

ENVIRONMENTAL MANAGEMENT PLAN/PROGRAMME

for the management of activities relating to the protection of the natural environment during the construction, operation, maintenance and demolition/decommissioning phases of

VISSERSPAN FARM NO. 40 SOLAR PHOTOVOLTAIC FACILITY - PROJECT 3

near Dealesville,
Tokologo Local Municipality,
Free State Province

SEPTEMBER 2020

Compiled by: **EnviroAfrica CC**

ENVIRONMENTAL ASSESSMENT PRACTITIONER INDEPENDENCE, CONDITIONS AND DETAILS

EnviroAfrica CC is an independent environmental consulting firm that has no interest in the proposed activity other than fair remuneration for services rendered. Remuneration for services is not linked to approval by decision making authorities and EnviroAfrica has no vested interest in secondary or subsequent development which may result from this project. There are no circumstances that compromise the objectivity of this EMPr.

The findings, results, observations and recommendations given here are based on the best scientific and professional knowledge available from information provided and verified, where required, by site visits.

EnviroAfrica reserves the right to modify aspects of this report, including the recommendations, if new information becomes available which may have a significant impact on the findings of this report.

This EMPr was prepared and compiled by Vivienne Thomson, the EAP for this project.

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Years Experience	Since 1999

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- Environmental contract management
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- Licence applications related to emissions, water use, waste discharge and waste sites
- On-site training and awareness interventions

EDUCATION AND MEMBERSHIPS

- BSc in Zoology, University of Cape Town (1995)
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- Environmental Management Plans/Programmes & Environmental Control or Site Officer during construction phase

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- BSc in Forestry (Nature Conservation) 1984
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January 1985 – June 1989	Cape Town Municipality (Nature Reserves)
December 1983 – January 1985	Department of Environmental Affairs, Indigenous Forest Section, Knysna

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1. INTRODUCTION

An Environmental Management Plan or Programme (EMPr) aims to identify actual and potential environmental impacts of the proposed activity and provide a tool to manage these impacts by:

- i. preventing avoidable damage and/or minimising or mitigating unavoidable environmental damage associated with any construction, operation, maintenance, or decommissioning work, where there is a risk of environmental damage and
- ii. enhancing positive impacts associated with the proposed project por activity.

The overall aim of the EMPr is to prevent avoidable damage and/or minimise or mitigate unavoidable environmental damage associated with the construction, and to a lesser degree the operational, phases of the proposed project.

The EMPr is partly prescriptive (identifying specific people or organisations to undertake specific tasks, in order to ensure that impacts on the environment are minimised) but it is also a dynamic, evolving document, in that information gained during the various activities and/or monitoring of procedures on site, could lead to changes in the EMPr.

1.1 TERMS OF REFERENCE

EnviroAfrica CC has been appointed by Ventura Renewable Energy (Pty) Ltd, to undertake the environmental impact assessment (EIA) application process for the development of a solar photovoltaic (PV) array on the Farm Visserspan No. 40, approximately 10km northwest of Dealesville and 68km northwest of Bloemfontein, in the Free State Province.

As part of the application for an environmental authorisation (EA), a basic assessment report (BAR) is required since, although the proposed development is for a large scale solar PV facility capable of generating of more than 20MW but less than 100MW of electricity, which would have normally required a scoping and full environmental impact report, the proposed development falls within renewable energy development zone 5 (REDZ 5) and therefore, GN. 350 of 2017 applies. This Environmental Management Plan/Programme (EMPr) is an appendix of the draft basic assessment report (DBAR) submitted as part of Ventura Renewable Energy (Pty) Ltd's application for environmental authorisation.

1.2 PURPOSE OF THE EMPr

The purpose of this Environmental Management Plan/Programme (EMPr) is to direct and guide all responsible parties, binding all contractors, sub-contractors and all other persons working on the site to adhere to the terms and conditions of the EMPr during the construction, operation, maintenance and anticipated demolition/decommissioning phases of the project. Any additional site specific conditions decided and agreed upon during the “On Site Start-Up Meeting” (OSSM), or any instruction given subsequent to commencement of the works by the regulating authority, must be included to become a part of the EMPr.

Thus , this EMPr forms part of the contractual obligations to which all persons including but not limited to, contractors/sub-contractors or employees involved in construction, operation, maintenance or decommissioning work, must be committed. It serves as a baseline information document for the project applicant and any entity working on behalf of the applicant during the various phases of the proposed activity.

It aims to comply with Section 24N of the National Environmental Management Act No. 107 of 1998, as amended (NEMA), as well as any additional specific information requested by any government department, including the regulating authority for this specific project, the national DEFF.

This EMPr:

- identifies project activities that could cause actual environmental damage (or potential environmental risks) and provides a summary of actions required;
- identifies persons responsible for ensuring compliance with the EMPr;
- provides standard procedures to avoid and/or minimise the identified negative environmental impacts and to enhance the positive impact of the project on the environment;
- provides site and project specific rules and actions required, including a site plan/s showing:
 - areas where construction, maintenance, or demolition work may be carried out;
 - areas where any material or waste may be stored;
 - allowed access routes, parking and turning areas for construction or construction related vehicles;
- forms a written record of procedures, responsibilities, requirements and rules for contractor/s, their staff and any other person who must comply with the EMPr;
- provides a monitoring and auditing programme to track and record compliance and identify and respond to any potential or actual negative environmental impacts; and
- provides a monitoring programme to record any mitigation measures that are implemented

1.3 SCOPE

The scope which is covered by this EMPr, includes the construction, operation and maintenance and eventual demolition/decommissioning (where required), phases of this development and all environmental activities associated with this project.

Compliance to the EMPr must be monitored by an independent Environmental Control or Site Officer (ECO or ESO) who will visit the site on a regular basis during the various phases of the activity (at least once monthly).

The Client, or the Construction Engineer or Project Manager on behalf of the Client, will be responsible to ensure adherence to and implementation of, the requirements of this EMPr by all involved/associated parties.

2. DEFINITIONS AND ABBREVIATIONS:

2.1 DEFINITIONS

Applicant: the person or responsible person from an organization who applied for the proposed activity described in the EA (or previously called RoD).

Audit: environmental evaluation (audit) of compliance of the specific project phase to the conditions of the EMPr.

Bund: enclosure under / around a storage facility to contain spillage.

Batch plant: a concrete or plaster mixing facility and associated equipment and materials.

Construction: means the construction period of the project, during which the actual works are carried out and includes site establishment, site preparation, the works, maintenance period and decommissioning and is defined as from commencement of site establishment until site handover (practical completion).

Construction site: means the area influenced and affected by the construction activities or under the control of the Contractor often referred to as “the Site”.

Construction Supervisor: the person responsible (appointed by the owner) to ensure that the construction is carried out to completion on time, within budget and that the Contractor fulfils his obligations in terms of the EMPr.

Contaminated water: means water contaminated by the Contractor's activities, e.g. concrete water and runoff from plant/ personnel wash areas.

Contractor: the principal persons / company and all other sub-contractors involved in the construction of the project.

Contractor's camp: means the designated and suitably demarcated areas on the Site within which all site offices and staff facilities are situated and within which equipment will be stored, for instance, borrow areas, batching plant, crusher plant, sand washing plant, workshop, offices, rest areas, ablution areas, etc., whichever is applicable.

Declaration of understanding: Form that is signed by all contractors involved in the construction works of their understanding and acceptance of the EMPr and site-specific additions to the EMPr.

Development site: boundary and extent of development works and infrastructure.

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

- the land, water and atmosphere of the earth;
- micro-organisms, plant and animal life;
- any part of the combination of the above two bullets and the interrelationships between them;
- the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being

Environmental Aspect: Any element of any construction activity, product or services that can interact with the environment.

Environmental Audit Report: report done by the ECO and submitted by the Applicant to the satisfaction of the Chief Directorate Environmental Affairs, within six months after construction has been completed and also after the site(s) has been rehabilitated.

Environmental Control Officer: The ECO must be independent and suitably qualified (a diploma or degree in environmental management with at least 5 or more years of environmental site management experience) and must have a sound knowledge of the environment in which the activity will take place.

Environmental Completion Statement: A report by the ECO to the relevant authorities stating completion of the project and compliance with the EMPr and its conditions.

Environmental Impact: Any change to the environment, whether adverse or beneficial, wholly or partially resulting from any construction activity, product or services.

Environmental Site Officer: The ESO must be an independent, suitably qualified and skilled person with a sound knowledge of the environment in which the activity will take place, as well as the requirements of the EA and EMPr. The ESO may be appointed by the ECO to conduct routine site inspections (more than once per month) and provide assurance that the conditions of the EA and EMPr are adhered to.

Method statement: A statement by the Contractor, describing the construction works step-by-step, in order for the ECO/ESO and Construction Supervisor to understand and comment on, the Contractors' intentions, so that they could assist with devising mitigating measures should it be necessary to avoid environmental impact.

No-Go Area/s: An area of such (environmental/aesthetical) importance that no person or activity are allowed within a designated boundary surrounding this area.

Owner: The owner, or dedicated person, responsible for the management of the property on which the proposed activity (in terms of the EA) will be performed.

Stop Works Order: An order which can be issued either by the ECO, ESO or Construction Supervisor to the Contractor (or any sub-contractor) if serious environmental damage is about to happen or is happening as a result of construction activities. On receiving such an order the Contractor must immediately stop all activities (or planned activities) relevant to the specific issue until an environmentally friendly resolution has been approved by the party issuing the stop works order.

Site meetings: Periodic (weekly or monthly) meetings between the ECO and/or , Construction Supervisor and Contractor to discuss construction activities that relate to the environment or any other environmental issues that might arise.

Works: The works to be executed in accordance with a contract.

On site start-up meeting: a start-up meeting held on site, before any construction has begun to discuss EMPr and determine site specific additions that will be included as the basis for the EMPr.

Potentially hazardous substance: is a substance which, by virtue of it's chemical constituents, physical properties or in the reasonable opinion of the Engineer, can have a deleterious (detrimental) effect on the environment.

Precautionary principle: means the basic principle, that when in doubt or having insufficient or unreliable information on which to base a decision, to then undertake actions that will have minimum risk.

Reasonable: means unless the context indicates otherwise, reasonable in the opinion of the Engineer/Project Leader after he has consulted with a person, not an employee of the client, suitably experienced in "environmental implementation plans" and "environmental management plans", both as defined in the NEMA.

Solid waste: means all solid waste, including construction debris, chemical waste, excess cement/concrete, wrapping materials, timber, tins and cans, drums, wire, nails, food and domestic waste (e.g. plastic packets and wrappers).

