
SANNASPOS SOLAR PV ADDITIONAL FOOTPRINT, FREE STATE PROVINCE

ENVIRONMENTAL MANAGEMENT PROGRAMME

August 2022

Prepared for:

Sannaspos Solar PV Project (Pty) Ltd
21 Woodlands Dr,
Woodmead,
Sandton,
2080

Prepared by:

Savannah Environmental (Pty) Ltd

First Floor, Block 2, 5 Woodlands Drive Office Park
Woodmead
Johannesburg, 2191
Tel: +27 (0)11 656 3237
Fax: +27 (0)86 684 0547
E-mail: info@savannahsa.com
www.savannahsa.com



EMPR DETAILS

Title	:	Environmental Management Programme: Sannaspos Solar PV Additional Footprint, Free State Province
Authors	:	Savannah Environmental (Pty) Ltd Tamryn Lee Goddard Jo-Anne Thomas
Specialists	:	Andrew Husted of The Biodiversity Company Jenna Lavin of CTS Heritage
Client	:	Sannaspos Solar PV Project (Pty) Ltd
Report Status	:	Environmental Management Programme submitted as part of the Environmental Impact Assessment Report <u>for final decision making</u>
Date	:	<u>August 2022</u>

When used as a reference this report should be cited as: Savannah Environmental (2022) Environmental Management Programme: Sannaspos Solar PV Additional Footprint, Free State Province

COPYRIGHT RESERVED

This technical report has been produced by Savannah Environmental (Pty) Ltd for Sannaspos Solar PV (Pty) Ltd. No part of the report may be copied, reproduced or used in any manner without written permission from Sannaspos Solar PV (Pty) Ltd or Savannah Environmental (Pty) Ltd.

DEFINITIONS AND TERMINOLOGY

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: Impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities (e.g. discharges of nutrients and heated water to a river that combine to cause algal bloom and subsequent loss of dissolved oxygen that is greater than the additive impacts of each pollutant). Cumulative impacts can occur from the collective impacts of individual minor actions over a period and can include both direct and indirect impacts.

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/occur 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 are made up of:

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

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

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

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

Environmental management programme: A plan that organises and co-ordinates mitigation, rehabilitation and monitoring measures in order to guide the implementation of a proposal and its on-going maintenance after implementation.

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

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

Incident: Section 30 of NEMA defines an 'incident' as "an unexpected sudden occurrence, including a major emission, fire or explosion leading to serious danger to the public or potentially serious pollution of or detriment to the environment, whether immediate or delayed."¹

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

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.

Mitigation hierarchy: The mitigation hierarchy is a framework for managing risks and potential impacts related to biodiversity and ecosystem services. The mitigation hierarchy is used when planning and implementing development projects, to provide a logical and effective approach to protecting and conserving biodiversity and maintaining important ecosystem services. It is a tool to aid in the sustainable management of living, natural resources, which provides a mechanism for making explicit decisions that balance conservation needs with development priorities

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.

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

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.

Waste: Any substance, material or object, that is unwanted, rejected, abandoned, discarded or disposed of, or that is intended or required to be discarded or disposed of, by the holder of that substance, material

¹<http://ipwis.pgwc.gov.za/ipwisdoc/Public/Publications/ChemicalsMgt/A%20Procedure%20for%20Section%2030%20of%20NEMA.pdf>

or object, whether or not such substance, material or object can be re-used, recycled or recovered and includes all wastes as defined in Schedule 3 to the Waste Amendment Act (as amended on June 2014); or any other substance, material or object that is not included in Schedule 3 that may be defined as a waste by the Minister.

ABBREVIATIONS AND ACRONYMS

DFFE	Department of Forestry, Fisheries and the Environment.
DWS	Department of Water and Sanitation
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
EPC	Engineering Procurement Contractor
ECO	Environmental Control Officer
EO	Environmental Officer
GG	Government Gazette
GN	Government Notice
Ha	Hectare
I&AP	Interested and Affected Party
km ²	Square kilometres
kV	Kilovolt
m ²	Square meters
m/s	Meters per second
MW	Mega Watt
NEMA	National Environmental Management Act (Act No 107 of 1998)
NHRA	National Heritage Resources Act (Act No 25 of 1999)
NIRP	National Integrated Resource Planning
NWA	National Water Act (Act No 36 of 1998)
PM	Project Manager
SHE	Safety, Health and Environment
SAHRA	South African Heritage Resources Agency
SANRAL	South African National Roads Agency Limited

TABLE OF CONTENTS

	Page
EMPR DETAILS	i
DEFINITIONS AND TERMINOLOGY	ii
ABBREVIATIONS AND ACRONYMS	vi
TABLE OF CONTENTS	vii
APPENDICES	viii
CHAPTER 1: INTRODUCTION	1
CHAPTER 2: PROJECT DETAILS	2
2.1. Findings of the Environmental Impact Assessment	6
2.2 Sensitivity Analysis for the Development Area	Error! Bookmark not defined.
CHAPTER 3: PURPOSE AND OBJECTIVES OF THE EMPR	17
3.1. Project Team	18
CHAPTER 4: ROLES AND RESPONSIBILITIES	20
4.1 The Applicant.....	20
4.2 The Environmental Control Officer (ECO)	20
4.3 The Contractor.....	20
4.4 Responsibility / Objectives: Planning and Construction Phase.....	20
4.5 Responsibility / Objectives: Operational Phase	21
4.6 Responsibility / Objectives: Decommissioning Phase	21
4.7 Objectives: Rehabilitation activities	21
CHAPTER 5: MANAGEMENT PROGRAMME - PLANNING AND DESIGN	22
5.1. Objectives	22
OBJECTIVE 1: To ensure that the design of the facility responds to the identified environmental constraints and opportunities	22
OBJECTIVE 2: Ensure that relevant permits and site-specific plans are in place to manage impacts on the environment	23
OBJECTIVE 3: To ensure effective communication mechanisms.....	25
CHAPTER 6: MANAGEMENT PROGRAMME - CONSTRUCTION	27
6.1. Objectives	27
OBJECTIVE 1: Securing the site and site establishment	27
OBJECTIVE 2: Appropriate management of the construction site and construction workers	28
OBJECTIVE 3: Protection of plant and animal life and sensitive features	30
OBJECTIVE 4: Protection of cultural historical aspects	33
OBJECTIVE 5: Appropriate handling and management of waste and hazardous substances	35
OBJECTIVE 6: Ensure appropriate rehabilitation of disturbed areas.....	36
CHAPTER 7: MANAGEMENT PROGRAMME - OPERATION	38
7.1. Objectives	38
OBJECTIVE 1: Protection of plant and animal life and sensitive features	38
CHAPTER 8: MANAGEMENT PROGRAMME - DECOMMISSIONING	42
8.1. Objectives	42

APPENDICES

- Appendix A:** Optimised Layout of the facility overlain with environmental sensitivities
Appendix B: Grievance Mechanism for Public Complaints and Issues
Appendix C: Waste Management Plan
Appendix D: Stormwater Management Plan
Appendix E: Chance Find Procedure
Appendix F: Curriculum Vitae of the Project Team

CHAPTER 1: INTRODUCTION

This Environmental Management Programme has been compiled for the Sannaspos Solar PV additional footprint. The proposed additional footprint for the Sannaspos Solar PV is located approximately 5 km northwest of Sannaspos and 6km west of Kromdraai in the Mangaung Metropolitan Municipality which forms part of the greater Mangaung District Municipality, in the Free State Province. The authorised Engie Sannaspos PV Facility will have a contracted capacity of up to 75MW (90MW installed capacity) and will have a development footprint of ~200ha is a Preferred Bidder Project under Round 5 of the Renewable Energy Independent Power Producers (REIPPP) Programme. In order to implement the project using the preferred technology, an additional 50ha is required. The solar facility and associated infrastructure is to be constructed within on Portion 0 of Farm 1808 Besemkop and Portion 0 of Farm 2962 Lejwe.

This EMPr has been developed on the basis of the findings of the Environmental Impact Assessment (EIA) undertaken for the project (Savannah, 2022), 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 Sannaspos Solar PV (Pty) Ltd employees and contractors working on the pre-construction, construction, and operation and maintenance phases of the Sannaspos Solar PV Facility. The document must 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 EIA report of the project.

In terms of the Duty of Care provision in S28(1) the project proponent must ensure that reasonable measures are taken throughout the life cycle of this project to ensure that any pollution or degradation of the environment associated with this project is avoided, halted or minimised. In terms of NEMA, it has become the legal duty of a project proponent to consider a project holistically, and to consider the cumulative effect of a variety of impacts.

CHAPTER 2: PROJECT DETAILS

Sannaspos Solar PV (Pty) Ltd received an Environmental Authorisation for the proposed Sannaspos PV Plant Phase 1 and associated infrastructure, located on Portion 0 of Farm 1808 Besemkop and Portion 0 of Farm 2962 Lejwe, within the Mangaung Metropolitan Municipality, Free State Province in May 2013 (**DFFE Reference No.: 14/12/16/3/3/2/360**). The project has been selected as a Preferred Bidder project under Round 5 of the Renewable Energy Independent Power Producers Procurement Programme (REIPPPP).

The proposed facility will have a contracted capacity of 75MW (90MW installed capacity) and will include the following infrastructure:

- » PV arrays and inverters
- » Cabling between project components, laid underground as far as possible
- » An on-site 132kV Independent Power Producer (IPP) substation to facilitate the grid connection
- » Internal access roads.
- » Guard house
- » Laydown, Campsite, and assembly area.
- » Office and Control centre.

A developmental footprint of 150 ha in extent is authorised for the facility and associated infrastructure. In order to implement the project, an additional 50ha is required. This additional area is located within the properties assessed for the project.

The EIA undertaken for the authorised facility considered monofacial PV Array technology with typical anodised aluminium frames. The developer (Sannaspos Solar PV (Pty) Ltd) now proposes the use of bifacial PV modules, which enable energy generation from both sides of the PV modules thus requiring additional space between PV module rows, compared to traditional monofacial PV modules, for reflected solar irradiation (solar energy) to reach the underside of the bifacial modules. Bifacial solar panels are more efficient than monofacial, as they collect sunlight on either side. They also perform better in diffuse light because the extra surface area allows bifacial panels to capture more light. This means that the long-term costs are lower than monofacial panels. With the implementation of bifacial PV panels, an additional area of approximately 50 ha is needed for project implementation. Although the contracted capacity of the facility will not be altered, part of the infrastructure for the authorised facility will be located within this area. The infrastructure on the additional area as assessed in the EIA report includes;

- » A total of 28 325 bifacial solar panels with a combined capacity of 15 MW
- » Internal Access roads

From a regional perspective, the area within which the project site is located is considered favourable for the development of a commercial solar energy facility by virtue of prevailing climatic conditions, relief, aspect, the extent of the affected property, the availability of a direct grid connection (i.e., a point of connection to the national grid) and the availability of land on which the development can take place. Furthermore, other authorised solar facilities are located within the study area to the east, west, north, and south of the authorised area and additional footprint. Owing to its proximity to the authorised area, the additional footprint has been identified by the applicant as a technically feasible site which has the potential for the development of a solar PV facility. The additional footprint of approximately 50 ha was identified by

the developer to accommodate a portion of the infrastructure (Solar PV Panels) for the Sannaspos Solar PV Facility.

The full extent of the proposed additional footprint has been considered within this Environmental Impact Assessment report with the aim of determining the suitability from an environmental and social perspective and identifying areas that should be avoided in development planning.

Details of the project site are provided in Table 2.1 below. The location of the site is provided in **Figure 2.1**.

On the basis of the findings of this Environmental Impact Assessment study, the PV facility infrastructure and associated infrastructure within the additional footprint can be appropriately designed and sited taking environmental and any other identified constraints into consideration.

Table 2.1: A detailed description of the project considered in this Environmental Impact Assessment

Province	Free State Province
District Municipality	Mangaung District Municipality
Local Municipality	Mangaung Metropolitan Municipality
Ward Number (s)	27
Nearest town(s)	Sannaspos (~5km north-west) and Kromdraai (~6km west)
Farm name(s) and number(s) of properties affected by the Solar Facility	Portion 0 of Farm 1808 Besemkop and Portion 0 of Farm 2962 Lejwe
Portion number(s) of properties affected by the Solar Facility	Portion 0 of Farm 1808 Besemkop and Portion 0 of Farm 2962 Lejwe
SG 21 Digit Code (s)	Farm 1808 Basemkop F00300000000180800000 Farm 2962 Lejwe F03200000000296200000
Current zoning	Agricultural
Site Coordinates (centre of affected property)	29°11'57.60"S 26°35'16.63"E

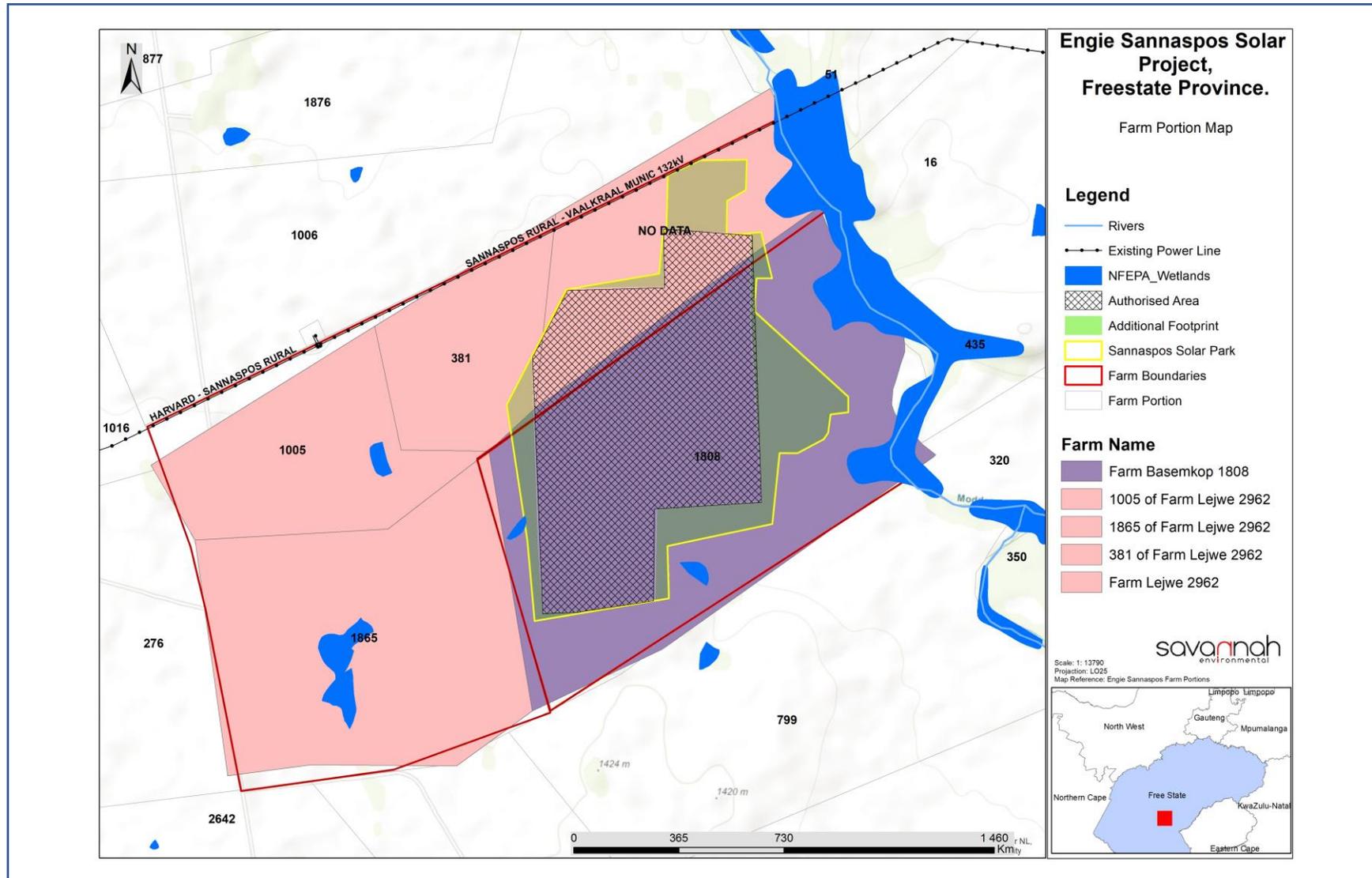


Figure 2.1: Locality map illustrating the location of the proposed additional footprint on Portion 0 of Farm Basemkop 1808 and Portion 0 of the farm Lejwe 2962 (also refer to **Appendix D**)

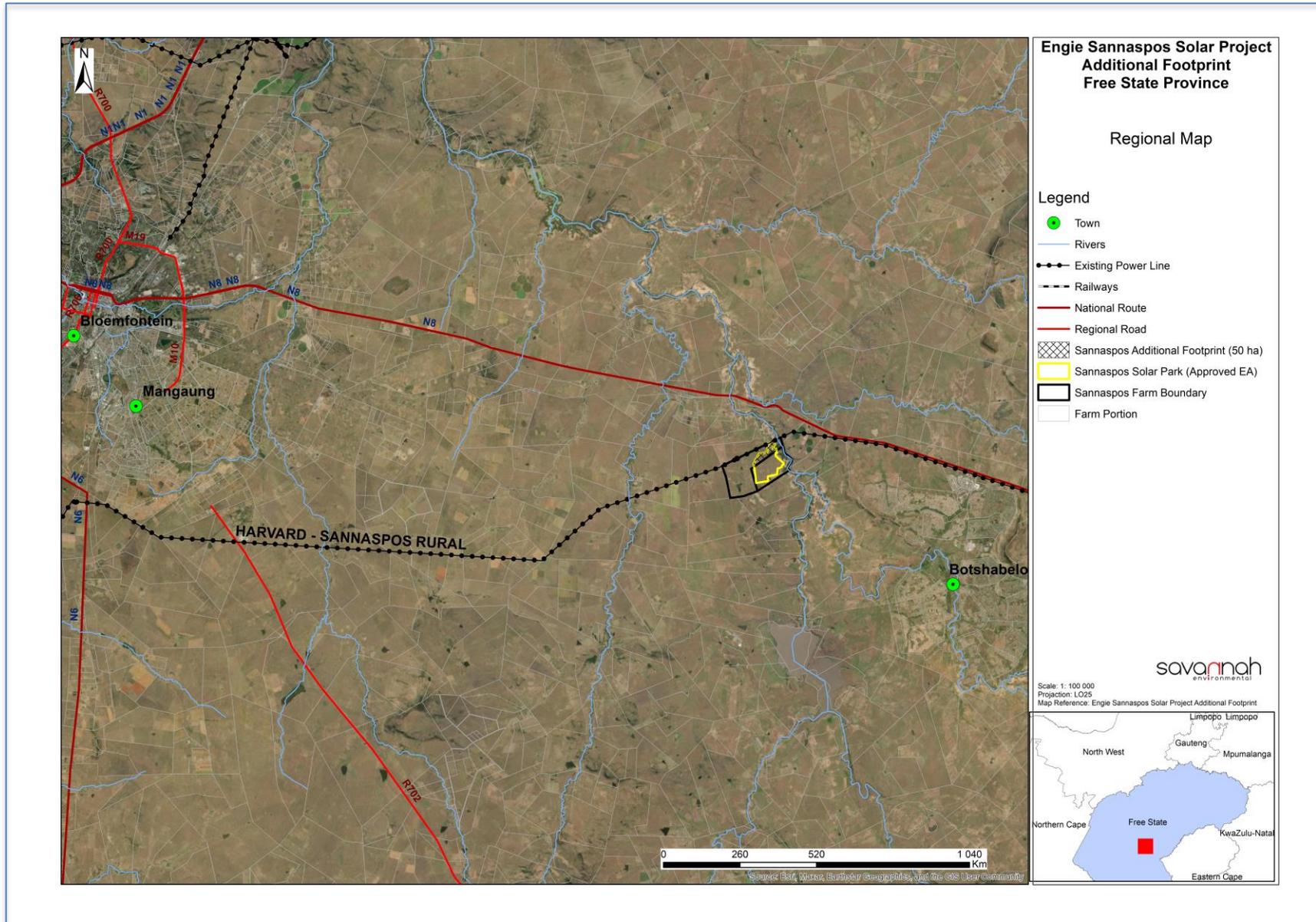


Figure 2.2: Regional map illustrating the location of the Sannaspos Solar PV Facility to the nearest town

2.1. Findings of the Environmental Impact Assessment

No environmental fatal flaws were identified in the detailed specialist studies conducted. It is recommended that mitigation measures are implemented to reduce impacts to acceptable levels. The potential environmental impacts associated with development within the additional footprint identified and assessed through the EIA process include:

- » Impacts on Terrestrial Biodiversity
- » Impacts on Aquatic Ecology
- » Impacts on Soils and Agricultural Potential

Based on the ecological assessment undertaken and consideration of the Site Ecological Importance as detailed in the specialist impact assessment (refer to Appendix I all habitats within the assessment area of the proposed project were allocated a sensitivity category (refer to Table 6.1 and Figure 6.2).

'High Sensitivity' areas are due to the following:

- » Unique and low resilience habitats; and
- » Water resources.

Table 6.1: SEI Summary of habitat types delineated within field assessment area of project area

Habitat	Conservation Importance	Functional Integrity	Biodiversity Importance	Receptor Resilience	Site Ecological Importance
Water Resource	High	Medium	Medium	Low	High
Degraded Grassland	Medium	Medium	Medium	Medium	Medium
Old Agriculture	Low	Low	Low	High	Low

2.2.1. Potential Impacts on Terrestrial Ecology

The completion of a comprehensive desktop study, in conjunction with the results from the field survey, suggest there is a good confidence in the information provided. The survey ensured that there was a suitable ground truth coverage of the assessment area, and most habitats and ecosystems were assessed to obtain a general species (fauna and flora) overview and the major current impacts were observed. The conservation status is classified as Least Concern albeit the protection level is regarded as 'Not Protected and Poorly Protected' Ecosystem. Moreover, the proposed activity overlaps with an ESA1, ESA2 and NPAES.

