Proposed Photo-Voltaic Solar Power Plant on Farm Nuwerus, No. 450 Portion 6, Worcester

Draft Environmental Management Programme

DEA Ref. 12/12/20/2019

Prepared for: SANVAL / JUWI South Africa

AUGUST 2011

Prepared by: Boland Environmental Consultants CC
PO Box 250, Worcester, 6849
Tel 023 347 0336 Fax 023 347 5336
work@BolandEnviro.co.za
CONTENTS

1. BACKGROUND ......................................................................................................................... 3

2. APPLICABLE LEGISLATION ...................................................................................................... 4
2.1. THE CONSTITUTION OF THE REPUBLIC OF SOUTH AFRICA ........................................... 4
2.2 NATIONAL ENVIRONMENTAL MANAGEMENT ACT .......................................................... 4
2.2. CONSERVATION OF AGRICULTURAL RESOURCES ACT ................................................ 5
2.3. NATIONAL ENVIRONMENTAL MANAGEMENT: BIODIVERSITY ACT ............................. 5
2.4. LAND USE PLANNING ORDINANCE .................................................................................. 5
2.5. NATIONAL HERITAGE RESOURCES ACT ......................................................................... 5

3. DESCRIPTIVE OVERVIEW ...................................................................................................... 6
3.1. LOCATION AND SITE DESCRIPTION ............................................................................... 6
3.2. RELEVANT ACTIVITIES ..................................................................................................... 7
3.3. THE RECEIVING ENVIRONMENT ..................................................................................... 10

4. SUMMARY OF IMPACTS PRIOR TO MITIGATION .................................................................. 11

5. CONSTRUCTION PHASE MANAGEMENT PLAN (C-EMP) ..................................................... 16
5.1. GENERAL MANAGEMENT STRATEGY ............................................................................. 16
5.2. MITIGATION MEASURES DURING THE CONSTRUCTION PHASE ....................................... 16
5.3. FIRE RISK MANAGEMENT DURING THE CONSTRUCTION PHASE .................................... 20
5.4. HEALTH AND SAFETY MANAGEMENT ............................................................................ 20
5.5. EMERGENCIES PROTOCOL ............................................................................................ 20
5.6. COMMUNICATION OF MANAGEMENT ACTIONS ............................................................. 21
5.7. ENFORCEMENT OF SITE USE RULES ............................................................................ 22
5.8. NON-COMPLIANCE ......................................................................................................... 22
5.9. RECORD KEEPING ........................................................................................................... 22
5.10. AUDITING ....................................................................................................................... 22

6. OPERATIONAL PHASE MANAGEMENT PLAN ...................................................................... 23
6.1. MITIGATION MEASURES DURING THE OPERATIONAL PHASE ....................................... 23
6.2. RECORD KEEPING ........................................................................................................... 25
6.3. AUDITING ......................................................................................................................... 25

7. DECOMMISSIONING PHASE .................................................................................................. 26

8. ANNEXURES ......................................................................................................................... 26
1. BACKGROUND

This Environmental Management Programme (EMP) provides an operational framework and serves as a guideline document with regards to the construction, operational and decommissioning phase activities associated with the development of a 71MW Solar Electric Power Plant on the Nuwerus, Farm 450 Portion 6, Worcester, hereafter referred to as the Site.

This EMP contains guidelines, operating procedures and rehabilitation/pollution control requirements which will be binding after approval of the EMP. It is essential that the EMP be carefully studied, understood, implemented and adhered to at all times. Expansion or adaptation of this management plan may be required in specific circumstances, but may require approval by the Competent Authority which is in this case, the National Department of Environmental Affairs.

The subject site, Farm No. 450 Potion 6 (Nuwerus) near Worcester, Western Cape Province, was identified from a suite of optional sites on the basis of low biodiversity, current vacant land use, tourism, market and transmission costs.

The proposed PV Solar Power Plant (preferred alternative) will have an electricity output in the region of 70 MW which will be provided to Eskom via the national grid. Construction and installation is planned for 2012 - 2013.

The solar power plant will consist of the following elements:
- PV solar panels/modules (arranged in arrays)
- PV module mountings
- DC-AC current inverters
- Electricity distribution boxes
- Internal cabling (mostly underground)
- Earthing systems
- Electrical substation

In addition to the power plant, the following associated infrastructure will be required:
- Electricity distribution line (high voltage transmission from substation to onsite power line)
- A perimeter security fence will be erected around the development sections
- Gravel/dirt roads within the development area

The Environmental Impact Assessment (EIA) Regulations 2010, promulgated in terms of the National Environmental Management Act (Act 107 of 1998) (NEMA), specifies activities that require authorization from the relevant authorities, based on the findings of an environmental assessment, before such activities can be implemented (Government Notice (GN) No. R. 543 - 547 of 2010). The proposed SanVal PV Solar Power Plant constitutes activities listed in Schedule 1 (GNR 544 No. 10 & 18), Schedule 2 (GNR 545 No. 1 & 15) and Schedule 3 (GNR 546 No. 14).

This EMP is required to conform to conditions as set out in the Environmental Regulations GN 543 of 2010.

The EMP has been drafted taking into account the Western Cape Provincial Guideline for Environmental Management Plans (2005).
The scope and the level of detail have been adjusted to an appropriately restricted level, reflecting the following considerations:

- **The assessment of impacts**
- **Mitigation & monitoring requirements**
- **Legal requirements**
- **The complexity of the project activities**

In addition, this EMP has been drafted taking into consideration such comments as have been received from Interested and Affected Parties (I&APs) with regard to the proposed development.

Start-up, development (daily/weekly/monthly) and post development checklists are included in **Annexure E** to facilitate site inspections by the Environmental Control Officer.

## 2. APPLICABLE LEGISLATION

The legislation that is relevant to this development is briefly outlined below.

### 2.1. THE CONSTITUTION OF THE REPUBLIC OF SOUTH AFRICA

The Constitution of the Republic of South Africa (Act 108 of 1996) states that everyone has a right to a non-threatening environment and that reasonable measure are applied to protect the environment. This includes preventing pollution and promoting conservation and environmentally sustainable development, while promoting justifiable social and economic development.

### 2.2 NATIONAL ENVIRONMENTAL MANAGEMENT ACT

The National Environmental Management Act (Act 107 of 1998) (NEMA), as amended, makes provision for the identification and assessment of activities that are potentially detrimental to the environment and which require authorization from the relevant authorities based on the findings of an environmental assessment. NEMA is a National Act, which is enforced by the Department of Environmental Affairs (DEA). These powers are delegated in the Western Cape to the Department of Environmental Affairs and Development Planning (DEA&DP). The DEA is however the relevant authority for all energy development projects which fall under the National Energy and Response Plan (NERP).

According to the regulations of Section 24(5) of NEMA (EIA Regulations 2010), authorisation is required for the following activities related to the proposed development:

**Government Notice R544** of 2010, listed activities:

**10:** The construction of facilities or infrastructure for the transmission and distribution of electricity - outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts

**18:** The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock from (i) a watercourse;

**DEA Reference: 12/12/20/2019**
Government Notice R545 of 2010, listed activities:

1: The construction of facilities or infrastructure for the generation of electricity where the electricity output is 20 megawatts or more.

15: Physical alteration of undeveloped, vacant or derelict land for residential, retail, commercial, recreational, industrial or institutional use where the total area to be transformed is 20 hectares or more;

Government Notice R546 of 2010, listed activities:

14: The clearance of an area of 5 hectares or more of vegetation where 75% or more of the vegetative cover constitutes indigenous vegetation..., (a) In .. Western Cape: All areas outside urban areas.

*NOTE: A full Scoping EIA process was undertaken to assess the impacts as required for activities listed in Government Notices R545.

2.2. CONSERVATION OF AGRICULTURAL RESOURCES ACT

The purpose of the Conservation of Agricultural Resources Act (Act 43 of 1983) provides for control over the utilization of the natural agricultural resources in order to promote the conservation of the soil, the water sources, vegetation and to combat weeds and invader plants.

2.3. NATIONAL ENVIRONMENTAL MANAGEMENT: BIODIVERSITY ACT

The National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004) (NEMBA) is part of a suite of legislation falling under NEMA, which includes the Waste Act, Protected Areas Act, the Air Quality Bill and the Coastal Zone Bill. Chapter 4 of NEMBA deals with threatened and protected ecosystems and species and related threatened processes and restricted activities. The need to protect listed ecosystems is addressed (Section 54). Section 73 deals with Duty of Care relating to invasive species, while Section 76(2) calls for development of invasive species monitoring, control and eradication plans by all organs of state in all spheres of government, as part of environmental management plans required in terms of Section 11 of NEMA.

2.4. LAND USE PLANNING ORDINANCE

The Western Cape Land Use Planning Ordinance 15 of 1985 aims to regulate land use planning and related matters, including zoning schemes. The Subject Land is currently zoned Agriculture I. An application by BolandPlan Town and Regional Planners, is in process to obtain a “Departure” from the current zoning scheme to accommodate the development. There will be no change in land use. No agricultural land will be subdivided.

2.5. NATIONAL HERITAGE RESOURCES ACT

The protection and management of South Africa’s heritage resources are controlled by the National Heritage Resources Act (Act No. 25 of 1999). South African National Heritage Resources Agency (SAHRA) is the enforcing authority and in the Western Cape, SAHRA have, in most cases, delegated this authority to Heritage Western Cape (HWC).
In terms of Section 38 of the National Heritage Resources Act, SAHRA and/or HWC will require a Heritage Impact Assessment (HIA) where certain categories of development are proposed. Section 38(8) also makes provision for the assessment of heritage impacts as part of an EIA process and indicates that if such an assessment is found to be adequate, a separate HIA is not required.