2.2 **ABBREVIATIONS**

CARA	Conservation of Agricultural Resources Act, No. 43 of 1983
DEFF	Department Environmental Affairs
DENC	Department of Environmental and Nature Conservation
DTEC	Department of Tourism, Environment And Conservation , Northern Cape Province
EA	Environmental Authorisation (previously called a Record of Decision) issued by the relevant competent authority for the authorisation to commence construction under certain environmental compliance conditions
EAP	Environmental Assessment Practitioner
ECA	Environmental Conservation Act, No. 73 of 1989
ECO	Environmental Control Officer - must be a suitably qualified independent environmental consultant appointed to ensure compliance to the EMPr
EIA	Environmental Impact Assessment
EMPr	Environmental Management Plan or Programme
ER	Engineers representative or main contractors representative
ESO	Environmental Site Officer - must be a person with adequate environmental knowledge to understand and implement the EMPr by conducting onsite inspections determined by the ECO and the client.
HCS/s	Hazardous Chemical Substance/s
MSDS/s	Material Safety Data Sheet/s
NCNCA	Northern Cape Nature Conservation Act, No. 9 of 2009.
NEMA	National Environmental Management Act, No. 107 of 1998.
NEM:AQA	National Environmental Management: Air Quality Act, No. 39 of 2004.
NEM:BA	National Environmental Management: Biodiversity Act, No. 10 of 2004.
NEM:PAA	National Environmental Management: Protected Areas Act, No. 57 of 2003
NEM:WA	National Environmental Management: Waste Act, No. 59 of 2008.
NFA	National Forest Act, No. 84 of 1998.
NHRA	National Heritage Resources Act, No. 25 of 1999.
NVFFA	National Veld and Forest Fire Act, No. 101 of 1998.
NWA	National Water Act, No. 36 of 1998
OSSM	On-site Start-up Meeting
SAHRA	South African Heritage Resources Agency

3. PROJECT LOCATION & DESCRIPTION

3.1 Activity Overview

The project is the establishment of an array of crystalline solar photovoltaic (PV) modules grouped into tables or panels of 20 modules each, together with associated infrastructure for the generation of between 75MW to approximately 100MW of electricity. The PV tables for Visserspan Solar PV Facility - Project 3 would form an array covering an area of not more than 222ha, surrounded by a perimeter fire access road and fence. This development footprint does not include evacuation powerlines and substation/s external to the 222ha site which will be dealt with in a separate environmental authorisation application.

The PV tables will be raised approximately 500mm above ground level and have single axis tracking systems allowing maximisation of solar energy harvesting for conversion to electrical energy. Similar solar PV arrays are depicted in Figure 1 below.



Figure 1: Single axis solar PV module tables raised 500mm above ground level (to a maximum tilt height of 3m). Proposed associated infrastructure includes a fenced construction staging area, a maintenance shed, inverter-transformer stations on concrete pads, office buildings and maintenance shed/s, a switch panel for connection to the power grid, all within the 222ha site.

It is proposed that the powerlines within the facility, as well as the approximately 22kV powerline/s used for evacuation of electricity from the solar PV facility to a proposed future substation of the far eastern corner of Project 2's site, be underground/sub-surface up until the point of tie-in to the proposed future substation. Although not part of this EIA, the proposed future substation will facilitate the connection of evacuated power to the national grid. Eskom's Perseus substation is located about 7km south-east of the proposed development site, as the crow flies but the length of the evacuation/tie-in power line (following the predetermined routes as negotiated with Eskom and landowners) must still be finalised.

Figure 2 below indicates the position of the proposed Visserspan Solar PV Facility - Project 3, relative to other proposed solar PV arrays on the Farm Visserspan (cumulative depiction should all the Visserspan Project be authorised and developed), as well as array relative to Eskom's existing high voltage power lines and Perseus substation.

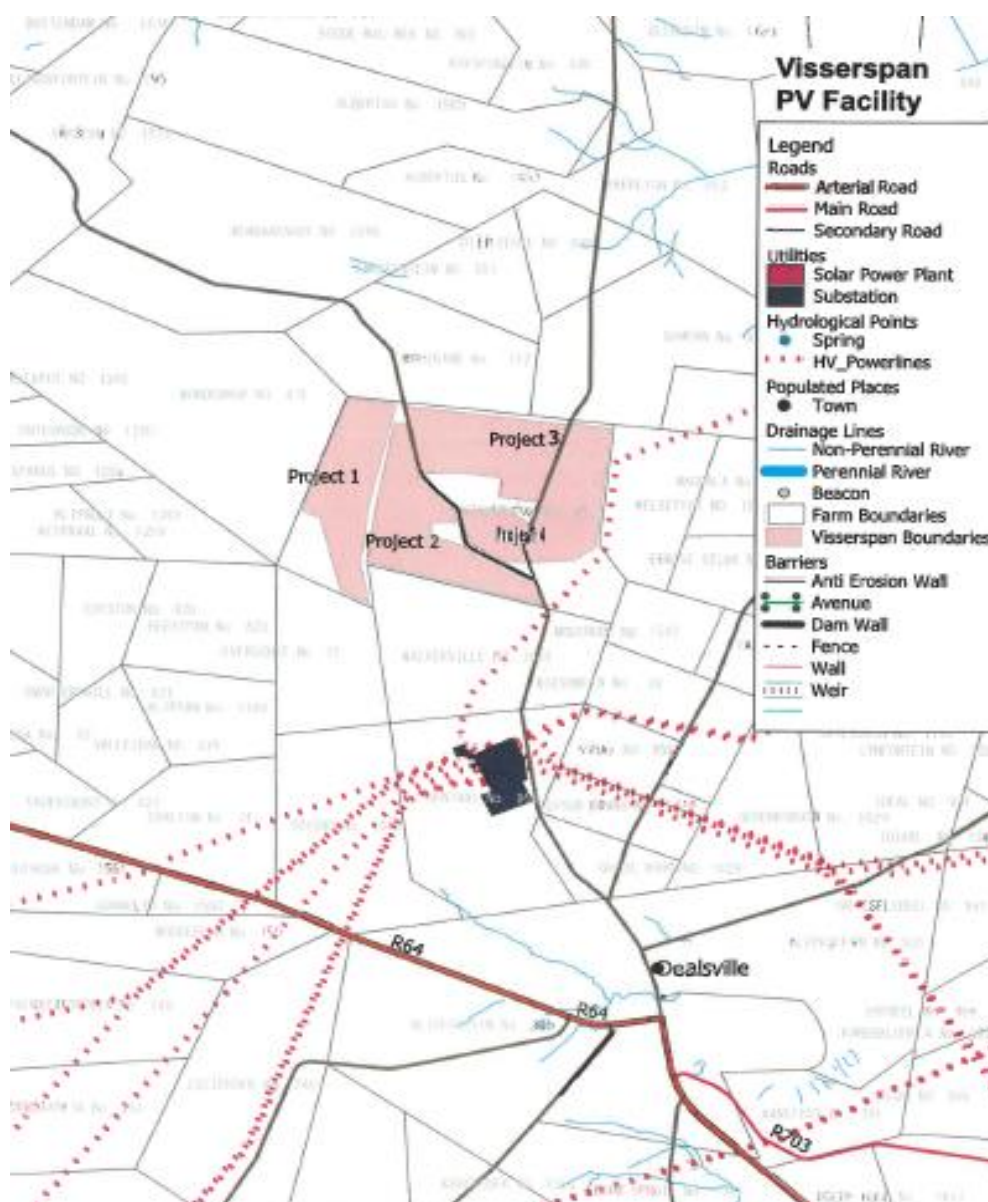


Figure 2: Indication of the proposed Visserspan Solar PV Facility - Project 3's position, relative to other proposed solar PV arrays on the Farm Visserspan (cumulative depiction should all the Visserspan Project be authorised and developed), as well as relative to Eskom's existing high voltage power lines and Perseus substation (closest substation to Visserspan Farm No. 40).

Refer to Appendix 13 for detailed A3 site specific layout, sensitivity overlay, status quo and regional maps.

3.2 Application Rationale

In March 2011, the Department of Energy's (DoE's) Integrated Resource Plan (IRP) 2010-2030 was promulgated with the aim of providing a long-term, cost-effective strategy to meet the electricity demand in South Africa. The IRP 2010-2030 objectives align with Government's in terms of reliable electricity

supply, as well as environmental and social responsibilities and economic policies. The study horizon for the IRP was the period from 2010 to 2030.

The short to medium term intentions of the IRP 2010 -2030 are to ascertain the most cost-effective electricity supply option for the country, speak to the opportunities for investment into new power generation projects and determine security of electricity supply.

The IRP's long-term electricity planning goal is to consider social, technical, environmental and economic constraints, as well as other externalities while ensuring sustainable development in the country.

To this end, within the IRP, the DoE set a target electricity supply of 17.8 GW from renewable energy sources by 2030. This target renewable energy capacity would be produced primarily by solar, wind, biomass and small-scale hydro electricity generation (with the bulk being met by wind and solar energy supplies). In addition, the 2030 target ensures that approximately 42% of the country's total estimated electricity generation capacity would be met by renewable energy sources. This application is in response to the DoE's target and IRP 2010-2030 strategy to expand the South African renewable energy electricity generation capacity.

3.3 Activity Description

The project is the establishment of an array of crystalline solar photovoltaic (PV) modules grouped into tables or panels of 20 modules each, together with associated infrastructure for the generation of between 75MW to approximately 100MW of electricity. The PV tables for Visserspan Solar PV Facility - Project 3 would form an array covering an area of not more than 222ha, surrounded by a perimeter fire access road and fence. This development footprint does not include evacuation powerlines and substation/s external to the 222ha site which will be dealt with in a separate environmental authorisation application.

Proposed associated infrastructure to be built on the 222ha footprint site includes a fenced construction staging area, a few maintenance sheds, inverter-transformer stations on concrete pads, a switch panel for connection to the power grid and an office with septic tank ablutions. The three-phase, 22kV, electricity evacuation power lines is proposed to run along a predetermined servitude to connect with the existing Eskom transmission lines to the east of the Farm Visserspan *en route* to Eskom's Perseus substation.

Although not part of this application process, the evacuation powerlines are proposed to be subsurface (underground) powerlines until they connect with a proposed substation to be located within Visserspan

- towards the eastern boundary of the Farm Visserspan No. 40. From the substation which will probably be situated immediately adjacent to the existing Eskom high voltage (HV) powerline servitude on the farm Melsetter. It is proposed that the powerlines run above-ground within the Eskom HV servitude for tie in with the national grid. It should be reiterated that the HV lines and substation are not being applied for in this application process but will be handled as a separate independent application, once routes have been finalised with Eskom. Electricity is evacuated from a solar PV facility in MWac (alternating current) with the solar PV facility capacity rating being in direct current and measured as a peak value under optimal conditions i.e. MWp. The maximum generation capacity of the facility is approximately not more than 100MW. Solar PV farms produce electricity in direct current which must be converted into alternating current and transformed into the correct voltage before it can be fed into the national grid. This conversion is done by inverters and transformers which are part of the abovementioned infrastructural development of the project

According to the regulations of Section 24(5) of NEMA, authorisation is required for the following listed activities:

NEMA, EIA Regulations Listing Notice 1 of 2014 (GN. R. 327):

Note: All internal powerlines for evacuation from, or supply to the facility must be sub-surface lines.