The current layout, the project area overlaps within sensitive habitats and other areas of high biodiversity potential. Portions current layout as well as the expected access and service road of the development would be considered to have a significant and high negative impact as it would directly affect the habitat of threatened plant species and expected listed avifaunal species that use these ecosystems;

- » The assessment area possesses a protected flora species. Moreover, protected fauna are ubiquitous within the assessment area and surrounding landscape was ubiquitous within the assessment area and surrounding landscape; and
- » One threatened species of avifauna were observed to occur and utilise the habitats within the assessment area during the survey period. *Sagittarius serpentarius* (Secretarybird) possess high priority

scores indicating that they are particularly susceptible to collisions with power lines. Excessive noise will lead to displacement of the species and the vehicle traffic potentially will lead to direct mortality.

The developer is urged to alter the layout or design which represents a compromise between the needs of the development and the environmental concerns at the site, especially in regard to the high sensitivity areas. Historically, overgrazing from livestock (Sheep, goats and cattle) and mismanagement has led to the deterioration these habits. However, the high sensitivity areas can be regarded as important, not only within the local landscape, but also regionally; as they are used for habitat, foraging, water resource and movement corridors for fauna within the landscape.

The habitat existence and importance of these habitats is regarded as crucial, due to the species recorded as well as the role of this intact unique habitat to biodiversity within a very fragmented disturbed local landscape, not to mention the sensitivity according to various ecological datasets.

The very high and sensitivity terrestrial areas surrounding the development site still:

- » Serve as and represent ESA as per the Conservation Plan;
- » Supports and protects fauna and flora; and
- » Support various organisms and may play a more important role in the ecosystem if left to recover from the superficial impacts.

The ecological integrity, importance and functioning of these terrestrial biodiversity areas provide a variety of ecological services considered beneficial, with one key service being the maintenance of biodiversity. The preservation of these systems is the most important aspect to consider for the proposed project.

Any development on the high sensitivity areas will lead the direct destruction and loss of portions of functional ESA, and also the floral and faunal species that are expected to utilise this habitat. Thus, if these areas are not maintained in a natural or near natural state, destroyed or fragmented, then meeting targets for biodiversity features will not be achieved. The mitigations, management and associated monitoring regarding these operational impacts will be the most important factor of this project and must be considered by the issuing authority.

The main expected impacts of the proposed project will include the following:

- » habitat loss and fragmentation;
- » degradation of surrounding habitat;
- » disturbance and displacement caused during the construction, operational and maintenance phases; and
- » direct mortality during the construction phase.

Mitigation measures as described in this report can be implemented to reduce the significance of the risk but there is still a possibility of impacts. Considering that this area that has been identified as being of significance for biodiversity maintenance and ecological processes (ESAs), development may proceed but with caution and only with the implementation of mitigation measures.

Considering the above-mentioned information, no fatal flaws are evident for the proposed project. It is the opinion of the specialist that the project may be favourably considered, on condition all prescribed mitigation measures and supporting recommendations are implemented.

2.2.2. Potential Impacts on Freshwater Resources

In total four (4) water resources were identified and delineated for the project. These included both natural and artificial systems, with the artificial systems comprising of impoundments and drainage features. Three (3) natural wetland hydrogeomorphic (HGM) units belonging to three HGM types (unchannelled valley bottom, depression and seepage) were identified within the 500 m regulated area. The unchannelled valley bottom (HGM 1) is traversed by a portion of the project area and was determined to be the only system at an appreciable level of risk and was the focus for the functional assessment. No functional assessment was completed for the artificial systems.

Overall, HGM 1 scored Moderately Low in terms of the wetland ecosystem services. The wetland was considered relatively important for regulating and supporting benefits. The integrity (or health) for HGM 1 was rated as being in a Largely Modified state (class D). The unchannelled valley bottom wetland type is classified as Critically Endangered and the ecological importance and sensitivity is Moderate.

A 30 m buffer width was recommended for the project. All identified natural wetland units and the Modder River were classified as having a High sensitivity, while the artificial systems and the associated 30 m buffer was assigned a Medium sensitivity. The remaining extent of the project area was assigned a Low sensitivity from a water resource perspective.

A risk assessment was conducted in line with Section 21 (c) and (i) of the National Water Act, 1998, (Act 36 of 1998). High risks are applicable based on the fact that wetlands may be directly impacted on by the proposed development. Medium risk refers to wetland areas that are either on the periphery of the infrastructure and at an indirect risk. Low risks are wetland systems beyond the project area that would be avoided, or wetland areas that could be avoided if feasible. Development in all the 'segments' of the project area is permissible, and the significance of all post-mitigation risks was determined to be low. All recommendations and mitigation measures are applicable to these areas, in order to achieve a low residual risk significance.

In terms of Water Use Authorisation, owing to the expected post-mitigation Low risks, a General Authorisation is permissible for the development. A General Authorisation has been issued for one of the affected farm portions, namely the farm Basemkop 1808 (reference number: WU23983). An application for the other affected farm (Portion 0 of Farm 2962 Lejwe) is in process (reference number: WU25438).

2.2.3. Potential Impacts on soil and agriculture

One soil form was identified within the project area, namely the Swartland soil form. The land capability of the abovementioned soil has been determined to be class "III" and a climate capability level 8 given the low Mean Annual Precipitation (MAP) and the high Mean Annual Potential Evapotranspiration (MAPE) rates. The combination between the determined land capabilities and climate capabilities results in a land potential "L6". The "L6" land potential level is characterised by very restricted potential. Regular and/or severe limitations are expected due to soil, slope, temperatures or rainfall. This land potential is regarded as non-arable.

This land potential level was used to determine the sensitivities of soil resources. Only "Low" sensitivities were determined throughout the project area by means of baseline findings. Potential impacts identified include:

Direct impacts:

- » Erosion due to heavy trucks transporting PV structures

Indirect impacts:

- » Water runoff
- » Low penetration of rainwater
- » Loss of arable land for grazing
- » Desertification

Considering the low sensitivities associated with land potential resources, it is the specialist's opinion that the proposed activities will have an acceptable impact on soil resources and that the proposed activities should proceed as have been planned.

2.2.4. Potential Cumulative Impacts

A total of 3067 ha of cumulatively transformed land comprising of other renewable energy developments is located within the 30 km (282 700 ha) radius of the additional footprint for the Sannaspos Solar Project. With the development of solar energy facilities in the Free State Province it is expected that the landscape will be altered by renewable energy development (Lavin, 2021). However, the facilities surrounding the additional footprint are scarcely located throughout the greater project area and comprise of a small fraction of the total land area which is predominantly agricultural fields and open natural areas. There are no other renewable energy facilities to the north of the project site. Furthermore, existing facilities are evenly distributed throughout the landscape imposing no major aesthetic alteration to the landscape or impacts regarding species fragmentation.

Based on the specialist studies undertaken, the following conclusions can be drawn regarding the cumulative impacts associated with the project:

- » There will be no unacceptable loss or impact on ecological aspects (vegetation types, species, and ecological processes) due to the development of the PV facility within the additional footprint and other renewable energy projects within the surrounding area, provided the recommended mitigation measures are implemented. The cumulative impact is therefore acceptable.
- » There will be no significant loss of sensitive and significant aquatic features. The cumulative impact is therefore acceptable.
- » There will be no unacceptable loss of land capability due to the development of the PV facility within the additional footprint and other renewable energy projects within the surrounding area, provided recommended mitigation measures are implemented. The cumulative impact is therefore acceptable.

All cumulative impacts associated with the development of the PV facility within the additional footprint will be of a medium or low significance. A summary of the cumulative impacts is included in the table below.

Issue	Overall impact of the proposed project considered in isolation	Cumulative impact of the project and other projects in the area
Ecology	Medium	Medium

Soils and land Capability

Low

Low

2.2. Sensitivity Analysis for the Development Area

Figure 2.1 and 2.2 displays the environmental sensitivities as identified in this Environmental Impact Assessment as well as the detailed layout produced by the applicant. The layout overlain with environmental sensitivities aims to make recommendations for the implementation of avoidance strategies and mitigation and management measures to ensure that the final assessed layout retains an environmental impact within acceptable limits. No high sensitivity areas or no-go areas have been identified within the additional footprint. The project overlaps with an ESA1, ESA2 and NPAES. Impacts on these features were assessed to be of low significance after the implementation of mitigation.

Based on an analysis of the identified sensitivities for the project development area, no optimisation of the layout is required. The layout as presented within **Figure 2.3** is therefore considered to be the most appropriate from an environmental perspective.

2.3. Environmental Costs versus Benefits of the Project

Environmental costs can be anticipated at a local and site-specific level and are considered acceptable provided the mitigation measures as outlined in the EIA report and the EMPr are implemented and adhered to. No fatal flaws have been identified.

These environmental costs could include:

- » A loss of biodiversity, flora, and fauna due to the clearing of land for the construction and utilisation of land for the PV facility. The cost of loss of biodiversity has been minimised/avoided through the placement of project components and infrastructure outside of CBA1 areas considered to be of high sensitivity.
- » Heritage impacts associated with the PV facility. Although no resources were identified within the proposed additional footprint area, there is the potential for impacts on heritage resources during construction. Impacts can be minimised through the implementation of a Chance Finds Procedure, as detailed in the EMPr in **Appendix K**.
- » Loss of land for agriculture. The development will remove areas available for agricultural activities. However, based on the low sensitivity of the soils within the additional development footprint for the PV Facility, all activities will have an acceptable impact on agricultural productivity.

Benefits of the project include the following:

- » The project will result in important economic benefits at the local and regional scale through job creation, income and other associated downstream economic development identified in the EIA for the Sannaspos Solar PV Facility. This will occur as the implementation of the Sannaspos Solar PV Facility, a Preferred Bidder project, will be facilitated with the addition of the 50ha. These will persist during the preconstruction, construction, operation, and decommissioning phases of the project.
- » The project provides an opportunity for a new land use on the affected properties which is considered as a more efficient use of the land and provides an opportunity for financial benefits to the current land use.
- » The project contributes towards the Provincial and Local goals for the development of renewable energy as outlined in the respective IDPs.

- » The project serves to diversify the economy and electricity generation mix of South Africa through the addition of solar energy.
- » South Africa's per capita greenhouse gas emissions are amongst the highest in the world due to the reliance on fossil fuels. The Sannaspos Solar PV Facility (including the additional footprint) will contribute to achieving goals for implementation of renewable energy and sustaining a 'green' economy within South Africa.

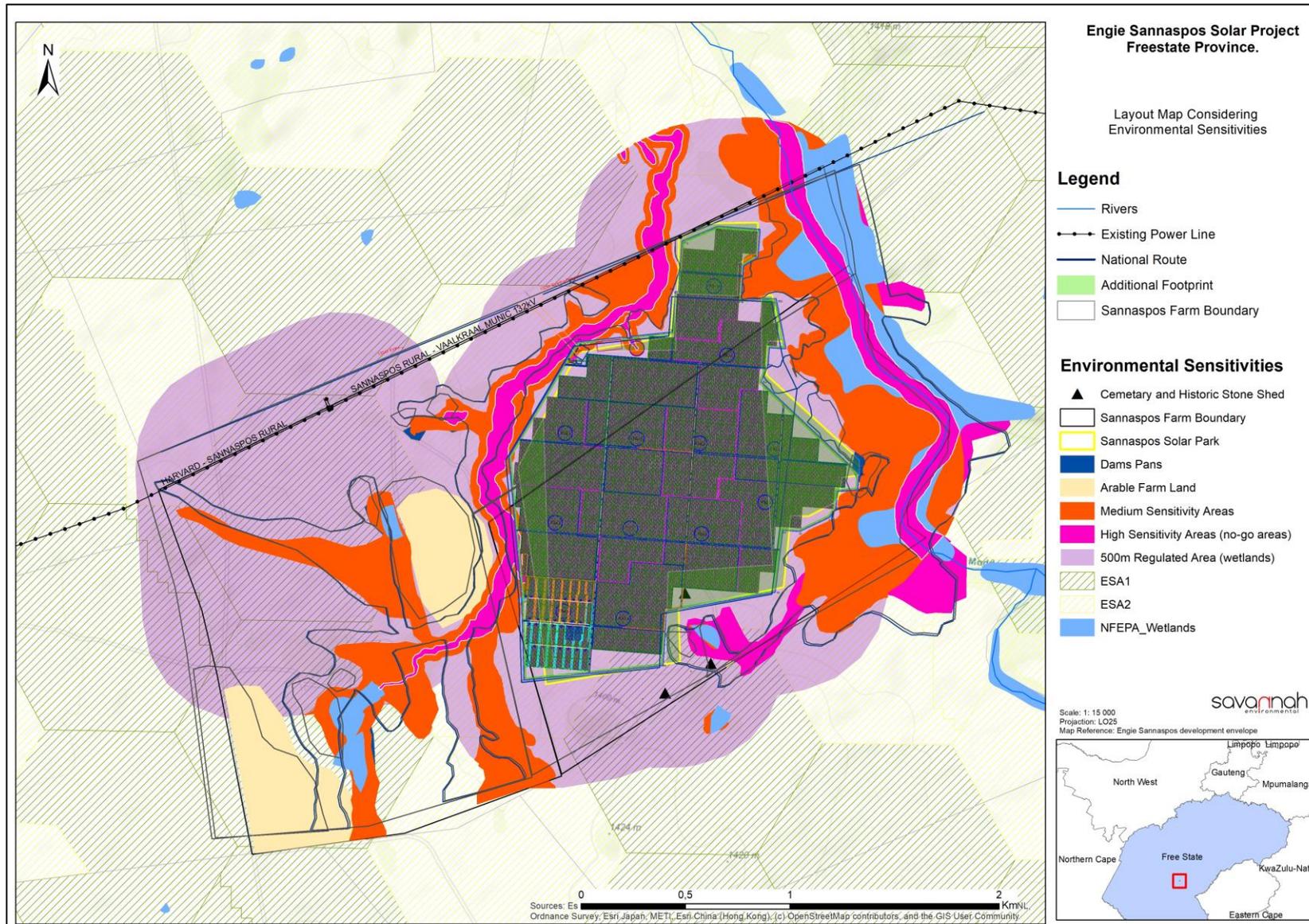


Figure 2.1: Final Layout for the Sannaspos Solar Project considering Environmental Sensitivities

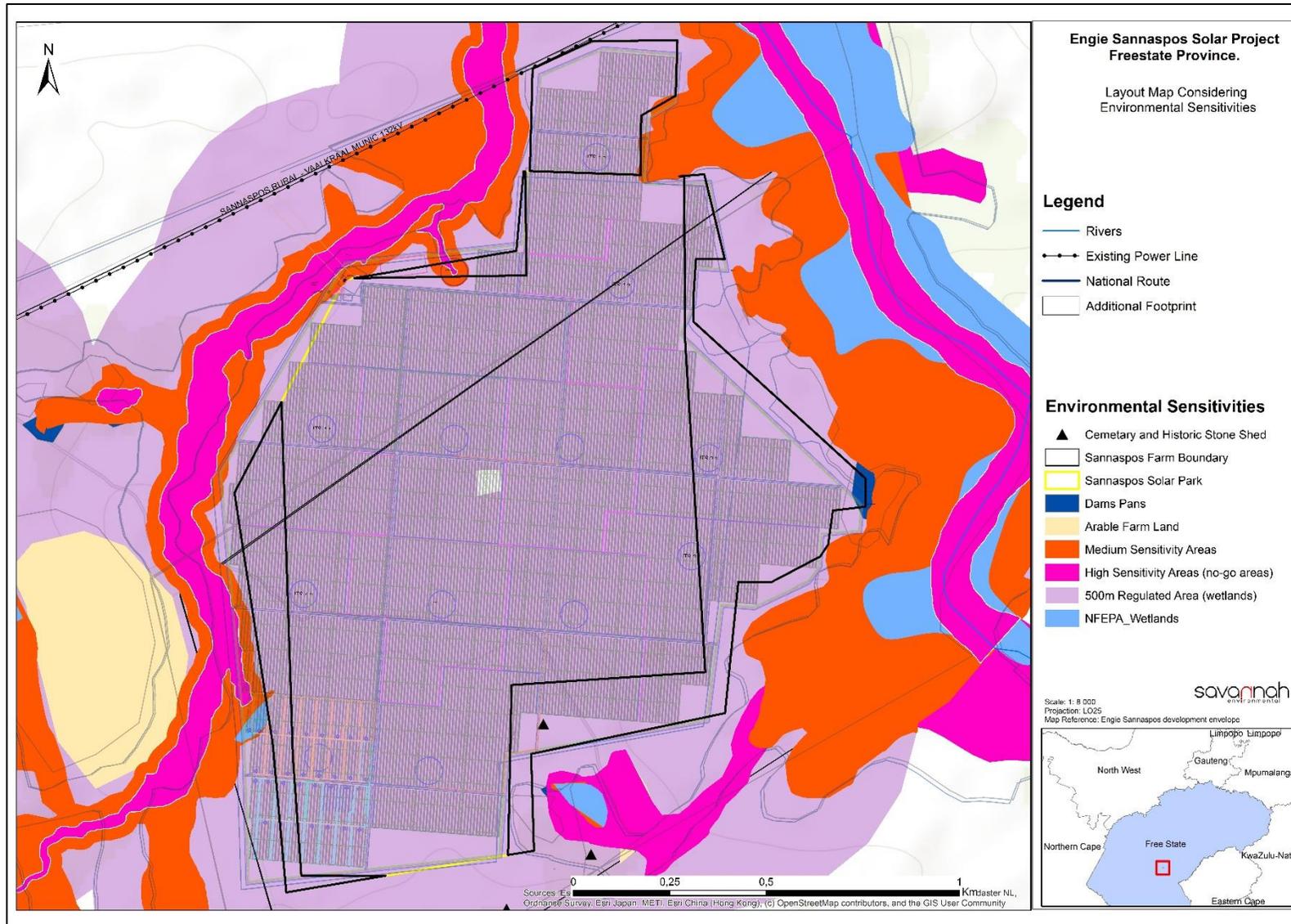


Figure 2.2: Final layout of the Sannaspos Solar PV Facility on the Authorised Area and on the Additional Footprint

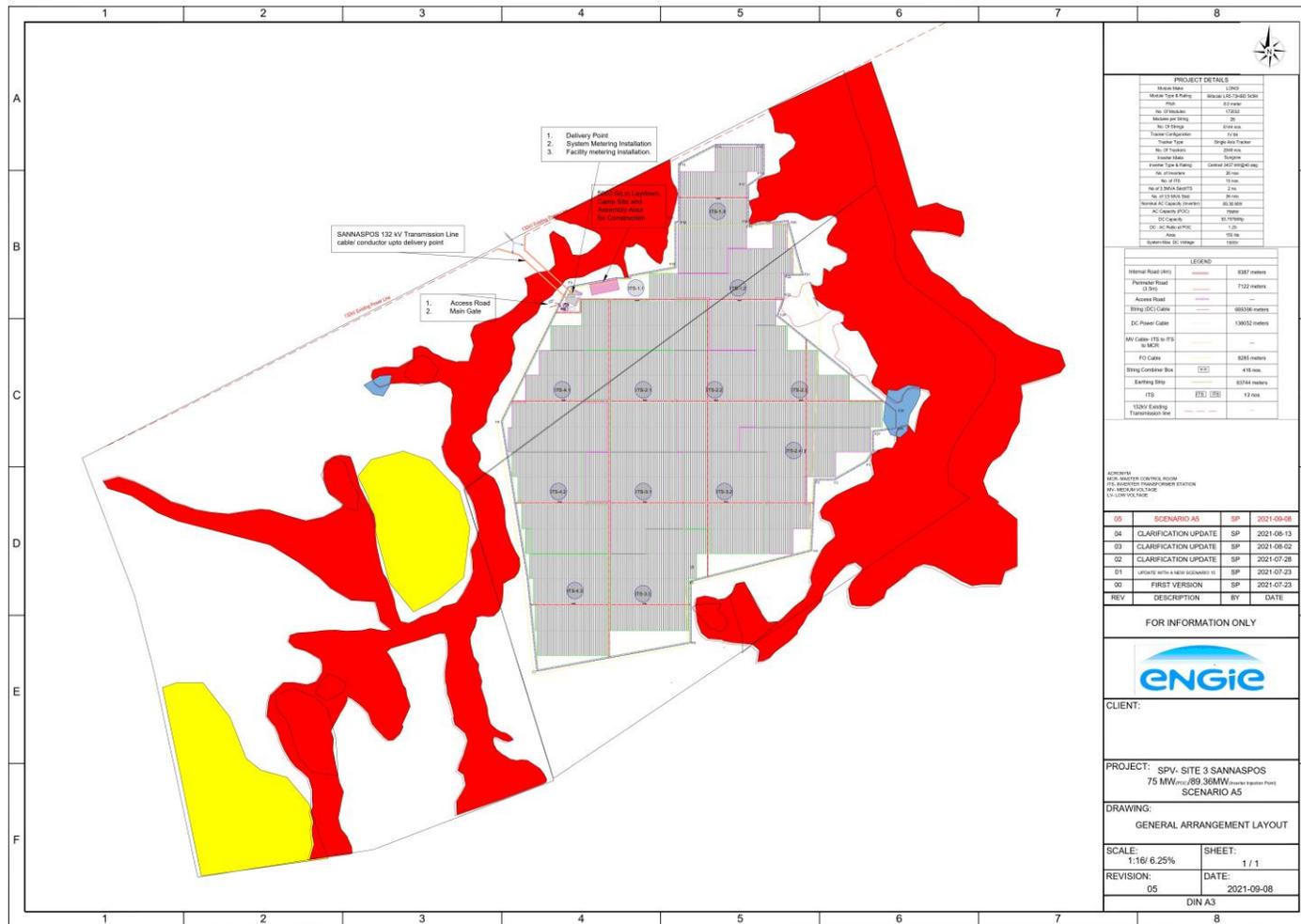


Figure 2.3: Micro setting of Infrastructure provided by the Applicant for the final layout of the Sannaspos Solar PV Facility

The benefits of the development of the Sannaspos Solar PV Facility (including the additional footprint) are expected to occur at a national, regional, and local level. As the costs to the environment at a site-specific level have been largely limited through the appropriate placement of infrastructure on the project site within lower sensitive areas through the avoidance of features and areas considered to be sensitive, the benefits of the project are expected to partially offset the localised environmental costs of the PV facility.

