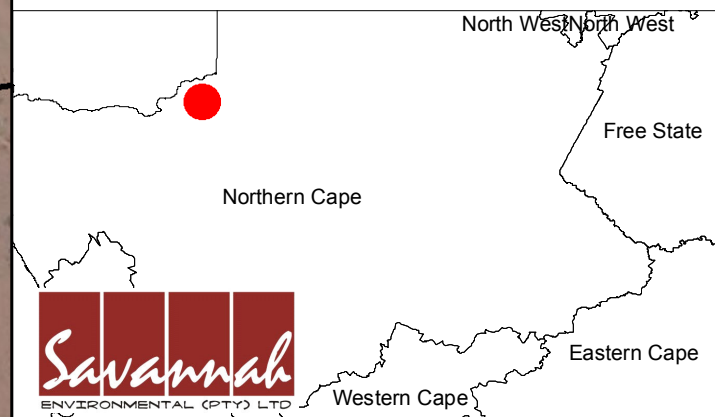
### Legend

- Existing Substation
- Existing Powerline
- Secondary Gravel Road
- Affected property

### Layout Plan:

- Rainwater Tanks
- Road realignment
- Internal Road
- Perimetral Road
- ..... Fence
- Power Line
- On-site Substation
- PV Panel Area
- Administration and Security Office
- Storage Area
- Ablution and workshop

Scale: 1:3 793  
Projection: LO19, CGS\_WGS\_1984  
Map Ref.: Skuitdrift Layout map - 13.05.16



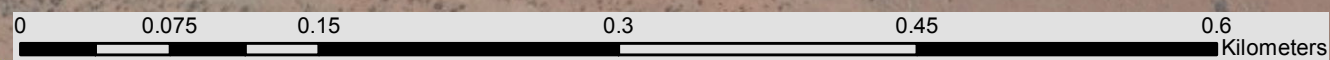
FARM SKUITDRIFT  
RE/426

BLOUPUTS / SCHUITDRIFT 1 132kV OHL

SCHUITDRIFT SUBSTATION

BLOUPUTS / SF

Source: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community







# Scuitdrift 10MW Solar Energy Facility, Northern Cape.

Environmental Sensitivity and Layout Map

FARM SKUITDRIFT  
RE/426

SCHUITDRIFT SUBSTATION

BLOUPUTS / SCHUITDRIFT 1 132kV OHL

BLOUPUTS / SCHUITDRIFT 1 132kV OHL

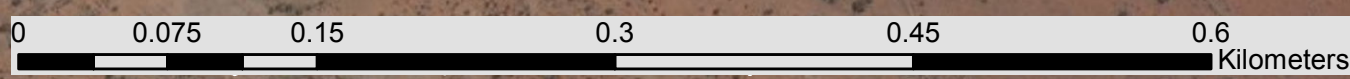
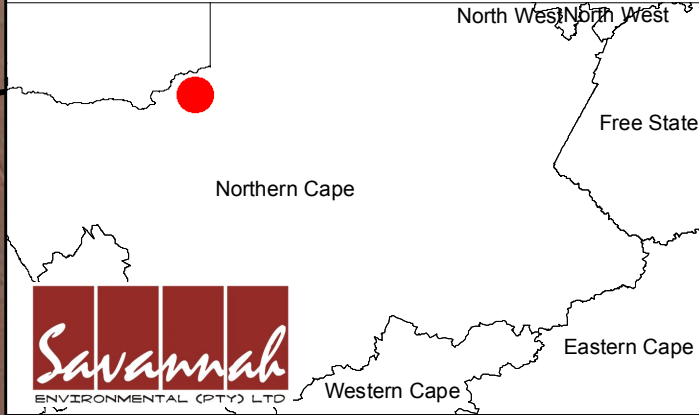
## Legend

- Existing Substation
  - Existing Powerline
  - Secondary Gravel Road
  - Affected property
- ### Layout Plan:
- Rainwater Tanks
  - Road realignment
  - Internal Road
  - Perimetral Road
  - ⋯ Fence
  - Power Line
  - On-site Substation
  - PV Panel Area
  - Administration and Security Office
  - Storage Area
  - Ablution and workshop

## Environmental Sensitivities:

- ▲ Heritage Points
- Very High Ecological Sensitivity
- High Ecological Sensitivity
- Medium Ecological Sensitivity

Scale: 1:3 804  
Projection: LO19, CGS\_WGS\_1984  
Map Ref.: Skuitdrift Layout & sens map - 13.05.16





**Appendix G(b):  
Grievance Mechanism for  
Public Complaints and  
Issues**

## **GRIEVANCE MECHANISM / PROCESS**

### **PURPOSE**

This Grievance Mechanism has been developed to receive and facilitate resolution of concerns and grievances about the Project's environmental and social performance. The aim of the grievance mechanism is to ensure that grievances or concerns raised by local landowners and or communities are addressed in a manner that:

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

The aim of this Grievance Mechanism is to address grievances in a manner that does not require a potentially costly and time consuming legal process.

### **PROCEDURE FOR RECEIVING AND RESOLVING GRIEVANCES**

- » Local landowners, communities and authorities must be informed in writing by the Proponent of the grievance mechanism and the process by which grievances can be brought to the attention of the Proponent through its designated representative.
- » A company representative must be appointed as the contact person for grievances to be addressed to. The name and contact details of the contact person must be provided to local landowners, communities and authorities.
- » Project related grievances relating to the construction, operational and or decommissioning phase must be addressed in writing to the contact person. The contact person should assist local landowners and or communities who may lack resources to submit/prepare written grievances.
- » The grievance must be registered with the contact person who, within 2 working days of receipt of the grievance, must contact the Complainant to discuss the grievance and agree on suitable date and venue for a meeting in order to discuss the grievances raised. Unless otherwise agreed, the meeting should be held within 2 weeks of receipt of the grievance.
- » The contact person must draft a letter to be sent to the Complainant acknowledging receipt of the grievance, the name and contact details of Complainant, the nature of the grievance, the date that the grievance was raised, and the date and venue for the meeting (once agreed).

- » Prior to the meeting being held the contact person must contact the Complainant to discuss and agree on the parties who should attend the meeting. The people who will be required to attend the meeting will depend on the nature of the grievance. While the Complainant and or proponent are entitled to invite their legal representatives to attend the meeting/s, it should be made clear that to all the parties involved in the process that the grievance mechanism process is not a legal process. It is therefore recommended that the involvement of legal representatives be limited.
- » The meeting should be chaired by the Proponenty representative appointed to address grievances. The Proponent must provide a person to take minutes of and record the meeting/s. Any costs associated with hiring venues must be covered by the Proponent.
- » Draft copies of the minutes must be made available to the Complainant and the Proponent within 4 working days of the meeting being held. Unless otherwise agreed, comments on the Draft Minutes must be forwarded to the company representative appointed to manage the grievance mechanism within 4 working days of receipt of the draft minutes.
- » In the event of the grievance being resolved to the satisfaction of all the parties concerned, the outcome must recorded and signed off by the relevant parties. The record should provide details of the date of the meeting/s, the names of the people that attended the meeting/s, the outcome of the meeting/s, and where relevant, the measures identified to address the grievance, the party responsible for implementing the required measures, and the agreed upon timeframes for the measures to be implemented.
- » In the event of a dispute between the Complainant and the proponent regarding the grievance, the option of appointing an independent mediator to assist with resolving the issue should be discussed. The record of the meeting/s must note that a dispute has arisen and that the grievance has not been resolved to the satisfaction of all the parties concerned.
- » In the event that the parties agree to appoint a mediator, the Proponent will be required to identify three (3) mediators and forward the names and CVs to the Complainant within 2 weeks of the dispute being declared. The Complainant, in consultation with the Project Company, must identify the preferred mediator and agree on a date for the next meeting. The cost of the mediator must be borne by the Project Company. The Project Company must provide a person to take minutes of and record the meeting/s.
- » In the event of the grievance, with the assistance of the mediator, being resolved to the satisfaction of all the parties concerned, the outcome must be recorded and signed off by the relevant parties, including the mediator. The record should provide details on the date of the meeting/s, the names of the people that attended the meeting/s, the outcome of the meeting/s, and where relevant, the measures identified to address the grievance, the party

responsible for implementing the required measures, and the agreed upon timeframes for the measures to be implemented.

