NALEDI PV
NORTHERN CAPE PROVINCE

ENVIRONMENTAL MANAGEMENT PROGRAMME

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Prepared for
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PROJECT DETAILS

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DEFINITIONS AND TERMINOLOGY

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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.

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, whether or not that substance can be reduced, re-used, recycled and recovered-

(a) that is surplus, unwanted, rejected, discarded, abandoned or disposed of;
(b) which the generator has no further use of for the purposes of production;
(c) that must be treated or disposed of; or
(d) that is identified by the Minister by notice in the Gazette.

and includes waste generated by the mining, medical or other sector, but –

(i) a by-product is not considered waste; and
(ii) any portion of waste once re-used, recycled and recovered, ceases to be waste.

ABBREVIATIONS

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

BA	Basic Assessment
BAR	Basic Assessment Report
DAFF	Department of Agriculture, Forestry and Fisheries
dB	Decibels
DEA	Department of Environmental Affairs
DEFF	Department of Environment, Forestry and Fisheries
DENC	Northern Cape Department of Environment and Nature Conservation
DoE	Department of Energy
DMRE	Department of Mineral Resources and Energy
EAP	Environmental Impact Practitioner
EHS	Environmental, Health and 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
kV	Kilo Volt
MW	Mega Watt
NEMA	National Environmental Management Act
NEMAA	National Environmental Management Amendment Act
NEMBA	National Environmental Management: Biodiversity Act
NERSA	National Energy Regulator of South Africa
NHRA	National Heritage Resources Act
NWA	National Water Act
PM	Post Meridiem; "Afternoon"
SAHRA	South African National Heritage Resources Agency
SWMP	Stormwater Management Plan

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CHAPTER 1: INTRODUCTION

This Environmental Management Programme (EMPr) has been compiled for Naledi PV (Pty) Ltd (the developer/proponent) for the development of the Naledi PV solar PV facility and associated infrastructure. The project is proposed on Portion 3 of the Farm McTaggarts Camp 453 and Portion 12 a portion of Portion 3 of the Farm Klip Punt 452 (study area), which is approximately 18km south-west of Upington in the Kai !Garib Local Municipality (LM) and within the greater ZF Mgcawu District Municipality (DM) in the Northern Cape Province. The study area for Naledi PV also borders the Dawid Kruiper Local Municipality to the east, but does not infringe on the municipal area.

Naledi PV will be designed to have a contracted capacity of 100MW and will make use of either fixed-tilt or tracking photovoltaic (PV) solar technology for the generation of electricity. This EMPr has been developed on the basis of the findings of the Basic Assessment (BA), and must be implemented to protect sensitive on-site and off-site features through controlling construction, operation and decommissioning activities that could have a detrimental effect on the environment, and through avoiding or minimising potential impacts. This EMPr is applicable to all employees and contractors working on the pre-construction, construction, and operation and maintenance phases of the project. In terms of the Duty of Care provision in S28(1) of NEMA, the project developer must ensure that reasonable measures are taken throughout the life cycle of this project to ensure that any pollution or degradation of the environment associated with this project is avoided, halted or minimised. The document must therefore be adhered to and updated as relevant throughout the project life cycle. This document fulfils the requirement of the EIA Regulations, 2014 (as amended) and forms part of the BA Report for the project.

CHAPTER 2: PROJECT DETAILS

Naledi PV (Pty) Ltd, a Special Purpose Vehicle (SPV), proposes the development of a 100MW solar PV facility, as well as, associated infrastructure on a site located south-west of the town of Upington in the Northern Cape Province. The solar PV facility will be known as Naledi PV and is intended to form part of the Department of Mineral Resources & Energy's (DMRE) Renewable Energy Independent Power Producer Procurement (REIPPP) Programme. A study area has been considered for the development of Naledi PV which consists of the entire extent of Portion 3 of the Farm McTaggarts Camp 453 and Portion 12, Portion of Portion 3 of the Farm Klip Punt 452. A development area[1] of 330ha has been identified within the study area for the development of Naledi PV and the associated infrastructure, which has been assessed within the BA Report.

2.1 Study Area

Table 2.1 provides information regarding the proposed study area and development area identified for Naledi PV and also includes information regarding the properties that may be impacted by the development.

Table 2.1: A description of the study area identified for Naledi PV

Province	Northern Cape Province
District Municipality	ZF Mgcawu District Municipality
Local Municipality	Kai !Garib Local Municipality Dawid Kruiper Local Municipality (to the east of the broader study area)
Ward number(s)	8 of Kai !Garib
Nearest town(s)	Upington (20km) and Keimoes (50km)
Affected Properties: Farm name, number and portion number	Portion 3 of the Farm McTaggarts Camp 453 Portion 12 a portion of Portion 3 of the Farm Klip Punt 452
SG 21 Digit Code (s)	C02800000000045300003 C02800000000045200012
Current zoning	Agricultural (i.e. Grazing) and Special Use (i.e. Energy Generation)
Current land use	Grazing Energy Generation
Study area	~2 904.7665ha
Development area	~330ha
Development footprint	~230ha
Site Co-ordinates (centre of the project site)	28°31'7.31"S 21° 3'53.52"E

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

2.2 Project Description

Naledi PV will comprise the following key infrastructure and components:

[1] The development area is the identified area within Portion 12, Portion of Portion 3 of the Farm Klip Punt 452 and Portion 3 of the Farm McTaggarts Camp 453 within which the required infrastructure for Naledi PV will be sited. The facility layout of the infrastructure and the area to covered by the infrastructure is known as the development footprint and will be up to 230ha in extent.

- Fixed-tilt or tracking solar PV panels with a maximum height of 3.5m;
- Centralised inverter stations or string inverters;
- A permanent laydown area;
- Cabling between the panels, to be laid underground where practical;
- A 22kV or 33kV/132kV on-site facility substation of up to 1ha in extent to facilitate the connection between the solar PV facility and the electricity grid;
- An access road to the development area with a maximum width of 6m;
- Internal access roads within the PV panel array area with a maximum width of 5m; and
- Operation and Maintenance buildings including a gate house and security building, control centre, offices, warehouses, a workshop and visitors centre.

A summary of the associated infrastructure proposed as part of Naledi PV is provided in **Table 2.2**, and described in more detail under the sub-headings below. **Figure 2.2** provides an overview of the layout proposed for the project.

Table 2.2: Planned infrastructure proposed as part of Naledi PV

Component	Description / Dimensions
Contracted capacity of the facility	Up to 100MW
Technology	Static or tracking solar photovoltaic systems.
PV panels	» Height: ~3.5m from ground level (installed). » Between 350 000 – 400 000 panels required. » Up to a maximum of 220ha » Fixed-tilt, single-axis tracking, and/or double-axis tracking systems.
On-site facility Substation	» Located within the development area. » Up to a maximum of 1ha » Stepping up from 22kV or 33kV to 132kV
Site Access	» Direct access to the study area and development area is provided by the existing gravel Lutzputs Road and the existing access road to the Khi Solar One facility. Both roads are connected to the N14 national road. » A 6m wide main gravel/hard surfaced access road will be constructed to provide direct access to the development area (refer to **Figure 2.2**).
Permanent Laydown Area	~3ha
Temporary infrastructure required during the construction phase (estimated to be ~ 18 months)	» Construction equipment camps » Construction yard; and » Storage areas.
Other infrastructure	» Operation and Maintenance buildings » Gate House and Security Building » Control Centre » Offices » Warehouses » Workshop » Visitors Centre » Perimeter Fence

2.3. Life-cycle Phases of Naledi PV

A series of activities are proposed as part of the design, pre-construction, construction, operation, and decommissioning phases associated with the development of Naledi PV. These are discussed in more detail under the respective sub-headings below.

2.3.1. Design and Pre-Construction Phase

Pre-planning: Several post-authorisation factors are expected to influence the final design of the facility and could result in small-scale modifications of the PV array and/or associated infrastructure. While an objective of the Engineering, Procurement and Construction (EPC) Contractor, who will be responsible for the overall construction phase of the project, will be to comply with the approved facility design as far as possible, it should be understood that the construction process is dynamic and that unforeseen changes to the project specifications will take place. This BA Report therefore describes the project in terms of the best available knowledge at the time. The final facility design is required to be approved by the DEA. Importantly, should there be any substantive changes or deviations from the original scope or layout of the project, the DEA will need to be notified and where relevant, approval obtained.

Conduct Surveys: Prior to initiating construction, a number of surveys will be required including, but not limited to confirmation of the micro-siting footprint (i.e. the precise location of the PV panels, on-site facility substation and the plant's associated infrastructure) and a geotechnical survey. Geotechnical surveys are executed by geotechnical engineers and geologists to acquire information regarding the physical characteristics of soil and rocks underlying a proposed development area. The purpose is to design earthworks and foundations for structures and to execute earthwork repairs necessitated due to changes in the subsurface environment.

2.3.2. Construction Phase

The construction phase will entail a series of activities including:

Procurement and employment

Naledi PV is likely to create approximately ~300 (at its peak) employment opportunities (temporary) for a period of ~12 to 18 months, depending on the final design, during the construction phase. Of this, approximately 60% of the opportunities will be available to low skilled workers (construction labourers, security staff, drivers, equipment operators etc.), 25% will be available to semi-skilled personnel (electricians, site managers etc.) and 15% of employment opportunities will be for skilled individuals (engineers, project managers, site managers etc.). Solar PV facilities make use of high numbers of low skilled and semi-skilled labour so there will be good opportunity to use local labour. Employment opportunities for Naledi PV will peak during the construction phase and significantly decline during the operation phase. The injection of income into the area in the form of wages will represent an opportunity for the local economy and businesses in the greater Upington area.

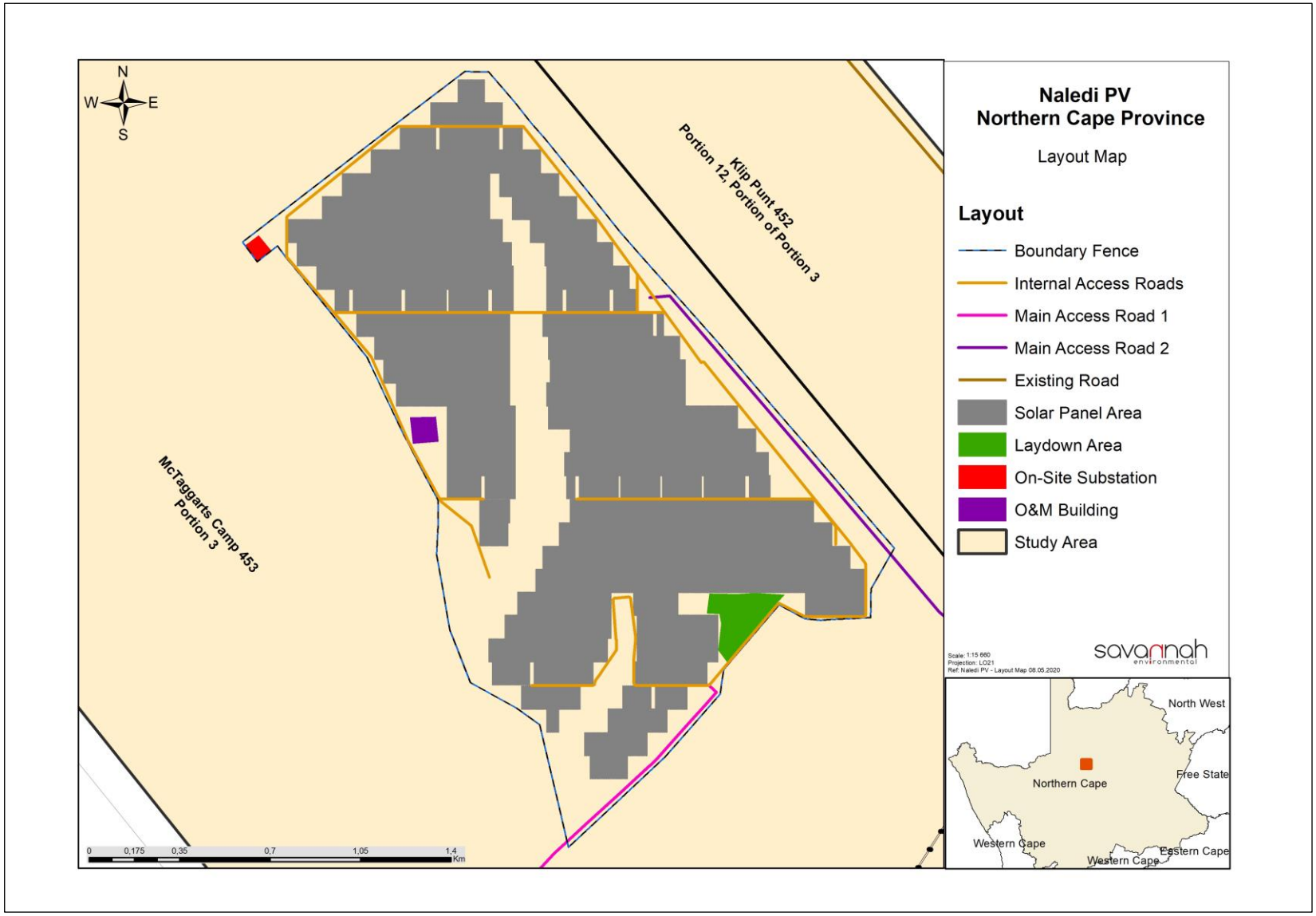

Figure 2.1: Locality map illustrating the location of the study area and development area of Naledi PV.

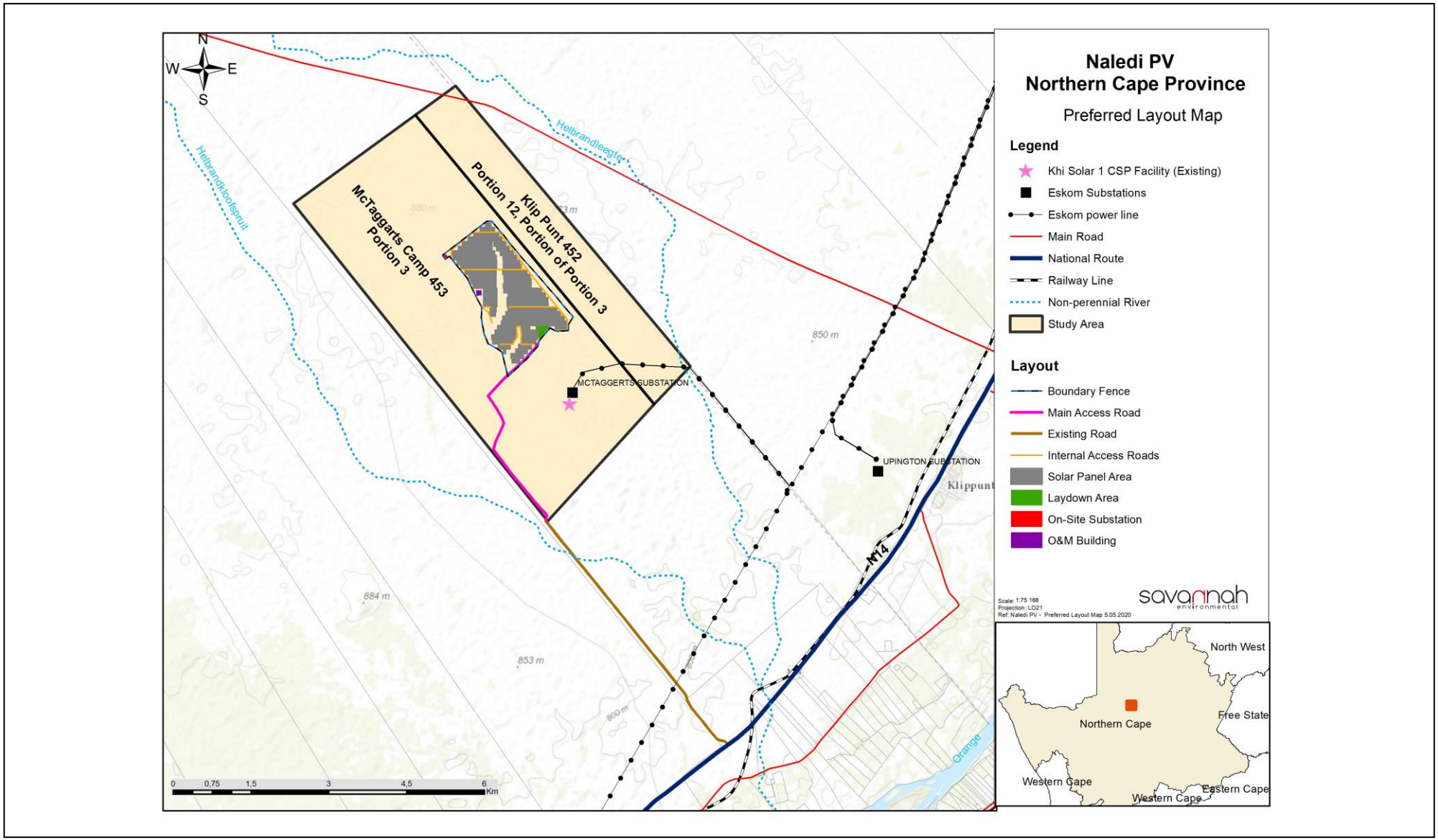

Figure 2.2: Final preferred layout map of the preferred development footprint for Naledi PV, as was assessed as part of the BA process.

Establishment of an Access Road to the Site

The study area is accessible via the existing Lutzputs gravel road (D3276) and the access road of the Khi Solar One facility, which at separate sections come off the N14 national road, which is located to the south-east of Naledi PV. Within the study area itself, access will be required from new/existing roads for construction purposes (and limited access for maintenance during operation). A 6m wide access road and a network of 5m internal access roads (with a combined length of 10km) will be developed to provide access to the development area and to the various project components within the development footprint of Naledi PV.

Water Usage and Waste Requirements

During the construction phase water will be required for the undertaking of the required construction activities as well as for potable use. For the duration of the construction phase (i.e. 12-18 months) ~12 250m^3 of water will be required. Water for the construction phase will be sourced directly from the Kai !Garib Local Municipality.

Services Required

During the construction phase specific services will be required for the undertaking of the construction activities. The services required includes refuse material disposal and sanitation. Chemical toilets will be the primary source of effluent collection. Any other effluent discharge during the construction phase will be collected in sealed containers/tanks, and collected via a honey-sucker truck and treated by a service provider (either the local municipality or a Contractor) at a licensed disposal site.

Undertake Site Preparation

Site preparation activities will include the clearance of vegetation. These activities will require the stripping of topsoil which will need to be stockpiled, backfilled and/or spread on site.

Transport of Components and Equipment to Site

The components for the solar PV facility will be transported to site by road. For Naledi PV, transport of components would be via the N14 and Lutzputs roads or the access road of the Khi Solar One facility. Some of the components (i.e. substation transformer) may be defined as abnormal loads in terms of the Road Traffic Act (Act No. 29 of 1989)[2] by virtue of the dimensional limitations. Typical civil engineering construction equipment will need to be brought to the site (e.g. excavators, trucks, graders, compaction equipment, cement trucks, etc.) as well as, components required for the mounting of the PV support structures, construction of the substation and site preparation.

Establishment of Laydown Areas on Site

A permanent laydown and storage area will be required for the typical construction equipment. Once the required equipment has been transported to site, a dedicated equipment construction camp and a laydown area (of approximately up to 3ha in extent) will be established. The equipment construction camp serves to confine activities and storage of equipment to one designated area and to limit the potential ecological impacts associated with this phase of the project. The laydown area will be used for the storage of the PV panels and the general placement/storage of construction equipment and other components required for the operation of the facility.