2.4. Overall Conclusion (Impact Statement)

The Sannaspos Solar PV Facility, located on Portion 0 of Farm 1808 Besemkop and Portion 0 of Farm 2962 Lejwe, near Sannaspos, has been selected as a Preferred Bidder project under Round 5 of the Renewable Energy Independent Power Producers Procurement Programme (REIPPPP). A developmental footprint of 150 ha in extent is authorised for the facility and associated infrastructure. In order to implement the project using the preferred technology, an additional 50ha is required. This additional area is immediately adjacent to the authorised area.

Independent specialists appointed to undertake the assessment of potential impacts associated with the development of PV infrastructure within the additional footprint considered desktop data, results from field work, existing literature and the National Web-based Environmental Screening Tool to inform the identification of sensitivities. The findings of the assessment undertaken have informed the results of this EIA report. The specialist findings have indicated that there are no identified fatal flaws associated with the implementation of the project within the project site.

From a review of the relevant policy and planning framework, it was concluded that the project is well aligned with the policy framework, and a clear need for the project is seen from a policy perspective at a local, provincial, and National level. The project development area is located outside of any formal protected areas and falls within ESA1, ESA2 and NPAES areas as defined within the Provincial Conservation Plan.

As detailed in the cost-benefit analysis, the benefits of the development of the Sannaspos Solar PV project (including that within the additional footprint) are expected to occur at a national, regional and local level. While some impacts of potential significance do exist, it is anticipated that the implementation of appropriate mitigation measures would assist in reducing the significance of such impacts to acceptable levels.

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

2.5. Overall Recommendation

Considering the findings of the independent specialist studies, the impacts identified, the development footprint proposed by the developer, the absence of the sensitive environmental features within the project site, as well as the potential to further minimise the impacts to acceptable levels through mitigation, it is the reasoned opinion of the EAP that the development of infrastructure associated with the Sannaspos Solar PV Facility within the identified additional footprint is acceptable within the landscape and can reasonably be authorised. The proposed layout as provided by the developer (**Figure 7.1**) is considered to be the most appropriate from an environmental perspective as it avoids identified sensitivities and recommended buffer areas.

The following infrastructure would be included within an authorisation issued for the project:

- » A total of 28 325 bifacial solar panels with a combined capacity of 15 MW
- » Internal Access roads

The following key conditions would be required to be included within an authorisation issued for the development of infrastructure associated with the Sannaspos Solar PV Facility within the identified additional footprint:

- » All mitigation measures detailed within this EIA report, as well as the specialist reports contained within **Appendices G to I** are to be implemented.
- » The EMPr as contained within **Appendix K** of this EIA report should form part of the contract with the Contractors appointed to construct and maintain the solar facility in order to ensure compliance with environmental specifications and management measures. The implementation of this EMPr for all life cycle phases of the project is considered key in achieving the appropriate environmental management standards as detailed for this project.
- » Implement a chance finds procedure for the rescuing of any fossils or heritage resources discovered during construction.
- » Maintain vegetation cover (i.e., either natural or cultivated) immediately adjacent to the actual development footprint, both during construction and operation of the proposed facility.

A validity period of 10 years of the Environmental Authorisation is requested, should the project obtain approval from DFFE.

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.

An EMPr compiled by H2on Environmental Specialists was compiled for the authorised Sannaspos Solar PV Project and is considered applicable to the management of identified risks within the additional footprint as it is directly linked to the authorised area and part of the same development. This EMPr has been compiled to include the additional mitigation measures recommended by the specialists during the EIA process for the additional footprint associated with the Sannaspos Solar PV Project.

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

This EMPr has been compiled in accordance with Appendix 4 of the EIA Regulations, 2014 (as amended). This is a dynamic document and will be further developed in terms of specific requirements listed in any authorisations issued for the Sannaspos Solar PV Project and/or as the project develops. The EMPr has been developed as a set of environmental specifications (i.e. principles of environmental management). The specifications have been developed on the basis of the findings of the Environmental Impact Assessment (EIA), and must be implemented to protect sensitive on-site and off-site features through controlling construction, operation and decommissioning activities that could have a detrimental effect on the environment, and through avoiding or minimising potential impacts.

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 Sannaspos Solar PV Facility.

- » 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 EIA process.

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

Sannaspos Solar PV Project (Pty) Ltd 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. The adequacy and efficacy of implementation is to be monitored by an independent Environmental Control Officer (ECO)². Since this EMPr is part of the BA process for the Sannaspos Solar PV Facility additional footprint, it is important that this document be read in conjunction with the EIA 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, the stipulations in the Environmental Authorisation shall prevail over that of the EMPr, unless otherwise agreed by the authorities in writing. Similarly, any provisions in legislation overrule any provisions or interpretations within this EMPr.

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

3.1. Project Team

This EMPr was compiled by:

EMP Compilers	
Tamryn Lee Goddard	Savannah Environmental
Jo-Anne Thomas	Savannah Environmental
Input from Specialist Consultants	
Terrestrial Ecology (including fauna and flora) and wetlands	Andrew Husted of The Biodiversity Company
Soil, Land Use, Land Capability and Agricultural Potential	Andrew Husted of The Biodiversity Company
Heritage (including archaeology, and palaeontology)	Jenna Lavin of CTS Heritage

The Savannah Environmental team have extensive knowledge and experience in environmental impact assessment and environmental management, having been involved in EIA processes for more than fifteen

² One ECO is required for the implementation of the project within the authorised facility and the additional footprint.

(15) years. They have managed and drafted Environmental Management Programmes for other power generation projects throughout South Africa, including numerous wind and solar energy facilities.

CHAPTER 4: ROLES AND RESPONSIBILITIES

4.1 The Applicant

- » The applicant is responsible for the implementation of the conditions in the EMPr
- » A responsible and suitably qualified person (Environmental Control Officer) must be appointed during the construction and operational phases to ensure that the contractor complies with the requirements in the EMPr.
- » During the operation phase the applicant must ensure that the relevant environmental biomonitoring is undertaken and that sufficient record is kept of this.

4.2 The Environmental Control Officer (ECO)

- »
- » Ensure that the EMPr is implemented by the Contractor during the construction phase and monitor all activities.
- » Ensure that all employees, including the contractor on site are familiar with all the conditions and requirements in the EMP.
- » Ensure that access routes and work areas are demarcated where activities will take place and also “no-go” areas.
- » Communicate any information that relates to the management of environmental aspects or any change of the EMP conditions to the contractor and the applicant.
- » Address any complaints from the public or official from a regulating authority appropriately and inform the applicant.
- » Keep record of any complaints received: date, name, complaint and response.
- » Keep a record of any non-compliance to the EMPr: date, description and corrective actions.
- » Report any non-compliance or incident that may have a significant impact on the environment or adjacent annual stream, to Department of Environmental Affairs and the Department of Water Affairs.

4.3 The Contractor

- » The contractor must be contractually bound to comply with all the conditions of the EMPr
- » The contractor must consult with the environmental coordinator with any matter on environmental issues
- » Report any incident that may have an impact on the environment or a non-compliance of any EMPr conditions to the environmental coordinator.

4.4 Responsibility / Objectives: Planning and Construction Phase

- » Protect the environment on the site, i.e. 200 ha of undeveloped land on the Portion 0 of Farm 1808 Besemkop and Portion 0 of Farm 2962 Lejwe.
- » Ensure controlled access to the site to prevent degradation.
- » Be held responsible to have a copy of the EMPr, Environmental Authorisations, Environmental Impact Report (EIR) and Environmental Impact Assessment available on site at all times.
- » Be held responsible for the implementation of the EMPr, EIR, BA and compliance with any conditions as stipulated in the Environmental Authorisation.
- » Implementation of management measures in order to limit and / or prevent any potential environmental impacts.
- » Ensure compliance to best practices and the requirements of the EMPr.

- » It is recommended that an environmental compliance audit be undertaken during the Construction Phase and / or after construction activities have ceased to verify compliance with the EMPr and Environmental Authorisation.
- » Ensure that all problems identified during any environmental audits or inspections, are addressed and rectified as soon as reasonably possible.
- » To have the results of any environmental audits available in writing, together with a report on action taken to rectify any identified environmental issues.

4.5 Responsibility / Objectives: Operational Phase

- » The applicant will be responsible to prevent negative environmental impacts and will be responsible for the following:
 - » Providing a budget for maintenance of infrastructure.
 - » Maintaining all approved infrastructure in good working order to effectively fulfil its intended purpose to prevent negative environmental impacts.
 - » Not construct any additional buildings, infrastructure, etc. without investigating the potential necessity to perform an Environmental Impact Assessment in terms with the NEMA Regulations of 2010.
 - » To immediately remedy any factors that contribute to negative environmental impacts.

4.6 Responsibility / Objectives: Decommissioning Phase

At present, it is not anticipated that the project will undergo decommissioning and / or Closure. However, should it be decided to demolish any infrastructure that will be associated with the proposed development, the site will be rehabilitated to its original state as far as practicable possible, depending on the end land use to be decided upon at the time. A Rehabilitation Plan will be submitted to the Free State Department of Agriculture, Land Reform and Rural Development (DALRRD) as well as the National Department of Forestry, Fisheries and the Environment (DFFE) for approval prior to commencement of any rehabilitation activities.

4.7 Objectives: Rehabilitation activities

Rehabilitation of areas disturbed during construction and management / mitigation measures will be undertaken throughout all the phases of the project. The most important objective regarding the measures during rehabilitation will be to limit any environmental impacts to the surrounding environment and potential affected parties as far as possible.

CHAPTER 5: MANAGEMENT PROGRAMME - PLANNING AND DESIGN

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

- » Ensures that the design of the solar facility 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 identified environmental sensitivities, as well as any landowner and community concerns and that these are appropriately addressed through design and planning (where applicable).
- » Enables the construction activities to be undertaken without significant disruption to other land uses and activities in the area.
- » Ensures that the best environmental options are selected for the solar facility.

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

5.1. Objectives

OBJECTIVE 1: To ensure that the design of the facility responds to the identified environmental constraints and opportunities

Subject to final facility micro-siting and subsequent acceptance from DFFE, the development footprint detailed in **Figure 2.2** must be implemented. Cognisance of sensitive areas defined in **Figure 2.1** and within the EIA Report should be considered when undertaking the final design of the facility.

Project component/s	<ul style="list-style-type: none"> » PV panels. » Access roads.
Potential Impact	» Design fails to respond optimally to the identified environmental considerations.
Activities/risk sources	<ul style="list-style-type: none"> » Positioning of PV panels and alignment of access roads within the additional footprint. » Pre-construction activities, e.g. geotechnical investigations.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To ensure that the design of the PV facility responds to the identified environmental constraints and opportunities, including the constraints identified through the EIA process. » To ensure that pre-construction activities are undertaken in an environmentally friendly manner by e.g. avoiding identified sensitive areas.

Mitigation: Action/control	Responsibility	Timeframe
Areas rated as High sensitivity in proximity to the development areas, should be declared as 'no-go' areas during the life of the project, and all efforts must be made to prevent access to this area from construction workers, machinery. The infrastructure should be realigned to prioritise development within low	Project manager, Environmental Officer	Pre-construction and Ongoing

Mitigation: Action/control	Responsibility	Timeframe
sensitivity areas. Mitigated development in medium sensitivity areas is permissible. High sensitivity areas are to be avoided.		
Plan and conduct pre-construction activities in an environmentally responsible manner and in a manner that does not lead to unnecessary impacts and disturbance.	Developer EPC Contractor	Pre-construction
Consider design level mitigation measures recommended by the specialists, as detailed within the EIA report and relevant appendices.	Developer EPC Contractor	Design phase
The minimum footprint areas of infrastructure should be used wherever possible, including road widths and lengths.	Developer EPC Contractor	Design phase
Temporary laydown areas should be located within previously transformed areas or areas that have been identified as being of low sensitivity. These areas should be rehabilitated after use.	Developer EPC Contractor	Design phase
Make use of existing roads where possible when planning the access road layout for the PV facility. Take cognisance of the topography and limit cut and fill requirements.	Developer EPC Contractor	Design phase
Design the facility such that no runoff is directed into the unchannelled valley bottom, depression, and seepage, as these are not tolerant of excessive / regular volumes of water and would then change in nature and attributes.	Developer EPC Contractor	Design phase
The duration of the construction should be minimised to as short term as possible, to reduce the period of disturbance on fauna.	Developer EPC Contractor	Design & planning
Outside lighting should be designed and limited to minimize impacts on fauna. All outside lighting should be directed away from highly sensitive areas. Fluorescent and mercury vapor lighting should be avoided and sodium vapor (green/red) lights should be used wherever possible.	Developer EPC Contractor	Design phase
A stormwater management plan must be compiled and implemented. Stormwater leaving the site should not be concentrated in a single exit drain but spread across multiple drains around the site each fitted with energy dissipaters (e.g. slabs of concrete with rocks cemented in).	Developer EPC Contractor	Design phase

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

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

Project Component/s	<ul style="list-style-type: none"> » PV panels. » Access roads.
----------------------------	---

Potential Impact	<ul style="list-style-type: none"> » Impact on identified sensitive areas. » Design fails to respond optimally to the environmental considerations.
Activities/Risk Sources	<ul style="list-style-type: none"> » Positioning of all project components » Pre-construction activities, e.g. geotechnical investigations, site surveys of substation footprint, power line servitude and internal access roads and environmental walk-through surveys. » Positioning of temporary sites.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To ensure that the design of the 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
All areas to be developed must be walked through prior to any activity to ensure no nests or fauna species are found in the area. Should any Species of Conservation Concern not move out of the area or their nest be found in the area a suitably qualified specialist must be consulted to advise on the correct actions to be taken.	Developer Specialist	Design phase
A detailed geotechnical investigation is required for the design phase for all infrastructure components.	Developer	Design phase
Obtain any additional environmental permits required (e.g. water use license, protected plant permits, faunal relocation permit, etc.). Copies of permits/licenses must be submitted to the Director: Environmental Impact Evaluation at the DFFE , and kept on site during the construction and operation phases of the project.	Developer	Design phase
Search and rescue of species of conservation concern (SCC) should be conducted prior to clearing activities.	Developer Contractor	Pre-construction
Obtain abnormal load permits for transportation of project components to site (if required).	Contractor(s)	Prior to construction
A stormwater management plan must be developed in the pre-construction phase, detailing the stormwater structures and management interventions that must be installed to manage the increase of surface water flows directly into any natural systems. The stormwater control systems must be inspected on an annual basis to ensure these are functional. Effective stormwater management must include effective stabilisation (gabions and Reno mattresses) of exposed soil and the re-vegetation of any disturbed riverbanks.	Contractor(s)	Design phase
Prepare a detailed Fire Management Plan in collaboration with surrounding landowners.	Developer	Pre-construction
Develop and implement an alien, invasive and weeds eradication/control plan.	Developer Specialist	Pre-construction
A comprehensive rehabilitation / monitoring plan must be developed in consultation with a specialist.	Developer Contractor Specialist	Pre-construction
To compensate for the loss in biodiversity, the surrounding areas should be used as set-aside areas in discussion with the	Developer	Throughout project development

Mitigation: Action/Control	Responsibility	Timeframe
landowners and the relevant conservation authority. This will ensure that no further habitat loss occurs within the area.		

Performance Indicator	<ul style="list-style-type: none"> » Layout does not destroy/degrade no-go areas. » No disturbance of no-go areas. » Permits are obtained and relevant conditions complied with. » Relevant management plans and Method Statements prepared and implemented.
Monitoring	<ul style="list-style-type: none"> » Review of the design by the Project Manager and the ECO prior to the commencement of construction. » Monitor ongoing compliance with the EMPr.

OBJECTIVE 3: To ensure effective communication mechanisms

It is important to maintain on-going communication with the public (including affected and surrounding landowners) during the construction and operation phases of the Sannaspos PV Facility. Any issues and concerns raised should be addressed as far as possible in as short a timeframe as possible.

Project component/s	<ul style="list-style-type: none"> » PV panels. » Access roads.
Potential Impact	<ul style="list-style-type: none"> » Impacts on affected and surrounding landowners and land uses.
Activity/risk source	<ul style="list-style-type: none"> » Activities associated with pre-construction phase. » Activities associated with construction of the PV facility. » Activities associated with operation.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » Effective communication with affected and surrounding landowners. » Addressing 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 procedure for the public (including the affected and surrounding landowners) (using Appendix B) to be implemented during both the construction and operation phases of the PV facility and if applicable during decommissioning. This procedure should include the 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. The mechanism must also include procedures to lodge complaints in order for the local community to express any complaints or grievances with the construction process. A Public Complaints register must be maintained by the Contractor to record all complaints and queries relating to the project and the actions taken to resolve the issue.	Developer Contractor O&M Operator	Pre-construction (construction procedure) Pre-operation (operation procedure)

Mitigation: Action/control	Responsibility	Timeframe
Develop and implement a grievance mechanism for the construction, operation and closure phases of the PV facility for all employees, contractors, subcontractors and site personnel. This procedure should be in line with the South African Labour Law.	Developer Contractor O&M Operator	Pre-construction (construction procedure) Pre-operation (operation procedure)
Develop an incident reporting system to record non-conformances to the EMPr.	Contractor	Pre-construction Duration of construction

Performance Indicator	» Effective communication procedures in place for all phases as required.
Monitoring	» An incident reporting system used to record non-conformances to the EMPr. » Grievance mechanism procedures implemented. » Public complaints register developed and maintained.

CHAPTER 6: MANAGEMENT PROGRAMME - CONSTRUCTION

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

- » Ensures that construction activities are properly managed in respect of environmental aspects and impacts.
- » Enables construction activities to be undertaken without significant disruption to other land uses and activities in the area.
- » Minimises the impact on the indigenous natural vegetation and habitats of ecological value.
- » Minimises impacts on fauna using the site.
- » Minimises the impact on heritage sites should they be uncovered.
- » Ensures rehabilitation of disturbed areas following the execution of the works, such that residual environmental impacts are remediated or curtailed.

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

6.1. Objectives

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

OBJECTIVE 1: Securing the site and site establishment

Project component/s	<ul style="list-style-type: none"> » PV panels. » Access roads.
Potential Impact	<ul style="list-style-type: none"> » Hazards to landowners and public. » Security of materials. » Substantially increased damage to natural vegetation. » Potential impact on fauna habitat.
Activities/risk sources	<ul style="list-style-type: none"> » Open excavations (foundations and cable trenches). » Movement of construction employees, vehicles and plant equipment in the area and on-site.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To secure the site against unauthorised entry. » To protect members of the public/landowners/residents.

Mitigation: Action/control	Responsibility	Timeframe
Secure the site, working areas and excavations in an appropriate manner.	Contractor EO	Construction
Where necessary to control access, fence and secure the area and implement access control procedures.	Contractor	Construction

Performance Indicator	<ul style="list-style-type: none"> » Site is secure and there is no unauthorised entry. » No members of the public/ landowners injured as a result of construction activities.
Monitoring	<ul style="list-style-type: none"> » Regular visual inspection of the fence for signs of deterioration/forced access. » An incident reporting system must be used to record non-conformances to the EMPr.

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

Project Component/s	<ul style="list-style-type: none"> » PV panels. » Access roads.
Potential Impact	<ul style="list-style-type: none"> » Damage to indigenous natural vegetation and sensitive areas. » Damage to and/or loss of topsoil (i.e. pollution, compaction etc.). » Impacts on the surrounding environment due to inadequate sanitation and waste removal facilities. » Pollution/contamination of the environment.
Activities/Risk Sources	<ul style="list-style-type: none"> » Vegetation clearing. » Ablution facilities. » Inappropriate waste management » Contractors not aware of the requirements of the EMPr, leading to unnecessary impacts on the surrounding environment.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » Limit vegetation clearance. » Ensure adequate sanitation facilities and waste management practices. » Ensure appropriate management of actions by on-site personnel in order to minimise impacts to the surrounding environment.

