ENVIRONMENTAL MANAGEMENT PROGRAMME

FOR THE

400MW PHOTOVOLTAIC ELECTRICITY GENERATION FACILITY AND 132 KV POWERLINE OF TO FEED THE ELECTRICITY GENERATED INTO THE EXISTING ARIES SUBSTATION ON PORTIONS 7 AND 3 OF FARM 187 OLYVENKOLK, KENHARDT DISTRICT

FIRST DRAFT

February 2019

Prepared for: Wine Estate Capital Management SA (Pty) Ltd
P.O. Box 1022
Wellington
7654
Tel: 021 873 6682
Fax: 086 605 3006
Email: Michael Stoeltzing michael@bakenhof.co.za

Prepared by: Eco Impact Legal Consulting (Pty) Ltd
P.O. Box 45070
Claremont
South Africa
7735
Tel: 021 671 1660
Email: admin@ecoimpact.co.za

eco impact Environmental Health & Safety Legal Consulting	**Title:** **400MW PHOTOVOLTAIC ELECTRICITY GENERATION FACILITY AND 132 KV POWERLINE OF TO FEED THE ELECTRICITY GENERATED INTO THE EXISTING ARIES SUBSTATION ON PORTIONS 7 AND 3 OF FARM 187 OLYVENKOLK, KENHARDT DISTRICT** **1st DRAFT ENVIRONMENTAL MANAGEMENT PROGRAMME**

Carried Out By: Eco Impact Legal Consulting (Pty) Ltd P.O. Box 45070 Claremont 7735 Tel: 021 671 1660 E-mail: admin@ecoimpact.co.za	**Client:** Wine Estate Capital Management SA (Pty) Ltd P.O. Box 1022 Wellington 7654 Tel: 021 873 6682 Fax: 086 605 3006 Email: michael@bakenhof.co.za
Author(s): Jessica Hansen	**Client Contact Person:** Mr. Michael Stoeltzing

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Verification	Capacity	Name	Signature	Date
By Author(s):	Senior EAP	Jessica Hansen		06 February 2019

COMMITMENT AND DECLARATION OF UNDERSTANDING BY CONTRACTOR AND DEVELOPER FOR THE PROPOSED 400MW PHOTOVOLTAIC ELECTRICITY GENERATION FACILITY AND 132 KV POWERLINE OF TO FEED THE ELECTRICITY GENERATED INTO THE EXISTING ARIES SUBSTATION ON PORTIONS 7 AND 3 OF FARM 187 OLYVENKOLK, KENHARDT DISTRICT

I, the undersigned …….., as duly authorized by the Contractor, have studied and understand the contents of this document. On behalf of the Contractor, I confirm that the Contractor undertakes to adhere to the conditions as set out herein, unless specifically otherwise agreed to in writing.

Signed at ……. on this …….. Day of …….20……

…….
For Contractor

I, the undersigned ……, as duly authorized by the Developer have studied and approve the contents of this document on behalf of the Developer, for implementation by all Contractors involved at the site.

Signed at ……. on this …….. day of …….20…….

…….
Developer's Representative

DEFINITIONS

Auditing:	A systematic and objective assessment of an organization's activities and services conducted and documented on a periodic basis based to a (e.g. ISO 19011:2011) standard.
Biodiversity:	The variety of life in an area, including the number of different species, the genetic wealth within each species, and the natural areas where they are found.
Contractor:	An employer, as defined in section 1 of the Occupational Health and Safety Act 85 of 1993, who performs construction work and includes principal contractors
Environment:	A place where living, non-living and man-made features interact, and where life and diversity is sustained over time.
Evaporation:	The change by which any substance (e.g. water) is converted from a liquid state into and carried off as vapour.
Developer:	One who builds on land or alters the use of an existing building for some new purpose
Independent:	Is independent and has no interest in any business related to the development site, nor will receive any payment or benefit other than fair remuneration for the task undertaken
Groundwater:	Subsurface water in the zone in which permeable rocks, and often the overlaying soil, are saturated under pressure equal to or greater than atmospheric.
Landowner:	Holder of the estate in land with considerable rights of ownership or, simply put, an owner of land
Monitoring:	A systematic and objective observation of an organisation's activities and services conducted and reported on regularly.
Monitoring programme:	A programme for taking regular measurements of the quantity and quality of a water resource, waste or wastewater discharge at specified intervals and at specific locations to determine the chemical, physical and biological nature of the water resource, waste or wastewater discharge.
Natural vegetation:	All existing vegetation species, indigenous or otherwise, of trees, shrubs, groundcover, grasses and all other plants found growing on a site.
Pollution:	The result of the release into air, water or soil from any process or of any substance, which is capable of causing harm to man or other living organisms supported by the environment.
Protected Plants:	Plant species officially listed under the Threatened or Protected Species regulations as well as on the Protected Plants List (each province has such a list), and which may not be removed or transported without a permit to do so from the relevant provincial authority.
Red Data Species:	Plant and animal species officially listed in the Red Data Lists as being rare, endangered or threatened.
Rehabilitation:	Making the land useful again after a disturbance. It involves the recovery of ecosystem functions and processes in a degraded habitat. Rehabilitation does not necessarily re-establish the pre-disturbance condition, but does involve establishing geological and hydro logically stable landscapes that support the natural ecosystem mosaic.
Site:	Property or area where the proposed development will take place

ACRONYMS

DEA:	Department of Environmental Affairs
DWS:	Department of Water and Sanitation
ECO:	Environmental Control Officer
EA:	Environmental Authorisation
EIA:	Environmental Impact Assessment
EM:	Environmental Manager
EMP:	Environmental Management Programme
EO:	Environmental Officer
ER:	Engineer's Representative
I&AP:	Interested and Affected Party
IEM:	Integrated Environmental Management
MS:	Method Statement
PM:	Project Manager
SANS:	South African National Standards

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DEVELOPER'S COMMITMENT

Wine Estate Capital Management SA (Pty) Ltd (WECM) has committed itself to a set of values that include the maintenance of good relations and transparent communications with all stakeholders, and the dynamic engagement of the larger community.

WECM undertakes to implement suitable management systems for all the areas and aspects of this operation. This will ensure that development itself and management of the project will comply with legal, technical, environmental and transformation policies and standards.

WECM, in drafting this EMP for implementation, intends to enable continuous improvement in legal compliance and the sustainable operation of the site.

The EMP intends to change the way in which the owners, the construction process they have commissioned and the contractor plan for and manage resources to achieve sustainability.

The satisfactory implementation of the EMP on site will require both the full support and commitment of all personnel.

CHAPTER 1

1.1. Executive Summary

This EMP has been prepared principally in compliance with the requirements of section 24N and Section 34 of the National Environmental Management Act 107 of 1998. This document, together with the conditions in the Environmental Authorisation, must be adhered to.

The EMP must be included as part of all contract documentation for all contractors in the construction phase of the development.

The Author and Eco Impact Legal Consulting (Pty) Ltd ("Eco Impact")

Eco Impact is an independent consulting company and has no interest in any business related to the development site, nor will it receive any payment or benefit other than fair remuneration for the task undertaken, as required in terms of the NEMA Regulations.

This report has been prepared by Jessica Hansen, of Eco Impact, an environmental consultancy, engaged in providing professional services in the field of environmental planning, -systems, -auditing and -biodiversity assessment and -management.

Jessica has a BSc (Honours) in Environmental and Geographical Science in 2011 from the University of Cape Town and subsequently obtained her MSc in Zoology in 2013.

Jessica has trained as an Environmental Assessment Practitioner since August 2013 and has been involved in the compilation, coordination and management of Basic Assessment Reports, Environmental Impact Assessments, Environmental Management Programmes, Waste Licence Applications, Water Use Licence Applications and Baseline Biodiversity Surveys for numerous clients.

WECM has appointed Eco Impact to prepare an Environmental Management Programme that meets the technical standards as required by DEA.

1.2. Project Description

This section of the report is included in compliance with Section 24N (2) (e) of the National Environmental Management Act, 107 of 1998.

ACTIVITY DESCRIPTION

Technical Details for the Proposed Facility Component	**Description I dimensions**
Height of PV panels	Solar PV panels: approximately 5 m high.
Height of substations	Collector (on-site) substation approximately: 30 m high including a 32 m high telecoms tower.
Height of ESKOM powerline	On-site 132 kV transmission line: approximately 30 m above ground level.
Area of PV Array	Block 3 - 146.5 hectares; Block 4 - 328.5 hectares; Block 5 – 301 hectares. Total area of PV facility: 776 hectares.
Number of inverters required	104 '
Area occupied by inverter *I* transformer stations *I* substations	Each substation covers area of 80 x 50m = ≥ .05 ha = 1.5ha total. Three substations.
Capacity of on-site substation	22/33 kV to 132 kV collector substation to receive, convert and step up electricity from the PV facility to the 132 kV grid suitable supply. The facility will house control rooms and grid control yards for both Eskom and the Independent Power Producer. A 32 m telecommunications tower (lattice or monopole type) will be established in the substation area.
Area occupied by both permanent and construction laydown areas	The PV blocks footprint, access roads, three substations and overhead powerlines connecting the three substations on the southern boundary of the property parallel with the Pofader Kenhardt road. From the Substation in the South Western Corner of the property (closest to Aries Substation, an overhead 132 kV powerline of approximately 8km will be constructed next to the existing ESKOM 33kv overhead powerline.
Area occupied by buildings	None
Length of internal roads	30km gravel road
Width of internal roads	4m wide
Proximity to grid connection	± 8km to the west to Aries Substation
Height of fencing	2.4m
Type of fencing	Palisade 2.4m fence on boundary of PV facility blocks and substations. No electric fencing.

The infrastructure associated with this facility includes:

- Solar panels arranged in units with a generating capacity of approximately 400 MW and a total footprint of approximately 800ha.
- A 132-kV power line (mono pole structures) of 11.062km in length over Portions 7 and 3 of Farm 187 to feed the electricity generated into the existing Aries substation.
- Expansion of the Aries substation to receive the generated electricity into the ESKOM grid; and
- Ancillary infrastructure such as inverters and transformers, conductors (cables), a central bushbar, isolators, switch gear, protection infrastructure, measurement devices and maintenance facility and security and control room.

The proposed development will be constructed closer than 32 meters from watercourses. The electricity cable connecting the panels to each other, the distribution network will be laid underground and the infrastructure and services roads on the PV layout impacting on dendritic drainage lines. Two on dendritic drainage lines on block 3, 9 as per block 4 and 11 on block 5. These dendritic drainage

lines were not identified as ecological sensitive areas and the PV facility will be constructed over these areas.

The panels would be mounted on the ground using a ground screw. A concrete foot piece secured to a steel pen driven into the ground would be used where it is not feasible to use ground screws. The maximum height of the panels in operation would be 5m and would allow some ground clearance for the free flow of surface water underneath the panels and for agricultural purposes where required.

The facility and associated infrastructure will be accessed on an 8m wide 100m long gavel road with direct access off the Kenhardt to Pofadder gravel road. A 4m management track will surround each block of photovoltaic arrays, totalling approximately 30km of gravel road. These single-track management roads will be used as access roads to service and maintain structuresand to serve as fire breaks. On full commissioning of the facility, any access points to the site which are not required during operational phase will be closed and rehabilitated.

Water (required in construction phase only) will be sourced from existing boreholes authorized in the EA for portion 3 and 13. The facility will not use water during operational phase. Solar panels will not be cleaned using water.

Electricity Generated distribution to ESKOM Grid:

The PV plant consists of three (3) PV blocks. At each of these blocks the DC input voltage from the PV panels is converted to AC by means of inverters. The AC output voltage from the inverter is then stepped up with a 400 V to 132 kV step-up transformer at each block. The electrical power is then transported via aboveground cables from the three substations on the southern edge of the PV facility blocks in a 22m wide servitude 132 kv overhead powerline parallel to the Kenhardt Pofadder road, next to existing 33kv Eskom Powerline. The three substations will be connected to the ESKOM grid via a 132-kV overhead transmission line. The powerline is 11.0628km in length.

Aries Substation Upgrades

The Aries MTS is a 400-kV substation. In order to expand the capacity of the substation, an intermediate bus at a nominal voltage of 132 kV via a 400 kV:132 kV transformer(s) bus in the substation must be constructed in the existing Aries Substation for the connection of the PV power plant via a 132-kV transformer(s).

Apart from the transformer(s) necessary to establish a new bus, other power system components and equipment are necessary. These typically include amongst other three circuit breakers, three current transformers and three bus isolators at each side of the transformer for each transformer. All newly established busses will also be equipped with three capacitive voltage transformers to measure the bus voltages. All of these components are mounted on steel structures with height of approximately 3 to 3.5 meters from ground level. Lastly, the steel structures for the support of the overhead busbar conductors and cabling are of the order of 10 m in height. The expansion to Aries Substation does not requires Environmental Authorizations. The proposed expansions will not result in expanded capacity that will exceed 275 kilovolts and the development footprint will not increase. The expansions is 132 kilovolts and within the existing Aries substation.

Fencing

For health & safety and security reasons, the plant will have to be fenced off from the surrounding farm.

Construction phase

a) Conduct surveys

Prior to construction, surveys such as, but not limited to, geotechnical, site surveys and confirmation of PV array micro-siting, road servitudes, etc. must be conducted.

b) Establish access roads

Access to site is via the Pofadder gravel road. Within the site itself, access will be required from the existing roads to the individual facility components for construction purposes (and later limited access for maintenance).

c) Site preparation
This will include clearance of vegetation at all the roads and infrastructure. These activities will require the stripping of topsoil which will need to be stockpiled, backfilled and/or spread on site.

d) Establishment of laydown areas
Laydown and storage areas will be required for the construction equipment required on site.

e) Establishment of ancillary infrastructure
The establishment of these facilities/buildings will require the clearing of vegetation and levelling of the development site and the excavation of foundations prior to construction. A laydown area for building materials and equipment associated with these buildings will also be required.

f) Contouring
Natural contouring must be used when constructing the facility. No artificial contouring to be used.

g) Construction of infrastructure foundations
The geo-technical assessment tests indicate that screws up to a depth of 1.8m can be installed. Screw-on foundations will be constructed for the “feet” of the PV panels. This statistically tested technology saves money and is environmentally friendly as no digging or concreting is necessary.

h) Transport of components and equipment to site
Trucks will be used to transport all components (e.g. trucks, graders, compaction equipment, and panels) to site. The equipment will be transported to the site using appropriate National and Provincial routes and the dedicated access road to the site itself.

i) Establishment of PV panels
PV panels are transported in containers. The steel structures will be assembled on site. The supports for the panels are made of steel structures directly driven into the ground or mounted on a steel pen driven into the soil with a concrete foot piece. The panels are arranged in a binary structure. The height of the supports has been determined so that the maximum height of the panel in operation is approximately 4.80 m. This choice is motivated by the need to avoid production losses due to fouling of the panels and the absorption of sunlight by clouds to the ground during the cold season. The minimum height is greater than 0.8m from the ground level to allow freedom and enjoyment of the land for agricultural or pastoral purposes where required.

j) Connection of PV panels to the substation
The PV plant consists of several smaller PV blocks. At each of these blocks the DC input voltage from the PV panels is converted to AC by means of inverters. The AC output voltage from the inverter is then stepped up with a 400 V to 132 kV step-up transformer at each block. The electrical power is then transported via above ground cables.

k) Connect substation to the grid
The plant will be connected to the ESKOM grid via a 132-kV overhead transmission line through the appropriate protection switch gear, ext. via an overhead transmission line.

Aries Substation Upgrades
The Aries MTS is a 400 kV substation. In order to expand the capacity of the substation, an intermediate bus at a nominal voltage of 132 kV via a 400 kV:132 kV transformer(s) bus in the substation must be constructed in the existing Aries Substation for the connection of the PV power plant via a 132 kV transformer(s).

Apart from the transformer(s) necessary to establish a new bus, other power system components and equipment are necessary. These typically include amongst other three circuit breakers, three current transformers and three bus isolators at each side of the transformer for each transformer. All newly established busses will also be equipped with three capacitive voltage transformers to measure the bus voltages. All of these components are mounted on steel structures with height of approximately 3 to 3.5 meters from ground level. Lastly, the steel structures for the support of the overhead busbar conductors and cabling are of the order of 10 m in height.

The transmission line will entail a configuration very similar to the 66 kV transmission lines found throughout South Africa to electrify rural parts of the country, i.e. concrete poles with the three conductors spaced in a triangular arrangement. The only possible difference is slightly thicker conductors than what is normally seen.

l) Undertake site remediation

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

Operation phase
The electricity that is generated from the PV modules will be stepped up through the onsite transformers. Thereafter the power will be fed to the ESKOM grid via a 132-kV overhead power line. It is anticipated that a full-time security, maintenance and control room staff will be required on site. Each component within the solar energy facility will be operational except under circumstances of mechanical breakdown, unfavourable weather conditions or maintenance activities. Maintenance will consist mostly of panel replacement and other mechanical and electrical infrastructure repairs. Cleaning would be undertaken using cloth as required. New self-cleaning technology is also investigated and will be implemented if feasible. An onsite maintenance facility will be used as a repair base and storage of maintenance equipment. Grounds will be maintained. All waste generated will be transported weekly or when required to the Kenhardt waste managing facilities.

Decommissioning phase
The PV is expected to have a lifespan of approximately 30 years (with maintenance). The infrastructure will only be decommissioned once it has reached the end of its economic life. If economically feasible, the decommissioning activities will comprise the disassembly and replacement of the individual components with more appropriate technology/infrastructure available at the time. However, if not deemed so, then the facility will be completely decommissioned which will include the following decommissioning activities.

(a) Site preparation
Activities will include confirming the integrity of the access to the site to accommodate the required equipment and the mobilisation of decommissioning equipment.

(b) Disassemble and replace existing components
The components will be disassembled and reused and recycled or disposed of in accordance with regulatory requirements.

CHAPTER 2

This section of the report is included in compliance with Section 24N (2) (e) of the National Environmental Management Act 107 of 1998.

It deals with issues relating to the implementation of the EMP.

2.1 Organizational Structure

The organizational structure identifies and defines the responsibilities and authority of the various persons and organizations involved in the project. All instructions and official communications regarding environmental matters must follow the organizational structure.

The Environmental Official (EO), to whom the Engineer's Representative (ER) and/or Environmental Control Officer (ECO) must report and interact, must be the responsible client representative.

The EMP must be an agenda item at the monthly site and operations meetings and the responsible client representative(s) may attend these meetings in order to provide input with respect to compliance with the EMP.

2.2 Responsibilities and Functions of the Environmental Control Officer

The ECO will be responsible for monitoring, reviewing and verifying compliance with the EMP and/or EA by all contractors and site management during site visits.

The ECO duties in this regard will include the following:

With the assistance, where necessary of the ER, to ensure all necessary environmental authorizations and permits have been obtained and are available and visible on site at the ER offices.

- monitor and verify that the EMP and/or EA is adhered to at all times and by taking action if the specifications are not followed;
- monitor and verify that environmental impacts are kept to a minimum;
- review and approve construction method statements, with input as appropriate from the ER;
- assist the contractor in finding environmentally responsible solutions to problems;
- report on the environmental issues at the site meetings and other meetings that may be called regarding environmental matters, if requested by ER;
- inspect the site and surrounding areas regularly with regard to compliance with the EMP and/or EA;
- monitor the environmental awareness training for all personnel coming onto site;
- advise management on the removal of person(s) and/or equipment not complying with the specifications, after collaboration with the ER. Recommendations must be recorded by the ER in Site Instruction Book.
- ensure that activities on site comply with known legislation of relevance to the environment;
- recommend the issuing of penalties via the developer for contraventions of the EMP and/or EA;
- keep a photographic record of progress on site from an environmental perspective; and
- Undertake a continual internal review of the EMP and/or EA and submit a report to the developer and the responsible DEA Environmental Official as according to EA conditions.

2.3 Agreed Work Plan and Site Visit Schedule of ECO

After initial construction start-up site visit it is recommended that an ECO site visit be conducted once a month during construction.

Information recording activity on site, and any guidelines or instructions emanating there from will be routinely made available electronically to the developer and applicable contractors and a copy of the report must be available at the site office.

Clearly matters of urgency or immediate action may be channelled appropriately on an urgent basis.

2.4 Site Manager

The site manager will have the following environmental control responsibilities:

- In conjunction with the ECO will present the environmental education programs to all persons employed on site.
- Consult with the ECO, landowner, developer and any contractor to resolve all environmental issues.
- Issue any instructions from the ECO to the management team via a formal site instruction book or appropriate management tool used for the purpose.
- Take responsibility for the penalty system. The ECO and developer recommendations must be considered when deciding whether or not to impose a penalty.
- The engineer will, via the ECO actions, be accountable for the overall implementation of the Environmental Management Programme.
- Keep a site diary and complaints register.

2.5 Contractors

As part of any tender, the tendering contractor must submit a first draft of a contractor's programme, to the developer which must include the environmental considerations to be followed prior to appointment.

The appointed Contractor's representative will have the following responsibilities:

- Ensure that all staff is familiar with the Environmental Management Programme, which explains the environmental policy for the project.
- Allow for sufficient time between surveying the exact locations where services will be intended and actual construction, for the ECO to facilitate and instruct for the removal of plants, seeds and cuttings if necessary.
- The contractor must keep his personnel fully aware of environmental issues and ensure they show adequate consideration to all environmental aspects.
- Establish environmental signs to be erected on the construction site at locations identified by the ECO and approved by the engineer.
- Be responsible for the cost of the restoration of any damage caused, in environmentally sensitive areas, as a result of contractor responsibility regarding negligence. This must be done in accordance with the engineer / ECO's specifications.
- Take responsibility and active steps to avoid any increase in the fire hazard.
- The contractor must take responsibility for implementing all the relevant provisions of the EMP, or if he encounters difficulties with the specifications, he must discuss alternative approaches with the ECO and engineer prior to proceeding.

Failure to comply with the EMP may result in the application of fines as set out, and any reported non-compliance may result in the suspension of work or termination of a contract.

2.6 Record keeping of activities, inclusive of recording of non-compliances and corrective actions

The site must keep a record of all activities relating to environmental matters on site, including:

- Meetings attended;
- Method statements received and approved;
- Issues arising on site;
- Cases of non-compliance with the EMP;
- Corrective action taken and penalties issued.

This information will be recorded in an appropriate manner in a site diary, registers, issues/warning book, etc.

2.7 Compliance with other legislation

It is important that all on site staff are aware of other relevant legislation that may relate to the activities taking place on site, especially local authority required compliances.