- » In the event of the dispute not being resolved, the mediator must prepare a draft report that summaries the nature of the grievance and the dispute. The report should include a recommendation by the mediator on the proposed way forward with regard to the addressing the grievance.
- » The draft report must be made available to the Complainant and the Proponent for comment before being finalised and signed by all parties. Unless otherwise agreed, comments on the draft report must be forwarded to the company representative appointed to manage the grievance mechanism within 4 working days. The way forward will be informed by the recommendations of the mediator and the nature of the grievance.

A Complaint is closed out when no further action can be or needs to be taken. Closure status will be classified in the Complaints Register as follows:

- » Resolved. Complaints where a resolution has been agreed and implemented and the Complainant has signed the Confirmation Form.
- » Unresolved. Complaints where it has not been possible to reach an agreed resolution and the case has been authorised for close out by the Appeals Committee.
- » Abandoned. Complaints where the Complainant is not contactable after one month following receipt of a Complaint and efforts to trace his or her whereabouts have been unsuccessful.

The grievance mechanism does not replace the right of an individual, community, group or organization to take legal action should they so wish. In the event of the grievance not being resolved to the satisfaction of Complainant and or the Proponent, either party may be of the opinion that legal action may be the most appropriate option.

**Appendix G(c):  
Erosion Management Plan**

## **PRINCIPLES FOR EROSION MANAGEMENT**

### **1. PURPOSE**

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

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

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

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

Sections of the development area contained very fine sandy and dispersive soils which in most cases already contained levels of erosion varying between low to moderate. The removal of vegetation and the disturbance of soil will render these areas prone to further erosion or the forming of new erosion areas.

Also prone to erosion are the soils occurring around the washes, however due to the extremely low annual rainfall the risk of water erosion is very low. The condition of the ground for the site as well as broader Scuitdrift areas is such that any surface water is very quickly absorbed into the soil, as such this substantiates that water build up on the surface is minimal to none and practically eliminates any water flow which might cause water erosion.

### **3. EROSION AND SEDIMENT CONTROL PRINCIPLES**

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

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



- » Progressively revegetate or stabilise disturbed areas.

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

### **3.1. On-Site Erosion Management**

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

- » Soil loss will be greater during wet periods than dry periods. Intense rainfall events outside of the wet season, such as occasional summer thunder storms can also cause significant soil loss. Therefore precautions to prevent erosion should be present throughout the year.
- Soils loss will be greater on steeper slopes. Ensure that steep slopes are not devegetated unnecessarily and subsequently become hydrophobic (i.e. have increased runoff and a decreased infiltration rate) increasing the erosion potential.
- » Soil loss is related to the length of time that soils are exposed prior to rehabilitation or stabilisation. Therefore the gap between construction activities and rehabilitation should be minimised. Phased construction and progressive rehabilitation, where practically possible, are therefore important elements of the erosion control strategy.
- » The extent of disturbance will influence the risk and consequences of erosion. Therefore site clearing should be restricted to areas required for construction purposes only. As far as possible, large areas should not be cleared all at once, especially in areas where the risk of erosion is higher.
- » Roads should be planned and constructed in a manner which minimises their erosion potential. Roads should therefore follow the natural contour as far as possible. Roads parallel to the slope direction should be avoided as far as possible.
- » Where necessary, new roads constructed should include water diversion structures present with energy dissipation features present to slow and disperse the water into the receiving area.
- » Roads and other disturbed areas should be regularly monitored for erosion. Any erosion problems recorded should be rectified as soon as possible and monitored thereafter to ensure that they do not re-occur.
- » Compacted areas should have adequate drainage systems to avoid pooling and surface flow. Heavy machinery should not compact those areas which are not intended to be compacted as this will result in compacted hydrophobic, water repellent soils which increase the erosion potential of the area. Where compaction does occur, the areas should be ripped.

- » All bare areas should be revegetated with appropriate locally occurring species, to bind the soil and limit erosion potential.
- » Silt fences should be used where there is a danger of topsoil or material stockpiles eroding and entering streams and other sensitive areas.
- » Gabions and other stabilisation features should be used on steep slopes and other areas vulnerable to erosion to minimise erosion risk as far as possible.
- » Activity at the site after large rainfall events when the soils are wet and erosion risk is increased should be reduced.
- » Topsoil should be removed and stored separately during construction activities (as per the recommendations in the EMPr), and should be reapplied where appropriate as soon as possible in order to encourage and facilitate rapid regeneration of the natural vegetation on cleared areas.
- » Regular monitoring of the site for erosion problems during construction (ongoing) and operation (at least twice annually) is recommended, particularly after large summer thunderstorms have been experienced. The ECO will determine the frequency of monitoring based on the severity of the impacts in the erosion prone areas.

### **3.1.1. Erosion control mechanisms**

The contractor may use the following mechanisms (whichever proves more appropriate/ effective) to combat erosion when necessary:

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

### **3.2. Engineering Specifications**

A detailed engineering specifications Storm-water Management Plan describing and illustrating the proposed stormwater control measures must be prepared by the Civil Engineers during the detailed design phase and should be based on the underlying principles of the Storm-water Management Plan (Appendix G of the

EMPr) and this should include erosion control measures. Requirements for project design include:

- Erosion control measures to be implemented before and during the construction period, including the final stormwater control measures (post construction).
- All temporary and permanent water management structures or stabilisation methods must be indicated within the Stormwater Management Plan.
- An onsite Engineer or Environmental Officer (EO) to be responsible for ensuring implementation of the erosion control measures on site during the construction period. The ECO to monitor the effectiveness of these measures on the interval agreed upon with the Site Manager and EO.
- The EPC Contractor holds ultimate responsibility for remedial action in the event that the approved Storm-Water Plan is not correctly or appropriately implemented and damage to the environment is caused.

### **3.3. Monitoring**

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

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

The Contractor (in consultation with an appropriate specialist, e.g. an engineer) must:

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

#### **4. CONCLUSION**

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

## **5. REFERENCES**

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**Appendix G(d):  
Waste Management Plan**

## **WASTE MANAGEMENT PLAN**

### **1. PURPOSE**

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

This WMP has been compiled as part of the project Environmental Management Programme (EMPr) and includes waste stream information available at the time of compilation. Construction practices and operations must be measured and analysed in order to determine the efficacy of the plan and whether further revision of the plan is required. This plan should be further updated should further detail regarding waste quantities and categorisation become available, during the construction and/or operational stages.

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

It is expected that the development of the Scuitdrift Solar Energy Facility will generate construction solid waste, general waste, contaminated water and soil.

Waste generated on site, originates from various sources including:

- » Concrete waste generated from removal and demolition of the batching plant, dummy columns, plinths, temporary bunds and foundations, spoilt and excess concrete.
- » Contaminated water, soil and vegetation due to hydrocarbon spills.
- » Hydrocarbon waste from vehicle, equipment and machinery parts (oil cans, filters, rags etc), and servicing.
- » Hazardous/ non-hazardous chemical waste from, chemical dosing in the WTP/WWTP, cleaning of steam/ heat storage vessels and pipework, fluorescent tubes and waste ink cartridges.
- » Recyclable waste in the form of paper, glass, steel, aluminium, wood/ wood pallets, plastic (PET bottles, PVC, LDPE), cardboard and rockwool. Organic waste from food waste and alien vegetation removal.
- » Sewage from portable toilets and septic tanks.
- » Inert waste from excess rock and soil from site clearance and trenching works.