The National Heritage Resources Act requires relevant authorities to be notified regarding this proposed development, as the following activity is relevant:

- any development or other activity which will change the character of a site exceeding 5 000 m² in extent;

Furthermore, in terms of Section 34(1), no person may alter or demolish any structure or part of a structure, which is older than 60 years without a permit issued by the SAHRA, or the responsible resources authority. Nor may anyone destroy, damage, alter, exhume or remove from its original position, or otherwise disturb, any grave or burial ground older than 60 years, which is situated outside a formal cemetery administered by a local authority, without a permit issued by the SAHRA, or a provincial heritage authority, in terms of Section 36 (3). In terms of Section 35 (4), no person may destroy, damage, excavate, alter or remove from its original position, or collect, any archaeological material or object, without a permit issued by the SAHRA, or the responsible resources authority.

Archaeological, Palaeontological and Visual Heritage Studies were conducted and reports submitted to HWC along with the Environmental Impact Assessment Report.

A Record of Decision was obtained from HWC on the “tbc”.

3. DESCRIPTIVE OVERVIEW

3.1. LOCATION AND SITE DESCRIPTION

The development site is located on Farm Nuwerus No. 450, Portion 6, Worcester, hereafter referred to as the Subject Land. The Subject Land is located in the Breede Valley Municipal area, approximately 15 km SE of Worcester adjacent to the R60 (TR31/1) towards Robertson. See Annexure A – Locality maps.

The Subject Land is currently undeveloped and consists of natural karoo veld. The Eskom power line servitude crosses the entire length of the Subject Land (NW-SE). There are no buildings on the site. Other features that are present include a small farm dam, two ephemeral water courses that cross the farm in a SW to NE direction, old irrigation furrows and a number of existing farm tracks. Access to the Subject Land is from the R60 at 18.023km.

<table>
<thead>
<tr>
<th>Property location(s):</th>
<th>Worcester</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farm number and portion</td>
<td>Farm Nuwerus, Portion 9 of Farm 450, Worcester</td>
</tr>
<tr>
<td>Property size</td>
<td>173.7013 ha</td>
</tr>
<tr>
<td>Development footprint size</td>
<td>116 ha</td>
</tr>
<tr>
<td>SG21 Digit code(s)</td>
<td>C08500000000045000006</td>
</tr>
<tr>
<td>Coordinates: Latitude</td>
<td>33° 42' 40.18&quot;</td>
</tr>
</tbody>
</table>

DEA Reference: 12/12/20/2019
3.2. RELEVANT ACTIVITIES

3.2.1 Construction

The construction phase described for the purposes of this EMP consist of the following activities:

Identification of construction, sensitive and NO-Go areas

- Areas of No-Go, including perimeter buffer areas and water courses will be staked and clearly flagged.
- The sensitive archaeological area Site 484, will be demarcated and fenced off.
- A qualified palaeontologist will visit the area identified as potentially fossiliferous prior to commencement and during construction to ascertain whether fossils are present. If identified, fossil rich areas will be staked, flagged and fenced off to prevent damage during the construction phase. HWC will be notified as to the findings of the field work.
- Construction areas including lay-down, parking and work areas will be identified, demarcated and fenced off if necessary.

Worker Environmental Awareness Programme (WEAP)

- The Applicant will implement a WEAP to educate on-site workers about sensitive environmental issues associated with the Project.
- The program will be administered to all on-site personnel including surveyors, construction engineers, employees, contractors, contractor’s employees, supervisors, inspectors, subcontractors, and delivery personnel.
- The program will be implemented during site mobilization, ground disturbance, grading, construction, operation, and closure.
- The training will place special emphasis on the special status species that have been identified or have a high likelihood to occur, including special status plant species, tortoise and other special status reptile species.
- The Applicant will be responsible for ensuring workers will be informed of No-Go areas and the consequences of transgressions.

Alteration or clearing of natural vegetation

- Clearing, levelling and compacting of a 70m x 70 area of indigenous vegetation to construct the electrical substation.
- Clearing of indigenous vegetation to create 3m wide gravel/dirt roads.
- Trimming of vegetation higher than 0.5m where required, to prevent interference with solar power arrays.
A number of plants identified by the botanical specialist will be identified, tagged and transplanted to buffer areas by suitably experienced personnel.

A number of 1 m deep trenches will be excavated through natural vegetated areas to allow the burying of electrical cables.

Construction of access and internal roads

- Upgrading and widening of existing gravel access road, at most 4m.
- The main access roads between the R60 and the electrical substation may be paved.
- Stormwater control measures such as appropriately spaced diversion humps and gullies will be constructed to prevent erosion from runoff.

Upgrading of earthen dam embankment on construction of spillway

- The existing dam on the Stream 1 requires upgrading of the earth embankment and the installation of a spillway.
- Refer to the report compiled by the Mr J. Kriel, dam safety engineer (Appendix G in the SANVAL EIR, 2011).

Construction of solar arrays

- Vertical metal beams will be driven into the soil and weathered rock
- Fixed PV solar modules will be installed in arrays, with each array consisting of 48 PV modules (4 x 12) mounted onto a metal frame at a fixed angle.
- Arrays will be 19.93 m x 3.974 m and the distance between rows of arrays will be 3 meters. At an angle of 25°, arrays will comprise an area of 3.6 meters wide. Installation height will be a maximum of 3 meters.
- The mounting systems are rammed directly into the ground using a small mobile piling machine (track or wheel mounted) - concrete will not be used.
- Trenches will be dug to depths of 1m for the laying of electrical cabling (low voltage).
- Construction of arrays will include the attachment of horizontal and vertical metal support struts, attachment of solar photo-voltaic panels, and the wiring and testing of the PV panels.

Construction of inverter power stations (56) and installation of underground cabling

- The construction of each inverter power station will commence with the clearing, flattening and laying of an 8m x 4m concrete base.
- The pre-manufactured inverter and electrical transformers will be bolted to the concrete base.
- Underground electrical cables from the PV arrays will be connected to the power stations.
- Higher voltage 22–33 KV buried cables will take the current inverted / produced at the power stations to the central electrical substation.
- The underground pipe conduits at depths of 1 metres below the surface will be installed across the watercourses, this will allow for repairs to electrical cabling without having to excavate the 22-33 KV cable.

Construction of electrical substation

- The electrical substation area will be covered in a 100 mm thick layer of 19-25 mm gravel.
- The substation will consist of various components (transformers, cabling, and wiring) fixed and anchored onto small concrete foundations. The transformers will be 2.5 - 3 m high.
• The highest point of the substation will be a lattice pylon / tower (maximum height of 15 meters) which will connect a cable (transmission line) from the substation to the grid (Eskom line).
• The substation will be fenced off to prevent accidental or unauthorised access.

Erection of fencing
• The existing perimeter fences should be inspected and mended where necessary.
• Perimeter fences that cut across the two watercourses should be modified to allow free movement of animals i.e. replace mesh wiring with widely spaced smooth wire strands.
• Any traps and snares found should be removed.
• New security fencing around the PV power plant can be partially installed during the construction phase i.e. along the R60, and the northern and southern flanks of the development footprint. The sections should be left open to allow any animals that are trapped to escape.
• Conditional on the environmental authorisation, small openings (7cm high and 5 cm wide) could be cut into the security fence at regular intervals along the ground level. This would allow small animals and reptiles trapped inside the PV plant areas to escape or move to the watercourses.

3.2.2 Operational

The operational phase described for the purposes of this EMP consist of the following activities:

• Workers should receive ongoing environmental awareness programmes.
• Cleaning of PV panel faces as required – expected to be performed using manual labour.
• Maintenance of electrical wiring, underground cabling, inverter power stations and substation.
• Inspection and routine maintenance of high voltage (132 KV) power line, from substation to ESKOM overhead power lines.
• Inspection and routine maintenance of the existing ESKOM high voltage overhead power lines (by ESKOM technicians).
• Inspection and maintenance of gravel roads.
• Inspection and maintenance of boundary and perimeter fences.
• Dam safety inspections to ensure the existing earth dam and spillway is safe.
• Inspection and maintenance of road culverts along the R60 to ensure they remain clear of debris and vegetation.
• Inspection of camera-traps to determine if any animals are trapped inside the PV power plant area.
• Trimming of vegetation to 0.5m as required – expected to be performed using manual labour.
• Removal of alien invasive plants and weeds that may establish themselves on the Subject Land.
• Careful translocation of any animal trapped inside the PV power plant area.
• Recording of any animal injury or fatality due to the PV power plant or associated infrastructure.
• Suitable signage will be installed at strategic positions to warn personnel or trespassers of the dangers.
• Passive security systems will be installed to warn of intrusion or security breaches.

3.2.3 Decommissioning

The decommissioning phase described for the purposes of this EMP consist of the following activities:
The PV power plant should be dismantled manually by a suitably experienced, licensed waste management company.

A hierarchical waste management approach should be adopted, namely:
- re-using whole components and infrastructure,
- recycling all useful materials such as metals, glass and plastics,
- energy and material recovery at a gasification plant or similar,
- safe disposal of remaining waste portions at a licensed incineration or landfill site.

Concreted areas should be broken up and building rubble recycled or disposed of at a licensed landfill site.

Compacted areas such as roads should be ripped and rehabilitated using local vegetation.