CHAPTER 3

Applicable Legislation, Policy and Environmental Principles

3.1 Applicable Legislation Identified

1. ADVERTISING ON ROADS AND RIBBON DEVELOPMENT ACT, 21 OF 1940
2. BASIC CONDITIONS OF EMPLOYMENT ACT, 75 OF 1997
3. COMPENSATION FOR OCCUPATIONAL INJURIES AND DISEASES ACT, 130 OF 1993
4. CONSERVATION OF AGRICULTURAL RESOURCES ACT, 43 OF 1983
5. CONSTITUTION OF THE REPUBLIC OF SOUTH AFRICA, 1996
6. ENVIRONMENT CONSERVATION ACT, 73 OF 1989, WESTERN CAPE NOISE CONTROL REGULATIONS
7. EMPLOYMENT EQUITY ACT, 55 OF 1998
8. ENVIRONMENT CONSERVATION ACT, 73 OF 1989
9. FENCING ACT, 31 OF 1963
10. HAZARDOUS SUBSTANCES ACT, 15 OF 1973
11. LABOUR RELATIONS ACT, 66 OF 1995
12. NATIONAL HEALTH ACT 61 OF 2003
13. NATIONAL HEALTH ACT 61 OF 2003 REGULATIONS RELATING TO THE MANAGEMENT OF HUMAN REMAINS
14. NATIONAL BUILDING REGULATIONS AND BUILDING STANDARDS ACT, 103 OF 1977
15. NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 107 OF 1998
16. NATIONAL ENVIRONMENTAL MANAGEMENT: AIR QUALITY ACT, 39 OF 2004
17. NATIONAL ENVIRONMENTAL MANAGEMENT: BIODIVERSITY ACT, 10 OF 2004
18. NATIONAL ENVIRONMENTAL MANAGEMENT: WASTE ACT, 59 OF 2008
19. NATIONAL FORESTS ACT, 84 OF 1998
20. NATIONAL HERITAGE RESOURCES ACT, 25 OF 1999
21. NATIONAL VELD AND FOREST FIRE ACT, 101 OF 1998
22. NATIONAL WATER ACT, 36 OF 1998
23. OCCUPATIONAL HEALTH AND SAFETY ACT, 85 OF 1993
24. TOBACCO PRODUCTS CONTROL ACT, 83 OF 1993
25. WATER SERVICES ACT, 108 OF 1997
26. KAI! GARIB MUNICIPALITY: ANTENNA SYSTEM BY-LAW
27. KAI! GARIB MUNICIPALITY: BUILDING CONTROL BY-LAW
28. KAI! GARIB MUNICIPALITY: FIRE SERVICES BY-LAW
29. KAI! GARIB MUNICIPALITY: ELECTRICITY BY-LAW
30. KAI! GARIB MUNICIPALITY: WATER SERVICES BY-LAW
31. KAI! GARIB MUNICIPALITY: BY-LAW ON THE CONTROL OVER ADVERTISING SIGNS AND THE DISFIGUREMENT OF THE FRONT OR FRONTAGES OF STREETS
32. KAI! GARIB MUNICIPALITY: BY-LAW ON MUNICIPAL LAND USE PLANNING
33. KAI! GARIB MUNICIPALITY: WASTE MANAGEMENT BY-LAW
34. KAI! GARIB MUNICIPALITY: BY-LAWS RELATING TO NUISANCE

CHAPTER 4

This section of the report is included in compliance with Section 24N (2) (e) of the National Environmental Management Act, 107 of 1998.

Compliance

4.1 Monitoring and Auditing

4.1.1 Introduction

In keeping with current environmental and associated legislation, all environmental management procedures and actions must be reviewed and refined on an ongoing basis.

This is in accordance with the dynamic nature of environmental management and allows for the timeous identification and mitigation of issues as they come to light.

The process of review and refinement, built into the requirements of the EMP, is known as monitoring and auditing.

4.1.2. Roles and Responsibilities

Efficient implementation of the performance specifications, effective monitoring and auditing, as well as clear responsibility and accountability allocation requires that various role-players be defined for the construction implementation project.

Depending on the nature and scale of a project, implementing teams could be composed of any number of role-players, each with their own specified responsibilities.

Therefore, for the purpose of this document, the following role-players are defined, based purely on responsibility and accountability allocation. The actual designation of role-players may vary, but the responsibilities will largely remain as stated.

4.1.2.1. Developer/landowner or custodian of the land

The developer/landowner or custodian of the land is the person or organization with decision making capacity for the land in question, and thus ultimately accountable for what takes place on that land.

4.1.2.2. Contractor

Contractors are appointed to undertake the works as specified in the contract. It is the responsibility of the contractor to do whatever is necessary from their side to ensure that he or an appointed advisor is well versed in environmental studies, so that they may accurately and efficiently carry out the requirements of the environmental specification.

The contractor is liable for any and all remedial work required in terms of the environmental specification, resulting from his environmental negligence, mismanagement and / or non-compliance.

4.1.2.3. Environmental Control Officer

An environmental control officer will manage and undertake monthly environmental inspections for the duration of the construction phase of the project as required.

The contractors or line management are answerable to the ECO for non-compliance. Issues of non-compliance raised by the ECO/EO must be taken up by the project manager, and resolved as per the conditions of his contract.

Decisions regarding environmental procedures, specifications and requirements which have a cost implication (i.e. those that are deemed to be a variation and not allowed for in the performance specification) must be endorsed by the project manager.

4.2 The Monitoring Procedure

Environmental monitoring is the continuous evaluation of the status and condition of environmental elements. Its purpose is to detect change that takes place in the environment over time and involves the measuring and recording of physical, social and economic variables associated with development impacts.

Many techniques for environmental monitoring have been proposed, each detailing a specific protocol. Regardless of which technique is used, the ultimate aim is that each environmental management specification be checked by means of a system in which a score may be allocated for:

- Full compliance;
- Satisfactory performance;
- Unsatisfactory performance and
- No action taken.

Completed monitoring reports will be submitted to the project engineer, developer/landowner and the contractor, who will attend to issues. These reports must be kept on file and be made available upon request by any environmental authority requesting such.

All persons employed, the contractor or his sub-contractors, must abide by the requirements of these performance specifications as they apply to the works. Any employees, the contractor or his sub-contractors found to be in breach of any of the environmental specifications, may be ordered to vacate the site forthwith and/or be subject to a disciplinary process.

The order may be given orally or in writing by the ECO. Confirmation of an oral order will be given as soon as practicable, but lack of confirmation in writing must not be a cause for the offender to remain on site, or not be subject to a disciplinary process. Supervisory staff, the contractor or his sub-contractor may not direct any person to undertake any activities which would place such person in contravention of the EMP, legislation and specifications.

The contractor and staff are deemed not to have complied with the performance specifications if:

- There is evidence of wilful or accidental contravention of any specification included in the specification;
- There is evidence of the contractor carrying out activities not permitted in terms of the EMP, contract and / or the specification;
- There is evidence of environmental negligence and / or mismanagement resulting in negative impacts on the environment;
- Has failed to meet with the requirements of the approved schedule.

The contractor and developer/landowner will be informed via ECO monthly reports, as well as by means of direct instruction (if necessary) as to what corrective actions are required in terms of environmental compliance.
Disregard for an instruction, and failure to respond adequately to complaints from the public will be construed as non-compliance. Non-compliance may lead to parties being penalised.

In more serious cases, the ECO may give notice, and halt operations until such a time that the corrective action is taken and the site complies with the performance specifications.

In cases of persistent non-compliance, the contractor or staff may be evicted from site after disciplinary process is followed. Only the developer/landowner may issue such instruction, retaining any costs required to remedy situations perpetuated by environmental negligence, mismanagement and / or non-compliance.

4.3 The Auditing Procedure

Environmental auditing is the process of comparing the impacts predicted with those which have actually occurred during implementation.

An environmental performance audit examines and assesses practices and procedures which, in the event of failure, would cause an environmental impact or result in an environmental risk. During each of the lifecycle phases, various issues will be monitored. The performance audit will ensure that the monitoring was correctly undertaken and that compliance was best achieved.

To these ends the project will be audited versus this EMP for effectiveness. ISO/SANS 19011:2011 auditing standards will be applied.

Audits will be undertaken at completion of the construction phases. Audit reports will be submitted to management, who will attend to all noted issues.

These reports must be kept on record and be made available upon request by the developer/landowner/custodian of the land and any environmental authority or I&AP requesting such.

4.4 Retentions and Penalties

It is recommended that a penalty retention system be combined with the penalty system to both motivate and compel the contractor to adhere to the EMP for the duration of the contract.

In this way incentives may be created to perform (i.e. in the form of the retention amounts that will only be paid to the contractor at the end of the contract), without creating the misunderstanding that adherence to the EMP is optional.

Persistent non-compliance will not only result in the contractor forfeiting any retention amount, but he will also be fined.

Of importance is that the contract specifies exactly how the penalty and retention system will operate, as well as how any funds resultant from retentions and penalties will be utilised.

All such funds must be used to improve environmental conditions on the site in general.

4.4.1. The Retention System

For this system, a percentage value for each of the sections priced for in the environmental bill of quantities is retained until the full completion of the contract works.

If the monitoring process reveals persistent and/or wilful non-compliance with any aspect of the environmental performance specifications, then the full retention associated with that particular item will be withheld.

The project may then apply these retained funds to rectify the problem on site possibly making use of other or alternate resources at his disposal.

At the end of the contract or action, all remaining environmental retention amounts will be paid out to the contractor or staff pending approval by the ECO, after having confirmed full compliance with the relevant performance and rehabilitation specifications.

4.4.2. Penalty System

A system of penalties will be introduced to reinforce environmentally sensitive and prudent behaviour. The maximum penalties that will be fined per incident that may be enforced are listed below. The penalty amount will be determined (inter alia) by the severity of the offence.

Offence	Amount
Non-compliance of EA or EMP condition	R 5 000.00 (ex VAT) per non-compliant act, per day until compliance is achieved
Casual Litter on site resulting from operation	R250 / offence / day
Disposal of any litter or construction material in non-specified area or by non-compliant means	R5000 / m^3 / per day
Dumping of cement, concrete, fuel or oil in an area or other than that authorised and suitable	R10 000 per offence / day
Failure to use portable / toilets	R100 / observed incident or evidence of human excrement on site

In addition to the above, all costs incurred by the client / developer to remedy any damage will be the responsibility of the offender.

Should the monitoring process reveal acts of persistent and / or wilful non-compliance with the environmental performance specifications, then the contractor or staff member will be fined according to the specified value of that item. The retention and penalty system should be adhered to.

4.5 Method Statements

Contractors must provide written statements for discussion with the ECO on environmentally sensitive aspects of the contract. Environmentally sensitive aspects include by example excavations, work close to sensitive areas, collection and storage of top soil and vegetation, erosion control, wash water control, waste control, etc.

CHAPTER 5

This section of the report is included in compliance with Section 24N (2) (e) of the National Environmental Management Act 107 of 1998.

5.1. Good Housekeeping

The developer/landowner will ensure the maintenance of “good housekeeping” practices during operations.

This will help avoid several disputes regarding responsibility and will allow for the smooth running of the operation as a whole.

Good housekeeping extends beyond the environmentally sensitive construction methods to include the care for and preservation of the surrounding environment.

5.2 Record Keeping

The developer/landowner will ensure that a filing system, identifying all documentation related to the EMP, is established.

A list of reports likely to be generated during the project is set out below.

All applicable documentation must be included in the environmental filing system catalogue or document retrieval index.

- Approved EMP, authorizations, licenses or permits;
- Final design documents and diagrams issued;
- All communications detailing changes of design/scope that may have environmental implications;
- Daily, weekly and monthly site monitoring reports;
- Complaints register;

- Environmental training manual;
- Environmental training attendance registers;
- Incident and accident reports;
- Emergency preparedness and response plans;
- Copies of all relevant environmental legislation;
- Permits and legal documents as part of emergency preparedness teams e.g. fire teams, etc.;
- Crisis communication manual;
- Disciplinary procedures;
- Monthly site meeting minutes during construction;
- All relevant permits;
- All method statements for all phases of the project.

5.3 Document Control

The developer/landowner will be responsible for establishing a procedure for document control.

The document control procedure must comply with the following requirements:

Documents must be identifiable by organisation, division, function, activity and contact person;
Every document must identify the person and their positions, responsible for drafting and compiling the document, for reviewing and recommending approval, and final approval of the document for distribution;

All documents must be dated, provided with a version number and reference number, filed systematically, and retained for a specified period.

The owner will ensure that documents are periodically reviewed and revised where necessary, and that current versions are available at all locations where operations essential to the functioning of the EMP are performed. All documents will be made available to the external auditor.

5.4 Reporting Requirements

All advice and recommendations made by the ECO must with the project engineer/engineers compliance be recorded on site in the site instruction book/ suitable register for his attention.

All spills will need to be documented and reported to DWS and other relevant authorities. Any event resulting in the spill or leak of fuels or any other hazardous solvents into the ground and/or water courses (e.g. that of hazardous substances used during the construction or operational phase), must be reported to all relevant authorities, including DEA, within 14 (fourteen) days. This requirement is in terms of Section 30 (10) of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) that pertains to the control of emergency incidents and should include the reporting, containment and clean-up procedure of such incident and the remediation of the affected area. All necessary documentation must be completed and submitted within the prescribed timeframes. Containment, clean-up and remediation must commence immediately in the case of NEMA Section 30 incidents.

CHAPTER 6

6.1. Public Communication Protocols

This section of the report is included in compliance with Section 24N (2) (e) of the National Environmental Management Act 107 of 1998.

The developer/landowner must be responsible for regulating public access to information and compliance reporting.

The developer/landowner must respond to third party or public queries and complaints.

The developer/landowner must also be responsible for maintaining the compliance register to record complaints received and action taken.

CHAPTER 7

This section of the report is included in compliance with Section 24 N 2 (d - g) and 3 (a - b) of the National Environmental Management Act 107 of 1998.

Goal for Planning and Design

Overall Goal for Planning and Design: Undertake the planning and design phase in a way that:

- Ensures that the design of the PV 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 any landowner concerns and that these are appropriately addressed through design and planning (where appropriate).
- Ensures that the best environmental options are selected for the project.
- Enables the PV facility construction activities to be undertaken without significant disruption to other land uses in the area.
- In order to meet this goal, the following objectives have been identified, together with necessary actions and monitoring requirements.

Design requirements:

- Conventional galvansing of steel frames and pedestals should be applied to protect critical elements in contact with the ground from corrosion.
- Provision of critter paths within the fencing to be provided (include during design).
- Reduce level of lighting and placement of lighting to be judiciously considered at time of implementation
- Ensure that live electrical fence wire is not placed at ground level.
- Transmission lines to Aries substation should follow as far as technically possible the path of the existing power line.
- Underground cabling should be installed where possible.
- Ensure that the panels are placed on structures and lifted off the ground so as to allow sunlight penetration.

OBJECTIVE PD1: PRE-CONDITIONS

- Ensure redistribution of non-agricultural enterprises as land is potentially removed from future Land Reform applications: 20%of the Solar Facility will be BEE owned. Ensure that locals are represented in the required 20%.
- Contractor appointed to announce the project so that the municipality, local community and local community organizations should be informed of potential job opportunities.
- Ensure that 90% of the semi- and unskilled employees contracted by Contractor are local.
- Apply mechanisms to enable locals to access jobs offered during the construction phase.
- Of locals employed, 90% has to be previously disadvantaged.
- Of locals employed, a minimum of 30% has to be female and has to be provided with training and education to develop the appropriate skills.
- Reserve 70% of jobs for youth (18 – 35).
- Reserve 50% of jobs for women.
- Apply mechanisms to enable youth and women to access employment.
- Pay youth and women market-related salaries and wages.
- Provide youth and women equal access to training and education opportunities.
- Should employees not be suitably qualified, skill transfer should take place.
- Where suitable and appropriately qualified local employees are not available, employ females and provide the appropriate training skills transfer.
- Offer formal and informal skills transfer:
  Should skilled persons from outside the community be employed, the contractor appointed should offer formal and informal training and skills development programme to enhance the opportunities for local historically disadvantaged individuals in the construction industry. Measures should be put in place to ensure successful training and development i.e. structured job shadowing and

learnerships. Such programmes should be offered in liaison with an accredited Further Education and Training College or University of Technology.
- Involve schools to visit site during the construction phase to inspire youngsters to join the construction industry.
- Establish a Monitoring Committee for the construction phase in collaboration with representatives of the local community. The Monitoring Committee has to ensure that the EMPr is implemented and that any problem that arise and is associated with the construction of the structures is addressed.
- Contractor to act as reference for locals employed.
- Contractor to liaise with existing or future projects to access employment for locals.
- The service provider database of local companies or individuals (including small businesses owned and run by HDIs that qualify as service providers of construction, catering, waste collection or site cleaning companies etc.) should be used by contractors to appoint service providers. Should a local company not be registered on the municipal service providers list, the contractor should assist such a company to register and comply prior with the commencement of the project. These firms should be invited to render services where required.
- Contractor should be directed by tender criteria to purchase locally and to make use of local service providers.
- Spending money locally purchasing from locals and South African should benefit employees. The proposed development should leverage discount in the local economy of the municipal area and employees should be made aware of it.
- Small business should be supported (i.e. skills training, assistance and guidance to set up small businesses) and joint ventures with previous disadvantaged persons should be promoted.
- The promotion of joint ventures between small business (owned by previous disadvantaged persons) and more established business should be encouraged.
- Foreign employees are restricted to limited work cycles and have to return home regularly.

The following pre-conditions must be fully met before any construction activities may commence.

A site meeting between the contractors and the representatives of the developer must take place at least 5 days prior to commencement of construction work to:
- Demarcate micro construction sites, services routes, access routes, working boundaries and no-go areas;
- Pre-construction evaluation and possible plant rescue operations;
- A site-specific avifaunal walk through should be conducted by a qualified ornithologist;
- Identification of laydown areas, roadways and infrastructure, particularly in respect of floral and faunal presence;
- Authorizations, Licenses or permitting requirements in terms of the National Water Act and Northern Cape Conservation Act;
- Discuss methods of stockpiling (vegetation, topsoil, sub-soil, shell-grit, etc);
- Check required toilets and fire-fighting facilities to be in place;
- Discuss and agree restricted access to construction site;
- Sign the Declaration of Understanding (Contractors);
- Discuss and agree communication channels including contact details;
- Discuss and agree areas of responsibility;
- Discuss and agree the demarcation and control of construction and building sites.

Minutes of this site meeting must be kept, and are to be distributed to all parties.

The following equipment must be on every micro or sub site before any construction work is due to start:
- Sufficient and suitable chemical toilet facilities.
- Sufficient refuse bins, which are weather and wind proof, with proper lids.
- 1 x type ABC (all purpose) 12.5 kg fire extinguisher.

This will be monitored by the ECO during site visits and recorded, reported and proof included in the audit report to be submitted once construction is completed.

OBJECTIVE PD2: LAYOUT PLAN CONTROLS

The contractor must ensure that a copy of the signed approved layout plan is available at the office on site at all times for inspection by the developer or his representative(s). Any variation to the approved layout plan must be submitted to the developer for signed approval and may only be implemented once the approved variation is available to the contractor and available on site at the office. The variation of changes to the layout must be approved by the competent authority as per the EA conditions. This will be monitored by the ECO during site visits and recorded, reported and proof included in the audit report to be submitted once construction is completed.

OBJECTIVE PD3: ADVERTISING

Signage related to the facility should be discrete and confined to the entrance gates. No other corporate or advertising signs should be permitted. The contractors may place no advertising material on the property unless prior formal written permission has been obtained from SANRAL.

This will be monitored by the ECO during site visits and recorded, reported and proof included in the audit report to be submitted once construction is completed.

OBJECTIVE PD4: METHOD STATEMENTS

To ensure all construction activities are undertaken with the appropriate level of environmental awareness to minimise environmental risk, in line with the specifications of the EMPr.

The environmental specifications are required to be underpinned by a series of Method Statements, within which the contractors and service providers are required to outline how any identified environmental risks will practically be mitigated and managed for the duration of the contract, and how specifications within this EMPr will be met. That is, the contractor will be required to describe how specified requirements will be achieved through the submission of written method statements to the site manager.

A method statement is defined as “a written submission by the contractor in response to the environmental specification or a request by the site manager, setting out the plant, materials, labour and method the contractor proposes using to conduct an activity, in such detail that the site manager is able to assess whether the contractor's proposal is in accordance with the specifications and/or will produce results in accordance with the specifications”.

The method statement must cover applicable details with regard to:

- Details of the responsible person/s
- Construction procedures
- Materials and equipment to be used
- Getting the equipment to and from site
- How the equipment/material will be moved while on-site
- How and where material will be stored
- The containment (or action to be taken if containment is not possible) of leaks or spills of any liquid or material that may occur
- Timing and location of activities
- Compliance/non-compliance with the specifications
- Any other information deemed necessary by the site manager

Method statements must be compiled for all activities which affect any aspect of the environment and should be applied consistently to all activities.

Specific areas to be addressed in the method statement pre, during and post construction (where applicable) include:

General Administration:

- Designate access road and the protocol on while roads are in use.
- Site establishment (which explains all activities from induction training to offloading, construction sequence for site establishment and the different amenities and to be established etc. Including a

site camp plan indicating all of these). Preparation of the site (i.e. clearing vegetation, compacting soils).

Soil Management:

- Soil management/stockpiling and erosion control.
- Excavations and backfilling procedure.

Water Management:

- Stipulate norms and standards for water supply and usage (i.e.: comply strictly to licence and legislation requirements and restrictions).
- Stipulate the storm water management procedures recommended in the storm water management plan.
- Ablution facilities (placement, maintenance, management and servicing).

Fire Prevention and Management:

- Fire management protocols and procedures to be put in place on site in accordance with relevant legislature.

Indigenous Fauna and Flora:

- Fauna and flora protection process on and off site (i.e. removal to reintroduction or replanting, if necessary).

Environmental Reporting:

- Incident and accident reporting protocol

Solid Waste Management:

- Description of the waste storage facilities (on site and accumulative).
- Placement of waste stored (on site and accumulative).
- Management and collection of waste process.
- Recycle, re-use and removal process and procedure.

Liquid Waste Management:

- The design, establish, maintain and operate suitable pollution control facilities necessary to prevent discharge of water containing polluting matter or visible suspended materials into rivers, streams or existing drainage systems.
- Should grey water (i.e. water from basins, showers, baths, kitchen sinks etc.) need to be disposed of, link into an existing facility where possible. Where no facilities are available, grey water runoff must be controlled to ensure there is no seepage into wetlands or natural watercourses.

Dust and Noise Pollution:

- Describe necessary measures to ensure that noise from construction activities is maintained within lawfully acceptable levels.
- Procedure to control dust at all times on the site, access roads, borrow pits and spoil sites (dust control shall be sufficient so as not to have significant impacts in terms of the biophysical and social environments). These impacts include visual pollution, decreased safety due to reduced visibility, negative effects on human health and the ecology due to dust particle accumulation.

Hazardous Substance Storage:

- Ensure compliance with all national, regional and local legislation with regard to the storage of oils, fuels, lubricants, solvents, wood treatments, bitumen, cement, pesticides and any other harmful and hazardous substances and materials (South African National Standards apply).
- Lists of all potentially hazardous substances to be used. Appropriate handling, storage and disposal procedures.
- Prevention protocol of accidental contamination of soil at storage and handling areas. All storage areas, (i.e.: for harmful substances appropriately bunded with a suitable collection point for accidental spills must be implemented and drip trays underneath dispensing mechanisms including leaking engines/machinery).

The contractor may not commence the activity covered by the method statement until it has been approved by the site manager, except in the case of emergency activities and then only with the consent of the site manager. Approval of the method statement will not absolve the contractor from their obligations or responsibilities in terms of their contract.

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

This will be monitored by the ECO during site visits and recorded, reported and proof included in the audit report to be submitted once construction is completed.

OBJECTIVE PD5: ENSURE THE DESIGN RESPONDS TO THE IDENTIFIED ENVIRONMENTAL CONSTRAINTS AND OPPORTUNITIES

The most sensitive landscape features for planning purposes in the study area are the water courses, pan and quiver tree dense areas.

Project Component/s	Access roads; Laydown areas and construction camp area.
Potential Impact	Design fails to respond optimally to the environmental consideration.
Activities/Risk Sources	Positioning of PV facility and access roads.
Mitigation: Target/Objective	Ensure that the design of the PV facility responds to the identified environmental constraints and opportunities.

Mitigation: Action/Control	**Responsibility**	**Timeframe**
Plan and conduct pre-construction activities in an environmentally acceptable manner.	Developer	Pre-construction
Access roads to be carefully planned to minimise the impacted area and prevent unnecessary over compaction of soil.	Developer	Design phase
As far as possible, existing roads must be used.	Developer	Design phase
Develop a site-specific waste management plan for the construction phase.	Developer	Pre-construction
The holder of an environmental authorisation has the responsibility to notify the competent authority of any alienation, transfer and, change of ownership rights in the property on which the activity is to take place.	Developer	Pre-construction
Fourteen (14) days written notice must be given to the Department that the activity will commence. The notification must include a date on which the activity will commence as well as the reference number.	Developer	Pre-construction
ECO to be appointed prior to the commencement of any authorised activities. Once appointed the name and contact details of the ECO must be submitted to the DEA	Developer	Pre-construction
Conventional galvansing of steel frames and pedestals should be applied to protect critical elements in contact with the ground from corrosion.	Developer	Design phase

Performance Indicator	Design meets objectives and does not degrade the environment. Design responds to the mitigation measures and recommendations in the EIAr. Minimal impact on the surrounding agricultural land.
Monitoring	Ensure that the design implemented meets the objectives and mitigation measures in the EIAr through review of the design by the Project Manager, Developer and the Contract or prior to the commencement of construction.