[2] A permit will be required for the transportation of these abnormal loads on public roads.

Erect PV Cells and Construct Substation and Invertors

The construction phase involves installation of the solar PV panels and the structural and electrical infrastructure to make the plant operational. In addition, preparation of the soil and improvement of the access roads would continue for most of the construction phase. For the array installation, typically vertical support posts are driven into the ground. Depending on the results of the geotechnical report, a different foundation method, such as screw pile, helical pile, micro-pile or drilled post/pile could be used. The posts will hold the support structures (tables) on which PV arrays would be mounted. Brackets attach the PV modules to the tables. Trenches are dug for the underground AC and DC cabling and the foundations of the inverter enclosures and transformers are prepared. While cables are being laid and combiner boxes are being installed, the PV tables are erected. Wire harnesses connect the PV modules to the electrical collection systems. Underground cables and overhead circuits connect the Power Conversion Stations (PCS) to the on-site AC electrical infrastructure and ultimately the project's on-site facility substation.

The construction of the on-site facility 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.

Establishment of Ancillary Infrastructure

Ancillary infrastructure will include cabling for the connection to the Eskom national grid, workshop and maintenance building, storage and laydown areas, gatehouse, security offices, and other storage areas. The establishment of these facilities/buildings will require the localised clearing of vegetation and levelling of the development area and the excavation of foundations prior to construction.

Undertake Site Remediation

Once construction is completed and all construction equipment is removed, the site must be rehabilitated where practical and reasonable. On full commissioning of the solar PV facility, any access points to the site which are not required during the operation phase must be closed and rehabilitated.

2.3.3. Operation Phase

Naledi PV is expected to be operational for a minimum of 20 years. The facility will, under normal operating conditions, operate continuously for 7 days a week.

Key elements of the Operation and Maintenance plan include monitoring and reporting the performance of the facility, conducting preventative and corrective maintenance, receiving visitors, and maintaining security of the project. The operation phase of Naledi PV will create a maximum of approximately 30 full-time employment opportunities. The number of skilled personnel during the operation phase will comprise 5%, semi-skilled 25% and low-skilled 70%. Employees that could be sourced from the local municipal pool include the less skilled and semi-skilled such as safety and security staff and certain maintenance crew. Highly skilled personnel may need to be recruited from outside the local area.

Water will be required for the operation phase of Naledi PV. Approximately 5 372m^3 of water per annum will be required for the operation of the solar PV facility, which is anticipated to be 20 years. The water required will be sourced directly from the Kai !Garib Local Municipality (through a Service Level Agreement).

Other services required for the operation of Naledi PV include refuse material disposal and sanitation. No effluent is anticipated to be produced during the operation phase, except for normal sewage due to the presence of the operations staff. The sewage generated over this period will be collected and treated as per normal standards using a septic or conservancy tank. Should the local municipality not permit the use of the septic tank, sewage will be stored in the conservancy tank and collected either by a honey-sucker truck or by a service provider (contractor) for treatment at a licensed disposal site.

2.3.4. Decommissioning Phase

Depending on the continued economic viability of Naledi PV following the initial 20-year operation period, the solar PV facility will either be decommissioned or the operation phase will be extended. If it is deemed financially viable to extend the operation phase, existing components would either continue to operate or be disassembled and replaced with new, more efficient technology/infrastructure available at that time. However, if the decision is made to decommission the solar PV facility, the following activities will form part of the project scope.

Site Preparation
Site preparation activities will include confirming the integrity of the access to the site to accommodate the required decommissioning equipment.

Disassemble and Remove Existing Components
When the solar PV facility is ultimately decommissioned, the equipment to be removed will depend on the proposed land use for the site at that time. At this time, all above ground facilities that are not intended for future use at the site will be removed. Underground equipment (e.g. foundation, wiring) will be removed, and the surface restored. Much of the above ground wire, steel, and PV panels, of which the system is comprised, are recyclable materials and would be recycled to the extent feasible. The components of the plant would be deconstructed and recycled or disposed of in accordance with regulatory requirements. The site will be rehabilitated and returned to a beneficial land use.

Future plans for the site and infrastructure after decommissioning
The capacity of Naledi PV would have degraded by ~15% over 20 years. The expectation is that the development area will be used for future renewable energy procurement as the operation phase approaches the termination date of the 20-year Power Purchase Agreement (PPA). If decommissioning were to occur, it would be 20 years (or the stated years) after the commencement of the PPA. Another option for the site after decommissioning is for grazing to resume.

2.4 Findings of the Basic Assessment

No environmental fatal flaws were identified in the detailed specialist studies conducted, provided that the recommended mitigation measures are implemented. These measures include, amongst others, the avoidance of highly sensitive features within the development area and the undertaking of monitoring, as specified by the specialists.

The potential environmental impacts associated with Naledi PV identified and assessed through the BA process include:

» Impacts on ecology, flora and fauna.

- Impacts on avifauna.
- Impacts on aquatic resources.
- Impacts on heritage resources, including archaeology and palaeontology.
- Visual impacts on the area imposed by the components of the facility.
- Positive and negative social impacts.
- Traffic impacts.

2.4.1 Impacts on Ecology

The Ecological Impact Assessment (**Appendix D**) assessed the impact of Naledi PV on the sensitive ecological features present within the development area for the life-cycle of the development. The assessment identified impacts within the construction, operation and decommissioning phases of the project.

During the pre-construction and construction phase (and the decommissioning phase), the impacts include impacts on vegetation and listed or protected plant species and direct faunal impacts. The duration of the impacts ranges from long-term to short-term, with the magnitude of the impacts ranging from medium to low. The significance of the construction phase impacts is medium and low, depending on the impact being considered, and with the implementation of the mitigation measures recommended by the specialist. No impacts of high significance were identified from an ecological perspective.

During the operation phase, the anticipated impacts include habitat degradation due to erosion and alien plant invasion and faunal impacts due to the operation of the facility. The duration of the impacts will be long-term, with the magnitude of the impacts ranging from low to minor. The significance of these impacts for the operation phase will be low, with the implementation of the recommended mitigation measures. No impacts of a high significance were identified.

From the findings of the Ecological Impact Assessment it can be concluded that no impacts of high ecological significance or fatal flaws were identified which would hinder the development of Naledi PV. The development area is considered suitable for the establishment of Naledi PV and all impacts associated with the development can be mitigated to an acceptable level of significance of either low or medium, depending on the impact under consideration. Therefore, the proposed development and the ecological impact thereof is considered to be appropriate and acceptable from an ecological perspective and will not result in detrimental impacts to ecosystems and habitat features within the development area and within the adjacent properties. As a result, the specialist has indicated that the development may be authorised, constructed and operated subject to the implementation of the recommended mitigation measures.

Considering the development footprint assessed for Naledi PV, the specialist has indicated that the project can be supported from a terrestrial ecology point of view.

2.4.2 Impacts on Avifauna

The Avifauna Impact Assessment (**Appendix E**) is based on the findings of two field surveys undertaken in spring (4 – 8 October 2018) and again in late summer (9 -12 April 2019). The avifauna impact identified to be associated with the pre-construction and construction phase (including decommissioning) will be negative with a short-term duration and will have a magnitude ranging from moderate to low. For the operation phase, the impact will also be negative, with a long-term duration for the life of the facility and a magnitude of moderate to low.

During the pre-construction and construction phase (and decommissioning phase) of Naledi PV, direct avifauna impacts include habitat loss and disturbance related to vegetation clearance and the displacement of shy avifauna species as a result of noise and an increased human presence associated with construction-related activities. The significance of the construction phase impact will be medium, with the implementation of mitigation measures. No impacts of a high significance from the construction phase are expected to occur.

Impacts on avifauna during the operation phase of Naledi PV include collisions with PV panels, entrapment along perimeter fencing, disturbance due to traffic and night lighting. The significance of the impacts will be low, with the implementation of mitigation measures. No impacts of a high significance are expected to occur during the operation phase.

From the results of the Avifauna Impact Assessment, it can be concluded that development area for Naledi PV is considered to represent a broadly suitable environment for the location of a solar PV facility. Taking into consideration that the development area supports a typical bioregional avifaunal assemblage, and that there are no known communal breeding or roosting sites of red-listed species, there are no impacts associated with the development that are regarded to be of a high residual significance and which cannot be mitigated to a low significance. Therefore, the development of Naledi PV is considered to be acceptable and supported from an avifaunal perspective.

From the results of the Avifauna Impact Assessment, it is concluded that no fatal flaws will be associated with the development of Naledi PV. The specialist has indicated that the project can be authorised subject to the implementation of the recommended mitigation measures.

2.4.3 Impacts on Aquatic Resources

The Aquatic Resources Impact Assessment (**Appendix F** of the BA Report) assessed the impact of Naledi PV on aquatic resources and/or features within the study area and development area for the life-cycle of the project.

During the construction and operation phase, impacts will include a loss of the larger pans and the major riparian systems associated with the mainstem rivers Helbrandleegte and Helbrandkloofspruit through physical disturbance; impacts on secondary alluvial watercourses with fragmented riparian systems; an impact on riparian systems through a possible increase in surface water run-off on riparian form and function; increase in sedimentation and erosion within the development footprint; and an impact on localised surface water quality. The impacts will be negative with mainly a long-term duration and moderate to low magnitude.

From the findings of the Aquatic Resources Impact Assessment, it is concluded that the proposed layout for Naledi PV would have no direct impact on the mains stem (larger scale rivers e.g. Helbrandleegte & Helbrandkloofspruit River) and the aquatic environment for the most part, as the layout avoids the significant high sensitivity watercourses. Some impacts such as road crossings and the PV panels are located in the smaller drainage areas (moderate sensitivity), which are fragmented and contained no riparian zones; therefore, with suitable mitigation (proper stormwater management and post construction rehabilitation), the impacts would be of a low significance. This is also based on the fact that some of the aquatic features to be affected by the proposed development contained no aquatic habitat and only functioned as a means to sustain or convey baseflows within the catchment. The development of Naledi PV would not have an

impact on this aspect, as surface run-off will emanate from the development footprint (when significant rainfall occurs); therefore, the hydrological system observed within the area will be maintained. Furthermore, the significance of the remaining impacts assessed for aquatic systems after mitigation would be low. This includes the internal roads and the sections of the PV panel area that will infringe on some of these systems. The infringement is considered to be acceptable from an aquatic perspective, particularly for the one small depression that could not be avoided by the layout, as it is rather small and showed little wetland functionality (i.e. important aquatic habitat or associated species). Therefore, the loss is considered to be acceptable on the basis that all other similar features within the study area but located outside the development area of Naledi PV would remain intact and attempts will be made to protect these systems from further degradation.

The construction and operation of Naledi PV and the associated infrastructure is supported from an aquatic resources perspective and is considered acceptable subject to proponent obtaining the necessary water use authorisation from the Department of Water and Sanitation.

2.4.4 Impacts on Soil and Agricultural Potential

The Soils, Land Use and Agricultural Impact Assessment (**Appendix G** of the BA Report) has identified and assessed impacts associated with the development of Naledi PV. These impacts are expected during the construction and operation phases and include, soil erosion, chemical pollution and an impact on the current land capability of the development area. These impacts will be negative with a permanent to medium-term duration depending on the impact being considered and will have a magnitude of moderate to low. The significance of the impacts is medium and low, depending on the impact being considered and following the implementation of the recommended mitigation measures.

No fatal flaws have been identified from a soils and agricultural perspective; therefore, all impacts can be mitigated to be within an acceptable level of impact during life cycle of the project. Therefore, the development of Naledi PV is considered to be acceptable from a soils and agricultural perspective.

The specialist has indicated that the development of Naledi PV can be authorised and that the development footprint proposed and assessed as part of this BA Report is acceptable from a soils and agricultural potential perspective, subject to the implementation of the recommended mitigation measures as provided by the specialist.

2.4.5 Impacts on Heritage Resources (including archaeology and palaeontology)

The Heritage Impact Assessment (**Appendix H** of the BA Report) assessed the impact of Naledi PV on heritage and palaeontological resources within the study area and the development area for the life cycle of the project. It is expected that impacts to heritage resources will occur during the construction phase due to the on-going ground disturbance required by the construction activities.

Although no heritage resources or formal and informal graves were identified within the development area for Naledi PV, only three (3) Stone Age archaeological resources were identified within the development area, with other additional archaeological resources located outside the development area for Naledi PV. These resources are considered not to be conservation-worthy as they are widely scattered and have no contextual material. Therefore, the development of Naledi PV will not have a significant negative impact on the heritage resources identified within the development area. The lithic and historic material identified is of a low significance and considering that the resources may be destroyed during the construction phase of the

solar PV facility, the impact is inconsequential and no further mitigation would be required. The significance of the impact on archaeological resources is therefore low, with a long-term duration and low magnitude.

Taking into consideration the nature of the development, construction-related activities may have an impact on the fossil heritage if preserved within the development area, however, for Naledi PV, the geological structures of the area suggests the rocks are either of an igneous origin and too old to contain any fossil heritage. Therefore, based on the experience of the specialist and the lack of any previously recorded fossils from the study area, it is unlikely that any fossil heritage will be preserved and therefore the impact is considered to be of a low significance. However, there is a small opportunity for fossils to occur within the adjacent shales of the early Permian Vryheid Formation; therefore, a Fossils Chance Finds Protocol has been added to the EMPr as **Appendix L**.

Based on the heritage resources identified and the lack of any fossils recorded or expected in the area, the significance of the impacts will be low, without the implementation of the recommended mitigation measures. As such, the development of Naledi PV is not associated with any fatal flaws from a heritage and palaeontological perspective and it is for this reason that the project is considered to be acceptable.

2.4.6 Visual Impacts

The Visual Impact Assessment (**Appendix I** of the BA Report) identified negative and neutral impacts on visual receptors during the construction and the operation phases of Naledi PV. The impacts includes a change in the character and sense of place of the landscape setting, a change in the character of the landscape as seen from the N14; the R359; and the Lutzputs Road; a change in the landscape as seen from local homestead and settlement areas; and impacts from glare and lighting, particularly during the operation phase of the facility at night for night-time observers.

The duration of the impacts is expected to be long-terms for the majority of the visual impacts, with a magnitude ranging from low to small. The significance of the impacts will be medium and low with the implementation of mitigation measures, depending on the impact being considered. No impacts of a high significance are expected to occur and it can be concluded that the development of Naledi PV will be viewed in the context of Khi Solar One, Dyasons Klip 1 & 2 and Sirius Solar PV Project One, which are all operational and located within the vicinity of the development area of Naledi PV. The development of Naledi PV is therefore considered to be acceptable from a visual perspective.

2.4.7 Social Impacts

The Social Impact Assessment (**Appendix J** of the BA Report) identified that most social impacts associated with the development of Naledi PV will have a short-term duration associated with the construction phase and long-term duration during the operation phase of the project. The magnitude of the impacts ranges from high to small depending on the impact being considered and the status thereof. Both positive and negative impacts have been identified for both the construction and operation phases of the development.

During the construction phase, negative impacts include, a nuisance impacts (including noise and dust); an influx of construction workers and job seekers to the area and a change in population; safety and security impacts; impacts on daily living and movement patterns; and visual and a sense of place impacts. The significance of the negative construction phase impacts will be low with the implementation of the recommended mitigation measures. The positive social impacts associated with the construction phase of

Naledi PV include, an economic multiplier effect and direct and indirect employment and skills development opportunities. The significance of the positive impacts will be medium with the implementation of the recommended enhancement measures by the specialist.

Impacts associated with the operation of Naledi PV will be both positive and negative. The negative impacts are related to the change in the sense of place and the loss of agricultural land and overall productivity as a result of the operation of the solar PV facility. The significance of the negative impacts will be low with the implementation of the recommended mitigation measures. The positive impacts associated with the operation of the facility relate to the development of non-polluting renewable energy infrastructure, a contribution to Local Economic Development (LED) and social upliftment, and the creation of employment and skill development opportunities for the local economy and the country. The significance of the positive impacts will be low and medium with the implementation of the recommended enhancement measures.

2.4.8 Impacts on Traffic

Traffic impacts are expected with the development of Naledi PV which were identified and assessed as part of a Traffic Impact Assessment (**Appendix K** of the BA Report).

During the construction phase, traffic, noise and dust will be generated through the transportation of project components and employees to the development area. The duration of the impacts will be of a very short-term and will have a moderate to low magnitude. The significance of the construction phase impacts on traffic will be low, with the implementation of the mitigation measures recommended by the specialist.

The traffic generated during the operation phase of Naledi PV will be minimal and of no significance to the existing road network. Therefore, the impacts of traffic for this phase are not considered further. Furthermore, no fatal flaws and impacts of a high significance are expected; therefore, the development of Naledi PV is considered to be acceptable from a traffic perspective.

2.5. Environmental Sensitivity Mapping

As part of the specialist investigations undertaken within the development area of Naledi PV, specific environmental features were identified which will be impacted by the placement of the development footprint (i.e. infrastructure) associated with the facility. The current condition of the features identified (i.e. intact or disturbed) will inform the sensitivity of the environmental features and its capacity for disturbance and change associated with the proposed development.

The environmental features identified within and directly adjacent to the development area and development footprint are illustrated in **Figure 2.3**. The features identified specifically relate to ecological and avifauna habitats, aquatic resources and heritage resources. The following points provide a description of the features present within the development area:

- Only two (2) heritage resources were identified within the development area for Naledi PV. Additional heritage resources were identified; however, these are located outside the development area.
- The eastern boundary of the study area is located within Korhaan habitat associated with the present gravel plains located within this area. This habitat has been at times noted to be used by red-listed avifaunal species, including the Karoo Korhaan and Kori Bustard. The development footprint of Naledi PV is located outside this habitat.

- Drainage lines bisect the central, northern and north-eastern sections of the development area and their riparian habitat is dominated by *Vachellia erioloba, Vachellia haematoxylon, Boscia foetida* and *Euclea pseudebenus*.
- One wetland, measuring less than a 1ha is located within the development area of Naledi PV and will be affected by the proposed development. Other wetlands, larger in size and identified within the study area are located outside the development area of Naledi PV.
- Minor washes are located within the eastern and southern sections of the development area. These washes are located within the PV panel area and are associated with the large drainage lines traversing the development area.
- The majority of the development area and development footprint contains a plains habitat which is located throughout the entire extent of the development area.

In the areas surrounding the development area, environmental features, other than those discussed above are present and mapped (**Figure 2.3**), and summarised below. Due to the location of these features outside of the development area boundary no infringement of Naledi PV is expected.

- Pans and other drainage lines located to the north and west of the development area of Naledi PV. Although located outside the development area, infringement on the larger pan located directly to the west of the development area should be avoided.
- Quartz patches and outcrops are located directly to the east and south-east of development area boundary. This feature is dominated by shrubby vegetation typical of Kalahari Shrubland. This feature is located outside the development area of Naledi PV and infringement in this area should be avoided.

Considering the features identified within the development area, the specialists have provided an indication of the sensitivity of the environmental features for the development of Naledi PV within the assessed development area. The features and the sensitivities thereof have been considered by the proponent for the placement of the development footprint within the development area of Naledi PV. The points below describe the sensitivity of the features as identified and mapped in **Figure 2.3**. **Figure 2.4** provides a sensitivity map of the development area overlain with the development footprint.

- A low sensitivity rating has been applied to the two (2) heritage resources identified within the development area of Naledi PV, and the others scattered throughout the study area. The low sensitivity rating is based on the small sample sizes and lack of archaeological context which offers little scientific value. These resources are not considered to be conservation-worthy.