Activity No. 14:

The development of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres (m^3) or more but not exceeding 500 m^3 .

Note: The proposed facility will utilise a battery storage system to ensure reliability of supply considering the fluctuating power output of a solar PV system. Batteries may be defined as 'dangerous goods' as per South African National Standards (SANS) 10234 due to the toxicity of their contents e.g. vanadium redox or lithium-ion batteries) and/or the flammability of the batteries.

NEMA, EIA Regulations Listing Notice 2 of 2014 (GN. R. 325)

Activity No. 1:

The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20MWs or more.

Activity No. 15:

The clearance of an area of 20ha or more of indigenous vegetation.

NEMA, EIA Regulations Listing Notice 3 of 2014 (GN. R. 324)

Activity No. 2:

The development of reservoirs, excluding dams, with a capacity of more than 250m³.

b. Free State

ii. Outside urban areas:

(dd) Critical biodiversity areas (CBAs) as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans

Note: The construction and effective operation of the proposed solar PV facility will require cleaning and maintenance (periodic washing) of the PV panels. It is not known if water will be supplied directly from the existing borehole on site, or if water will be stored in reservoirs/tanks at various points in the proposed facility to service the facility. According to the South African National Biodiversity Institute's (SANBI's) Biodiversity Geographic Information System (BGIS), parts of the proposed development footprint occur within a CBA and an ESA.

Activity No. 4:

The development of a road wider than 4 metres (m) with a reserve of less than 13,5m.

b. Free State

ii. Outside urban areas:

(ee) CBAs as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans

Activity No. 10:

The development of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 30m³ or more but not exceeding 80m³.

b. Free State

ii. Outside urban areas:

(ee) CBAs as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans

Activity No. 12:

The clearance of an area of 300m³ or more of indigenous vegetation.

b. Free State

- ii. Within CBAs identified in bioregional plans;*
- iv. Areas within a watercourse or wetland; or within 100m from the edge of a watercourse or wetland*

Activity No. 14:

The development of;

- (ii) infrastructure or structures with a physical footprint of 10m² or more;*

where such development occurs;

- (c) if no development setback exists, within 32m of a watercourse, measured from the edge of a watercourse;*

b. Free State

- i. Outside urban areas:*
 - (ff) CBAs or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans.*

4. APPLICABLE LEGISLATION

Constitution of the Republic of South Africa (1996): of special relevance in terms of environment is section 24

Conservation of Agricultural Resources Act 43 of 1983 (CARA): supports conservation of natural agricultural resources (soil, water, plant biodiversity) by maintaining the production potential of the land and combating/preventing erosion; for example, by controlling or eradicating declared weeds and invader plants.

Hazardous Substances Act 15 of 1973: to control substances that may cause injury, ill-health, or death through their toxic, corrosive, irritant, strongly sensitizing or flammable nature, or by the generation of pressure

National Environmental Management Act 107 of 1998 (as amended): replaces the Environmental Conservation Act (ECA) and establishes principles for decision-making on matters affecting the environment, and for matters connected therewith.

- **Environmental Impact Assessment Regulations:** identifying activities (listed activities) for which environmental authorisation must be obtained.

National Environmental Management: Air Quality Act 39 of 2004 (NEMAQA): replaces the Atmospheric Pollution Prevention Act (No. 45 of 1965).

National Environmental Management: Biodiversity Act 10 of 2004 (NEMBA): supports conservation of plant and animal biodiversity, including the soil and water upon which it depends.

- **National list of ecosystems that are threatened and in need of protection** (GN 1002 of 9 December 2011).

National Environmental Management: Protected Areas Act 57 of 2003 (as amended Act 31 of 2004) (NEMPAA): To provide for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes.

National Environmental Management: Waste Act 59 of 2008 (NEMWA): To reform the law regulating waste management in order to protect health and the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development.

- **List of Waste Management Activities that have, or are likely to have a detrimental effect on the environment:** Identifies activities in respect of which a waste management license is required.

National Forests Act 84 of 1998 (as amended): supports sustainable forest management and the restructuring of the forestry sector.

- **List of protected tree species** (GN 716 of 7 September 2012)

National Heritage Resources Act 25 of 1999: supports an integrated and interactive system for the management of national heritage resources, including supports soil, water and animal and plant biodiversity.

National Veld and Forest Fire Act 101 of 1998 (NVFFA): protects soil, water and plant life through the prevention and combating of veld, forest, and mountain fires

National Water Act 36 of 1998 (NWA): promotes the protection, use, development, conservation, management, and control of water resources in a sustainable and equitable manner.

Northern Cape Nature Conservation Act 9 of 2009 (NCNCA): which provides for the sustainable utilization of wild animals, aquatic biota and plants.

- Schedule 1 – 3 listing protected and specially protected species for which authorisation must be obtained if they are to be impacted upon.

5. SITE SPECIFIC ENVIRONMENTAL CONCERNS

The purpose of this section of the EMPr is to discuss possible significant environmental impacts that may be encountered. In other words, this section aims to give site specific guidance for impact minimisation in the context of the proposed development.

5.1 VEGETATION ENCOUNTERED

According to the botanical biodiversity survey done towards the end of 2018 and reported on by the botanical specialist early in 2019 (Appendix G1), only one indigenous vegetation type, Vaal-Vet Sandy Grassland, occurs on Farm Visserspan No. 40. Nonetheless, a small deviation from this occurs in the southwest corner of the farm, where trees of *Vachellia karoo* (*Acacia spp.* commonly known as sweet thorn trees) are present. The botanical specialist, Dave MacDonald, identified this area as a 'no-go' area. The south western corner of the farm was, therefore, excluded from potential land to be considered for placement of Visserspan Solar PV Facility (specifically Project 3's) development footprint.

The above-mentioned botanical scan determined the:

- (i) vegetation type/s and condition;
- (ii) veracity of the existing CBA (conservation status) map;
- (ii) sensitivity of the vegetation and
- (iv) areas that could be considered for the construction of a PV facility.

Owing to the widespread occurrence of the principal vegetation type, Vaal-Vet Sandy Grassland, it is the botanical specialist's view that although this vegetation type is classified as endangered it is not considered to be sensitive at Visserspan due to overgrazing, historical cultivation and large areas of degradation which were evident.

Although the BGIS maps included in Appendix B (Sensitivity Maps) indicate that almost all of the development footprint proposed for Project 3 is a CBA 1 area, a site visit to 'ground-truth' the critical biodiversity area (CBA) database classification with the actual site, caused the botanical specialist to "*question the CBA 1 classification imposed on parts of the farm*" and to "*contend that the ESA areas and degraded areas are incorrectly mapped*".

Vaal-Vet Sandy Grassland (Gh10) is listed as an endangered ecosystem in the National List of Threatened Ecosystems (Government Gazette, 2011). The professional opinion of the specialist is that, except for the no-go area in the south western corner of the farm, the areas around the existing

farmhouse and the watercourses i.e. pans with a 32m buffer zone around them, the rest of the Farm Visserspan No. 40 “could all be considered for the construction of solar PV infrastructure”.

Figure 3 below indicates the facility layout superimposed on the site’s sensitivity layers.

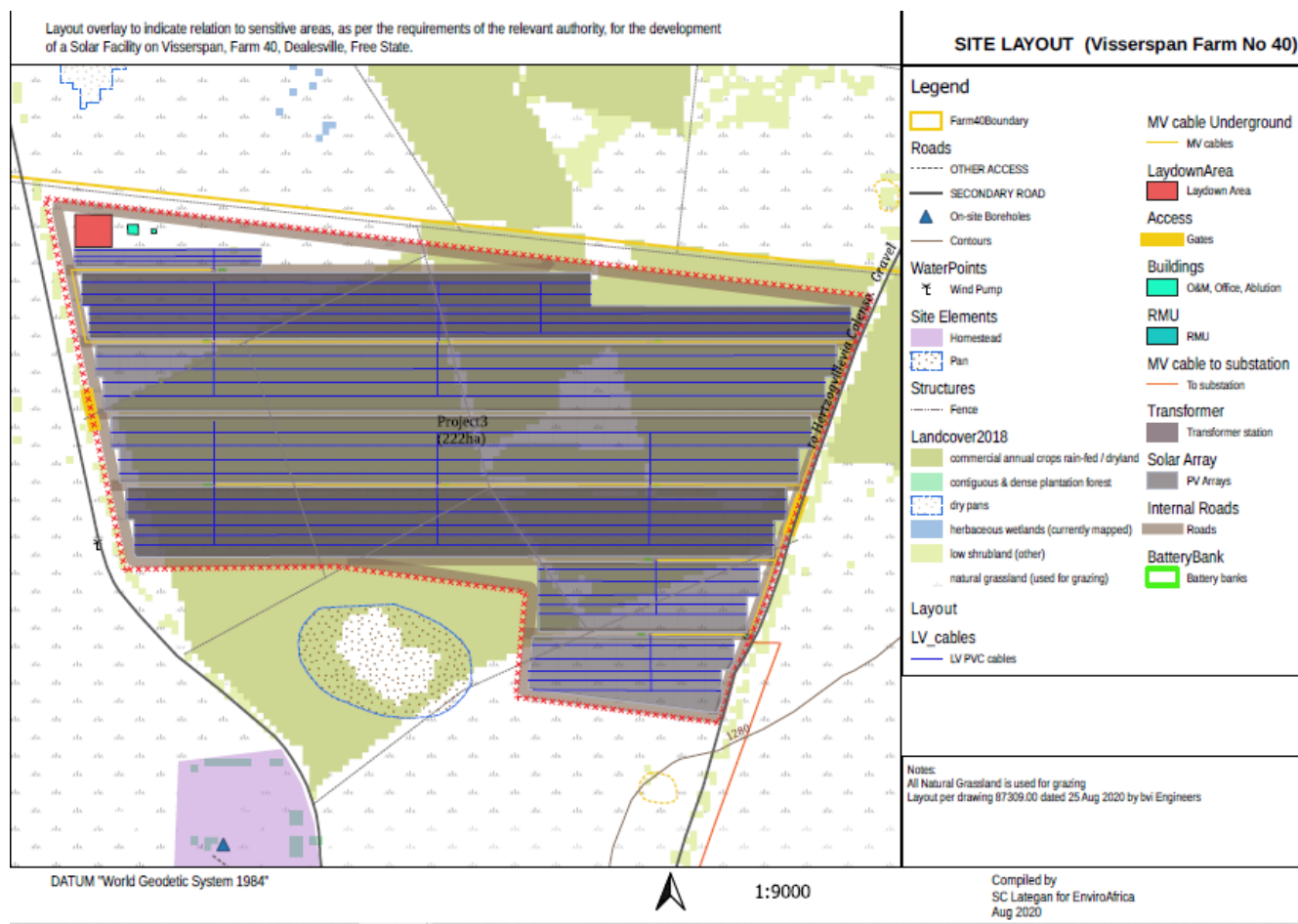


Figure 3. Site layout and sensitivity map.