### 3. LEGISLATIVE REQUIREMENTS

Waste in South Africa is currently governed by means of a number of pieces of legislation, including:

- » National Environmental Management: Waste Act (NEM:WA), 2008 (Act 59 of 2008)
- » National Environmental Management: Waste Amendment Act, 2014 (Act 26 of 2014)
- » The South African Constitution (Act 108 of 1996)
- » Hazardous Substances Act (Act 5 of 1973)
- » Health Act (Act 63 of 1977)
- » Environment Conservation Act (Act 73 of 1989)
- » Occupational Health and Safety Act (Act 85 of 1993)
- » National Water Act (Act 36 of 1998)
- » The National Environmental Management Act (Act 107 of 1998)
- » Municipal Structures Act (Act 117 of 1998)
- » Municipal Systems Act (Act 32 of 2000)
- » Mineral and Petroleum Resources Development Act (Act 28 of 2002)
- » Air Quality Act (Act 39 of 2004)

Storage of waste must be undertaken in accordance with the National Norms and Standards for the Storage of Waste published in GN926.

### 4. WASTE MANAGEMENT PRINCIPLES

An integrated approach to waste management on site is needed. Such an approach is illustrated in the figure below.





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

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

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

#### **4.1. Construction phase**

A plan for the management of waste during construction waste is detailed below. As previously stated, construction practices must be measured and analysed in order to determine the efficacy of the plan and whether further revision of the plan is required. A Method Statement detailing specific waste management practices during construction should be prepared by the Contractor prior to the commencement of construction.

##### **4.1.1. Waste Assessment / Inventory**

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

##### **4.1.2. Waste collection, handling and storage**

- » Each subcontractor must implement their own waste recycling system, i.e. separate bins for food waste, plastics, paper, wood, glass cardboard, metals, etc.
- » Septic tanks and portable toilets must be monitored and maintained daily. Below ground storage of septic tanks must withstand the external forces of the surrounding environment. The area above the tank must be demarcated to prevent any vehicles or heavy machinery from driving around the area.
- » Waste collection bins and hazardous waste containers must be provided by the principal contractor and placed at various areas around site for the storage of organic, recyclable and hazardous waste.

- » A dedicated waste area must be established on site for the storage of all waste streams, before removal from site.
- » Signage/ colour coding must be used to differentiate disposal areas for the various waste streams (i.e. paper, cardboard, metals, food waste, glass etc.).
- » Hazardous waste must be stored within a bunded area constructed according to SABS requirements. The volume of waste stored in the bunds must not exceed 110% of the bund capacity.
- » The location of all temporary waste storage areas must aim to minimise the potential for impact on the surrounding environment, including prevention of contaminated runoff, seepage, and vermin control.
- » Waste storage shall be in accordance with all Regulations and best-practice guidelines and under no circumstances may waste be burnt on site.
- » A dedicated waste management team must be appointed by the principal contractors' EO, whom will be responsible for ensuring the continuous sorting of waste and maintenance of the area. The waste management team must be trained in all areas of waste management and monitored by the EO.
- » All waste removed from site must be done so by a registered/ licensed subcontractor, whom must supply information regarding how waste recycling/ disposal will be achieved. The registered subcontractor must provide waste manifests for all removals at least once a month.

#### **4.1.3. Management of waste storage areas**

- » The position of all waste storage areas must be located away from water courses and ensure minimal degradation to the environment. The main waste storage area must have a suitable storm water system separating clean and dirty storm water.
- » Collection bins placed around site and at subcontractors' camps must be maintained and emptied on a regular basis by the principal contractor.
- » Inspections and maintenance of the main waste storage area must be undertaken daily. Skips and storage containers must be clearly marked or colour coded and well-maintained, not allowing access to vermin or other rodents. Shade cloth should ideally be used to ensure avifauna does not have access to waste.
- » Waste must be stored in designated containers and not on the ground.
- » Inspections and maintenance of bunds must be undertaken daily. Bunds must be inspected for leaks or cracks in the foundation and walls.
- » It is assumed that any rainwater collected inside the bund is contaminated and must be removed and stored as hazardous waste, and not released into the environment. If any leaks occur in the bund, these must be removed immediately.

#### **4.1.4. Disposal**

- » Waste generated on site must be removed on a regular basis, as determined by the Environmental Officer. This frequency may change during construction depending on waste volumes generated at different stages of the construction process.
- » Waste must be removed by a suitably qualified contractor and disposed at an appropriately licensed landfill site. Proof of appropriate disposal must be provided by the contractor.

#### **4.1.5. Record keeping**

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

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

#### **4.1.6. Training**

Training and awareness regarding waste management shall be provided to all employees and contractors as part of the toolbox talks or on-site awareness sessions

### **5. Operational phase**

It is expected that the operational phase will result in the production of general waste consisting mostly of cardboard, paper, plastic, tins, metals and a variety of synthetic compounds. Limited hazardous wastes (grease, oils) may also be generated. All waste generated will be required to be temporarily stored at the facility in appropriate sealed containers prior to disposal at a permitted landfill site.

The following waste management principles apply during the operational phase:

- » The Environmental Manager must develop, implement and maintain a waste inventory reflecting all waste generated during construction for both general and hazardous waste streams.

- » Adequate waste collection bins at site must be supplied. Separate bins should be provided for general and hazardous waste.
- » Recyclable waste must be removed from the waste stream and stored separately.
- » All waste must be stored in appropriate temporary storage containers (separated between different construction wastes, and contaminated or wet waste) at each construction area prior to being taken to the construction camp for final sorting (if required) and further temporary storage. Waste storage shall be in accordance with all best-practice guidelines and under no circumstances may waste be burnt on site.
- » Waste generated on site must be removed on a regular basis throughout the operational phase.
- » Waste must be removed by a suitably qualified contractor and disposed at an appropriately licensed landfill site. Proof of appropriate disposal must be provided by the contractor.

## **6. Monitoring of Waste Management Activities**

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

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

This report will aid in monitoring the progress and relevance of the waste management procedures that are in place. If it is found that the implemented procedures are not as effective as required, this WMP is to be reviewed and amended accordingly.

**Appendix G(e):  
Stormwater Management  
Plan**

## **STORMWATER MANAGEMENT PLAN**

### **1. PURPOSE**

It is widely recognised that developments impact negatively on drainage systems. By taking greater cognisance of natural hydrological patterns and processes it is possible to develop stormwater management systems in manner that reduces these potentially negative impacts and mimic nature. The main risks associated with inappropriate stormwater management are increased erosion risk and risks associated with flooding. Therefore, this stormwater management plan and the erosion management plan are closely linked to one another and be managed together.

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

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

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

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

This storm water management plan must be updated and refined once the construction/ civil engineering plans have been finalised.

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

The 'Washes' are defined in terms of the current study as those areas which show visible signs of occasional water movement and sediment transport, but which do not receive sufficient runoff to develop characteristic soils or vegetation associated with wetlands or drainage lines.

It is important to understand the dynamic nature of the washes; they are not heavily incised and due to the homogenous slope and substrate of the site, they are fairly dynamic in nature and frequently move back and forth across the slope over time as active channels become vegetated or filled with sediment. In terms of mitigation, in order to maintain the natural pattern of water movement across the site, diversion structures should be present along the roads the divert flow off of the roads.

Although development within the washes themselves should be avoided, a large buffer is not deemed necessary in the current context. The appropriate buffer around these areas is to some extent dependent on the manner in which the PV panel support structures will be constructed. Any vegetation disturbance and clearing during construction over the washes would be acceptable provided that care is taken to ensure that the washes themselves are not obstructed. For this reason, a 5 - 10m buffer is proposed for the construction of the PV panels.

### **3. STORMWATER MANAGEMENT PRINCIPLES**

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

- » Prevent concentration of stormwater flow at any point where the ground is susceptible to erosion.
- » Reduce stormwater flows as far as possible by the effective use of attenuating devices (such as swales, berms, silt fences). As construction progresses, the stormwater control measures are to be monitored and adjusted to ensure complete erosion and pollution control at all times.
- » Minimise the area of exposure of bare soils to minimise the erosive forces of wind, water and all forms of traffic.
- » Ensure that development does not increase the rate of stormwater flow above that which the natural ground can safely accommodate at any point in the sub-catchments.
- » Ensure that all stormwater control works are constructed in a safe and aesthetic manner in keeping with the overall development.
- » Plan and construct stormwater management systems to remove contaminants before they pollute surface waters or groundwater resources.
- » Contain soil erosion, whether induced by wind or water forces, by constructing protective works to trap sediment at appropriate locations. This applies particularly during construction.
- » Avoid situations where natural or artificial slopes may become saturated and unstable, both during and after the construction process.
- » Design and construct roads to avoid concentration of flow along and off the road. Where flow concentration is unavoidable, measures to incorporate the road into the major stormwater system should be taken, with the provision of detention storage facilities at suitable points.