- A very high sensitivity rating from an ecological, aquatic and avifauna perspective, which is considered to be no-go for the development of the Naledi PV development footprint, has been allocated to the drainage lines bisecting the PV panel area in the southern section of the development area. Major developments, such as the placement of PV panels in this very high sensitivity feature is considered not to be acceptable. The development footprint avoids this feature in order to ensure that no detrimental environmental impact occurs. These areas are considered unsuitable for development and while it would be necessary for roads to occasionally traverse these features, which is considered acceptable, there should not be any PV panels in these areas.

- The washes or poorly developed drainage lines are considered to be to be of a high to medium sensitivity depending on their extent and degree of vegetation extent from an ecological, avifauna

and aquatic perspective. Some level of development within these areas is considered acceptable. The development footprint in the high sensitivity areas has been significantly reduced through careful placement of the infrastructure, and as a result, the assessed footprint and associated impact in the high sensitivity areas is considered acceptable. From an avifauna perspective, the development of Naledi PV would potentially result in much of these habitats and their functioning being lost, and therefore, where possible, buffer zones (50 to 100m width) must be implemented around the largest and most significant of these habitats. From an aquatic perspective, the proposed development footprint would seem to have no direct impact on the mains stem and the aquatic environment for the most part, as the Naledi PV layout has avoided the significant high sensitivity watercourses.

» The development area does not infringe into the Karoo Korhaan habitat located along the eastern boundary of the study area. This area has been identified as a possible corridor for this species based on consistent presence of the Karoo Korhaan. The area extends further east and north of the study area and is therefore associated with a wider distribution in the surrounding area and would not be directly affected by the development of Naledi PV.

» Areas of medium sensitivity from an ecological, aquatic and avifauna perspective include the arms of the drainage lines/minor washes bisecting the PV panel area in a north and north-easterly direction.

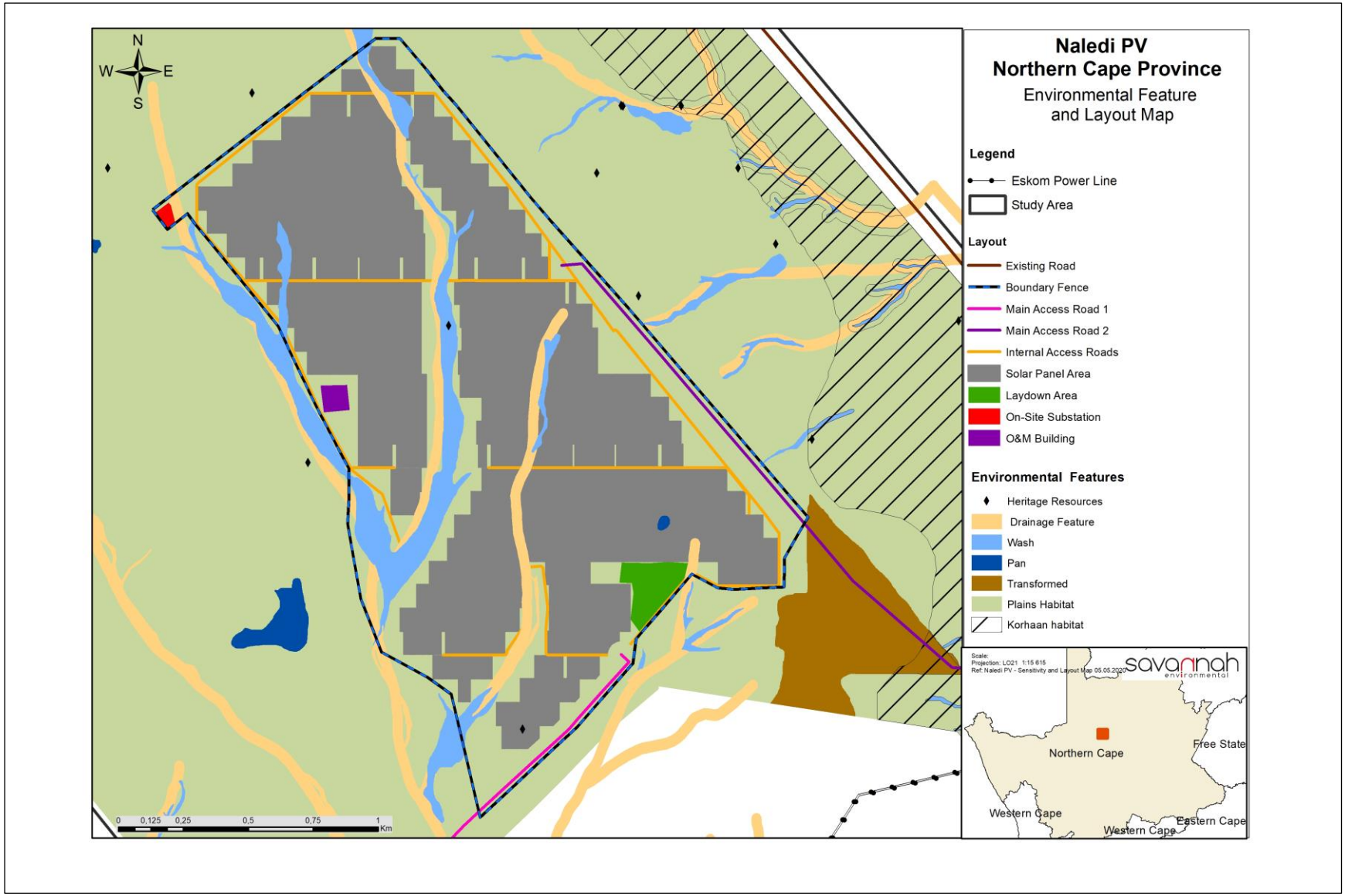

Figure 2.3: Final layout map of the development footprint for Naledi PV, as was assessed as part of the BA process, overlain with the environmental features.

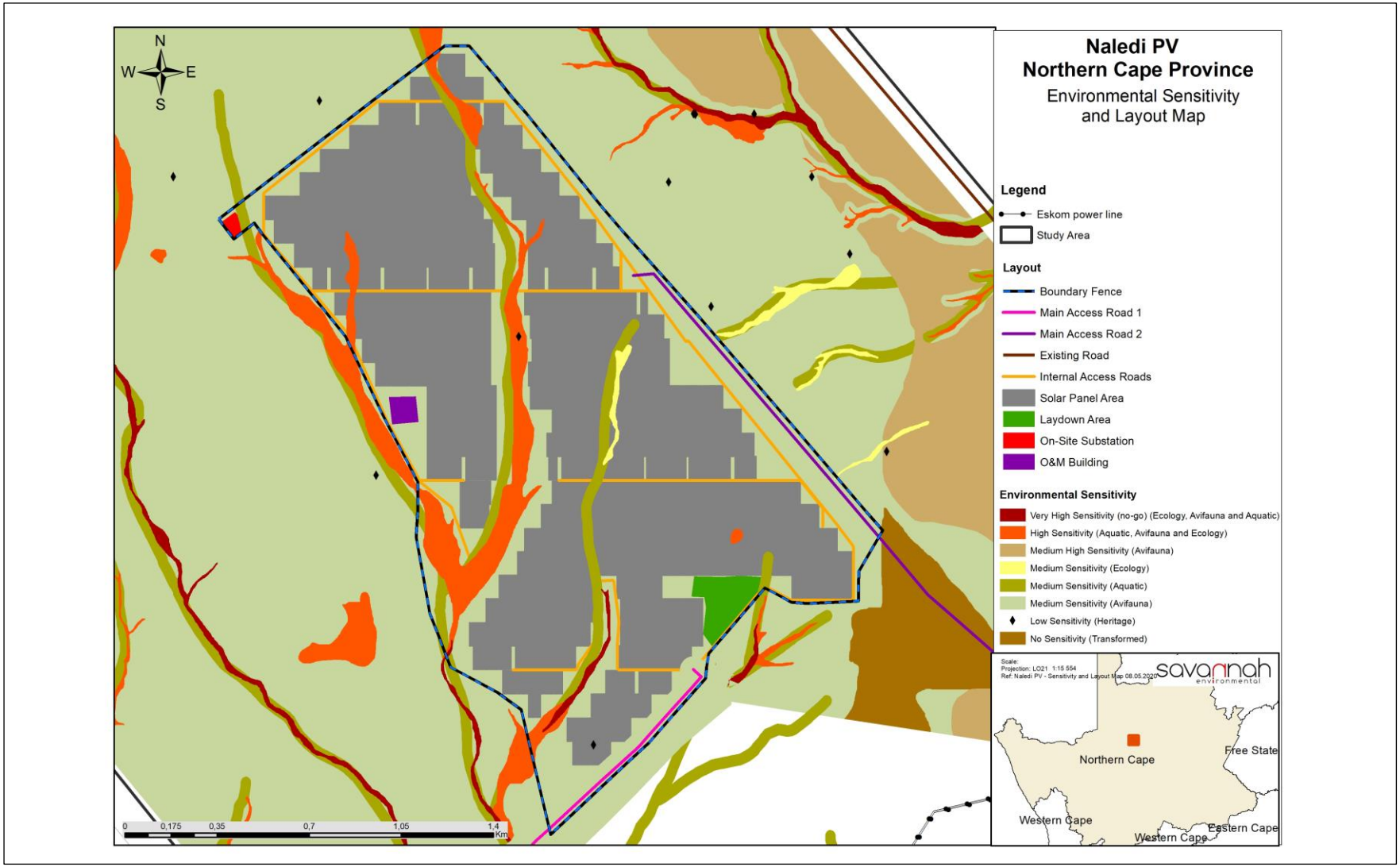

Figure 2.4: Final layout map of the development footprint for Naledi PV, as was assessed as part of the BA process, overlain with the environmental sensitivities.

CHAPTER 3 : PURPOSE AND OBJECTIVES OF THE EMPR

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

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

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

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

The EMPr has the following objectives:

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

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

The developer must ensure that the implementation of the project complies with the requirements of all environmental authorisations, permits, and obligations emanating from relevant environmental legislation. This obligation is partly met through the development and the implementation of this EMPr, and through its integration into the relevant contract documentation provided to parties responsible for construction and/or operation activities on the site. Since this EMPr is part of the BA process for Naledi PV, it is important that this document be read in conjunction with the BA Report compiled for this project. This will contextualise the EMPr and enable a thorough understanding of its role and purpose in the integrated environmental management process. Should there be a conflict of interpretation between this EMPr and the Environmental Authorisation (EA), the stipulations in the EA shall prevail over that of the EMPr, unless otherwise agreed by the authorities in writing. Similarly, any provisions in legislation overrule any provisions or interpretations within this EMPr.

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

CHAPTER 4: STRUCTURE OF THIS EMPR

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

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

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

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

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

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

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

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

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

4.1 Contents of this Environmental Management Programme (EMPr)

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

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

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

Requirement	Location in this EMPr
(1) An EMPr must comply with section 24N of the Act and include – (a) Details of – (i) The EAP who prepared the EMPr. (ii) The expertise of that EAP to prepare an EMPr, including a curriculum vitae.	Chapter 4 Appendix A
(b) A detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description.	Chapter 2
(c) A map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffers.	Chapter 2 Appendix M
(d) A description of the impact management outcomes, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development including –	
(i) Planning and design.	Chapter 5
(ii) Pre-construction activities.	Chapter 5
(iii) Construction activities.	Chapter 6
(iv) Rehabilitation of the environment after construction and where applicable post closure.	Chapter 7
(v) Where relevant, operation activities.	Chapter 8
(f) A description of proposed impact management actions, identifying the manner in which the impact management outcomes contemplated in paragraph (d) will be achieved, and must, where applicable, include actions to –	Chapters 5 - 8

Requirement	Location in this EMPr
(i) Avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation. (ii) Comply with any prescribed environmental management standards or practices. (iii) Comply with any applicable provisions of the Act regarding closure, where applicable. (iv) Comply with any provisions of the Act regarding financial provision for rehabilitation, where applicable.	
(g) The method of monitoring the implementation of the impact management actions contemplated in paragraph (f).	Chapters 5 - 8
(h) The frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f).	Chapters 5 - 8
(i) An indication of the persons who will be responsible for the implementation of the impact management actions.	Chapters 5 - 8
(j) The time periods within which the impact management actions contemplated in paragraph (f) must be implemented.	Chapters 5 - 8
(k) The mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f).	Chapters 5 - 8
(l) A program for reporting on compliance, taking into account the requirements as prescribed by the Regulations.	Chapter 6
(m) An environmental awareness plan describing the manner in which – (i) The applicant intends to inform his or her employees of any environmental risk which may result from their work. (ii) Risks must be dealt with in order to avoid pollution or the degradation of the environment.	Chapter 6
(n) Any specific information that may be required by the competent authority.	Table 4.2
(2) Where a government notice gazetted by the Minister provides for a generic EMPr, such generic EMPr as indicated in such notice will apply.	N/A

4.2 Project Team

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

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

Savannah Environmental is a leading provider of integrated environmental and social consulting, advisory and management services with considerable experience in the fields of environmental assessment and management. The company is wholly woman-owned (51% black woman-owned), and is rated as a Level 2 Broad-based Black Economic Empowerment (B-BBEE) Contributor. Savannah Environmental's team have been actively involved in undertaking environmental studies over the past 13 years, for a wide variety of projects throughout South Africa, including those associated with electricity generation and infrastructure development.

This BA process is being managed by Jo-Anne Thomas. She is supported by Reuben Maroga and Lisa Opperman.

» **Reuben Maroga** is the principal author of this EMPr. He holds a Bachelor degree in Environmental Management and has 3 years of experience in the environmental management field. His key focus is on environmental impact assessments, public participation, environmental management programmes, water use licence applications, as well undertaking ECO reporting for a variety of projects.

» **Lisa Opperman** is the co-author of this EMPr. She holds a Bachelor degree with Honours in Environmental Management and has five years of experience in the environmental field. Her key focus is on environmental impact assessments, public participation, environmental management plans and programmes, as well as mapping using ArcGIS for a variety of environmental projects. She is currently involved in several EIAs for energy generation projects across South Africa.

» **Jo-Anne Thomas** is the registered EAP for the BA process for this project. Jo-Anne holds a Master of Science Degree in Botany (M.Sc. Botany) from the University of the Witwatersrand, and is a registered Environmental Assessment Practitioner (2019/726) with the Environmental Assessment Practitioners Association of South Africa (EAPASA), as well as a Professional Natural Scientist (400024/2000) with the South African Council for Natural Scientific Professions (SACNASP). She has over 20 years of experience in the field of environmental assessment and management, and the management of large environmental assessment and management projects. During this time she has managed and coordinated a multitude of large-scale infrastructure EIAs, and is also well versed in the management and leadership of teams of specialist consultants, and dynamic stakeholders. Jo-Anne has been responsible for providing technical input for projects in the environmental management field, specialising in Strategic Environmental Advice, EIA studies, environmental permitting, public participation, EMPs and EMPrs, environmental policy, strategy and guideline formulation, and integrated environmental management (IEM). Her responsibilities for environmental studies include project management, review and integration of specialist studies, identification and assessment of potential negative environmental impacts and benefits, and the identification of mitigation measures, and compilation of reports in accordance with applicable environmental legislation.

Savannah Environmental's team have been actively involved in undertaking environmental studies over the past 13 years, for a wide variety of projects throughout South Africa, including those associated with electricity generation and infrastructure development, and therefore have extensive knowledge and experience in EIAs and environmental management, having managed and drafted EMPrs for numerous other power generation projects throughout South Africa. Curricula Vitae (CVs) detailing the Savannah Environmental team's expertise and relevant experience are provided in **Appendix A** of the EMPr.

4.2.2 Details of the Specialist Consultants

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

Table 4.2: Specialist Consultants which provided input into the EMPr

Company	Specialist Area of Expertise	Specialist Name
3Foxes Biodiversity Consulting	Ecology	Simon Todd
3Foxes Biodiversity Consulting	Avifauna	Eric Hermann
EnviroSci	Aquatic	Brian Colloty
TerraAfrica	Soils and Agricultural Potential	Marinè Pienaar
CTS Heritage	Heritage and Palaeontology	Jenna Lavin
Environmental Planning and Design	Visual	Jon Marshall
Savannah Environmental & Neville Bews and Associates	Social	Lisa Opperman with peer review by Neville Bews
SRK	Storm Water Management Plan	Jeandre Thompson
JG Afrika	Traffic Impact Assessment	Iris Wink

CHAPTER 5: PLANNING AND DESIGN MANAGEMENT PROGRAMME

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

- Ensures that the preferred design and layout of the PV panels, on-site facility 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, and the on-site facility substation), including the access roads.
- Enables the construction activities to be undertaken without significant disruption to other land uses and activities in the area.

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

5.1 Objectives

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

The Naledi PV development footprint will not infringe on areas or features identified to be of a very high environmental sensitivity (i.e. no-go areas for development). All impacts associated with the layout can be mitigated to acceptable levels or enhanced through the implementation of the recommended mitigation or enhancement measures. Through the assessment of the development of Naledi PV within the study area and development area, it was concluded that the development of the solar PV facility is environmentally acceptable (subject to the implementation of the recommended mitigation measures).

Project Component/s	» PV panels » Access roads » On-site facility substation » Inverter stations » Transformer » Underground cabling » Associated buildings
Potential Impact	» Impact on identified sensitive areas. » Design fails to respond optimally to the environmental considerations.
Activities/Risk Sources	» Positioning of all project components » Pre-construction activities, e.g. geotechnical investigations, site surveys and environmental walk-through surveys. » Positioning of temporary sites.
Mitigation: Target/Objective	» The design of the PV facility responds to the identified environmental constraints and opportunities.

	» Optimal planning of infrastructure to minimise visual impact. » Site sensitivities are taken into consideration and avoided as far as possible, thereby mitigating potential impacts.

Mitigation: Action/Control	Responsibility	Timeframe
Plan and conduct pre-construction activities in an environmentally acceptable manner.	Developer Contractor	Pre-construction
Undertake a detailed geotechnical pre-construction survey.	Developer Geotechnical specialist	Pre-construction
Finalise layout of all components, and submit to DEA for approval prior to commencement of construction.	Developer	Pre-construction
The EMPr and the EA should form part of the contract with the Contractors appointed to construct the PV facility and associated infrastructure, and must be used to ensure compliance with environmental specifications and management measures.	Developer Contractor	Tender Design and Design Review Stage
Ensure that the face of the PV panels have the most effective non-reflective surface possible.	Developer	Project planning
Plan the placement of the temporary laydown areas and construction equipment camps in order to minimise vegetation clearing (i.e. in already disturbed areas) wherever possible and to avoid habitat loss and disturbance to adjoining areas and . ensure the laydown areas are located in areas of low sensitivity and are properly fenced off.	Developer	Project planning
Plan development levels to minimise earthworks to ensure that levels are not elevated.	Developer	Project planning
The fence to be used to fence off the facility must be designed to be animal and bird friendly in order to prevent entrapment and electrocutions of ground-dwelling animal and bird species. No electrified strands should be placed within 30cm of the ground or alternatively, the electrified strands should be placed on the inside of the fence and not on the outside.	Developer	Project planning
Ensure clear rules and regulations for access to the proposed site are developed.	Developer Contractor	Pre-Construction
Carefully plan the access roads and entrances to the site in order to limit any intrusion on the neighbouring property owners and road users.	Developer	Planning and design
Plan a designated access point to the site to ensure safe entry and exit.	Developer Contractor	Design
Plan the laydown areas, operation and maintenance buildings such that they are located outside drainage features and their associated buffer zones.	Developer Contractor	Design
Plan the placement of light fixtures for the plant and the ancillary infrastructure in such a manner so as to minimise glare impacts on the surrounding area. All night-lighting should use low-UV type lights (such as most LEDs), which do not attract insects, and should be directed downwards.	Developer Contractor	Project planning

Mitigation: Action/Control	Responsibility	Timeframe
Where discharge of rainwater on roads will be channelled directly into the natural environment, the application of diffuse flow measures must be included in the design.	Developer Contractor	Project planning
New elements should be designed to blend as naturally as possible with their backdrop.	Developer Design engineer	Planning and design
Plan to maintain the height of structures as low as possible.	Developer Design engineer	Planning and design
Minimise disturbance of the surrounding landscape and maintain existing vegetation around the development.	Developer Design engineer	Planning and design
Reduce the construction period as far as possible through careful planning and productive implementation of resources.	Developer Contractor	Pre-construction
No temporary site camps must be planned outside the development footprint of the project.	Developer	Planning and design
Should any water storage reservoirs be required, these should be covered with fine mesh or other exclusion material in order to exclude and prevent birds from accessing potentially contaminated water contained therein.	Developer Contractor	Planning and design
Have appropriate action plans on site, and training for contactors and employees in the event of spills, leaks and other potential impacts to the aquatic systems.	Developer Contractor	Planning and design

Performance Indicator	» The design meets the objectives and does not degrade the environment. » Demarcated sensitive areas (i.e. no-go areas) are avoided at all times. » Design and layouts respond to the mitigation measures and recommendations in the BA Report.
Monitoring	» Review of the design by the Project Manager and the Environmental Control Officer (ECO) prior to the commencement of construction. » Monitor ongoing compliance with the method statements.