OBJECTIVE PD6: ENSURE EFFECTIVE COMMUNICATION MECHANISMS WITH THE VARIOUS STAKEHOLDERS

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

Project Component/s	PV facility; Access roads.
Potential Impact	Impacts on affected and surrounding landowners and land uses.
Activities/Risk Sources	Activities associated with facility construction and operation.
Mitigation: Target/Objective	Effective communication with affected and surrounding landowners. Addressing of any issues and concerns raised as far as possible in as short a timeframe as possible.

Mitigation: Action/Control	Responsibility	Timeframe
Compile and implement a grievance mechanism procedure for the public to be implemented during both the construction and operational phases of the facility. This procedure must include details of the contact person who will be receiving issues raised by I&APs, and the process that will be followed to address issues.	Developer	Pre-construction, construction and operational phase

Performance Indicator	Effective communication procedures in place.
Monitoring	An incident must be reported in the site book and monitored by the ECO.

CONSTRUCTION AND REHABILITATION PHASE
CIVIL CONTRACTOR

Goals for Construction Phase

Overall Goal for Construction:
Undertake the construction of the PV facility infrastructure 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 in the area, in particular concerning noise impacts, dust, farming practices, traffic and road use, and effects on local residents;
- Minimises the impact on the surrounding area;
- Minimises impacts on sensitive environments;
- Minimises the impact on the heritage and historical value of the site and
- Minimises possible health impacts.

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

OBJECTIVE C1: WORKING HOURS

Civil & Construction Sites	
Mondays to Fridays	06h00 – 19h00
Saturdays & Public Holidays	06h00 – 17h00

Project Component/s	PV facility; Access roads.
Potential Impact	Impacts on affected and surrounding landowners and land uses such as noise impacts.
Activities/Risk Sources	Activities associated with facility construction that creates disturbing noises.
Mitigation: Target/Objective	Effective communication with affected and surrounding landowners. Addressing of any issues and concerns raised as far as possible in as short a timeframe as possible.

Mitigation: Action/Control	Responsibility	Timeframe
Contractors may only be present on the site during the public time hours.	Developer and contractor	Construction phase

Performance Indicator	Effective communication and procedures in place.
Monitoring	This will be monitored by the ECO during site visits and recorded, reported and proof included in the audit report to be submitted once construction is completed.

OBJECTIVE C2: SAFETY

Project Component/s	PV facility; Access roads.
Potential Impact	Impacts on affected and surrounding landowners and land uses such as crime, violence and incidents.
Activities/Risk Sources	The proposed development may result in an increase in crime levels in the surrounding community.
Mitigation: Target/Objective	To protect all involved from incidents and injury.

Mitigation: Action/Control	**Responsibility**	**Timeframe**
Telephone numbers of emergency services, including the local firefighting services, must be posted conspicuously in the contractor's office and near the telephone. No firearms are permitted on the construction site, other than those authorised by the developer for the property security service provider if needed. Notices should be displayed at all public entrances to the property, warning visitors that they are entering a construction site. Fine structures for livestock theft. Restrict movement to inside the site. Demarcate work areas which are safeguarded with a fence. Keep security control to enter and exit premises. Security lighting must be kept to the absolute minimum and be confined to only those sections of the facility that are necessary to be illuminated. No external up-lighting or flood-lighting of any part of the facility must be allowed. External, inclusive of perimeter security lighting must be by means of shielded down-lighters, minimizing light pollution beyond the extent of the area to be lit.	Contractor	Construction phase

Performance Indicator	Effective communication and procedures in place.
Monitoring	This will be monitored by the ECO during site visits and recorded, reported and proof included in the audit report to be submitted once construction is completed.

OBJECTIVE C3: SPEED LIMIT

Project Component/s	PV facility; Access roads.
Potential Impact	Impacts on affected and surrounding landowners and land uses such as dust, noise and traffic accidents.
Activities/Risk Sources	Activities associated with facility construction such as transport of construction material, rubble and contractors.
Mitigation: Target/Objective	To protect all involved from incidents and injury and keep dust and noise impacts to a minimum.

Mitigation: Action/Control	**Responsibility**	**Timeframe**
For security and safety reasons the speed limit on the property for all contractors' vehicles is 30 km per hour. The contractor is responsible for ensuring that all his employees, sub-contractors and delivery vehicles adhere to this rule.	Contractor	Construction phase

Performance Indicator	Effective communication and procedures in place.
Monitoring	This will be monitored by the ECO during site visits and recorded, reported and proof included in the audit report to be submitted once

	construction is completed.

OBJECTIVE C4: CONTRACTOR'S CAMP

Project Component/s	PV facility; Access roads.
Potential Impact	Impacts on affected and surrounding landowners and land uses such as pollution and litter as well as visual impacts.
Activities/Risk Sources	Setting up and operation of the contractor's camp.
Mitigation: Target/Objective	Construction camp must be neatly fenced and construction site must be neat and tidy. Outdoor lighting must be strictly controlled so as to prevent light pollution. All lighting must be installed at downward angles. Sources of light must as far as possible be shielded by physical barriers such as buildings or structures i.e. steel frames. Use only minimum wattage light fixtures.

Mitigation: Action/Control	**Responsibility**	**Timeframe**
The contractor's camp will be indicated by and to landowner management and the ECO on the site. The final location of the contractor's camp will be authorized by the ECO and landowner. Construction camp must be neatly fenced and construction site must be neat and tidy.	Developer / Contractor	Construction phase

Performance Indicator	Contractor's camp is neat and tidy and fenced.
Monitoring	The ECO in conjunction with the landowner will approve construction camp area. This will be monitored by the ECO during site visits and recorded, reported and proof included in the audit report to be submitted once construction is completed.

OBJECTIVE C5: DELIVERIES TO CONTRACTORS

Project Component/s	Access roads.
Potential Impact	Impacts on affected and surrounding landowners and land uses such as dust, noise, increased traffic, soil compaction and traffic accidents.
Activities/Risk Sources	Vehicles on site transporting material to contractors.
Mitigation: Target/Objective	To protect and mitigate impacts on the environment and surrounding land uses.

Mitigation: Action/Control	**Responsibility**	**Timeframe**
Contractors will at all times be responsible for compliance by their delivery service providers as engaged. Delivery times will be limited to working times as defined in this document. Contractors have the responsibility of advising the property security staff of deliveries expected and to be executed. Contractors shall further ensure that drivers of service providers are informed of all procedures and restrictions e.g. which access road to use, speed limits, no-go areas, demarcated construction areas, and maximum allowed vehicle mass etc., as applicable before their first visit to site. Washing of service provider delivery vehicles and equipment will not be allowed on the property and must be carried out elsewhere.	Contractor	Construction phase

Performance Indicator	Site is secure and there is no unauthorised entry. No members of the public/landowners injured.
Monitoring	This will be monitored by the ECO during site visits and recorded,

	reported and proof included in the audit report to be submitted once construction is completed.

OBJECTIVE C6: ALIEN/INVASIVE PLANTS

Project Component/s	PV facility; Access roads.
Potential Impact	Impacts on indigenous vegetation due to spreading of alien/invasive plants.
Activities/Risk Sources	Activities associated with facility construction such as the removal of vegetation and top soil.
Mitigation: Target/Objective	To prevent the spread of alien/invasive plants.

Mitigation: Action/Control	**Responsibility**	**Timeframe**
A contractor appointed by the developer and engineer shall be tasked to ensure that all weeds and alien/invasive species are removed as instructed and approved by the ECO. No on-site burying, dumping or stockpiling of any weeds and aliens or invasive species shall occur. Such should be removed from the site to a suitable dumping site from which seed cannot escape. Compliance with the Alien Invasive Plant Management Plan.	Contractor	Construction phase

Performance Indicator	All possible introduction and spreading of alien invasive plant species are controlled. Compliance with the Alien Invasive Plant Management Plan.
Monitoring	This will be monitored by the ECO during site visits and recorded, reported and proof included in the audit report to be submitted once construction is completed.

OBJECTIVE C7: STORM WATER MANAGEMENT

Project Component/s	Storm water; Access roads.
Potential Impact	Potential pollution of water resources and erosion. Erosion due to poor storm water management. Pooling of water / flooding in portions of the development site due to poor storm water management.
Activities/Risk Sources	Activities associated with facility construction.
Mitigation: Target/Objective	To manage storm water effectively and prevent pollution and erosion.

Mitigation: Action/Control	**Responsibility**	**Timeframe**
All roads need to be maintained and monitored and visible signs of possible erosion immediately rehabilitated. Undertake storm water management measures as required by the Storm Water Management Plan. Rehabilitate or stabilise eroded areas immediately to prevent increase in erosion.	Contractor	Construction phase

Performance Indicator	No signs of storm water pollution or accumulation that will result in a nuisance. All possible erosion impacts are controlled.
Monitoring	This will be monitored by the ECO during site visits and recorded, reported and proof included in the audit report to be submitted once construction is completed.

OBJECTIVE C8: ARCHAEOLOGY AND PALAEONTOLOGY MANAGEMENT

Project Component/s	PV facility;

	Access roads.
Potential Impact	The loss of cultural or heritage resources.
Activities/Risk Sources	Activities associated with facility construction such as excavation.
Mitigation: Target/Objective	To protect and mitigate impacts on the areas heritage.

Mitigation: Action/Control	**Responsibility**	**Timeframe**
<u>Survey final layout footprint</u> Because the survey conducted in the specialist study was largely limited to specified target areas, there will need to be a follow up survey of any areas within the final development footprint that have not yet been covered. It is important that LCTs are individually plotted in order to provide an accurate indication of where the densest ESA scatters lie. The results of this survey along with those reported in the specialist study will be used to determine which areas should be subjected to archaeological mitigation. It is likely that all these areas can be covered in three days on site. **<u>Excavation/sampling of significant sites and collection of ESA artefacts and diagnostic elements from dense artefact clusters</u>** For archaeological sites the mitigation would entail excavation and sampling of the sites to recover archaeological materials. Radiocarbon dating might be required if suitable organic materials are present. For the ESA scatters a thorough examination of the relevant areas with collection of all LCTs and other diagnostic elements (e.g. cores, large blades) should be carried out. Artefact locations can be recorded by GPS. All materials would require analysis and reporting and the work would need to be carried out under a permit issued by SAHRA. <u>ESA4: S29 26 39.5 E20 52 01.5</u> Sample artefacts over one area of about 20 x 20 m. This can be done within large grid squares (2x2 m) because of the relatively low density. A detailed survey of the surrounding area should then be undertaken with all LCTs and other diagnostic artefacts collected (GPS points should be taken) (c. 4 hours required). <u>ESA5: S29 26 24.1 E20 52 43.0</u> Sample artefacts over one or more areas as appropriate. This can be done within large grid squares (2x2 m) because of the relatively low density. A detailed survey of the surrounding area should then be undertaken with all LCTs and other diagnostic artefacts collected (GPS points should be taken) (c. 12 hours required). <u>ESA3: S29 25 43.8 E20 53 30.4</u> Sample artefacts over one or more areas as appropriate. This can be done within large grid squares (2x2 m) because of the relatively low density. A detailed survey of the surrounding area should then be undertaken with all LCTs and other diagnostic artefacts collected (GPS points should be taken) (c. 6 hours required). Mitigation of the areas listed above would take 3 days on site altogether for one person. Any further areas requiring	Contractor	Construction phase

mitigation (identified in additional survey) would need to be added to this. Management measures would be limited to ensuring that construction activities all remain within the authorised footprints. This monitoring would be carried out by the Environmental Control Officer (ECO). Ensure effective rehabilitation of any disturbed areas not required during operation. Monitoring of substantial excavations for fossil material by ECO on an on-going basis during construction phase. Application of Palaeontological Chance Finds Procedure. No specialist mitigation or monitoring necessary, pending the potential discovery of substantial new fossil material during the construction phase. The ECO responsible for the development must remain aware that all sedimentary deposits have the potential to contain fossils and he/she should thus monitor all deeper (> 1 m) excavations into sedimentary bedrock for fossil remains on an on-going basis. If any substantial fossil remains (e.g. vertebrate bones, teeth, stromatolites, petrified wood, shells) are found during construction SAHRA should be notified immediately (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Phone: +27 (0)21 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za). This is in order that that appropriate mitigation (i.e. recording, sampling or collection) by a palaeontological specialist can be considered and implemented, at the developer's expense. A chance-find procedure (in Annexure 3) should be implemented so that, in the event of fossils being uncovered, the ECO/Site Engineer will take the appropriate action, which includes: • Stopping work in the immediate vicinity and fencing off the area with tape to prevent further access; • Reporting the discovery to the provincial heritage agency and/or SAHRA; • Appointing a palaeontological specialist to inspect, record and **(if warranted)** sample or collect the fossil remains; • Implementing further mitigation measures proposed by the palaeontologist; and • Allowing work to resume only once clearance is given in writing by the relevant authorities. The palaeontologist concerned with mitigation work **(if warranted)** will need a valid collection permit from SAHRA. All work would have to conform to international best practice for palaeontological fieldwork and the study (e.g. data recording fossil collection and curation, final report) should adhere to the minimum standards for Phase 2 palaeontological studies recently published by SAHRA (2013). Any substantial fossil finds to be reported by ECO to SAHRA.		

Performance Indicator	Protection of heritage resources
Monitoring	This will be monitored by the ECO during site visits and recorded, reported and proof included in the audit report to be submitted once construction is completed.

OBJECTIVE C9: SERVICES

Project Component/s	PV facility; Associated services infrastructure; Access roads.
Potential Impact	Damage/loss of services infrastructure or supply.
Activities/Risk Sources	Activities associated with facility construction.
Mitigation: Target/Objective	To protect and mitigate impacts on the surrounding land uses.

Mitigation: Action/Control	**Responsibility**	**Timeframe**
Care and due cognisance must be taken of existing services, service routes and services restrictions. The main Eskom substation in the area is situated at Kalbaskraal, approximately 6,0km to the south-east of the site. An 11kV feeder known as “Kalbaskraal Farmers 1” originates from Kalbaskraal and provides power to the irrigation pumps on the south-east corner of the site. The existing “Kalbaskraal Farmers 1”- feeder can provide a maximum 550kVA (0,55MVA) power supply without any upgrade of the overhead line. The transformer, 11kV switchgear, and metering equipment must be upgraded at the transformer on site. The developer and landowners shall not be liable for damages, expenses or costs incurred for any interruption in supply, variation, frequency, or failure of any utility provider to supply service. Eskom’s rights and services must be acknowledged and respected at all times. Eskom shall at all times retain unobstructed access to and egress from its servitudes. Eskom’s consent does not relieve the developer from obtaining the necessary statutory, land owner or municipal approvals. Any cost incurred by Eskom as a result of non-compliance to any relevant environmental legislation will be charged to the developer. If Eskom has to incur any expenditure in order to comply with statutory clearances or other regulations as a result of the developer’s activities or because of the presence of his equipment or installation within the servitude restriction area, the developer shall pay such costs to Eskom on demand. The use of explosives of any type within 500 metres of Eskom’s services shall only occur with Eskom’s previous written permission. If such permission is granted the developer must give at least fourteen working days prior notice of the commencement of blasting. This allows time for arrangements to be made for supervision and/or precautionary instructions to be issued in terms of the blasting process. It is advisable to make application separately in this regard. Changes in ground level may not infringe statutory ground to conductor clearances or	Contractor	Construction phase

statutory visibility clearances. After any changes in ground level, the surface shall be rehabilitated and stabilised so as to prevent erosion. The measures taken shall be to Eskom's satisfaction. Eskom shall not be liable for the death of or injury to any person or for the loss of or damage to any property whether as a result of the encroachment or of the use of the servitude area by the developer, his/her agent, contractors, employees, successors in title, and assignees. The developer indemnifies Eskom against loss, claims or damages including claims pertaining to consequential damages by third parties and whether as a result of damage to or interruption of or interference with Eskom's services or apparatus or otherwise. Eskom will not be held responsible for damage to the developer's equipment. No mechanical equipment, including mechanical excavators or high lifting machinery, shall be used in the vicinity of Eskom's apparatus and/or services, without prior written permission having been granted by Eskom. If such permission is granted the developer must give at least seven working days' notice prior to the commencement of work. This allows time for arrangements to be made for supervision and/or precautionary instructions to be issued by the relevant Eskom Manager. Note: Where and electrical outage is required, at least fourteen work days are required to arrange it. Eskom's rights and duties in the servitude shall be accepted as having prior right at all times and shall not be obstructed or interfered with. Under no circumstances shall rubble, earth or other material be dumped within the servitude restriction area. The developer shall maintain the area concerned to Eskom's satisfaction. The developer shall be liable to Eskom for the cost of any remedial action which has to be carried out by Eskom. The clearances between Eskom's live electrical equipment and the proposed construction work shall be observed as stipulated by Regulation 15 of the Electrical Machinery Regulations of the Occupational Health and Safety Act, 1993 (Act 85 of 1993). Equipment shall be regarded electrically live and therefore dangerous at all times. In spite of the restrictions stipulated by Regulation 15 of the Electrical Machinery Regulations of the Occupational Health and Safety Act, 1993 (Act 85 of 1993), as an additional safety precaution, Eskom will not approve the erection of houses, or structures occupied or frequented by human beings, under the power lines or within the servitude restriction area.		

Performance Indicator	Protection of existing services and infrastructure.
Monitoring	This will be monitored by the ECO during site visits and recorded, reported and proof included in the audit report to be submitted once construction is completed.

OBJECTIVE C10: ROADS

Project Component/s	Access roads.
Potential Impact	Increased traffic/congestion. Construction vehicles pose a potential risk to other road uses and the natural environment if they do not use designated routes.
Activities/Risk Sources	Deliveries and construction vehicle travelling to site and on site.
Mitigation: Target/Objective	Designation of specific routes for construction vehicles to reduce impact on the environment and other road users.

Mitigation: Action/Control	**Responsibility**	**Timeframe**
Only existing access routes to the property will be used during construction work, so as to control the movement of construction vehicles. The contractor shall ensure that access to construction sites and associated infrastructure and equipment is designated off-limits to the public at all times during construction. Traffic safety measures shall be considered in determining entry or exit points to public roads. Construction vehicles to be restricted only to demarcated footprint areas. Upgrade road signs to address the conflict that could be caused by movement. Provide transport to and from work where possible to decrease pedestrian traffic. Restrict heavy vehicles to specific hours. Erect road signs signaling times when heavy vehicles will make use of the road. Adhere to national traffic safety standards and precaution measures. During the construction phase the contractor has to provide a traffic safety awareness programme for all employees and the project team; the community and particularly kids. Comply with Traffic Management Plan.	Contractor	Construction phase

Performance Indicator	To minimise the impacts on road users and the environment.
Monitoring	This will be monitored by the ECO during site visits and recorded, reported and proof included in the audit report to be submitted once construction is completed.

OBJECTIVE C11: ANTI-EROSION MEASURES

Project Component/s	PV facility; Access roads.
Potential Impact	Wind/water erosion as a result of construction/operation activities.
Activities/Risk Sources	Activities associated with facility construction such as excavation, removal of vegetation etc.
Mitigation: Target/Objective	Reduce erosion by implementing anti-erosion measures.

Mitigation: Action/Control	**Responsibility**	**Timeframe**
The contractor shall take all appropriate and active measures to prevent erosion, especially wind and water erosion, resulting from operations and activities, specifically of storm water control measures to the satisfaction of the ECO/ER. During construction the contractor shall protect areas susceptible to wind and water erosion, by installing all the necessary temporary and permanent works. Measures can include brush packing, anchovy net stabilisation, etc. Where required erosion protection measures must be installed. Aspects normally covered in construction contracts in terms of protection of works are standard and are not to be confused with those under environmental legislation. Ripping of compact soils when	Contractor	Construction phase

and where extensive compaction arises. Flattening and grading of the site should be kept to the minimum. The natural profile and shape of the site is to be maintained. Provision should be made for the rehabilitation of areas damaged by construction activities. Comply with Erosion Management Plan.		

Performance Indicator	All possible erosion impacts are controlled and rehabilitated
Monitoring	This will be monitored by the ECO during site visits and recorded, reported and proof included in the audit report to be submitted once construction is completed.

OBJECTIVE C12: CONSTRUCTION MATERIAL

Project Component/s	PV facility; Access roads.
Potential Impact	Visual impacts and causing a nuisance to surrounding landowners/residents.
Activities/Risk Sources	Activities associated with facility construction such as storage of construction material.
Mitigation: Target/Objective	Reduce the visual impact or nuisance to the surrounding landowners/residents.

Mitigation: Action/Control	**Responsibility**	**Timeframe**
Construction material will be stored at the contractor's camp, as well as on the construction site within the demarcated working areas at each construction point. Special permission may be obtained from the ECO/ER to store material on suitable substitute or ancillary locations should the need arise, and as communicated by the project engineer. All structures should be kept as small and low as technically possible. All painted surfaces are to use earth tones chosen for its ability to blend into the background. Security fencing should be as transparent as possible and mimic agricultural fencing fond in the area. The fence should not be visually dominant over the solar arrays. The use of razor wire should be avoided. Screen planting in the form of tree lines should not be considered. Only in exceptional circumstances should vegetation screening be considered in clumps around structures to mimic farmsteads found in the region.	Contractor	Construction phase

Performance Indicator	To minimise the impact on the surround land uses and environment.
Monitoring	This will be monitored by the ECO during site visits and recorded, reported and proof included in the audit report to be submitted once construction is completed.

OBJECTIVE C13: FIRES

Project Component/s	PV facility; Access roads.
Potential Impact	Uncontrolled fire on/off site, resulting in damage to the environment, property, injuries/death to personnel on site, or injuries/death to the public.
Activities/Risk Sources	Activities associated with facility construction.
Mitigation: Target/Objective	To protect and mitigate the safety of people, property, and the environment on and off site by preventing uncontrolled fires.

Mitigation: Action/Control	**Responsibility**	**Timeframe**
No open fires will be allowed on site and adequate firefighting equipment should be available on site in good working order at all times as prescribed by the fire management protocols. Fires, inclusive of burning of waste, should not be allowed on site. Ensure staff is trained in fire drill. Comply with Fire Management Plan.	Contractor	Construction phase

Performance Indicator	No fire occurred to damage the surrounding environment and land uses and management actions are in place should a fire occur.
Monitoring	This will be monitored by the ECO during site visits and recorded, reported and proof included in the audit report to be submitted once construction is completed.

OBJECTIVE C14: HERBICIDES, PESTICIDES AND FERTILIZERS

Project Component/s	PV facility; Access roads.
Potential Impact	Adjacent land/property or natural environments contaminated by the application of herbicides, fertilizers and pesticides.
Activities/Risk Sources	Activities associated with facility construction.
Mitigation: Target/Objective	To protect and mitigate impacts on the environment and surrounding land uses.

Mitigation: Action/Control	**Responsibility**	**Timeframe**
The contractor must make sure of, and allow, all legal requirements regarding herbicide application procedures. It is vital that the contractor becomes familiar with all the information detailed on every herbicide label before using it. The instructions on the label must be strictly followed throughout. The contractor shall take all necessary precautions to prevent overspray of herbicides outside of the demarcated construction areas and onto natural veld. All personnel working with any herbicide, pesticide or fertilizer must be registered and comply with the requirements set in these registrations. The contractor must put a system in place to control the use of herbicides and pesticides. All equipment associated to herbicides and pesticides must be maintained in accordance to the set standards. The disposal of all redundant and empty containers of herbicides and pesticides must be controlled and disposed of at a waste management facility licensed under the National Environmental Management: Waste Act.	Contractor	Construction phase

Performance Indicator	Herbicide, pesticides and fertilizer use is controlled to prevent impacts on the environment and surrounded land uses.