- » To assist with the stormwater run-off, gravel roads should typically be graded and shaped with a 2-3% crossfall back into the slope, allowing stormwater to be channelled in a controlled manor towards the, natural drainage lines and to assist with any sheet flow on the site.
- » Design culvert inlet structures to ensure that the capacity of the culvert does not exceed the pre-development stormwater flow at that point. Provide detention storage on the road and/or upstream of the stormwater culvert.
- » Design outlet culvert structures to dissipate flow energy. Any unlined downstream channel must be adequately protected against soil erosion.
- » Where the construction of a building causes a change in the vegetative cover of the site that might result in soil erosion, the risk of soil erosion by stormwater must be minimised by the provision of appropriate artificial soil stabilisation mechanisms or revegetation of the area. Any inlet to a piped system should be fitted with a screen, or grating to prevent debris and refuse from entering the stormwater system.
- » Preferably all drainage channels on site and contained within the larger area of the property (i.e. including buffer zone) should remain in the natural state so that the existing hydrology is not disturbed.

### **3.1. Engineering Specifications**

A detailed Stormwater Management Plan describing and illustrating the proposed stormwater control measures must be prepared by the Civil Engineers during the detailed design phase. This should include erosion control measures. Requirements for project design include:

- » Erosion control measures to be implemented before and during the construction period, including the final stormwater control measures (post construction).
- » The location, area/extent (m<sup>2</sup>/ha) and specifications of all temporary and permanent water management structures or stabilisation methods must be indicated within the Stormwater Management Plan.
- » The drainage system for the site should be designed to specifications that can adequately deal with a 1:50 year intensity rainfall event or more to ensure sufficient capacity for carrying storm waters around and away from infrastructure.
- » Procedures for storm water flow through a project site need to take into consideration both normal operating practice and special circumstances. Special circumstances in this case typically include severe rainfall events.
- » An onsite Engineer or Environmental Officer to be responsible for ensuring implementation of the erosion control measures on site during the construction period.
- » The Developer holds ultimate responsibility for remedial action in the event that the approved stormwater plan is not correctly or appropriately implemented and damage to the environment is caused.

During the construction phase, the contractor must prepare a Stormwater Control Method Statement to ensure that all construction methods adopted on site do not cause, or



precipitate soil erosion and shall take adequate steps to ensure that the requirements of the Stormwater Management Plan are met before, during and after construction. The designated responsible person on site, as indicated in the Stormwater Control Method Statement shall ensure that no construction work takes place before the stormwater control measures are in place.

An operational phase stormwater management plan should be designed and implemented, with a view to preventing the passage of concentrated flows off hardened surfaces and onto natural areas.

**Appendix G(f):  
Emergency Fire  
Management Plan**

## EMERGENCY PREPAREDNESS AND RESPONSE PLAN

### 1. PURPOSE

The purpose of the Emergency Preparedness and Response Plan is:

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

This plan outlines response actions for potential incidents of any size. It details response procedures that will minimise potential health and safety hazards, environmental damage, and clean-up efforts. The plan has been prepared to ensure quick access to all the information required in responding to an emergency event. The plan will enable an effective, comprehensive response to prevent injury or damage to the construction personnel, public, and environment during the project. Contractors are expected to comply with all procedures described in this document. A Method Statement should be prepared at the commencement of construction detailing how this plan is to be implemented as well as details of relevant responsible parties for the implementation. The method statement must also reflect conditions of the IFC PS1 and include the following:

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

## **2. PROJECT-SPECIFIC DETAILS**

**Scuitdrift Solar Project (Pty) Ltd** intends to develop a 10MW photovoltaic solar facility on the Farm Scuitdrift 426, near Augrabies, Northern Cape Province. The development is to be referred to as the Scuitdrift Solar Energy Facility. Due to the scale and nature of this development, it is anticipated that the following risks could potentially arise during the construction and operational phases:

- » Fires;
- » Leakage of hazardous substances;
- » Storage of flammable materials and substances;
- » Flood events and overflow of wastewater retention dam;
- » Accidents; and
- » Natural disasters.

## **3. EMERGENCY RESPONSE PLAN**

There are three levels of emergency as follows:

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

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

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

### **3.1. Emergency Scenario Contingency Planning**

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

##### **i. Spill Prevention Measures**

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

- » All equipment refuelling, servicing and maintenance activities should only be undertaken within appropriately sealed designated areas.
- » All maintenance materials, oils, grease, lubricants, etc. should be stored in a designated area in an appropriate storage container.
- » No refuelling, storage, servicing, or maintenance of equipment should take place within 50m of drainage lines or sensitive environmental resources in order to reduce the risk of contamination by spills.
- » No refuelling or servicing should be undertaken without absorbent material or drip pans properly placed to contain spilled fuel.
- » Any fluids drained from the machinery during servicing should be collected in leak-proof containers and taken to an appropriate disposal or recycling facility.
- » If these activities result in damage or accumulation of product on the soil, the contaminated soil must be disposed of as hazardous waste. Under no circumstances shall contaminated soil be added to a spoils pile and transported to a regular disposal site.
- » Chemical toilets used during construction must be regularly cleaned. Chemicals used in toilets are also hazardous to the environment and must be controlled. Portable chemical toilets could overflow if not pumped regularly or they could spill if dropped or overturned during moving. Care and due diligence should be taken at all times.
- » Contact details of emergency services and HazMat Response Contractors are to be clearly displayed on the site. All staff are to be made aware of these details and must be familiar with the procedures for notification in the event of an emergency.

##### **ii. Procedures**

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

1. Spill or release identified.
2. Assess person safety, safety of others and environment.
3. Stop the spill if safely possible.

4. Contain spill to limit entering water bodies and surrounding areas.
5. Identify substance spilled.
6. Quantify spill (under or over guideline/threshold levels).
7. Notify Site Manager and emergency response crew and authorities (in event of major spill).
8. Inform users (and downstream users) of potential risk.
9. Clean up of spill using spill kit or by HazMat team.
10. Record of spill incident on company database.

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

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

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

**Containment of Spills on Land**

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

» *Dykes*

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

» *Trenches*

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

### **Containment of Spills on Water**

Spills in water can negatively impact water quality and aquatic life. All measures need to be undertaken to contain spills on open water. The following methods could be used:

» *Weirs*

Weirs can be used to contain spills in streams and to prevent further migration downstream. Plywood or other materials found on site can be placed into and across the width of the stream, such that water can still flow under the weir. Weirs are however only effective for spilled substances which float on the water surface.

» *Barriers*

In some situations barriers made of netting or fence material can be installed across a stream, and sorbent materials placed at the base to absorb spilled substance. Sorbents will need to be replaced as soon as they are saturated. Water will be allowed to flow through.

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

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

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

### ***c) Procedures for restoring affected areas***

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

### **3.1.2. Scenario: Fire (and fire water handling)**

#### **i. Action Plan**

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

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

#### **ii. Procedures**

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

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

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

#### **a) Procedures for initial actions**

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

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



## **b) Reporting procedures**

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

### **3.1.3. Scenario: Flood events and overflow of wastewater retention dam**

#### **i. Action Plan**

The following action plan is proposed in the event of a flood of overflow of wastewater retention dam:

1. Identify flood state or overflow
2. Assess personal safety, safety of others and environment
3. Identify source
4. Stop the source of water(waste) causing overflow if safely possible
5. Contain overflow water to limit it entering surrounding water bodies
6. Quantify overflow
7. Notify Site Manager and emergency response crew and authorities
8. Inform users (and downstream users) of potential risk
9. Record of incident on company database

#### **ii. Flood/overflow Effect Prevention Measures**

Preventing flood/ overflowing of wastewater retention dam must be a top priority. The responsibility to effectively prevent and mitigate any scenario lies with the Contractor and the Environmental Manager. All parties are expected to:

- » Always conduct proper maintenance and inspections on the area and machinery/vehicles.
- » Never allow for the risk of over flowing, especially in or near sensitive areas.
- » Know the limits of the wastewater dam/s.
- » Store all materials in protected areas.