Refer to Appendix 13 for detailed A3 site specific layout, sensitivity overlay, status quo and regional maps.

BGIS maps do not indicate that the site falls within any formal or informal protected areas which concurs with the findings of Appendix G3c (Visual Impact Assessment Report) which states that the nearest provincial nature reserves are Soetdoring Nature reserve (35km from proposed development site) and Sandveld Nature reserve 85km from proposed development site).

There are, therefore, no reserves within potential viewshed area.

5.2 CRITICAL BIODIVERSITY AREAS

At present there are not fine scale conservation maps for the Lejweleputswa District Municipality available. Underneath is a short summary of typical biodiversity categories used.

5.2.1 Biodiversity categories for land-use planning

Critical biodiversity areas (CBA's) are terrestrial and aquatic features in the landscape that are critical for retaining biodiversity and supporting continued ecosystem functioning and services (SANBI 2007). The primary purpose of CBA's is to inform land-use planning in order to promote sustainable development and protection of important natural habitat and landscapes. CBA's can also be used to inform protected area expansion and development plans. The CBA's underneath is based on the definition laid out in the guideline for publishing bioregional plans (Anon, 2008):

- **Critical biodiversity areas (CBA's)** are areas of the landscape that need to be maintained in a natural or near-natural state in order to ensure the continued existence and functioning of species and ecosystems and the delivery of ecosystem services. In other words, if these areas are not maintained in a natural or near-natural state then biodiversity conservation targets cannot be met. Maintaining an area in a natural state can include a variety of biodiversity-compatible land uses and resource uses.
- **Ecological support areas (ESA's)** are areas that are not essential for meeting biodiversity representation targets/thresholds but which nevertheless play an important role in supporting the ecological functioning of critical biodiversity areas and/or in delivering ecosystem services that support socio-economic development, such as water provision, flood mitigation or carbon sequestration. The degree of restriction on land use and resource use in these areas may be lower than that recommended for critical biodiversity areas.

From a land-use planning perspective it is useful to think of the difference between CBA's and ESA's in terms of where in the landscape the biodiversity impact of any land-use activity action is most significant:

- For CBA's the impact on biodiversity of a change in land-use that results in a change from the desired ecological state is most significant locally at the point of impact through the direct loss of a biodiversity feature (e.g. loss of a populations or habitat).
- For ESA's a change from the desired ecological state is most significant elsewhere in the landscape through the indirect loss of biodiversity due to a breakdown, interruption or loss of an ecological process pathway (e.g. removing a corridor results in a population going extinct elsewhere or a new plantation locally results in a reduction in stream flow at the exit to the catchment which affects downstream biodiversity).

5.2.2 Potential Critical Biodiversity Areas encountered

Large portion of Visserspan Farm fall into either CBA or ESA areas. Although the Vaal-Vet Sanday Grassland is classified as endangered according to the NEM:BA, it is not considered to be sensitive at Visserspan due to overgrazing, historical cultivation and large areas of degradation which were evident.

It is considered highly unlikely that the proposed footprint will fall within any CBA or ESA on strength of its floristic value. Although it has potential connectivity value, the small size of the proposed footprint is unlikely to have any significant impact on connectivity.

5.3 HERITAGE ASSESSMENT

Archaeological:

A field assessment by Jonathan Kaplan of ACRM of the proposed Visserspan Solar PV Facility took place between the 30th of November and the 3rd December 2019.

A field survey revealed the following results for Solar PV Project 3:

A broken grindstone fragment near the north western boundary fence;

In terms of the total Visserspan Farm property, the archaeological impact assessment further states that, “archaeological resources have been rated as having LOW (Grade IVC) significance since, generally, relatively small numbers of archaeological remains were found in other areas of the farm (not part of Project 3’s site) and were isolated and were found in a disturbed context.

No evidence of any Late Iron Age archaeological heritage was noted during the field assessment, which appears to be absent from the study area.

No evidence of any Anglo-Boer War battlefield sites (1899-1904), war graves or memorials were encountered during the study”.

Please note that:

1. No mitigation of archaeological resources is required is required prior to construction activities commencing.
2. Historic (c. 1899), calcrete and clay, sheep and cattle enclosures within the farm werf must not be disturbed, damaged or altered in any way by development activities. The structures are protected under Section 34 of the National Heritage Resources Act (No. 29 of 1999) and cannot be disturbed in any way without a permit issued by SAHRA.
3. If any human burials are uncovered during construction activities then work in the immediate area should be halted. The find would need to be reported to the heritage authorities and will require inspection by a professional archaeologist.

Palaeontological:

On 11 January 2020, John Almond of Natura Viva CC and an experience field assistant undertook the palaeontological impact assessment of the proposed development site.

According to the specialist palaeontological impact assessment report attached as Appendix G3b, it was “concluded that the palaeontological sensitivity of the solar PV project area on Farm Visserspan No. 40 near Dealesville is low. Anticipated impacts on local palaeontological heritage resources from the construction phase of the developments are accordingly also of LOW SIGNIFICANCE.

This applies equally to all four of the proposed solar PV facilities whose cumulative impact significance would also be LOW.

No further significant impacts are expected during the operational and decommissioning phases of the developments.

There are no fatal flaws in the development proposals”.

The palaeontological specialist further states that provided that the recommended mitigation measures as detailed in the Palaeontological Impact Assessment Report (as per Appendix G3b) are fully implemented, there are no objections on palaeontological heritage grounds to authorisation of the proposed Visserspan Solar PV Facility.

Visual:

Sarien Lategan was appointed to undertake the visual impact assessment for the Visserspan PV Facility, Project 3, near Dealesville, Free State. The term visual and aesthetic is defined to cover the broad range of visual, scenic, cultural, and spiritual aspects of the landscape. It also includes the impact on ‘sense of place’ of the area.

At the time of assessment, detail regarding the exact technology and site layout was not yet available. The most probable technology would be Single axis tracking PV arrays, with an assumed maximum vertical height of 3m. Should a different technology thus been decided on which involve smaller units, the visual impacts will certainly be less than what is assessed in this report.

The viewshed of the site is limited by the topography which is characterized by low undulating rises and valleys which created a medium level of visual absorption. Due to the low vertical extent of the proposed development, this absorption rate is sufficient to reduce the viewshed for the particular project proposal.

An assessment of the potential visual receptors through the use of landscape profiles coupled with on-site verification was undertaken. The visual receptors in the area are of medium to low sensitivity. The

assessment finds that the overall visual impact of the proposed Project 3 of the Visserspan PV facility holds a low overall visual impact. For this reason, no mitigation measures are required.

Due to the fact that a number of PV facilities have been approved to the south of Project 3, the project does contribute to the cumulative impact specifically to spatial crowding. The pro rate contribution to the overall number of approved projects is however low. Since no thresholds have been determined on a regional level it is not appropriate to assess the impact on landscape change.

The proposed site is situated in a rural area with natural *Acacia spp.* trees, as well as planted alien invasive (*Eucalyptus spp.*) vegetation. The area displays a rural character with low intensity farming, game farming and natural areas. The Eskom (Perseus) substation is in relative close proximity to the site and an HV power line servitude runs to the east of the Farm Visserspan No. 40 towards Perseus substation in the south.

<p>NOTE: All mitigations and recommendations from specialists as included in the Basic Assessment Report (Appendix G) for this project must be adhered to.</p>

6. RECOMENDATIONS

The following are site specific recommendations, as per the various specialist assessments of the project. Please note that if there is any contradiction between the following specialists recommendations and/or the conditions of the Environmental Authorisation, and the recommendations in Section 7 and 8 below, the Environmental Authorisation and specialist recommendations take precedent.

6.1 **RECOMMENDATIONS ON IMPACT MINIMISATION**

- The construction and operational phase of the project must be done in accordance with this environmental management programme, the aim of which is, to minimise environmental impact during the construction and operational phases.
- A suitable qualified ECO must be appointed to oversee the construction phase.

Biodiversity:

There are numerous possibilities for mitigation measures to lessen the direct impact during construction and even operation. The construction areas must be clearly demarcated and must aim for the absolute minimum disturbance footprint.

- An ecological survey of the site prior to construction in terms of protected and/or endangered faunal and floral species must be undertaken to ensure that the relevant ecologist/biodiversity specialist (including flora, fauna and avifauna expertise) will be able to develop an adequate search and rescue plan, or a management plan in terms of alien plant species, if required.
- All construction must be done in accordance with an approved construction and operational phase Environmental Management Plan (EMP), which must be developed by a suitably experienced Environmental Assessment Practitioner.
- A suitably qualified Environmental Control Officer must be appointed to monitor the construction phase in terms of the EMP and the Biodiversity study recommendations as well as any other conditions pertaining to other specialist studies and requirements of the DESTEA, DAFF or DEFF.
- **Permits must be obtained in terms of the NFA and NEMBA**, for the removal of any protected species, should any be found on site.
- Before any work is done the footprint must be clearly demarcated. The demarcation must aim at minimum footprint and minimisation of disturbance.
- Topsoil (the top 15-20 cm) must be removed and protected and re-used for rehabilitation purposes of suitable areas on site or within the immediate surroundings (Seedbed protection).
- Before construction the footprint must be scanned by a botanist or suitably qualified ECO in order to identify the plants listed for Search & Rescue. The Botanist must advise on the best way for search & rescue and must also take the following into account:

- These plants must be transplanted outside of the disturbance footprint, but within the same vegetation type (preferably the immediate surroundings of the site).
 - A watering program must be implemented for transplanted plants.
- All efforts must be made to protect all mature indigenous trees that might be encountered.
- Lay-down areas or construction camp sites must be located within areas already disturbed or areas of low ecological value and must be pre-approved by the ECO.
- Indiscriminate clearing of any area outside of these footprints may not be allowed.
- Alien invasive plant species must be removed from within the construction footprint (including laydown areas etc.). Follow up work must be carried out throughout the construction phase to ensure that no invasive alien plant re-establishes itself.
- All construction areas must be suitably rehabilitated on completion of the project.
 - This includes the removal of all excavated material, spoil and rocks, all construction related material and all waste material.
 - It also included replacing the topsoil back on top of the excavation as well as shaping the area to represent the original shape of the environment.
 - All absolute aboveground infrastructure associated with the site must be removed.
- An integrated waste management approach must be implemented during construction.
 - Construction related general and hazardous waste may only be disposed of at Municipal approved waste disposal sites.
 - Clean spoil from excavation work must be used as fill where possible.
 - All rubble and rubbish must be collected and removed from the site to a Municipal approved waste disposal site.