Disturbed or eroded areas should be rehabilitated using suitable methods and natural local vegetation.

All rehabilitation should be supervised by a suitably qualified professional such as a botanist, hydrologist or engineer.

The earth dam, if no longer performing a function, should be demolished and the watercourse restored to its natural state.

3.3. THE RECEIVING ENVIRONMENT

The Subject Land is currently zoned for agricultural use (Agriculture I). The site consists of natural karoo veld utilized for small stock grazing. The Subject Land in its current state has a low agricultural potential and no existing water "right", although there is an existing dry earth dam on the main watercourse.

The Subject Land is located within an undulating plain and comprise low hills (NW - SE trending), traversed by a small non-seasonal water course (flowing SW to NE). The Eskom servitude line runs down the centre of the Subject Land, and the site from this spine slopes gently (north-easterly) down towards the R60 and down towards the back of the farm (south-westerly). Low mounds or termiteria (heuweltjies) are prominent features within the otherwise homogenous landscape.

The oldest rocks are found in the south of the Subject Land, consisting of Ecca Shales of the Karoo Super Group. The Ecca rocks are covered by the younger Uitenhage Group Enon Conglomerates, which have been known to contain important fossils in other areas.

Two small (unnamed) streams traverse the Subject Land. An unnamed Stream 1 runs through the centre of the Subject Land (from south to north), with a small farm dam located within this water course. Another small arid water course (Stream 2) runs across the eastern portion of the Subject Land. Both are ephemeral streams that flow into the Toontjies River which flows into the Nuy River which in turn is a tributary of the Breede River.

The site is traversed by old defunct water furrows previously used to connect farm dams and divert/transport water between farm dams on the Subject Land and surrounding properties. These furrows are now overgrown with vegetation and not functioning.

The Subject Land is in a fairly pristine condition and comprise a large area of natural habitat. According to the NSBA 2004 the Subject Land consists of Robertson Karoo vegetation which is
considered "Least Threatened". The more recent CAPE Fine-Scale Biodiversity Planning project (FSP) classified the vegetation on site as Worcester Renosterveld Karoo (Least Threatened). According to the CAPE Fine-Scale Plan Critical Biodiversity Areas Map there are two ecological support areas located on the site which corresponds to the non-seasonal water courses running through the Subject Land. Ecological processes should be maintained within these buffer/supporting areas. The remainder of the Subject Land is characterised as "other natural areas". There are no identified Critical Biodiversity Areas (CBAs) present on the Subject Land.

A number of reptiles and small mammals will occur naturally on the Subject Land. Mammals that are commonly found in the Robertson Karoo region include amongst others, Small Grey Mongoose (Galerella pulverulenta), Scrub Hare (Lepus saxatilis), Cape Porcupine (Hystrix africaeaustralis), Cape Grysbok (Raphicerus melanotis) and Caracal (Felis caracal). Notable reptiles include Angulate Tortoise/Pleooskaarskip (Chersina angulata), Leopard Tortoise (Stigmochelys pardalis) and Parrot Beaked Padloper (Homopus areolatus).

4. SUMMARY OF IMPACTS PRIOR TO MITIGATION

The Environmental Impact Assessment (Scoping and EIA) identified various potential impacts associated with the proposed development:

The most significant negative impacts are associated with the construction phase of the proposed PV solar power facility (preferred technology alternative). These relate to the transformation and impact on natural vegetation. All impacts are of Medium-Low or mostly Low significance prior to the implementation of the mitigation proposed.

The most significant negative impacts associated with the operational phase of the proposed development relates to the visual impact to users of the R60 (adjacent to the Subject Land), a change in the character of the area (sense of place) and the potential impact of lighting at night. Most visual impacts cannot be mitigated, although the impact of lighting at night will be of low significance after mitigation.

Negative impacts associated with the decommissioning phase related to potential disturbance to biodiversity and the generation of waste.

Positive impacts associated with the proposed development will be socio-economically related, specifically the creation of employment opportunities, the generation of renewable (green) energy at a large scale and local and regional economic development in the area.

4.1. CONSTRUCTION PHASE IMPACTS PRIOR TO MITIGATION:

4.1.1. Negative Impacts of Low Significance for the construction phase prior to mitigation

<table>
<thead>
<tr>
<th>NEGATIVE IMPACTS (LOW)</th>
<th>DESCRIPTION OF IMPACT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heritage: Palaeontological</td>
<td>The southern portion (Tierberg Formation Ecca Group) is of low palaeontological sensitivity. Potentially palaeontological sensitivity rocks may occur in the Uitenhage Group sediments in the northwestern area. Quaternary alluvial deposits along ephemeral water courses are of low palaeontological sensitivity.</td>
</tr>
<tr>
<td>Heritage: Visual impact of the internal access roads</td>
<td>The site's existing access road will be upgraded and utilised. Internal access roads have the potential to manifest as a network of landscape scarring, and may thus represent a</td>
</tr>
<tr>
<td>Heritage: Visual impact of the construction activities</td>
<td>During the construction period, there will be an increase in heavy vehicles utilising the roads to the development site that may cause a visual nuisance to other road users and land owners in the area. In this environment, dust from construction work is also likely to represent a visual impact.</td>
</tr>
<tr>
<td>Noise</td>
<td>Increased noise levels due to vegetation trimming, earthmoving and construction equipment.</td>
</tr>
</tbody>
</table>

4.1.2. Negative Impacts of Medium-Low Significance for the construction phase prior to mitigation

<table>
<thead>
<tr>
<th>NEGATIVE IMPACTS (MEDIUM-LOW)</th>
<th>DESCRIPTION OF IMPACT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biodiversity - Vegetation type</td>
<td>The development will not result in a complete removal of this vegetation within the development site. The local, non-permanent loss of vegetation type due to the proposed solar power plant development on the Subject Land will have a small overall effect and will not endanger the future of this vegetation type.</td>
</tr>
<tr>
<td>Biodiversity - Loss of Habitat</td>
<td>The development will lead to a local loss of the habitat within a fairly homogeneous area. Fauna and other organisms that utilise the area will have other similar habitat still available to them (adjacent natural areas of similar homogeneous habitat). Apart from ephemeral water courses traversing the Subject Land, no specialised habitats such as quartz patches or rocky outcrops are evident on the site.</td>
</tr>
<tr>
<td>Biodiversity - Ecological processes</td>
<td>Despite the loss of a localised area of Worcester Renosterveld Karoo, it is unlikely that the development will have a significant effect on ecological processes such as pollination and migration in the remaining natural areas.</td>
</tr>
<tr>
<td>Biodiversity - Fauna</td>
<td>No significant fauna or faunal habitat will be destroyed by the proposed development. Some animals may be harmed during construction or trapped within the development footprints.</td>
</tr>
<tr>
<td>Hydrological – Storm Water</td>
<td>The development will result in a marginal increase in storm water run-off, especially where vegetation will be cleared for the construction of roads and the sub-station. This will require some management to prevent soil erosion. Hardened surfaces in the form of concrete bases are limited to the bases of the inverter stations (fifty six 8m x 4m bases) and beneath the electrical infrastructure of the substation.</td>
</tr>
<tr>
<td>Erosion</td>
<td>The areas identified for the establishment of the solar power plant will not be cleared of natural vegetation or levelled. The proposed development is therefore not expected to be too susceptible to erosion. Certain areas between the solar arrays may be at greater risk during the Construction Phase, due to the trampling of vegetation by vehicles and workers. Erosion may occur in trenches excavated for cabling and along newly scraped roads.</td>
</tr>
<tr>
<td>Heritage Resources – Archaeological</td>
<td>The proposed development will not have an impact of great significance on these and other archaeological remains that might be encountered during implementation of the project.</td>
</tr>
</tbody>
</table>
### Heritage: Visual impact of the substation, inverters housing and mast and other infrastructure

The position of the auxiliary infrastructure will not be viewed from the R60 due to the topography of the site and the areas of potential visual exposure will be viewed as separate portions.

### Dust

The proposed development may result in increased dust levels during the construction phase.

### Waste and Effluent

Very little sewerage will be generated during the construction phase. Littering may be produced by construction personnel. All equipment, including the fencing will be prefabricated. Any waste produced during the construction phase will be removed.

### 4.1.3. Negative Impacts of Medium Significance for the construction phase prior to mitigation

<table>
<thead>
<tr>
<th>NEGATIVE IMPACTS (MEDIUM)</th>
<th>DESCRIPTION OF IMPACT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biodiversity - Loss of indigenous plant species</td>
<td>Vegetation (and geophytes) will be impacted where earthmoving activities (vegetation clearing and bulldozing / disturbance of the topsoil) are necessary during the construction period.</td>
</tr>
</tbody>
</table>

### 4.1.4. Positive Impacts identified for the construction phase prior to mitigation

<table>
<thead>
<tr>
<th>POSITIVE IMPACTS</th>
<th>DESCRIPTION OF IMPACT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Socio-Economic – upliftment of quality of life</td>
<td>The proposed development will create several local employment opportunities during the construction phase. Although the extent of permanent job creation is difficult to quantify, it is expected that approximately 200 employment opportunities will be created during the manufacturing, construction and installation stages of the proposed development.</td>
</tr>
</tbody>
</table>

### 4.2. OPERATIONAL PHASE IMPACTS:

#### 4.2.1. Negative Impacts of Low Significance for the operational phase prior to mitigation

<table>
<thead>
<tr>
<th>NEGATIVE IMPACTS (LOW)</th>
<th>DESCRIPTION OF IMPACT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biodiversity - Fauna</td>
<td>Some animals may get trapped within the development sections. Animals may get entangled in boundary fences that cross the water courses (ecological corridors).</td>
</tr>
<tr>
<td>Heritage: Archaeological</td>
<td>The proposed development is not expected to have any impact on archaeological remains during the operational phase, should the buffer around the area logged as Site 484 in Portion C be maintained.</td>
</tr>
<tr>
<td>Heritage: Visual impacts on residents of farms</td>
<td>The visual impact of the proposed facility on residents of neighbouring farms is expected to be of low significance. Only two dwellings at 2km distance from the site adjacent to the Nuy settlement exist. The biggest impact will be on the dwelling currently in construction on the adjacent farm on the western boundary. However the dwelling is orientated to the northwest and will therefore have its rear elevation to the site.</td>
</tr>
<tr>
<td>Heritage: Visual impacts on sensitive visual receptors</td>
<td>Within the greater region, the potential visual impact on sensitive visual receptors (i.e. users of roads and residents of towns, farms and homesteads) will be of low significance, due to the...</td>
</tr>
</tbody>
</table>
distance of the site from the towns, Nuy settlement and the majority of farms in the valley.