Monitoring	This will be monitored by the ECO during site visits and recorded, reported and proof included in the audit report to be submitted once construction is completed.

OBJECTIVE C15: MEASURES TO PROTECT HYDROLOGICAL FEATURES SUCH AS RIVERS, WETLANDS AND OTHER ENVIRONMENTAL SENSITIVE AREAS FROM CONSTRUCTION IMPACTS

Project Component/s	PV facility; Access roads; Adjacent natural environments/features.
Potential Impact	Destruction of natural hydrological systems and the pollution of ground water resources.
Activities/Risk Sources	Activities associated with facility construction.
Mitigation: Target/Objective	To protect and mitigate impacts on the environment and hydrological features.

Mitigation: Action/Control	**Responsibility**	**Timeframe**
No development may take place in the ecological support area (water course) adjacent to the site. Non-perennial (Graafwater River) and others and pan should be avoided and a no-go buffer of 100 m should be applied. Staff and Vehicles to be kept off pan and restricted movement otherwise i.e. keeping on existing roads. Buffers must be maintained as per Annexure B. Inspection of drainage features immediately outside of the footprint of the proposed PV facility and undertakes removal of solid waste and litter on a regular basis. Undertake storm water management measures as required by the storm water management plan. All spillage incidences and actions taken consequent thereto must be reported to the ECO and recorded in the site register.	Contractor	Construction phase

Performance Indicator	Impacts on hydrological features minimized and mitigated.
Monitoring	This will be monitored by the ECO during site visits and recorded, reported and proof included in the audit report to be submitted once construction is completed.

OBJECTIVE C16: AN EFFECTIVE MONITORING SYSTEM TO DETECT ANY LEAKAGE OR SPILLAGE OF ALL HAZARDOUS SUBSTANCES DURING THEIR TRANSPORT, HANDLING USAGE AND STORAGE. THIS MUST INCLUDE PRECAUTIONARY MEASURES TO LIMIT THE POSSIBILITY OF OIL AND OTHER TOXIC LIQUIDS FROM ENTERING THE SOIL OR STORM WATER SYSTEMS

Project Component/s	PV facility; Access roads.
Potential Impact	Contamination of soil, storm water and ground water resources by hazardous substances.
Activities/Risk Sources	The handling, storage and use of hazardous substances.
Mitigation: Target/Objective	Prevention and mitigation of the environment contaminated as a result of exposure to hazardous substances.

Mitigation: Action/Control	**Responsibility**	**Timeframe**
The EA holder, Land Owner, Site Environmental Officer and Environmental Control officer will do daily, weekly and monthly inspections and report and monitor compliance	Contractor	Construction phase

with the management actions included in the EMPr and EA conditions. These monitoring and reporting requirements are recorded in several sections of the EMPr. Monitoring will focus on signs of spillages and procedures during handling and storage of dangerous goods as described in the EMPr. The section on storage and handling of dangerous goods in the EMPr will be enforced.		

Performance Indicator	Impacts on soil and hydrological features minimized and mitigated.
Monitoring	This will be monitored by the ECO during site visits and recorded, reported and proof included in the audit report to be submitted once construction is completed.

OBJECTIVE C17: DIESEL FUEL AND LUBRICANT HANDLING PROGRAMME

Project Component/s	PV facility; Access roads.
Potential Impact	Contamination of soil, storm and ground water resources as a result of an oil/diesel/lubricant spill/leak.
Activities/Risk Sources	Diesel fuel and lubricant use and storage.
Mitigation: Target/Objective	To protect and mitigate impacts of contaminants on the environment and hydrological features.

Mitigation: Action/Control	**Responsibility**	**Timeframe**
Servicing of construction vehicles and machinery to take place of site. All vehicles must be in a good condition with no leakages leading to possible contamination of soil or water supplies. The following conditions related to the temporary fuel tanks must be implemented: The fuel tanks must be designed and installed in accordance with relevant Oil Industry standards and SANS codes where applicable for the aboveground storage tanks. The tanks must be located within a bund (110 % of the tanks capacity) in order to contain potential spills. During fuel tanker delivery, the tanker driver must be present at all times during product offloading. Should an incident occur the supply vehicle emergency cut-off switch must be activated to immediately stop fuel delivery. Flexible hoses with dry-break couplings and emergency isolation must be used. All spillage incidences and actions taken consequent thereto must be reported to the ECO and recorded in the site register. All fuel and flammable liquids should be stored under secure and fenced conditions and in a bunded site with the volume of the bunding capable of holding 110% of the liquid. Double bunded tanks, with leak monitoring sensors should be used. The applicant must ensure that effective stock inventory monitoring and regular auditing take place for the early identification of possible leaks. The requirements of the Occupational Health and Safety Act, 1993 (Act No. 85 of 1993), must be adhered to. Within three months of the tanks ceasing to be used the tanks must be removed at the expense of the applicant, and the site, including all associated infrastructure must be	Contractor	Construction phase

rehabilitated to the satisfaction of the relevant authority. **Refuelling:** Refuelling of equipment must be conducted from the bunded fuel tank and pump at the contractor's camp. Fuel tanks must be bunded and supplied with a concrete apron. The concreted refuelling apron will be constructed with a drain along its extremities to collect any diesel contaminated run-off and channel it to the oil trap where separated oil will be collected and disposed of in the oil recycling container and process. Any spills on the concrete apron of floor below the tank are to be treated with OT8 or Spillsolve or equivalent as per the product instructions. A 500-litre drawn trailer to convey diesel to the equipment for re-fuelling may also be used. Such trailer will be drawn by a specified vehicle and driver, with alternate nominated as approved by the Project Engineer. Such tow vehicle may travel at 20kms per hour maximum at any time, be clearly identifiable as such, and may only tow the diesel cart should the pre-requisite drip trays and emergency equipment be on the vehicle at the time. In situ refuelling activity may only take place during a standard specified daily time slot as displayed in the construction office, unless specific per day permission has been given to refuel at any other time by the ECO. This must be pre-recorded in the site record book. Staff will require instruction in the identification of diesel and oil leaks and the use of Spillsolve (or equivalent) products. **On-site emergency repairs:** Only small mobile plant and emergency repairs are to take place on site. These will require the provision of drip trays and funnels to ensure that no oil or fuel leakages occur onto the ground. Should such spill take place, then the oil saturated soil is to be placed in suitable containers and disposed of at a hazardous waste disposal site. Any contamination of soil is to be treated with Spillsolve or similar product. Contaminated water as a result of an oil or fuel spillage on the area should similarly be treated in appropriate way, and the polluted water should not be specifically removed and not allowed to merge with run-off water collected in the trap collecting all run offs from the slab. **Collection of contaminated spares and waste oils:** Contaminated spares, oil filters, gaskets, water, etc. will be collected in separate holders at the designated storage facility for disposal at a licensed H:h site. Staff will require instruction in: • Deleterious effects of oil / fuel on the environment • Identification of oil leaks • Handling of oil / fuel leaks into soil • Location and method in storage of contaminated spares • Fire prevention and emergency drills in case of an accident		

Performance Indicator	Ensure that no spillages occur and if it occurs that it is handled and cleaned up.

Monitoring	This will be monitored by the ECO during site visits and recorded, reported and proof included in the audit report to be submitted once construction is completed.

OBJECTIVE C18: APPROPRIATE HANDLING AND STORAGE OF CHEMICALS, HAZARDOUS SUBSTANCES AND WASTE

The construction phase will involve the storage and handling of a variety of chemicals including adhesives, abrasives, oils and lubricants, paints and solvents. The main wastes expected to be generated by the construction of the facility will include will include general solid waste and liquid waste, and may include hazardous waste.

Project Component/s	Access roads; Construction camp; Storage areas.
Potential Impact	• Release of contaminated water from contact with spilled chemicals. • Generation of contaminated wastes from used chemical containers. • Inefficient use of resources resulting in excessive waste generation. • Litter or contamination of the site or water through poor waste management practices. • Pollution of water and soil resources.
Activities/Risk Sources	• Vehicles associated with site preparation and earthworks. • Packaging and other construction wastes. • Hydrocarbon use and storage. • Spoil material from excavation, earthworks and site preparation.
Mitigation: Target/Objective	• To ensure that the storage and handling of chemicals and hydrocarbons on-site does not cause pollution to the environment or harm to persons. • Good housekeeping of chemicals and other materials on site for the duration of the construction will minimize, avoid any spillages, or other incidents. All spillages should be reported immediately. • To ensure that the storage and maintenance of machinery on-site does not cause pollution of the environment or harm to persons. • To comply with waste management guidelines. • 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 the waste management plan during the construction phase. • The applicant, land owner and environmental control officer (ECO) must ensure that the inert waste is separated from other hazardous construction materials. • All hazardous waste should be treated and or disposed of in the correct manner. • The National Information System regulations must be adhered to and the registration and reporting of hazardous waste generated must be done online to the Integrated Pollution and Waste Information System (IPWIS) system once the stations are operational. • Spill kits must be made available on-site for the clean-up of spills and leaks of contaminants. • Corrective action must be undertaken immediately if a complaint is received, or potential/actual leak or spill of polluting substance identified. This includes stopping the contaminant from further escaping, cleaning up the affected environment as much as practically possible and implementing preventive	Contractor	Construction phase

measures. • Implement an effective monitoring system to detect any leakage or spillage of all hazardous substances during their transportation, handling, use and storage. This must include precautionary measures to limit the possibility of oil and other toxic liquids from entering the soil or storm water systems. • Leakage of fuels must be avoided at all times and if spillage occurs, it must be remediated immediately. • In the event of a major spill or leak of contaminants, the relevant administering authority must be immediately notified as per the notification of emergencies/incidents. • Spilled cement, fly ash and concrete must be cleaned up as soon as possible and disposed of at a suitably licensed waste disposal site. • Please note all material used to clean hazardous material spills must be considered as hazardous waste, together with contaminated soil. Moreover, if hazardous waste is mixed with general waste, the entire content of waste must be seen as hazardous and therefore be disposed at a licenced hazardous disposal facility. • Any contaminated/polluted soil removed from the site must be disposed of at a licensed hazardous waste disposal facility. • All stored fuels to be maintained within a sealed bund and on a sealed surface. The bund must be at least 110% of the volume of the total containers. • Adjacent fuelling areas situated around fuel tanks must be provided with an impervious layer or drip trays must be used during refuelling. • Areas around fuel tanks must be appropriately bunded or contained in an appropriate manner as per the requirements of SABS 089:1999 Part 1. • Fuel storage areas must be inspected regularly to ensure bund stability, integrity, and function. • Oily water from bunds at the substations must be removed from site by licensed contractors. • The storage of flammable and combustible liquids such as oils will be in designated areas which are appropriately bunded, and stored in compliance with MSDS files. • The environmental officer must ensure all material data sheets of chemicals utilized on site is kept in the site office. • Any storage and disposal permits/approvals which may be required must be obtained, and the conditions attached to such permits and approvals will be compiled with and copies kept on site in the environmental file. • Transport of all hazardous substances must be in accordance with the relevant legislation and regulations. • Construction sub-contractors must provide specific detailed waste management plans to deal with all waste streams. • Specific areas must be designated on-site for the temporary management of various waste streams, i.e. general refuse, construction waste (wood and metal scrap) and contaminated waste as required. Location of such areas must seek to minimise the potential for impact on the surrounding environment, including prevention of contaminated runoff, seepage and vermin control. • Where practically possible, construction and general wastes on-site must be reused or recycled. Bins and skips must be available on-site for collection, separation, and storage of waste streams (such as wood, metals, general refuse etc.).		

• Disposal of waste must be in accordance with relevant legislative requirements, including the use of licensed contractors and disposal at appropriately licensed waste disposal sites. • Hydrocarbon waste must be contained and stored in sealed containers within an appropriately bunded area. • Waste and surplus dangerous goods must be kept to a minimum and must be transported by approved waste transporters to sites designated for their disposal and copies of the safe disposal slips must be kept in the environment file on site. • Documentation (waste manifest) must be maintained detailing the quantity, nature, and fate of any regulated waste. Waste disposal records must be available for review at any time. • An incident/complaints register must be established and maintained on-site. • The sediment control and water quality structures used on-site must be monitored and maintained in a fully operational state at all times. • An integrated waste management approach that is based on waste minimisation must be used and must incorporate reduction, recycling, re-use and disposal where appropriate • Upon the completion of construction, the area must be cleared of potentially polluting materials. • Dispose of all solid waste collected at an appropriately registered waste disposal site. Waste disposal shall be in accordance with all relevant legislation and under no circumstances may waste be burnt on site. • Where a registered waste site is not available close to the construction site, provide a method statement with regard to waste management.		

Performance Indicator	• Limited chemical spills outside of designated storage areas. • No water or soil contamination by spills. • No complaints received regarding waste on site or indiscriminate dumping. • Internal site audits ensuring that waste segregation, recycling and reuse is occurring appropriately. • Provision of all appropriate waste manifests for all waste streams.
Monitoring	• Observation and supervision of chemical storage and handling practices and vehicle maintenance throughout construction phase. • A complaints register must be maintained, in which any complaints from the community will be logged. • Complaints will be investigated and, if appropriate, acted upon • Observation and supervision of waste management practices throughout construction phase. • Waste collection will be monitored on a regular basis. • Waste documentation completed. • An incident reporting system will be used to record non-conformances to the EMPr. This will be monitored by the ECO during site visits and recorded, reported and proof included in the audit report to be submitted once construction is completed.

OBJECTIVE C19: EFFECTIVE MANAGEMENT OF CONCRETE BATCHING AREA

Project Component/s	Concrete batching area.
Potential Impact	• Dust emissions. • Release of contaminated water, pollution of ground water resources. • Ground, soil pollution. • Generation of contaminated wastes from used chemical containers. • Inefficient use of resources resulting in excessive waste generation.
Activities/Risk Sources	• Operation of the batching area. • Packaging and other construction wastes. • Hydrocarbon use and storage. • Spoil material from excavation, earthworks and site preparation.
Mitigation: Target/Objective	To ensure that the operation of the batching area does not cause pollution to the environment or harm to persons.

Mitigation: Action/Control	**Responsibility**	**Timeframe**
• Concrete mixing must be conducted on an impermeable surface that is bunded. • Concrete batching plants to be sited such that impacts on the environment or the amenity of the local community from noise, odour or polluting emissions are minimised. • Access and exit routes for heavy transport vehicles should be planned to minimise noise and dust impacts on the environment. • The concrete batching plant site should demonstrate good maintenance practices, including regular sweeping to prevent dust build-up. • The prevailing wind direction should be considered to ensure that bunkers and conveyors are sited in a sheltered position to minimise the effects of the wind. • Aggregate material should be delivered in a damp condition, and water sprays or a dust suppression agent should be correctly applied to reduce dust emissions and reduce water usage. • Use recycled/ grey water for dust suppression. • The site should be designed and constructed such that clean storm water, including roof runoff, is diverted away from contaminated areas and directed to the storm water discharge system. • Any liquids stored on site, including admixtures, fuels and lubricants, should be stored in accordance with applicable legislation. • Contaminated storm water and process wastewater should be captured and recycled where possible. • Areas where spills of oils and chemicals may occur should be equipped with easily accessible spill control kits to assist in prompt and effective spill control. • Ensure that all practicable steps are taken to minimise the adverse effect that noise emissions. This responsibility includes not only the noise emitted from the plant and equipment but also associated noise sources, such as radios, loudspeakers and alarms. • Where possible, waste concrete should be used for construction purposes at the batching area. • The batching area to be monitored by the ECO to ensure that the area is operating according to its	Contractor	Construction phase

environmental objectives, within legislative requirements.		

Performance Indicator	• No complaints regarding dust or contamination • No water or soil contamination by chemical spills/concrete • No complaints received regarding waste on site or indiscriminate dumping
Monitoring	Observation and supervision of chemical storage and handling practices and vehicle maintenance throughout construction phase. 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. All registers should be kept on site and must be made available to the department on request. An incident reporting system will be used to record non-conformances to the EMPr. Developer or appointed ECO must monitor indicators listed above to ensure that they have been met for the construction phase.

OBJECTIVE C20: MEASURES TO PROTECT FLORA, FAUNA AND AVIFAUNA

Project Component/s	PV facility; Access roads; Adjacent natural environments/features.
Potential Impact	Destruction of ecological functioning.
Activities/Risk Sources	Activities associated with facility construction.
Mitigation: Target/Objective	To protect and mitigate impacts on the environment.

Mitigation: Action/Control	**Responsibility**	**Timeframe**
Site induction and interaction on ecological aspects. Site inspection of any fauna and avifauna within the construction area during post fencing completion. Monitoring of operations, including species presence within site, mortalities and sightings. Maintenance of vegetation and avoidance of unnecessary clearance of site. Exotic weed management and erosion control measures to be implemented where applicable. No development may take place in the ecological support area (water course) adjacent to the site. Non-perennial (Graafwater River) and others and pan should be avoided and a no-go buffer of 100 m should be applied. Staff and Vehicles to be kept off pan and restricted movement otherwise i.e. keeping on existing roads. Buffers must be maintained as per Annexure B. Prohibit propagate alien plan species / weeds during construction. Introduce plant rescue operations in accordance with Plant Rescue and Protection Plan. Introduce weed control. Conduct a fauna sweep of site. Maintain vegetation and avoid “blading” clearance. Conduct regular daily inspections of the fence line to address any animals that may be affected by the fence. Provision of critter paths within the fencing to be provided (include during design). Promote and support faunal	Contractor	Construction phase

presence and activities within the proposed PV facility. A site-specific avifaunal walk through should be conducted by a qualified ornithologist as part of the site specific EMP just prior to construction, as to ensure that no sensitive bird species have started breeding on or near the site. In such a case mitigation measure should be designed. For birds nesting during operations, a case by case basis should be followed including the application to the provincial authority for permits for any necessary nest management. Facility lighting during construction should be kept to a minimum and should make use of latest technology to ensure light disturbance is minimized. This will also reduce attraction of insects (and in return insectivorous birds) to the facility. Construct powerlines in exiting and approved servitudes and routes. Bird monitoring is required. Bird striking's must be recorded and reflectors installed at collusion zones.		
Performance Indicator	Impacts on hydrological features minimized and mitigated.	
Monitoring	This will be monitored by the ECO during site visits and recorded, reported and proof included in the audit report to be submitted once construction is completed.	

OPERATIONAL PHASE

OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME

This following section defines the management programme for each of the identified goals during the operational phase. The programme is presented in the form of a table, which includes the components described. This programme consists of the following components:

Goals
Over-arching environmental goals for the management phase.

Objectives
The objectives are in place in order to meet these goals. These take into account the findings from existing studies and monitoring programmes.

Management Actions
The actions needed to achieve the objectives, taking into consideration factors such as responsibility, methods, frequency, resources required and prioritisation.

Monitoring
*K*ey actions to verify that objectives are being achieved, taking into consideration responsibility, frequency, methods, and reporting.

Criteria/Targets
The criteria or targets indicate the efficacy of the management programme. The targets should be readily measurable, understandable to the layperson, cost-effective to monitor, and meet legal requirements.

Remedial Actions
Specifies actions needed to be taken if the targets are not met; or if there is an unforeseen event.

Goals
The following are specified goals:

Goal 1: Waste Management
Goal 2: Pollution Control
Goal 3: Water Quality and Storm Water Management
Goal 4: Soil Erosion
Goal 5: Fire Management
Goal 6: Safety, Security and Emergency Procedures (including Fences)
Goal 7: On-going Monitoring of Social Environmental Impacts
Goal 8: Fauna and Flora Management
Goal 9: Archaeology and Palaeontology Management

Goal 1: Waste Management

Objectives	Risks	Actions	Monitoring	Criteria/Targets	Remedial Actions
Ensure allocation of sufficient resources for on-going Integrated Waste Management e.g. staff, equipment.	Pollution and odours	1. No solid waste may be incinerated on the property. 2. All vehicles transporting waste must be closed to avoid possible pollution of waste on transport routes. 3. Waste needs to be sorted and recycled were necessary. 4. Domestic waste not suitable for compost needs to be stored in skips for transport to a registered Landfill site. 5. Squatting and rubble dumping adjacent to the new development must be controlled and regular inspections conducted to ensure control. 6. An integrated waste management approach must be implemented on site, based on waste minimisation, reduction, recycling, re-use and disposal where possible. 7. Comply with Waste Management Plan.	Audits of operations vs EMP to identify those requirements that are not being met. **Responsibility:** Applicant	Adequate annual Budgets. On-going employment of in house maintenance staff	If pollution on site is detected immediate actions must be taken to contain the pollution. Within 24hours of detection the ECO must be informed of the incident, where after ECO will conduct a site visit and recommend further rehabilitation methods to be implemented. Depending on type and extent of pollution occurred specialists may be contacted to provide specific recommendations. An incident report to be compiled and sent to municipal and governmental authorities.

Waste Management

Waste is defined as any matter for which the current user has no further purpose, or any matter, gaseous, liquid, or solid or any combination thereof originating from any residential, commercial or industrial use, which has been discarded, accumulated, or stored.

It further is worth noting that on average 80% of waste management costs accrue to transport.

Principally three types of waste occur-

- Gaseous	Open fires
- High moisture (effluent)	Sewerage/waste water/ petroleum products
- Low moisture (solid/semi solid)	Gass/plastic/ cardboard/ paper/ domestic/ chemical

Some potential consequences-

- Salination of ground/surface/ river water.
- Eutrophication (nutrient enrichment) of natural areas.
- Microbiological contamination of natural areas.
- Sediment & silt migration inflows.
- Harmful inorganic/organic compounds introduction into soil.

Identified Waste Streams:

Components-
Sewerage (black water)
Sewerage (grey water)
Garden refuse
General other waste

Integrated Waste Management Strategy:

Waste Avoidance-
Objective is to promote the concept of minimisation in the generation of any waste in all activities and sites.

Waste Reduction-
To promote the reduction of all waste by ensuring that nothing that can be decomposed is disposed of to waste as opposed to recycling.

Waste Recycling-
Re-using waste or selling waste to recycling companies as far as and if possible to prevent re-usable waste from going to municipal landfill site.

Waste Disposal-
To store, dispose or treat all waste that cannot be avoided, recycled, or composted at licensed facilities within regular operational and environmental monitoring and always in accordance with regulatory requirements.

Storm water Pollution Management-
Storm water and effluent systems must be separated by cut-off trenches to ensure that storm water is not contaminated by effluent water.

Goal 2: Pollution Control

Objectives	Risks	Actions	Monitoring	Criteria/Targets	Remedial Actions
Ensure allocation of sufficient resources for on-going Integrated Waste and pollution control Management e.g. staff, equipment, budget.	Pollution, odours and health.	1. Waste to be stored on the property appropriate containers or facilities as provided by the municipality. 2. All vehicles transporting waste must be closed to avoid pollution of transport routes. 3. Special measures such as surface drainage works to prevent water from running onto this area must be constructed.	Audits of operations vs EMP to identify those requirements that are not being met. **Responsibility:** Applicant	Adequate annual Budgets. On-going employment of in house maintenance staff	If pollution on site is detected immediate action must be taken to contain the pollution. Within 24hours of detection the ECO must be informed of the incident, where after ECO will conduct a site visit and recommend further rehabilitation methods to be implemented. Depending on type and extent of pollution occurred specialists may be contacted to provide specific recommendations. An incident report to be compiled and sent to municipal and governmental authorities.