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

Project Component/s	» PV panels » Access roads » On-site facility substation » Inverter stations » Transformer » Underground cabling » Associated buildings
Potential Impact	» Impact on identified sensitive areas and protected species. » Design fails to respond optimally to the environmental considerations.
Activities/Risk Sources	» Positioning of all project components. » Pre-construction activities, e.g. geotechnical investigations, site surveys of on-site facility substation footprint and internal access roads and environmental walk-through surveys. » Positioning of temporary sites.

Mitigation: Target/Objective	» To ensure that the design of the solar PV facility responds to the identified environmental constraints and opportunities. » To ensure that pre-construction activities are undertaken in an environmentally friendly manner. » To ensure that the design of the solar PV facility responds to the identified constraints identified through pre-construction surveys.

Mitigation: Action/Control	Responsibility	Timeframe
Obtain any additional environmental permits required from the Department of Agriculture, Forestry and Fisheries (DAFF) and the Northern Cape Department of Nature Conservation and Environment (DENC) prior to the commencement of construction. Copies of permits/licenses must be submitted to the Director: Environmental Impact Evaluation at the DEA.	Developer	Pre-construction
Water Use Authorisation must be obtained from the Department of Water and Sanitation prior to commencing with construction activities.	Developer	Pre-construction
Should abnormal loads have to be transported by road to the site, a permit must be obtained from the relevant Provincial Government. Alert traffic authorities well in advance of any heavy loads that must be transported on local roads and elicit their assistance in controlling traffic associated with the transportation of these loads.	Developer Contractor transporting material to site.	Planning and design
Pre-construction walk through of the facility's layout and the main access road.	Developer	Pre-construction
Undertake search and rescue for identified species of concern before construction.	Developer Contractor Specialist	Pre-construction
Affected individuals of selected protected plant species which cannot be avoided must be translocated to a safe area. This does not include woody plant species listed under the National Forest Act (Act No. 84 of 1989) which will require a permit from DAFF prior to their destruction.	Developer	Pre-construction
Vegetation clearing to commence only after the walk through has been conducted and necessary permits obtained.	Developer Contractor	Pre-construction
Pre-construction environmental induction must be provided to all construction staff on site to ensure that basic environmental principles are adhered to. This includes awareness of no littering, appropriate handling of pollution and chemical spills, avoiding fire hazards, minimising wildlife interactions, remaining within demarcated construction areas etc.	Developer Contractor	Pre-construction
The Chance Fossil Find Protocol must be implemented in the event that archaeological or palaeontological resources are found (**Appendix L**).	Developer Contractor	Pre-construction
The mitigation measures of the Stormwater Management Plan (SWMP) must be implemented and should provide for a drainage system sufficiently designed to prevent water run-off from the solar panels to cause soil erosion (**Appendix G**).	Developer Design engineer	Pre-construction
Develop and implement an alien, invasives and weeds eradication/control plan (**Appendix C**).	Developer Specialist	Pre-construction

Mitigation: Action/Control	Responsibility	Timeframe
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.	Contractor	Pre-construction

Performance Indicator	» Permits are obtained and relevant conditions complied with. » Impact on protected plant species reduced to some degree through Search and Rescue. » Relevant management plans and Method Statements prepared and implemented.
Monitoring	» Review of the design by the Project Manager and the ECO prior to the commencement of construction. » Monitor ongoing compliance with the EMPr and method statements.

OBJECTIVE 3: Ensure appropriate planning is undertaken by each contractor

Project Component/s	» PV panels » Access roads » On-site facility substation » Inverter stations » Transformer » Underground cabling » Associated buildings
Potential Impact	» Impact on identified sensitive areas. » Design and planning fail to respond optimally to the environmental considerations.
Activities/Risk Sources	» Positioning of all project components. » Pre-construction activities. » Positioning of temporary sites. » Employment and procurement procedures.
Mitigation: Target/Objective	» To ensure that the design of the solar PV facility responds to the identified environmental constraints and opportunities. » To ensure that pre-construction activities are undertaken in an environmentally friendly manner.

Mitigation: Action/Control	Responsibility	Timeframe
Where feasible, local suppliers and contractors, that are compliant with the Broad-Based Black Economic Empowerment (B-BBEE) criteria, should be used as far as possible to ensure that the benefits resulting from the project accrue to the local communities which are also likely to be the most significantly impacted/affected by the project.	Developer Contractor	Pre-construction
Develop a database of local companies, specifically Historically Disadvantaged (HD), that qualify as potential service providers (e.g. construction companies, security companies, catering companies, waste collection companies, transportation companies etc.) prior to the tender process and invite them to bid for project-related work where applicable.	Developer	Pre-construction

Mitigation: Action/Control	Responsibility	Timeframe
Adopt a local employment policy to maximise the opportunities made available to the local labour force.	Developer Contractor	Pre-construction
The tender documentation must stipulate the use of local labour as far as possible.	Developer	Pre-construction
Perform a skills audit to determine the potential skills that could be sourced in the local area.	Developer Contractor	Pre-construction
Develop and implement a recruitment protocol in consultation with the Kai !Garib LM and local community leaders. Ensure that the procedures for applications for employment are clearly communicated.	Developer Contractor	Pre-construction
In the recruitment selection process, a minimum percentage of women must be employed.	Developer Contractor	Pre-construction
Set realistic local recruitment targets for the construction phase.	Contractor	Pre-construction
Training and skills development programmes must be initiated prior to the commencement of the construction phase.	Developer	Pre-construction
Recruitment of temporary works onsite is not permitted. A recruitment office with a Community Liaison Officer must be established to deal with job seekers. The labour desk should be in a secure and suitable area in order to discourage the gathering of people at the construction site. .	EO	Pre-construction
Local community organisations and policing forums must be informed of construction times and the duration of the construction phase. Procedures for the control and removal of loiterers at the construction site should be established.	Developer Contractor	Pre-Construction
A security company must be appointed and appropriate security procedures implemented.	Developer Contractor	Pre-Construction

Performance Indicator	» Local employment and procurement is encouraged.
Monitoring	» Monitor ongoing compliance with the EMPr and method statements.

OBJECTIVE 4 : Ensure effective communication mechanisms

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

Project component/s	» PV facility » Access roads » Associated infrastructure
Potential Impact	» Impacts on affected and surrounding landowners, communities and land uses
Activity/risk source	» Activities associated with construction » Activities associated with operation
Mitigation: Target/Objective	» Effective communication with affected and surrounding landowners, and communities. » Addressing of any issues and concerns raised as far as possible in as short a timeframe as possible.

Mitigation: Action/control	Responsibility	Timeframe
Compile and implement a grievance mechanism (**Appendix B**) procedure for the public to be implemented during both the construction and operation 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.	Developer Contractor O&M Contractor	Pre-construction (construction procedure) Pre-operation (operation procedure)
Develop and implement a grievance mechanism for the construction, operation and closure phases of the project for all employees, contractors, subcontractors and site personnel. This procedure should be in line with the South African Labour Law.	Developer Contractor O&M Contractor	Pre-construction (construction procedure) Pre-operation (operation procedure)
Organise local community meetings to advise the local labour of the project that is planned to be established and the jobs that can potentially be applied for.	EO	Pre-construction
Before construction commences, representatives from the local municipality, community leaders, community-based organisations and the surrounding property owners (of the larger area), must be informed of the details of the contractors, size of the workforce and construction schedules.	Developer Contractor	Pre-construction and construction

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

CHAPTER 6: MANAGEMENT PROGRAMME: CONSTRUCTION

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

- Ensures that construction activities are appropriately managed in respect of environmental aspects and impacts.
- Enables construction activities to be undertaken without significant disruption to other land uses and activities in the area, in particular concerning 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, including drainage lines.
- Minimises impacts on fauna (including avifauna) in the study area.
- Minimises the impact on heritage sites should they be uncovered.
- Establish an environmental baseline during construction activities on the site, where possible.

6.1 Institutional Arrangements: Roles and Responsibilities for the Construction Phase

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

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

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

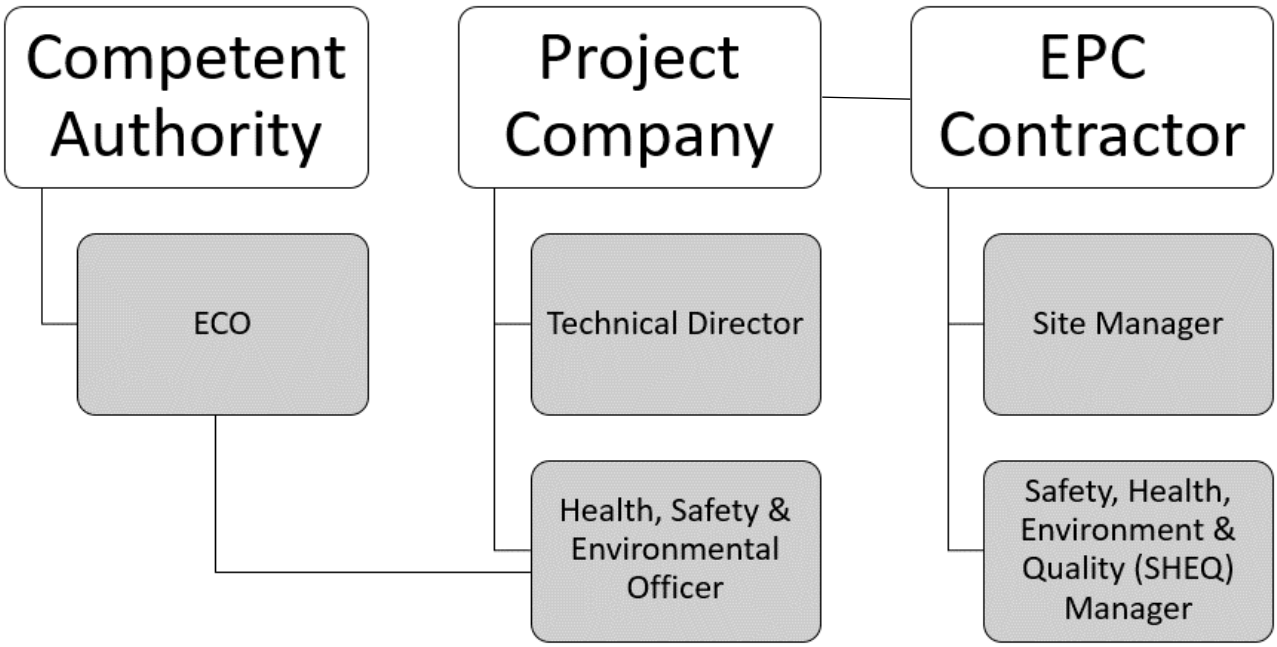

Figure 6.4: Organisational structure for the implementation of the EMPr

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 BA Report for the project, the EMPr, the conditions of the Environmental Authorisation, and all relevant environmental legislation.
- Be fully knowledgeable with the contents of all relevant licences and permits.

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

- Be fully knowledgeable with the contents of the BA Report.
- Be fully knowledgeable with the contents and conditions of the Environmental Authorisation.
- Be fully knowledgeable with the contents of the EMPr.
- Be fully knowledgeable with the contents of all relevant environmental legislation, and ensure compliance with these.
- Have overall responsibility of the EMPr and its implementation.
- Conduct audits to ensure compliance to the EMPr.
- Ensure there is communication with the Technical Director, the ECO, the Internal EO and relevant discipline engineers on matters concerning the environment.
- Be fully knowledgeable with the contents of all relevant licences and permits.

- Ensure that no actions are taken which will harm or may indirectly cause harm to the environment, and take steps to prevent pollution on the site.
- Confine activities to the demarcated construction site.

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

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

As a general mitigation strategy, the ECO should be present on site full-time for the site preparation and initial clearing activities to ensure the correct demarcation of no-go areas, to facilitate environmental induction with construction staff and to supervise any flora relocation and faunal rescue activities that may need to take place during the site clearing (i.e. during site establishment, and excavation of foundations). Thereafter, weekly site compliance inspections would probably be sufficient, which must be increased if required. The ECO will be supplemented with the EPC Contractor's/Project Company's Environmental Officer (EO) who will be located on site on a daily basis and will guide the EPC Contractors/Project Company to ensure compliance with the environmental considerations. Therefore, in the absence of the ECO there will be a designated owner's EO present to deal with any environmental issues that may arise 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.

Contractor's Safety, Health and Environment Representative and/or Environmental Officer: The Contractor's Safety, Health and Environment (SHE) Representative, employed by the Contractor, is responsible for managing the day-to-day on-site implementation of this EMPr, and for the compilation of regular (usually weekly) Monitoring Reports. In addition, the SHE must act as liaison and advisor on all environmental and

related issues and ensure that any complaints received from the public are duly recorded and forwarded to the Site Manager and Contractor. In some instances, a separate EO may be appointed to support this function.

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

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

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

- Must be fully knowledgeable on all environmental features of the construction site and the surrounding environment.
- Be fully knowledgeable with the contents and the conditions of the Environmental Authorisation.
- Be fully knowledgeable with the contents with the EMPr.
- Be fully knowledgeable of all the licences and permits issued for the site.
- Ensure a copy of the Environmental Authorisation and EMPr is easily accessible to all on-site staff members.
- Ensure contractor employees are familiar with the requirements of this EMPr and the environmental specifications as they apply to the construction of the solar PV facility.
- Ensure that prior to commencing any site works, all contractor employees and sub-contractors must have attended environmental awareness training included in the induction training which must provide staff with an appreciation of the project's environmental requirements, and how they are to be implemented.

- Ensure that any complaints received from the public are duly recorded and forwarded to the Site Manager and Contractor.
- Manage the day-to-day on-site implementation of this EMPr, and the compilation of regular (usually weekly) Monitoring Reports.
- Keep record of all activities on site, problems identified, transgressions noted and a task schedule of tasks undertaken, including those of the Independent ECO.
- Inform staff of the environmental issues as deemed necessary by the Independent ECO.

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

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

Community Liaison Officer (CLO) will represent the community and assist the Owner, Contractor and the Engineer with communication between them and the community. The CLO will inform the community regarding the project details, safety precautions and programme. Duties and responsibilities of the community liaison officer include:

- Be available at the site offices generally between the hours of 07:00 and 09:00 and again from 15:00 until the end of working day. Normal working hours will be from 07:00 till 17:00.
- Maintain an up-to-date record of potential employees within the community and provide the contractor with copies of this information.
- To identify, screen and nominate labour from the community in accordance with the Contractor's requirements and determine, in consultation with the Contractor, the needs of local labour for employment and relevant technical training, where applicable.
- Liaise between the Contractor and labour regarding wages and conditions of employment.
- Communicate on a daily basis with the Contractor on labour related issues such as numbers and skills.
- Identify possible labour disputes, unrest, strikes, etc., in advance and assist in their resolution.
- Have a good working knowledge of the contents of the contract document regarding labour and training matters.
- Attend all meetings at which the community and/or labour is represented or discussed.
- Attend contract site meetings and report on community and labour issues at these meetings.
- Co-ordinate and assist with the obtaining of information regarding the community's needs (questionnaires, etc.).
- Inform local labour of their conditions of temporary employment, to ensure their timeous availability and to inform them timeously of when they will be relieved.

- » Ensure that all labour involved in activities when tasks have been set, are fully informed of the principle of task-based work.
- » Attend disciplinary proceedings to ensure that hearings are fair and reasonable.
- » Keep a daily written record of interviews and community liaison.
- » Arrange venues for training, if required.
- » Assist with the training and education of the community regarding the correct usage of the services, where applicable.
- » Any other duties that may become necessary as the works progress.