**Heritage: Visual impact of the internal access roads**

Internal access roads have the potential of manifesting as a network of landscape scarring, and may thus represent a potential visual impact within the viewshed area.

**Dust**

The proposed development may result in increased dust levels during the operational phase.

### 4.2.2. Negative Impacts of Medium-Low Significance for the operational phase prior to mitigation

<table>
<thead>
<tr>
<th>NEGATIVE IMPACTS (MEDIUM-LOW)</th>
<th>DESCRIPTION OF IMPACT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Biodiversity - Loss of indigenous plant species</strong></td>
<td>The proposed development is not expected to have a significant impact on indigenous plant species during the Operational Phase although site maintenance i.e. follow-up trimming of vegetation may have an impact if not properly managed.</td>
</tr>
<tr>
<td><strong>Biodiversity - Vegetation type</strong></td>
<td>Site maintenance i.e. follow-up trimming of vegetation may have an impact on the vegetation type if not properly managed. The solar modules may pose a long term effect to species composition within the vegetation type as a result of shade and microclimate. Impact on vegetation will depend on the resilience of each element to changing environmental conditions.</td>
</tr>
<tr>
<td><strong>Storm water</strong></td>
<td>Run-off from solar panel arrays may create local drip lines, however since the natural vegetation will be left in place, this will break most of the expected energy, preventing erosion. Obstruction of culverts underneath the R60 may cause storm water back-up.</td>
</tr>
<tr>
<td><strong>Erosion</strong></td>
<td>The development areas will not be cleared of vegetation or levelled. The proposed development is therefore not expected to be susceptible to erosion. Erosion may occur along internal roads and possibly along drip lines caused by run-off from solar panels.</td>
</tr>
<tr>
<td><strong>Heritage: Visual impact of the substation, invertors housing and electrical pylon / mast and other infrastructure</strong></td>
<td>The position of the auxiliary infrastructure will not be viewed from the R60 due to the topography of the site and the areas of potential visual exposure will be viewed as separate portions.</td>
</tr>
<tr>
<td><strong>Heritage: Visual impacts on tourist routes, tourist destinations and tourist potential within the region</strong></td>
<td>The anticipated visual impact of the facility on existing tourist routes, as well as on the tourism potential of the region, is expected to be low significance.</td>
</tr>
</tbody>
</table>

### 4.2.3. Negative Impacts of Medium Significance for the operational phase prior to mitigation

<table>
<thead>
<tr>
<th>NEGATIVE IMPACTS</th>
<th>DESCRIPTION OF IMPACT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Heritage: Visual impact on users of public roads</strong></td>
<td>The proposed development will be visible to users of the R60 adjacent to the site within 500 metres.</td>
</tr>
<tr>
<td><strong>Heritage: visual character and sense of place of the region</strong></td>
<td>The anticipated visual impact of the facility on the regional visual character, and by implication, on the sense of place, is expected to be moderate due to the short time span the site is visible from</td>
</tr>
</tbody>
</table>
4.2.4. Negative Impacts of High-Medium Significance for the operational phase prior to mitigation

<table>
<thead>
<tr>
<th>NEGATIVE IMPACTS</th>
<th>DESCRIPTION OF IMPACT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heritage: Visual impact of lighting at night</td>
<td>The area surrounding the proposed facility has a relatively low incidence of receptors, being mainly agricultural and rural in nature. In this respect, light trespass and glare from the security and after-hours operational lighting for the facility infrastructure will have some significance for residents in the area. The facility may contribute to the effect of sky glow in an otherwise dark environment.</td>
</tr>
</tbody>
</table>

4.2.5. Positive Impacts for the operational phase prior to mitigation

<table>
<thead>
<tr>
<th>POSITIVE IMPACTS</th>
<th>DESCRIPTION OF IMPACT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Socio-Economic employment and economic development</td>
<td>For the operation and maintenance phase of this development, back-office support will be boosted due to the relative infancy of this technology in South Africa. Employment opportunities would include manual labour for cleaning panel faces, trimming of vegetation and security services. The proposed development will increase the economic viability of the Subject Land.</td>
</tr>
<tr>
<td>Socio-economic electricity output</td>
<td>The preferred alternative will have a renewable electricity output of 71MW. Renewable energy developments have the cumulative positive impact of being more environmentally friendly than fossil fuels and are less or non-polluting.</td>
</tr>
</tbody>
</table>
4.3. DECOMMISSIONING PHASE IMPACTS:

4.3.1. Negative Impacts of Medium-Low Significance for the decommissioning phase prior to mitigation

<table>
<thead>
<tr>
<th>NEGATIVE IMPACTS</th>
<th>DESCRIPTION OF IMPACT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impact on Biodiversity</td>
<td>Decommissioning may impact on adjacent natural vegetation by means of trampling and dumping of decommissioned infrastructure. Exposed areas may be susceptible to alien invasion and soil erosion.</td>
</tr>
</tbody>
</table>

4.3.2. Negative Impacts of Medium Significance for the decommissioning phase prior to mitigation

<table>
<thead>
<tr>
<th>NEGATIVE IMPACTS</th>
<th>DESCRIPTION OF IMPACT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste</td>
<td>All infrastructure will be removed and will generate waste.</td>
</tr>
</tbody>
</table>

5. CONSTRUCTION PHASE MANAGEMENT PLAN (C-EMP)

The overall goal for the construction phase is to undertake the activities associated with the development of the photo-voltaic power plant in a way that:

- Ensures that activities are properly managed in respect of environmental aspects and impacts. Protects the natural environment from degradation and harm.
- Ensures the development achieves its positive socio-economic impact.
- Complies with legislation.

5.1. GENERAL MANAGEMENT STRATEGY

- Appointment of the Environmental Control Officer (Annexure D).
- A start-up, development (daily/weekly) and post construction checklist has been included in Annexure E to facilitate site inspection by the Environmental Control Officer.
- The “Pro Forma: Protection of the Environment” form, must be completed by the Contractor and submitted to the Developer, for safe keeping, before he is allowed onto the Site (Annexure F).

5.2. MITIGATION MEASURES DURING THE CONSTRUCTION PHASE

All appropriate mitigation measures should be implemented by the Developer / Contractor for the duration of the construction phase.

<table>
<thead>
<tr>
<th>Objective</th>
<th>Mitigation: Action/control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protection of floral</td>
<td>➢ Extensive earth moving activities and leveling is highly undesirable.</td>
</tr>
<tr>
<td>biodiversity - indigenous</td>
<td>➢ Vegetation cover should be left intact, except for development areas such as the electrical substation, inverter stations and roads. A certain amount of damage is expected during construction phase.</td>
</tr>
</tbody>
</table>
| **plant species and vegetation type** | Where vegetation cover is too high, trimming back to at most to 0.5m height is recommended instead of the complete removal of vegetation.  
Selected succulents (Crassula, Gasteria, Haworthia & Tylecodon paniculatus) should be relocated before construction commences to buffer areas on the Subject Land.  
Disturbance or removal of the topsoil should be prevented as far as possible to reduce the risk of erosion and to prevent the impact on dormant geophytes. Wherever topsoil is disturbed, geophytes should be removed and relocated to buffer areas.  
Physical disturbance (i.e. excavation of cabling trenches, removal of topsoil) to *heuweltjies* on the south-facing section of Quadrant D should be prevented as far as possible as they contain the highest richness of geophytes and plant species.  
Vegetation within corridors and buffer areas (along fences and water courses) should not be disturbed, removed or trimmed.  
Vegetation debris and building rubble should not be dumped on adjacent natural vegetation.  
Dust levels should be kept to a minimum to avoid smothering of sensitive areas by windblown sediments. |
| **Protection of biodiversity – ecological processes** | Natural vegetation should remain intact to allow for natural storm water infiltration and dust management.  
No development, trimming or removal of any vegetation should take place within the ephemeral water courses or perimeter buffer areas.  
The extent of the buffer areas along the water courses should be at least as wide as the 1:50 year flood level as recommended by a flood line specialist.  
The two ephemeral water courses should be maintained as unobstructed, natural corridors. |
| **Protection of faunal biodiversity** | Construction of the major infrastructure components should be completed before the security fence is closed off thus allowing animals to escape.  
Animals must be allowed to cross the site unharmed during the construction phase.  
Animals remained within the development area must be translocated unharmed to adjacent natural areas (outside the development area).  
The new security fence surrounding the development should be designed to keep animals from entering the area (including borrowing animals). It is recommended that small openings (approximately 7cm high and 5cm wide) be left in the fence on ground level to allow small animals to escape. Since the water courses and dam are outside the development footprint, it is unlikely that animals will seek shelter or food inside the fenced area.  
The sections of the existing perimeter mesh fence should be removed or modified to allow free movement of animals. Where the corridors (watercourses) intersect with the farm fence, the mesh fence should be replaced with a widely spaced, smooth wire fence that will allow animals through.  
Artificial food and water sources, including refuse, should be kept out of reach of animals.  
Poaching (hunting without permits, trapping and snaring) of local wildlife must be strictly prohibited. |
| **Storm water management** | Physical disturbance to topsoil should be restricted to demarcated areas (for the construction of internal roads, inverter stations, substation and cabling trenches). |
The existing furrows that traverse the subject land should remain intact and should allow unobstructed flow of storm water.
Runoff from larger storm events should be led into existing water furrows.
Storm water bumps/furrows or adequate drainage structures must be used on internal gravel roads.
Natural vegetation should remain intact beneath solar modules to receive the run-off from the panel surfaces.
Proper erosion measures should be implemented where storm water is discharged into the stormwater channel.
The existing earthen dam should be made safe during construction in accordance to the specifications of the dam engineer.