Goal 3: Water Quality and Storm Water Management Measures

Objectives	Risks	Actions	Monitoring	Criteria/Targets	Remedial Actions
1] Ensure allocation of sufficient resources for on-going Water Quality and Storm Water Management *e.g. staff, equipment, budget*	Pollution, odours, erosion and illegal quality of waste water discharge.	1. Ensure no pollution of any water resources, including surface water, storm water and groundwater takes place as a result of any activities on the site. 2. Any storm water channels must be monitored and maintained on a regular basis. 3. All waste must be removed on a weekly base. 4. If any erosion and/or degradation of the storm water channel or surrounds are noticed immediate action must be taken to rectify the situation. (Corrective and preventative measures taken will depend upon type and extent of erosion and/or degradation occurring). 5. Comply with Storm Water Management Plan. 6. Provide alternative energy to borehole on the way to Brandvlei (i.e. provide its own solar installation). 7. Refurbish the water gear at the borehole so that it can function. 8. Manage and maintain the operation of the borehole as part of the management of the solar sites.	Audits of operations vs EMP to identify those requirements that are not being met. **Responsibility:** Applicant	Adequate annual Budgets. On-going employment of in house maintenance staff	If pollution or erosion is detected immediate action must be taken to contain the pollution or erosion. Within 24hours of detection the ECO must be informed of the incident, where after ECO will conduct a site visit and recommend further rehabilitation methods to be implemented. Depending on type and extent of pollution or erosion occurred specialists may be contacted to provide specific recommendations. An incident report to be compiled and sent to municipal and governmental authorities.

Goal 4: Erosion Control

Objectives	Risks	Actions	Monitoring	Criteria/Targets	Remedial Actions
Ensure allocation of sufficient resources) for on-going erosion control management (e.g. staff, equipment, budget	Erosion, sink-holes and or blocking of storm water systems. Damage to Infrastructure.	1. On-going control and management of roads, roadways and areas susceptible to erosion. 2. Ensure suitable vegetation cover or surface on non-hardened surfaces. 3. Control runoff of storm water to prevent soil erosion. 4. Avoid the formation of sink-holes on sensitive soils. 5. Management and control of erosion. 6. Comply with Erosion Management Plan.	Audits of operations vs EMP to identify those requirements that are not being met. **Responsibility:** Applicant	Adequate annual Budgets. On-going employment of in house maintenance staff	If erosion is detected immediate actions must be taken to contain the erosion. Within 24hours of detection the ECO must be informed of the incident, where after ECO will conduct a site visit and recommend further rehabilitation methods to be implemented. Depending on type and extent of erosion occurred specialists may be contacted to provide specific recommendations. An incident report to be compiled and sent to municipal and governmental authorities.

Erosion Control

Erosion control and maintenance will be an on-going process, especially erosion developing on or as a result of roads. The applicant must implement erosion control measures to ensure that no erosion occurs on site. The area must also be regularly monitored and erosion maintenance measures implemented to prevent erosion.

Goal 5: Fire Management

Objectives	Risks	Actions	Monitoring	Criteria/Targets	Remedial Actions
Ensure allocations of sufficient resources e.g. staff, equipment, Budget,) for Ongoing fire management	Pollution, fire, damage to property and health risks.	Comply with Fire Management Plan. Such legislation applies to the open countryside beyond urban limits and puts in place a range of legal requirements. **The responsibilities of people who own or control land:** The landowner on whose land a fire may start, or from whose land it may spread across boundaries, must have in place: • Take all reasonable steps to notify the fire chief of the local authority should a fire break out. • Do everything in their reasonable power to stop the spread of the fire. The Act also requires that should the owner be absent, a known and identified other person responsible needs to be present on or near this land to: • Extinguish a fire if one breaks out, or assist or instruct others to do so • Take all reasonable steps to alert the neighbours and Fire Chief. • The owner may appoint an agent to act on his or her behalf to perform these duties.	Yearly audits of operations vs EMP to identify those requirements that are not being met. **Responsibility:** Applicant	Adequate annual Budgets. On-going employment of staff	To be determined when required

Goal 6: Safety and Security Measures and Emergency Procedures

Objectives	Risks	Actions	Monitoring	Criteria/Targets	Remedial Actions
Ensure allocation of sufficient resources for on-going safety, security and emergency procedures. e.g. staff, equipment, budget	Pollution, fire, security and health risks.	1. The site should be fenced and access allowed at controlled points. 2. One site emergency plans should be reviewed regularly.	Six monthly at start and then yearly audits of operations vs EMP to identify those requirements that are not being met. **Responsibility:** Applicant	Adequate annual Budgets. On-going employment of staff.	To be determined when required

Any emergency incident, originating at the facility, which falls within the definition of section 30 (1) a of the National Environmental Management Act (NEMA) Act 107 of 1998, must be dealt with by the facility in accordance with section 30 of NEMA". In the event of any incident the facility must ensure containment by the responsible person and report the incident to DEA.

Goal 7: On-going Monitoring of Social Environmental Impacts

Objectives	Risks	Actions	Monitoring	Criteria/Targets	Remedial Actions
Ensure allocation of sufficient resources for on-going monitoring of environmental impacts. e.g. staff, equipment, budget	Pollution, nuisances and health risks.	1. Provide health and social training for the project team and in the community, which include HIV/AIDs awareness training. 2. The formalization and institutionalization of educational support. 3. Reserve jobs for women and youth. 4. Youth are afforded an opportunity to enhance their skills and/ or improve their education.	Six monthly at start and then yearly audits of operations vs EMP to identify those requirements that are not being met. **Responsibility:** Applicant	Adequate annual Budgets. On-going employment of staff.	To be determined when required

		5. Youth are afforded opportunity to access start up or seed capital to establish own businesses 6. Institutionalizing standard procedures and a monitoring committee to govern appointments shall ensure fair appointments and avoid party political preferences. 7. Divert impact to make Kenhardt the focus point: a) Cover dirt roads in town with a natural looking material (not tar) to prohibit dust i.e. main street to Kaap Agri, Brussels street to old town precinct, Longlands Street. b) Plant indigenous and historic alien (that is currently part of the urban landscape) trees. 8. The use of lighting is to be monitored over the entire life of the project to minimize light pollution. • All lighting must be installed at downward angles. • Sources of light must as far as possible be shielded by physical barriers such as built • structures. • Only minimum wattage light fixtures must be used. • A strict fire prevention policy must be implemented and monitored • Divert impact to make Kenhardt the focus point: a) Amplify the Eucalyptus Trees at			

		corner of Main and Lourens Street as a focus point; b) Link older precinct to one another i.e. Brussels street 8. The promotion of joint ventures between small business (owned by previous disadvantaged persons) and more established business. 9. Implement formal small business training and mentoring programmes. 10. Strengthen access to resources to build tourism sector. 11. Market the tourism opportunities the solar facility offer and create links with other tourism activities through the local tourism office and its website. 12. Develop a plan to intensify tourism. 13. Provide space for a tourism market (selling local hand crafts and food) at Eucalyptus Trees at corner of Main and Lourens Street 14. Enhance social space around tree i.e. similar to Evita's Paronne: Community Garden and tourism market 15. Celebrate the history of Bushmanland as part of this space. 16. Avail bursaries and seed capital for entrepreneurs; 17. Establish an education and skills			

		centre (youngsters to improve their future options). 18. Provide recreational and sport facilities for youngsters i.e. restore swimming pool and provide skateboard park. 19. Provide recreational activities and sport programmes during school holidays. 20. Enhance sport activities during school terms. 21. Keep local traders afloat by sensitizing contractors to incentivize project staff to spend money locally and purchasing South African brands i.e. discount at shops in the municipal area subsidized by contractor. 22. Facilitate the improvement of educational levels and skills 23. Enhance and contribute to the development of the skills centre supporting and building local businesses.			

Goal 8: Fauna and Flora Management

Objectives	Risks	Actions	Monitoring	Criteria/Targets	Remedial Actions
Ensure allocations of sufficient resources (e.g. staff, equipment, Budget,) for ongoing alien and vegetation management	Loss of conservation worthy species, fire and health.	1. Comply with Alien Invasive Plant Management Plan 2. Comply with Plant Rescue and Protection Plan 3. Comply with Revegetation and Rehabilitation Plan 4. Comply with Open Space Management Plan 5. Comply with Avifauna Monitoring Plan 6. Conduct regular daily inspections of the fence line to address any animals that may be affected by the fence. 7. Monitoring of faunal and avifauna activities within the fenced area of the site and immediate proximity of site; 8. Management of faunal intrusion through the fencing, including possible mortalities; 9. Consideration of lighting regime around the site and the impact of ELP. 10. Nest management on a case by case basis under the supervision of an avifaunal specialist, and in conformance with all relevant national and provincial legislation. 11. Vegetation management on site – consideration of redress methods of growth and habitat form around site. 12. Exotic weed management. 13. Erosion control measures. 14. Bird monitoring is required. Bird striking's must be recorded and reflectors installed at collusion zones	Six monthly at start and then yearly audits of operations vs EMP to identify those requirements that are not being met. **Responsibility:** Applicant	Adequate annual Budgets. On-going employment of staff.	To be determined when required

Goal 9: Archaeology and Palaeontology Management

Objectives	Risks	Actions	Monitoring	Criteria/Targets	Remedial Actions
Ensure allocations of sufficient resources (e.g. staff, equipment, Budget,)	Loss of	1. Management measures would be limited to ensuring that maintenance and activities all remain within the authorised footprints. This monitoring would be carried out by the Environmental Control Officer (ECO). 2. During maintenance and servicing of infrastructure, if excavation is required, it shall be limited to the disturbed footprint as far as practicable. Should bulk works exceed the existing disturbed footprint, SAHRA shall be notified. 3. A marked trail could be developed to access and view the resources telling the story of the different ages. Access to such a trail and opening it to the public are dependent on the security measures related to the facility and would best be place between the two boundary fences. Such an endeavour could become one of the local youth driven businesses.	Six monthly at start and then yearly audits of operations vs EMP to identify those requirements that are not being met. **Responsibility:** Applicant	Adequate annual Budgets. On-going employment of staff.	To be determined when required

CHAPTER 8

ENVIRONMENTAL REPORTING

In order to ensure that the necessary environmental issues are adequately addressed and recorded, the following environmental reporting shall be undertaken:

- Incident reporting; and
- Compliance reporting

See below for a template of an Incident Report to serve as a guideline for the recording and addressing of emergency incidents as and when they occur.

ENVIRONMENTAL INCIDENT REPORT

DATE:	**File Ref:**
NAME:	**Copy to:**
EXACT LOCATION OF INCIDENT:	

SECTION 1 : DESCRIPTION OF INCIDENT

SECTION 2 : REMEDIAL ACTION REQUIRED

Remedial Action Due Date:
Confirmation of implementation: **Name:** **Date:**

SECTION 3 : RELEVANT DOCUMENTATION

SECTION 4 : SIGNATURES

Municipal Engineer:

.....

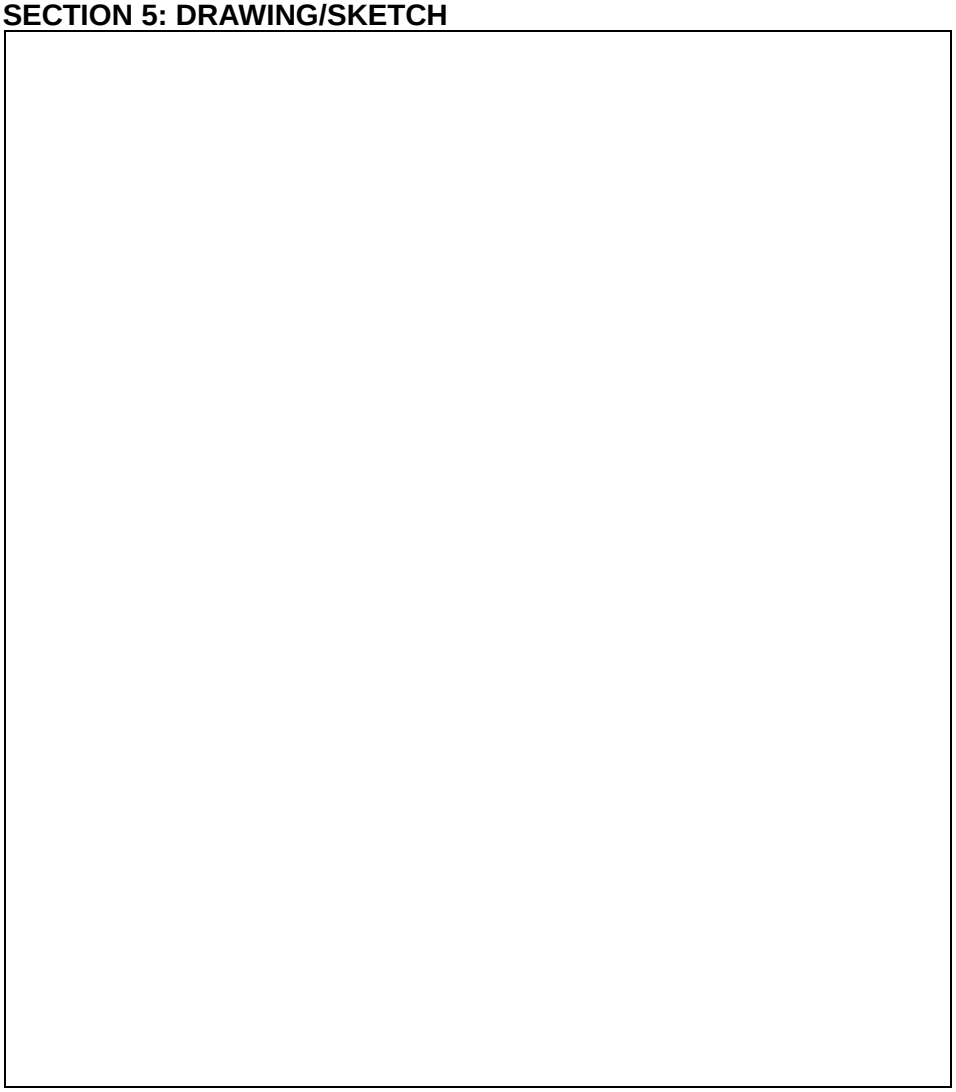
Name:
Date:

ECO:

.....

Name:
Date:

SECTION 5: DRAWING/SKETCH



CHAPTER 9

DECOMMISSIONING PHASE

As the final phase in the project cycle, decommissioning may present positive environmental opportunities associated with the return of the land for alternative use and the cessation of impacts associated with operational activities. However, the need to manage risks and potential residual impacts may remain well after operations have ceased.

The decommissioning phase EMP provides specific guidance with respect to the management of the environmental risks associated with the decommissioning stage of a project.

Closure and decommissioning impacts are likely to be similar to the construction phase impacts. The management actions and control under the construction phase EMP need to be implemented to mitigate the negative impacts on the environment and to restore the property to its natural state.

A decommissioning phase is where a structure is removed or otherwise modified to make it incapable for re-use for the original design purpose.

The results of environmental monitoring during the decommissioning phase will be used to assess the impact of the decommissioning on the surrounding environment and demonstrate compliance with regulatory requirements.

The actual scope of the decommissioning environmental monitoring will be established following consultation with the regulatory authorities. The format of decommission management strategy will probably be similar to that of earlier development phases and consist of the following:

- Management Principles
    - Develop monitoring procedures in accordance with standard protocols and the requirements of the environmental legislation.
    - Undertake environmental monitoring during the decommissioning phase as shown below.

Environmental monitoring during the decommission phase will include water quality, terrestrial flora rehabilitation monitoring.

Specific requirements include:

- Management measures would be limited to ensuring that decommissioning activities all remain within the authorised footprints. This monitoring would be carried out by the Environmental Control Officer (ECO).
- Ensure effective rehabilitation after decommissioning if this occurs.
- Keep security employed until demolition is completed to prohibit the erection of temporary structures.
- During demolition, the trails and archaeological site should be re-established (fenced) and rejuvenated to operate as an independent entity (without the solar).

CHAPTER 10

REHABILITATION SPECIFICATIONS AND SITE CLEAN-UP

The contractors must ensure that all temporary structures, equipment, materials and facilities used or created on site for, or during construction activities, are removed once the project has been completed. The construction sites must be cleared, and cleaned to the satisfaction of the developer.

Stabilisation and rehabilitation must take place immediately after construction operations have been completed. No vehicles or unauthorised personnel must be allowed onto areas that have been rehabilitated.

The areas impacted during construction must be stabilised and shaped according to the natural surrounding contours. If topsoil was removed during construction the topsoil must be used to stabilise the impacted areas.

The impacted areas must be re-vegetated with indigenous vegetation species within 3 months after completion of construction activities. Rehabilitated areas must be irrigated if required.

If erosion occurred the ECO must be informed immediately who will then recommend erosion mitigation measures to be implemented.

Alien vegetation monitoring of the rehabilitated areas and surrounds must be conducted on an annual basis and if alien vegetation is detected the ECO must be informed immediately who will then recommend eradication methods.

CHAPTER 11

ENVIRONMENTAL AWARENESS INDUCTION COURSE MATERIAL

This section of the report is included in compliance with Section 24N (3) (c) of the National Environmental Management Act 107 of 1998.

WHAT IS THE ENVIRONMENT?

- Soil
- Water
- Plants
- People
- Animals
- Air we breathe

WHY MUST WE LOOK AFTER THE ENVIRONMENT?

- It affects us all as well as future generations
- We have a right to a healthy environment
- A Policy and System will be signed

HOW DO WE LOOK AFTER THE ENVIRONMENT?

- Report problems to your supervisor/ foreman
- Team work
- Follow the rules in the EMP

WORKING AREAS

Workers & equipment must stay inside the site boundaries at all times

RIVERS & STREAMS

- Do not swim in or drink from streams
- Do not throw oil, petrol, diesel, concrete or rubbish in the stream
- Do not work in the stream without direct instruction
- Do not damage the banks or vegetation of the stream

ANIMALS

- Do not injure or kill any animals on the site
- Ask your supervisor or Contract's Manager to remove animals found on site

TREES AND FLOWERS

- Do not damage or cut down any trees or plants without permission
- Do not pick flowers

SMOKING AND FIRE

- Put cigarette butts in a rubbish bin
- Do not smoke near gas, paints or petrol
- Do not light any fires without permission
- Know the positions of fire fighting equipment
- Report all fires
- Do not burn rubbish or vegetation without permission

PETROL, OIL AND DIESEL

- Work with petrol, oil & diesel in marked areas
- Report any petrol, oil & diesel leaks or spills to your supervisor
- Use a drip tray under vehicles & machinery
- Empty drip trays after rain & throw away where instructed

DUST

Try to avoid producing dust

NOISE

- Do not make loud noises around the site, especially near schools and homes
- Report or repair noisy vehicles

TOILETS

- Use the toilets provided
- Report full or leaking toilets

EATING

- Only eat in demarcated eating areas
- Never eat near a river or stream
- Put packaging & leftover food into rubbish bins

RUBBISH

- Do not litter – put all rubbish (especially cement bags) into the bins provided
- Report full bins to your supervisor
- The responsible person should empty bins regularly

TRUCKS AND DRIVING

- Always keep to the speed limit
- Drivers – check & report leaks and vehicles that belch smoke
- Ensure loads are secure & do not spill

EMERGENCY PHONE NUMBERS

Know all the emergency phone numbers:

- Ambulance:
- Fire:
- Police: 10111

FINES AND PENALTIES

- Spot fines of between R20 and R2000
- Your company may be fined
- Removal from site
- Construction may be stopped

PROBLEMS - WHAT TO DO!

- Report any breaks, floods, fires, leaks and injuries to your supervisor
- Ask questions!

ATTENDANCE REGISTER FOR ……	
PLACE ……..	TRAINER……
NAME & SURNAME	SIGNED
SIGNED ……	DATE & TIME ……

CHAPTER 12

COMPLIANCE WITH THE ENVIRONMENTAL AUTHORISATION

All conditions of the Environmental Authorisation must be adhered to onsite during the construction-, operational-, decommissioning- and rehabilitation phases of the proposed project. A copy of the Environmental Authorisation must be available on site together with the EMP and all contractors on site must sign the Declaration of Understanding as proof of awareness and understanding of all the conditions to be adhered to on site in terms of the EA and EMP.

CHAPTER 13

UPDATING/ADAPTING THE EMP

Although care has been taken to address all known relevant environmental issues for the development, it will become necessary to add or amend certain procedures or instructions to improve the efficiency of the EMP. Only those additions to, or amendments of, this EMP that will either improve environmental protection or can be proven not to have any negative effects would be considered to be included, and any amendments to the EMP must first be approved by the ECO and competent authority/ies i.e. DEA

REFERENCES

City of Cape Town (2002) Environmental Management Programme (Version 5) for Civil Engineering Construction Activities.

DEA&DP: ENVIRONMENTAL MANAGEMENT PROGRAMME. VER 5 (04/2002). Guideline Document for the ECO / ESO and the ER

Department of Water Affairs and Forestry, February 2005. Environmental Best Practice Specifications: Construction Integrated Environmental Management Sub-Series No. IEMS 1.6. Third Edition. Pretoria.

Curriculum vitae of Jessica Hansen

Personal Details

Nationality: South African
ID: 9003160270083
Address: 6a Avalon Road, Claremont, Cape Town 7708
Date of Birth: 16.03.1990
Marital Status: Married
Health: Excellent
Language Proficiency: English - Excellent: speaking, reading, writing Afrikaans- Second language, moderate skill
Driver's license: Yes
Cell: 083 666 8046
Email: jessica@ecoimpact.co.za
Jessica Hansen has completed her professional registration in terms of section 20(3) (b) of the Natural Scientific Professions Act, 2003 (Act 27 of 2003) as a Professional Natural Scientist in the field of practice Environmental Science (Registration number 400192/16).

Work Experience

May-July 2013: Research assistant at the University of Cape Town Zoology Department
August 2013- Current: Senior EAP and Head of Training at Eco Impact Legal Consulting (Pty) Ltd.