Heritage

In the event that indicator(s) of heritage resources are identified, the following actions must be taken immediately:

- All construction within a radius of at least 20m of the indicator must cease. This distance should be increased at the discretion of supervisory staff if heavy machinery or explosives could cause further disturbance to the suspected heritage resource.
- This area must be marked using clearly visible means, such as barrier tape, and all personnel must be informed that it is a no-go area.
- A guard should be appointed to enforce this no-go area if there is any possibility that it could be violated, whether intentionally or inadvertently, by construction staff or members of the public.

- Should any evidence of archaeological or palaeontological sites or remains (e.g. unmarked human burials/remains, ostrich eggshell fragments/water flask caches, remnants of stone-made structures, indigenous ceramics or charcoal and ash concentrations) be uncovered or exposed during construction activities, these must immediately be reported to the archaeologist (Jonathan Kaplan 082 321 0172), or the South African Heritage Resources Agency Archaeology, Palaeontology and Meteorites (SAHRA APM) Unit (Natasha Higgitt/John Gribble 021 462 5402).
- If unmarked human burials are uncovered the SAHRA Burial Grounds and Graves Unit (Mimi Seetelo 021 320 8490) must immediately be alerted. Burials must not be removed or disturbed until inspected by the archaeologist and SAHRA BGG Unit.
- No measures must be taken to cover up the suspected heritage resource with soil, or to collect any remains such as bone, ceramics or stone.
- The South African Police Services must be notified by a SAHRA staff member or an independent heritage practitioner if human remains are identified. No SAPS official may disturb or exhume such remains, whether of recent origin or not.
- All parties concerned must respect the potentially sensitive and confidential nature of the heritage resources, particularly human remains, and refrain from making public statements until a mutually agreed time.

6.2 ENVIRONMENTAL AUTHORISATION

Please ensure that the DEFF confirm their approval of this project in writing and that a copy of the EA is always on site during construction.

7. CONSTRUCTION PHASE EMPr

7.1.1 Structure and Responsibility

Implementation of the EMPr and environmental control and management of the construction phase will be achieved through the responsibility structure set out below. The role players include the Owner, the Construction Supervisor, the Environmental Control Officer (ECO), the Environmental Site Officer (ESO) if so appointed by the ECO, and the Contractor. All role players must familiarise themselves with the requirements of the EMPr.

7.1.2 The client / applicant / owner

The client (or the designated responsible person appointed by him) is responsible for:

- appointing a suitably experienced ECO, the Construction Supervisor and the Contractor for the duration of the construction contract, and
- ensuring that the Construction Supervisor and Contractor fulfil their obligations in terms of this EMPr.

7.1.3 The Construction Supervisor

The Construction Supervisor is responsible to ensure that the construction is carried out to completion on time, within budget and that the Contractor fulfils his obligations in terms of the EMPr. In addition, the Construction Supervisor and the ECO/ESO are expected to develop a close working relationship and to stay in contact with each other.

The responsibilities of the Construction Supervisor include:

- To issue site instructions to the Contractor.
- To serve as conduit for all communication between the ECO/ESO and the Contractor [The only exception is where the ECO, ESO or the Construction Supervisor needs to issue a “**STOP WORKS**” order on the contractor if serious environmental harm is about to happen or is happening as a result of construction activity. The “STOP WORKS” order must be confirmed by the other party as soon as reasonably possible].
- Discussing any problems that might lead to environmental damage with the ECO/ESO.
- When the ECO/ESO is not on site the Construction Supervisor will be responsible for the implementation of the EMPr.

7.1.4 The contractor

The Contractor shall be responsible to:

- ensure that all sub-contractors, employees, suppliers, agents etc. are fully aware and adhere to the environmental conditions detailed in the EMPr;
- liaise closely with the Construction Supervisor and the ECO;
- ensure that works on the site are conducted in an environmentally sensitive manner and in full accordance with the EMPr;
- carry out instructions issued in the site instruction book;
- assist with solutions to environmental problems that may arise during the construction phase; and

- ensure that all “**No-Go**” areas are adequately fenced off.
- will report any deviation from the requirements of this EMPr to the Principal Agent, and any pollution or environmental contaminant spill events.
- agrees to work stoppage and/or payment of penalties as required by this EMPr and directed by the ECO/Construction Supervisor.
- agrees bear full costs for any work stoppage resulting from contravention of the requirements of this EMPr, and/or the costs of remedying environmental damage resulting from their or their sub-contractors or employee’s contravention of the requirements of this EMPr.

NB: All contractors must sign the “Declaration of Understanding” appended to this EMPr before construction commences.

7.1.5 The Environmental Control and/or Site Officer (ECO/ESO)

ECO will be responsible for overseeing the environmental aspects of the Construction phase and will work in close co-ordination with the Construction Supervisor. The ECO may appoint an ESO to undertake more regular site inspections and EMPr compliance evaluations as the development may require.

7.1.5.1 ECO and ESO qualifications

The ECO must be independent and suitably qualified (a diploma or degree in environmental management with at least 5 or more years of environmental site management experience) and must have a sound knowledge of the environment in which the activity will take place. The ECO or company which the ECO represents should be/have a registered Environmental Scientist in terms of section 20(3) of the Natural Scientific Professions Act 27 of 2003.

ESO must be an independant, suitably qualified person appointed by the ECO, with adequate environmental knowledge to understand and implement the EMPr by conducting onsite inspections determined by the ECO and the client. The ESO’s inspections and finding will be overseen/verified by the ECO.

7.1.5.2 ECO duties

An ECO must be appointed for the duration of the construction phase (as required by the EA). The ECO:

- will be primarily responsible for ensuring the implementation of the EMP and will perform regular site inspections/audits with the specific aim to ensure environmental conformance by the Contractor;
- to visit the site on a regular basis while construction is in progress;
- will keep environmental records (including photographs) of the construction activities;
- must ensure that “No-Go” and “Open Space” areas are adequately protected and adhered to;
- must approve and be present during the demarcation of the necessary areas for storage of materials, ablutions, eating areas of contract workers etc.;
- to conduct a start-up meeting before construction commences and will provide environmental training at the beginning of the project and will provide environmental awareness training throughout the life of the project;
- must be informed of site and technical meetings to be able to comment and report on environmental issues;

- will call for, and approve, method statements for construction activities that might pose an environmental impact and must ensure that method statements are approved before commencement of the work;
- must implement immediate mitigating action in the case of critical environmental impacts
- must deal with public complaints/queries regarding environmental issues;
- will record his findings and all environmental non-conformances in an environmental completion report (which will be forwarded to the Client and the Construction Supervisor);
- will conduct a closing down visit ASAP after completion of the Development;
- will commission an independent Environmental Compliance Audit within 6 months after completion of the contract.

7.1.5.3 ECO/ESO Authority

The ECO/ESO has the authority to stop works if there is a serious threat to or impact on, the environment as a direct cause of construction. However, this authority is limited only to emergency situations where immediate consultation with the Construction Supervisor is not possible.

- The ECO/ESO is to inform the client/developer and site representative of the reasons for the stoppage as soon as possible. A relevant reason must be supplied as soon as possible after stoppage of such works.
- Upon failure by the contractor or his employee to show adequate consideration to the environmental aspects of this contract i.e. wilful destruction of the environment, the ECO may recommend to the client/developer or site representative to have the contractor's representative or any employee(s) removed from the site or work suspended until the matter is remedied.
- No extension of time will be considered in the case of such suspensions and all costs will be borne by the contractor

7.1.6 Health & safety officer:

A health & safety (H&S) officer for the project must be designated or appointed by the Contractor or Principal Agent, and his/her role is to support the successful implementation of the EMP through:

- Site evaluation on a regular basis.
- Identifying issues relating to day to day construction activities and that can have a detrimental effect on the environment.
- Subcontractor audits to ensure compliance.
- Assist in the direct implementation of the EMP.
- Ensure that the requirements of the EMP are communicated understood by personnel on site via induction sessions.
- Ensure that the contractors on site develop, implement and monitor the required H&S management functions.
- Evaluate the applicability and accuracy of the EMP and the method statements throughout the construction phase.
- Coordinate all statutory requirements including permit authorisation and license requirements.
- Conduct or have conducted a hazard analysis and take the necessary corrective action.
- Where it is not possible to remove any remaining hazard's to inform employees thereof and what precautionary action is to be taken.
- Detail mitigation measures required to be taken, and the procedures for their implementation to the project manager.
- Representing H&S issues at the production meetings.
- Coordinate H&S training of personnel.
- Coordinating spill response personnel.

- The H&S officer shall inspect the integrity of the hazardous waste containers/bins/skips on a weekly basis.

7.1.6.1 Health & Safety Officer qualifications

The Health and Safety Officer must be independent and suitably qualified, with a sound knowledge of the Occupational Health & Safety Act (Act no. 85 of 1993), and must have experience of the implementation of the act with regards to the construction and environmental environments in which the activity will take place.

7.2 COMMENCEMENT OF WORKS

The site project contractors must timeously receive a copy of the construction phase EMPr (CEMPr) and any other further additional information that pertains to site conditions/amendments or deviations from original site plan.

- This EMPr must be included to form part of the Contractors site specification documentation.
- A copy of the EMPr must be on site at all times and available for presentation to any authority requesting to see such document.

NO WORK ON SITE MAY TAKE PLACE UNTIL

- The Declaration of Understanding/Environmental Contract is signed between the relevant parties.
- One week's written notice given to the Department **before** commencement of any construction activity (as per EA).
- On-Site Start-Up Meeting has been held
- Site and No-Go areas has been identified **and demarcated**.
- Contractors are in possession of the EMPr and other relevant documentation
- Contractors/Sub contractors have signed the Declaration Of Understanding
- All mandatory site equipment is in place
- On Site Environmental Education & Awareness training session has taken place with all relevant construction personnel present.

NB: "Work/s" refers to camp establishment, earthmoving activities and any pre-liminary construction activities.

7.3 ISSUES OF CONCERN

Issues of concern that were identified in the Environmental Impact Assessment process and included in the EA or detailed in the Basic Assessment Report must be addressed during the "On Site Start-Up Meeting" and must be included in the On-Site Start-Up Report. Issues of Concern include but shall not be limited or restricted to the following:

- Waste management and disposal;
- Mandatory site equipment;
- Establishment of construction site;
- Above ground bulk fuel storage facilities;
- Concrete works & batching plant facilities;
- Soil erosion & sediment control;
- Use and storing of hazardous substances; and
- Establishment of temporary laydown areas.

7.4 SITE SPECIFIC ARRANGEMENTS & CONSTRUCTION PROCEDURES

7.4.1 On-site start-up meeting

The mandatory **On-Site Start-Up Meeting** must be conducted prior to commencement of any site/camp establishment, earthworks and/or construction activities and will focus on site specific conditions and requirements that may be applicable to the project and may require additional or special measures of control.