Reduce risk of erosion

- Effective storm water measures must be implemented.
- The removal of natural vegetation below solar modules should be prevented as far as possible.
- Any eroded area must be repaired as soon as possible to prevent further damage.
- Physical disturbance to topsoil should be restricted to development areas i.e. internal roads, inverter stations, substation and cabling trenches.
- Disturbances within and around the development area caused by the construction activities should be prevented as far possible, and rehabilitated once construction is completed. Rehabilitation should include re-vegetating the exposed areas or stabilizing the soil.

Protection of heritage resources: Archaeology

- A 25 m buffer around the site logged as Site 484 in Portion C must be demarcated, fenced off prior to the commencement of construction and remain undisturbed.
- No archaeological material may be removed from the area.
- If any archaeological material (e.g. human remains) is found during earthmoving and construction, work must cease, the site should be demarcated and Heritage Western Cape must be notified immediately.
- The remains should not be removed until inspected by an archaeologist.

Protection of heritage resources: Palaeontological

- Bulk earthworks in the northwestern section of the study area should be monitored by a qualified palaeontologist. The monitoring work should involve the recording and sampling of a representative fraction of deeper excavations into fresh bedrock and should be commissioned before construction begins.
- Should substantial fossil remains – such as vertebrate bones and teeth, fossil wood, plant- or shell-rich beds - be exposed during development, the responsible ECO should safeguard these, in situ if possible, and alert Heritage Western Cape so that appropriate mitigation measures may be implemented.

Minimisation of visual impact

- The substation and inverter housing should be painted a dark grey/muted olive green colour to blend into the landscape.
- Select the PV panel technology: the preferred technology resulted in the preferred choice being the polycrystalline PV due to its higher electrical efficiency, compared to the thin film PV technology.
- Polycrystalline panels (dark blue) appear to have a lower visual impact than thin-film PV panels, which appear almost black in sunlight.
- Layout and construction of roads and infrastructure should be planned with due cognisance of the topography.
- Rehabilitate areas disturbed during construction to prevent visual scarring.
- A "no development" buffer area must be maintained between the R60 road and PV panels.
- Prevent the removal of vegetation below solar panel to lessen the change to the landscape.
- Reduce the construction period through careful planning and productive implementation of resources.
- Plan the placement of lay-down areas and any potential temporary construction camps in order to minimise vegetation clearing.
- Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads.
- Ensure that rubble, litter and disused construction materials are managed and removed regularly.
- Ensure that all infrastructure and the site and general surrounds are maintained in a neat and attractive way;
- Reduce and control construction dust through the use of approved dust suppression techniques.
- Restrict construction activities to daylight hours (08h00 – 17h00) in order to negate or reduce the visual impacts associated with lighting.
- Rehabilitate all disturbed areas, construction areas, road servitudes and cut and fill slopes to acceptable visual standards.

**Minimisation of Dust**

- Vegetation trimming should not be undertaken during very windy conditions.
- Earthworks (clearing, trenching and installation of underground cabling) should not be conducted during very windy conditions.
- Cleared land should be exposed for a minimum time possible and rehabilitated after construction.
- Rehabilitation should include re-vegetation to stabilise the soil.
- Any soil, and only areas intended for development, must be exposed for the minimum time possible once cleared of vegetation to avoid prolonged exposure to wind and water erosion and to minimize dust generation.
- Water used for dust suppression purposes must be used in moderation and should not be wasted.

**Minimisation of Noise**

- All construction equipment, including vehicles, must be properly and appropriately maintained in order to minimise noise generation.
- Noise levels will be kept to a minimum by limiting operation of heavy earthmoving equipment and construction activities to normal working hours, and to normal work days (i.e. Monday to Friday, between 08h00 and 17h00).
- Silencers (sound bafflers) should be used to ensure effective sound dampening if necessary.

**Waste and effluent management**

- Construction vehicles and machinery should be properly maintained to prevent contamination of soil and water through the spillage or leakage of hydrocarbons such as petrol and diesel. All vehicles leaking fuel or other liquids should immediately be removed to the maintenance area and repaired. Spills should be cleaned up promptly and disposed of correctly.
- Portable toilets should be supplied for personnel during the construction phase.
- Waste and litter drums should be placed at strategic points for use by personnel and emptied regularly to the Worcester Municipal landfill site.
- All construction waste and building rubble must be removed by the installation contractors.
- Ready-mix concrete should be delivered and there should be no on-site concrete mixing permitted.
- Any building waste must be transported to the Worcester Municipal landfill
site at the Developer’s cost.

<table>
<thead>
<tr>
<th>Minimisation of traffic impact</th>
<th>▶ Construction vehicles may only park on specific demarcated areas.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>▶ Appropriate traffic safety measures should be put into place to ensure the safety of travellers on the R60.</td>
</tr>
<tr>
<td></td>
<td>▶ Appropriate traffic warning signs shall be maintained. Trained and equipped flagmen shall be used where the access road intersects with public roads.</td>
</tr>
<tr>
<td></td>
<td>▶ All public roads shall be kept clear of mud and sand. If this material is deposited onto public roads by construction activities it must be cleared regularly.</td>
</tr>
</tbody>
</table>

| Socio-economic development    | ▶ Local workers, companies and contractors should be used as far as possible during the construction phase. |

5.3. FIRE RISK MANAGEMENT DURING THE CONSTRUCTION PHASE

▶ The Developer/Contractor shall appoint a Fire Officer who shall be responsible for ensuring immediate and appropriate actions in the event of a fire and shall ensure that employees are aware of the procedure to be followed.

▶ The Fire Officer shall ensure that there is basic fire-fighting equipment available on Site at all times.

▶ The Fire Officer shall ensure that the basic fire-fighting equipment is to the satisfaction of the Local Fire Services.

▶ Any fires which occur shall be reported to the Fire Officer immediately.

▶ Smoking shall not be permitted in those areas where it is a fire or health hazard.

▶ All incidents must be recorded in a Log Book. The date, time, the names of persons involved, a short description of incident and the final outcome must be recorded.

5.4. HEALTH AND SAFETY MANAGEMENT

▶ The Contractor shall appoint a Safety Officer who has been sufficiently trained to deal with medical emergencies.


▶ Dangerous zones (e.g. scaffolding, heavy vehicles, electrical) must be clearly demarcated.

▶ The rules and procedures should include emergency telephone numbers and shall be displayed on a visible notice board that is accessible to all employees and workers on site.

▶ Any new recruits or casual workers employed by the Developer/Contractor for this project should be provided with basic health and safety awareness training as part of their induction.

▶ No unauthorised firearms are permitted on Site.

▶ All incidents must be recorded in a Log Book. The date, time, the names of persons involved, a short description of incident and the final outcome must be recorded.

5.5. EMERGENCIES PROTOCOL

▶ Fire: The Contractor shall advise the Fire Officer and relevant authority of a fire as soon as one starts and shall not wait until he can no longer control it. The Contractor shall ensure that his employees are aware of the procedure to be followed in the event of a fire.

DEA Reference: 12/12/20/2019  

20
DRAFT Environmental Management Programme PV Solar Power Plant on
Nuwerus, Farm 450 Portion 6, Worcester

➢ **Hydrocarbon (fuel & oil) leaks and spillages**: The Contractor shall ensure that his employees are aware of the procedure to be followed for dealing with spills and leaks, which shall include notifying the Supervising Engineer, Environmental Control Officer and the relevant authorities.

➢ **Raw Sewerage spills (from portable toilets)**: The Contractor shall ensure that his staff and the staff of Subcontractors are aware of the procedure to be followed for dealing with spills and leaks, which shall include notifying the Supervising Engineer, Environmental Control Officer and the relevant local authorities.

  - The Contractor shall ensure that the necessary materials and equipment for dealing with spills and leaks are present on site at all times.
  - The clean-up of sewerage spills and any damage caused by the spill or leak shall be for the Contractor’s account.

➢ **Emergency telephone numbers** shall be displayed on a visible notice board that is accessible to all employees and workers on site.