Key Responsibilities:

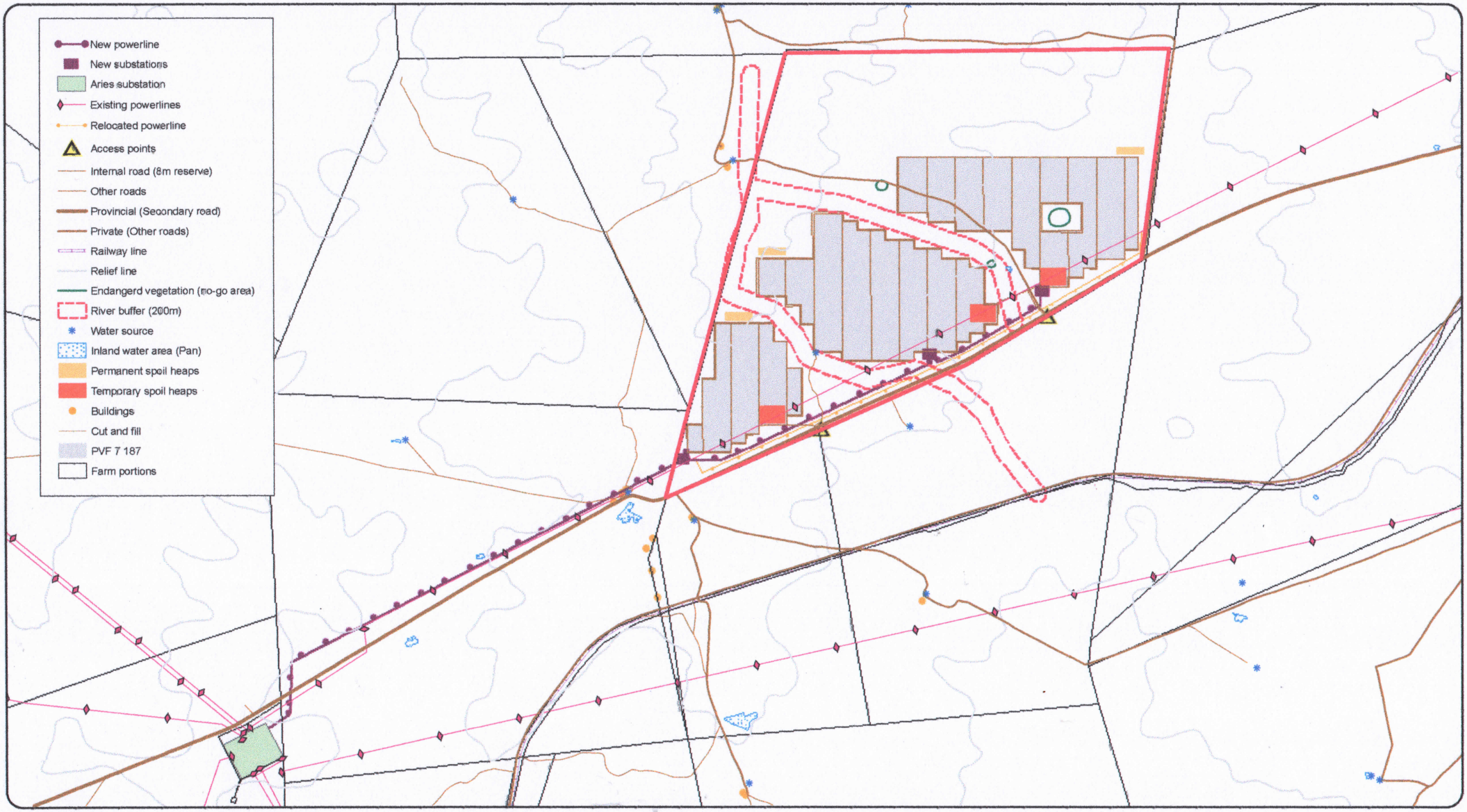
Senior EAP

- Drafting / Completing Application forms for Basis Assessment Reports and Full Scoping Environmental Impact Reports
- Drafting / Completing draft and final Basis Assessment Reports and Full Scoping Environmental Impact Reports
- Public participations process
- Drafting Environmental Management Plans / BBS

Education

2012 - University of Cape Town
MSc in Applied Marine Science (by coursework and dissertation)
Course work subjects: Project Management, Numerical skills & Statistics, Ocean Tools, Marine Environmental Law, Introduction to Global Warming & Earth System Science, Population & Fisheries Modelling, Marine Conservation, Ecosystem Approach to Fisheries and Marine Ecosystems.
Master's thesis- "A comparison of parasite assemblages of Cape horse mackerel (*Trachurus capensis*) from the northern and southern Benguela."
2011 - University of Cape Town
BSc (Honours) in Environmental and Geographical Science (specialization Environmental Management)
Course work subjects: Environmental Law for non-lawyers, Living with Environmental Change, Environmental Management and Applied research in Environmental Management.
Honours thesis – "An examination of the encroachment of *Putterlickia pyracantha* in the Witzands Aquifer Nature Reserve."
2008 – 2010 - University of Cape Town
BSc in Environmental and Geographical Science and Oceanography and Atmospheric Science. Deans Merit list 2010
1996 – 2007 - St Mary's DSG, Kloof, KZN Subjects: Mathematics, English, Afrikaans, Geography, Biology, History

ANNEXURE 1 – SDP – FINAL SITE LAYOUT MAP (to be added)
ANNEXURE 2 – ENVIRONMENTAL SENSITIVITY MAP + SUPERIMPOSE LAYOUT
ANNEXURE 3 – SPECIFIC MANAGEMENT PLANS AND PROCEDURES
ANNEXURE 4 - SPECIFIC MANAGEMENT PLANS AND PROCEDURES BY SPECIALIST



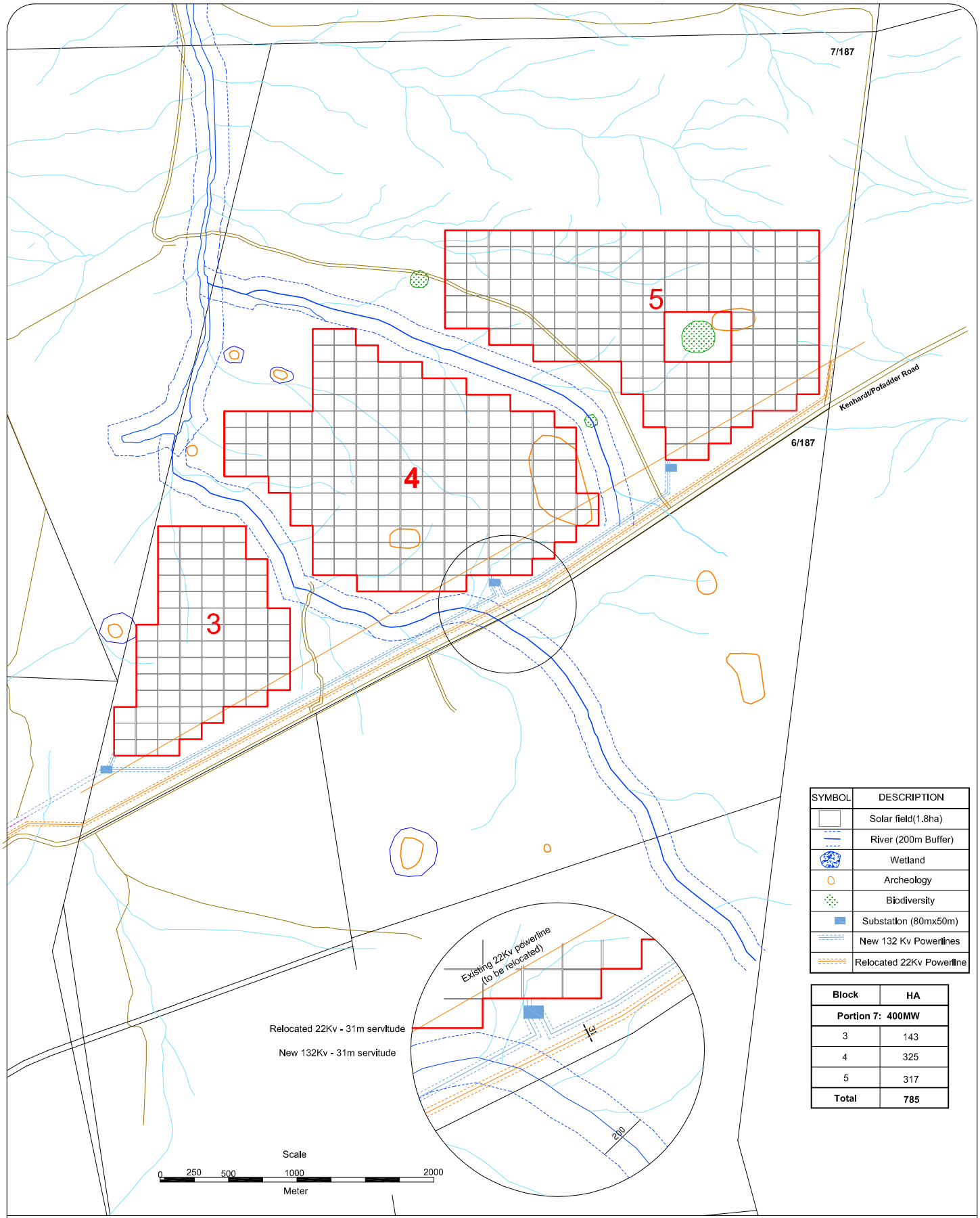
PLANSCAPE
TOWN PLANNERS

SITE DEVELOPMENT PLAN
PORTION 7 OF FARM 187, KENHARDT

N

Date: 06/02/19

PO Box 557, Moorreesburg, 7310, Cell 0722026587, Fax 086 697 2069, planscape@telkomsa.net



SYMBOL	DESCRIPTION
	Solar field(1.8ha)
	River (200m Buffer)
	Wetland
	Archeology
	Biodiversity
	Substation (80mx50m)
	New 132 Kv Powerlines
	Relocated 22Kv Powerline

Block	HA
Portion 7: 400MW	
3	143
4	325
5	317
Total	**785**

Project: Portion 7 of Farm 187, Kenhardt

Title: Site Development plan

Owner: Solar Energy Land Pty Ltd

N

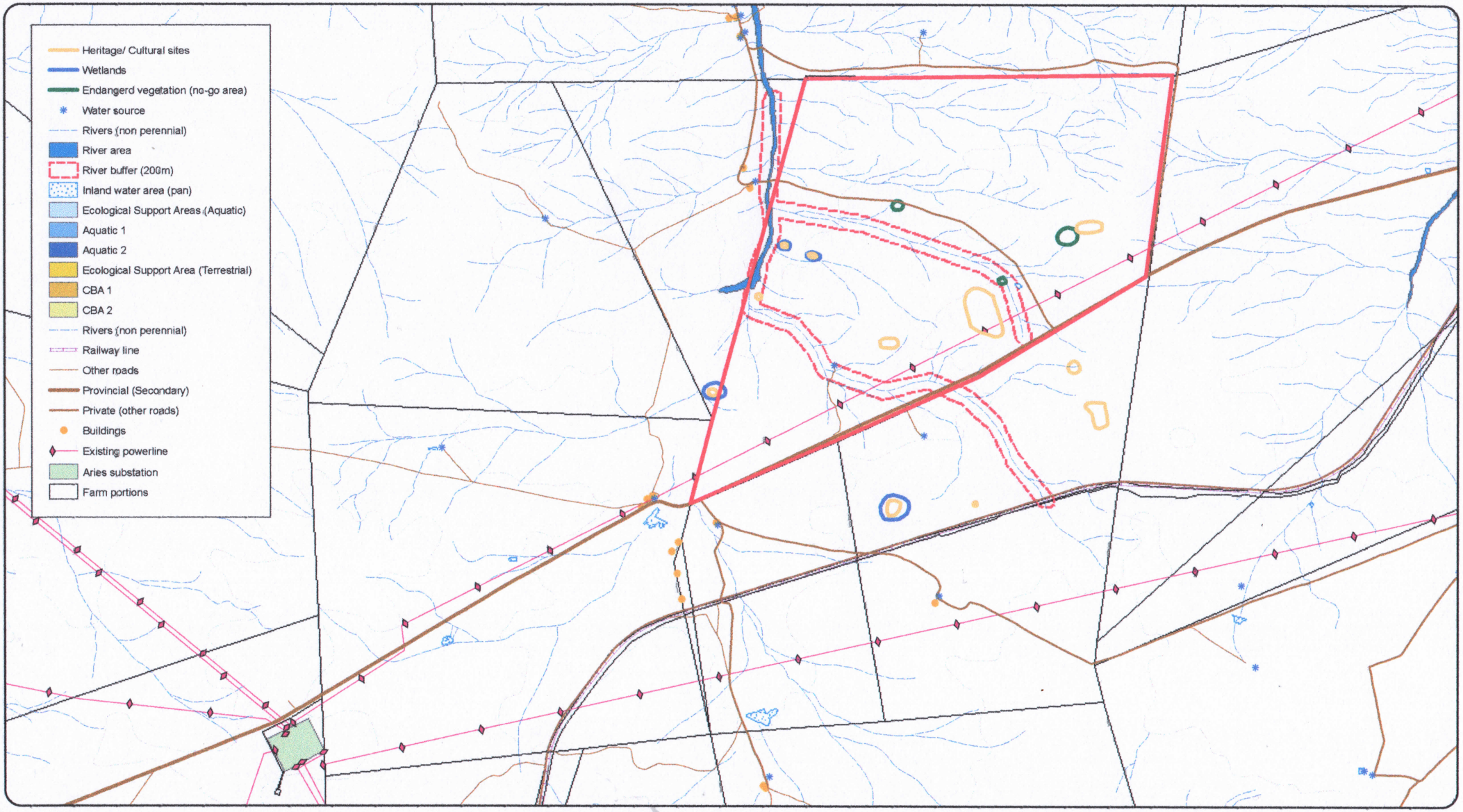
S

Notes: Configuration of solar arrays subject to detailed design

Datum: 01/11/18

Reference:207~6/7-187-KAI

PLANSCAPE
Tel: 022 4334408
planscape@telkomsa.net



ENVIRONMENTAL SENSITIVITY MAP

PORTION 7 OF FARM 187, KENHARDT

N

Date: 06/02/19

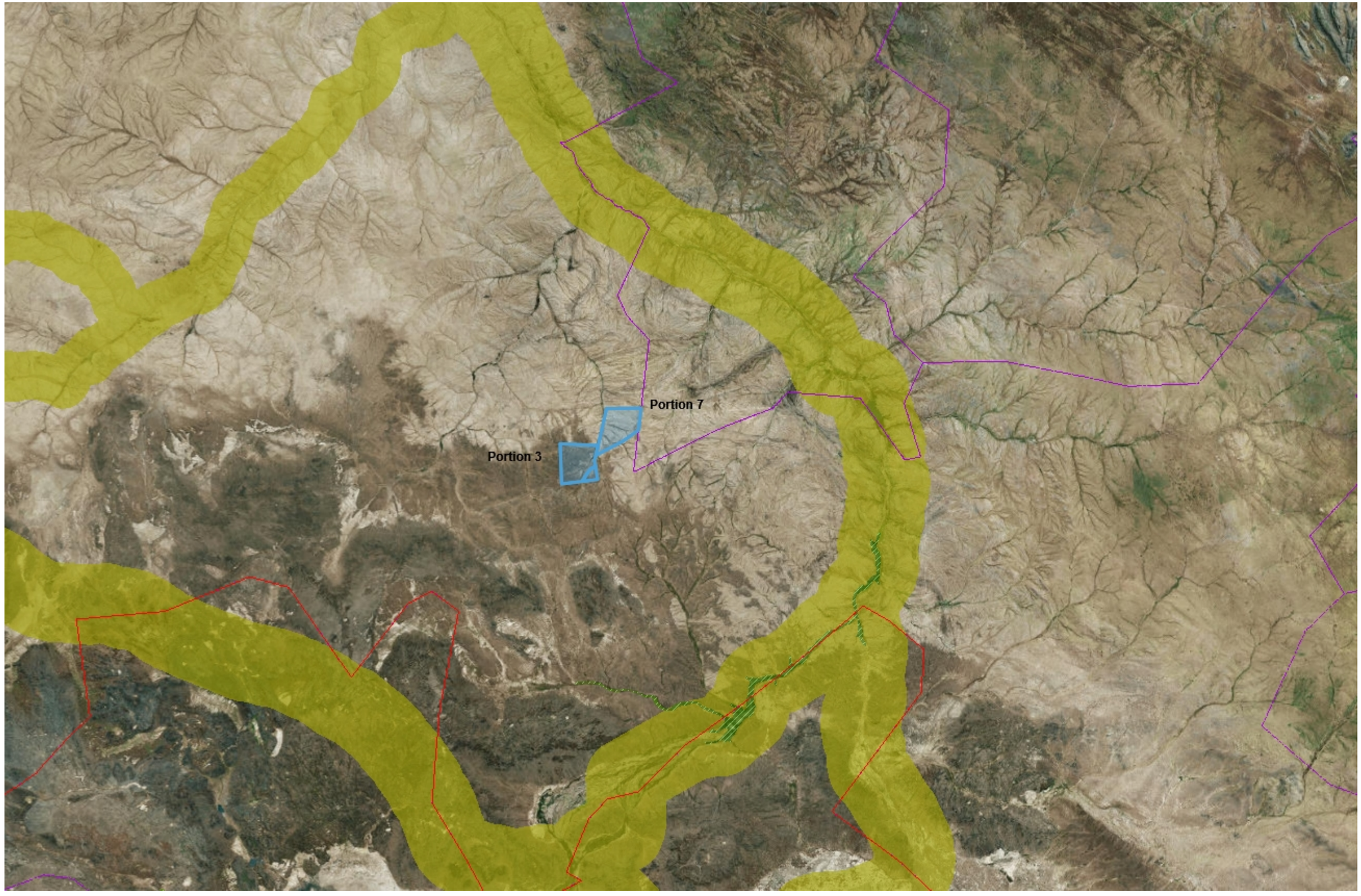
PLANSCAPE
TOWN PLANNERS

PO Box 557, Moorreesburg, 7310, Cell 0722026587, Fax 086 697 2069, planscape@telkomsa.net

SANBI Biodiversity for Life

BGIS Land Use Decision Support (LUDS) Tool

Wine Estate Capital Management Portion 7



Description

Wine Estate Capital Management (Pty) Ltd 400 MW Solar PV Electricity Generation Facility on Portion 7 of Farm 187.
132kV power line to connect to the Aries Substation on portion 3 of Farm 187.

Legend

- Namakwa Biodiversity Sector Plan
- Local municipalities - LUDS

Namakwa - Aquatic CBA map

- Critical Biodiversity Area (type 1)
- Critical Biodiversisty Area (type 2)
- Ecological Support Areas

Namakwa - Terrestrial CBA map

- Critical Biodiversity Area (type 1)
- Critical Biodiverwsity Area (type 2)
- Ecological Support Area

Namakwa - Report Aquatic CBA map legend

- CBA aquatic (type 1)
- CBA aquatic (type 2)
- Ecological Support Areas aquatic

1: 577 790

29,4 0 14,68 29,4 Kilometers

WGS_1984_Web_Mercator_Auxiliary_Sphere

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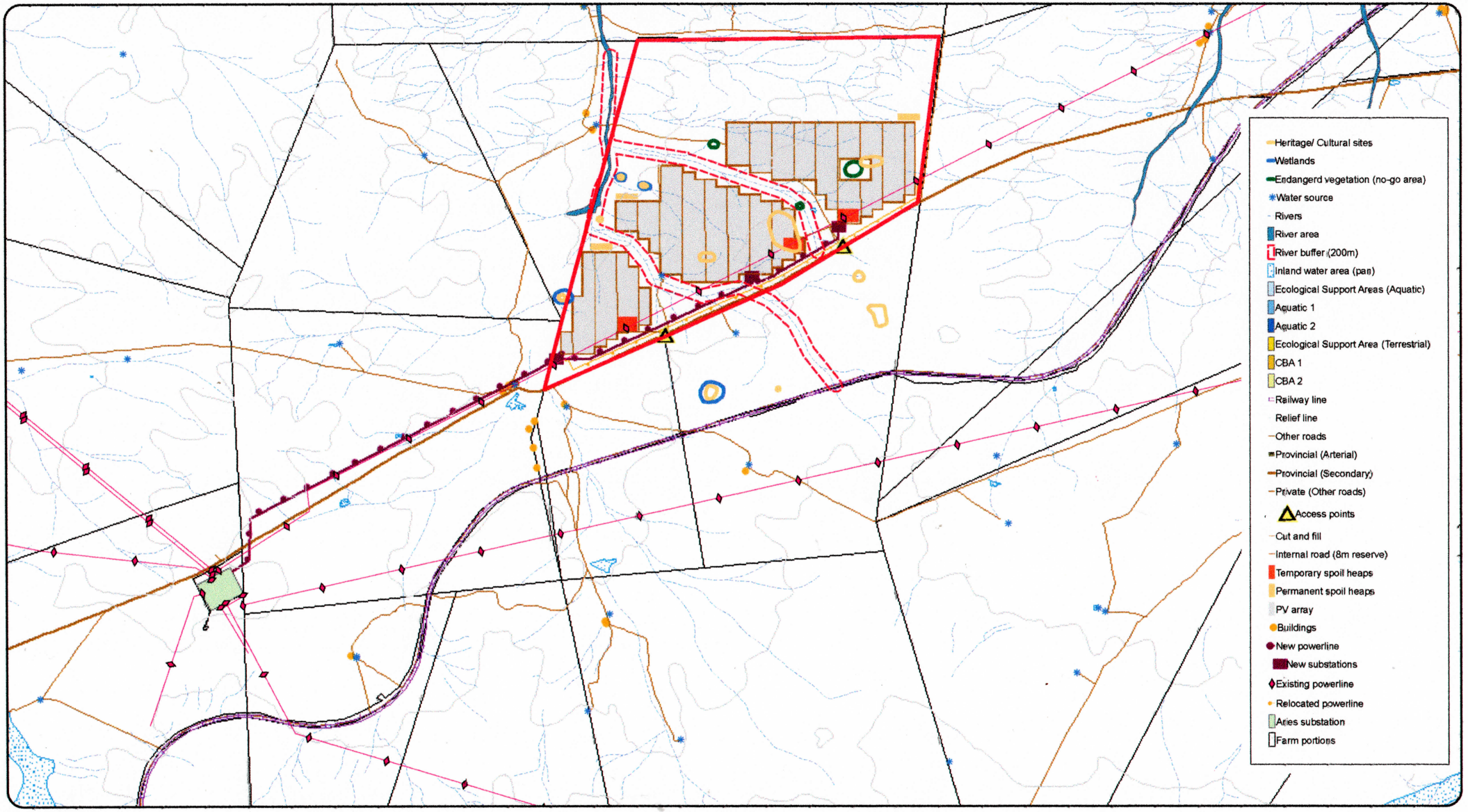
This map is a user generated static output from an Internet mapping site and is for reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable.