6.2 Objectives

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

OBJECTIVE 2: Minimise impacts related to inappropriate site establishment

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

Mitigation: Action/Control	Responsibility	Timeframe
All personnel should undergo environmental induction with regards to fauna and, in particular, awareness about not harming or collecting species such as snakes, tortoises and owls, which are often persecuted out of superstition.	Developer Contractor	Site establishment and duration of construction
Any fauna threatened by the construction activities should be removed to safety by an appropriately qualified environmental officer.	Contractor/Suitably qualified personnel	Site establishment and duration of construction
If there are any active bird nests near construction areas, these should be reported to the ECO and where possible, these should	Contractor	Site establishment and duration of construction

Mitigation: Action/Control	Responsibility	Timeframe
be monitored until the birds have finished nesting and the fledglings have left the nest. The EO should monitor and enforce a ban on the hunting and collecting avifauna or their products (i.e. eggs).		
The ECO must monitor and enforce a ban on hunting and the collection of all plants and animals and their products; and construction activities are restricted near active raptor nests should these be discovered prior to or during construction (none were identified during the BA process).	ECO	Site establishment and duration of construction
Any avifauna threatened or injured by construction activities should be removed to safety by the EO or any appropriately qualified professional.	EO/Suitably qualified personnel	Duration of construction
All construction vehicles should adhere to the demarcated access roads and must adhere to a low speed limit (40km/h max for heavy duty vehicles and 30km/h max for light duty vehicles) to avoid collisions with susceptible species such as snakes and tortoises.	Developer Contractor	Duration of construction
Minimise vegetation clearance and maintain the existing vegetation as far as possible with the development footprint and on the surrounding areas. Unnecessary vegetation clearance must be avoided.	Contractor	Duration of construction
Vegetation clearance must only be undertaken prior to construction.	Contractor	Duration of construction
Soil stockpiles must be dampened with a dust suppressant or an equivalent to prevent erosion by wind.	Contractor	Duration of construction
All graded or disturbed areas which will not be covered by permanent infrastructure such as paving, buildings or roads must be stabilised with erosion control mats (geo-textiles) and revegetated.	Contractor	Duration of construction
Signs of erosion within the development footprint must be documented through photographic evidence encompassed with the inclusion of the GPS coordinates of the identified problem areas.	EO	Duration of project
All soil stockpiles on site that are within 100m of the large drainage line must be bunded using an appropriate structure (i.e. silt nets, sand bags, pegged wooden planks, etc.)	Contractor	Site establishment and duration of construction.
All vehicles and machinery must be checked for leaks before being allowed to operate on site. Should leaks be detected, the relevant vehicles and machinery must be repaired before being allowed to operate on the development area.	Contractor	Site establishment and duration of construction
Vehicle movement through the drainage lines is to be limited as far as possible.	Contractor	Site establishment and duration of construction.
If holes or trenches are to be dug, these should not be left open for extended periods of time as terrestrial avifauna may become entrapped therein.	Contractor	Site establishment and duration of construction
Where erosion takes place, the EO must inspect the degree of erosion and propose suitable mitigation measures to prevent further erosion.	Contractor EO	Construction

Mitigation: Action/Control	Responsibility	Timeframe
The Stormwater Management Plan (**Appendix G**) must be implemented for the construction phase to ensure that drainage and run-off issues on the site are adequately addressed.	Contractor Civil Engineer	Site establishment and duration of construction.
Secure site, working areas and excavations in an appropriate manner.	Contractor	Site establishment, and duration of construction
Ensure that no activities infringe on identified no-go and very high and high sensitivity areas.	Contractor	Duration of construction
Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads.	Contractor	Construction
Access to adjacent areas to be strictly controlled.	Developer Contractor	Pre-construction Construction
Reduce and control construction dust through the use of approved dust suppression techniques as and when required (i.e. whenever dust becomes apparent).	Contractor	Construction
Restrict construction activities to daylight hours in order to negate or reduce the visual impacts associated with lighting.	Contractor	Construction
The construction site must be fenced and security provided.	Contractor	Construction
Adequate protective measures must be implemented to prevent unauthorised access to the working area and the internal access routes.	Contractor	Construction
All unattended open excavations must be adequately demarcated and/or fenced.	Contractor	Construction
Establish appropriately bunded areas for storage of hazardous materials (e.g. fuel to be required during construction).	Contractor	Site establishment, and duration of construction
Visual impacts must be reduced during construction through minimising areas of surface disturbance, controlling erosion, using dust suppression techniques, and restoring exposed soil as closely as possible to their original contour and vegetation.	Contractor	Site establishment, and duration of construction
Cleared alien vegetation must not be dumped on adjacent intact vegetation during clearing but must be temporarily stored in a demarcated area.	Contractor	Site establishment, and duration of construction
Establish the necessary ablution facilities with chemical toilets and provide adequate sanitation facilities and ablutions for construction workers so that the surrounding environment is not polluted (at least one sanitary facility for each sex and for every 30 workers as per the 2014 Construction Regulations; Section 30(1)(b)) at appropriate locations on site). The facilities must be placed within the construction area.	Contractor	Site establishment, and duration of construction
Ablution or sanitation facilities must not be located within 100m from any drainage line or within the 1:100 year flood.	Contractor	Site establishment, and duration of construction
Supply adequate weather and vermin proof waste collection bins and skips (covered at minimum with secured netting or shade cloth) at the site where construction is being undertaken. Separate bins should be provided for general and hazardous waste. Provision should be made for separation of waste for recycling.	Contractor	Site establishment, and duration of construction

Mitigation: Action/Control	Responsibility	Timeframe
Foundations and trenches must be backfilled to originally excavated materials as much as possible. Excess excavation materials must be disposed of only in approved areas, or, if suitable, stockpiled for use in reclamation activities.	Contractor	Site establishment, and duration of construction and rehabilitation

Performance Indicator	» Site is secure and there is no unauthorised entry. » No members of the public/ landowners injured. » Appropriate and adequate waste management and sanitation facilities are provided at construction site. » Vegetation cover on and in the vicinity of the site is intact (i.e. full cover as per natural vegetation within the environment) with no evidence of degradation or erosion. » Avifaunal microhabitat loss restricted to development footprint. » Low disturbance and impact on red-listed avifaunal species. » Avifauna do not have access to water contained in reservoirs. » Low mortality of avifauna due to construction machinery and activities. » No disturbance of breeding raptors (i.e. no nest abandonment due to disturbance), if present in the development area. » No poaching or collecting of avifauna or their products (e.g. eggs and nestlings) by construction personnel. » Removal to safety of entrapped/injured avifauna encountered during construction. » Prevent, minimise and manage any visible erosion within the development footprint of the project.
Monitoring	» An incident reporting system is used to record non-conformances to the EMPr. » EO and 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. » Monitoring of vegetation clearing during construction (by contractor as part of construction contract). » On-going visual assessments of disturbed areas to ensure erosion prevention by the EO. » Monitor visual signs of erosion such as the formation of gullies after rainfall events and the presence of the dust emissions during wind storms. » Monitoring of rehabilitated areas quarterly for at least a year following the end of construction (by contractor as part of construction contract). » Vegetation is cleared only within footprint areas during construction. » Perimeter fencing is constructed in a manner that is considered bird friendly, especially with respect to ground-dwelling birds. » Open reservoirs on site are covered with mesh to exclude birds. » No birds or eggs are disturbed or removed by construction personnel.

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

Project Component/s	» Area infrastructure (i.e. PV panels, on-site facility substation, inverters, transformers, switchgear and ancillary buildings). » Linear infrastructure (i.e. underground cabling, main access road and internal access roads and fencing).
Potential Impact	» Damage to indigenous natural vegetation and sensitive areas. » Damage to and/or loss of topsoil (i.e. pollution, compaction etc.).

	» Impacts on the surrounding environment due to inadequate sanitation and waste removal facilities. » Pollution/contamination of the environment.
Activities/Risk Sources	» Vegetation clearing and levelling of equipment storage area/s. » Access to and from the equipment storage area/s. » Ablution facilities. » Contractors not aware of the requirements of the EMPr, leading to unnecessary impacts on the surrounding environment.
Mitigation: Target/Objective	» Limit equipment storage within demarcated designated areas. » Ensure adequate sanitation facilities and waste management practices are implemented. » Ensure appropriate management of actions by on-site personnel in order to minimise impacts to the surrounding environment.

Mitigation: Action/Control	Responsibility	Timeframe
Restrict public access to works area including construction areas, laydown and storage sites via appropriate security. Only allow site access after appropriate induction and use of appropriate personal protective equipment (PPE).	Contractor	Construction
In order to minimise impacts on the surrounding environment, contractors must be required to adopt a certain Code of Conduct and commit to restricting construction activities to areas within the development footprint. Contractors and their sub-contractors must be familiar with the conditions of the EA, the BA Report, and this EMPr, as well as the requirements of all relevant environmental legislation.	Contractor	Construction
Introduce an incident reporting system to be tabled at weekly/monthly project meetings.	Contractor and sub-contractor/s	Pre-construction
Infrastructure such as the perimeter fences (including gates) and the main access and internal roads must be maintained or repaired if disturbed or damaged due to construction activities.	Contractor	Construction
Adequate traffic warning signs and control measures (including speed limits) must be implemented along access roads to warn road users of the construction activities taking place for the duration of the construction phase. Ensure that all signage is visible at all times (especially at night) and must be maintained throughout the construction phase.	Contractor	Construction
All vehicles must be road worthy and drivers must be licensed, obey traffic rules, follow speed limits and be made aware of potential road safety issues.	Contractor and sub-contractor/s	Construction
Implement penalties for drivers of heavy and light vehicles for reckless driving or speeding as a way to enforce compliance to traffic rules.	Contractor	Construction
Heavy and light vehicles must be inspected regularly to ensure their road safety worthiness. Records pertaining to this must be maintained and made available for inspection as necessary.	Contractor	Construction
Ensure all construction equipment and vehicles are properly maintained at all times.	Contractor	Construction

Mitigation: Action/Control	Responsibility	Timeframe
Restrict the operation of power tools and plant that generate noise to daylight hours as per the Environment Conservation Act (Act No. 73 of 1989) during the construction phase, and/or as any deviation that is approved by the relevant authorities.	Contractor	Construction
Ensure that construction workers are clearly identifiable. All workers should carry identification cards and wear identifiable clothing.	Contractor	Construction
As far as possible, minimise vegetation clearing and levelling for equipment storage areas.	Contractor	Site establishment, and during construction
Ensure that operators and drivers are properly trained and make them aware, through regular toolbox talks, of any risk they may pose to the community and/or environment.	Contractor	Construction
Contact details of emergency services should be prominently displayed on site.	Contractor	Construction
Open fires on the site for heating, smoking or cooking are not allowed, except in designated areas.	Contractor	Construction
Contractor must provide adequate firefighting equipment on site and provide firefighting training to selected construction staff.	Contractor	Construction
Personnel trained in first aid should be on site to deal with smaller incidents that require medical attention.	Contractor	Construction
Road borders must be regularly maintained to ensure that vegetation remains short to serve as an effective firebreak. An emergency fire plan must be developed with emergency procedures in the event of a fire.	Contractor	Site establishment, and during construction
Encourage contractors and local people to report any suspicious activity associated with crime to the appropriate authorities.	Contractor	Construction
Ensure that the local municipalities, police, security companies, and policing forums are alerted to the increased construction activities in the region and the risk it poses in respect of crime.	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	Duration of construction
Ensure that all personnel have the appropriate level of environmental awareness and competence to ensure continued environmental due diligence and on-going minimisation of 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.	Contractor	Duration of construction
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	Construction
Ensure ablution facilities are appropriately maintained. Ablutions must be cleaned regularly and associated waste disposed of at	Contractor and sub-contractor/s	Duration of contract

Mitigation: Action/Control	Responsibility	Timeframe
a registered/permitted waste disposal site. Ablutions must be removed from site when construction is completed.		
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
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 disturbance of flora or fauna must be undertaken outside of the demarcated construction area/s.	Contractor and sub-contractor/s	Duration of contract
Workers must be aware of the importance of drainage lines and drainage systems (especially those located within and surrounding the development footprint) and the significance of not undertaking activities that could result in pollution of the features.	Contractor and EO	Pre-construction Construction
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
When possible, no activity should be undertaken at the site between sunset and sunrise, except for security personnel guarding the development.	Contractor and sub-contractor/s	Construction
Keep record of all accidents or transgressions of safety in accordance with OHS Act and implement corrective action.	Contractor	Construction
Implement an HIV/AIDS Awareness and Training Programme for the Contractor's workforce and if feasible the local community within two weeks of commencement of construction. Ensure that the HIV/AIDS Awareness and Training Programme is consistent with national guidelines and/or IFC's Good Practice.	Contractor	Construction
A CLO should be appointed and a grievance mechanism (**Appendix B**) implemented. A communication protocol should be implemented whereby procedures to lodge complaints are set out in order for the local community to express any complaints or grievances with the construction process.	Contractor	Construction

Performance Indicator	» The construction camps and laydown areas have avoided sensitive areas. » Ablution and waste removal facilities are in a good working order and do not pollute the environment due to mismanagement. » All areas are rehabilitated promptly after construction in an area is complete. » Excess vegetation clearing and levelling is not undertaken. » No complaints regarding contractor behaviour or habits are received. » Appropriate training of all staff is undertaken prior to them commencing work on the construction site. » Code of Conduct drafted before commencement of the construction phase. » Compliance with OHS Act.

	» Vehicles are roadworthy, inspected regularly and speed limits are adhered to. » Roadworthy certificates are in place for all vehicles. » Traffic warning signs are placed along the main access road and these are well illuminated at night. » Roads and the perimeter fence are maintained or improved if disturbed. » A CLO is appointed for the project. » The CLO is available for community grievances and provides a communication channel.
Monitoring	» Regular audits of the construction camps and areas of construction on site by the EO. » Proof of disposal of sewage at an appropriate licensed wastewater treatment works. » Proof of disposal of waste at an appropriate licensed waste disposal facility. » An incident reporting system should be used to record non-conformances to the EMPr. » Observation and supervision of Contractor practices throughout the construction phase by the EO. » Complaints are investigated and, if appropriate, acted upon. » Comprehensive record of accidents and incidence and related investigations, findings and corrective action in accordance with the OHS Act.

OBJECTIVE 4: Maximise local employment, skills development and business opportunities associated with goods and services from the local area. Engage with local authorities and business organisations to investigate the possibility of procurement of construction materials, goods and products from local suppliers, where feasible.

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

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

Mitigation: Action/Control	Responsibility	Timeframe
A local procurement policy must be adopted to maximise the benefit to the local economy.	Developer Contractor	Construction

Mitigation: Action/Control	Responsibility	Timeframe
Where feasible, source as much goods and services as possible from the local area. Engage with local authorities and business organisations to investigate the possibility of procurement of construction materials, goods and products from local suppliers.	Developer	Duration of project
Where feasible, effort must be made to employ locally in order to create maximum benefit for the communities. Ensure that the majority of the low-skilled workforce is recruited locally.	Contractor	Construction
Identify employment opportunities for women and ensure that women are employed on the construction site and are trained.	Contractor	Construction
Facilitate the transfer of knowledge between experienced employees and the staff.	Contractor	Construction
Proof of skills development must be provided to the upskilled individuals.	Developer Contractor	Construction
Identify opportunities for local businesses and ensure that the services from local businesses are prioritised.	Contractor	Construction

Performance Indicator	» Composition of labour force and value of procurement from local businesses. » Level of skills imparted to local workforce. » Local goods and services are purchased from local suppliers.
Monitoring	» Human Resources and Finance function to monitor and report on through audits.

OBJECTIVE 5: Protection of sensitive areas, flora, fauna and soils

Project Component/s	» PV panels. » Underground cabling. » Ancillary buildings. » Construction of the internal access roads. » On-site facility substation.
Potential Impact	» Impacts on natural vegetation, habitats and fauna. » Loss of indigenous natural vegetation due to construction activities and vegetation clearing. » Impacts on soil. » Loss of topsoil. » Erosion.
Activity/Risk Source	» Site preparation and earthworks. » Excavation of foundations. » Construction of infrastructure. » Site preparation (e.g. compaction). » Excavation of foundations. » Stockpiling of topsoil, subsoil and spoil material.
Mitigation: Target/Objective	» To minimise the development footprint as far as possible. » To minimise impacts on surrounding sensitive areas. » To minimise impacts on soils. » Minimise spoil material. » Minimise erosion potential.

Mitigation: Action/Control	Responsibility	Timeframe
Contractor's EO to provide supervision and oversight of vegetation clearing activities within sensitive areas such as drainage lines.	Developer Contractor EO	Construction
In order to minimise impacts on flora, fauna, and ecological processes, the development footprint should be limited to the minimum necessary to accommodate the required infrastructure.	Contractor	Duration of contract
Land clearance must only be undertaken immediately prior to construction activities.	Contractor	Construction
Retain and augment natural vegetation on all sides of the proposed project.	Contractor	Construction
During vegetation clearance, methods should be employed to minimise potential harm to fauna species.	Contractor	Construction
Prior and during vegetation clearance any larger fauna species noted should be given the opportunity to move away from the construction machinery.	Contractor	Construction
Areas to be cleared must be clearly marked on-site to eliminate the potential for unnecessary clearing. No vegetation removal must be allowed outside the designated project development footprint. Restrict construction activity to demarcated areas.	Contractor	Duration of Construction
Practical phased development and vegetation clearing must be practiced so that cleared areas are not left un-vegetated and vulnerable to erosion for extended periods of time. Where possible work should be restricted to one area at a time.	Contractor	Construction
No harvesting of plants for firewood, medicinal or any other purposes are to be permitted	Contractor	Construction
No killing and poaching of any wild animal to be allowed. This should be clearly communicated to all employees, including subcontractors.	Contractor	Construction
Areas beyond the development footprint should be expressly off limits to construction personnel and construction vehicles and this should be communicated to them.	Contractor	Construction
If trenches need to be dug for electrical cabling or other purpose, these should not be left open for extended periods of time as fauna may fall in and become trapped in them. Trenches which are standing open should have places where there are soil ramps allowing fauna to escape the trench.	Contractor	Construction
Education of employees on the conservation importance of natural areas and fauna must be provided.	Contractor	Construction
Access to high sensitivity and no-go areas to be restricted and controlled. This should be clearly communicated to all employees.	Contractor	Construction
All construction vehicles should adhere to clearly defined and demarcated roads	Contractor	Construction
Topsoil must be removed and stored separately from subsoil and must be reapplied where appropriate as soon as possible in order to encourage and facilitate rapid regeneration of the natural vegetation on cleared areas.	Contractor	Construction

Mitigation: Action/Control	Responsibility	Timeframe
Soil stockpiles must be located away from any drainage lines or preferential water flow path in the landscape, to minimise soil erosion from these	Contractor	Construction
All graded or disturbed areas which will not be covered by permanent infrastructure such as paving, buildings or roads must be stabilised using appropriate erosion control measures.	Contractor	Construction
A method statement must be developed and submitted to the engineer to deal with erosion issues prior to bulk earthworks operations commencing.	Contractor	Before and during construction
Stockpiles are not to be used as stormwater control features.	Contractor	Construction
Any stockpiling of materials may not exceed two metres in height to reduce materials being blown away during high wind velocity events.	Contractor	Construction
Any erosion problems observed within the development area as a result of the construction activities must be rectified immediately and monitored thereafter to ensure that they do not re-occur.	Contractor	Construction
Any signs of soil erosion on site should be documented (including photographic evidence and coordinates of the problem areas) and submitted to the management team for further action.	Contractor	Construction
During construction the contractor shall protect areas susceptible to erosion by installing appropriate temporary and permanent drainage works as soon as possible and by taking other measures necessary to prevent the surface water from being concentrated in streams and from scouring the slopes, banks or other areas.	Contractor	construction
Create energy dissipation at discharge areas to prevent scouring	Contractor	construction
Activity at the site must be reduced after large rainfall events when the soils are wet. No driving off of hardened roads should occur at any time and particularly immediately following large rainfall events.	Contractor	Construction
Silt traps or cut-off berms downslope of working areas should be used where there is a danger of topsoil or material stockpiles eroding and entering drainage lines and other sensitive areas.	Contractor	Construction
Erosion control measures to be regularly maintained.	Contractor	Construction
If erosion has occurred, topsoil should be sourced and replaced and shaped to reduce the recurrence of erosion.	Contractor	Construction
Only the designated access routes are to be used to reduce any unnecessary compaction.	Contractor	Construction
Compacted areas are to be ripped to loosen the soil structure.	Contractor	Construction
Topsoil to be stripped when the soil is dry in order to reduce compaction. The topsoil should be stripped by means of an excavator bucket, and loaded onto dump trucks.	Contractor	Construction
The handling of the stripped topsoil must be minimized to ensure the soil's structure does not deteriorate significantly	Contractor	Construction
Compaction of the removed topsoil must be avoided by prohibiting traffic on stockpiles.	Contractor	Construction
The stockpiles must be vegetated in order to reduce the risk of erosion, prevent weed growth and to reinstitute the ecological processes within the soil.	Contractor	Construction

Mitigation: Action/Control	Responsibility	Timeframe
Place the cleared vegetation were the topsoil stockpiles are to be placed.	Contractor	Construction
Outside lighting should be designed to minimise impacts on fauna.	Contractor	Before construction
All night-lighting should use low-UV type lights (such as most LEDs), which do not attract insects. The lights should also be of types which are directed downward and do not result in large amounts of light pollution.	Contractor	Construction
Fluorescent and mercury vapour lighting should be avoided and sodium vapor (yellow) lights should be used wherever possible.	Contractor	Construction
Noise from vehicles and powered machinery and equipment on-site should not exceed the manufacturer's specifications, based on the installation of a silencer. Equipment should be regularly serviced. Attention should also be given to muffler maintenance and enclosure of noisy equipment.	Contractor	Construction

Performance Indicator	» No disturbance outside of the designated work areas. » Minimised clearing of existing vegetation. » Vegetation and habitat loss is restricted to the development footprint. » No poaching etc. of fauna by construction personnel during construction. » Removal to safety of fauna encountered during construction. » Low mortality of fauna due to construction machinery and activities. » Topsoil appropriately stored, managed and rehabilitated. » Limited soil erosion around the development area. » No activity is undertaken in restricted areas. » Minimal level of soil degradation.
Monitoring	» Contractor's EO to provide supervision and oversight of vegetation clearing activities within sensitive areas such as near drainage lines. » Supervision of all clearing and earthworks. » Ongoing monitoring of erosion management measures within the development area. » Monthly inspections of sediment control devices by the EO. » An incident reporting system will be used to record non-conformances to the EMPr.