<table>
<thead>
<tr>
<th>Emergency Medical Services:</th>
<th>08600 10 177</th>
</tr>
</thead>
<tbody>
<tr>
<td>Police:</td>
<td>08600 10 111</td>
</tr>
<tr>
<td>Worcester Hospital:</td>
<td>023 348 1100</td>
</tr>
<tr>
<td>Worcester Fire Brigade:</td>
<td>023 342 2430</td>
</tr>
<tr>
<td>Breede Valley Municipality Sewerage, Water &amp; Electricity:</td>
<td>023 348 8000</td>
</tr>
</tbody>
</table>

➢ All incidents must be recorded in a Log Book. The date, time, the names of persons involved, a short description of incident and the final outcome must be recorded.

5.6. COMMUNICATION OF MANAGEMENT ACTIONS

➢ The Environmental Control Officer is responsible for communicating the management actions of the EMP to the labour force during the initial site orientation and to coordinate and facilitate weekly tool-box meetings.

➢ Telephone numbers of emergency services, including the local fire fighting service, shall be posted conspicuously on site, either in the Contractor’s office or the nearest telephone. In the event of an emergency, the Contractor shall contact the relevant authority or emergency service.

➢ The Contractor shall erect and maintain accessible public information boards. Such boards shall include details of the Environmental Control Officer for complaints by members of the public.

➢ The Contractor shall keep a “Complaints Register” on site. The Register shall contain all contact details of the person who made the complaint, and information regarding the complaint itself.

➢ All incidents must be recorded in a “Log Book”. The date, time, the names of persons involved, a short description of incident and the final outcome must be recorded.
5.7. ENFORCEMENT OF SITE USE RULES

- The Environmental Control Officer can impose spot fines on the Contractor for any contraventions of the C-EMP by individuals. By imposing spot fines on individuals guilty of contravening the EMP, the Environmental Control Officer will be able to ensure that the requirements of the C-EMP are taken seriously not only by the management personnel on site, but also by labour.
- The Environmental Control Officer will not collect the fines from individuals, but will rather inform the Contractor of the contravention, the individual's identity and the amount of the fine. The fine will be deducted from the Contractor's monthly certificate, or the Environmental Control Officer will issue a variation order, to the value of the fine, for the Contractor to undertake activities that would in some way enhance the state of the environment or the site. It will be the Contractor's responsibility to reclaim such fines from the guilty individuals.
- In addition to penalties, the Environmental Control Officer has the power to remove from Site any person who is in contravention of the C-EMP, and if necessary, the Environmental Control Officer can suspend the part or all of the works, as required.

5.8. NON-COMPLIANCE

- DEA in their environmental authorisation stipulate that: "The Department of Environmental Affairs reserves the right as a result of non-compliance with a condition of this authorisation to withdraw the authorisation and render the holder liable for criminal prosecution."
- Non-compliance with the conditions of the EMP constitutes a breach of Contract for which the Contractor may be liable to pay penalties. These penalties imposed will be per incident. The amount of the penalty will depend on the seriousness of the contravention, and thus the Environmental Control Officer must use his judgement in determining the amount of the penalty.

5.9. RECORD KEEPING

- The Environmental Control Officer will keep a record of all activities on site, meetings attended, accidents or incidents, verbal or written complaints received, cases of non-compliance with the C-EMP together with corrective action taken and penalties issued. This information will be recorded in an appropriate manner by the Environmental Control Officer in a site diary.
- In addition, the Environmental Control Officer's daily, weekly and monthly checklist on Site will be kept in order to ensure compliance with the C-EMP (Annexure E).
- At the end of each month, a compliance certificate needs to be completed and submitted to the Developer for his records and safe-keeping. The weekly and month end checklists need to be attached to the compliance certificate.
- The Environmental Control Officer will keep a photographic record of progress and all incidents or events that take place on site. Such photographs shall be properly dated. The photographs should be kept safe and may be called for in disputes regarding environmental management.

5.10. AUDITING

The purpose of auditing is to monitor compliance with this C-EMP and measure its effectiveness in mitigating environmental impact. To this end, the following will be required:

- An internal review procedure will be established by the Environmental Control Officer to monitor the progress and implementation of the C-EMP. Any modifications to the C-EMP will be issued
as variation orders by the Environmental Control Officer and registered in the records of the Environmental Control Officer.

➢ At the end of the construction period, a report outlining the implementation of the C-EMP and highlighting any problems or issues that arose during the construction period will be compiled by the Environmental Control Officer.

➢ The following documents and information should be taken into consideration when completing this audit:

• log book (site diary)
• completed start-up, daily/weekly, monthly and closure checklists
• compliance certificates
• photographic records
• public complaints register

➢ The post-completion audit shall be submitted to the Developer and the relevant DEA case officer. This report will contain recommendations for how future EMPs can be improved or revised to limit, mitigate or rectify any potential environmental impacts.

6. OPERATIONAL PHASE MANAGEMENT PLAN

The overall goal for the operational phase is to undertake the activities associated with the development of the photo-voltaic power plant in a way that:

➢ Ensures that activities are properly managed in respect of environmental aspects and impacts. Protects the natural environment from degradation and harm.
➢ Ensures the development achieves its positive socio-economic impact.
➢ Complies with legislation, permits and authorisations.

6.1. MITIGATION MEASURES DURING THE OPERATIONAL PHASE

The proposed mitigation measures should be implemented as a minimum by the Developer for the duration of the operational phase.

<table>
<thead>
<tr>
<th>Objective</th>
<th>Mitigation: Action/control</th>
</tr>
</thead>
</table>
| Biodiversity – indigenous plants species | ➢ No additional vegetation should be cleared during the operational phase.  
➢ Manual trimming of vegetation underneath solar modules should be conducted on foot (without use of machinery apart from petrol brush cutters if necessary). |
| Biodiversity – Vegetation type | ➢ Measure long term changes to micro-climate and monitor effects on vegetation.  
➢ Alien invasive plants should be cleared and measures put in place to control further spread. |
| Biodiversity - Fauna        | ➢ Water courses should be maintained to serve as ecological corridors.  
➢ The existing perimeter fence crossing the water courses should be removed or modified to allow the free movement of animals.  
➢ The development areas should be monitored (by camera traps) during the operational phase for the occurrence of any animals.  
➢ Any animals encountered within the development areas must be safely relocated to adjacent natural areas.  
➢ Trapping or hunting should not be permitted. |
| Storm water                 | ➢ Drip lines formed from run-off from solar arrays should be monitored and where local erosion takes place, energy breakers such as a gravel or |
stone chip layer should be added.

- The existing furrows that traverse the Subject Land should remain intact and should be maintained to allow unobstructed flow of storm water.
- Storm water diversions / furrows along internal gravel roads should be maintained. Any signs of erosion should immediately be addressed.
- The culverts underneath the R60 should be checked regularly for any vegetation debris or material that may cause an obstruction to storm water to reduce the potential of storm water back-up above the 1:50 year flood lines.

**Erosion**

- Effective storm water measures must be implemented.
- The removal of vegetation below solar modules should be prevented as far as possible.
- Any erosion sites must be repaired as soon as possible to prevent further damage.
- Disturbances within and around the development area caused by the construction activities should be rehabilitated once construction is completed (re-vegetated to stabilise the soil).
- Site maintenance i.e. cleaning of solar panels and trimming of vegetation should be conducted on foot (use of heavy machinery between arrays should not be permitted).

**Heritage - Archaeological**

- The buffer area around the area logged as Site 484 in Portion C must remain intact and undisturbed.
- The fence around the archaeological buffer area should be maintained.
- No archaeological material may be removed from the archaeological buffer.

**Heritage - Visual impact public roads**

- A "no development" buffer area must be maintained between the road and PV areas.
- Consider the design of the perimeter fencing: perimeter fencing is proposed to be dark grey, visually permeable and a maximum height of 2.1m; the fence encloses the PV panel sections leaving the riverine and fence buffer areas unfenced.

**Heritage - Visual impact of substation, inverter housing & electrical mast**

- Maintain the gray / olive paint on the inverter housing and electrical substation infrastructure.

**Heritage - Visual impact of internal roads**

- No additional roads may be constructed between arrays.
- Existing roads should be used for all maintenance purposes.

**Heritage - Visual impact of lighting at night**

- Shielding the sources of light by physical barriers (vegetation, or the structure itself).
- Limiting mounting heights of lighting fixtures by specifying foot-lights or bollard level lights.
- Making use of minimum lumen or wattage in fixtures.
- Making use of down-lighters, or shielded fixtures.
- Making use of Low Pressure Sodium lighting or other types of low impact lighting.
- Making use of motion detectors on security lighting. This will allow the site to remain in relative darkness, until lighting is required for security or maintenance purposes.

**Dust**

- Follow-up vegetation trimming should be limited to areas where re-growth of vegetation may cause problems to the infrastructure.
- Vegetation trimming should not be conducted during extreme windy
6.2. RECORD KEEPING

➢ The Environmental Control Officer will keep a record of all activities on site, meetings attended, accidents or incidents, verbal or written complaints received, cases of non-compliance with the Operational EMP together with corrective action taken and any penalties issued. This information will be recorded in an appropriate manner by the Environmental Control Officer.

➢ At the end of each inspection, a compliance report will be submitted to the Developer for his records and safe-keeping. The checklists need to be attached to the report.

➢ The Environmental Control Officer will keep a photographic record of progress and all incidents or events that take place on site. Such photographs shall be properly dated. The photographs should be kept safe and may be called for in disputes regarding environmental management.

6.3. AUDITING

The purpose of auditing is to monitor compliance with this Operational EMP (O-EMP) and measure its effectiveness in mitigating environmental impact. To this end, the following will be required:

➢ An audit procedure will be established by the Environmental Control Officer to monitor the progress and implementation of the O-EMP. Any modifications to the O-EMP will be issued as variation orders by the Environmental Control Officer and registered in the records of the Environmental Control Officer.