Restrictions must be placed on amounts of wastewater to be pumped into the dam. All technical detail as to capacity and limitations of the facility must be made extremely clear to reduce the potential of contamination.

#### **iii. Procedures**

Although attempts can be made to minimise the effects of flooding, it is impossible to prevent floods altogether. Being prepared for flooding and having emergency plans must therefore be a priority.

**a) Procedures for initial actions**

- » Ensure safety of all personnel.
- » Assess hazards and risks.
- » Stop the flood/overflow if safely and physically possible, e.g. shut off pump.
- » No matter what the volume is, notify site manager.
- » Contain the wastewater.

**b) Reporting procedures**

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

**c) Procedures for containing and controlling overflow of wastewater retention dam**

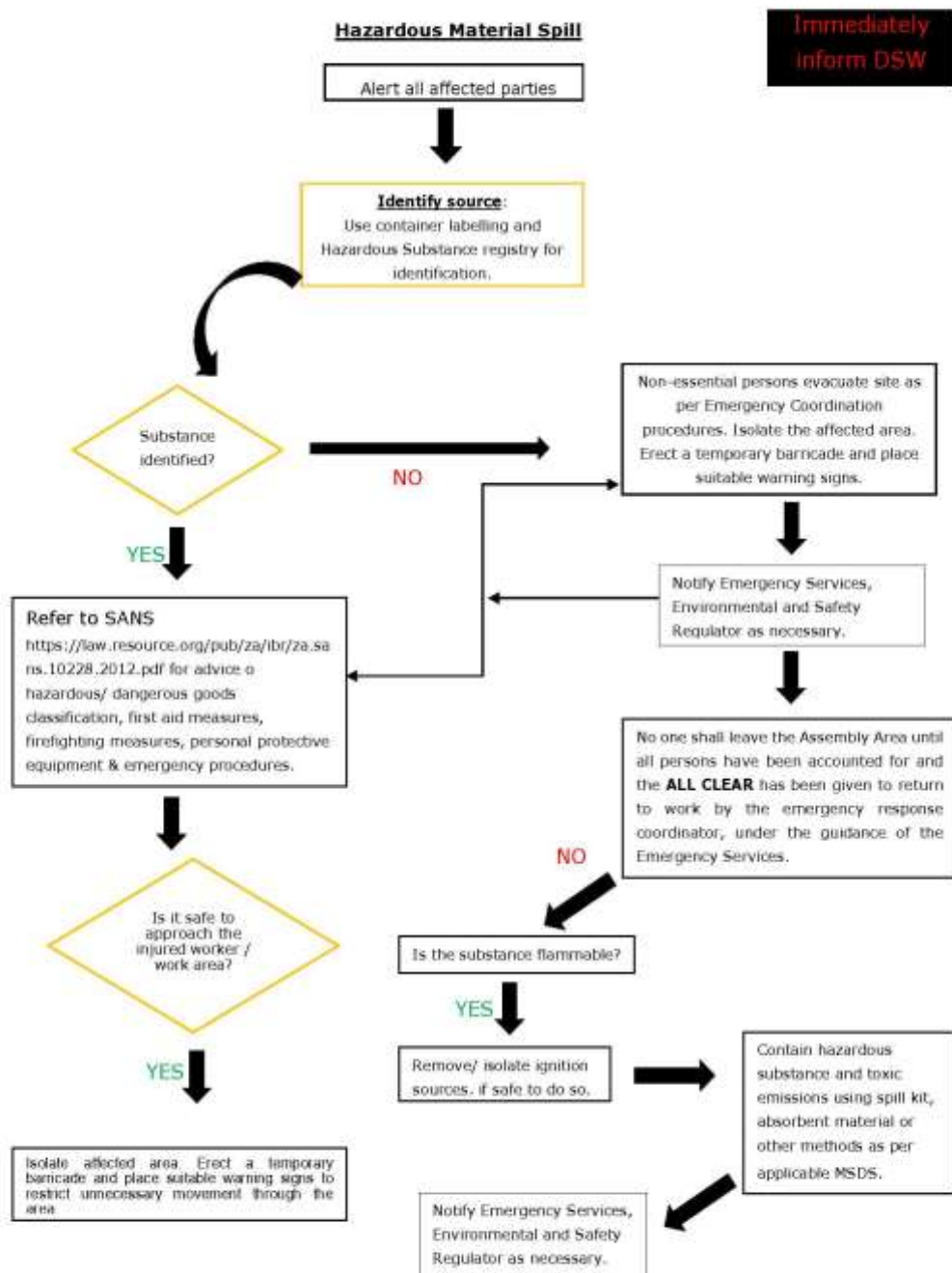
Measures can be taken to prepare for quick and effective containment of any potential overflow.

- » Initiate overflow containment by first determining what will be affected by the incident.
- » Assess speed and direction of overflow and cause of movement (water, wind and slope).
- » Determine best location for containing wastewater, avoiding any water bodies.
- » Have a contingency plan ready in case event worsens beyond control or if the weather or topography impedes containment.

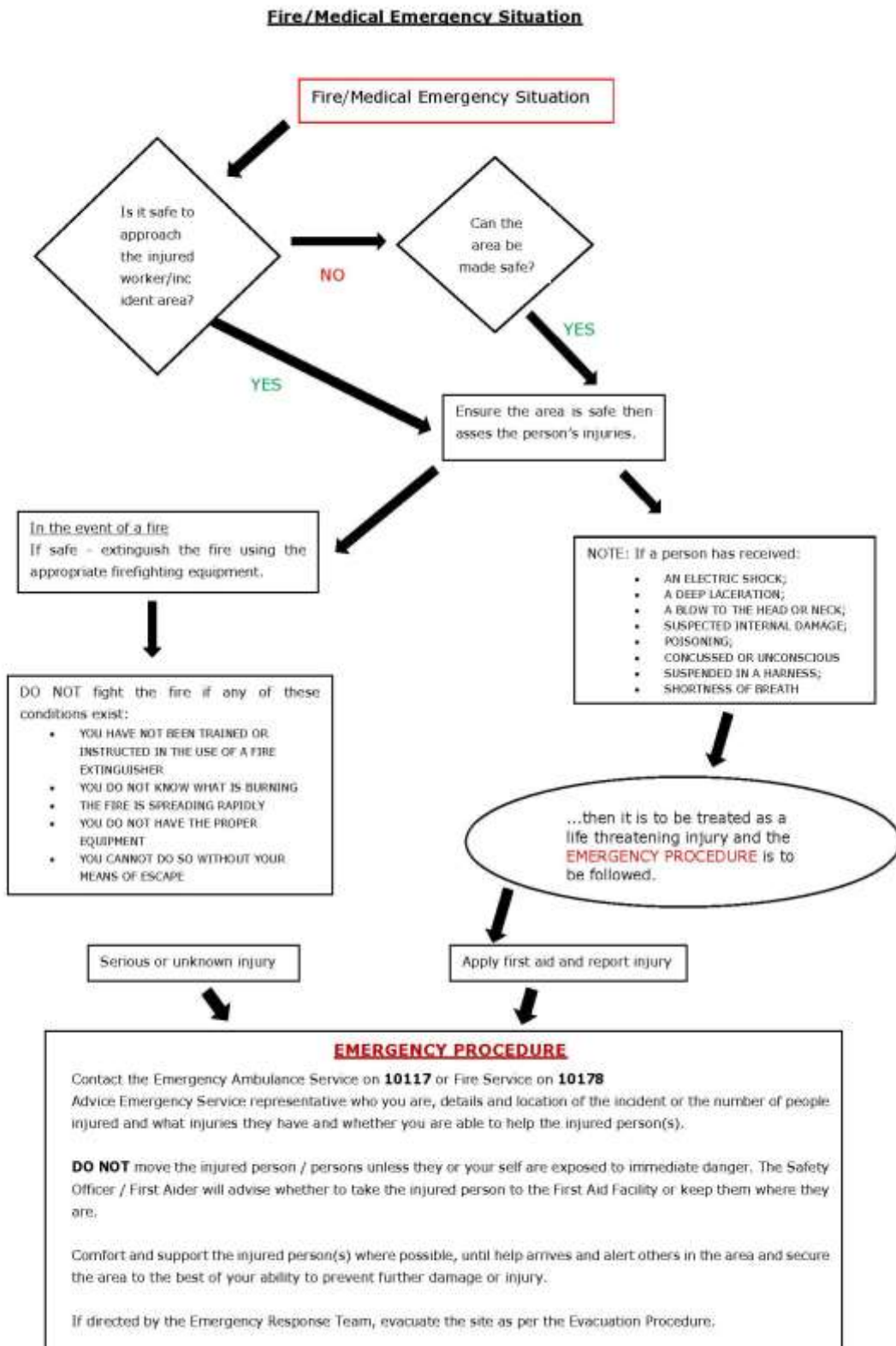
**d) Procedures for transferring, storing, and management.**