THIS MAP IS NOT TO BE USED FOR NAVIGATION



PLANSCAPE
TOWN PLANNERS

SUPERIMPOSED MAP
PORTION 7 OF FARM 187, KENHARDT

N

Date: 06/02/19

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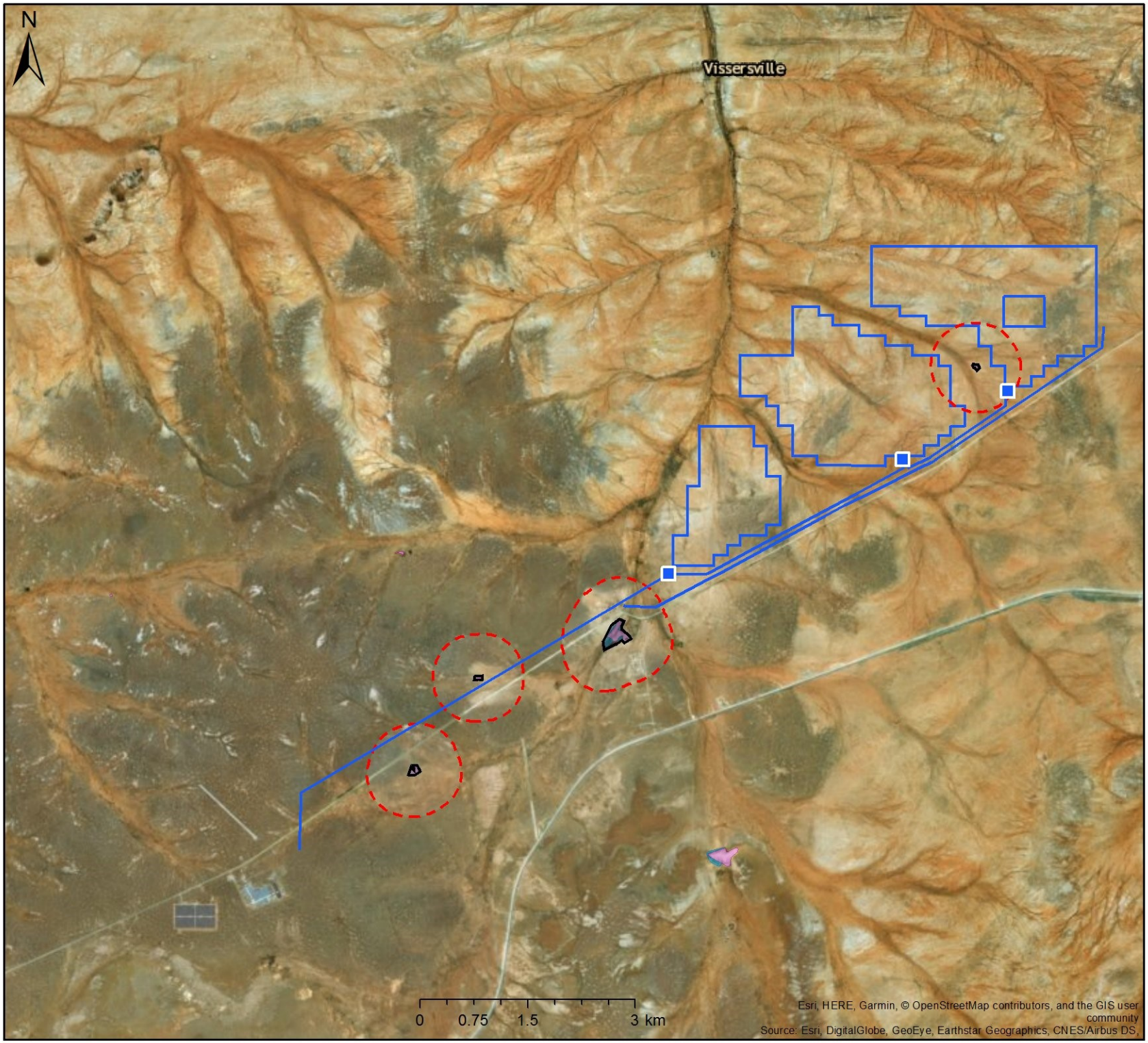


Wetlands (NFEPA) with 500 buffers indicated

Legend

Wetlands (NFEPA)

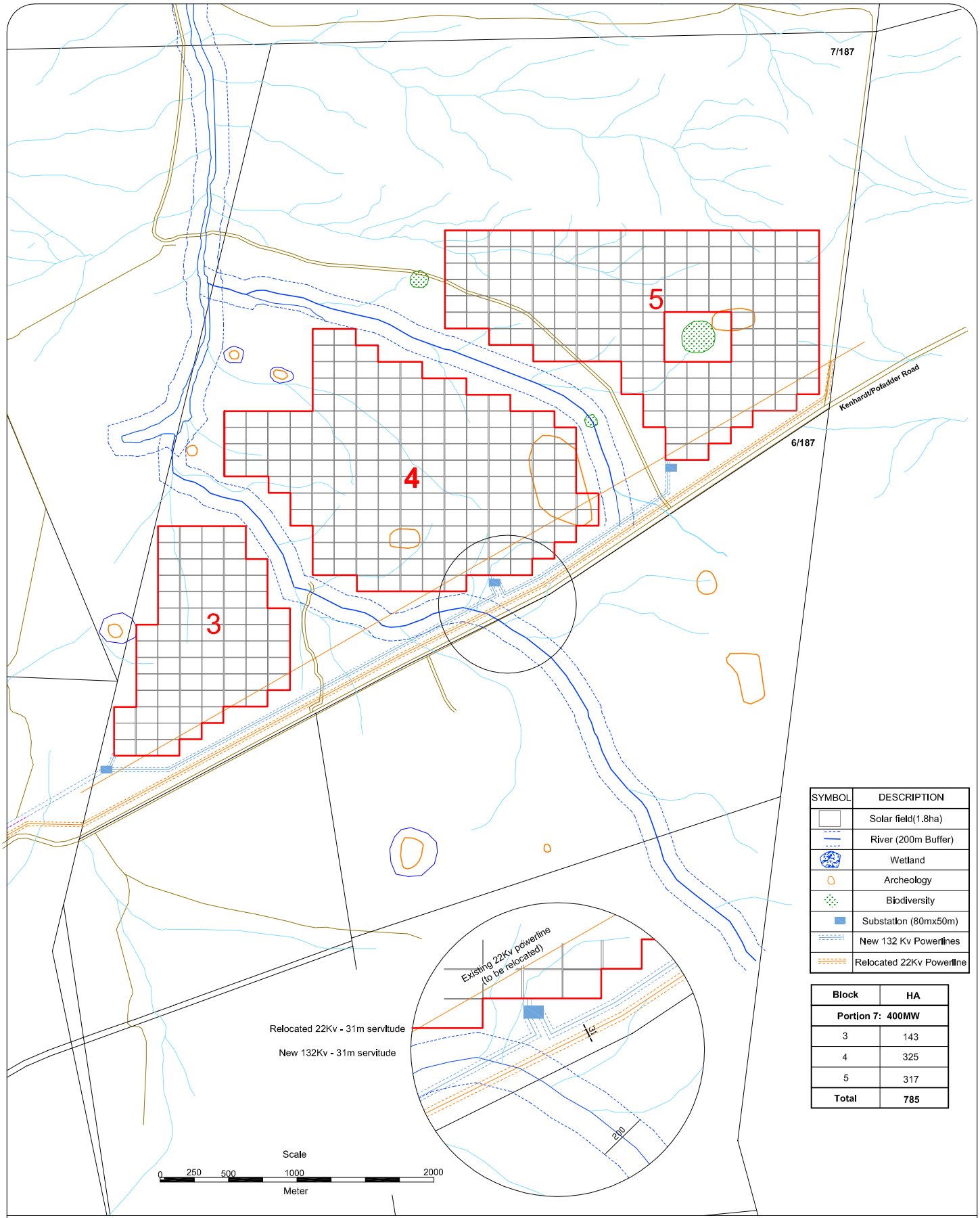
- Artificial
- Estuaries
- Natural

Scale: 1:72 224

Date created: January 4, 2019

Western Cape Government

Agriculture



SYMBOL	DESCRIPTION
	Solar field(1.8ha)
	River (200m Buffer)
	Wetland
	Archeology
	Biodiversity
	Substation (80mx50m)
	New 132 Kv Powerlines
	Relocated 22Kv Powerline

Block	HA
Portion 7: 400MW	
3	143
4	325
5	317
Total	**785**

Project: Portion 7 of Farm 187, Kenhardt

Title: Site Development plan

Owner: Solar Energy Land Pty Ltd

N

S

Notes: Configuration of solar arrays subject to detailed design

Datum: 01/11/18

Reference:207~6/7-187-KAI

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planscape@telkomsa.net

ANNEXURE 3

SPECIFIC MANAGEMENT PLANS AND PROCEDURES

A variety of management plans and procedures have been developed as part of the EMPr. These are aimed at ensuring that construction and operation occur in a responsible manner and are included in Annexure 1 of the EMPr.

1. Waste Management Plan;
2. Stormwater Management Plan;
3. Traffic Management Plan;
4. Fire Management Plan;
5. Erosion Management Plan.
6. Chance Fossil Finds Procedure

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1. WASTE MANAGEMENT PLAN

Purpose

Activities associated with the construction and operation of the Project will generate various wastes which if not properly managed have the potential to impact the environment and pose a risk to public health and workers.

This Waste Management Plan (WMP) describes the actions that will be taken to reduce, segregate, collect, and dispose of wastes to avoid or minimize impacts on the environment, communities, and workers.

This WMP covers management of non-hazardous waste and hazardous wastes.

Objectives

The WMP has the following objectives:

- The management of waste is done in accordance with applicable South African laws and regulations as well as other requirements.
- Waste minimisation is incorporated into processes.
- Wastes are characterised, classified, and segregated as close to their source as practical.
- Wastes are properly handled, stored, transported and disposed of.
- Waste management is properly documented.

Philosophy

The Project has adopted a simple philosophy for waste management which places a strong emphasis on waste minimization. The principles of the waste management philosophy are as follows:

- Reduce: If generated, reduce the quantity of waste.
- Reuse: Where possible, use items for multiple use.
- Recycle: Recycle if waste generation cannot be practicably reduced
- Reclaim: Transform waste to a value-added product.
- Dispose: If materials or energy are recovered from a waste it is classified as recovery rather than disposal.

The philosophy is adopted from the early planning phases of project development.

Scope
This WMP applies to all activities associated with construction and operation of the plant, including all work sites established during construction and operations.
At the time of decommissioning, a specific WMP will be prepared.

Document control
The WMP will be maintained and controlled by the responsible party.
The WMP will be reviewed every three months during the construction or sooner in the event of a significant change in activities. The WMP will be reviewed on an annual basis during operation or sooner in the event of a significant change in activities.
The WMP will be reviewed in the event of a significant change in South African regulations.

Management
This section describes the actions that will be taken to manage waste.

Overview
After waste has been generated the following management process will be implemented:

Waste Identification
Table 1 illustrates the types of waste expected during construction and operation of the project. The table is also divided into various waste streams, such as recyclable, hazardous, and non-hazardous.

Table 1: Waste Types

Waste Type	**Waste Classification**	**Phase**	**Source**	**End use**
Broken Solar PV Panels	Construction and Operation Hazardous Waste	Construction and Operation	PV Site	Recycle
Obsolete Electronics	Hazardous waste	Construction and Operation	Administrative buildings on portion 3 as per EA issued for another project.	Recycle or Dispose via Outside Contractor
Obsolete Electronics	Hazardous Waste	Construction and Operation	Administrative buildings on portion 3 as per EA issued for another project.	Recycle or Dispose via Outside Contractor
Sewerage	Hazardous Waste	Construction and Operation	Administrative buildings on portion 3 as per EA issued for another project.	Collected and disposed at Kenhardt WWTW.
Medical Waste	Hazardous	Construction and Operation	Administrative buildings on portion 3 as per EA issued for another project.	Collected, treated and disposed by outside contractor
Scrap Iron and Steel	Recyclable waste	Construction	PV Site and facilities	Recycle
Copper Wire	Recyclable waste	Construction and Operation	PV Site and facilities	Recycle
Aluminum	Recyclable waste	Construction and Operation	PV Site and facilities	Recycle
Beverage containers	Recyclable waste	Construction and Operation	PV Site and facilities	Recycle
Electric Cabling and conduit	Recyclable waste	Construction and Operation	PV Site and facilities	Recycle
Clean Drums, Pails, Boxes	Reusable waste	Construction and Operation	PV Site and facilities	N/A – will be reused
Wooden Pallets	Reusable waste	Construction and Operation	PV Site and facilities	N/A – will be reused

Plastic and Glass Bottles	Reusable waste	Construction and Operation	PV Site and facilities	N/A – will be reused
Hardware (e.g., old tools, fasteners, etc.)	Reusable waste	Construction and Operation	PV Site and facilities	N/A – will be reused
Packaging Materials	Non-hazardous Waste	Construction	PV Site and facilities	Recycle or Dispose via Outside Contractor
Concrete	Non-hazardous Waste	Construction	PV Site and facilities	Dispose via Outside Contractor
Glass	Non-hazardous Waste	Construction	PV Site and facilities	Recycle or Dispose via Outside Contractor
Dried Paint containers	Non-hazardous Waste	Construction	PV Site and facilities	Dispose via Outside Contractor
Plastics	Non-hazardous Waste	Construction	PV Site and facilities	Recycle or Dispose via Outside Contractor
Food and beverage waste	Non-hazardous Waste	Construction	PV Site and facilities	Recycle or Dispose via Outside Contractor
Shredded Paper and Cardboard	Non-hazardous Waste	Construction	PV Site and facilities	Recycle or Dispose via Outside Contractor
Biomass	Non-hazardous Waste	Construction	PV Site and facilities	Use to cover bare soil areas on edge of construction area.

- ***Planning and Waste Prevention***

Opportunities to prevent the creation of waste or the type of waste generated must be identified. This could lead to a reduction in the amount of waste generated or the creation of non-hazardous waste instead of hazardous waste.

Where possible:

  - Substitute inputs which are less hazardous or with those that lead to lower waste volumes;
  - Institute procurement measures that recognize opportunities to return usable materials; and
  - Minimize hazardous waste generation by implementing stringent waste segregation to prevent contamination.

- ***Identification of Non-Hazardous and Hazardous Waste; and Waste Handling***

Waste will be identified, classified, and managed as non-hazardous or hazardous waste.

Non-Hazardous Waste

Non-hazardous waste includes garbage and refuse. For example, domestic trash and garbage; inert construction and demolition materials; refuse, such as metal scrap and empty containers and residual waste from industrial operations.

Hazardous Waste

Hazardous waste shares the properties of a hazardous material (i.e., ignitability, corrosivity, reactivity, or toxicity), or other physical, chemical, or biological characteristics that may pose a potential risk to human health or the environment if improperly managed.

Waste handling

Non-hazardous and hazardous wastes will be handled so as to reduce the risk to workers. The use of Personal Protective Equipment (PPE) is critical in the handling of various waste types. In order to protect workers from the adverse impacts that could occur from contact with wastes, measures will be put in place to ensure that personnel handling wastes are trained in the use of PPE for handling waste.

PPE required for handling non-hazardous waste will include the following:

- Coveralls;
- Safety glasses or chemical splash goggles;
- Gloves;
- Hearing protection;
- Safety boots (chemical-resistant with steel toe and shank);
- Hard hat; and
- Face shield.

PPE required for handling hazardous waste will include the following:

- Full-face or half-mask, air purifying respirators (IOSH approved);
- Coveralls;
- Gloves (chemical resistant);
- Hearing protection;
- Safety boots (chemical-resistant with steel toe and shank);
- Hard hat;
- Face shield; and

- Escape mask.

Waste Segregation

Non-hazardous waste will be physically separated from hazardous wastes. Non-hazardous waste will be segregated by type (plastics, glass, metal, biodegradable) in order to achieve the following:

- Maximize the possibilities for waste recycling or reuse;
- Minimize the possibility of contamination of non-hazardous wastes by hazardous wastes;
- Ensure that waste is properly contained to avoid release of hazardous substances to the environment;
- Ensure the proper management of each specific waste type; and
- Prevent mixture of incompatible wastes that could result in chemical reactions.

Waste storage

Wastes will be collected in bins/skips, appropriately labelled and colour-coded for easy identification and evacuation. Orientation labels such as 'This End Up' will be used for all containers bearing liquid wastes during all handling, storage, transportation and disposal activities.

The core characteristics of approved containers are as follows:

- Bins/skips will be colour-coded and labeled for easy identification;
- Food and perishable wastes will be sealed in bin bags and containers covered at all times to reduce odour and restrict access by vermin and scavengers.
- Chemicals, and any other hazardous liquids will be contained in compatible, appropriately sealed and labeled containers to prevent reaction with containers and spillage during handling.
- Bins/skips will be kept on pallets or other space buffers to prevent contamination in the event of a spill.
- Bins/skips will be maintained in good condition and stored with appropriate secondary containment.

Waste Container Identification

- Metals and cans – Blue Container
- Food Waste – Yellow Container
- Glass – Green container
- Cardboard, Paper, Plastics and Packaging - White Container
- Contaminated and hazardous waste – Red container
- Medical Waste – Specially supplied container by contractor.
- Used batteries – Black container.

Minimum requirements for waste storage facilities are as follows:

- Locate safe areas with limited chance of exposure to hazards and accidents.
- Facilities are to be enclosed with appropriate secondary containment to prevent spreading of waste and contamination of surrounding areas.
- Facilities are to be lined to prevent contamination of soil and ground water.
- Facilities are to be covered to prevent being washed off and spread by rain which could lead to contamination of soil, contamination of ground water; and air pollution via wind-borne odours and dusts.
- The entire area will be sealed off and operated with limited access.
- Safety signs will be used to indicate potential hazards and restricted access.

- Sufficient capacity will be maintained to contain anticipated types and volumes.
- Waste chemicals will have MSDS close by for easy identification and for emergencies.
- All hazardous waste (e.g., fuel, oil, used oil, paints, chemicals and contaminated soil) shall be stored in impervious containers in bunded areas of 110 percent capacity of the stored material to prevent contamination in case of accidental release.
- Effluent from the washing-down of concrete mixing and handling equipment will be contained within a bunded area of 110 percent capacity of the stored material. Effluent will be treated as hazardous waste.
- Chemical toilets must be provided for all employees, and located at convenient locations throughout the site. Toilets must be replaced by a registered contractor.
- Facilities will be provided for temporary accumulation and consolidation of waste. Waste storage will be on short-term basis. Some materials may be stored on a longer-term basis until volumes accrued are sufficient to support a selected waste management option.

Waste transportation

Waste stored on site will be periodically removed and transported to waste treatment or disposal facilities. Vehicles transporting waste must be capable of transporting waste safely. Vehicles must be loaded correctly and must have the appropriate labelling and warning signs attached to the vehicle. Appropriate firefighting and spill response equipment must also be transported with each vehicle to contain, manage and remove accidental spillages.

A Waste Manifest Form must be completed for waste removed from the plant.

The form must include the following:

- Name and address of the contractor who generated the waste;
- Name of the waste transporter used to transport a load of waste;
- Registration number of the waste transport vehicle;
- Waste treatment license number of the waste transporter;
- Description of the waste transporter including its class and subcategories;
- Quantity of waste transported;
- Type of container used for transport;
- Name and address of transit points and the final destination of the waste; and
- Intended method of waste treatment, storage, recycling, processing, reprocessing or disposal at destination.

Copies of the Waste Manifest form must be retained on site and remedial action must be taken if copies are not available.

Waste treatment and disposal

Panel Recycling

Solar panels will be recycled once they are no longer of use.

Other Waste Disposal

The Project will ensure that the disposal of waste generated by its activities does not have an adverse impact on the environment or on public health and that the removal and treatment methods are aligned with the risk that the waste poses to the

environment. Detailed records will be maintained documenting the type and quantity of waste which has been stored, transported, treated, recovered or disposed.

Monitoring

Ongoing Monitoring, Inspections and Audit

Objective: Monitor, inspect and audit all waste management activities and facilities to ensure they are in line with South African standards.

Construction Phase

The contractor/ECO/EO will undertake the following monitoring, inspection and auditing procedures during construction:

- Inspections will be carried out examining in detail documentation, processes and implementation to establish degree of compliance to this plan. Non-compliances will be identified and stewarded to closure. Inspections will be scheduled by the HSE manager and will occur weekly.
- Monitor construction activities to ensure waste management is carried out according to management plans through a fortnightly audit.
- Waste findings will also be captured under management walkthroughs and sites visits.
- The HSE Manager must produce an Incident Report and proof of disposal Documentation.

Operational Phase

The Project Proponent will undertake the following monitoring, inspection and auditing procedures during operations:

- Inspections will be carried out for contractors and their selected approved third-party subcontractors to ensure that their activities with respect to waste management are in compliance to the conditions of this plan. Inspections will be scheduled by the HSE manager and will occur monthly.
- Waste findings will also be captured under management walkthroughs and sites visits.
- The HSE Manager must produce an Incident Report and keep record of disposal documentation.

Competence, training and awareness

Training/awareness on waste management will be provided by the facilities HSE Manager to the entire personnel and key contractor's personnel. This training will include appropriate information and awareness on waste management. All training must be registered and records kept of all individuals and employees who have completed training. Training must be completed annually to ensure waste management procedures are continuously up to date.

Documentation

All relevant documents related to collection, containment, onsite storage, transfers, delivery, offsite storage, analysis, treatment, disposal and certification of materials and wastes shall be maintained by the Project Proponent HSE Manager from the point of generation to final disposition for easy tracking and audit purposes.

Reporting

Construction Phase

The contractor will undertake the following monitoring, inspection and procedures during construction:

- Inspections will be carried out examining documentation, processes and implementation of procedures to establish degree of compliance to this plan. Non-compliances will be identified and reported. Inspections will be scheduled by the HSE manager and will occur every fortnight.
- Waste matters will also be captured under management walkthroughs and sites visits.

  The HSE Manager must produce a Waste Management Report every month which must include:
  - Proof of disposal documentation;
  - Incident reports from any non-compliance; and
  - Log and photo evidence of inspections.

Operation Phase

The Project Proponent will undertake the following monitoring, inspection and procedures during operations:

- Inspections will be carried out of contractors and their selected approved third party contractors to ensure that their activities with respect to waste management are in compliance to the conditions of this plan. Inspections will be scheduled by the HSE manager and will occur monthly.
- Waste matters will also be captured under management walkthroughs and sites visits.

  The HSE Manager must produce a Waste Management Report for each quarter. The report must include:
  - Proof of disposal documentation;
  - Incident reports from any non-compliance; and
  - Log and photo evidence of inspections.

Assessment and audit

Waste Management Reports will be audited twice during the construction phase and once a year during operations. Audits will be undertaken as part of the annual ECO audits. The audit will assess compliance with the specifics of the WMP as well as all reporting procedures.

2. STORMWATER MANAGEMENT PLAN

Purpose

The construction and operation of the Project can negatively impact drainage systems therefore stormwater management systems that take cognisance of natural hydrological patterns and processes will reduce the potentially negative impacts. The main risks associated with poor stormwater management practices are increased erosion risk and, to a lesser degree, flooding.

The objective of this SWMP is to provide measures to address runoff from disturbed portions of the site so that:

- Concentrated flows into natural watercourses are minimised;
- Concrete or other lining of watercourses to protect them from concentrated flows is not required; and
- Natural flow pathways are not diverted.

Stormwater management principles

The following sets out the general design principles that will enable effective stormwater management. It should be noted that a detailed SWMP with engineering specifications for proposed stormwater control measures will be prepared by the civil engineers during the detailed design phase. This will be based on the following underlying principles.

Sedimentation

Mitigation of possible sedimentation that may impact drainage systems must be achieved by implementing the following measures:

- The service road around the PV facilities will act as an energy dissipation structures where concentrated flows occur.
- The service road will trap sediment at sources where areas are going to be disturbed (e.g. construction materials laydown area). Mitigation measures could include covering of areas with vegetated material removed from construction areas.
- Maintain, where possible, the natural vegetation cover and facilitate re-vegetation of disturbed areas to stabilise the soil.
- Exercise good excavation practises during the construction phase. Backfill and compact all material to acceptable standards as soon as possible after construction and facilitate re-vegetation of all disturbed areas as soon as possible after backfilling.

Flooding

Mitigation of the possible risk of flooding can be achieved by implementing the following measures:

- Only remove natural vegetation where necessary and maintain the natural flow resistance which will decrease flood peaks.

Monitoring

Although it is anticipated that the proposed Project will have a limited impact on the drainage characteristics of the area, it is recommended that monitoring of the site be carried out both during and after construction to identify potential impacts on the natural systems as a result of potential altered flow patterns. In addition, the discharge points from the construction areas must be monitored for signs of concentrated flows and erosion.

The access roads have the potential to impact negatively on the natural drainage pattern of the area if not designed and implemented correctly. The road network must be monitored regularly to determine areas where stormwater may be concentrated or diverted which may lead to erosion.

Should signs of erosion and alterations to the natural flow patterns be identified, appropriate interventions must be designed to address the issues as they arise.

3. TRAFFIC MANAGEMENT PLAN

Purpose

Implementation of the Traffic Management Plan (TMP) will ensure regulatory compliance and the reduction of the significance of impacts related to transport during the construction and operation of the Project. The objectives of this plan are therefore: Ensure compliance with all legislation regulating traffic and transportation within South Africa;

- Avoid incidents and accidents;
- Raise greater safety awareness in each driver;
- Avoid the deterioration of roads; and
- Avoid pollution that can be created from noise and emissions related to transport.

Traffic and transport management principles

The following principles will be adhered to during the applicable phases of the Project:

- Conduct a road condition survey in order to gauge the damage to the road as a result of the intensive increased traffic.
- All employees must attend an environmental training programme which will include details of approved access roads and speed limits.
- Adjacent landowners must be notified of the construction and operation schedule.
- Flagging must be provided at access points to the site and must be maintained until construction is completed.
- All vehicles must be maintained in good condition.
- Speed restrictions must be established prior to commencement of construction and enforced over all construction traffic.
- The movement of all vehicles within the site must be on designated roadways.
- All necessary transportation permits to be applied for and obtained from the relevant authorities prior to construction.
- If abnormal loads are required, the appropriate arrangements must be made to obtain the necessary transportation permits and the route agreed with the relevant authorities to minimise the impact of other road users.
- A designated access point to the site must be created and clearly marked to ensure safe entry and exit.
- Signs must be placed along construction roads and at the entrance to the site to identify speed limits, travel restrictions and other standard traffic control information and road markings.
- Where possible, construction vehicles must avoid travelling on the public roadway during the morning and late afternoon commute time, to reduce the impact on other road users.
- All internal and access roads that will be used during the operational phase of the Project must be maintained.