OBJECTIVE 6: 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. 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; and
» Hydrological impacts due to increased transpiration and runoff.

Project Component/s	» PV facility. » Access road. » Associated infrastructure.
Potential Impact	» Invasion of natural vegetation surrounding the development area by declared weeds or invasive alien species. » Impacts on soil. » Impact on faunal habitats. » Degradation and loss of agricultural potential.
Activities/Risk Sources	» Transport of construction materials to the development area. » Movement of construction machinery and personnel. » Site preparation and earthworks causing disturbance to indigenous vegetation. » Construction of site access roads. » Stockpiling of topsoil, subsoil and spoil material. » Routine maintenance work – especially vehicle movement.
Mitigation: Target/Objective	» To significantly reduce the presence of weeds and eradicate alien invasive species. » To avoid the introduction of additional alien invasive plants to the development area. » To avoid distribution and thickening of existing alien plants in the development area. » To complement existing alien plant eradication programs in gradually causing a significant reduction of alien plant species throughout the development area.

Mitigation: Action/Control	Responsibility	Timeframe
Develop and implement an Alien Invasive Plant (AIP) Control and Eradication Programme.	Contractor	Construction
Avoid creating conditions in which alien plants may become established: » Keep disturbance of indigenous vegetation to a minimum. » Rehabilitate disturbed areas as quickly as possible. » Do not import soil from areas with alien plants.	Contractor	Construction
When alien plants are detected, these must be controlled and cleared using the recommended control measures for each species to ensure that the problem is not exacerbated or does not re-occur.	Contractor	Construction
Eradicate all weeds and alien invasive plants as far as practically possible and ensure that material from invasive plants are adequately destroyed and not further distributed. Continually monitor the re-emergence of these species and manage according to the invasive species management plan (**Appendix C**).	Contractor	Construction
Any alien and invasive vegetation removed should be taken to a registered landfill site to prevent the proliferation of alien and invasive species.	Contractor	Construction
The use of herbicides and pesticides and other related horticultural chemicals must be carefully controlled and only applied by personnel adequately certified to apply pesticides and herbicides. It must be ensured that World Health Organisation (WHO) Recommended Classification of Pesticides by Hazard Class 1a (extremely hazardous) or 1b (highly hazardous) are not purchased, stored or used on site along with	Contractor	Construction

Mitigation: Action/Control	Responsibility	Timeframe
any other nationally or internationally similarly restricted/banned products.		

Performance Indicator	» Low abundance of alien plants. For each alien species: number of plants and aerial cover of plants within the development area and immediate surroundings.
Monitoring	» On-going monitoring of area by EO during construction. » Annual audit of development footprint and immediate surroundings by qualified botanist. » 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. » The results should be interpreted in terms of the risk posed to sensitive habitats within and surrounding the development area. » The environmental manager/site agent should be responsible for driving this process. » Reporting frequency depends on legal compliance framework.

OBJECTIVE 7: Minimise impacts on surface water resources

The large drainage lines that bisect the central and north-eastern sections of the development area are dominated by a woody component which includes, *Vachellia erioloba, Vachellia haemotoxylon, Boscia foetida* and *Euclea pseudebenus***.** In addition, the less well developed drainage lines/washes are also located within the eastern and southern sections of the development area and are associated with the large drainage lines. In addition, only one (1) depression wetland/feature is affected by the development of Naledi PV. The feature is 2110m^2 in extent and contains little to no obligate or important habitat and the riparian vegetation within its vicinity is terrestrial in nature.

Project component/s	» Construction activities. » Storage of dangerous goods. » Ablution facilities.
Potential Impact	» Compaction of soil. » Pollutants such as lime-containing (high pH) construction materials such as concrete, cement, grouts, etc. could be harmful to aquatic biota, particularly during low flows when dilution is reduced. » Removal of freshwater habitat. » Compaction of soils within and surrounding the drainage lines. » Erosion of soils surrounding drainage lines. » Potential proliferation of alien and invasive species within the drainage lines (i.e. drainage lines). » Vegetation clearance in drainage lines. » Movement of vehicles in drainage lines.
Activity/risk source	» Re-fuelling, usage and maintenance of construction vehicles. » Cement batching and usage. » Ablution facilities usage by employees. » Use of any chemicals or hazardous materials/dangerous goods during construction.
Mitigation: Target/Objective	» Reduce potential loss of habitat and ecological structure. » No incidents related to spills of chemicals and hazardous materials. » No release of contaminated water in drainage lines including the riparian habitat.s.

	» No misbehaviour of construction workers (i.e. ablution activities, washing).

Mitigation: Action/control	Responsibility	Timeframe
No in-stream vegetation is to be removed unnecessarily.	Contractor	Construction
Alien Invasive and Control Management Plan (**Appendix C**) is to be formulated and implemented.	Contractor	Construction
Ensure strict management of potential sources of pollution (hydrocarbons from vehicles and machinery, cement during construction, etc.). Bunded containment to be provided below and around any fuel storage containers.	Contractor	Construction
No storage of fuels, oils or any other hazardous substance are allowed directly in the drainage lines or within 100m from any drainage line.	Contractor	Duration of contract
Temporary ablution facilities may not be placed directly or within 100m of any drainage line.	Contractor	Construction
Temporary ablution facilities must be regularly checked for leaks and spillages, and repaired where any leakages are detected before being allowed for use on the site.	Contractor	Construction
Suitable crossings through the drainage lines are to be implemented, where required.	Contractor	Construction
Where erosion takes place, the EO must inspect the degree of erosion and propose suitable mitigation measures to prevent further erosion.	Contractor EO	Construction
Construction equipment is to be checked daily (by Contractor) to ensure that no fuel spillage takes place from construction vehicles or machinery.	Contractor	Construction
Proper use of ablutions should be strictly enforced.	Contractor	Construction
Sand, stone and cement must be stored in demarcated areas, and must be covered or sealed to prevent wind erosion and resultant deposition of dust on the surrounding indigenous vegetation.	Contractor	Construction
Any excess sand, stone and cement must be removed from site at the completion of the construction period.	Contractor	Construction
Measures must be put in place to control illegal dumping of construction waste as this may result in the pollution of surface water run-off. Furthermore, no pollution of groundwater resources may occur.	Contractor	Construction
Any areas disturbed during the construction phase should be encouraged to rehabilitate as fast and effective as possible.	Contractor	Construction
Where possible, reduce the footprint area of exposed ground and prioritise vegetation clearing for the winter months as far as possible.	Contractor	Construction
Exposed areas must be ripped and vegetated to increase surface roughness.	Contractor	Construction
A comprehensive rehabilitation plan must be implemented from the project onset to ensure net benefit of the environment within all the drainage lines that were affected during construction.	Contractor	Construction

Performance Indicator	» No major preventable spillages are recorded. » No erosion recorded within the drainage lines within the development area. » No degradation of the water resources within the development area.
Monitoring	» Monitor management measures in place for potentially hazardous materials. » Monitoring occurrence of erosion and degradation within the drainage lines.

OBJECTIVE 8: Appropriate Stormwater Management

The Stormwater Management Plan (SWMP) aims to facilitate the protection of surface water resources within the development area of Naledi PV. Although, the findings of the SWMP (**Appendix G**) indicated that the development of the solar PV facility is likely to have a low impact, it remains important that the engineers and contractors responsible for the detailed design of the stormwater management systems consider the requirements of this EMPr, as well as, the recommendations by other specialists on the project.

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

Mitigation: Action/Control	Responsibility	Timeframe
The mitigation measures included in the Stormwater Management Plan (**Appendix G** of the EMPr) must be implemented.	Contractor Developer	Duration of project
Stormwater management around the construction footprint areas must be undertaken to ensure that sediment-laden run-off does not enter the surrounding drainage lines. .	Contractor	Construction
Any stormwater within the site must be handled in a suitable manner. Contaminated water must not be discharged into the drainage lines.	Contractor and Engineers	Construction
Excavate clean water diversion channel to direct run-off around dirty areas. The channel must be sized for a 1:5 year flood event. Typical design should be an excavated earth channel or berms.	Contractor	During site establishment
Construct stormwater drains or bunds to divert clean run-off around the workshop, chemical stores, transformers and the waste water conservancy tank. The channel must be sized for a 1:5 year flood event. Typical design should be an excavated earth channel or berms.	Contractor	During site establishment
Construct silt fences or berms to prevent sediment transport into the large drainage line.	Construction	During site establishment
All roads and other hardened surfaces must have runoff control features which redirect water flow and dissipate any energy in the water which may pose an erosion risk.	Contractor	Construction
The access roads should be permeable to allow for drainage from the road surface. In this regard, suitable stormwater	Contractor	Construction

Mitigation: Action/Control	Responsibility	Timeframe
management should be implemented to allow for water to drain from the roads without causing erosion.		
Where discharge of rainwater on roads will be channelled directly into the natural environment, the application of diffuse flow measures must be included in the design	Contractor	Construction
New access roads within the site are to be constructed according to design and contract specifications. The access routes must have suitable storm water management plans and erosion control measures.	Contractor	Construction
Drainage measures must promote the dissipation of storm water run-off.	Contractor	Construction
Any loss/alteration of flow dynamics must be quantified, and mitigation options to re-introduce water in a safe and environmentally friendly way must be assessed.	Contractor	Construction
Site surface water and wash water must be contained and treated before reuse or discharge from site.	Contractor	Construction

Performance Indicator	» No impacts due to runoff. » Minimise erosion as far as possible. » Appropriate stormwater management system in place.
Monitoring	» Ongoing monitoring of erosion management measures within the development area. » Monthly inspections of sediment control devices by the EO. » An incident reporting system must be used to record non-conformances to the EMPr.

OBJECTIVE 9: Protection of Heritage Resources

Although heritage resources have been identified within the study area and development area for Naledi PV, these are of a low significance and no fatal flaws have been identified to be associated with the development; therefore, the development area is considered as an appropriate place for the development of a solar PV facility.

Project Component/s	» PV facility. » On-site facility substation. » Access roads. » Associated infrastructure.
Potential Impact	» Heritage objects or artefacts found on site and within the development footprint are inappropriately managed or destroyed.
Activity/Risk Source	» Site preparation and earthworks. » Foundations or plant equipment installation. » Mobile construction equipment movement on site.
Mitigation: Target/Objective	» To ensure that any heritage objects found on site are treated appropriately and in accordance with the relevant legislation.

Mitigation: Action/control	Responsibility	Timeframe
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 if they find sites. All staff should also be familiarised with procedures for dealing with heritage objects/sites.	Contractor, and heritage specialist	Duration of contract, particularly during excavations
EO to alert workers to the importance of reporting fossil bones seen on site and to the possibility of encountering human remains.	EO	Construction
A Chance Find Protocol (**Appendix L**) must be developed and implemented in the event that archaeological or palaeontological resources are found. In the case where the proposed development activities bring these materials to the surface, work must cease and SAHRA must be contacted immediately.	Developer Contractor	Construction and duration of contract
If heritage resources are uncovered during the course of the development, a professional archaeologist or palaeontologist, depending on the nature of the finds, must be contacted as soon as possible to inspect the heritage resource. If the newly discovered heritage resources prove to be of archaeological or paleontological significance, a Phase 2 rescue operation may be required subject to permits issued by SAHRA.	EO Developer	Construction and duration of contract
Chance fossil finds such as vertebrate bones and teeth or shells should be safeguarded preferably in-situ and reported by the EO as soon as possible to the South Africa Heritage Resources Agency, SAHRA. Contact Details: 111 Harrington Street, Cape Town P.O Box 4637 Cape Town 8001 Tel: +27 (021) 462 4502 Fax: +27 (021) 462 4509 www. sahra.org.za	EO Archaeologist	Construction and duration of contract.
If unmarked human burials are uncovered, the SAHRA Burial Grounds & Graves (BGG) Unit (Thingahangwi Tshivhase/Mimi Seetelo 012 320 8490) must be alerted immediately.	EO Developer	Construction and duration of contract.

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

OBJECTIVE 10: Management of dust and air emissions

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 main and internal access roads.

Project component/s	» PV facility. » Access roads. » Associated infrastructure.
Potential Impact	» Dust generation and particulates from vehicle movement to and on-site, foundation excavation, road construction activities, road maintenance activities, temporary stockpiles, and vegetation clearing affecting the surrounding residents and visibility. » Release of minor amounts of air pollutants (for example NO_2, CO and SO_2) from vehicles and construction equipment.
Activity/risk source	» Clearing of vegetation and topsoil. » Excavation, grading, scraping, levelling, digging, drilling and associated construction activities. » Transport of materials, equipment, and components on internal access roads and the associated increased traffic. » Vehicle movement on gravel roads. » Re-entrainment of deposited dust by vehicle movements. » Wind erosion from topsoil and spoil stockpiles and unsealed roads and surfaces. » Fuel burning vehicle and construction engines.
Mitigation: Target/Objective	» To ensure emissions from all vehicles and construction engines are minimised, where possible, for the duration of the construction phase. » 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. » Suppression of dust, pollution control and minimise dust generation.

Mitigation: Action/control	Responsibility	Timeframe
Implement appropriate dust suppression measures on a regular basis along the gravel access road and on the development area.	Contractor	Construction
Make use of dust suppressants on roads and limit development of new roads.	Contractor	Construction
Areas must be cleared in a progressive manner. Road surfaces and other infrastructure to be constructed as soon as possible after vegetation clearing in order to minimise exposed ground surfaces, specifically roads which carry traffic.	Contractor	Construction
Roads must be maintained that will ensure that nuisance to the community from dust emissions from road or vehicle sources is not visibly excessive.	Contractor	Construction
Haul vehicles moving outside the construction site carrying material that can be wind-blown must be covered with suitable material tarpaulins shade cloth.	Contractor	Duration of contract
Ensure that vehicles used to transport sand and building materials are fitted with tarpaulins or covers.	Contractor	Duration of contract

Mitigation: Action/control	Responsibility	Timeframe
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
Should a batching plant be required, this must be enclosed with shade cloth to reduce the amount of cement particulates/ particles released into the environment.	Contractor	Duration of contract

Performance Indicator	» No complaints from affected residents or surrounding communities regarding dust or vehicle emissions. » Limited visual presence of dust and good air quality. » Dust does not cause health (inhaling, eye irritation) and safety risks (low visibility). » Dust suppression measures implemented for all heavy vehicles that require such measures during the construction phase. » Drivers made aware of the potential safety issues and enforcement of strict speed limits when they are employed. » All heavy vehicles are equipped with speed monitors before they are used in the construction phase in accordance with South African vehicle legislation. » Road worthy certificates in place for all heavy vehicles at the outset of the construction phase and updated on a monthly basis. » 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.
Monitoring	Monitoring must be undertaken to ensure emissions are not exceeding the prescribed levels via the following methods: » Immediate reporting by personnel of any potential or actual issues with regards to nuisance dust or emissions to the Site Manager. » 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. » An incident register and non-conformance must be used to record incidents and non-conformances to the EMPr. » A complaints register must be used to record grievances by the public.

OBJECTIVE 11: Minimise impacts related to traffic management and transportation of equipment and materials to site

Project Component/s	» Delivery of any component required for the construction phase of the solar PV facility.
Potential Impact	» Impact of heavy construction vehicles on road surfaces, and possible increased risk in accidents involving people and animals. » Traffic congestion, particularly on narrow roads or on road passes where overtaking is not permitted. » Deterioration of road pavement conditions (both surfaced and gravel road) due to abnormal loads.
Activities/Risk Sources	» Construction vehicle movement. » Speeding on local roads. » Degradation of local road conditions.

	» Site preparation and earthworks. » Foundations or plant equipment installation. » Transportation of ready-mix concrete to the development area. » Mobile construction equipment movement on site.
Mitigation: Target/Objective	» Minimise impact of traffic associated with the construction of the solar PV facility on local traffic volumes, existing infrastructure, property owners, animals, and road users. » To minimise potential for negative interaction between pedestrians or sensitive users and traffic associated with the facility construction. » To ensure all vehicles are roadworthy and all materials/equipment are transported appropriately and within any imposed permit/licence conditions.

Mitigation: Action/Control	Responsibility	Timeframe
Compile and implement a construction period traffic management plan (**Appendix I**) 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
Undertake regular maintenance of gravel roads.	Contractor	Construction
Ensure that, at all times, people have access to their properties as well as to social facilities.	Developer Contractor	Construction
Limit the need for transportation over long distances by sourcing as much materials and goods as is feasible from local suppliers.	Contractor	Construction
Strict vehicle safety standards must be implemented and monitored.	Contractor	Construction
No deviation from approved transportation routes must be allowed, unless roads are closed for whatever reason outside the control of the contractor.	Contractor	Construction
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)	Construction
Heavy construction vehicles must be restricted to off-peak periods. Schedule the delivery hours to avoid peak hour traffic, weekends and evenings and stagger component delivery to site.	Contractor	Construction
Any traffic delays expected because of construction traffic must be co-ordinated with the appropriate authorities.	Contractor	Construction
When upgrading, constructing and maintaining the access roads ensure that proper hazard warnings signage and traffic control mechanisms such as flags men and traffic control barriers, chevrons and traffic cones separating the road from the worksite are in place at all times.	Contractor	Construction
Visible signage must be established at appropriate points warning of turning traffic and the construction site (all signage to be in accordance with prescribed standards). Signage must be appropriately maintained throughout the construction period.	Contractor	Construction
All construction vehicles must remain on properly demarcated roads. No off-road driving to be allowed.	Contractor	Construction
Implement penalties for reckless driving for the drivers of heavy vehicles as a way to enforce compliance to traffic rules.	Contractor	Construction

Mitigation: Action/Control	Responsibility	Timeframe
The contractors must ensure that there is a dedicated access road and an access control point to the development area.	Contractor	Construction
Provide clearly defined roadway, parking and pedestrian walkway areas within the site with adequate lighting.	Contractor	Construction
Provide flagmen at the access road when accommodating abnormal load vehicles.	Contractor	Construction
On-site parking and safe turn-around facilities should be provided for private vehicles and for buses and mini-buses transporting workers to and from site.	Contractor	Construction

Performance Indicator	» Vehicles are keeping to the speed limits. » Vehicles are in good working order and safety standards are implemented. » Local residents and road users are aware of vehicle movements and schedules. » No construction traffic related accidents are experienced. » Local road conditions and road surfaces are up to standard. » Complaints of residents are not received (e.g. concerning the speeding of heavy vehicles).
Monitoring	» Developer and or appointed EO must monitor indicators listed above to ensure that they have been implemented.

OBJECTIVE 12: Appropriate handling and management of waste

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

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

Project Component/s	» PV facility. » Access roads. » On-site facility substation » Associated infrastructure.
Potential Impact	» Inefficient use of resources resulting in excessive waste generation. » Litter or contamination of the site or water through poor waste management practices.
Activity/Risk Source	» Packaging. » Other construction wastes. » Hydrocarbon use and storage. » Spoil material from excavation, earthworks and site preparation.
Mitigation: Target/Objective	» To comply with waste management legislation. » To minimise production of waste. » To ensure appropriate waste storage and disposal.

	» To avoid environmental harm from waste disposal. » A waste manifest must be developed for the ablutions showing proof of disposal of sewage at appropriate water treatment works.