Mitigation: Action/Control	Responsibility	Timeframe
Potable drinking water must be available at the site office and other convenient locations on the site. Water used must be taken from a legal source and must comply with the standards for potable water.	Contractor	Construction
Establish the necessary ablution facilities with chemical toilets and provide adequate sanitation facilities and ablutions for construction workers (1 toilet per every 15 workers) at appropriate locations on site. These must be situated outside of any delineated watercourses and pans/depressions or the buffers shown.	Contractor	Construction
Ensure ablution facilities are appropriately maintained. Ablutions must be cleaned regularly and associated waste disposed of at a registered/permitted waste disposal site. Ablutions must be removed from site when construction is completed.	Contractor and sub-contractor/s	Duration of contract
Supply adequate weather and vermin proof waste collection bins and skips (covered at minimum with secured netting or shade cloth) at sites where construction is being undertaken. Separate bins should be provided for general and hazardous waste. As far as possible, provision should be made for separation of waste for recycling.	Contractor	Construction

Mitigation: Action/Control	Responsibility	Timeframe
Waste management must be a priority and all waste must be collected and stored adequately. It is recommended that all waste be removed from site on a weekly basis to prevent rodents and pests entering the site	Contractor	Duration of Contract
Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed regularly at licensed waste facilities.	Contractor	Duration of Contract
No liquid waste, including grey water, may be discharged into any water body or drainage line. All sewage disposal to take place at a registered and operational wastewater treatment works. Proof of disposal to be retained as proof of responsible disposal.	Contractor	Duration of construction
Ensure all construction equipment and vehicles are properly maintained at all times.	Contractor	Construction
Pre-construction environmental induction must be undertaken for all construction staff on site to ensure that basic environmental principles are adhered to. This induction must take place prior to construction. The induction must be led by the ECO in the presence of the contractor and applicant. An attendance register must be signed by all parties present including the entire workforce.	Contractor	Construction
Educate staff and relevant contractors on the location and importance of the identified wetlands through toolbox talks and by including them in site inductions as well as the overall master plan.	Contractor	Construction
Regular toolbox talks should be undertaken to ensure appropriate levels of environmental awareness.	Contractor	Construction
Contact details of emergency services must be prominently displayed on site.	Contractor	Construction
Contractor must provide adequate firefighting equipment on site and provide firefighting training to selected construction staff.	Contractor	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	During construction.
Ensure no fire wood is collected on the site or from the surrounding area.	Contractor	During construction.
No open fires may be made on the site or outside the site boundaries.	Contractor	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
Dust-reducing mitigation measures must be put in place and must be strictly adhered to. This includes wetting of exposed soft soil surfaces. No non environmentally friendly suppressants may be used as this could result in pollution of water sources.	Contractor	Construction
Avoid excessively compacting the ground beneath the solar panels.	Contractor	Construction

Mitigation: Action/Control	Responsibility	Timeframe
Where possible minimise the use surfactants to clean solar panels and herbicides to control vegetation beneath the panels. If surfactants and herbicides must be used do so well prior to any significant predicted rainfall events.	Contractor	Construction

Performance Indicator	<ul style="list-style-type: none"> » Code of Conduct drafted before commencement of the construction phase. » Appropriate training of all staff is undertaken prior to them commencing work on the construction site. » 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.
Monitoring	<ul style="list-style-type: none"> » Regular audits of the construction camps and areas of construction on site by the EO. » Proof of disposal of sewage at an appropriate licensed wastewater treatment works. » Proof of disposal of waste at an appropriate licensed waste disposal facility. » An incident reporting system must be used to record non-conformances to the EMPr. » Observation and supervision of Contractor practices throughout the construction phase by the EO. » Complaints will be investigated and, if appropriate, acted upon.

OBJECTIVE 3: Protection of plant and animal life and sensitive features

Project component/s	<ul style="list-style-type: none"> » PV panels. » Access roads.
Potential Impact	<ul style="list-style-type: none"> » Loss of plant cover leading to loss of faunal habitat and loss of specimens of protected plants. » Soil erosion. » Increased fire hazards. » Traffic to and from the site and within the site.
Activity/risk source	<ul style="list-style-type: none"> » Site preparation and clearing. » Soil disturbance » Introduction of plant propagules with people and vehicles. » Activities outside of designated construction areas. » Driving off designated routes. » Mobile construction equipment movement on site.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To limit construction activities to designated areas. » Implement invasive plant clearing prior to construction, but after site demarcation. » To minimise footprints of habitat destruction. » To minimise disturbance to resident and visitor faunal species.

Mitigation: Action/control	Responsibility	Timeframe
Identify and demarcate the extent of the construction site as indicated by the layout plan. Signs must be put up to enforce this.	Contractor	Construction
Use the wetland shapefiles to signpost the edge of the wetlands closest to site. Place the sign 25 m from the edge (this is the buffer zone). Label these areas as environmentally sensitive areas, keep out.	Contractor	Construction
All construction vehicles must adhere to clearly defined and demarcated roads. No driving outside of the development boundary must be permitted.	Contractor	Construction
Mitigated development in High sensitivity areas is permissible. Avoid disturbances to areas beyond the project area. Access to the area should be from the authorised solar park facility.	Contractor	Construction
No activities are permitted within the wetland and associated buffer areas.	Contractor	Construction
The illegal collection, hunting or harvesting of any plants or animals at the site must be strictly forbidden. Personnel should not be allowed to wander off of the construction site.	Contractor	Construction
Areas of indigenous vegetation, even secondary communities outside of the direct project footprint, should under no circumstances be fragmented or disturbed further. Clearing of vegetation should be minimized and avoided where possible. All activities must be restricted too within the agricultural areas. No further loss of very high/high sensitivity areas should be permitted.	Contractor	Construction
Existing access routes, especially roads must be made use of.	Contractor	Construction
All laydown, chemical toilets etc. should be restricted to agricultural areas. Any materials may not be stored for extended periods of time and must be removed from the project area once the construction phase has been concluded. No permanent construction phase structures should be permitted. Construction buildings should preferably be prefabricated or constructed of re-usable/recyclable materials. No storage of vehicles or equipment will be allowed outside of the designated project areas.	Contractor	Construction
Appropriately stockpile topsoil cleared from the project area.	Contractor	Construction
It should be made an offence for any staff to take/ bring any plant species into/out of any portion of the project area. No plant species whether indigenous or exotic should be brought into/taken from the project area, to prevent the spread of exotic or invasive species or the illegal collection of plants.	Contractor	Construction
A fire management plan needs to be compiled and implemented to restrict the impact fire might have on the surrounding areas.	Contractor	Construction
Promptly remove / control all alien and invasive plant species that may emerge during construction (i.e. weedy annuals and other alien forbs) must be removed. All alien vegetation must be managed in terms of the Regulation GNR.1048 of 25 May 1984 (as amended) issued in terms of the Conservation of Agricultural Resources Act, Act 43 of 1983.	Contractor	Construction

Mitigation: Action/control	Responsibility	Timeframe
Limit construction activities near (< 20m) of buffers to winter (as much as possible) when rain is least likely to wash concrete and sand into the wetland.	Contractor	Construction
Ensure soil stockpiles and concrete / building sand are sufficiently safeguarded against rain wash.	Contractor	Construction
Speed limits must be put in place to reduce erosion. Reducing the dust generated by construction activities, especially the earth moving machinery, through wetting the soil surface and putting up signs to enforce speed limit as well as speed bumps built to force slow speeds. Signs must be put up to enforce this.	Contractor	Construction
Noise must be kept to an absolute minimum during the evenings and at night to minimise all possible disturbances to amphibian species and nocturnal mammals	Contractor	Construction
No trapping, killing, or poisoning of any wildlife is to be allowed. Signs must be put up to enforce this.	Contractor	Construction
All construction and maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply with speed limits, to respect all forms of wildlife. Speed limits must still be enforced to ensure that road killings and erosion is limited.	Contractor	Construction
Schedule activities and operations during least sensitive periods, to avoid migration, nesting and breeding seasons.	Contractor	Construction
Any holes/deep excavations must be dug and planted in a progressive manner and shouldn't be left open overnight. Should the holes overnight they must be covered temporarily to ensure no small fauna species fall in.	Contractor	Construction
Ensure that cables and connections are insulated successfully to reduce electrocution risk.	Contractor	Construction
Any exposed parts must be covered (insulated) to reduce electrocution risk.	Contractor	Construction
A pest control plan must be put in place and implemented; it is imperative that poisons not be used due to the likely presence of SCCs	Contractor	Construction
Promote water infiltration into the ground beneath the solar panels. Release only clean water into the environment. A covering of soil and grass (regularly cut and maintained) below the solar panels is ideal for infiltration. If not feasible then gravel is preferable over concrete or paving.	Contractor	Construction

Performance Indicator	<ul style="list-style-type: none"> » No disturbance outside of designated work areas. » Minimised clearing of existing/natural vegetation and habitats for fauna. » Limited alien infestation within project control area. » Construction activities restricted to the development footprint.
------------------------------	---

Monitoring and Reporting	<ul style="list-style-type: none"> » Observation of vegetation clearing activities by ,the EO throughout the construction phase. » Monitoring of alien plant establishment within the site on an on-going basis.
---------------------------------	--

OBJECTIVE 4: Protection of cultural historical aspects

Project component/s	<ul style="list-style-type: none"> » Excavations of foundations. » Excavations of trenches for the installation of cabling and infrastructure.
Potential Impact	<ul style="list-style-type: none"> » Loss of archaeological artefacts. » Loss of fossil resources. » Impacts on heritage sites. » Impacts on graves or burial sites. » Loss of resources going unnoticed. » Destruction of resources
Activity/risk source	<ul style="list-style-type: none"> » All bulk earthworks.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To facilitate the likelihood of noticing heritage resources and ensure appropriate actions in terms of 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 must also be familiarised with procedures for dealing with heritage objects/sites.	Contractor	Construction
<p>Chance Find Procedure:</p> <ul style="list-style-type: none"> » Should any objects of archaeological remains, graves or skeletal material be found during construction activities, work must immediately stop in that area and the ECO must be informed. » The person who made the find must immediately report the find to his/her direct supervisor which in turn must report the find to his/her manager and the Environmental Officer (EO) (if appointed) or site manager . The EO must report the find to the relevant Heritage Agency (South African Heritage Research Agency, SAHRA). (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za). The information to the Heritage Agency must include photographs of the find, from various angles, as well as the GPS co-ordinates. » A preliminary report must be submitted to the Heritage Agency within 24 hours of the find and must include the following: 1) date of the find; 2) a description of the discovery and a 3) description of the fossil and its context 	Contractor	Construction

Mitigation: Action/control	Responsibility	Timeframe
<p>(depth and position of the fossil), GPS co-ordinates.</p> <ul style="list-style-type: none"> » Photographs (the more the better) of the discovery must be of high quality, in focus, accompanied by a scale. It is also important to have photographs of the vertical section (side) where the fossil was found. » <u>If any evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils or other categories of heritage resources are found during the proposed development, SAHRA APM Unit (Natasha Higgitt/Phillip Hine 021 462 5402) must be alerted as per section 35(3) of the NHRA.</u> » <u>If unmarked human burials are uncovered, the SAHRA Burial Grounds and Graves (BGG) Unit (Thingahangwi Tshivhase/Ngaalabutho Madida 012 320 8490), must be alerted immediately as per section 36(6) of the NHRA.</u> <p>Upon receipt of the preliminary report, the Heritage Agency will inform the EO (or site manager) whether a rescue excavation or rescue collection by a palaeontologist is necessary.</p> <ul style="list-style-type: none"> » The site must be secured to protect it from any further damage. No attempt should be made to remove material from their environment. The exposed finds must be stabilised and covered by a plastic sheet or sand bags. The Heritage agency will also be able to advise on the most suitable method of protection of the find. » In the event that the fossil cannot be stabilised the fossil may be collected with extreme care by the EO (or site manager). Fossils finds must be stored in tissue paper and in an appropriate box while due care must be taken to remove all fossil material from the rescue site. » Once Heritage Agency has issued the written authorisation, the developer may continue with the development. 		

<p>Performance Indicator</p>	<ul style="list-style-type: none"> » Reporting of and liaison about possible finds of heritage resources. » Heritage resources noticed and rescued. » All heritage items located are dealt with as per the legislative guidelines.
<p>Monitoring and Reporting</p>	<ul style="list-style-type: none"> » Ensure staff are aware of heritage resources and the procedure to follow when found. » EO to conduct inspections of open excavations.

OBJECTIVE 5: Appropriate handling and management of waste and hazardous substances

Project Component/s	<ul style="list-style-type: none"> » PV panels. » Access roads.
Potential Impact	<ul style="list-style-type: none"> » Inefficient use of resources resulting in excessive waste generation. » Litter or contamination of the site or water through poor waste management practices.
Activity/Risk Source	<ul style="list-style-type: none"> » Packaging. » Other construction wastes. » Hydrocarbon use and storage. » Spoil material from excavation, earthworks and site preparation.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To comply with waste management legislation. » To minimise production of waste. » To ensure appropriate waste storage and disposal. » To avoid environmental harm from waste disposal.

Mitigation: Action/Control	Responsibility	Timeframe
Implement an integrated waste management approach 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 an appropriately licensed landfill.	Contractor	Construction
Waste management must be a priority and all waste must be collected and stored effectively.	Contractor	Construction
Litter, spills, fuels, chemicals and human waste in and around the project area.	Contractor	Construction
The Contractor should supply sealable and properly marked domestic waste collection bins and all solid waste collected shall be disposed of at a licensed disposal facility	Contractor	Construction
Where a registered disposal facility is not available close to the project area, the Contractor shall provide a method statement with regard to waste management. Under no circumstances may domestic waste be burned on site	Contractor	Construction
Refuse bins will be emptied and secured Temporary storage of domestic waste shall be in covered waste skips. Maximum domestic waste storage period will be 10 days.	Contractor	Construction
Make sure all excess consumables and building materials / rubble is removed from site and deposited at an appropriate waste facility.	Contractor	Construction
A hydrocarbon spill management plan must be put in place to ensure that should there be any chemical spill out or over that it does not run into the surrounding areas. The Contractor shall be in possession of an emergency spill kit that must always be complete and available on site. Drip trays or any form of oil absorbent material must be placed underneath vehicles/machinery and equipment when not in use. No servicing of equipment on site unless necessary. All	Contractor	Construction

Mitigation: Action/Control	Responsibility	Timeframe
contaminated soil / yard stone shall be treated in situ or removed and be placed in containers. Appropriately contain any generator diesel storage tanks, machinery spills (e.g. accidental spills of hydrocarbons oils, diesel etc.) in such a way as to prevent them leaking and entering the environment. Construction activities and vehicles could cause spillages of lubricants, fuels and waste material potentially negatively affecting the functioning of the ecosystem. All vehicles and equipment must be maintained, and all re-fuelling and servicing of equipment is to take place in demarcated areas outside of the project area.		
Appropriately contain any generator diesel storage tanks, machinery spills (e.g. accidental spills of hydrocarbons oils, diesel etc.) or construction materials on site (e.g. concrete) in such a way as to prevent them leaking and entering the wetlands.	Contractor	Construction

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

OBJECTIVE 6: Ensure appropriate rehabilitation of disturbed areas

Project component/s	<ul style="list-style-type: none"> » PV panels. » Access roads.
Potential Impact	» Environmental integrity of the site undermined resulting in reduced visual aesthetics, erosion, compromised land capability and the requirement for on-going management intervention.
Activity/risk source	<ul style="list-style-type: none"> » Site preparation and earthworks. » Excavation of foundations and trenches. » Temporary laydown areas. » Temporary access roads/tracks. » Other disturbed areas/footprints.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To ensure and encourage site rehabilitation of disturbed areas. » To 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
Develop and implement a rehabilitation and closure plan.	Contractor	Construction
Appropriately rehabilitate the project area by ripping, landscaping, and re-vegetating with locally indigenous species.	Contractor	Construction
It is recommended that all areas surrounding the development footprint areas that have been degraded by traffic, laydown yards etc. must be ripped and revegetated by means of indigenous grass species. Mixed stands or monocultures will work sufficiently for revegetation purposes. Mixed stands tend to blend in with indigenous vegetation species and are more natural. Monocultures however could achieve high productivity. In general, indigenous vegetation should always be preferred due to various reasons including the aesthetical presence thereof as well as the ability of the species to adapt to its surroundings.	Contractor	Construction Rehabilitation

Performance Indicator	<ul style="list-style-type: none"> » All portions of site, including construction camp and working areas, cleared of equipment and temporary facilities. » Topsoil replaced on all areas and stabilised. » Disturbed areas rehabilitated and acceptable plant cover achieved on rehabilitated sites. » Closed site free of erosion and alien invasive plants.
Monitoring and Reporting	<ul style="list-style-type: none"> » On-going inspection of rehabilitated areas in order to determine the effectiveness of the rehabilitation measures implemented during the operational lifespan of the PV facility. » On-going alien plant monitoring and removal should be undertaken on an annual basis. » An incident reporting system must be used to record non-conformances to the EMPr.

CHAPTER 7: MANAGEMENT PROGRAMME - OPERATION

Overall Goal: To ensure that the operation of the PV facility within the additional footprint 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 Sannaspos Solar PV Facility in a way that:

- » Ensures that operation activities are properly managed in respect of environmental aspects and impacts.
- » Enables the PV facility operation activities to be undertaken without significant disruption to other land uses in the area.
- » Minimises impacts on fauna using the site.

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

7.1. Objectives

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

OBJECTIVE 1: Protection of plant and animal life and sensitive features

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

Mitigation: Action/Control	Responsibility	Timeframe
Areas of indigenous vegetation, even secondary communities outside of the direct project footprint, should under no circumstances be fragmented or disturbed further. No further loss of very high/high sensitivity areas should be permitted. It is recommended that areas to be developed be specifically	O&M Operator	Operation phase

Mitigation: Action/Control	Responsibility	Timeframe
demarcated so that during the construction phase, only the demarcated areas be impacted upon.		
Existing access routes, especially roads must be made use of.	O&M Operator	Operation phase
A hydrocarbon spill management plan must be put in place to ensure that should there be any chemical spill out or over that it does not run into the surrounding areas. The Contractor shall be in possession of an emergency spill kit that must always be complete and available on site. Drip trays or any form of oil absorbent material must be placed underneath vehicles/machinery and equipment when not in use. No servicing of equipment on site unless necessary. All contaminated soil / yard stone shall be treated in situ or removed and be placed in containers. Appropriately contain any generator diesel storage tanks, machinery spills (e.g. accidental spills of hydrocarbons oils, diesel etc.) in such a way as to prevent them leaking and entering the environment. Construction activities and vehicles could cause spillages of lubricants, fuels and waste material potentially negatively affecting the functioning of the ecosystem. All vehicles and equipment must be maintained, and all re-fuelling and servicing of equipment is to take place in demarcated areas outside of the project area.	O&M Operator	Operation phase
It should be made an offence for any staff to take/ bring any plant species into/out of any portion of the project area. No plant species whether indigenous or exotic should be brought into/taken from the project area, to prevent the spread of exotic or invasive species or the illegal collection of plants.	O&M Operator	Operation phase
A fire management plan needs to be complied and implemented to restrict the impact fire might have on the surrounding areas.	O&M Operator	Operation phase
Any potentially dangerous fauna such as snakes or fauna threatened by the maintenance and operational activities should be removed to a safe location.	O&M Operator	Operation phase
The collection, hunting or harvesting of any plants or animals at the site should be strictly forbidden by anyone except landowners or other individuals with the appropriate permits and permissions where required.	O&M Operator	Operation phase
Noise and disturbance on the site should be kept to a minimum during operation and maintenance activities.	O&M Operator	Operation phase
Outside lighting should be limited to minimize impacts on fauna. All outside lighting should be directed away from highly sensitive areas. Fluorescent and mercury vapor lighting should be avoided and sodium vapor (green/red) lights should be used wherever possible.	O&M Operator	Operation phase
All maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to	O&M Operator	Operation phase

Mitigation: Action/Control	Responsibility	Timeframe
comply with speed limits, to respect all forms of wildlife. Speed limits must still be enforced to ensure that road killings and erosion is limited.		
Schedule maintenance activities during least sensitive periods, to avoid migration, nesting and breeding seasons.	O&M Operator	Operation phase
Compilation of and implementation of an alien vegetation management plan.	O&M Operator	Operation phase
Waste management must be a priority and all waste must be collected and stored adequately. It is recommended that all waste be removed from site on a weekly basis to prevent rodents and pests entering the site.	O&M Operator	Operation phase
A pest control plan must be put in place and implemented; it is imperative that poisons not be used due to the likely presence of SCCs.	O&M Operator	Operation phase
Dust-reducing mitigation measures must be put in place and must be strictly adhered to. This includes wetting of exposed soft soil surfaces. No non environmentally friendly suppressants may be used as this could result in pollution of water sources.	O&M Operator	Operation phase
Speed limits must be put in place to reduce erosion. Reducing the dust generated by the listed activities above, especially the earth moving machinery, through wetting the soil surface and putting up signs to enforce speed limit as well as speed bumps built to force slow speeds. Signs must be put up to enforce this.	O&M Operator	Operation phase
Where possible, existing access routes and walking paths must be made use of.	O&M Operator	Operation phase
Areas that are denuded during construction need to be re-vegetated with indigenous vegetation to prevent erosion during flood events and strong winds.	O&M Operator	Operation phase

Performance Indicator	<ul style="list-style-type: none"> » No further disturbance to vegetation or terrestrial faunal habitats. » No erosion problems resulting from operational activities within the PV facility. » Low abundance of alien plants within affected areas. » Maintenance of a ground cover that resist erosion. » Continued improvement of rehabilitation efforts.
Monitoring	<ul style="list-style-type: none"> » Observation of vegetation on-site by environmental manager. » Regular inspections to monitor plant regrowth/performance of rehabilitation efforts and weed infestation compared to natural/undisturbed areas. » Annual monitoring with records of alien species presence and clearing actions. » Annual monitoring with records of erosion problems and mitigation actions taken with photographs.

flora and fauna. The ecological specialist must always be consulted by the ECO with respect to decision making when it comes to populations of protected or endangered flora and fauna. Aspects that will require monitoring during the life cycle of the proposed project are:

- » Compliance to best practise, the EMPr, conditions in the Environmental Authorisation and any other permits and licenses obtained.
- » Monitoring of any re-located populations of flora and fauna. These pertain especially to the likelihood of endangered Sungazer (*Cordylus giganteus*) occurring on the site.
- » Monitoring of any populations of protected species remaining on the site. These pertain especially to the population of Trapdoor Spider (*Stasimopus* sp.) and dwarf succulents (*Nananthus* sp.).
- » Monitoring of all faunal populations on the site. These pertain especially to the movement of mammals out of the site as well as the monitoring of animal burrows.
- » Monitoring of any faunal fatalities during the construction and operational phase of the project.
- » Monitoring of bird fatalities during the operational phase of the project.