Following clean up, any tools or equipment used will be properly washed and decontaminated, or replaced if this is not possible. All materials used for containment of spilled wastewater must be placed into empty waste oil containers and sealed for proper disposal at an approved disposal facility.

**SUMMARY: RESPONSE PROCEDURE**



**Figure 1:** Hazardous Material Spill



**Figure 2:** Emergency Fire/Medical

**Appendix G(g):  
Traffic Management Plan**

## **PRINCIPLES FOR TRAFFIC MANAGEMENT**

### **1. PURPOSE**

The purpose of this Traffic Management Plan (TMP) is to address regulatory compliance, traffic management practices, and protection measures to help reduce impacts related to transportation and the construction of temporary and long-term access within the vicinity of the Scuitdrift Solar Energy Facility. The objectives of this plan include the following:

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

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

The N14 national road is located approximately 30km North West of the proposed development site. Transport to the site will be along appropriate national, provincial and local roads. The access roads to the site will be from Pofadder or Augrabies via Kakamas, along the N14. This is a tarred national road and no alterations should be necessary to handle construction traffic and traffic involved in the operation phase. The access road to the Scuitdrift Solar Energy Facility from the N14 has been confirmed as two divisional roads, the R359 and DR3256 which fall under the ZF Mgcau District Municipality. Access/haul roads to the site as well as internal access roads within the site are required to be established. The internal access roads will be up to 4 m in width. As far as possible, existing access roads to the site would be utilised, and upgraded where required.

### **3. TRAFFIC AND TRANSPORTATION MANAGEMENT PRINCIPLES**

- » Prior to the commencement of construction the contractor must develop their own detailed Transport Management Plan (TMP) based on the requirements laid out in this plan.
- » The transport contractor must ensure that all required permits for the transportation of abnormal loads are in place prior to the transportation of

equipment and project components to the site. Specific abnormal load routes must be developed with environmental factors taken into consideration.

- » Before construction commences, authorised access routes must be clearly marked in the field with signs or flagging. The Construction Contractor must review the location of designated access and will be responsible for ensuring construction travel is limited to designated routes. The entrance of the main access road must not be constructed before a blind rise or on a bend of the public road.
- » All employees must attend an environmental training program (e.g. toolbox talks) by the Environmental Officer (EO). Through this program, employees will be instructed to use only approved access roads, drive within the delineated road limits, and obey jurisdictional and posted speed limits to minimise potential impacts to the environment and other road users.
- » The contractor will be responsible for making sure that their suppliers, vendors, and subcontractors strictly comply with the principles of this TMP and the contractor's TMP.
- » Adjacent landowners must be notified of the construction schedule.
- » Access roads and entrances to the site should be carefully planned to limit any intrusion on the neighbouring property owners and road users.
- » Signs must be posted in the project area to notify landowners and others of the construction activity.
- » Flagging must be provided at access points to the site and must be maintained until construction is completed on the site.
- » Speed limits must be established prior to commencement of construction and enforced over all construction traffic.
- » Speed controls and implementation of appropriate dust suppression measures must be enforced to minimise dust pollution.
- » Throughout construction the contractor will be responsible for monitoring the condition of roads used by project traffic and for ensuring that roads are maintained in a condition that is comparable to the condition they were in before the construction began.
- » Drivers must have an appropriate valid driver's license and other operation licences required by applicable legislation.
- » All vehicles must be maintained in good mechanical, electrical, and electronic condition, including but not limited to the brake systems, steering, tires, windshield wipers, side mirrors and rear view mirror, safety belts, signal indicators, and lenses.
- » Any traffic delays attributable to construction traffic must be co-ordinated with the appropriate authorities.
- » No deviation from approved transportation routes must be allowed, unless roads are closed for reasons outside the control of the contractor.

- » Impacts on local communities must be minimised. Consideration should be given to limiting construction vehicles travelling on public roadways during the morning and late afternoon commute time.

#### **4. MONITORING**

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



**Appendix G(h):  
Plant Rescue and Protection  
Plan**

## PLANT RESCUE AND PROTECTION PLAN

### 1. PURPOSE

The purpose of the plant rescue and protection plan is to implement avoidance and mitigation measures, in addition to the mitigations included in the Environmental Management Programme (EMPr) to reduce the impact of the development of the Scuitdrift Solar Energy Facility on listed and protected plant species and their habitats and to provide guidance on search and rescue of species of conservation concern.

### 2. RELEVANT ASPECTS OF THE SITE

According to the national vegetation map (Mucina & Rutherford 2006), the site lies within the Blouputs Karroid Thornveld vegetation type. Blouputs Karroid Thornveld occurs as a belt of irregular flat areas from the vicinity of Augrabies Falls in the east to Kotie se Laagte and Samoep se Laagte in the west. The vegetation type is listed as Least Threatened and less than 1% has been transformed. It is well conserved (27%) within Augrabies Falls National Park. At 607 km<sup>2</sup> it is however the smallest mapped vegetation unit within the Nama Karoo Biome. Other vegetation types which occur in the vicinity of the site include Lower Gariep Broken Veld, Bushmanland Arid Grassland and along the banks of the Orange River, Lower Gariep Alluvial Vegetation. Lower Gariep Broken Veld and Bushmanland Arid Grassland are also classified as Least Threatened and have been little impacted by transformation. The lower Gariep Alluvial Vegetation is however classified as Endangered on account of the high degree of transformation it has experienced. This vegetation is however restricted to the banks of the Orange River and would not be affected by the development.

Several different habitats and plant communities were evident at the site, including plant communities associated with rocky plains, sandy plains, drainage lines and rocky outcrops. Within the area earmarked for development, the vegetation was however homogenous and apart from several small washes, there was little differentiation of the vegetation. Consequently, only two communities are recognized, that of the washes and that of the adjacent plains. The plains within the development area are generally open with occasional scattered trees of *Acacia erioloba*, *Acacia mellifera* and *Boscia foetida*. The plains are dominated by the grasses *Stipagrostis uniplumis*, *S.ciliata* and *Schmidtia kalahariensis* with occasional shrubs such as *Rhigozum trichotomum*, *Phaeoptilum spinosum* and *Salsola rabieana*.

According to the SANBI SIBIS database, only one endangered species *Caesalpinia bracteata* is known from the area, and is classified as Vulnerable. This species has

a highly restricted distribution and is known from a total population of about 1000 adult plants (Threatened Species Programme, Red List of South African Plants (2011), but as it occurs on rocky outcrops, it would not occur within the proposed development area and was not observed. A number of protected species were observed at the site including *Hoodia gordonii*, *Aloe dichotoma* and *Acacia erioloba*. Within the proposed development area only *Acacia erioloba* was observed. Four individuals of *Acacia erioloba* were within the proposed development area and an additional two in close proximity to the development.