On-Site Start-Up Meeting points of discussion are:

- The Construction EMPr & other relevant site documents
- Project to be discussed and all uncertainties are cleared
- Method statement/s to be discussed
- Power line installation access routes
- Road and construction area to be demarcated
- Materials stockpile and lay down areas to be demarcated
- Method of stockpiling to be discussed
- Firefighting procedures
- Mandatory firefighting equipment & fire preventative measures
- Solid waste removal intentions
- Placement, type and service of toilets to be agreed on
- Placement and type of rubbish bins and removal of rubbish to be agreed on
- Labour overnight camp to be demarcated and services agreed on
- Environmental Education and awareness training session to all contractors & onsite staff/labour.
- Location & establishment of concrete batching plant facility.

7.4.2 Start-up meeting participants

Minutes of the onsite Start-Up Meeting will be condensed to a report format and circulated to all attendees of the above named meeting for their perusal and comments. The On-site Start-up Meeting report will form part of this EMPr. If any discrepancies between the start-up report and the EMPr arise then the EMPr will take precedence until clarification on the discrepancy is clarified. If any discrepancies between the EMPr and the EA then the EA will take precedence until clarification on the discrepancy is clarified.

Participants to the start-up meeting can include:

- Applicants Representative.
- Main Contractor's Representative.
- Resident Engineer
- Site foreman.
- Environmental Consultant.
- Environmental Control Officer.

NB: It is the responsibility of the main contractors to ensure that all sub- contractors, that work on the site during and after the civil's contract, are informed of the environmental conditions pertaining to the site.

7.5 ENVIRONMENTAL AWARENESS TRAINING

7.5.1 Environmental awareness course

Environmental awareness training courses shall be run for all personnel on site. The ECO will be responsible for the initial awareness course which shall include all relevant management, the Construction Supervisor, the Contractor and all foremen. All attendees shall remain for the duration of the course.

The Contractor shall be responsible to ensure that all his personnel and subcontractors (if applicable) are informed and made aware of the environmental constraints and shall also supply the ECO with a monthly report indicating the number of employees used by him. If refresher courses are deemed necessary, for instance, where personnel disregard the requirements of the EMPr, the time lost and the cost of the course would be for the account of the Contractor.

7.5.2 Specific training

All contractors and workers shall be informed about any special habitat, biodiversity feature, vegetation and/or rare plant species that might be present on the specific construction site (if applicable).

7.6 METHOD STATEMENTS

Method statements from the contractor will be required for specific sensitive actions on request of the authorities, the Applicant or ECO.

A method statement forms the base line information on which sensitive area work takes place and is a “live document” in that modifications are negotiated between the Contractor and ECO/applicant, as circumstances unfold.

All method statements will form part of the EMPr documentation and are subject to all terms and conditions contained within the EMPr main document.

These documents must be available to the authorities for inspection or on request.

A method statement describes the scope of the intended work in a step-by-step description in order for the ECO and Applicant to understand the contractor's intentions. This will enable them to assist in devising any mitigation measures, which would minimize environmental impact during these tasks.

The Contractor must submit the method statement before any particular construction activity is due to start. Work may not commence until the ECO and applicant have approved the method statement.

Method statements need to be compiled by the contractor for approval by Applicant and the ECO. The contractor must submit written method statements to Applicant for the purposes of the environmental specification, a “Method Statement” is defined as a written submission by the contractor to Applicant setting out the plant, materials, labour and method the contractor proposes using to carry out an activity, in such detail that Applicant and the ECO is able to assess whether the contractor's proposal is in accordance with the specifications and/ or will produce results in accordance with specifications.

The method statement must cover applicable details with regard to:

- Construction procedures
- Materials and equipment to be used
- Getting the equipment to and from site
- How the equipment/ material will be moved while on site
- How and where material will be stored

- Location & establishment of concrete batching plant facility.
- The containment (or action to be taken if containment is not possible) of leaks or spills of any liquid or material (of any potential hazardous material) that may occur
- Timing and location of activities
- Compliance/ non-compliance with the Specifications, and
- Any other information deemed necessary by the Applicant and the ECO

The Contractor must abide by these approved method statements, and any activity covered by a method statement must not commence until Applicant and the ECO has approved of such method Statement.

NB: No work may commence or take place before the Method Statement has been approved by all relevant parties. List of possible Method statements include but shall not be limited or restricted to:

- Demarcation
- Entrance and haul roads
- Traffic management plan
- A traffic management plan for the site access roads.
- A transportation plan for the transport of larger components.
- A storm water management plan.
- An erosion management plan.
- Clearing of vegetation & topsoil removal
- Stockpiling
- Temporary storage facilities
- Construction camp & site offices
- Fuel storage
- Labourer's facilities
- Mandatory site equipment
- Waste control
- Cement mixing & batching areas
- Construction vehicle maintenance
- Heavy earthmoving equipment
- Dust control
- Noise control
- Rehabilitation

7.6.1 Additional method statements

Any additional method statements (with regards to a specific aspect of construction) that may be required must be **submitted** and approved before commencement of the specific works and must be available at the site offices.

7.7 NON-COMPLIANCE

Applicant (on recommendation by the ECO) reserves the right at all times for the duration of this agreement to impose restrictions and associate penalties on the contractor with respect to the specific nature, timing and extent of construction activities on environmentally sensitive sites.

7.7.1 Corrective action instruction

The ECO may issue an onsite corrective action instruction to the site agent, or, by means of an entry into the Site Instruction Register for remedial work to be carried out to rectify any non-compliance that has been carried out within a reasonable agreeable time frame to carry out and complete the remedial work.

7.7.2 Written warning

In instances of non-compliance with the EMPr by the contractor (or any of their employees) or sub-contractor/s (or any of their employees) that move on or off the site, the onsite ECO/ESO must issue a written warning indicating the non-conformance to the contractor.

If repeated instructions by the ECO/ESO to the site agent to respond to the corrective action instruction have not been carried out the ECO/ESO can issue a Written Warning notation instructing the site agent to timeously carry out the corrective measures as per the original non-compliance.

7.7.3 Penalty fines

In the event of the site agent negligence to respond and correct the noted non-compliance the ECO may in collaboration with the relevant parties recommend that a Penalty Fine be imposed on the contractor.

- The applicant, in consultation with the ECO/ESO must determine the amount of the penalty applicable in accordance with the Penalties for Non-Compliance Schedule of Tariffs.
- Such penalty amount must be in writing and presented to the contractor within seven (7) days of the written warning.
- Applicant may recover penalties by deducting the fine from the offending contractor.
- The contractor will be responsible for all costs incurred where emergency procedures are implemented to deal with accidents impacting on the environment as well as the rehabilitation of such damage in conjunction with the ECO/ESO and site engineer.
- In serious cases, at the discretion of Applicant and the Environmental Consultant/ECO/ESO, multiple offences can be added together.

7.7.4 Stop works

The ECO (after consultation with Environmental Consultant/Applicant/Engineer) may also stop the works or part thereof until the situation is resolved; no extension of time is claimable by the contractor.

These penalties do not preclude any prosecution under any law or regulation.

7.8 CHANGES TO EMPr

Although care has been taken to address all known relevant environmental issues in this Environmental Management Plan/Programme (EMPr), it may become necessary to add or amend certain procedures or instructions to improve the efficiency of the EMPr.

- Only those additions or amendments of this EMPr that will either improve environmental protection or can be proved not to have any negative effect to the immediate and surrounding environment will be considered.
- Changes or deviations have to be motivated in writing by means of a Method Statement and the same procedures for a standard Method Statement have to be followed.

- Any additions or amendments must be submitted by the ECO to DEFF (if so requested) after the ECO has consulted with the Environmental Consultant and Applicant.
- No deviation from the contents of the EMPr will be allowed without following the above procedures.

7.9 RECORD KEEPING

All records relating to the implementation of this Environmental Management Plan must be kept together, be readily retrievable and available for scrutiny by any relevant authority. Records include the following:

- Declarations of understanding;
- ECO Checklist, audits and/or diary;
- Method statements
- Photographs (must be taken before, during and immediately after construction as a visual reference);
- The Environmental completion statement.

These records must be available for scrutiny by any relevant authorities.

7.10 STANDARD MANAGEMENT PROCEDURES

7.10.1 Access & haul routes

The Contractor must control all access (vehicles and plant) to and from the construction site, including that of his suppliers so that they remain on the pre-approved designated routes. In addition such vehicles and plant must be so routed and operated as to minimise disruption to regular users of the routes.

- Where heavy duty vehicles and construction plant are required, both the type of vehicles/machinery and the area/s these are to access shall be specified in a Method Statement.
- Access routes/haul roads will utilise only existing roads or tracks, unless such routes are not available or new routes are to be constructed as part of the project, in which case a Method Statement must be submitted for the construction of any new access/ haul roads (including temporary routes).
- No new roads or tracks may be created except where such routes are specifically approved by the ECO, in the EA or in this EMPr.
- Any new access roads/haul roads must be designed so as to minimise erosion and must run across slopes and not directly up-hill.
- All vehicles and access to the site must remain within demarcated access routes and working areas on site.
- All reasonable measures must be implemented to minimize impacts on local commuters e.g. limiting construction vehicles travelling on public roadways during the morning and late afternoon commute time and avoid using roads through densely populated built-up areas so as not to disturb existing retail and commercial operations.
- On gravel or earth roads on site, the vehicles of the Contractor and his suppliers may not exceed a speed of 25 km/h.
- On public roads adjacent to the site vehicles will adhere to municipal and provincial traffic regulations.
- All temporary access routes must be rehabilitated at the end of the contract to the satisfaction of the ECO.

If so required by the owner of the land the following may also apply with regard to access and vehicular movement on site:

- All Contractors, subcontractors and staff shall be identified by clothing with company logos and be in possession of valid SA identity documents.
- Deliveries, removals etc. to be completed during normal working hours (unless otherwise agreed upon by the Construction Supervisor).
- No personnel shall stay permanently on site, unless permission to stay on site provided as part of the construction contract.
- Access routes must be demarcated by orange twine/danger tape on steel posts or temporary fencing.
- The Contractor shall at his cost document the existing condition of all access roads prior to commencement.
- Should any damage occur to the access road as a result of the upgrade activities, the road will be rehabilitated to its original state with all costs borne by the contractor.

7.10.2 Construction of access roads (potential temporary and/or new roads)

In the event of the possible construction of a temporary/new access road to the site the access route is pre-determined prior to the On Site Start-Up Meeting. Discussions pertaining to any potential "Access Road Start-Up Meeting" must include the following but is not restricted to:

- EMPr and contents thereof
- Demarcation of the access route
- Containment of soil and rock from excavations
- Transit areas for excess excavation road materials
- Stockpile areas for sub-base and surface material
- Earthmoving machinery for specific tasks
- Mandatory Site Equipment
- Placing of on site toilet facilities
- Specific requests from farmers or Applicant Property and land owners
- Dust Pollution
- Post construction erosion control methods
- Site Specific agreements emanating from the Start-Up Meeting

7.10.3 Appropriate use of machinery

Contractor must at all times carefully consider what machinery is appropriate to the task while minimizing the extent of environmental damage.