➢ An environmental compliance report outlining the implementation of the O-EMP and highlighting any problems or issues that arose during the quarterly period will be compiled by the Environmental Control Officer.

➢ The following documents and information should be taken into consideration when completing this audit:

  • log book (site diary)
  • completed quarterly checklists
  • compliance certificates (if applicable)
  • photographic records
  • public complaints register

➢ The completed quarterly checklist and compliance report will be sent to the Developer and the Department of Environmental Affairs. This report will contain recommendations for how future EMPs can be improved or revised to limit, mitigate or rectify any potential environmental impacts.
7. DECOMMISSIONING PHASE

The development is designed to produce electricity for 25 – 30 years. It is envisaged that newer and more efficient renewable technological will over time replace the initial solar power plant, and it is thus unlikely that the development will be decommissioned.

<table>
<thead>
<tr>
<th>Objective</th>
<th>Mitigation: Action/control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impact on Biodiversity</td>
<td>➢ The buffer areas should remain intact.</td>
</tr>
<tr>
<td></td>
<td>➢ All infrastructure must be removed from the site.</td>
</tr>
<tr>
<td></td>
<td>➢ Concrete foundations and roads must be broken up and ripped.</td>
</tr>
<tr>
<td></td>
<td>➢ All rubble must be removed from site and safely disposed of.</td>
</tr>
<tr>
<td></td>
<td>➢ No disturbances should occur within the water courses.</td>
</tr>
<tr>
<td></td>
<td>➢ Trampling of adjacent natural vegetation should be avoided.</td>
</tr>
<tr>
<td></td>
<td>➢ Decommissioned infrastructure should be placed at demarcated laydown areas prior to removal.</td>
</tr>
<tr>
<td></td>
<td>➢ Bare areas should be re-vegetated with local indigenous species to prevent alien infestation and soil erosion.</td>
</tr>
<tr>
<td></td>
<td>➢ Disturbed areas should be rehabilitated to acceptable visual standards.</td>
</tr>
<tr>
<td>Waste management</td>
<td>➢ All materials should be reused or recycled on decommissioning, this will consist of mostly metals such as aluminum frames, steel posts and fencing, copper cabling and semi-conductor silicon and glass (from panels).</td>
</tr>
<tr>
<td></td>
<td>➢ Waste such as plastic coatings should be separated from metals and if not possible to recycle, should be disposed of at a licensed landfill site.</td>
</tr>
<tr>
<td></td>
<td>➢ Should Cadmium-Telluride (Cd-Te) PV panels be selected as technology alternative, special care would be required to recycle or dispose of the panels as cadmium is a toxic metal.</td>
</tr>
</tbody>
</table>

8. ANNEXURES

Annexure A – Locality maps
Annexure B – Site layout
Annexure C – Environmental Authorization (when issued)
Annexure D – Letter of Appointment: Environmental Control Officer
Annexure E – Project start-up, Development and Post Development Checklists
Annexure F – Protection of the Environment Statement
ANNEXURE A:
LOCALITY MAPS
**Figure A1:** Location of the proposed PV Solar Power Plant on Farm 450/6 near Worcester, Western Cape, South Africa. Sourced from 1:250 000 Government topo-cadastral map 3319.
**Figure A2:** Locality map of the proposed area and farms surrounding Farm 450/6, Worcester, sourced from 1:50 000 Government topo-cadastral map 3319DA.
Figure A3: Satellite image depicting the boundaries of Farm 450/6, Worcester and land use of the surrounding area. Imagery dated January 2010 (sourced from Google Earth).

DEA Ref: 12/12/20/2019
Regional Map 3319 DA.

Figure A4: Regional map of the proposed site (Farm 450/6, Nuwerus, Worcester) sourced from 1:50 000 Government topo-cadastral map 3319DA.

DEA Ref: 12/12/20/2019
ANNEXURE B:
SITE LAYOUT
ANNEXURE C:

ENVIRONMENTAL AUTHORISATION

(when issued)
ANNEXURE D:

LETTER OF APPOINTMENT

ENVIRONMENTAL CONTROL OFFICER

(an Environmental Control Officer has not been appointed at this stage – this letter of appointment will be completed subject to environmental authorisation being granted by DEA).
ANNEXURE E

PROJECT START-UP, CONSTRUCTION AND OPERATIONAL CHECKLISTS
# PROJECT START-UP AND SITE MOBILISATION CHECKLIST

<table>
<thead>
<tr>
<th>ENVIRONMENTAL ASPECT</th>
<th>YES/ NO (✓ or X)</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>A copy of the Contract Document and the Construction Environmental Management Programme (C-EMP) is on Site.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Worker Environmental Awareness Programme. All personnel on site have been orientated, been made aware of the contents of the C-EMP and have signed the protection of the environment commitment.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No-go areas (watercourses, perimeter buffers and archaeological site) have been identified and flagged.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Botanist has identified, photographed and tagged recommended plant species for rescue.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perimeter fence lines have been inspected and flagged where they intersect with buffer zones.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Location of work and lay-down areas have been demarcated, established and approved by the Supervising Engineer and ECO.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solid waste management systems are in place and approved by the Supervising Engineer and ECO.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Toilet facilities are in place and approved by the Supervising Engineer and ECO.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Telephone numbers of emergency services are available and on display on site.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All necessary fire-fighting equipment is on site and in good working order.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trained Safety and Fire Officers are appointed.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Complaints Register and Incident Logbook (Site Diary) on site.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Completed by:.......................... Sign:.......................... Date:..........................

DEA Reference: 12/12/2019
**DAILY CHECKLIST – CONSTRUCTION PHASE**

Contract: 

<table>
<thead>
<tr>
<th>ENVIRONMENTAL ASPECT</th>
<th>YES/ NO (✓ or X)</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proper measures are implemented to manage storm water run-off from site.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Erosion control measures are in place and are effective in controlling erosion.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Identified No-Go areas are respected and all fences are in good order and no transgressions occurred.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>There are no signs of trapping, snaring or animals being caught in fences.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Any animals found on site were either left to escape unassisted, or the faunal specialist / ECO was contacted and requested to translocate the animal. The animal was moved unharmed to the natural veld adjacent to the development.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Natural vegetation in buffer areas (perimeter buffer &amp; watercourses) and outside the immediate development footprint is intact and undisturbed.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Waste (solid and effluent) control and removal system are being maintained.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Portable toilets are being emptied and maintained in a proper manner.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Personnel are not washing or conducting acts of excretion and urination in areas not designated for this use.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All construction vehicles are in good working order and no leakages are visible.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drip trays are being utilised where there is a risk of incidental spillage of hydrocarbons.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oil spill kits are available and kept in good working order for emergency incidences.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

DEA Reference: 12/12/20/2019
| Basic fire-fighting equipment is available on site and to the satisfaction of Local Fire Services. |
| Emergency telephone numbers are displayed on site. |
| Access road form the R60 upgraded to maximum 4m width (and possibly paved). |
| Road safety and other measures are in place at intersection of access road with R60. |
| All public roads are cleared of mud and sand deposited by construction vehicles and equipment. |
| Noise Control measures are in place and are working effectively. |
| Construction activities are limited to the designated work area. |
| All construction and installation materials and equipment is stored safely and in the correct designated area. |
| Chemical and flammable substances area kept apart and stored separately in the necessary containers. |
| Any pre-warnings, non-conformances and spot fines have been recorded in the Log Book (Site Diary). |
| All incidents have been recorded in the Incident Logbook. |
| All complaints from personnel or the public have been recorded in the Complaints Register. |

Completed by:.......................... Sign:.......................... Date:..........................
## POST CONSTRUCTION CHECKLIST A

### No-Go areas, Plant and Animal Rescues, Site preparation, Earthmoving and installation of security fencing

**Contract:**

<table>
<thead>
<tr>
<th>ENVIRONMENTAL ASPECT</th>
<th>YES/ NO (✓ or X)</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identified Nc-Go archaeological area was fenced off.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other No-Go areas (perimeter buffer and watercourses) were respected and not damaged.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Identified sections of the farm perimeter fence were modified to allow for unharmed movement of animals.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fences blocking culverts at R60 (Stream 1 and Stream 2) were modified to allow free movement of animals through the culverts.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Animals were not harmed during this phase. If any accidents have taken place they have been recorded, and photographed by the faunal specialist / ECO.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Botanist has rescued and transplanted recommended plant species to the buffer areas – this should take place in Autumn or preferably Winter.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All alien invasive plants on site were identified and permanently removed.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internal roads were graded (to a maximum of 3m width) and constructed in accordance to plans.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Earthworks for the substation area (70m x 70m) completed. Any excess top soil, including seed bank, not required for the platform was stockpiled (and covered) for use to repair or rehabilitate other areas.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Earthworks for the dam safety repairs and construction of the spillway were completed to the satisfaction of the consulting engineer.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Existing water furrow was identified and flagged – any damage to the furrow was repaired to allow any runoff / water to flow freely.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**DEA Reference:** 12/12/20/2019
| Proper measures were implemented to manage storm water run-off from site in general, and substation area and roads in particular. |
| Water furrow exit points to dam and watercourses have proper water and energy dispersal mechanisms to prevent erosion. |
| Erosion control measures along roads are in place and are effective in controlling erosion. |
| Excess amount of dust was not created. Earthwork did not take place during strong winds. |
| Security fence was constructed along the R60, northern and southern boundaries of the PV plant development areas. Correct methods, material, height, type and colour were used for the fence. |
| Buffers of correct width were left between farm fence and security fence. Gaps in the fence and small holes, as indentified and placed by the faunal specialist, were left in the security fence to allow for the free movement of animals. |
| Waste (solid and effluent) control and removal system are in place and working. All construction waste, not removed for recycling was disposed of at the Worcester Regional landfill Site. |
| Inspect all locations where fuel (diesel, petrol or paraffin) and chemicals were stored – confirm that there is no pollution / spillage evident (sight or smell). |
| All public roads are cleared of mud and sand deposited by construction vehicles and equipment. |
| Any pre-warnings, non-conformances and spot fines have been recorded in the Log Book (Site Diary). |
| All incidents have been recorded in the Incident Logbook. |
| All complaints from personnel or the public have been recorded in the Complaints Register. |