All monitoring data will be documented and will be made available to any conservation body, Department of Environmental Affairs or any other entity with legitimate interest in the matter. If re- location of any protected or endangered fauna takes place the re-located population must be monitored daily during the first two weeks following re-location. Monitoring of such populations should take place weekly thereafter for a period of one year.

CHAPTER 8: MANAGEMENT PROGRAMME - DECOMMISSIONING

The PV infrastructure which will be utilised for the Sannaspos Solar PV Facility is expected to have a lifespan of 25 to 30 years (with maintenance). Equipment associated with this PV facility would only be decommissioned once it has reached the end of its economic life. It is most likely that decommissioning activities of the infrastructure of the PV facility would comprise the dismantling and replacement of the PV panels and supporting structures with more appropriate technology/infrastructure available at that time. It must be noted that decommissioning activities will need to be undertaken in accordance with the legislation applicable at that time, which may require this section of the EMP to be revisited and amended.

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

Site Preparation

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

Dismantle and Remove Infrastructure

The PV facility infrastructure (panels and supporting structure, inverters, etc) will be dismantled once it reaches the end of its economic lifespan. Once dismantled, the components will be reused, recycled, or disposed of in accordance with regulatory requirements (NEMA / NEM:WA). All parts of the facility would be considered reusable or recyclable except for the blades.

8.1. Objectives

In decommissioning the Sannaspos Solar PV Facility, Sannaspos Solar PV Facility (Pty) Ltd must ensure that:

- » All structures not required for the post-decommissioning use of the site (may include the PV panels, substation, ancillary buildings, monitoring masts) are dismantled and/or demolished, removed and waste material disposed of at an appropriately licensed waste disposal site or as required by the relevant legislation.
- » Rehabilitate access/service roads and servitudes not required for the post-decommissioning use of the site. If necessary, an ecologist should be consulted to give input into rehabilitation specifications.
- » All disturbed areas are compacted, sloped and contoured to ensure drainage and runoff and to minimise the risk of erosion.
- » Monitor rehabilitated areas quarterly for at least a year following decommissioning, and implement remedial action as and when required.
- » Any fauna encountered during decommissioning activities should be removed to safety by a suitably qualified person.
- » All vehicles to adhere to low speed limits (i.e. 30km/h max) on the site, to reduce risk of faunal collisions as well as reduce dust.
- » Retrenchments should comply with South African Labour legislation of the day.

The general specifications of Chapter 6 (Construction) are also relevant to the decommissioning of the Sannaspos Solar PV Facility and must be adhered to.

APPENDIX A

ENVIRONMENTAL SENSITIVITY MAP

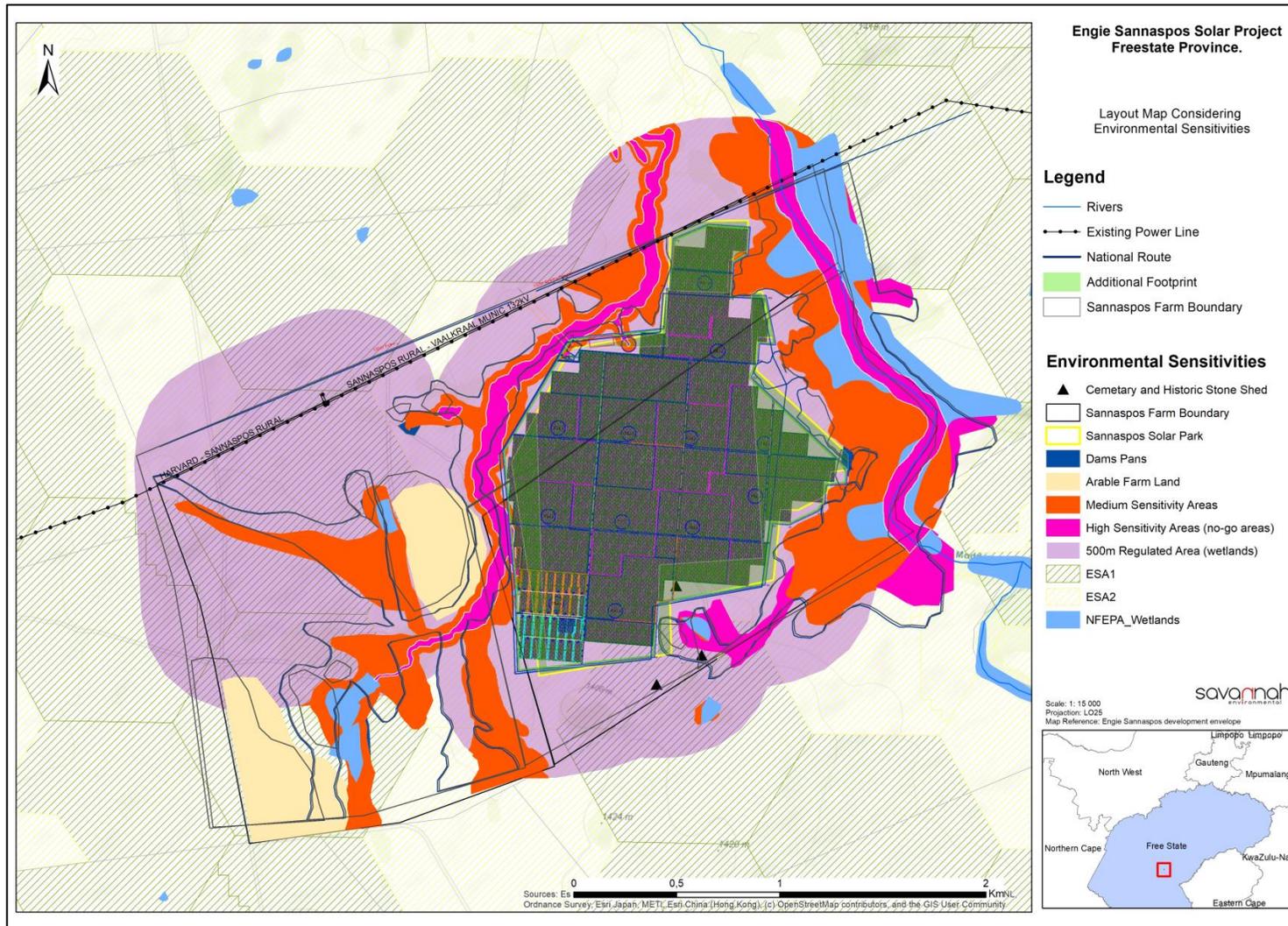


Figure 7.1: Final Layout for the Sannaspos Solar PV Project considering Environmental Sensitivities

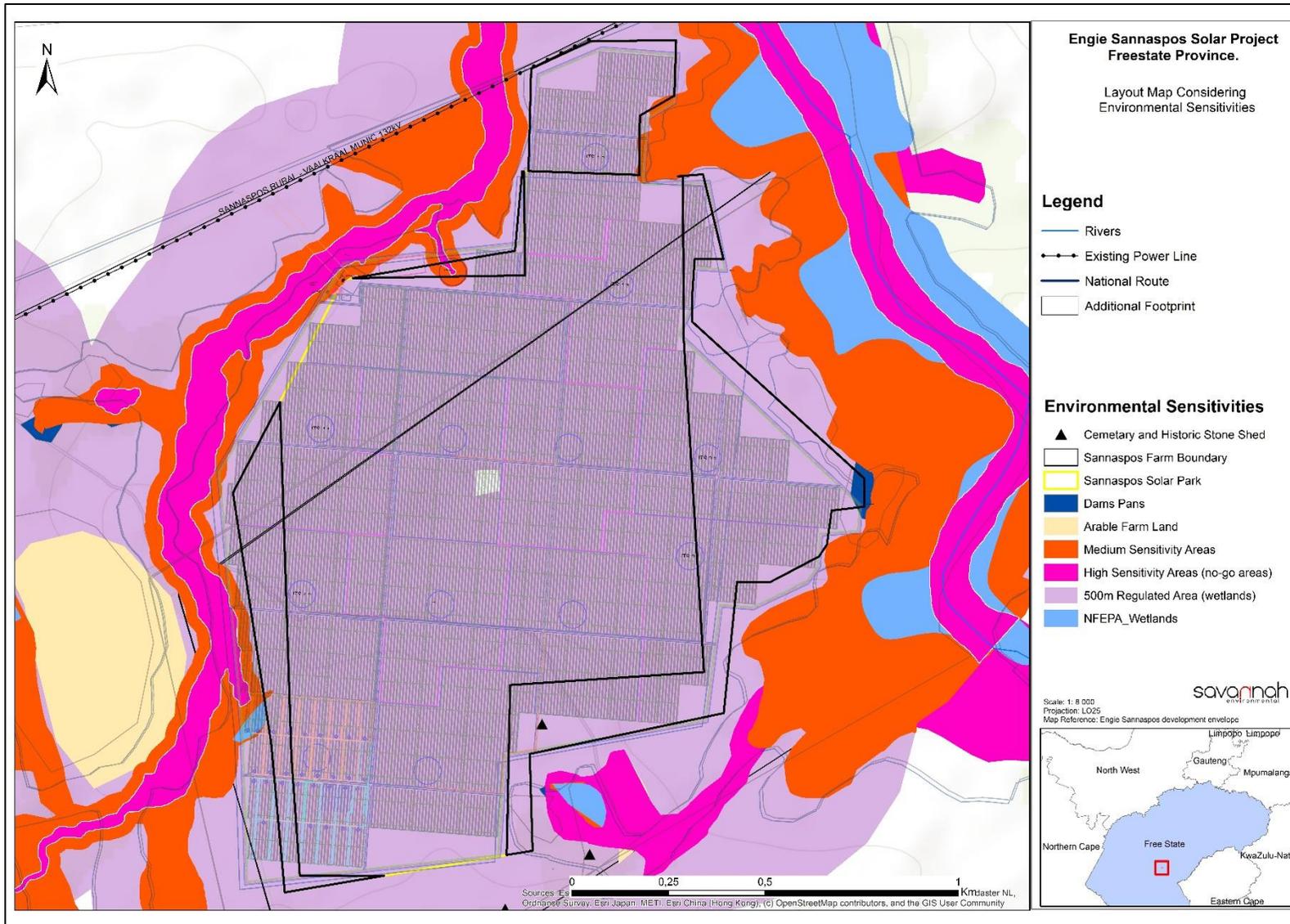


Figure 7.2: Final layout of the Sannaspos Solar PV Facility on the Authorised Area and on the Additional Footprint

APPENDIX B:

GRIEVANCE MECHANISM FOR PUBLIC COMPLAINTS AND ISSUES

GRIEVANCE MECHANISM / PROCESS

PURPOSE

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

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

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

PROCEDURE FOR RECEIVING AND RESOLVING GRIEVANCES

- » Local landowners, communities and authorities must be informed in writing by the Project Company of the grievance mechanism and the process by which grievances can be brought to the attention of the Project Company through its designated representative.
- » A company representative must be appointed as the contact person for grievances to be addressed to. The name and contact details of the contact person must be provided to local landowners, communities and authorities.
- » Project related grievances relating to the construction, operational and or decommissioning phase must be addressed in writing to the contact person. The contact person should assist local landowners and or communities who may lack resources to submit/prepare written grievances.
- » The grievance must be registered with the contact person who, within 2 working days of receipt of the grievance, must contact the Complainant to discuss the grievance and agree on suitable date and venue for a meeting in order to discuss the grievances raised. Unless otherwise agreed, the meeting should be held within 2 weeks of receipt of the grievance.
- » The contact person must draft a letter to be sent to the Complainant acknowledging receipt of the grievance, the name and contact details of Complainant, the nature of the grievance, the date that the grievance was raised, and the date and venue for the meeting (once agreed).
- » Prior to the meeting being held the contact person must contact the Complainant to discuss and agree on the parties who should attend the meeting. The people who will be required to attend the meeting will depend on the nature of the grievance. While the Complainant and or proponent are entitled to invite their legal representatives to attend the meeting/s, it should be made clear that to all the parties involved in the process that the grievance mechanism process is not a legal process. It is therefore recommended that the involvement of legal representatives be limited.
- » The meeting should be chaired by the company representative appointed to address grievances. The Project Company must provide a person to take minutes of and record the meeting/s. Any costs associated with hiring venues must be covered by the Project Company.

- » Draft copies of the minutes must be made available to the Complainant and the proponent within 4 working days of the meeting being held. Unless otherwise agreed, comments on the Draft Minutes must be forwarded to the company representative appointed to manage the grievance mechanism within 4 working days of receipt of the draft minutes.
- » In the event of the grievance being resolved to the satisfaction of all the parties concerned, the outcome must be recorded and signed off by the relevant parties. The record should provide details of the date of the meeting/s, the names of the people that attended the meeting/s, the outcome of the meeting/s, and where relevant, the measures identified to address the grievance, the party responsible for implementing the required measures, and the agreed upon timeframes for the measures to be implemented.
- » In the event of a dispute between the Complainant and the proponent regarding the grievance, the option of appointing an independent mediator to assist with resolving the issue should be discussed. The record of the meeting/s must note that a dispute has arisen and that the grievance has not been resolved to the satisfaction of all the parties concerned.
- » In the event that the parties agree to appoint a mediator, the Project Company will be required to identify three (3) mediators and forward the names and CVs to the Complainant within 2 weeks of the dispute being declared. The Complainant, in consultation with the Project Company, must identify the preferred mediator and agree on a date for the next meeting. The cost of the mediator must be borne by the Project Company. The Project Company must provide a person to take minutes of and record the meeting/s.
- » In the event of the grievance, with the assistance of the mediator, being resolved to the satisfaction of all the parties concerned, the outcome must be recorded and signed off by the relevant parties, including the mediator. The record should provide details on the date of the meeting/s, the names of the people that attended the meeting/s, the outcome of the meeting/s, and where relevant, the measures identified to address the grievance, the party responsible for implementing the required measures, and the agreed upon timeframes for the measures to be implemented.
- » In the event of the dispute not being resolved, the mediator must prepare a draft report that summarises the nature of the grievance and the dispute. The report should include a recommendation by the mediator on the proposed way forward with regard to the addressing the grievance.
- » The draft report must be made available to the Complainant and the Project Company for comment before being finalised and signed by all parties. Unless otherwise agreed, comments on the draft report must be forwarded to the company representative appointed to manage the grievance mechanism within 4 working days. The way forward will be informed by the recommendations of the mediator and the nature of the grievance.

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

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

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

APPENDIX C:

WASTE MANAGEMENT PLAN

WASTE MANAGEMENT PLAN

PURPOSE

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

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

RELEVANT ASPECTS OF THE SITE

General waste will be generated by the construction crew during the construction phase of the development as well as a limited amount of waste during the operational phase. This waste will be collected in containers and removed on a weekly basis to the nearest authorised landfill site (Allanridge/Odendaalsrus).

During construction sewage will be managed by on-site chemical toilets. During the Operational Phase the sewage generated will be managed by the use of a composting toilet which makes use of an aerobic process to treat human waste material. The system would not utilise water for the functioning and would therefore not produce any effluent.

Waste generated on site, originates from various sources including:

General Construction Waste

Contaminated water, soil and vegetation due to hydrocarbon spills.

Hydrocarbon waste from vehicle, equipment and machinery parts (oil cans, filters, rags etc), and servicing.

Recyclable waste in the form of paper, glass, steel, aluminium, wood/ wood pallets, plastic (PET bottles, PVC, LDPE), Cardboard and rockwool.Organic waste from food waste and alien vegetation removal.

Sewage from portable toilets and septic tanks.

Inert waste from excess rock and soil from site clearance and trenching works.

LEGISLATIVE REQUIREMENTS

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

National Environmental Management: Waste Act (NEM:WA), 2008 (Act 59 of 2008)

National Environmental Management: Waste Amendment Act, 2014 (Act 26 of 2014)

The South African Constitution (Act 108 of 1996)

Hazardous Substances Act (Act 5 of 1973)

Health Act (Act 63 of 1977)

Environment Conservation Act (Act 73 of 1989)

Occupational Health and Safety Act (Act 85 of 1993)

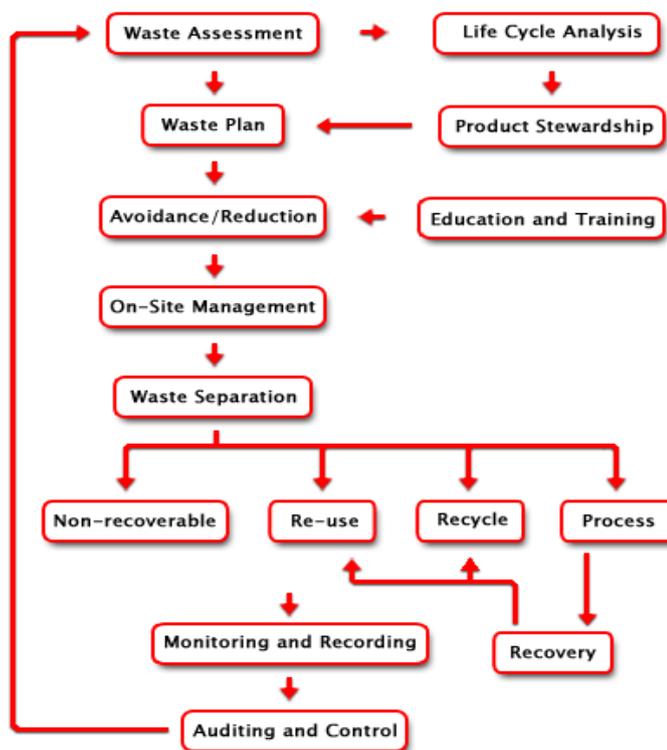
- National Water Act (Act 36 of 1998)
- The National Environmental Management Act (Act 107 of 1998)
- Municipal Structures Act (Act 117 of 1998)
- Municipal Systems Act (Act 32 of 2000)
- Mineral and Petroleum Resources Development Act (Act 28 of 2002)
- Air Quality Act (Act 39 of 2004)

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

WASTE MANAGEMENT PRINCIPLES

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

The Integrated Waste Management Approach to Waste



Source: <http://>

I=496

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

Reducing volumes of waste is a priority;

If reduction is not feasible, the maximum amount of waste is to be recycled; and

Waste that cannot be recycled is to be disposed of in the most environmentally responsible manner as possible.

Construction phase

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

4.1.1. Waste Assessment / Inventory

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

Construction method and materials should be carefully considered in view of waste reduction, re-use, and recycling opportunities.

Once a waste inventory has been established, targets for recovery of waste (minimisation, re-use, recycling) should be set.

The Environmental Officer must conduct waste classification and rating in terms of SANS 10288 and Government Notice 634 published under the NEM: WA.

4.1.2. Waste collection, handling and storage

Each subcontractor must implement their own waste recycling system, i.e. separate bins for food waste, plastics, paper, wood, glass cardboard, metals, etc.

Septic tanks and portable toilets must be monitored and maintained daily. Below ground storage of septic tanks must withstand the external forces of the surrounding environment. The area above the tank must be demarcated to prevent any vehicles or heavy machinery from driving around the area.

Waste collection bins and hazardous waste containers must be provided by the principal contractor and placed at various areas around site for the storage of organic, recyclable and hazardous waste.

A dedicated waste area must be established on site for the storage of all waste streams, before removal from site.

Signage/ colour coding must be used to differentiate disposal areas for the various waste streams (i.e. paper, cardboard, metals, food waste, glass etc.).

Hazardous waste must be stored within a bunded area constructed according to SABS requirements. The volume of waste stored in the bunds must not exceed 110% of the bund capacity.

The location of all temporary waste storage areas must aim to minimise the potential for impact on the surrounding environment, including prevention of contaminated runoff, seepage, and vermin control.

Waste storage shall be in accordance with all Regulations and best-practice guidelines and under no circumstances may waste be burnt on site.

A dedicated waste management team must be appointed by the principal contractors' EO, whom will be responsible for ensuring the continuous sorting of waste and maintenance of the area. The waste management team must be trained in all areas of waste management and monitored by the EO.

All waste removed from site must be done so by a registered/ licensed subcontractor, whom must supply information regarding how waste recycling/ disposal will be achieved. The registered subcontractor must provide waste manifests for all removals at least once a month.

4.1.3. Management of waste storage areas

The position of all waste storage areas must be located away from water courses and ensure minimal degradation to the environment. The main waste storage area must have a suitable storm water system separating clean and dirty storm water.

Collection bins placed around site and at subcontractors' camps must be maintained and emptied on a regular basis by the principal contractor.

Inspections and maintenance of the main waste storage area must be undertaken daily. Skips and storage containers must be clearly marked or colour coded and well-maintained, not allowing access to vermin or other rodents. Shade cloth should ideally be used to ensure avifauna does not have access to waste.

Waste must be stored in designated containers and not on the ground.

Inspections and maintenance of bunds must be undertaken daily. Bunds must be inspected for leaks or cracks in the foundation and walls.

It is assumed that any rainwater collected inside the bund is contaminated and must be removed and stored as hazardous waste, and not released into the environment. If any leaks occur in the bund, these must be removed immediately.

4.1.4. Disposal

Waste generated on site must be removed on a regular basis, as determined by the Environmental Officer. This frequency may change during construction depending on waste volumes generated at different stages of the construction process.

Waste must be removed by a suitably qualified contractor and disposed at an appropriately licensed landfill site. Proof of appropriate disposal must be provided by the contractor.

4.1.5. Record keeping

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

Documentation (waste manifest, certificate of issue or safe disposal) must be kept detailing the quantity, nature, and fate of any regulated waste for audit purposes.

Waste management must form part of the monthly reporting requirements in terms of volumes generated, types, storage and final disposal.

4.1.6. Training

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

Operational phase

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

The following waste management principles apply during the operational phase:

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

Adequate waste collection bins at site must be supplied. Separate bins should be provided for general and hazardous waste.