- The contractor may not operate any machinery including a fuel driven compressor outside the demarcated area.
- All vehicles and equipment must be routinely inspected for fuel and oil leaks and kept in good working order and serviced regularly. Leaking equipment must be repaired immediately or removed from the Site. When servicing equipment, drip trays must be used to collect the waste oil and other lubricants. Drip trays must also be provided in construction areas for stationary plant (such as compressors) and for "parked" plant (such as scrapers, loaders, vehicles). Drip trays will be kept free of water that will float the oil to overspill. All drip trays / bungs to attain a 120% capacity of the plant fuel / oil capacity.
- Where practical, all maintenance of plant and machinery on Site must be performed in workshops. If it is necessary to do maintenance outside of a workshop area, the Contractor must obtain the approval of the Engineer and the ECO prior to commencing activities.

- Appropriate 2.5 kg (minimum requirement) dry powder SABS approved and service certified firefighting extinguisher must be a mandatory item on all vehicles working and moving on or off the construction site.
- The servicing, repairs and maintenance of all construction machinery must take place at the designated service and maintenance yard and not along the proposed new road construction route.

7.10.4 “No-Go” areas

Specifications of the Environmental Authorisation (EA), the Environmental Management Plan/Programme (EMPr) or the On Site Start-Up Meeting (OSSM) can require that certain areas are to be considered as "No go" areas as a result of their environmental significance or proximity to environmental significant features.

- No-Go areas will be demarcated and indicated on a site plan.
- A Method Statement is to be submitted to the ECO/ESO by the Contractor, detailing the method of fencing for protection of such conservation areas.
- No-Go areas are out of bounds to the Contractor and his staff, sub-contractors and their staff or suppliers and their staff or any other person involved in the project, without the written permission specified by the ECO/ESO.
- The Contractor must ensure that, insofar as he has the authority, no person, machinery, equipment or material enters the designated "No Go" areas at any time.
- All contractors must be made aware of the importance of these features and the consequences of non-compliance.

7.10.5 Restriction of working areas

The approved layout plans will be used to establish the site demarcation (footprint). All relevant parties responsible for the day-to-day activities on the site will be present and made aware of the implication of the site demarcation. They include the:

- Environmental Consultant: EnviroAfrica
- Principle Agent
- Main Contractor: Project Site Manager
- Sub-contractor: Project Contractor
- ECO/ESO: Environmental Control Officer or Environmental Site Officer

The proposed site will be demarcated prior to the commencement of any construction whatsoever, this includes site establishment, the moving of construction material or any other items onto the site, etc.

- The site will be demarcated with appropriate dropper poles. A single strand of orange baler twine is to be attached to the dropper poles to indicate boundaries and no-go areas for site personnel and vehicular movement. (Alternative fencing may be decided upon dependent on site requirements).
- The construction area i.e. road, stockpile areas and development footprint etc. must be demarcated and fenced off with dropper poles and orange baler twine approximately 1m high is considered adequate. The demarcation will be agreed on during the start-up meeting.
- All fencing and fence placement / positioning must be approved by the ECO on site.
- Work areas and access routes must be clearly demarcated to minimise environmental impact.
- In the event that sensitive features are threatened by construction activities, temporary fencing off of these areas (for individual areas such as trees or rocks) or the construction area (when working in a mainly natural environment) is recommended.

- NB: Also note the requirements discussed under the following paragraphs: 7.10.6; 7.10.7; 7.10.2; 7.10.10; 7.10.8; 7.10.9.
- The Contractor must maintain in good order all demarcation, fencing and barriers for the duration of construction activities, or as otherwise instructed.
- Demarcation may not be moved, re-located or altered or changed without the approval of the ECO.
- Any temporary fencing removed for the execution of any portion of the works is to be reinstated by the Contractor as soon as practicable.
- The Contractor at the end of the contract must remove all demarcation, fencing or barriers not forming part of the final works on Site.

7.10.6 Protection of natural veld

Habitat fragmentation is usually defined as a landscape-scale process involving both habitat loss and the breaking apart of habitat. Habitat loss has large, consistently negative effects on biodiversity. Habitat fragmentation per se has much weaker effects on biodiversity, but could be just as negative. As such the construction activities must endeavour to minimise its impact on any remaining natural features and natural corridors.

- All remaining natural corridors identified as significant biodiversity features during the environmental assessment stage, must be mapped and identified as “No-Go” areas on the site plans and protected measures must be installed (demarcated);
- Except to the extent necessary for the carrying out of the works, no flora may be removed, damaged or disturbed;
- Trapping, poisoning and/or shooting of animals is strictly forbidden. No domestic pets or livestock are permitted on Site;
- Where the use of herbicides, pesticides and other poisonous substances are to be used, the Contractor must submit a Method Statement;
- The Contractor may not deface, paint, damage or mark any natural features, if these should occur (e.g. trees, rock formations, buildings, etc.) situated in or around the Site for survey or other purposes unless agreed beforehand with the Engineer and the ECO/ESO. Any features affected by the Contractor in contravention of this clause must be restored/rehabilitated to the satisfaction of the Engineer and the ECO/ESO.
- All incidents of harm to any animal or natural vegetation (apart from the agreed upon areas) must be reported to the ECO/ESO.

7.10.7 Protection of flora

A plant rescue and protection plan which allows for the maximum transplant of conservation important species from areas to be transformed must be implemented, if required. Please also refer to the specific recommendations in Section 6.2 above.

- The areas of vegetation that are to be protected during construction must be demarcated and indicated as “No-Go” areas on a site plan. Include the area under the canopy of trees so that tree roots will not be damaged by soil compaction.
- An ecological survey of the site prior to construction in terms of protected and/or endangered plant/floral species must be undertaken to ensure that the relevant ecologist/biodiversity specialist will be able to develop an adequate search and rescue plan, or a management plan in terms of alien plant species, if required.
- All flora identified to be rescued must be removed and placed in an area specifically allocated for these plants to ensure that the necessary care thereof will take place until being relocated and planted in designated areas.

- The specialist must also advise and oversee a re-vegetation and habitat rehabilitation plan during the construction and operation of the facility. Restoration must be undertaken as soon as possible after completion of construction activities to reduce the amount of habitat converted at any one time and to speed up the recovery to natural habitats.
- Also refer to the requirements of the rehabilitation and restoration guidelines (Refer to paragraph 7.10.27).

7.10.8 Protection of fauna and avi-fauna

Trapping, poisoning and/or killing of animals is strictly forbidden. No domestic pets or livestock are permitted on Site. Many slow moving animals, local amphibian and other species follow instinctive movements along roadside corridors where they travel from place to place.

- An ecological survey of the site prior to construction in terms of protected and/or endangered faunal species must be undertaken to ensure that the relevant ecologist/biodiversity specialist (fauna and avifauna expertise) will be able to develop an adequate search and rescue plan, or a management plan in terms of alien plant species, if required.
- Every effort must be implemented on a daily on-going basis by the contractor to ensure that the construction areas have been checked for any animals and to ensure their removal and protection (search and rescue) from direct and in-direct impacts during the construction activities.
- The removal of fauna from the site must be done in accordance with the requirements of the Nature Conservation Ordinance regulating these activities.
- Environmental corridors and “No-Go” areas must be demarcated and protected.

7.10.9 Clearing of vegetation, stripping & conservation of topsoil

The contractor shall take all reasonable steps to minimise the impact of his activities on the environment. If natural vegetation have to be removed for construction purposes, the natural vegetation shall be rescued, re-used (e.g. stabilizing the area after construction or re-vegetating other impacted areas) in such a way that it enhances the remaining natural veld. By the same principle topsoil (which contains the remaining natural seed store as well as possibly many bulb species) must be carefully removed and stored or re-used for rehabilitation or impacted areas in the immediate vicinity.

Vegetation clearing:

- A Method Statement must be submitted detailing the methods to be used for vegetation clearing.
- All cleared areas must be stabilised as soon as possible.
- Burning of cleared vegetation on site is prohibited.
- The burying of cleared vegetation or use as part of backfill or landscape shaping is prohibited unless written approval is obtained from the ECO/ESO.
- Cleared vegetation may be used for mulch or slope stabilisation of the Site.
- Should bulk vegetation be removed from the designated working areas (foot print area) then tall vegetation shall first be removed through brush cutting and chipping of larger shrub material; this may be added to the topsoil material stockpiles as mulch.
- Unless otherwise agreed upon, only indigenous plant material shall be used for this purpose.

Topsoil removal

- Prior to any activities within the demarcated work areas, topsoil material shall be removed to a depth of 300 mm or deeper if specified by the engineer in consultation with the ECO/ESO, and stockpiled in a designated area for use in rehabilitation of the site post construction.

- Any area where the topsoil will be impacted by construction activities, including the construction offices and storage areas, must have the topsoil stripped and removed and covered with herbaceous vegetation (other than alien species), overlying grass and other fine organic matter and stockpiled for subsequent use in rehabilitation.
- Topsoil storage areas must be convex and must not exceed 2 m in height. The Contractor must ensure that the material does not blow or wash away.
- Topsoil must be treated with care, must not be buried or in any other way be rendered unsuitable for further use (e.g. by mixing with spoil) and precautions must be taken to prevent unnecessary handling and compaction.
- In particular, topsoil must not be subject to compaction greater than 1 500 kg/m² and must not be pushed by a bulldozer for more than 50 m. Trucks may not be driven over the stockpiles.
- Topsoil from different soil types must be stockpiled separately and replaced in the same areas from which they were taken if this proves to be the case. Specific attention must be given to the areas that may house rare and threatened species.
- Topsoil areas must be demarcated in order to ensure the safekeeping of topsoil and to separate different stockpile types.

7.10.10 Erosion & sedimentation control

The Contractor must take appropriate on-going and active measures to prevent erosion resulting from his own construction activities and operations as well as storm water control measures to the satisfaction of the ECO/ESO. During construction the Contractor must protect areas susceptible to erosion by installing all the necessary temporary and permanent drainage works as soon as possible.

In order to achieve erosion and sediment control, the following are applicable to all sites:

- No new development, without written authority approval, will be allowed on slopes greater than 12% (CARA, regulation 3). If applicable terraces will be made in accordance with agricultural regulations.
- Install erosion and sediment controls before work starts and maintain these features throughout the construction and operational phases (as applicable).
- Leave as much vegetation as possible.
- Install temporary fences to define “No Go” areas in those areas that are not to be disturbed.
- Divert run-off from upslope away from the site, but ensure that it does not cause downstream erosion. For example, dig drainage channels (catch drains sized to accommodate the upslope catchment).
- Install sediment controls down slope of the site to catch sediment (if applicable).
- Inspect and maintain erosion and sediment controls regularly.
- Limit vehicle movement to the site and control access points. Clearly mark such access points and inform all suppliers.
- Save and re-use topsoil during re-vegetation. Never store topsoil around trees as this may kill them. Spread the topsoil back when the work is finished and re-vegetate the site as soon as possible to control erosion. Remove the sediment and erosion controls only after re-vegetation was successfully implemented.
- Store all stockpiles and building materials behind sediment fences. Cover them with plastic to prevent erosion by wind.
- It is illegal to discharge water into a public stream if the quality does not conform to the required health or water standards. Other measures as may be necessary must be taken to prevent the surface water from being concentrated in streams and from scouring the slopes, banks or other areas. All potential hazardous fluids / materials must be protected from the rain to prevent them being washed into storm water channels. All such measures must be discussed with and approved by the ECO.
- Build a dam below the area used for cutting tiles, concrete and bricks. Surround the wash-out area with a sediment fence that slows down the water flow. Filter or settle-out all water pumped

off the site. The water must be clear before it enters the storm water system or creeks. Gypsum can be applied to muddy (turbid) water to help clay particles settle.