Completed by:.......................... Sign:.......................... Date:..........................
POST CONSTRUCTION CHECKLIST B

Trenching and installation of electrical cabling, trimming of vegetation, construction of solar arrays, installation of solar PV panels, construction of inverter power stations, substation and security fencing

Contract:  

<table>
<thead>
<tr>
<th>ENVIRONMENTAL ASPECT</th>
<th>YES/ NO (✓ or X)</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trench lines for electrical cabling were surveyed and flagged.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Palaeontologist or suitably qualified ECO was on site to monitor earth works in the north-eastern section of the property,</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trenches were dug according to plan and to the correct depth. Topsoil was stockpiled separately from the deeper soil layers.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conduit piping was correctly installed across the Stream 1 and Stream 2 watercourses.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrical cabling was laid and the trenches were filled in and compacted correctly. Topsoil was used last.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The botanist identified vegetation identified for trimming and trained personnel with regards to correct method for trimming vegetation.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vegetation was manually trimmed (using petrol driven brush cutters) to the correct height and with the least disturbance to the surrounding vegetation.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mobile piling machine (on tracks or tyres) installed the vertical anchor beams directly into the soils and weather rocks, carefully avoiding unnecessary disturbance to the natural vegetation.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Array beams and support struts installed by hand with the least possible disturbance to the surrounding natural vegetation. Vehicle use was limited to the minimum.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solar PV panels are installed correctly.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>56 Inverter areas were excavated and 8m x 4m x 0.5m concrete foundations thrown using ready-mix concrete.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

DEA Reference: 12/12/2019
<table>
<thead>
<tr>
<th>Inverter powerstations installed and bolted onto the hardened concrete bases.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Substation constructed in accordance to plans. Ready-mix concrete supplied for the small concrete bases below electrical substation infrastructure. Cleared area around substation gravelled with 19 – 25 mm stone chip to a depth of 100mm. Substation fenced off to prevent unauthorised access.</td>
</tr>
<tr>
<td>ESKOM or project electrical engineers signed off the work, confirming construction and electrical system were completed to specification.</td>
</tr>
<tr>
<td>Visual impact of lighting at night is kept to a minimum in compliance with VIA recommendations. These include and are not limited to the use of shields, downlighters, use of minimum lumen lights, use of motion-detector lights etc</td>
</tr>
<tr>
<td>Security fence constructed along western side of the PV plant development areas. Gaps and holes as identified by faunal specialist / ECO were left to allow for the free movement of animals.</td>
</tr>
<tr>
<td>Gaps in the security fence closed (along the R60, northern and southern boundaries).</td>
</tr>
<tr>
<td>Small openings remain along the base of the fence (placed at regular intervals) for the free movement of small animals.</td>
</tr>
<tr>
<td>Excess amount of dust was not created. Earthworks did not take place during strong winds.</td>
</tr>
<tr>
<td>Waste (solid and effluent) control and removal system are in place and working. All construction waste, not removed for recycling was disposed of at the Worcester Regional landfill Site.</td>
</tr>
<tr>
<td>Inspect all locations where fuel (diesel, petrol or paraffin) and chemicals were stored – confirm that there is no pollution / spillage evident (sight or smell).</td>
</tr>
<tr>
<td>Construction, lay-down and worker areas are neat and clean.</td>
</tr>
<tr>
<td>All construction vehicles and equipment are removed from site.</td>
</tr>
</tbody>
</table>

DEA Reference: 12/12/20/2019
All temporary containers (fuel, water), site offices / housing and portable toilets removed from site and areas rehabilitated.

All public roads are cleared of mud and sand deposited by construction vehicles and equipment.

Any pre-warnings, non-conformances and spot fines have been recorded in the Log Book (Site Diary).

All incidents have been recorded in the Incident Logbook.

All complaints from personnel or the public have been recorded in the Complaints Register.

Completed by:.......................... Sign:.......................... Date:..........................
<table>
<thead>
<tr>
<th>ENVIRONMENTAL ASPECT</th>
<th>YES/ NO (✓ or X)</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Workers receive ongoing environmental awareness programmes.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No-go areas and buffer zones are being respected. Fences surrounding the archaeological no-go area are in good condition.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measures are in place to accommodate storm water run-off. Water furrows are in good order. No signs of erosion are present on the property. Describe measures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No sign of erosion along the drip lines of the PV panel arrays. Describe any effects created by the drip-line and make recommendations to minimise.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gravel roads in good condition. Describe any measures required.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water efficient systems are used for the cleaning of the solar PV panel faces. Describe systems.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy-efficient systems are used to minimize electricity usage.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Visual impact of lighting at night is kept to a minimum in compliance with VIA specialist's recommendations. These include and are not limited to the use of shields, downlighters, use of minimum lumen lights, use of motion-detector lights, etc</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Passive security systems and alarms are functional and in working order. No temporary or permanent security guards buildings are permitted without the local municipality’s approval.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Farm and security fences are in good repair and still allow animals to pass safely. Make further recommendation to ensure animals are not being harmed.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

DEA Reference: 12/12/20/2019
| Animal fatalities / mortalities are recorded (describe reason for fatality, photograph animal and context, record GPS position). Record to incident log. Make recommendations to reduce further fatalities if caused by the PV installation and related infrastructure. |
| No sign of trapping, snaring or hunting present on the property. |
| Install and monitor camera-traps at strategic position inside and outside the plant footprint to monitor fauna types and movement. Describe the species and number of animals so “captured”. |
| Road culverts under the R60 are kept clear of debris. Describe nature and volume of any debris. |
| Vegetation is being trimmed in an environmentally sensitive manner (to 0.5m). Describe any negative impact noted. |
| Identify and mark a monitoring plot below, in front and behind a PV panel array. Identify and mark a control plot of similar vegetation type and position outside of the development footprint. Record any changes in the vegetation and compare to the control plot. |
| Measures are implemented to keep the property free of alien invasive plants – there are no signs of invasive plants. |
| There is no evidence of dumping on the property. |
| Warning and other signage is in good order and clearly displayed. |
| Routine dam safety inspection held and on schedule. |
| Routine electricity safety inspection held and on schedule. |
| Contact numbers are on display from the roadside and are correct and operational. |
| All incidents have been recorded in the Incident Logbook. |
| All complaints from personnel or the public have been recorded in the Complaints Register. |

Completed by:.......................... Sign:.......................... Date:..........................

DEA Reference: 12/12/2019
ANNEXURE F

PRO FORMA: “PROTECTION OF THE ENVIRONMENT”
Protection of the Environment

(hereafter referred to as the Developer / Employer)

Contract No __________________________

Contract title __________________________

PROTECTION OF THE ENVIRONMENT

The Contractor will not be given right of access to the Site until this form has been signed

I/ we, ......................................................... (hereafter referred to as the Contractor) record as follows:

1. I/ we, the undersigned, do hereby declare that I/ we am/ are aware of the conditions stipulated in the environmental authorization issued by the Department of Environmental Affairs (DEA), dated ......................, as well as the increasing requirement by society that construction activities shall be carried out with due regard to their impact on the environment.

2. In view of the above mentioned conditions and requirements and in addition to complying with the letter of the terms of the Contract dealing with protection of the environment, I/ we will also take into consideration the spirit of such requirements and will, in selecting appropriate employees, plant, materials and methods of construction, in-so-far as I/ we have the choice, include in the analysis not only the technical and economic (both financial and with regard to time) aspects but also the impact on the environment of the options. In this regard, I/ we recognised and accept the need to abide by the “precautionary principle” which aims to ensure the protection of the environment by the adoption of the most environmentally sensitive construction approach in the face of uncertainty with regard to the environmental implications of construction.

3. I/ we acknowledge and accept the right of the Developer / Employer to deduct, should he so wish, from any amounts due to me/ us, such amounts (hereinafter referred to as fines) as the Environmental Control Officer shall certify as being warranted in view of my/ our failure to comply with the terms of the Contract dealing with protection of the environment, subject to the following:

3.1 The Environmental Control Officer, in determining the amount of such fine, shall take into account inter alia, the nature of the offence, the seriousness of its impact on the environment, the degree of prior compliance/non-compliance, the extent of the Contractor’s overall compliance with environmental protection requirements and, in particular, the extent to which he considers it necessary to impose a sanction in order to eliminate/reduce future occurrences

3.2 The Environmental Control Officer shall, with respect to any fine imposed, provide me/ us with a written statement giving details of the offence, the facts on which the Environmental Control Officer has based his assessment and the terms of the Contract (by reference to the specific clause) which has been contravened.

Signed ...........................................CONTRACTOR Date....................................

DEA Reference: 12/12/20/2019