Recyclable waste must be removed from the waste stream and stored separately.

All waste must be stored in appropriate temporary storage containers (separated between different construction wastes, and contaminated or wet waste) at each construction area prior to being taken to the construction camp for final sorting (if required) and further temporary storage. Waste storage shall be in accordance with all best-practice guidelines and under no circumstances may waste be burnt on site.

Waste generated on site must be removed on a regular basis throughout the operational phase.

Waste must be removed by a suitably qualified contractor and disposed at an appropriately licensed landfill site. Proof of appropriate disposal must be provided by the contractor.

Monitoring of Waste Management Activities

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

Monthly volumes/ mass of the different waste streams collected;

Monthly volumes/ mass of the waste that is disposed of at a landfill site;

Monthly volumes/ mass of the waste that is recycled;

Data illustrating progress compared to previous months.

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

APPENDIX D

CURRICULUM VITAE OF THE PROJECT TEAM



CURRICULUM VITAE OF JO-ANNE THOMAS

Profession:	Environmental Management and Compliance Consultant; Environmental Assessment Practitioner
Specialisation:	Environmental Management; Strategic environmental advice; Environmental compliance advice & monitoring; Environmental Impact Assessments; Policy, strategy & guideline formulation; Project Management; General Ecology
Work experience:	Twenty four (24) years in the environmental field

VOCATIONAL EXPERIENCE

Provide technical input for projects in the environmental management field, specialising in Strategic Environmental Advice, Environmental Impact Assessment studies, environmental auditing and monitoring, environmental permitting, public participation, Environmental Management Plans and Programmes, environmental policy, strategy and guideline formulation, and integrated environmental management. Key focus on integration of the specialist environmental studies and findings into larger engineering-based projects, strategic assessment, and providing practical and achievable environmental management solutions and mitigation measures. Responsibilities for environmental studies include project management (including client and authority liaison and management of specialist teams); review and manipulation of data; identification and assessment of potential negative environmental impacts and benefits; review of specialist studies; and the identification of mitigation measures. Compilation of the reports for environmental studies is in accordance with all relevant environmental legislation.

Undertaking of numerous environmental management studies has resulted in a good working knowledge of environmental legislation and policy requirements. Recent projects have been undertaken for both the public- and private-sector, including compliance advice and monitoring, electricity generation and transmission projects, various types of linear developments (such as National Road, local roads and power lines), waste management projects (landfills), mining rights and permits, policy, strategy and guideline development, as well as general environmental planning, development and management.

SKILLS BASE AND CORE COMPETENCIES

- Project management for a range of projects
- Identification and assessment of potential negative environmental impacts and benefits through the review and manipulation of data and specialist studies
- Identification of practical and achievable mitigation and management measures and the development of appropriate management plans
- Compilation of environmental reports in accordance with relevant environmental legislative requirements
- External and peer review of environmental reports & compliance advice and monitoring
- Formulation of environmental policies, strategies and guidelines
- Strategic and regional assessments; pre-feasibility & site selection
- Public participation processes for a variety of projects



1st Floor, Block 2, 5 Woodlands Drive Office Park
Woodlands Drive, Woodmead
Johannesburg, South Africa

Email: joanne@savannahsa.com
Tel: +27 (11) 656 3237

-
- Strategic environmental advice to a wide variety of clients both in the public and private sectors
 - Working knowledge of environmental planning processes, policies, regulatory frameworks and legislation



EDUCATION AND PROFESSIONAL STATUS

Degrees:

- B.Sc Earth Sciences, University of the Witwatersrand, Johannesburg (1993)
- B.Sc Honours in Botany, University of the Witwatersrand, Johannesburg (1994)
- M.Sc in Botany, University of the Witwatersrand, Johannesburg (1996)

Short Courses:

- Environmental Impact Assessment, Potchefstroom University (1998)
- Environmental Law, Morgan University (2001)
- Environmental Legislation, IMBEWU (2017)
- Mining Legislation, Cameron Cross & Associates (2013)
- Environmental and Social Risk Management (ESRM), International Finance Corporation (2018)

Professional Society Affiliations:

- Registered EAP with the Environmental Assessment Practitioners Association of South Africa (EAPASA) (2019/726)
- Registered with the South African Council for Natural Scientific Professions as a Professional Natural Scientist: Environmental Scientist (400024/00)
- Registered with the International Associated for Impact Assessment South Africa (IAIAsa): 5601
- Member of the South African Wind Energy Association (SAWEA)

EMPLOYMENT

Date	Company	Roles and Responsibilities
January 2006 - Current:	Savannah Environmental (Pty) Ltd	Director Project manager Independent specialist environmental consultant, Environmental Assessment Practitioner (EAP) and advisor.
1997 – 2005:	Bohlweki Environmental (Pty) Ltd	Senior Environmental Scientist at. Environmental Management and Project Management
January – July 1997:	Sutherland High School, Pretoria	Junior Science Teacher

PROJECT EXPERIENCE

Project experience includes large infrastructure projects, including electricity generation and transmission, wastewater treatment facilities, mining and prospecting activities, property development, and national roads, as well as strategy and guidelines development.

RENEWABLE POWER GENERATION PROJECTS: PHOTOVOLTAIC SOLAR ENERGY FACILITIES

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Christiana PV 2 SEF, North West	Solar Reserve South Africa	Project Manager & EAP
De Aar PV facility, Northern Cape	iNca Energy	Project Manager & EAP

Project Name & Location	Client Name	Role
Everest SEF near Hennenman, Free State	FRV Energy South Africa	Project Manager & EAP
Graafwater PV SEF, Western Cape	iNca Energy	Project Manager & EAP
Grootkop SEF near Allanridge, Free State	FRV Energy South Africa	Project Manager & EAP
Hertzogville PV 2 SEF with 2 phases, Free State	SunCorp / Solar Reserve	Project Manager & EAP
Karoshhoek CPV facility on site 2 as part of the larger Karoshhoek Solar Valley Development East of Upington, Northern Cape	FG Emvelo	Project Manager & EAP
Kgabalatsane SEF North-East for Brits, North West	Built Environment African Energy Services	Project Manager & EAP
Kleinbegin PV SEF West of Groblershoop, Northern Cape	MedEnergy Global	Project Manager & EAP
Lethabo Power Station PV Installation, Free State	Eskom Holdings SoC Limited	Project Manager & EAP
Majuba Power Station PV Installation, Mpumalanga	Eskom Holdings SoC Limited	Project Manager & EAP
Merapi PV SEF Phase 1 – 4 South-East of Excelsior, Free State	SolaireDirect Southern Africa	Project Manager & EAP
Sannaspos Solar Park, Free State	SolaireDirect Southern Africa	Project Manager & EAP
Ofir-Zx PV Plant near Keimoes, Northern Cape	S28 Degrees Energy	Project Manager & EAP
Oryx SEF near Virginia, Free State	FRV Energy South Africa	Project Manager & EAP
Project Blue SEF North of Kleinsee, Northern Cape	WWK Development	Project Manager & EAP
S-Kol PV Plant near Keimoes, Northern Cape	S28 Degrees Energy	Project Manager & EAP
Sonnenberg PV Plant near Keimoes, Northern Cape	S28 Degrees Energy	Project Manager & EAP
Tutuka Power Station PV Installation, Mpumalanga	Eskom Transmission	Project Manager & EAP
Two PV sites within the Northern Cape	MedEnergy Global	Project Manager & EAP
Two PV sites within the Western & Northern Cape	iNca Energy	Project Manager & EAP
Upington PV SEF, Northern Cape	MedEnergy Global	Project Manager & EAP
Vredendal PV facility, Western Cape	iNca Energy	Project Manager & EAP
Waterberg PV plant, Limpopo	Thupela Energy	Project Manager & EAP
Watershed Phase I & II SEF near Litchtenburg, North West	FRV Energy South Africa	Project Manager & EAP
Alldays PV & CPV SEF Phase 1, Limpopo	BioTherm Energy	Project Manager & EAP
Hyperion PV Solar Development 1, 2, 3, 4, 5 & 6, Northern Cape	Building Energy	Project Manager & EAP
Vrede & Rondavel PV, Free State	Mainstream Renewable Energy Developments	Project Manager & EAP

Environmental Impact Assessments

Project Name & Location	Client Name	Role
Aberdeen PV SEF, Eastern Cape	BioTherm Energy	Project Manager & EAP
Christiana PV 1 SEF on Hartebeestpan Farm, North-West	Solar Reserve South Africa	Project Manager & EAP
Heuningspruit PV1 & PV 2 facilities near Koppies, Free State	Sun Mechanics	Project Manager & EAP
Kakamas PV Facility, Northern Cape	iNca Energy	Project Manager & EAP
Kakamas II PV Facility, Northern Cape	iNca Energy	Project Manager & EAP

Project Name & Location	Client Name	Role
Machadodorp 1 PV SEF, Mpumalanga	Solar To Benefit Africa	Project Manager & EAP
PV site within the Northern Cape	iNca Energy	Project Manager & EAP
PV sites within 4 ACSA airports within South Africa, National	Airports Company South Africa (ACSA)	Project Manager & EAP
RustMo1 PV Plant near Buffelspoort, North West	Momentous Energy	Project Manager & EAP
RustMo2 PV Plant near Buffelspoort, North West	Momentous Energy	Project Manager & EAP
RustMo3 PV Plant near Buffelspoort, North West	Momentous Energy	Project Manager & EAP
RustMo4 PV Plant near Buffelspoort, North West	Momentous Energy	Project Manager & EAP
Sannaspos PV SEF Phase 2 near Bloemfontein, Free State	SolaireDirect Southern Africa	Project Manager & EAP
Solar Park Expansion within the Rooiwal Power Station, Gauteng	AFRKO Energy	Project Manager & EAP
Steynsrus SEF, Free State	SunCorp	Project Manager & EAP
Sirius Solar PV Project Three and Sirius Solar PV Project Four (BA in terms of REDZ regulations), Northern Cape	SOLA Future Energy	Project Manager & EAP
Northam PV, Limpopo Province	Northam Platinum	Project Manager & EAP
Kolkies PV Suite (x 6 projects) and Sadawa PV Suite (x 4 projects), Western Cape	Mainstream Renewable Energy Developments	Project Manager & EAP

Screening Studies

Project Name & Location	Client Name	Role
Allemans Fontein SEF near Noupoot, Northern Cape	Fusion Energy	Project Manager & EAP
Amandel SEF near Thabazimbi, Limpopo	iNca Energy	Project Manager & EAP
Arola/Doomplaat SEF near Ventersdorp, North West	FRV & iNca Energy	Project Manager & EAP
Bloemfontein Airport PV Installation, Free State	The Power Company	Project Manager & EAP
Brakspruit SEF near Klerksorp, North West	FRV & iNca Energy	Project Manager & EAP
Carolus Poort SEF near Noupoot, Northern Cape	Fusion Energy	Project Manager & EAP
Damfontein SEF near Noupoot, Northern Cape	Fusion Energy	Project Manager & EAP
Everest SEF near Welkom, Free State	FRV & iNca Energy	Project Manager & EAP
Gillmer SEF near Noupoot, Northern Cape	Fusion Energy	Project Manager & EAP
Grootkop SEF near Allansridge, Free State	FRV & iNca Energy	Project Manager & EAP
Heuningspruit PV1 & PV 2 near Koppies, Free State	Cronimat	Project Manager & EAP
Kimberley Airport PV Installation, Northern Cape	The Power Company	Project Manager & EAP
Kolonnade Mall Rooftop PV Installation in Tshwane, Gauteng	Momentous Energy	Project Manager & EAP
Loskop SEF near Groblersdal, Limpopo	S&P Power Unit	Project Manager & EAP
Marble SEF near Marble Hall, Limpopo	S&P Power Unit	Project Manager & EAP
Morgenson PV1 SEF South-West of Windsorton, Northern Cape	Solar Reserve South Africa	Project Manager & EAP
OR Tambo Airport PV Installation, Gauteng	The Power Company	Project Manager & EAP
Oryx SEF near Virginia, Free State	FRV & iNca Energy	Project Manager & EAP
Rhino SEF near Vaalwater, Limpopo	S&P Power Unit	Project Manager & EAP
Rustmo2 PV Plant near Buffelspoort, North West	Momentous Energy	Project Manager & EAP
Spitskop SEF near Northam, Limpopo	FRV & iNca Energy	Project Manager & EAP

Project Name & Location	Client Name	Role
Steynsrus PV, Free State	Suncorp	Project Manager & EAP
Tabor SEF near Polokwane, Limpopo	FRV & iNca Energy	Project Manager & EAP
Upington Airport PV Installation, Northern Cape	The Power Company	Project Manager & EAP
Valeria SEF near Hartebeestpoort Dam, North West	Solar to Benefit Africa	Project Manager & EAP
Watershed SEF near Lichtenburg, North West	FRV & iNca Energy	Project Manager & EAP
Witkop SEF near Polokwane, Limpopo	FRV & iNca Energy	Project Manager & EAP
Woodmead Retail Park Rooftop PV Installation, Gauteng	Momentous Energy	Project Manager & EAP

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
ECO and bi-monthly auditing for the construction of the Adams Solar PV Project Two South of Hotazel, Northern Cape	Enel Green Power	Project Manager
ECO for the construction of the Kathu PV Facility, Northern Cape	REISA	Project Manager
ECO and bi-monthly auditing for the construction of the Pulida PV Facility, Free State	Enel Green Power	Project Manager
ECO for the construction of the RustMo1 SEF, North West	Momentous Energy	Project Manager
ECO for the construction of the Sishen SEF, Northern Cape	Windfall 59 Properties	Project Manager
ECO for the construction of the Upington Airport PV Facility, Northern Cape	Sublary Trading	Project Manager
Quarterly compliance monitoring of compliance with all environmental licenses for the operation activities at the Kathu PV facility, Northern Cape	REISA	Project Manager
ECO for the construction of the Konkoonsies II PV SEF and associated infrastructure, Northern Cape	BioTherm Energy	Project Manager
ECO for the construction of the Aggeneys PV SEF and associated infrastructure, Northern Cape	BioTherm Energy	Project Manager

Compliance Advice and ESAP Reporting

Project Name & Location	Client Name	Role
Aggeneys Solar Farm, Northern Cape	BioTherm Energy	Environmental Advisor
Airies II PV Facility SW of Kenhardt, Northern Cape	BioTherm Energy	Environmental Advisor
Kalahari SEF Phase II in Kathu, Northern Cape	Engie	Environmental Advisor
Kathu PV Facility, Northern Cape	Building Energy	Environmental Advisor
Kenhardt PV Facility, Northern Cape	BioTherm Energy	Environmental Advisor
Kleinbegin PV SEF West of Groblershoop, Northern Cape	MedEnergy	Environmental Advisor
Konkoonsies II SEF near Pofadder, Northern Cape	BioTherm Energy	Environmental Advisor
Konkoonsies Solar Farm, Northern Cape	BioTherm Energy	Environmental Advisor
Lephalale SEF, Limpopo	Exxaro	Environmental Advisor

Project Name & Location	Client Name	Role
Pixley ka Seme PV Park, South-East of De Aar, Northern Cape	African Clean Energy Developments (ACED)	Environmental Advisor
RustMo1 PV Plant near Buffelspoort, North West	Momentous Energy	Environmental Advisor
Scuitdrift 1 SEF & Scuitdrift 2 SEF, Limpopo	Building Energy	Environmental Advisor
Sirius PV Plants, Northern Cape	Aurora Power Solutions	Environmental Advisor
Upington Airport PV Power Project, Northern Cape	Sublunary Trading	Environmental Advisor
Upington SEF, Northern Cape	Abengoa Solar	Environmental Advisor
Ofir-ZX PV SEF near Keimoes, Northern Cape	Networx S28 Energy	Environmental Advisor
Environmental Permitting for the Steynsrus PV1 & PV2 SEF's, Northern Cape	Cronimet Power Solutions	Environmental Advisor
Environmental Permitting for the Heuningspruit PV SEF, Northern Cape	Cronimet Power Solutions	Environmental Advisor

Due Diligence Reporting

Project Name & Location	Client Name	Role
5 PV SEF projects in Lephalale, Limpopo	iNca Energy	Environmental Advisor
Prieska PV Plant, Northern Cape	SunEdison Energy India	Environmental Advisor
Sirius Phase One PV Facility near Upington, Northern Cape	Aurora Power Solutions	Environmental Advisor

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

Project Name & Location	Client Name	Role
Biodiversity Permit & WULA for the Aggeneys SEF near Aggeneys, Northern Cape	BioTherm Energy	Project Manager & EAP
Biodiversity Permit for the Konkoonises II SEF near Pofadder, Northern Cape	BioTherm Energy	Project Manager & EAP
Biodiversity Permitting for the Lephalale SEF, Limpopo	Exxaro Resources	Project Manager & EAP
Environmental Permitting for the Kleinbegin PV SEF West of Groblershoop, Northern Cape	MedEnergy	Project Manager & EAP
Environmental Permitting for the Upington SEF, Northern Cape	Abengoa Solar	Project Manager & EAP
Environmental Permitting for the Kathu PV Facility, Northern Cape	Building Energy	Project Manager & EAP
Environmental Permitting for the Konkoonsies Solar Farm, Northern Cape	BioTherm Energy	Project Manager & EAP
Environmental Permitting for the Lephalale SEF, Limpopo	Exxaro Resources	Project Manager & EAP
Environmental Permitting for the Scuitdrift 1 SEF & Scuitdrift 2 SEF, Limpopo	Building Energy	Project Manager & EAP
Environmental Permitting for the Sirius PV Plant, Northern Cape	Aurora Power Solutions	Project Manager & EAP
Environmental Permitting for the Steynsrus PV1 & PV2 SEF's, Northern Cape	Cronimet Power Solutions	Project Manager & EAP

Project Name & Location	Client Name	Role
Environmental Permitting for the Heuningspruit PV SEF, Northern Cape	Cronimet Power Solutions	Project Manager & EAP
Permits for the Kleinbegin and UAP PV Plants, Northern Cape	MedEnergy Global	Project Manager & EAP
S53 Application for Arriesfontein Solar Park Phase 1 – 3 near Danielskuil, Northern Cape	Solar Reserve / SunCorp	Project Manager & EAP
S53 Application for Hertzogville PV1 & PV 2 SEFs, Free State	Solar Reserve / SunCorp	Project Manager & EAP
S53 Application for the Bloemfontein Airport PV Facility, Free State	Sublunary Trading	Project Manager & EAP
S53 Application for the Kimberley Airport PV Facility, Northern Cape	Sublunary Trading	Project Manager & EAP
S53 Application for the Project Blue SEF, Northern Cape	WWK Developments	Project Manager & EAP
S53 Application for the Upington Airport PV Facility, Free State	Sublunary Trading	Project Manager & EAP
WULA for the Kalahari SEF Phase II in Kathu, Northern Cape	Engie	Project Manager & EAP

RENEWABLE POWER GENERATION PROJECTS: CONCENTRATED SOLAR FACILITIES (CSP)

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Ilanga CSP 2, 3, 4, 5, 7 & 9 Facilities near Upington, Northern Cape	Emvelo Holdings	Project Manager & EAP
Ilanga CSP near Upington, Northern Cape	Ilangethu Energy	Project Manager & EAP
Ilanga Tower 1 Facility near Upington, Northern Cape	Emvelo Holdings	Project Manager & EAP
Karoshhoek CPVPD 1-4 facilities on site 2 as part of the larger Karoshhoek Solar Valley Development East of Upington, Northern Cape	FG Emvelo	Project Manager & EAP
Karoshhoek CSP facilities on sites 1.4; 4 & 5 as part of the larger Karoshhoek Solar Valley Development East of Upington, Northern Cape	FG Emvelo	Project Manager & EAP
Karoshhoek Linear Fresnel 1 Facility on site 1.1 as part of the larger Karoshhoek Solar Valley Development East of Upington, Northern Cape	FG Emvelo	Project Manager & EAP

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
ECO for the construction of the !Khi CSP Facility, Northern Cape	Abengoa Solar	Project Manager
ECO for the construction of the Ilanga CSP 1 Facility near Upington, Northern Cape	Karoshhoek Solar One	Project Manager
ECO for the construction of the solar Park, Northern	Kathu Solar	Project Manager

Project Name & Location	Client Name	Role
Cape		
ECO for the construction of the KaXu! CSP Facility, Northern Cape	Abengoa Solar	Project Manager
Internal audit of compliance with the conditions of the IWUL issued to the Karoshoek Solar One CSP Facility, Northern Cape	Karoshoek Solar One	Project Manager

Screening Studies

Project Name & Location	Client Name	Role
Upington CSP (Tower) Plant near Kanoneiland, Northern Cape	iNca Energy and FRV	Project Manager & EAP

Compliance Advice and ESAP reporting

Project Name & Location	Client Name	Role
Ilanga CSP Facility near Upington, Northern Cape	Ilangethu Energy	Environmental Advisor
Ilangaletu CSP 2, Northern Cape	FG Emvelo	Environmental Advisor
Kathu CSP Facility, Northern Cape	GDF Suez	Environmental Advisor
Lephalale SEF, Limpopo	Cennergi	Environmental Advisor
Solis I CSP Facility, Northern Cape	Brightsource	Environmental Advisor

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

Project Name & Location	Client Name	Role
Environmental Permitting for the Ilanga CSP Facility near Upington, Northern Cape	Ilangethu Energy	Project Manager & EAP
Environmental Permitting for the Kathu CSP, Northern Cape	GDF Suez	Project Manager & EAP
WULA for the Solis I CSP Facility, Northern Cape	Brightsource	Project Manager & EAP