Monitoring

Contractors and the Project Proponent must ensure that all vehicles adhere to the speed limits. A speeding register must be maintained which details the offending drivers and the offence. Corrective actions must be implemented for speeding and other traffic offences.

4. FIRE MANAGEMENT PLAN

Fire Risk Management: Although fires are not a natural occurrence at the site, fires may occasionally occur under the right circumstances, such as following exceptional summer rainfall, when grass biomass may reach sufficient density to carry a fire. Ignition risk sources in the area include the following:

- Lightning strikes
- Personnel within the facility dropping cigarettes or other activities which pose a fire risk.
- Electrical shorts

The National Veld and Forest Fires Act places responsibility on the landowner to ensure that the appropriate equipment as well as trained personnel are available to combat fires. Therefore, the management of the facility should ensure that they have suitable equipment as well as trained personnel available to assist in the event of fire.

Firebreaks

Extensive firebreaks are not recommended as a fire-risk management strategy at the site. In the majority of years there is not sufficient biomass to carry a fire and the risk of fire is very low. In addition, the service roads within and around the facility will serve to break up the connectivity of the vegetation within the facility and would serve as fire breaks which would also retard the spread of fire around the site.

Grazing management is recommended to reduce the fire risk. In the absence of livestock grazing, the biomass within the facility may build up which may not be desirable for biodiversity or the management of the facility. The simplest and most ecologically sound way to reduce the biomass within the facility would be through the use of livestock grazing. Small stock such as sheep are compatible with solar energy facilities and are commonly grazed within such facilities as they do not pose a danger to the electrical or other infrastructure of the facility. In order to reduce the biomass within the facility, it could be grazed once or twice a year, depending on the rainfall. If this is not possible and the vegetation is too tall or deemed a fire hazard, the vegetation can be brush-cut to about 10-15cm of the soil, and the excess material raked up and removed if necessary.

5. EROSION MANAGEMENT PLAN

During the construction phase, the discharge points from the construction areas and the entire site must be monitored for signs of erosion during construction on an on-going basis.

The road network specifically must be monitored regularly for erosion on a monthly basis during construction and operation.

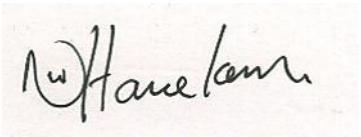
Should signs of erosion be identified, appropriate interventions must be designed to address the issues as they arise.

Add here

6. CHANCE FOSSIL FINDS PROCEDURE

<table>
<tr><td>Province & region:</td><td colspan="2">KENHARDT DISTRICT, NORTHERN CAPE</td></tr>
<tr><td>Responsible Heritage Management Authority</td><td colspan="2">SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000,South Africa. Phone : +27 (0)21 462 4502. Fax: +27 (0)21 462 4509. Web : www.sahra.org.za</td></tr>
<tr><td>Rock unit(s)</td><td colspan="2">Dwyka Group (Mbizane Formation), Gordonia and Mokolanen Formations (Kalahari Group)</td></tr>
<tr><td>Potential fossils</td><td colspan="2">Calcretised rhizoliths & termitaria, ostrich egg shells, land snail shells, rare mammalian and reptile (e.g. tortoise) bones, teeth</td></tr>
<tr><td rowspan="5">ECO protocol</td><td colspan="2">1. Once alerted to fossil occurrence(s): alert site foreman, stop work in area immediately (N.B. safety first!), safeguard site with security tape / fence / sand bags if necessary.</td></tr>
<tr><td colspan="2">2. Record key data while fossil remains are still in situ:
Accurate geographic location – describe and mark on site map / 1: 50 000 map / satellite image / aerial photo
Context – describe position of fossils within stratigraphy (rock layering), depth below surface
Photograph fossil(s) in situ with scale, from different angles, including images showing context (e.g. rock layering)</td></tr>
<tr><td>3. If feasible to leave fossils in situ:
Alert Heritage Management Authority and project palaeontologist (if any) who will advise on any necessary mitigation
Ensure fossil site remains safeguarded until clearance is given by the Heritage Management Authority for work to resume</td><td>3. If not feasible to leave fossils in situ (emergency procedure only):
Carefully remove fossils, as far as possible still enclosed within the original sedimentary matrix (e.g. entire block of fossiliferous rock)
Photograph fossils against a plain, level background, with scale
Carefully wrap fossils in several layers of newspaper / tissue paper / plastic bags
Safeguard fossils together with locality and collection data (including collector and date) in a box in a safe place for examination by a palaeontologist
Alert Heritage Management Authority and project palaeontologist (if any) who will advise on any necessary mitigation</td></tr>
<tr><td colspan="2">4. If required by Heritage Management Authority, ensure that a suitably-qualified specialist palaeontologist is appointed as soon as possible by the developer.</td></tr>
<tr><td colspan="2">5. Implement any further mitigation measures proposed by the palaeontologist and Heritage Management Authority</td></tr>
<tr><td>Specialist palaeontologist</td><td colspan="2">Record, describe and judiciously sample fossil remains together with relevant contextual data (stratigraphy / sedimentology / taphonomy). Ensure that fossils are curated in an approved repository (e.g. museum / university / Council for Geoscience collection) together with full collection data. Submit Palaeontological Mitigation report to Heritage Resources Authority. Adhere to best international practice for palaeontological fieldwork and Heritage Management Authority minimum standards.</td></tr>
</table>

ANNEXURE 4

Alien Invasive Plant Management Plan Plant Rescue and Protection Plan Revegetation and Rehabilitation Plan Open Space Management Plan Avifauna Monitoring Plan		
Prepared by:	**Nicolaas Hanekom** **Pri.Sci.Nat (Ecology) 400274/11**	

1. ALIEN INVASIVE PLANTS MANAGEMENT PLAN

Objectives

The purpose of the Alien Invasive Management Plan is to provide a framework for the management of alien and invasive plant species during the construction and operation of the Project.

The broad objectives of the plan include the following:

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

Principles

General Clearing and Guiding Principles

The lighter infested areas should be cleared first to prevent the build-up of seed banks. Pre-existing dense mature stands ideally should be left for last, as they probably won't increase in density or pose a greater threat than they are currently.

Collective management and planning with neighbours may be required in the case of large woody invaders as seeds of aliens are easily dispersed across boundaries by wind or water courses.

All clearing actions should be monitored and documented to keep track of which areas are due for follow-up clearing.

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

Construction phase alien invasive management principles

Clearing of vegetation should be undertaken as the work front progresses – mass clearing should not occur unless the cleared areas are to be surfaced or prepared immediately afterwards.

Where cleared areas will be exposed for some time, these areas should be protected with packed brush.

Alien invasive species (such as ryegrass or oats) or straw containing any such species will not be used for temporary soil stabilisation of any exposed eroded areas, as these will then rapidly dominate these areas, to the exclusion of indigenous species.

Stockpiles should be checked regularly and any weeds emerging from material stockpiles should be removed.

Operation phase alien invasive management principles

Ongoing alien invasive plant management will be undertaken on an annual or biannual basis within any undeveloped portions of the solar PV power plant site.

No spraying of herbicide will be undertaken in the rehabilitated areas as this kills numerous non-target species.

Focus will be on removing (using DWS approved methodology) all alien invasive shrubs and large herbs, although in some cases it may be possible and necessary to also remove invasive alien grasses.

Monitoring

Document and record alien invasive plant management throughout the life cycle of the project on a biannual basis including:

- alien plant distribution maps (simple Google Earth records will suffice);
- alien plant control measures implemented; and
- evaluation of control success rate.

2. PLANT RESCUE AND PROTECTION PLAN

Purpose

The purpose of the plant rescue and protection plan is to reduce the impact of the development of the Project on listed and protected plant species and their habitats during construction and operation.

Rescue and protection plan principles

The impacted areas were identified after a botanical survey to avoid any species that require search and rescue. However, as precautional principle, a plant rescue and translocation operation for protected plants will be undertaken prior to site clearing or construction taking place, according to the following principles:

- A suitably qualified botanist must be appointed prior to any construction / land clearing activities taking place, to undertake plant search and rescue from the entire project footprint area. Search and Rescue will also be undertaken for selected species within the solar PV power plant footprint prior to development.
- All translocatable plant species will be bagged up and stored in a nursery for later transplanting, once construction has been completed and rehabilitation is required.
- Replanting of the rescued specimens will be undertaken as soon after construction has been completed as possible, giving the plants maximum time to establish before the next summer rainfall period into the surrounding areas not impacted by the proposed infrastructure.
- The approved development footprint in this area will be surveyed and clearly demarcated and strung with warning signs, prior to any construction.
- Immediately after being transplanted, species should be adequately watered.

Monitoring

Plant mortality can be high when plants are transplanted and it is therefore recommended that relocated plants be monitored for a period of at least one-year post-translocation to identify any additional plant requirements.

3. REVEGETATION AND REHABILITATION PLAN

Purpose

Disturbance of terrestrial vegetation outside the actual development footprint is likely to be inevitable (particularly in the construction laydown area) and will likely require rehabilitation post-construction where the vegetation and / or soil surface has been damaged or disturbed. The purpose of this plan is to ensure that areas cleared or impacted during construction activities of the proposed solar PV power plant are rehabilitated with a plant cover that reduces the risk of erosion from these areas as well as restores ecosystem function. The purpose of the rehabilitation at the site can be summarised as follows:

- Achieve long-term stabilisation of all disturbed areas to minimise erosion potential;
- Re-vegetate all disturbed areas with suitable local plant species;
- Minimise visual impact of disturbed areas;
- Ensure that disturbed areas are safe for future uses; and
- Restrict and control movement of people and vehicles within rehabilitated areas.

Principles

The following guidelines provide a clear and practical means of implementing such rehabilitation once construction activities have ceased.

General recommendations

Progressive rehabilitation is an important element of the rehabilitation strategy and should be implemented where feasible.
Once revegetated, areas should be protected to prevent trampling and erosion.
No construction equipment, vehicles or unauthorised personnel should be allowed onto areas that have been vegetated.
Fencing should be removed once a sound vegetative cover has been achieved.
Any erosion channels developing after revegetation should be backfilled and consolidated and the areas restored to a proper stable condition.

Topsoil management

Effective topsoil management is a critical element of rehabilitation, particularly in arid areas where soil properties are a fundamental determinant of vegetation composition and abundance. Where any excavation or topsoil clearing is required, the topsoil should be used immediately where possible or stockpiled and later used to cover cleared and disturbed areas once construction activity has ceased.

Topsoil should be retained on site in order to be used for site rehabilitation. Topsoil must be excavated to the correct depth.

Wherever possible, stripped topsoil should be placed directly onto an area being rehabilitated. This avoids stockpiling and double handling of the soil.

If direct transfer is not possible, the topsoil should be stored separately from other soil heaps until construction in an area is complete. The soil should not be stored for extended periods and should be used as soon as possible.

Ideally stored topsoil should be used within one month and should not be stored for longer than three months.

If topsoil is stored on a slope then sediment fencing should be used downslope of the stockpile in order to intercept any sediment and runoff should be directed away from the stockpiles upslope.

Seeding

In some areas the natural regeneration of the vegetation may be poor and the application of seed to enhance vegetation recovery may be required. Seed should be collected from plants present at the site and should be used immediately or stored appropriately and used at the start of the following wet season. Seed can be broadcast onto the soil, but should preferably be applied in conjunction with measures to improve seedling survival such as scarification of the soil surface or simultaneous application of mulch.

Transplants

Where succulent plants are available or other species which may survive translocation are present, individual plants can be dug out from areas about to be cleared and planted into areas which require revegetation. The primary purpose of using transplants is not to restore plant cover to its former levels, but rather to provide nodes of biological activity and a source of propagules that can spread and recover disturbed areas on their own. As such transplants should be planted in clumps rather than as isolated individuals.

Plants for transplant should preferably be removed from areas that are going to be cleared.

Transplants should be placed within a similar environment from where they came in terms of aspect, slope and soil depth.

Transplants must remain within the site and may not be transported off the site.

Use of Soil Savers

In areas where seed and organic matter retention is low, it is recommended that soil savers are used to stabilise the soil surface. Soil savers are man-made materials, usually constructed of organic material such as hemp or jute and are usually applied in areas where traditional rehabilitation techniques are not likely to succeed. In areas where a soil saver is used, it should be pegged down to ensure that it captures soil and organic matter flowing over the surface.

Soil savers may be seeded directly once applied as the holes in the material catch seeds and provide suitable microsites for germination. Alternatively, fresh mulch containing seed can be applied to the soil saver.

Monitoring requirements

As rehabilitation success is unpredictable, monitoring and follow-up actions are important to achieve the desired cover and soil protection.

Re-vegetated areas should be monitored every 6 months for the first 18 months following construction. Re-vegetated areas showing inadequate surface coverage (less than 10% within 12 months after re-vegetation) should be prepared and re-vegetated. Any areas showing erosion, should be re-contoured and seeded with indigenous grasses or other locally occurring species which grow quickly.

4. OPEN SPACE MANAGEMENT PLAN

The buffer areas surrounding the *Aloidendron dichotomum* (Quiver Tree), Archaeological sensitive sites, buffer areas around the pans and non-perennial rivers and areas immediately surrounding the PV facility generation blocks form part of the Open Space areas and this management plan. All sections included in the EMPr applicable to the operational phase forms part of the Open Space Management activities and requirements.

The following elements are considered part of the Open Space Management Subplan

Access Control:

- Access to the facility should be strictly controlled.
- All visitors and contractors should be required to sign-in.
- Signage at the entrance should indicate that disturbance to fauna and flora is strictly prohibited.
- The fencing around the facility should consist of a single fence with no electrified strands.

Prohibited Activities: The following activities should not be permitted within the facility by anyone except as part of the other management programmes of EMP for the development:

- No fires within the site.
- No hunting, collecting or disturbance of fauna and flora, except where required for the safe operation of the facility and only by the Environmental Officer on duty and with the appropriate permits and landowner permission.
- No driving off demarcated roads.
- No interfering with livestock.

Based on observations from existing PV plants, is highly likely that a variety of small fauna will find the PV plant attractive and will become resident within the facility. The primary purpose of the open space management plan should be to maintain the vegetation of the site in a state which does not comprise a high proportion of alien species and which can still support the majority of smaller fauna which inhabit the area. This is best achieved through ensuring that the vegetation of the site consists of natural species and that management of the vegetation is largely through natural means such as livestock grazing or occasional mowing to 10-15 cm height. Small resident fauna are not likely to compromise the safety and operation of the facility and are likely to perform important ecological functions such as reducing rodent levels within the facility which are likely to increase as a result of protection from larger predators and owls. As a result, smaller fauna should be tolerated or passively encouraged to remain or forage within the facility. There are no PV facilities in the country that have been operational for more than a few years and so the long-term consequences of these facilities are not yet known and so management will need to be adaptive and respond to the various changes and challenges as they occur.

5. AVIFAUNA MONITORING PLAN

This monitoring plan takes into account Birdlife South Africa's (BLSA's) most recent "Birds and Solar Energy Best Practice Guidelines" (Jenkins et al. 2016). The development is planned as successive and adjacent phases. The area of photovoltaic (PV) arrays for each phase is considered large (>150 ha) by BLSA's standards (with potentially a very large total if all three phases are completed). The development qualifies for BLSA's monitoring Regime 3. Regime 3, which recommends monitoring to be both pre- and post-construction, with a minimum of 4-5 surveys spread over 12 months, each of 4-8 days and including a carcass search (Jenkins et al. 2016). Based on previous assessments of each phase (Kemp 2016 a,b,c), BLSA's Regime 3 guidelines are adapted to suit the topography, extent, habitats and avifauna expected over all three site phases and infrastructure. The monitoring plans proposed should be read in conjunction with the references cited, in particular BLSA's guidelines (Jenkins et al. 2016), but additional references are provided to assist with development and modification of the onsite monitoring.

Monitoring priorities and proposals

This arid area is home to several large terrestrial bird and raptor species, the most important of which are Ludwig's Bustard *Neotis ludwigii*, Kori Bustard *Ardeotis kori*, Secretary bird *Sagittarius serpentarius*, Karoo Korhaan *Eupodotis vigorsii,* Verreaux's Eagle *Aquila verreauxii* and Martial Eagle *Polemaetus bellicosus*. In addition to being classified as threatened regionally and in some cases globally, most of these species are facing significant threats to their survival from existing impacts in the arid parts of South Africa. In addition, this area is home to an assemblage of arid zone adapted smaller bird species including larks, sparrow-larks, chats and others. Most important of these from a conservation perspective are Red Lark *Calendulauda burra* and Sclater's Lark *Spizocorys sclateri*, both of which are listed as regionally threatened species (Vulnerable and Near-threatened respectively), have very restricted ranges and have been recorded in the broader area within which the study area is situated. Stark's Lark *Spizocorys starki* is also an important endemic present in the area, and Burchell's Courser *Cursorius rufus* (Vulnerable) is a nomadic species which occurs in the broader area[1].

Considering the bird and habitat data collected on site it is concluded that the following species will be most at risk if the proposed development goes ahead:

- Ludwig's Bustard;
- Kori Bustard;
- Karoo Korhaan;
- Red Lark;
- Sclater's Lark; and
- Stark's Lark.

The monitoring proposals are for compilation of information that can be used to reduce any negative effects of the arrays and associated powerline structures on birds, and

[1] Smallie. J. (2017). Avifauna Impact Assessment for the Proposed Development of a 100 MWac Solar Photovoltaic Facility (SKEERHOK PV 1) on the farm Smutshoek 395, north-east of Kenhardt, Northern Cape Province.

of the birds on operation of the arrays. Two primary approaches are considered necessary, each with two principal objectives:

- To compile sufficiently rigorous information on the diversity, composition and abundance of bird species that visit/occupy the site so as to detect changes resulting from the development, and
- To compile site-specific information on interactions of birds with the developments as the basis for their mitigation and management.

Given the inadequate database for planning the monitoring (see section below), any plans must be considered as preliminary and subject to adaptive development and management as more on-site experience and information is acquired.

Establish pre-construction and seasonal post-construction baselines

An initial survey must be initiated prior to development, so that a baseline of current composition and density of the on-site avifauna can be estimated for the undisturbed vegetation and habitats prior to commencement of construction. Then post-construction, a further year of monitoring is necessary so that a baseline for seasonal changes can be estimated. The experimental design of the surveys for accumulation of these baseline data includes identical control studies in adjacent habitats, which will subsequently provide comparative information for distinguishing on-site from merely seasonal changes. Monitoring is proposed as two line-transects per PV block, N-S and W-E, which extend from the site into neighbouring habitats as controls. The control extensions of the W-E transect for one phase will cross the adjacent sites proposed for for the other PV generation blocks, where they can subsequently serve as pre-construction baselines for each of these phases once their own N-S control transects are added across the.

Timing of surveys

The pre-construction survey should be conducted in midsummer (before 21 December). The four post-construction surveys should be conducted quarterly for one year, starting around the mid-summer and mid-winter solstices and intervening equinoxes (around 15 December, March, June & September, respectively).

Transects per surveys

During each of the five site visits, at least four surveys of each line transect should be conducted, if possible six or even eight.

Timing of transects

Each line transect should be done during the cooler least disturbed periods, alternating between a start 30 min after sunrise or ending 30 min before sunset. Exact start, finish and duration times for each transect should be recorded.

Starting points of transects

Each successive round of line-transects should commence at the opposite end and sequence to the previous one (i.e. S-W, N-E, S-E and N-W).

Recording of sightings during transects

Each line transects should first record the time and GPS location of the observer on the line for each sighting, including for flying birds, to provide a count of each species and its individuals seen from the line. This takes into account the open habitat and diversity in size of species likely to be encountered. Secondly, the distance and direction of each individual/flock from the initial sighting point should also be estimated

(ideally using a range-finder and compass), to allow subsequent analysis and estimation of density for each species based on perpendicular distance from the line.

Documentation of structural habitat changes
Once on each visit, at 50-m intervals and for each direction/time of transect (i.e. N or S, W or E, dawn or dusk) to include different views and lighting, take geo-referenced fixed-point images facing forward along the transect to document changes in habitat structure and composition, both within and outside areas covered by the arrays.

Documentation of climate
Establish an automated on-site weather station at the centre of the three PV blocks to daily record at least rainfall, temperature, wind direction/speed and cloud cover, and to convey the results directly to the monitoring avian biologist. These data will inform the seasonal conditions for each monitoring visit and line-transect, and variance in the seasonal conditions for each monitoring visit, line-transect or opportunistic report/recording. They will also provide alerts of any extreme weather events and their effects, so that they can decide if a special additional monitoring visit is necessary and what it might entail.

Analysis of surveys.
After each monitoring visit, the data collected should be analysed to guide how best subsequent line-transects can be optimised. By the end of the first year of post-construction transects, transects should be analysed to document changes in avian species composition on the sites, both pre- and post-construction and in relation to seasonal changes in climate and habitat, and also in changes in densities of some of the species encountered. At the end of a year of post-construction monitoring, the transect design and results should be reviewed to decide what subsequent monitoring is required.

Monitor bird movements and interactions relative to arrays, powerlines and extreme local climatic events cannot all be monitored in such a repeatable and structured way as the line-transects, especially for the Northern Cape where local climatic events and their effects on avifaunal are so unpredictable.

Structured monitoring

Point counts from lookouts
During each monitoring visits, conduct as many 1-hour point-counts as possible from elevated lookouts, such as on-site windmills/substations or adjacent hilltops/slopes. Make as wide a spread of locations and daylight hours as possible. Choose a fixed geo-referenced lookout point; use a compass to decide the arc over and around the arrays within which counts and observations will be confined, and take location-specific habitat images within that arc from the lookout point on each visit. Record the times when birds are detected and under observation within that arc and estimate their distance away, using a range-finder where possible, and their altitude and direction if flying, all of which will differ for each species according to size and habits. The period that the bird is under observation and any relevant activities, such as movements or behaviours, and how they are affected by the arrays or pylons, should be recorded. Along powerlines, detect any regular flight paths, or long-distance movements and their directions and altitudes, since this is especially relevant for large birds, such as threatened raptors, storks and cranes, and especially bustards.

Opportunistic monitoring

Use the weather station results to detect any extreme events (i.e. outside the normal range of any parameter for that season) and their effects (e.g. flooding, desiccation, wind damage), so that they can decide if a special additional monitoring visit is necessary and what it might entail.

Record whenever and wherever any birds are encountered among the arrays, alongside the arrays, above the arrays and/or along the pylons during each monitoring visits, and with the assistance between visits of on-site staff during maintenance. Note as accurately as possible the location, date, description and duration of behaviours.

Randomly observe bird species and activities, where possible, from a vehicle or other lookout.

Check that the edges and undersides of panels (poles/legs, frames, wiring), and pylons of powerlines, do not provide unsuitable perch/roost/nest sites for birds or other animals.

Note any other uses by birds of the structures, such as for shade, resting or nesting, or where unnaturally high input of nutrients or seeds/fruits may have altered vegetation structure, composition and/or attractiveness.

Take geo-referenced images of any particular avian interactions and effects. Report any bird remains found, during all activities and with the help of on-site staff.

Note the location and take an image/sample of each set of remains to enable identification of high-risk sections and the bird species involved.

Searches for carcasses during each monitoring visit, along each transect, array and new power lines, and the around sub-station structures and fences associated with each development phase.

Also search along existing powerlines that cross or come within 500 m of the developments for possible influence from the presence of or reflections off the arrays.

Consult data from both structured and opportunistic monitoring on acquisition, so as to plan and guide any adaptive management and remedial mitigatory actions considered necessary.

These also expand databases of little studied effects of the technology on semi-arid habitats and avifauna’s, with relevance to development to both subsequent phases and new projects.