A permit would be required for the destruction of the trees within the development footprint. No succulent or geophytes species suitable for search and rescue operations were observed within the development footprint and this is not seen as a viable option for any of the species present. Species for which this would be viable such as *Hoodia gordonii* and *Aloe dichotoma* were observed at the site, but did not occur within the development footprint.

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

Successful plant rescue can only be achieved if:

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

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

- » A permit is required from the Northern Cape Department of Economic Development and Nature Conservation (DENC) to translocate or destroy any listed and protected species identified by the ecological walkthrough survey undertaken for the optimised final Scuitdrift Solar Energy Facility layout, even if they do not leave the property. This permit should be obtained prior to any search and rescue operations being undertaken.
- » Where suitable species are identified, a search and rescue operation of these species should be undertaken within the development footprint, where these species would be affected, and prior to the commencement of construction.
- » As far as possible, timing of search and rescue activities should be planned with the onset of the growing season.

- » Affected individuals should be translocated to a similar habitat outside of the development footprint and marked and recorded for monitoring purposes. For each individual plant that is rescued, the plant must be photographed before removal, tagged with a unique number or code and a latitude longitude position recorded using a hand-held GPS device.
- » The rescued plants must be planted into a container to be housed within a temporary nursery on site or immediately planted into the target habitat.
- » Rescued plants, if re-planted back in the wild, should be placed as close as possible to where they were originally removed. Re-planting into the wild must cause as little disturbance as possible to existing natural ecosystems. The position of the rescued individual/s must be recorded to aid in future monitoring of that plant as noted earlier.
- » During construction, the Environmental Control Officer (ECO)/ Contractor's Environmental Officer (EO/ Environmental Representative must monitor vegetation clearing at the site. Any deviations from the plans that may be required should first be checked for listed species by the Environmental Control Officer (ECO)/ Contractor's Environmental Officer (EO/ Environmental Representative or Environmental Officer and any listed species present which are able to survive translocation should be translocated to a safe site.
- » Any listed species suitable for translocation observed within the development footprint, and that would be affected, that were not previously observed be translocated to a safe site.
- » The collecting of plants or their parts should be strictly forbidden (as per the mitigations included in the EMP). Staff should be informed of the legal and conservation aspects of harvesting plants from the wild as part of the environmental induction training as per the mitigations including the EMP).
- » Sensitive habitats and area outside project development should be clearly demarcated as no go areas during the construction and operational phase to avoid accidental impacts.

**Appendix G(i):  
Revegetation and  
Rehabilitation Plan**

## **REVEGETATION AND REHABILITATION PLAN**

### **1. PURPOSE**

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

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

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

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

According to the national vegetation map (Mucina & Rutherford 2006), the site lies within the Blouputs Karroid Thornveld vegetation type. Blouputs Karroid Thornveld occurs as a belt of irregular flat areas from the vicinity of Augrabies Falls in the east to Kotie se Laagte and Samoep se Laagte in the west. The vegetation type is listed as Least Threatened and less than 1% has been transformed. It is well conserved (27%) within Augrabies Falls National Park. At 607 km<sup>2</sup> it is however the smallest mapped vegetation unit within the Nama Karoo Biome. Other vegetation types which occur in the vicinity of the site include Lower Gariep Broken Veld, Bushmanland Arid Grassland and along the banks of the Orange River, Lower Gariep Alluvial Vegetation. Lower Gariep Broken Veld and Bushmanland Arid Grassland are also classified as Least Threatened and have been little impacted by transformation. The lower Gariep Alluvial Vegetation is however classified as Endangered on account of the high degree of transformation it has experienced. This vegetation is however restricted to the banks of the Orange River and would not be affected by the development.

Rehabilitation and revegetation of cleared ground in arid areas can be very difficult and slow. Therefore, it is recommended that only essential vegetation clearing should take place. If the foundations of the panel mounting structures can be constructed without wholesale vegetation clearing, then this would significantly

reduce the erosion and alien plant invasion risks associated with the development, with long-term benefits for the maintenance requirements of the facility. Woody plants that need to be cleared could be removed individually by cutting them off at ground level with a chainsaw or if heavy machinery is available, they can be pulled directly from the soil using chains. This would possibly include some individuals of protected tree species such as *Acacia erioloba*, and a permit for the destruction of such species would be required.

### 3. Recommended plant species to use for rehabilitation

The following plant species are recommended for rehabilitation:

(Species highlighted in blue are the preferred species to be used during the initial revegetation and species in green for the final phase.)

- » Rescued plants and bulbs
- » *Ehrharta calycina*,
- » *Merxmuellera stricta*
- » *Karoochloa purpurea*
- » *Pentaschistis eriostoma*
- » *Stipagrostis ciliata*
- » *Stipagrostis namaquensis* (along drainage lines and dry stream crossings)
- » *Enneapogon scaber* (within disturbed rockeries and beds)
- » Annual and Pioneer herbs:
  - Seeds can be collected from various annual herb species occurring naturally within the area, especially spreading and mat forming species.
  - *Heliophila cornuta*
  - *Heliophila crithmifolia*
  - *Hemimeris centrodes*
  - *Diascia parviflora* (along drainage lines and shaded areas)
  - *Nemesia karroensis*
  - *Cotula microglossa* (along drainage lines)
  - *Lasiospermum brachyglossum*, *Lasiospermum pedunculare*
  - *Ursinia pilifera*
  - *Arctotis fastuosa* (along drainage lines)
  - Various *Gazania* species including *G. heterochaeta*, *G. krebsiana*, *G. othonnites* etc.
- » Shrubs
  - *Pelargonium agrotanifolium*, *Pelargonium crithmifolium*
  - *Oedera genistifolia*
  - *Euryops multifidus*
  - *Dimorphotheca cuneata*
  - *Decerothamnus rhinocerotis*
  - *Rosenia oppositifolia*
  - *Eriochepahlus africanus*, *Erioccephalus punctulatus*, *Erioccephalus microphyllus* (within and around disturbed rockeries and beds)

- *Pteronia glomerata*, *Pteronia incana*, *Pteronia pallens*
- *Chrysocoma ciliata*
- » Succulents
  - Most of the occurring species can be removed and transplanted afterwards to stabilize the soil. Their seeds can also be collected and cultivated species can be used.
  - These species include:
    - *Ruschia cradockensis*, *Ruschia centrocapsula*, *Ruschia* spp. (*R. pungens*)
    - *Antimima pumila*
    - *Cheiridopsis namaquensis*
  - Other species found in the surrounding area that can also be affectively used are:
    - *Cephalophyllum framesii*
    - *Drosanthemum eburneum*, *Drosanthemum lique*
    - *Mesembryantemum guerichianum* (Annual)
    - *Mesembryantemum nodiflorum* (Annual)

#### 4. REHABILITATION METHODS

- » Immediately after replacing topsoils in disturbed areas, the soil surface must be revegetated with a suitable plant cover.
- » It is expected that soil seed banks of indigenous vegetation will be present to initiate initial vegetation cover. However, simply applying this topsoil to a well prepared rehabilitation site does not result in the same species richness and diversity as the surrounding areas. In some areas the natural regeneration of the vegetation may be poor and the application relevant of seed to enhance vegetation recovery may be required.
- » Where possible, seed should be collected from plants present at the site during plant rescue operations. Indigenous seeds may also be harvested for purposes of re-vegetation in areas that are free of alien or invasive vegetation, either at the site prior to clearance or from suitable neighbouring sites.
- » Seed collection should be undertaken by a suitably qualified specialist who is familiar with the various seed types associated with the plant species and rehabilitation in the area.
- » Seed collection may be done throughout the year as seed ripens, but can also be restricted to summer, when a large amount of the perennial seed should have ripened. The collection of unripe seeds will reduce the percentage germination thereby reducing the effectiveness of the rehabilitation efforts. Seeds should be stored in paper or canvas bags dusted with insecticide, and sown at the onset of the rainy season.
- » Seed can be sown onto the soil, but should preferably be applied in conjunction with measures to improve seedling survival such as scarification of the soil surface or simultaneous application of mulch. Additional organic material may



be added to the soil mix, if required, to assist with water retention during the early stages of seedling establishment.