RENEWABLE POWER GENERATION PROJECTS: WIND ENERGY FACILITIES

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Sere WEF, Western Cape	Eskom Holdings SoC Limited	EAP
Aberdeen WEF, Eastern Cape	Eskom Holdings SoC Limited	Project Manager & EAP
Amakhala Emoyeni WEF, Eastern Cape	Windlab Developments	Project Manager & EAP
EXXARO West Coast WEF, Western Cape	EXXARO Resources	Project Manager & EAP
Goereesoe Wind Farm near Swellendam, Western Cape	iNca Energy	Project Manager & EAP
Hartneest WEF, Western Cape	Juwi Renewable Energies	Project Manager & EAP
Hopefield WEF, Western Cape	Umoya Energy	EAP
Kleinsee WEF, Northern Cape	Eskom Holdings SoC Limited	Project Manager & EAP
Klipheuwel/Dassiesfontein WEF within the Overberg area, Western Cape	BioTherm Energy	Project Manager & EAP
Moorreesburg WEF, Western Cape	iNca Energy	Project Manager & EAP
Oyster Bay WEF, Eastern Cape	Renewable Energy Resources Southern Africa	Project Manager & EAP
Project Blue WEF, Northern Cape	Windy World	Project Manager & EAP
Rhebokfontein WEF, Western Cape	Moyeng Energy	Project Manager & EAP
Spitskop East WEF near Riebeeck East, Eastern Cape	Renewable Energy Resources Southern Africa	Project Manager & EAP
Suurplaat WEF, Western Cape	Moyeng Energy	Project Manager & EAP
Swellendam WEF, Western Cape	IE Swellendam	Project Manager & EAP
Tsitsikamma WEF, Eastern Cape	Exxarro	Project Manager & EAP
West Coast One WEF, Western Cape	Moyeng Energy	Project Manager & EAP

Environmental Impact Assessments

Project Name & Location	Client Name	Role
Amakhala Emoyeni Wind Monitoring Masts, Eastern Cape	Windlab Developments	Project Manager & EAP
Beaufort West Wind Monitoring Masts, Western Cape	Umoya Energy	Project Manager & EAP
Hopefield Community Wind Farm near Hopefield, Western Cape	Umoya Energy	Project Manager & EAP
Koekenaap Wind Monitoring Masts, Western Cape	EXXARO Resources	Project Manager & EAP
Koingnaas WEF, Northern Cape	Just Palm Tree Power	Project Manager & EAP
Laingsburg Area Wind Monitoring Masts, Western Cape	Umoya Energy	Project Manager & EAP
Overberg Area Wind Monitoring Masts, Western Cape	BioTherm Energy	Project Manager & EAP
Oyster Bay Wind Monitoring Masts, Eastern Cape	Renewable Energy Systems Southern Africa (RES)	Project Manager & EAP
Wind Garden & Fronteer WEFs, Eastern Cape	Wind Relc	Project Manager & EAP

Screening Studies

Project Name & Location	Client Name	Role
Albertinia WEF, Western Cape	BioTherm Energy	Project Manager & EAP
Koingnaas WEF, Northern Cape	Just Pal Tree Power	Project Manager & EAP
Napier Region WEF Developments, Western Cape	BioTherm Energy	Project Manager & EAP
Tsitsikamma WEF, Eastern Cape	Exxarro Resources	Project Manager & EAP
Various WEFs within an identified area in the Overberg area, Western Cape	BioTherm Energy	Project Manager & EAP
Various WEFs within an identified area on the West Coast, Western Cape	Investec Bank Limited	Project Manager & EAP
Various WEFs within an identified area on the West Coast, Western Cape	Eskom Holdings Limited	Project Manager & EAP
Various WEFs within the Western Cape	Western Cape Department of Environmental Affairs and Development Planning	Project Manager & EAP
Velddrift WEF, Western Cape	VentuSA Energy	Project Manager & EAP
Wind 1000 Project	Thabo Consulting on behalf of Eskom Holdings	Project Manager & EAP
Wittekleibosch, Snylip & Doriskraal WEFs, Eastern Cape	Exxarro Resources	Project Manager & EAP

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
ECO for the construction of the West Coast One WEF, Western Cape	Aurora Wind Power	Project Manager
ECO for the construction of the Gouda WEF, Western Cape	Blue Falcon	Project Manager
EO for the Dassiesklip Wind Energy Facility, Western Cape	Group 5	Project Manager
Quarterly compliance monitoring of compliance with all environmental licenses for the operation activities at the Gouda Wind Energy facility near Gouda, Western Cape	Blue Falcon	Project Manager
Annual auditing of compliance with all environmental licenses for the operation activities at the West Coast One Wind Energy facility near Vredenburg, Western Cape	Aurora Wind Power	Project Manager
External environmental and social audit for the Amakhala Wind Farm, Eastern Cape	Cennergi	Project Manager
External environmental and social audit for the Tsitsikamma Wind Farm, Eastern Cape	Cennergi	Project Manager
ECO for the construction of the Excelsior Wind Farm and associated infrastructure, Northern Cape	BioTherm Energy	Project Manager
External compliance audit of the Dassiesklip Wind Energy Facility, Western Cape	BioTherm Energy	Project Manager

Compliance Advice

Project Name & Location	Client Name	Role
Amakhala Phase 1 WEF, Eastern Cape	Cennergi	Environmental Advisor
Dassiesfontein WEF within the Overberg area, Western Cape	BioTherm Energy	Environmental Advisor
Excelsior Wind Farm, Western Cape	BioTherm Energy	Environmental Advisor
Great Karoo Wind Farm, Northern Cape	African Clean Energy Developments (ACED)	Environmental Advisor
Hopefield Community WEF, Western Cape	African Clean Energy Developments (ACED)	Environmental Advisor
Rheboksfontein WEF, Western Cape	Moyeng Energy	Environmental Advisor
Tiqua WEF, Western Cape	Cennergi	Environmental Advisor
Tsitsikamma WEF, Eastern Cape	Cennergi	Environmental Advisor
West Coast One WEF, Western Cape	Moyeng Energy	Environmental Advisor

Due Diligence Reporting

Project Name & Location	Client Name	Role
Witteberg WEF, Western Cape	EDPR Renewables	Environmental Advisor
IPD Vredenburg WEF within the Saldanha Bay area, Western Cape	IL&FS Energy Development Company	Environmental Advisor

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

Project Name & Location	Client Name	Role
Biodiversity Permitting for the Power Line between the Tsitsikamma Community WEF & the Diep River Substation, Eastern Cape	Cennergi	Project Manager & EAP
Biodiversity Permitting for the West Coast One WEF, Western Cape	Aurora Wind Power	Project Manager & EAP
Environmental Permitting for the Excelsior WEF, Western Cape	BioTherm Energy	Project Manager & EAP
Plant Permits & WULA for the Tsitsikamma Community WEF, Eastern Cape	Cennergi	Project Manager & EAP
S24G and WULA for the Rectification for the commencement of unlawful activities on Ruimsig AH in Honeydew, Gauteng	Hossam Soror	Project Manager & EAP
S24G Application for the Rheboksfontein WEF, Western Cape	Ormonde - Theo Basson	Project Manager & EAP
S53 Application & WULA for Suurplaat and Gemini WEFs, Northern Cape	Engie	Project Manager & EAP
S53 Application for the Hopefield Community Wind Farm near Hopefield, Western Cape	Umoya Energy	Project Manager & EAP
S53 Application for the Project Blue WEF, Northern Cape	WWK Developments	Project Manager & EAP
S53 for the Oyster Bay WEF, Eastern Cape	RES	Project Manager & EAP
WULA for the Great Karoo Wind Farm, Northern Cape	African Clean Energy Developments (ACED)	Project Manager & EAP

CONVENTIONAL POWER GENERATION PROJECTS (COAL)

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Mutsho Power Station near Makhado, Limpopo	Mutsho Consortium	Project Manager & EAP
Coal-fired Power Station near Ogies, Mpumalanga	Ruukki SA	Project Manager & EAP
Thabametsi IPP Coal-fired Power Station, near Lephhalale, Limpopo	Axia	Project Manager & EAP
Transalloys Coal-fired Power Station, Mpumalanga	Transalloys	Project Manager & EAP
Tshivasho IPP Coal-fired Power Station (with WML), near Lephhalale, Limpopo	Cennergi	Project Manager & EAP
Umbani Coal-fired Power Station, near Kriel, Mpumalanga	ISS Global Mining	Project Manager & EAP
Waterberg IPP Coal-Fired Power Station near Lephhalale, Limpopo	Exxaro Resources	Project Manager & EAP

Environmental Impact Assessments

Project Name & Location	Client Name	Role
Coal Stockyard on Medupi Ash Dump Site, Limpopo	Eskom Holdings	Project Manager & EAP
Biomass Co-Firing Demonstration Facility at Arnot Power Station East of Middleburg, Mpumalanga	Eskom Holdings	Project Manager & EAP

Screening Studies

Project Name & Location	Client Name	Role
Baseload Power Station near Lephhalale, Limpopo	Cennergi	Project Manager & EAP
Coal-Fired Power Plant near Delmas, Mpumalanga	Exxaro Resources	Project Manager & EAP
Makhado Power Station, Limpopo	Mutsho Consortium, Limpopo	Project Manager & EAP

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
ECO for the Camden Power Station, Mpumalanga	Eskom Holdings	Project Manager

Compliance Advice

Project Name & Location	Client Name	Role
Thabametsi IPP Coal-fired Power Station, near Lephhalale, Limpopo	Axia	Environmental Advisor

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

Project Name & Location	Client Name	Role
Permit application for the Thabametsi Bulk Water Pipeline, near Lephhalale, Limpopo	Axia	Project Manager & EAP
S53 & WULA for the Waterberg IPP Coal-Fired Power Station near Lephhalale, Limpopo	Exxaro Resources	Project Manager & EAP
S53 Application for the Tshivasho Coal-fired Power Station near Lephhalale, Limpopo	Cennergi	Project Manager & EAP

CONVENTIONAL POWER GENERATION PROJECTS (GAS)

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Ankerlig OCGT to CCGT Conversion project & 400 kV transmission power line between Ankerlig and the Omega Substation, Western Cape	Eskom Holdings SoC Limited	Project Manager & EAP
Gourikwa OCGT to CCGT Conversion project & 400kV transmission power line between Gourikwa & Proteus Substation, Western Cape	Eskom Holdings SoC Limited	Project Manager & EAP
Richards Bay Gas to Power Combined Cycle Power Station, KwaZulu-Natal	Eskom Holdings SoC Limited	Project Manager & EAP
Richards Bay Gas to Power Plant, KwaZulu-Natal	Richards Bay Gas Power 2	Project Manager & EAP
Decommissioning & Recommissioning of 3 Gas Turbine Units at Acacia Power Station & 1 Gas Turbine Unit at Port Rex Power Station to the existing Ankerlig Power Station in Atlantis Industria, Western Cape	Eskom Holdings	Project Manager & EAP
320MW gas-to-power station in Richards Bay, KwaZulu-Natal	Phinda Power Projects	Project Manager & EAP

Screening Studies

Project Name & Location	Client Name	Role
Fatal Flaw Analysis for 3 area identified for the establishment of a 500MW CCGT Power Station	Globeleq Advisors Limited	Project Manager & EAP
Richards Bay Gas to Power Combined Cycle Power Station, KwaZulu-Natal	Eskom Holdings SoC Limited	Project Manager & EAP

GRID INFRASTRUCTURE PROJECTS

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Aggeneis-Oranjemond Transmission Line & Substation Upgrade, Northern Cape	Eskom Transmission	Project Manager & EAP
Ankerlig-Omega Transmission Power Lines, Western Cape	Eskom Transmission	Project Manager & EAP
Karoshhoek Grid Integration project as part of the Karoshhoek Solar Valley Development East of Uptington, Northern Cape	FG Emvelo	Project Manager & EAP
Koeberg-Omega Transmission Power Lines,, Western Cape	Eskom Transmission	Project Manager & EAP
Koeberg-Stikland Transmission Power Lines, Western Cape	Eskom Transmission	Project Manager & EAP
Kyalami Strengthening Project, Gauteng	Eskom Transmission	Project Manager & EAP

Project Name & Location	Client Name	Role
Mokopane Integration Project, Limpopo	Eskom Transmission	Project Manager & EAP
Saldanha Bay Strengthening Project, Western Cape	Eskom Transmission	Project Manager & EAP
Steelpoort Integration Project, Limpopo	Eskom Transmission	Project Manager & EAP
Transmission Lines from the Koeberg-2 Nuclear Power Station site, Western Cape	Eskom Transmission	Project Manager & EAP
Tshwane Strengthening Project, Phase 1, Gauteng	Eskom Transmission	Project Manager & EAP
Main Transmission Substation (MTS) associated with the Choje Wind Farm cluster, Eastern Cape	Wind Relic	Project Manager & EAP

Environmental Impact Assessments

Project Name & Location	Client Name	Role
Dassenberg-Koeberg Power Line Deviation from the Koeberg to the Ankerlig Power Station, Western Cape	Eskom Holdings	Project Manager & EAP
Golden Valley II WEF Power Line & Substation near Cookhouse, Eastern Cape	BioTherm Energy	Project Manager & EAP
Golden Valley WEF Power Line near Cookhouse, Eastern Cape	BioTherm Energy	Project Manager & EAP
Karoshhoek Grid Integration project as part of the Karoshhoek Solar Valley Development East of Upington, Northern Cape	FG Emvelo	Project Manager & EAP
Konkoonsies II PV SEF Power Line to the Paulputs Substation near Pofadder, Northern Cape	BioTherm Energy	Project Manager & EAP
Perdekraal West WEF Powerline to the Eskom Kappa Substation, Western Cape	BioTherm Energy	Project Manager & EAP
Rheboksfontein WEF Powerline to the Aurora Substation, Western Cape	Moyeng Energy	Project Manager & EAP
Soetwater Switching Station near Sutherland, Northern Cape	African Clean Energy Developments (ACED)	Project Manager & EAP
Solis Power I Power Line & Switchyard Station near Upington, Northern Cape	Brightsource	Project Manager & EAP
Stormwater Canal System for the Ilanga CSP near Upington, Northern Cape	Karoshhoek Solar One	Project Manager & EAP
Tsitsikamma Community WEF Powerline to the Diep River Substation, Eastern Cape	Eskom Holdings	Project Manager & EAP
Two 132kV Chickadee Lines to the new Zonnebloem Switching Station, Mpumalanga	Eskom Holdings	Project Manager & EAP
Electrical Grid Infrastructure for the Kolkies and Sadawa PV clusters, Western Cape	Mainstream Renewable Energy Developments	Project Manager & EAP
Sadawa Collector substation, Western Cape	Mainstream Renewable Energy Developments	Project Manager & EAP
Electrical Grid Infrastructure for the Vrede and Rondavel PV facilities, Free State	Mainstream Renewable Energy Developments	Project Manager & EAP

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
ECO for the construction of the Ferrum-Mookodi Transmission Line, Northern Cape and North West	Trans-Africa Projects on behalf of Eskom	Project Manager
EO for the construction of the Gamma-Kappa Section A Transmission Line, Western Cape	Trans-Africa Projects on behalf of Eskom	Project Manager
EO for the construction of the Gamma-Kappa Section B Transmission Line, Western Cape	Trans-Africa Projects on behalf of Eskom	Project Manager
EO for the construction of the Hydra IPP Integration project, Northern Cape	Trans-Africa Projects on behalf of Eskom	Project Manager
EO for the construction of the Kappa-Sterrekus Section C Transmission Line, Western Cape	Trans-Africa Projects on behalf of Eskom	Project Manager
EO for the construction of the Namaqualand Strengthening project in Port Nolloth, Western Cape	Trans-Africa Projects on behalf of Eskom	Project Manager
ECO for the construction of the Neptune Substation Soil Erosion Mitigation Project, Eastern Cape	Eskom	Project Manager
ECO for the construction of the Ilanga-Gordonia 132kV power line, Northern Cape	Karoshhoek Solar One	Project Manager

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

Project Name & Location	Client Name	Role
Environmental Permitting and WULA for the Rockdale B Substation & Loop in Power Lines,	Eskom Holdings	Project Manager & EAP
Environmental Permitting and WULA for the Steelpoort Integration project, Limpopo	Eskom Holdings	Project Manager & EAP
Environmental Permitting for Solis CSP near Upington, Northern Cape	Brightsource	Project Manager & EAP

MINING SECTOR PROJECTS

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Elitheni Coal Mine near Indwe, Eastern Cape	Elitheni Coal	Project Manager & EAP
Groot Letaba River Development Project Borrow Pits	liso	Project Manager & EAP
Grootegeeluk Coal Mine for coal transportation infrastructure between the mine and Medupi Power Station (EMPr amendment) , Limpopo	Eskom Holdings	Project Manager & EAP
Waterberg Coal Mine (EMPr amendment), Limpopo	Seskoko Resources	Project Manager & EAP
Aluminium Plant WML & AEL, Gauteng	GfE-MIR Alloys & Minerals	Project Manager & EAP

Environmental Impact Assessments

Project Name & Location	Client Name	Role
Rare Earth Separation Plant in Vredendal, Western Cape	Rareco	Project Manager & EAP
Decommissioning and Demolition of Kilns 5 & 6 at the Slurry Plant, Kwa-Zulu Natal	PPC	Project Manager & EAP

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
ECO for the construction of the Duhva Mine Water Recovery Project, Mpumalanga	Eskom Holdings SoC Limited	Project Manager
External compliance audit of Palesa Coal Mine's Integrated Water Use License (IWUL), near KwaMhlanga, Mpumalanga	HCI Coal	Project Manager
External compliance audit of Palesa Coal Mine's Waste Management License (WML) and EMP, near KwaMhlanga, Mpumalanga	HCI Coal	Project Manager
External compliance audit of Mbali Coal Mine's Integrated Water Use License (IWUL), near Ogies, Mpumalanga	HCI Coal	Project Manager
Independent External Compliance Audit of Water Use License (WUL) for the Tronox Namakwa Sands (TNS) Mining Operations (Brand se Baai), Western Cape	Tronox Namakwa Sands	Project Manager
Independent External Compliance Audit of Water Use License (WUL) for the Tronox Namakwa Sands (TNS) Mineral Separation Plant (MSP), Western Cape	Tronox Namakwa Sands	Project Manager
Independent External Compliance Audit of Water Use License (WUL) for the Tronox Namakwa Sands (TNS) Smelter Operations (Saldanha), Western Cape	Tronox Namakwa Sands	Project Manager
Compliance Auditing of the Waste Management Licence for the PetroSA Landfill Site at the GTL Refinery, Western Cape	PetroSA	Project Manager

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

Project Name & Location	Client Name	Role
Waste Licence Application for the Rare Earth Separation Plant in Vredendal, Western Cape	Rareco	Project Manager & EAP
WULA for the Expansion of the Landfill site at Exxaro's Namakwa Sands Mineral Separation Plant, Western Cape	Exxaro Resources	Project Manager & EAP
S24G & WML for an Aluminium Plant, Gauteng	GfE-MIR Alloys & Minerals	Project Manager & EAP

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

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Bridge across the Ngotwane River, on the border of South Africa and Botswana	Eskom Holdings	Project Manager & EAP
Chemical Storage Tanks, Metallurgical Plant Upgrade & Backfill Plant upgrade at South Deep Gold Mine, near Westonaria, Gauteng	Goldfields	Project Manager & EAP

Project Name & Location	Client Name	Role
Expansion of the existing Welgedacht Water Care Works, Gauteng	ERWAT	Project Manager & EAP
Golden Valley WEF Access Road near Cookhouse, Eastern Cape	BioTherm Energy	Project Manager & EAP
Great Fish River Wind Farm Access Roads and Watercourse Crossings near Cookhouse, Eastern Cape	African Clean Energy Developments (ACED)	Project Manager & EAP
llanga CSP Facility Watercourse Crossings near Upington, Northern Cape	Karoshhoek Solar one	Project Manager & EAP
Modification of the existing Hartebeestfontein Water Care Works, Gauteng	ERWAT	Project Manager & EAP
N10 Road Realignment for the llanga CSP Facility, East of Upington, Northern Cape	SANRAL	Project Manager & EAP
Nxuba (Bedford) Wind Farm Watercourse Crossings near Cookhouse, Eastern Cape	African Clean Energy Developments (ACED)	Project Manager & EAP
Pollution Control Dams at the Medupi Power Station Ash Dump & Coal Stockyard, Limpopo	Eskom	Project Manager & EAP
Qoboshane borrow pits (EMPr only), Eastern Cape	Emalahleni Local Municipality	Project Manager & EAP
Tsitsikamma Community WEF Watercourse Crossings, Eastern Cape	Cennergi	Project Manager & EAP
Clayville Central Steam Plant, Gauteng	Bellmall Energy	Project Manager & EAP
Msenge Emoyeni Wind Farm Watercourse Crossings and Roads, Eastern Cape	Windlab	Project Manager & EAP

Environmental Impact Assessments

Project Name & Location	Client Name	Role
Harmony Gold WWTW at Doornkop Mine, Gauteng	Harmony Doornkop Plant	Project Manager & EAP
Ofir-ZX Watercourse Crossing for the Solar PV Facility, near Keimoes, Northern Cape	Networx S28 Energy	Project Manager & EAP
Qoboshane bridge & access roads, Eastern Cape	Emalahleni Local Municipality	Project Manager & EAP
Relocation of the Assay Laboratory near Carletonville, Gauteng	Sibanye Gold	Project Manager & EAP
Richards Bay Harbour Staging Area, KwaZulu-Natal	Eskom Holdings	Project Manager & EAP
S-Kol Watercourse Crossing for the Solar PV Facility, East of Keimoes, Northern Cape	Networx S28 Energy	Project Manager & EAP
Sonnenberg Watercourse Crossing for the Solar PV Facility, West Keimoes, Northern Cape	Networx S28 Energy	Project Manager & EAP
Kruisvallei Hydroelectric Power Generation Scheme, Free State	Building Energy	Project Manager & EAP
Masetjaba Water Reservoir, Pump Station and Bulk Supply Pipeline near Nigel, Gauteng	Naidu Consulting Engineers	Project Manager & EAP
Access Road for the Dwarsug Wind Farm, Northern Cape Province	South Africa Mainsteam Renewable Power	Project Manager & EAP