Mitigation: Action/Control	Responsibility	Timeframe
Construction method and materials must be carefully considered in view of waste reduction, re-use, and recycling opportunities.	Contractor	Duration of contract
Construction contractors must provide specific detailed waste management plans (**Appendix H**) to deal with all waste streams.	Contractor	Duration of contract
Ensure that no litter, refuse, wastes, rubbish, rubble, debris and builders wastes generated on the premises are placed, dumped or deposited on adjacent/surrounding properties, and that the waste is disposed of at a dumping site as approved by the Council.	Contractor	Duration of contract
Waste disposal at the construction site must be avoided by separating and trucking out of waste.	Contractor	Construction
Specific areas must be designated on-site for the temporary management of various waste streams, i.e. general refuse, construction waste (wood and metal scrap), and contaminated waste as required. Location of such areas must seek to minimise the potential for impact on the surrounding environment, including prevention of contaminated runoff, seepage, and vermin control.	Contractor	Duration of contract
Where practically possible, construction and general wastes on site must be reused or recycled. Bins and skips must be available on-site for collection, separation, and storage of waste streams (such as wood, metals, general refuse etc.).	Contractor	Duration of contract
Disposal of waste must be in accordance with relevant legislative requirements, including the use of licensed contractors.	Contractor	Duration of contract
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
All sewage disposal to take place at a registered and operational wastewater treatment works. Slips of disposal to be retained as proof of responsible disposal.	Contractor	Maintenance: duration of contract within a particular area
All liquid waste must be contained in appropriately sealed vessels/ponds within the footprint of the development, and be disposed of at a designated waste management facility after use.	Contractor	Duration of contract
Documentation (waste manifest) must be maintained detailing the quantity, nature, and fate of any regulated waste. Waste disposal records must be available for review at any time.	Contractor	Duration of contract
SABS approved spill kits must be available and easily accessible.	Contractor	Duration of contract
Regularly serviced chemical toilet facilities and/or septic tank must be used to ensure appropriate control of sewage.	Contractor	Duration of contract

Mitigation: Action/Control	Responsibility	Timeframe
Daily inspection of all chemical toilets and septic tanks must be performed by environmental representatives on site.	Contractor	Duration of contract
In the event where sewage is discharged into the environment, all contaminated vegetation/ rock and soil must be removed immediately and treated as hazardous waste.	Contractor	Duration of construction
Under no circumstances may waste be burnt on site or on surrounding premises.	Contractor	Duration of construction
Where a registered waste site is not available close to the construction site, provide a method statement with regard to waste management.	Contractor	Duration of construction
Implement an integrated waste management approach (**Appendix H**) that is based on waste minimisation and incorporates reduction, recycling, re-use and disposal where appropriate. Where solid waste is disposed of, such disposal shall only occur at a landfill licensed in terms of section 20(b) of the National Environmental Management Waste Act, 2008 (Act 59 of 2008).	Contractor	Duration of construction
Upon the completion of construction, the area must be cleared of potentially polluting materials. Spoil stockpiles must also be removed and appropriately disposed of or the materials re-used for an appropriate purpose.	Contractor	Completion of construction
Upon the completion of construction, all sanitation facilities (including chemical toilets) must be removed, as well as the associated waste to be disposed of at a registered waste disposal site.	Contractor	Completion of construction
Litter generated by the construction crew must be collected in rubbish bins and disposed of weekly, or at an appropriate frequency, at registered waste disposal sites.	Contractor	Duration of construction
All building rubble, solid and liquid waste etc. generated during the construction activities must be disposed of as necessary at an appropriately licensed refuse facility.	Contractor	Duration of construction
All vehicles and containers used for moving waste must encapsulate the waste, which prevents the waste from causing odours and from escaping or blowing around the site. This will also prevent leachate material from spilling out of the containers, which is hazardous.	Contractor	Duration of construction

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

OBJECTIVE 13: Appropriate handling and storage of chemicals, hazardous substances

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

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

Mitigation: Action/Control	Responsibility	Timeframe
Implement an emergency preparedness plan (**Appendix J**) during the construction phase.	Contractor	Duration of Contract
Any liquids stored on site, including fuels and lubricants, must be stored in accordance with applicable legislation.	Contractor	Duration of Contract
Spill kits must be made available on-site for the clean-up of spills and leaks of contaminants.	Contractor	Duration of contract
Losses of fuel and lubricants from the oil sumps and steering racks of vehicles and equipment must be contained using a drip tray with plastic sheeting filled with absorbent material when not parked on hard standing.	Contractor	Construction
Establish an appropriate Hazardous Store which is in accordance with the Hazardous Substance Amendment Act, No. 53 of 1992. This should include but not be limited to: » Designated area; » All applicable safety signage; » Firefighting equipment; » Enclosed by an impermeable bund; » Protected from the elements, » Lockable; » Ventilated; and	Contractor	Duration of Contract

Mitigation: Action/Control	Responsibility	Timeframe
» Have adequate capacity to contain 110% of the largest container contents.		
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.	Contractor	Duration of contract
In the event of a major spill or leak of contaminants, the relevant administering authority must be immediately notified as per the notification of emergencies/incidents.	Contractor	Duration of contract
Spilled concrete must be cleaned up as soon as possible and disposed of at a suitably licensed waste disposal site. Check vehicles and machinery daily for oil, fuel and hydraulic fluid leaks and undertake regular high standard maintenance on vehicles.	Contractor	Duration of contract
Accidental spillage of potentially contaminating liquids and solids must be cleaned up immediately in line with procedures by trained staff with the appropriate equipment.	Contractor	Duration of contract
Any contaminated/polluted soil removed from the site must be disposed of at a licensed hazardous waste disposal facility.	Contractor	Duration of contract
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.	Contractor	Duration of contract
All stored fuels to be maintained within an appropriate bund and on a sealed surface as per the requirements of SABS 089:1999 Part 1 and any relevant by-laws.	Contractor	Duration of contract
Fuel storage areas must be inspected regularly to ensure bund stability, integrity, and function.	Contractor	Duration of contract
Construction machinery must be stored in an appropriately sealed area.	Contractor	Duration of contract
Oily water from bunds at the on-site facility substation must be removed from site by licensed contractors.	Contractor	Duration of contract
The storage of flammable and combustible liquids such as oils must be undertaken in designated areas which are appropriately bunded, and stored in compliance with Material Safety Data Sheets (MSDS) files.	Contractor	Duration of contract
Any storage and disposal permits/approvals which may be required must be obtained, and the conditions attached to such permits and approvals must be complied with.	Contractor	Duration of contract
Transport of all hazardous substances must be in accordance with the relevant legislation and regulations.	Contractor	Duration of contract
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

Mitigation: Action/Control	Responsibility	Timeframe
An effective monitoring system must be put in place to detect any leakage or spillage of all hazardous substances during their transportation, handling, installation and storage.	Contractor	Construction
Precautions must be in place to limit the possibility of oil and other toxic liquids entering the soil or clean stormwater system.	Contractor	Construction
As much material as possible must be pre-fabricated and then transported to site to avoid the risks of contamination associated with mixing, pouring and the storage of chemicals and compounds on site.	Contractor	Construction
All chemicals and toxicants used during construction must be stored in bunded areas.	Contractor	Construction
All machinery and equipment should be inspected, serviced and re-fuelled regularly for faults and possible leaks, these should be serviced off-site (pre-use inspection). These activities should either take place off-site, or in controlled and bunded working areas.	Contractor	Construction
All waste generated on-site during construction must be adequately managed.	Contractor	Construction
Should a chemical spill take place, an aquatic ecologist must be contracted to identify the extent of the impact and assist with additional mitigation measures, where aquatic features have been affected.	Contractor	Construction
Minimise fuels and chemicals stored on site.	Contractor	Construction
Install bunds on storage areas and take other precautions to reduce the risk of spills.	Contractor	Construction
Implement a contingency plan to handle spills, so that environmental damage is avoided.	Contractor	Construction
No refuelling, servicing of plant/equipment or chemical substance storage allowed outside of designated areas.	Contractor	Construction
Drip trays should be used during al fuel/chemical dispensing and be placed beneath standing machinery/plant.	Contractor	Construction
In the case of petrochemical spillages, the spill must be collected immediately and stored in a designated area until it can be disposed of in accordance with the Hazardous Chemical Substances Regulations, 1995 (Regulation 15).	Contractor	Construction

Performance Indicator	» No chemical spills outside of designated storage areas. » No water or soil contamination by spills. » No complaints received regarding waste on site or indiscriminate dumping. » Safe storage of hazardous chemicals. » Proper waste management.
Monitoring	» Observation and supervision of chemical storage and handling practices and vehicle maintenance throughout the construction phase. » A grievances register must be maintained, in which any complaints from the community will be logged. » An incident reporting system will be used to record non-conformances to the EMPr. » On-going visual assessment to detect polluted areas and the application of clean-up and preventative procedures.

	» Monitor hydrocarbon spills from vehicles and machinery during construction continuously and record the volume and the nature of the spill, location and clean-up actions. » Monitor maintenance of drains and intercept drains weekly. » Analyse soil samples for pollution in areas of known spills or where a breach of containment is evident when it occurs. » Records of accidental spills and clean-up procedures and the results thereof must be audited on an annual basis by the ECO. » Records of all incidents that caused chemical pollution must be kept and a summary of the results must be reported to management annually.

6.3 Detailing Method Statements

OBJECTIVE 14: Ensure all construction activities are undertaken with the appropriate level of environmental awareness to minimise environmental risk

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

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

» Responsible person/s;
» Construction procedures;
» Materials and equipment to be used;
» Getting the equipment to and from site;
» How the equipment/material will be moved while on-site;
» How and where material will be stored;
» The containment (or action to be taken if containment is not possible) of leaks or spills of any liquid or material that may occur;
» Timing and location of activities;
» Compliance/non-compliance with the Specifications; 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.
- Design, establish, maintain and operate suitable pollution control facilities necessary to prevent discharge of water containing polluting matter or visible suspended materials into the surrounding environment. Should grey water (i.e. water from basins, showers, baths, kitchen sinks etc.) need to be disposed of, link into an existing facility where possible. Where no facilities are available, grey water runoff must be controlled to ensure no seepage into the surrounding environment occurs.
- Dust and noise pollution:
  - Describe the necessary measures to ensure that noise from construction activities is maintained within lawfully acceptable levels.
  - Procedure to control dust at all times on the site, access roads and spoil sites (dust control shall be sufficient so as not to have significant impacts in terms of the biophysical and social environments). These impacts include visual pollution, decreased safety due to reduced visibility, negative effects on human health and the ecology due to dust particle accumulation.
- Hazardous substance storage (ensure compliance with all national, regional and local legislation with regard to the storage of oils, fuels, lubricants, solvents, wood treatments, bitumen, cement, pesticides and any other harmful and hazardous substances and materials. South African National Standards apply).
  - Lists of all potentially hazardous substances to be used.
  - Appropriate handling, storage and disposal procedures.
  - Prevention protocol of accidental contamination of soil at storage and handling areas.
  - All storage areas, (i.e. for harmful substances appropriately bunded with a suitable collection point for accidental spills must be implemented and drip trays underneath dispensing mechanisms including leaking engines/machinery).
- Fire prevention and management measures on site.
- Fauna and flora protection process on and off site (i.e. removal to reintroduction or replanting, if necessary).
  - Rehabilitation, re-vegetation process and bush clearing.
- Incident and accident reporting protocol.
- General administration.
- Designate access road and the protocols while roads are in use.
- Requirements on gate control protocols.

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

Contractor from their obligations or responsibilities in terms of their contract. Failure to submit a method statement may result in suspension of the activity concerned until such time that an appropriate method statement has been submitted and approved.

6.4 Awareness and Competence: Construction Phase

OBJECTIVE 15: To ensure all construction personnel have the appropriate level of environmental awareness and competence to ensure continued environmental due diligence and on-going minimisation of environmental harm

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

The Contractors obligations in this regard include the following:

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

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

6.4.1 Environmental Awareness and Induction Training

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

As a minimum, induction training should include:

- Explanation of the importance of complying with the EMPr;
- Explanation of the importance of complying with the Environmental Authorisation;
- Discussion of the potential environmental impacts of construction activities;
- Awareness regarding sensitivities on the site, including sensitive plant species (including the use of visual aids and on-site identification);
- The benefits of improved personal performance;
- Employees' roles and responsibilities, including emergency preparedness (this should be combined with this induction, but presented by the contractor's Health and Safety Representative);
- Explanation of the mitigation measures that must be implemented when carrying out their activities; and
- Explanation of the specifics of this EMPr and its specification (no-go areas, etc.).

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

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

6.4.2 Toolbox Talks

Toolbox talks should be held on a scheduled and regular basis (at least twice a month) where foremen, environmental and safety representatives of different components of the works and sub-consultants hold talks relating to environmental practices and safety awareness on site. These talks must also include discussions on

possible common incidents occurring on site and ones recommended by the on-site EO and the prevention of reoccurrence thereof. Records of attendance and the awareness talk subject must be kept on file.

6.5 Monitoring Programme: Construction Phase

OBJECTIVE 16: To monitor the performance of the control strategies employed against environmental objectives and standards

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

The 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 in communication and feedback to authorities and stakeholders

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

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

6.5.1. Non-Conformance Reports

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

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

6.5.2. Monitoring Reports

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

6.5.3. Audit Reports

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

An environmental internal audit must be conducted and submitted 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 construction and rehabilitation. This Report must be compiled in accordance with Appendix 7 of the EIA Regulations, 2014, as amended, and indicate the date of the audit, the name of the auditor and the outcome of the audit in terms of compliance with the EA conditions and the requirements of the EMPr.

6.5.4. Final Audit Report

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

CHAPTER 7: MANAGEMENT PROGRAMME: REHABILITATION

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.

7.1. 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 must be undertaken in an area as soon as possible after the completion of construction activities within that area.

Project Component/s	» Construction camps. » Laydown areas. » Access roads. » Ancillary buildings.
Potential Impact	» Environmental integrity of the site undermined resulting in reduced visual aesthetics, erosion and increased runoff, and the requirement for on-going management intervention.
Activity/Risk Source	» Temporary construction and laydown areas. » Temporary access roads/tracks. » Other disturbed areas/footprints.
Mitigation: Target/Objective	» Ensure and encourage site rehabilitation of disturbed areas. » Ensure that the site is appropriately rehabilitated following the execution of the works, such that residual environmental impacts (including erosion) are remediated or curtailed.

Mitigation: Action/Control	Responsibility	Timeframe
Implement an appropriate Revegetation and Rehabilitation Plan (**Appendix E**).	Contractor	Following execution of the works
All temporary facilities, equipment, and waste materials must be removed from site as soon as construction is completed.	Contractor	Following execution of the works
All temporary fencing and danger tape must be removed once the construction phase has been completed.	Contractor	Following completion of construction activities in an area
Laydown areas and construction camps are to be checked for spills of substances such as oil, paint, etc. Any spills recorded must be cleaned up and the contaminated soil appropriately disposed of.	Contractor	Following completion of construction activities in an area

Mitigation: Action/Control	Responsibility	Timeframe
All voids must be backfilled. Any gullies or dongas must also be backfilled.	Contractor	Following completion of construction activities in an area
Where disturbed areas are not to be used during the operation of the solar PV facility, these areas must be rehabilitated/re-vegetated with appropriate natural indigenous vegetation and/or local seed mix. A seed mix must be applied to rehabilitated and bare areas. No exotic plants must be used for rehabilitation purposes. No grazing must be permitted to allow for the recovery of the area.	Contractor in consultation with rehabilitation specialist	Following completion of construction activities in an area
The area must be shaped to a natural topography. Trees (or vegetation stands) removed must be replaced.	Contractor	Following completion of construction activities in an area
No planting or importing any listed invasive alien plant species (all Category 1a, 1b and 2 invasive species) to the site for landscaping, rehabilitation or any other purpose must be undertaken.	Contractor	Following completion of construction activities in an area
Compacted areas must be ripped (perpendicularly) to a depth of 300mm, and the area must be top soiled and re-vegetated.	Contractor	Following completion of construction activities in an area
Temporary roads must be closed and access to these blocked. The temporary access roads must be rehabilitated.	Contractor	Following completion of construction activities in an area
Necessary drainage works and anti-erosion measures must be installed, where required, to minimise loss of topsoil and control erosion.	Contractor	Following completion of construction activities in an area
Topsoil from all excavations and construction activities must be salvaged and reapplied during reclamation. Soils must be replaced in the correct sequence / profile.	Contractor	Following completion of construction activities in an area
Re-vegetated areas may need to be protected from wind erosion and maintained until an acceptable plant cover has been achieved.	Developer in consultation with rehabilitation specialist	Post-rehabilitation
Erosion control measures must be used in sensitive areas such as steep slopes, hills, and drainage systems if necessary.	Developer in consultation with EO and rehabilitation specialist (if required)	Post-rehabilitation
On-going alien plant monitoring and removal must be undertaken on all areas of natural vegetation on an annual basis.	Developer	Post-rehabilitation

Performance Indicator	» All portions of the site, including the construction equipment camp and working areas, are cleared of equipment and temporary facilities. » Topsoil is replaced on all areas and stabilised where practicable or required after construction and temporally utilised areas. » Disturbed areas are rehabilitated and an acceptable plant cover achieved on rehabilitated sites. » The completed site is free of erosion and alien invasive plants.

Monitoring	» Rehabilitated areas must be monitored (responsibility of EO) on a weekly basis throughout the construction phase and on a monthly basis thereafter and to the point where the area has been rehabilitated to a satisfactory level. » On-going inspection of rehabilitated areas in order to determine the effectiveness of rehabilitation measures implemented during the operational lifespan of the facility. » On-going alien plant monitoring and removal should be undertaken on an annual basis.

CHAPTER 8: OPERATION MANAGEMENT PROGRAMME

Overall Goal: To ensure that the operation of Naledi PV 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.

8.1. Objectives

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

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

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

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

The **Technical/SHEQ Manager** will:

» Develop and Implement an Environmental Management System (EMS) for the solar PV 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 the facility.
» Compile environmental policies and procedures.
» Liaise with interested and affected parties on environmental issues of common concern.
» Track and control the lodging of any complaints regarding environmental matters.

OBJECTIVE 2: Limit the ecological footprint of the solar PV Facility

Indirect impacts on vegetation and terrestrial fauna and avifauna 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.

Project Component/s	» PV panels. » Access roads. » Rehabilitated areas.
Potential Impact	» Disturbance to or loss of vegetation and/or habitat in surrounding areas. » Environmental integrity of the site undermined resulting in reduced visual aesthetics, erosion, compromised land capability and the requirement for on-going management intervention. » Mortality and disturbance of avifauna within and beyond the footprint of the facility due to collisions with solar panels, presence of personnel and vehicle traffic
Activities/Risk Sources	» Avifaunal collisions with PV panels » Birds entrapped along perimeter fencing » Human presence » Movement of vehicles to and from the site. » Presence of the PV infrastructure and site fencing.
Mitigation: Target/Objective	» Maintain minimised footprints of disturbance of vegetation/habitats on-site. » Ensure and encourage plant regrowth in non-operational areas of post-construction rehabilitation.