- » It should be ensured that the seed mix is as diverse as possible in the first season. After the first season, when pioneer plant communities have successfully established, attempts should be made to re-sow and replant the area with more perennial and woody species. It is a process that will require several follow-ups.
- » Planting is dependent on species involved. Planting of species recommended for rehabilitation should be carried out as far as is practicable to coincide with the onset of the first significant rains. In general however, planting should commence as soon as possible after construction is completed in order to minimise the potential for erosion.
- » The final vegetation cover should resemble the original (non-encroached and indigenous) vegetation composition and structure as far as practicably possible.
- » Progressive rehabilitation is an important element of the rehabilitation strategy and should be implemented where feasible. Re-vegetation of disturbed surfaces must occur immediately after construction activities are completed.
- » Once revegetated, areas should be protected to prevent trampling and erosion.
- » No construction equipment, vehicles or unauthorised personnel should be allowed onto areas that have been vegetated.
- » Where rehabilitation sites are located within actively grazed areas, they should be fenced, this must be undertaken in consultation with the landowner.
- » Fencing should be removed once a sound vegetative cover has been achieved.
- » Any runnels, erosion channels or wash ways developing after revegetation should be backfilled and consolidated and the areas restored to a proper stable condition.

## **5. MONITORING AND FOLLOW-UP ACTION**

Throughout the lifecycle of the development, regular monitoring and adaptive management must be in place to detect any new degradation of rehabilitated areas. During the construction phase, the Environmental Officer (EO) and EPC Contractor will be responsible for initiating and maintaining a suitable monitoring system. Once the development is operational, the Proponent will need to identify a suitable entity that will be able to take over and maintain the monitoring cycle and initiate adaptive management as soon as it is required. Monitoring personnel must be adequately trained.

The following are the minimum criteria that should be monitored:

- » Composition and density of replanted vegetation, distinguishing between species introduced for initial revegetation only and species that are part of the pre-determined desirable end state.
- » Associated nature and stability of surface soils

- » Re-emergence of alien and invasive plant species. If noted, remedial action must be taken immediately.

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

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

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

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

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

**Appendix G(j):  
Alien Invasive Management  
Plan**

## **ALIEN PLANT MANAGEMENT PLAN**

### **1. PURPOSE**

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

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

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

According to the national vegetation map (Mucina & Rutherford 2006), the site lies within the Blouputs Karroid Thornveld vegetation type. Blouputs Karroid Thornveld occurs as a belt of irregular flat areas from the vicinity of Augrabies Falls in the east to Kotie se Laagte and Samoep se Laagte in the west. The vegetation type is listed as Least Threatened and less than 1% has been transformed. It is well conserved (27%) within Augrabies Falls National Park. At 607 km<sup>2</sup> it is however the smallest mapped vegetation unit within the Nama Karoo Biome. Other vegetation types which occur in the vicinity of the site include Lower Gariep Broken Veld, Bushmanland Arid Grassland and along the banks of the Orange River, Lower Gariep Alluvial Vegetation. Lower Gariep Broken Veld and Bushmanland Arid Grassland are also classified as Least Threatened and have been little impacted by transformation. The lower Gariep Alluvial Vegetation is however classified as Endangered on account of the high degree of transformation it has experienced. This vegetation is however restricted to the banks of the Orange River and would not be affected by the development.

Very few alien species were observed at the site which can be ascribed to the arid nature of the area combined with nutrient-poor soils. As a result, the risk of alien plant invasion should be relatively low. Alien plants are however likely to become an issue if the site is highly disturbed during construction or if water runoff is not properly managed.

### **3. LEGISLATIVE CONTEXT**

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

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

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

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

The National Environmental Management: Biodiversity Act (NEM:BA) regulates all invasive organisms in South Africa, including a wide range of fauna and flora. Regulations have been published in Government Notices R.506, R.507, R.508 and R.509 of 2013 under NEMBA. According to this Act and the regulations, any species designated under Section 70 cannot be propagated, grown, bought or sold without a permit. Below is an explanation of the three categories:

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

Plants listed under the categories above are detailed within Notice 1 of the Alien and Invasive Species published in GNR599 of 01 August 2014. The following guide is a useful

starting point for the identification of alien species: Bromilow, C. 2010. Problem Plants and Alien Weeds of South Africa. Briza, Pretoria.

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

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

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

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

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

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

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

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

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

aliens are easily dispersed across boundaries by wind or water courses. All clearing actions should be monitored and documented to keep records of which areas are due for follow-up clearing.

### **i. Clearing Methods**

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

Fire shall not be used for alien control or vegetation management at the site. The best-practice clearing method for each species identified should be used. The preferred clearing methods for most alien species can be obtained from the DWAF Working for Water Website: <http://www.dwaf.gov.za/wfw/Control/>.

#### » **Mechanical control**

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

#### » **Chemical Control**

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

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

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

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

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

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

» **Biological control**

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

To obtain biocontrol agents, provincial representatives of the Working for Water Programme or the Directorate: Land Use and Soil Management (LUSM), Department of Agriculture, Forestry and Fisheries (DAFF) can be contacted.



#### 4.4. General management practices

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

- » Establish an ongoing monitoring programme for construction phase to detect and quantify any alien species that may become established and identify the problem species.
- » Alien vegetation regrowth on areas disturbed by construction must be immediately controlled once recorded throughout the entire site during construction and operation.
- » Care must be taken to avoid the introduction of alien invasive plant species to the site. Particular attention must be paid to imported material such as building sand or dirty earth-moving equipment. Stockpiles should be checked regularly and any weeds emerging from material stockpiles should be removed.
- » Cleared areas that have become invaded by alien species can be sprayed with appropriate herbicides provided that these are such that break down on contact with the soil. Residual herbicides should not be used. Mechanical/ manual method should however also be considered as an option.
- » The effectiveness of vegetation control varies seasonally and this is also likely to impact alien species. Control early in the wet season will allow species to re-grow and follow-up control is likely to be required. It is tempting to leave control until late in the wet season to avoid follow-up control. However, this may allow alien species to set seed before control and hence will not contribute towards reducing alien species abundance. Therefore, vegetation control should be aimed at the middle of the wet season, with a follow-up event towards the end of the wet season. There are no exact dates that can be specified here as each season is unique and management must therefore respond according to the state and progression of the vegetation.
- » Alien management is an iterative process and it may require repeated control efforts to significantly reduce the abundance of a species. This is often due to the presence of large and persistent seed banks. However, repeated control usually results in rapid decline once seed banks become depleted.
- » Some alien species are best individually pulled by hand and in the case of *Opuntia* removed from the site.
- » Regular vegetation control to reduce plant biomass within the site should be conducted. This should be timed so as to coincide with the critical growth phases of the most important alien species on site. This will significantly reduce the cost of alien management as this should contribute towards the control of the dominant alien species and additional targeted control will be required only for a limited number of species.
- » No alien species should be cultivated on-site. If vegetation is required for aesthetic purposes, then non-invasive, water-wise locally-occurring species should be used
- » During operation, surveys for alien species should be conducted regularly. It is recommended that this be undertaken every 6 months for the first two years after

construction and annually thereafter. All aliens identified should be cleared using appropriate means.

#### 4.5. Monitoring

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

In general, the following principles apply for monitoring:

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

The following monitoring could be used as a baseline to ensure management of alien invasive plant species.

#### **Construction Phase**

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

#### **Operation Phase**

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

<b>Monitoring Action</b>	<b>Indicator</b>	<b>Timeframe</b>
Document rehabilitation measures implemented and success achieved in problem areas	Decline in vulnerable bare areas over time	Biannually