Screening Studies

Project Name & Location	Client Name	Role
Roodepoort Open Space Optimisation Programme (OSOP) Precinct, Gauteng	TIMAC Engineering Projects	Project Manager & EAP
Vegetable Oil Plant and Associated Pipeline, Kwa-Zulu Natal	Wilmar Oils and Fats Africa	Project Manager & EAP

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
ECO and bi-monthly auditing for the construction of the Olifants River Water Resources Development Project (ORWRDP) Phase 2A: De Hoop Dam, R555 realignment and housing infrastructure	Department of Water and Sanitation	Project Manager Auditor
ECO for the Rehabilitation of the Blaaupan & Storm Water Channel, Gauteng	Airports Company of South Africa (ACSA)	Project Manager
Due Diligence reporting for the Better Fuel Pyrolysis Facility, Gauteng	Better Fuels	Project Manager
ECO for the Construction of the Water Pipeline from Kendal Power Station to Kendal Pump Station, Mpumalanga	Transnet	Project Manager
ECO for the Replacement of Low-Level Bridge, Demolition and Removal of Artificial Pong, and Reinforcement the Banks of the Crocodile River at the Construction at Walter Sisulu National Botanical Gardens, Gauteng Province	South African National Biodiversity Institute (SANBI)	Project Manager
External Compliance Audit of the Air Emission Licence (AEL) for a depot in Bloemfontein, Free State Province and in Tzaneen, Mpumalanga Province	PetroSA	Project Manager

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

Project Name & Location	Client Name	Role
WULA for the Izubulo Private Nature Reserve, Limpopo	Kjell Bismeyer, Jann Bader, Laurence Saad	Project Manager & EAP
WULA for the Masodini Private Game Lodge, Limpopo	Masodini Private Game Lodge	Environmental Advisor
WULA for the Ezulwini Private Nature Reserve, Limpopo	Ezulwini Investments	Project Manager & EAP
WULA for the Masodini Private Game Lodge, Limpopo	Masodini Private Game Lodge	Project Manager & EAP
WULA for the N10 Realignment at the Ilanga SEF, Northern Cape	Karoshhoek Solar One	Project Manager & EAP
WULA for the Kruisvallei Hydroelectric Power Generation Scheme, Free State	Building Energy	Project Manager & EAP
S24G and WULA for the illegal construction of structures within a watercourse on EFF 24 Ruimsig Agricultural Holdings, Gauteng	Sorrow Language Services	Project Manager & EAP

HOUSING AND URBAN PROJECTS

Environmental Impact Assessments

Project Name & Location	Client Name	Role
Postmasburg Housing Development, Northern Cape	Transnet	Project Manager & EAP

Compliance Advice and reporting

Project Name & Location	Client Name	Role
Kampi ya Thude at the Olifants West Game Reserve, Limpopo	Nick Elliot	Environmental Advisor
External Compliance Audit of WUL for the Johannesburg Country Club, Gauteng	Johannesburg Country Club	Project Manager

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
Due Diligence Audit for the Due Diligence Audit Report, Gauteng	Delta BEC (on behalf of Johannesburg Development Agency (JDA))	Project Manager

ENVIRONMENTAL MANAGEMENT TOOLS

Project Name & Location	Client Name	Role
Development of the 3rd Edition Environmental Implementation Plan (EIP)	Gauteng Department of Agriculture and Rural Development (GDARD)	Project Manager & EAP
Development of Provincial Guidelines on 4x4 routes, Western Cape	Western Cape Department of Environmental Affairs and Development Planning	EAP
Compilation of Construction and Operation EMP for the Braamhoek Transmission Integration Project, Kwazulu-Natal	Eskom Holdings	Project Manager & EAP
Compilation of EMP for the Wholesale Trade of Petroleum Products, Gauteng	Munaca Technologies	Project Manager & EAP
Operational Environmental Management Programme (OEMP) for Medupi Power Station, Limpopo	Eskom Holdings	Project Manager & EAP
Operational Environmental Management Programme (OEMP) for the Dube TradePort Site Wide Precinct	Dube TradePort Corporation	Project Manager & EAP
Operational Environmental Management Programme (OEMP) for the Kusile Power Station, Mpumalanga	Eskom Holdings	Project Manager & EAP
Review of Environmental Impact Assessment Process for the Wittekleibosch Wind Monitoring Mast, Eastern Cape	Exxaro Resources	Project Manager & EAP
Revision of the EMP for the Sirius Solar PV	Aurora Power Solutions	Project Manager & EAP

Project Name & Location	Client Name	Role
State of the Environment (SoE) for Emalahleni Local Municipality, Mpumalanga	Simo Consulting on behalf of Emalahleni Local Municipality	Project Manager & EAP
Aspects and Impacts Register for Salberg Concrete Products operations	Salberg Concrete Products	EAP
First State of Waste Report for South Africa	Golder on behalf of the Department of Environmental Affairs	Project Manager & EAP
Responsibilities Matrix and Gap Analysis for the Kruisvallei Hydroelectric Power Generation Scheme, Free State Province	Building Energy	Project Manager
Responsibilities Matrix and Gap Analysis for the Roggeveld Wind Farm, Northern & Western Cape Provinces	Building Energy	Project Manager

PROJECTS OUTSIDE OF SOUTH AFRICA

Project Name & Location	Client Name	Role
Advisory Services for the Zizabona Transmission Project, Zambia, Zimbabwe, Botswana & Namibia	PHD Capital	Advisor
EIA for the Semonkong WEF, Lesotho	MOSCET	Project Manager & EAP
EMP for the Kuvaninga Energia Gas Fired Power Project, Mozambique	ADC (Pty) Ltd	Project Manager & EAP
Environmental Screening Report for the SEF near Thabana Morena, Lesotho	Building Energy	EAP
EPBs for the Kawambwa, Mansa, Mwense and Nchelenge SEFs in Luapula Province, Zambia	Building Energy	Project Manager & EAP
ESG Due Diligence for the Hilton Garden Inn Development in Windhoek, Namibia	Vatange Capital	Project Manager
Mandahill Mall Rooftop PV SEF EPB, Lusaka, Zambia	Building Energy	Project Manager & EAP
Monthly ECO for the PV Power Plant for the Mocuba Power Station	Scatec	Project Manager

CURRICULUM VITAE OF LEHLOGONOLO MASHEGO

(Comprehensive CV)

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

VOCATIONAL EXPERIENCE

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

SKILLS BASE AND CORE COMPETENCIES

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

EDUCATION AND PROFESSIONAL STATUS

Degrees:

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

Short Courses:

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

Professional Society Affiliations:

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

Other Relevant Skills:

- xxx

EMPLOYMENT

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

Date	Company	Roles and Responsibilities
		<ul style="list-style-type: none"> • Environmental authorisation applications • Marketing • Tendering and proposal compilation • Project administration • Project management • Application of environmental management systems • Maintenance of ISO systems • Environmental control officer, auditing and compliance monitoring • Internal and external training • Health and safety, risk identification and risk management • Project management • Project organisation and planning • Human Resources Management and marketing • Mentoring and coaching • Team continual development representative with the duty of assigning fundamental tasks for continuous growth and development
<p>April 2018 – Dec 2019</p>	<p>Myezo Environmental Management Services</p>	<p>Junior Environmental Consultant</p> <p><u>Tasks included:</u></p> <ul style="list-style-type: none"> • Project assistance • Project administration • Project support • Report writing • Research • Document control • Quality management system management
<p>April 2017 – Mar 2018</p>	<p>Myezo Environmental Management Services</p>	<p>Environmental Intern and Project Assistant</p> <p><u>Tasks included:</u></p> <ul style="list-style-type: none"> • Project assistance • Project administration • Project support • Report writing • Research • Document control • Quality management system management

Date	Company	Roles and Responsibilities
2016	University of Pretoria – Department of Geography and Environmental Sciences	<p><i>Student mentor</i></p> <p><u>Tasks included:</u></p> <ul style="list-style-type: none"> • Academic mentoring and coaching • Academic support and guidance • Academic recommendations • Research assistance • Personal guidance
Oct 2013 – Sep 2014	University of Johannesburg – Annirand Dayhouse	<p><i>Hawker/Leader</i></p> <p><u>Tasks included:</u></p> <ul style="list-style-type: none"> • Head of Communication • Secretary • Head of Community Service • Mentoring and academic guidance • Overseeing all administration tasks • In-charge of social media platforms

PROJECT EXPERIENCE

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

RENEWABLE POWER GENERATION PROJECTS: SOLAR ENERGY FACILITIES

Environmental Impact Assessments and Environmental Management Programmes

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

CONVENTIONAL POWER GENERATION PROJECTS (COAL)

Environmental Impact Assessments and Environmental Management Programmes

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

GRID INFRASTRUCTURE PROJECTS

Environmental Impact Assessments and Environmental Management Programmes

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

MINING SECTOR PROJECTS

Screening Studies

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

Environmental Compliance, Auditing and ECO

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

Due Diligence Reporting

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

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

Environmental Impact Assessments and Environmental Management Programmes

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

Environmental Compliance, Auditing and ECO

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

HOUSING AND URBAN PROJECTS

Environmental Impact Assessments and Environmental Management Programmes

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

CURRICULUM VITAE OF TAMRYN LEE GODDARD

(Comprehensive CV)

Profession :	Environmental Consultant/ Environmental Assessment Practitioner (EAP)
Specialisation:	Environmental Pre-feasibility Screening, Environmental Impact Assessments, Scoping, Environmental Impact Assessments, Environmental Management Plans, Compliance, Public Participation, water use licensing, cartography (GIS), environmental sensitivity analysis for renewable energy project (wind and solar)
Work Experience:	Two years' experience in Health, Safety and Environmental Management Plans in the geohydrology/ construction industry and five (5) months experience as an environmental consultant for renewable energy projects conducting EIAs, pre-feasibility screenings, compliance, Environmental Impact Assessments, water use-licensing and amendments.

VOCATIONAL EXPERIENCE

Professional execution of consulting services for projects in the environmental management field, specialising in Environmental Impact Assessments, Environmental Impact Assessments, GIS mapping, Screening assessments, water use authorisations and assessments, environmental permitting, public participation, compilation of Environmental Management Plans and Programmes, and integrated environmental management.

Responsibilities include report writing, compilation of project specific mapping (GIS) including environmental sensitivity mapping and facility layouts, project management, review of specialist studies and the identification and assessment of potential negative environmental impacts and benefits. Compilation of reports for environmental studies is in accordance with all relevant environmental legislation.

Experience in conducting environmental impact assessments for renewable energy developments (wind and solar), industrial projects (hazardous chemical storage and logistics), and water use licensing for Mixed-Use Developments

Tamryn holds a BA in Environmental Management, and postgraduate higher postgraduate diplomas in Environmental Engineering, monitoring, and conservation ecology. She has 2 years of experience in the environmental management field within the geohydrology sector prior to her work as an Environmental Consultant with Savannah Environmental. She is registered as a young professional with the International Association of Impact Assessors (IAIA).

SKILLS BASE AND CORE COMPETENCIES

- Environmental Impact Assessments (EIAs)
- Environmental Management Plans (EMPr's)
- Pre-feasibility screening
- Environmental Scoping
- Public Participation
- GIS mapping (Cartography)
- Report Writing (Pre-feasibility screening, Project Proposals, Environmental Impact Assessments, Environmental Impact Assessments)
- Site inspection and identification of environmental sensitivities and fatal flaws
- Knowledge of environmental legislation guiding renewable energy projects and other developmental projects

EDUCATION AND PROFESSIONAL STATUS

Degrees:

- Postgraduate Diploma in Environmental Engineering (Civil, Industrial and Mechanical), Conservation Ecology, & Environmental Monitoring, University of South Africa, 2021
- Bachelor of Art in Environmental Management, University of South Africa, 2020

Short Courses:

- Foundations of Impact Assessment, International Association of Impact Assessors (IAIA), 2021
- Solar Energy and Electrical System Design, SUNY and BUFFALO University, Coursera, 2020
- Biogas as a form of renewable energy, AGAMA Biogas, 2019

Professional Society Affiliations:

- Member of the International Association of Impact Assessors (IAIA)

Other Relevant Skills:

- Health, Safety, and Environmental Management (HSE)
- HSE Annual Management plans
- Aqua base geohydrological report generation
- Site Safety, Inspection, and Audits
- ISO9001 quality standards

EMPLOYMENT

Date	Company	Roles and Responsibilities
September 2021 to date	Savannah Environmental (Pty) Ltd	<p><u>Tasks include:</u></p> <p>Environmental Impact Assessments (EIAs) in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), read with the EIA Regulations (2014), as amended.</p> <p>1.1 Specific primary aspects of the including, inter alia: Environmental permitting, environmental authorisation applications, and associated public participation.</p> <p>2.1 Understanding and applying applicable legislation, efficient and quality report writing,</p>

Date	Company	Roles and Responsibilities
		<p>liaison with relevant environmental authorities, site visits, compilation of environmental management programmes (EMPrs), amendment applications, and public participation tasks.</p> <p>3.1 Water use license applications, environmental compliance monitoring and any other related authorisation, permitting and licensing tasks.</p> <p>4.1 Implementation of appropriate procedures and mechanisms to consolidate and complete a compliance check on project-related files with a view to enhance overall management of project documentation for all closed, live and future projects executed by the company,</p> <p>5.1 Project-related GIS mapping</p>
<p>August 2019 to September 2021</p>	<p>Aqua Earth Consulting</p>	<p>1.1 Tasks included:</p> <p>2.1 Health, Safety and Environmental project administrator</p> <p>3.1 Developed the annual HSE management plan for Aqua Earth Consulting</p> <p>4.1 Developed the company waste management system (recycling)</p> <p>5.1 Compiling site -specific appointment letters, Safe work policies and procedures, Safety checklists, site-layouts, toolbox talks, emergency response planning, first aid, fire safety, OHS safety and Environmental policies, material data safety sheets, risk matrixes, waste management plan, vehicle lists, employee competencies and Identity documents, mandatory agreements, audit forms, risk assessments, management of change.</p> <p>6.1 Site safety analysis</p> <p>7.1 Internal HSE auditing (office safety audits)</p> <p>8.1 Advise on policies, development, and administration programs related to transport (journey management plans), emergency procedures (emergency response plans) / preparedness, communications, the environment (HSE policies), waste management and recycling.</p> <p>9.1 provide administrative and consultation services related to public health, environmental protection, and workplace safety.</p>

Date	Company	Roles and Responsibilities
		10.1 develop, implement, and evaluate health and safety programs and strategies 11.1 promote awareness and education on the sustainable use of groundwater resources, the environment, and other subjects. 12.1 Site specific health and safety file compilation and maintenance 13.1 consulting (telephonic, electronic and face to face) 14.1 scientific data capturing (project completion certificates, generating project close out reports through the aqua base database, generating scientific reports detailing geology, penetration rates, engineering of monitoring wells) 15.1 develop, implement, and evaluate health and safety programs and strategies 16.1 Sampling (Environmental Matrices such as soil, water and air)

PROJECT EXPERIENCE

- Environmental Sensitivity Screening for the Merafong Solar PV cluster in the West Rand District Municipality (WRDM) in Gauteng (site inspection or ground truthing, desktop analysis (GIS), report writing)
- Desktop Environmental Sensitivity Screening for the SOLINK PV development near Northam, Limpopo.
- Environmental Impact Assessment for the Engie SannasposSolar Project (Pty) in the Manguang Metropolitan Municipality, in the Free State Province of South Africa.
- Environmental Impact Assessment for the Engie Sannaspos PV Additional Footprint, Free State Province
- Environmental Impact Assessment for the Engie Graspan PV Additional Footprint, Northern Cape Province
- Environmental Impact Assessment Development of cluster of Poortjies Renewable Energy (Solar PV) Facilities, Central Karoo District Municipality, in the Western Cape Province. Renewable power generation projects: solar (pv) energy facilities and one wind facility
- Environmental Impact Assessments for the Akuo Energy Solar PV facilities (30) in the Northern Cape Province

Screening Studies

Project Name & Location	Client Name	Role
<i>Prescriptive Pre- feasibility screening and ground truthing (site inspection) for the Merafong Solar Clusters development, Gauteng</i>	<i>Gauteng Infrastructure Finance Agency (GIFA)</i>	Environmental Assessment Practitioner (EAP) <i>Conducted the pre- feasibility screening for the proposed Merafong Solar Cluster development in the West Rand District Municipality (WRDM) of Gauteng. Environmental sensitivity analysis (desktop GIS and ground truthing) to advise on the suitable placement of solar PV clusters near Sibanye</i>

		<p>Stillwater Mine.</p> <p>Identification of sensitive environmental features (agricultural, land capability, topography, avifauna, birds, bats, terrestrial and aquatic biodiversity, vegetation, glint and glare).</p> <p>Identification of applicable legislation and triggering activities with reference to the National Environmental Management Act 107 of 1998.</p>
<p>Discretionary Environmental sensitivity screening for the SOLINK Photovoltaic development for Union Mine near Northam, Limpopo.</p>	<p>SOLINK Power Procurement (Pty) Ltd</p>	<p>Environmental Assessment Practitioner (EAP)</p> <p>Desktop environmental sensitivity screening for the proposed SOLINK Solar PV development for Siyanda Bakgatla Platinum Mine (Pty) Ltd (Union Mine) near Northam, Limpopo Province. Desktop study and GIS mapping of environmental sensitivities within the proposed portions such as (agricultural, land capability, topography, avifauna, birds, bats, terrestrial and aquatic biodiversity, vegetation)..</p>

Environmental Impact Assessments

Project Name & Location	Client Name	Role
<p>Environmental Impact Assessment for the additional footprint (19.9 ha) for the Engie SannasposSolar Project (Pty)</p>	<p>Engie Southern Africa (Ptd) Ltd</p>	<p>Environmental Assessment Practitioner (EAP)</p> <p>Environmental Impact Assessment for the additional footprint for the Engie SannasposSolar Project (Pty). Included specialist ecology and heritage studies. Sole author of the Environmental Impact Assessment, mapping individual environmental sensitivities, locality, cumulative</p>

		mapping, consideration of alternatives, buffering sensitive features, interpretation of specialist reports.
Environmental Impact Assessment for the storage of class 1a and 1b hazardous chemicals (pesticides) at value Chemical Freight Pak Warehouse in Kempton Park, Johannesburg	Value Chemical (Pty) Ltd	Environmental Assessment Practitioner (EAP) Environmental Impact Assessment for the additional footprint for Value Chemical Project (Pty). Included specialist ecology and heritage studies. Sole author of the Environmental Impact Assessment, mapping individual environmental sensitivities, locality, cumulative mapping, consideration of alternatives, buffering sensitive features, interpretation of specialist reports.
Environmental Impact Assessment for tennis court at Country Club Johannesburg	Country Club Johannesburg (Pty) Ltd	GIS Mapping/ Cartographer (Locality and sensitivity mapping, buffering, delineation of environmental sensitivities, layout maps)
Environmental Impact Assessment Report for the Becrux Solar Photovoltaic (PV) Energy Facility, Mpumalanga Province	Becrux Solar PV Project One (Pty) Ltd	GIS Mapping/ Cartographer (Locality and sensitivity mapping, buffering, delineation of environmental sensitivities, layout maps)
Hopefield Watercourse Crossing Environmental Impact Assessment Report	Umoya Energy (RF) Pty Ltd	GIS Mapping/ Cartographer (Locality and sensitivity mapping, buffering, delineation of environmental sensitivities, layout maps)

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Scoping and Environmental Impact Assessment for the additional footprint for the Sannaspos Solar PV (Pty)	Engie Southern Africa (Pty) Ltd	Environmental Assessment Practitioner (EAP) Environmental Impact Assessment for the additional footprint for the Sannaspos Solar PV (Pty). Included specialist ecology

		and heritage studies. Sole author of the EIA, mapping individual environmental sensitivities, locality, cumulative mapping, consideration of alternatives, buffering sensitive features, interpretation of specialist reports.
Scoping and Environmental Impact Assessment for the additional footprint for the Engie Grapsan Solar Project (Pty)	Engie Southern Africa (Pty) Ltd	Environmental Assessment Practitioner (EAP) Environmental Impact Assessment for the additional footprint for the Engie Grapsan Solar Project (Pty). Included specialist ecology and heritage studies. Sole author of the EIA, mapping individual environmental sensitivities, locality, cumulative mapping, consideration of alternatives, buffering sensitive features, interpretation of specialist reports.

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Engie Grapsan, Sannaspos and Sannaspos Additional footprints	Engie Southern Africa (Pty) Ltd	Author

IWUL & WML audit for Tronox Namakwa Sands sites, Western Cape

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

Project Name & Location	Client Name	Role
IWUL & WML audit for Tronox Namakwa Sands sites, Western Cape	Tronox (Pty) Ltd	GIS Mapping
Water Use General Authorisation for the Engie Sannaspos PV facility in the Free State Province	Engie Southern Africa (Pty) Ltd	EAP / Principal Author
Water Use General Authorisation for the Engie Sannaspos PV facility in the Free State Province	Engie Southern Africa (Pty) Ltd	EAP / Principal Author
Application for Amendment of the Environmental Authorisation validity period of the 90MW ENGIE Drennan Photovoltaic (PV) Power Facility on Portion 15 of Portion 1 of the farm Waai Plaats No.550 within the Inxuba Yethemba Local Municipality in the Eastern Cape Province.	Engie Southern Africa (Pty) Ltd	EAP/ Principal Author