Mitigation: Action/Control	Responsibility	Timeframe
Rehabilitate disturbed areas should the previous attempt be unsuccessful.	O& M Contractor	Operation
Where the vegetation is not re-establishing itself, particularly in areas of disturbance, soil samples must be collected and taken in for analysis at a registered laboratory for pH levels, electrical conductivity and major plant nutrients. The results must be submitted to a suitably qualified soil or agricultural scientist for recommendations to ensure that the vegetation cover is established and erosion is prevented.	O&M Contractor Developer	Duration of project
Where vegetation re-establishment still remains unsatisfactory, the bulk density of the soil should be measured with a penetrometer to determine whether compaction is an issue.	O&M Contractor Developer	Duration of project
Site access and access to adjacent areas should be controlled and only authorised staff and contractors should be allowed on-site.	O&M Contractor	Operation
All vehicles accessing the site should adhere to a low speed limit (40km/h max for heavy vehicles and 30km/h max for light vehicles) to avoid collisions with susceptible species such as snakes and tortoises.	O&M Contractor Developer	Operation
Maintain and augment natural vegetation around the proposed project	O&M Contractor	Operation

Mitigation: Action/Control	Responsibility	Timeframe
Vegetation control should be by manual clearing and herbicides should not be used except to control alien plants in the prescribed manner.	O&M Contractor	Operation
The use of herbicides and pesticides and other related horticultural chemicals should be carefully controlled and only applied by personnel adequately certified to apply pesticides and herbicides. It must be ensured that World Health Organisation (WHO) Recommended Classification of Pesticides by Hazard Class 1a (extremely hazardous) or 1b (highly hazardous) are not purchased, stored or used on site along with any other nationally or internationally similarly restricted/banned products.	O&M Contractor Developer	Operation
All incidents of collision with PV panels should be recorded as meticulously as possible, including data related to the species involved, the exact location of collisions within the facility, and suspected cause of death. Site security video surveillance records could be used if available, as this will contribute towards understanding bird interactions with solar panels.	O&M Contractor	Operation
If birds nest on the infrastructure of the facility and cannot be tolerated due to operational risks of fire, electrical shorts, soiling of panels or other concerns, birds should be prevented from accessing nesting sites by using mesh or other manners of excluding them. Birds should not be shot, poisoned or harmed as this is not an effective control method and has negative ecological consequences. Birds with eggs or nestlings should be allowed to fledge their young before nests are removed.	O&M Contractor	Operation
If there are any persistent problems with avifauna, then an avifaunal specialist should be consulted for advice on further mitigation.	O&M Contractor Developer Specialist	Operation
Should any open reservoirs be required, these should be covered with fine mesh or other exclusion material in order to prevent birds from falling in and drowning.	O&M Contractor Developer	Operation
Soil surfaces where no revegetation seems possible will have to be covered with gravel or small rock fragments to increase porosity of the soil surface, slow down runoff and prevent wind and water erosion.	O&M Contractor	Operation
Any vegetation clearing that needs to take place as part of the maintenance activities must be done in an environmentally friendly manner, including avoiding the use of herbicides and using manual clearing methods wherever possible.	O&M Contractor	Operation
Vehicle movements must be restricted to designated access roads.	O&M Contractor	Operation
Existing roads must be maintained to ensure limited erosion and impact on areas adjacent to roadways.	O&M Contractor Developer	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 Contractor Developer	Operation

Mitigation: Action/Control	Responsibility	Timeframe
Develop and implement an appropriate Stormwater Management Plan (**Appendix G**) for the operation phase of the facility.	O&M Contractor	Operation
No harvesting of plants for firewood, medicinal or any other purposes is to be permitted	O&M Contractor	Operation
No killing and poaching of any wild animal to be allowed. This should be clearly communicated to all employees, including subcontractors.	O&M Contractor & sub-contractor(s)	Operation
Any potentially dangerous fauna such as snakes or fauna threatened by the maintenance and operational activities must be removed to a safe location.	O&M Contractor & sub-contractor (s)	Operation
An on-going alien plant monitoring and eradication programme (**Appendix C**) must be implemented, where necessary.	Developer	Operation
Undertake an annual site inspection for erosion or water flow regulation problems – with follow up remedial action where problems are identified.	Developer	Operation

Performance Indicator	» Limited soil erosion around site. » No further disturbance to vegetation or terrestrial faunal habitats. » No disturbance of breeding raptors, if present (i.e. no nest abandonment due to disturbance). » No disturbance of red-listed avifaunal species perched or foraging in the vicinity of the development area. » No poaching or collecting of avifauna or their products (e.g. eggs and nestlings) by maintenance personnel. » Removal to safety of entrapped/injured avifauna encountered during routine maintenance. » Low impact on nocturnal and crepuscular species along roads. » Continued improvement of rehabilitation efforts.
Monitoring	» Observation of vegetation on-site by environmental manager. » Regular inspections to monitor plant regrowth/performance of rehabilitation efforts and weed infestation compared to natural/undisturbed areas. » No birds or eggs are disturbed or removed by personnel. » Perimeter fencing is maintained in a manner that ensures it is bird friendly, with respect to ground-dwelling species. » Any raptor nests (especially of red-listed species) discovered on site or nearby, are monitored weekly until post-fledging period. » Any open reservoirs on site are covered with mesh to exclude birds.

OBJECTIVE 3: 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. 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; and
- Hydrological impacts due to increased transpiration and runoff.

Project Component/s	» PV facility. » Access road. » Associated infrastructure.
Potential Impact	» Invasion of natural vegetation surrounding the site by declared weeds or invasive alien species. » Impacts on soil. » Impact on faunal habitats. » Degradation and loss of agricultural potential.
Activities/Risk Sources	» Transport of construction materials to site. » Movement of construction machinery and personnel. » Site preparation and earthworks causing disturbance to indigenous vegetation. » Construction of site access roads. » Stockpiling of topsoil, subsoil and spoil material. » Routine maintenance work – especially vehicle movement.
Mitigation: Target/Objective	» To significantly reduce the presence of weeds and eradicate alien invasive species. » To avoid the introduction of additional alien invasive plants to the development area. » To avoid distribution and thickening of existing alien plants in the development area. » To complement existing alien plant eradication programs in gradually causing a significant reduction of alien plant species throughout the development area.

Mitigation: Action/Control	Responsibility	Timeframe
Develop and implement an AIP Control and Eradication Programme.	O&M Contractor	Operation
Avoid creating conditions in which alien plants may become established: » Keep disturbance of indigenous vegetation to a minimum. » Rehabilitate disturbed areas as quickly as possible. » Do not import soil from areas with alien plants.	O&M Contractor	Operation
Annual monitoring for alien plant species - with follow up clearing as needed – or as per the frequency stated in the Alien Invasive Management Plan to be developed for the site. When alien plants are detected, these must be controlled and cleared using the recommended control measures for each species to ensure that the problem is not exacerbated or does not re-occur.	O&M Contractor	Operation
Eradicate all weeds and alien invasive plants as far as practically possible and ensure that material from invasive plants are adequately destroyed and not further distributed.	O&M Contractor	Operation
Any alien and invasive vegetation removed should be taken to a registered landfill site to prevent the proliferation of alien and invasive species	O&M Contractor	Operation

Performance Indicator	» Low abundance of alien plants. For each alien species: the number of plants and aerial cover of plants within the site and immediate surroundings.
Monitoring	» Annual audit of development footprint and immediate surroundings by qualified botanist. » 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. » The results should be interpreted in terms of the risk posed to sensitive habitats within and surrounding the site. » The environmental manager/site agent should be responsible for driving this process. » Reporting frequency depends on legal compliance framework.

OBJECTIVE 4: Minimise dust and air emissions

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

Project Component/s	» Gravel surfaces. » On-site vehicle movement.
Potential Impact	» Dust and particulates from vehicle movement to and on site. » Release of minor amounts of air pollutants (for example NO_2, CO and SO_2) from vehicles.
Activities/Risk Sources	» Re-entrainment of deposited dust by vehicle movements. » Wind erosion from unsealed roads and surfaces. » Fuel burning vehicle engines.
Mitigation: Target/Objective	» To ensure emissions from all vehicles are minimised, where possible. » To minimise nuisance to the community from dust emissions and to comply with workplace health and safety requirements. » To ensure emissions from the power generation process are minimised.

Mitigation: Action/Control	Responsibility	Timeframe
Implement appropriate dust suppression on gravel roads on a regular basis.	O&M Contractor	Operation
Ensure all vehicles are roadworthy and drivers are qualified and made aware of the potential noise and dust issues.	Developer	Operation
Speed of vehicles must be restricted on site to 40km/h max (for light duty vehicles) and 30km/h max for heavy duty vehicles.	Developer	Operation
Vehicles and equipment must be maintained in a road-worthy condition at all times.	Developer	Operation

Performance Indicator	» No complaints from affected residents or community regarding dust or vehicle emissions. » Dust suppression measures implemented where required. » Drivers made aware of the potential safety issues and enforcement of strict speed limits when they are employed.
Monitoring	» Immediate reporting by personnel of any potential or actual issues with nuisance or dust to the Operations Manager.

	» A grievances 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. » An incident reporting system must be used to record non-conformances to the EMPr.

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

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

» Alien Invasive species should be completely eradicated in order to decrease the fire risk associated with 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 a fire outbreak, contact details of the local fire and emergency services must be readily available.
» Contractors must ensure that basic firefighting equipment is available on site as per the specifications defined by the health and safety representative / consultant.
» The fire risk on site is a point of discussion that must take place as part of the environmental induction training prior to 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 (also refer to **Appendix J** of the EMPr):

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

Mitigation: Action/Control	Responsibility	Timeframe
Provide adequate firefighting equipment on site and establish a fire-fighting management plan during operation.	O&M Contractor	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 legislation when planning and burning firebreaks (in terms of timing, etc.).	Contractor	Operation

Mitigation: Action/Control	Responsibility	Timeframe
Upon completion of the construction phase, an emergency evacuation plan must be drawn up to ensure the safety of the staff and surrounding land users in the case of an emergency.	O&M Contractor	Operation
Contact details of emergency services should be prominently displayed on site.	O&M Contractor	Operation
Road borders must be regularly maintained to ensure that vegetation remains short and that they therefore serve as an effective firebreak.	O&M Contractor	Operation
Should panels be required to be replaced, the following will apply: » Materials and panels are to be stored within the previously disturbed construction laydown area. No disturbance of areas outside of these areas should occur. » Full clean-up of all materials must be undertaken after the removal and replacement of the solar panel arrays and associated infrastructure is complete, and disturbed areas appropriately rehabilitated. » Most of the materials used for solar panel systems can be recycled. The majority of the glass and semiconductor materials can be recovered and re-used or recycled. Recyclable materials must be transported off-site by truck and managed at appropriate facilities in accordance with relevant waste management regulations. No waste materials may be left on-site. » Waste material which cannot be recycled shall be disposed of at an appropriately licensed waste disposal site or as required by the relevant legislation.	O&M Contractor	Operation

Performance Indicator	» Firefighting equipment and training provided before the operation phase commences. » Appropriate fire breaks in place.
Monitoring	» The O&M contractor must monitor indicators listed above to ensure that they have been met.

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

The development of Naledi PV will result in positive socio-economic benefits for the local communities near Upington, particularly through the creation of direct and indirect employment opportunities, which will result in an economic effect multiplier effect for the local businesses.

Project Component/s	» Operation and maintenance activities associated with the solar PV facility.
Potential Impact	» The opportunities and benefits associated with the creation of local employment and business should be maximised.
Activities/Risk Sources	» Limited use of local labour, thereby reducing the employment and business opportunities for locals. » Sourcing of individuals with skills similar to the local labour pool outside the municipal area.

	» Unavailability of locals with the required skills resulting in locals not being employed and labour being sourced from outside the municipal area. » Higher skilled positions might be sourced internationally, where required.
Enhancement: Target/Objective	» The Developer / O&M Contractor should aim to employ as many low-skilled and semi-skilled workers from the local area as possible. » Employment of a maximum number of the low-skilled and/or semi-skilled workers from the local area where possible. » Appropriate skills training and capacity building.

Mitigation: Action/Control	Responsibility	Timeframe
Where feasible, effort must be made to employ locally in order to create maximum benefit for the communities.	O&M Contractor Developer	Operation
In order to maximise the positive impact, it is suggested that the Developer (including the O&M Contractor) provide training courses for employees where feasible to ensure that employees gain as much as possible from the work experience.	Developer O&M Contractor	Operation
Facilitate the transfer of knowledge between experienced employees and the staff.	O&M Contractor	Operation
Local Small and Medium Enterprises are to be approached to investigate the opportunities for supplying inputs required for the maintenance and operation of the facility, as far as feasible	Developer O&M Contractor	Operation

Performance Indicator	» Job opportunities, especially of low to semi-skilled positions, are primarily awarded to members of local communities as appropriate. » Locals and previously disadvantaged individuals (including women) are considered during the hiring process. » Labour, entrepreneurs, businesses, and SMMEs from the local sector are awarded jobs, where possible, based on requirements in the tender documentation. » The involvement of local labour is promoted. » Reports are not made from members of the local communities regarding unrealistic employment opportunities or that only outsiders were employed. » Skills training and capacity building initiatives are developed and implemented.
Monitoring	» Developer must keep a record of local recruitments and information on local labour to be shared with the ECO for reporting purposes.

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

The operation of the solar 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.

Project Component/s	» PV facility. » On-site facility substation » Associated infrastructure.
Potential Impact	» Inefficient use of resources resulting in excessive waste generation. » Litter or contamination of the site or water through poor waste management practices.

	» Contamination of water or soil because of poor materials management.
Activity/Risk Source	» On-site facility substation, transformers, switchgear and supporting equipment. » Workshop / control room.
Mitigation: Target/Objective	» Comply with waste management legislation. » Minimise production of waste. » Ensure appropriate waste disposal. » Avoid environmental harm from waste disposal. » Ensure appropriate storage of chemicals and hazardous substances.

Mitigation: Action/Control	Responsibility	Timeframe
Spill kits must be made available on-site for the clean-up of spills and leaks of contaminants.	O&M Contractor	Operation and maintenance
Storage areas for hazardous substances must be appropriately sealed and bunded.	O&M Contractor	Operation
All hazardous materials (such as used/new transformer oils, etc.) must be stored in the appropriate manner (stored in sealed containers within a clearly demarcated designated area) to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill.	O&M Contractor	Operation
All structures and/or components replaced during maintenance activities must be appropriately disposed of at an appropriately licensed waste disposal site or sold to a recycling merchant for recycling.	O&M Contractor	Operation
Care must be taken to ensure that spillage of oils and other hazardous substances are limited during maintenance. Handling of these materials should take place within an appropriately sealed and bunded area. Should any accidental spillage take place, it must be cleaned up according to specified standards regarding bioremediation.	O&M Contractor & sub-contractor(s)	Operation and maintenance
Disposal of waste must be in accordance with relevant legislative requirements, including the use of licensed contractors.	O&M Contractor	Operation
All food waste and litter at the site should be placed in bins with lids and removed from the site on a regular basis.	O&M Contractor	Operation
Waste handling, collection, and disposal operations must be managed and controlled by a waste management contractor.	O&M Contractor	Operation
All sewage disposal to take place at a registered and operational wastewater treatment works. Proof of disposal to be retained as proof of responsible disposal.	O&M Contractor	Operation
Used oils and chemicals: » Appropriate disposal must be arranged with a licensed facility in consultation with the administering authority. » Waste must be stored and handled according to the relevant legislation and regulations.	O&M Contractor	Operation
General waste must be recycled where possible or disposed of at an appropriately licensed landfill.	O&M Contractor	Operation
Hazardous waste (including hydrocarbons) and general waste must be stored and disposed of separately.	O&M Contractor	Operation

Mitigation: Action/Control	Responsibility	Timeframe
Separation and recycling of different waste materials should be supported.	O&M Contractor	Operation
Should a chemical spill take place, an aquatic ecologist must be contracted to identify the extent of the impact and assist with additional mitigation measures, where aquatic features are affected.	O&M Contractor Developer	Operation
Immediately report significant spillages and initiate an environmental site assessment for risk assessment and remediation if necessary.	O&M Contractor	Operation
Regular quality monitoring of waste before discharge must be undertaken.	O&M Contractor	Operation
Emergency response arrangements and systems such as foam pourers, fire-fighting systems and cooperation with emergency responders must be implemented. Preventive measures could include maintenance procedures to prevent the occurrence of a catastrophic loss of containment, as well as strict control of ignition sources and other measures which may be required according to standards such as those prescribed by the South African National Standards system.	O&M Contractor	Operation

Performance Indicator	» No complaints received regarding waste on site or indiscriminate dumping. » Internal site audits identifying that waste segregation recycling and reuse is occurring appropriately. » Provision of all appropriate waste manifests. » No contamination of soil or water.
Monitoring	» Waste collection must be monitored on a regular basis. » Check vehicles and machinery monthly for oil, fuel and hydraulic oil leaks. » Undertake high standard maintenance of the vehicles and machinery. » Monitor hydrocarbon spills from vehicles and machinery during operations continuously and record the volume and nature of the spill, location and clean up actions. » Analyse soil samples for pollution in areas of known spills or where a breach of containment is evident. » Records of accidental spills and clean-up procedures and the results thereof must be audited by the EO & Environmental Manager during the operation phase. » Waste documentation must be completed and made available for inspection. » An incidents/grievances register must be maintained, in which any complaints from the community must be logged. » Complaints must be investigated and, if appropriate, acted upon. » Regular reports on exact quantities of all waste streams exiting the site must be compiled by the waste management contractor and monitored by the O&M Contractor. » All appropriate waste disposal certificates accompany the monthly reports.

CHAPTER 9: MANAGEMENT PROGRAMME: DECOMMISSIONING

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

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

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

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

9.1. Objectives

Within a period of at least 12 months prior to the decommissioning of the site, a Decommissioning Method Statement must be prepared and submitted to the Local Planning Authority, as well as the Provincial and National Environmental Authority. This method statement must cover site restoration, soil replacement, landscaping, conservation, and a timeframe for implementation. Furthermore, this decommissioning must comply with all relevant legal requirements administered by any relevant and competent authority at that time.

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

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

9.2. 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 PV FACILITY.

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

- All concrete and imported foreign material must be removed from the PV facility i.e. panels, support structures etc.
- The holes where the panel support structures are removed must be levelled and covered with subsoil and topsoil.
- Infrastructure not required for the post-decommissioning use of the site must be removed and appropriately disposed of.
- Access roads and servitudes not required for the post-decommissioning use of the site must be rehabilitated. If necessary, an ecologist should be consulted to give input into rehabilitation specifications.
- Tracks that are to be utilised for the future land use operations should be left *in-situ*. The remainder of the tracks to be removed (ripped) and topsoil replaced.
- All ancillary buildings and access points are to be removed unless they can be used for the future land use.
- Underground electric cables are to be removed if they cannot be used in the future land use.
- All material (cables, PV Panels etc.) must be re-used or recycled wherever possible.
- The competent authority may grant approval to the owner not to remove the landscaping and underground foundations.
- The site must be seeded with locally sourced indigenous vegetation (unless otherwise dictated by the future land use) to allow revegetation of the site.
- Monitor rehabilitated areas quarterly for at least three years (expected) following decommissioning, and implement remedial action as and when required.

SCENARIO 2: PARTIAL DECOMMISSIONING OF ENERGY FACILITY.

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

9.2.1. Identification of structures for post-closure use

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

9.2.2. Removal of infrastructure

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

9.2.3. Soil rehabilitation

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

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

9.2.4. Establishment of vegetation

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

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

» Prevent erosion;
» Restore the land to the agreed land capability;
» Re-establish 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.

9.2.5. Maintenance

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

9.2.6. Monitoring

The purpose of monitoring is to ensure that the objectives of rehabilitation are met and 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;
- Vegetation species diversity; and
- Faunal re-colonisation.
- Bird nests, eggs or nestlings are not disturbed or removed by personnel.
- Any raptor nests (especially of red-listed species) discovered on site or nearby, are monitored weekly to ensure zero disturbances.