- Fill in all trenches immediately after services have been laid.

7.10.11 Alien invasive management plan

In accordance with Regulation 15 and 16 of the Conservation of Agricultural Resources Act, 1983 (Act no. 43 of 1983) (CARA) as amended, all listed alien invasive plant species must be managed on any land in SA. As such an alien invasive management plan may be required to be implemented during construction and operation phase of the project. If such a plan is required, it must include mitigation measures to reduce the invasion of alien species and ensure that the removal of alien species is undertaken. Wetlands and rivers are especially susceptible to many of species.

- In accordance with CARA all identified alien invasive plants encountered on the property and its immediate surroundings must be controlled.
- All alien invasive species must be identified and removed from each site and its immediate surroundings. This is especially true for any remaining natural corridor on site.
- No vegetation may be buried or burned on site.
- Where the use of herbicides and other poisonous substances are to be used, the Contractor must submit a Method Statement.

The invader status of the various invasive alien species in South Africa is described in accordance with Regulation 15 and 16 of the Conservation of Agricultural Resources Act, 1983 (Act no. 43 of 1983) (CARA) as amended (the 3 categories and its control are summarised underneath).

Category 1 (Declared Weed)

- Prohibited on any land or water surface in South Africa
- Must be controlled or eradicated (except in biological control reserves).

Category 2 (Declared Invader – commercial value)

- Allowed only in demarcated areas under controlled conditions
- Outside of controlled areas invaders must be controlled or eradicated where possible
- Prohibited within 30 m off the 1:50 year flood line of watercourses or wetlands unless authorization has been obtained

Category 3 (Plant Invaders – ornamental value)

- Allowed only in areas where they were already in existence with the promulgation of the regulations.
- Prohibited within 30 m of the 1:50 year flood line of watercourses or wetlands unless authorization has been obtained.
- All reasonable steps must be taken to ensure that they do not spread.
- Propagative materials of these plants (e.g. seeds or cuttings) may no longer be planted, propagated, imported, bought, sold or traded in any way.

7.10.12 Protection of archaeological & paleontological remains

Archaeological remains are ancient man-made objects, structures, or ancient burials that have been preserved on the earth's surface, underground, or underwater and serve as the historical sources that make it possible to reconstruct the past history of human society, including mankind's prehistory. Palaeontology or Palaeontology, on the other hand, is the study of prehistoric life. It includes the study of fossils to determine organisms' evolution and interactions with each other and their environments (their paleoecology). Palaeontology lays on the border between biology and geology, and shares with

archaeology a border that is difficult to define. Please refer to the specific recommendations in Section 6.2.

- Basic archaeological remains include work tools, weapons, domestic utensils, clothing, and ornaments; settlements including campsites, fortified and unfortified settlements, and separate dwellings; ancient fortifications; the remains of ancient hydraulic structures; ancient agricultural fields; roads; mining pits and workshops; ancient burial grounds and various burial and religious structures (stelae, stone figurines, stone fish monoliths (vishaps), menhirs, cromlechs, dolmens, sanctuaries); drawings and inscriptions carved into individual stones and cliffs; and architectural monuments. Archaeological remains also include ancient ships and their cargoes that sank in rivers and seas and settlements that came to be underwater as a result of shifts in the earth's crust
- Should any unmarked human burials/remains or ostrich eggshell water flask caches be uncovered, or exposed during construction activities, these must immediately be reported to the ECO and South African Heritage Resources Agency (SAHRA) (Att: Ms Mariagrazia Galimberti 021 462 4502) for information on the appropriate course of action to be taken. Burials, etc. must not be removed or disturbed until inspected by an archaeologist or without written approval from SAHRA.
- Should any substantial fossil remains (e.g. vertebrate bones and teeth, shells, petrified wood) be encountered during excavation, however, these must be reported to SAHRA for possible mitigation by a professional palaeontologist.
- Note that the Contractor may not, without a permit issued by the responsible heritage resource authority; destroy, damage, excavate, alter, deface or otherwise disturb any archaeological site or archaeological material. The latter is a criminal offence under the Heritage Resources Act.

SAHRA contact details:

PO Box 4637, CAPE TOWN, 8000

111 Harrington Street, Cape Town

Tel: (021) 462 4502

Fax: (021) 462 4509

Website: www.sahra.org.za

- Should any objects of archaeological or palaeontological remains be found during construction activities, work must immediately stop in that area and the Environmental Control Officer (ECO) must be informed.
- The ECO must inform the South African Heritage Recourse Agency (SAHRA) and contact an archaeologist and/or palaeontologist, depending on the nature of the find, to assess the importance and rescue them if necessary (with the relevant SAHRA permit). No work may be resumed in this area without the permission from the ECO and SAHRA.
- If the newly discovered heritage resource is considered significant a Phase 2 assessment may be required. A permit from the responsible heritage authority will be needed.
- A Chance Finds Procedure has been included as Appendix 19 of this EMP to ensure that standard protocols and steps are followed should any heritage and/or fossil resources be uncovered during all phases of the project. These procedures should outline the steps and reporting structure to be followed in the instance that heritage resources are found. This must be included in the Environmental Awareness Plan.

7.10.13 Storage of construction material & stockpiling

New construction material will be stored in demarcated areas on the affected properties prior to commencement of reconstruction of decommissioned power line. The Contractor must provide a method statement (for approval by the ECO) of the construction activities which will indicate:

- the type and quantity of material to be stored;
- whether any oil contaminated/containing equipment will be stored;
- how (including what type of vehicles will be required) it will be deliver the material on site at the necessary storage area; and
- whether there is any risk of spill or runoff of any building materials or chemicals and how this is to be mitigated.

In addition:

- The Contractor must ensure that any delivery drivers are informed of all procedures and restrictions (including "no go" areas) required to comply with the Specifications. The Contractor must ensure that these delivery drivers are supervised during off-loading, by someone with an adequate understanding of the requirements of the Specifications.
- All manufactured and/or imported material must be stored within the demarcated area, and, if so required, out of the rain. All lay down areas outside of the construction camp must be subject to the Engineer and the ECO's approval in such a way as not to cause a nuisance or environmental damage.
- All building materials are to be prepared at the batching plant, to enable the effects of cement and other substances, and the resulting effluent to be more easily managed.
- It is essential that any imported material i.e. base material for road works, building sand, bedding base sand for pipe / cable lines etc. must be screened and of which the origins must be identified prior to arriving at the receiving environment, this must be approved by the Engineer / ECO.
- Special care must be taken to prevent bringing in materials contaminated with seed of Invasive Alien Plants. Contractors shall not import construction materials such as sand, gravel or fill contaminated with seed of Invasive Alien Plants, or quarried from areas surrounded by Invasive Alien plant species such as but not limited to Port Jackson, Rooikrans, Black Wattle, Blue Gum.
- The Contractor must negotiate appropriate space for this purpose on an area away from natural vegetation and any wetland habitat with the ECO.
- The Contractor must ensure that all staff, contractors and subcontractors are aware of and keep material within these designated storage areas. The Construction Supervisor shall ensure that the consultant team is familiar with same.
- Contractors will not be allowed to store new construction material on the sides of the access road, or within natural vegetation or next to the existing access road.
- Stockpiling of gravel, cut, fill or any other material including spoil must only be allowed in degraded areas or areas below the future cover of buildings and tar or paved parking surface.
- Any area used for stockpiling and not covered by building development must be returned to at least the state they were in before stockpiling and it must be ensured that the erosion potential of these areas is not increased.
- The Contractor must ensure that the material does not blow or wash away or mix with each other. If the stockpiled material is in danger of being washed or blown away, the Contractor must cover it with a suitable material, such as hessian, netting or plastic.
- Also refer to the traffic- and transportation management plans and their requirements.

7.10.14 Oil storage and management

An important potential environmental impact is oil spills from any oil filled equipment and machinery that may occur during transportation or storage of decommissioned and new construction material/ equipment. The following conditions shall apply:

- Vehicles must be checked for oil leaks prior to going on site

- Care must be taken to prevent any potential oil spillage during upgrading activities.
- Sufficient measures must be put in place to ensure that any potential oil spills are mitigated.
- An oil spill kit must be available on site at all times during the construction activities;
- Oil containment facilities must be provided for any oil filled equipment onsite;
- All oil spills must be reported to the ECO/ESO within 24 hours, indicating the containment and rehabilitation measures implemented

Oil spill kits, or details of their nearest supplier, are available from:

- Drizit (021) 531 5335
- Enretech (021) 683 1858
- Pinelands Environmental Technology (021) 531 3749

7.10.15 Storing of petroleum products

Petroleum fuels contain harmful substances known to cause health problems and can easily have adverse effects on water quality, and the environment. Petroleum spills can move rapidly into the soil and quickly contaminate drinking water. In order to prevent pollution it is important to, use proper methods when handling, using, and storing diesel fuel, gasoline, kerosene, or other petroleum products.

The South African National Standards pertaining to the installation of a storage tank include:

- Sans 310, which requires that an aboveground storage tank be of sufficient structural strength, based on sound engineering practices, to withstand normal operations and use;
- Sans 1668, for fibre-reinforced plastic tanks for the underground storage of petroleum products;
- Sans 10089-1, which deals with the storage and distribution of petroleum products in aboveground bulk installations; and
- Sans 1535, for glass- reinforced polyester-coated steel tanks, for the underground storage of hydro- carbons and oxygenated solvents, which are intended to be buried horizontally.

Above ground fuel storage tanks

Any fuel storage proposals must be cleared by the ECO/ESO before any storage or stockpiling takes place. If the contractor proposes to install above-ground fuel storage tanks for use during the construction phase of the project, the following basic requirements must be adhered to:

- A Method Statement, explaining the method of storage and mitigation measures to prevent spillages must be submitted to the ECO and accepted prior to the installation of such a fuel storage facility (please note that storage of any hazardous substance of 5 000 litres or more require environmental authorization).
- The fuel tank must be placed within a completely sealed concrete bund (containment structure) which must be able to contain at least 120% of the total capacity of the fuel tank.
- The bunded area must be built to be at least a third wider (on all sides) than the base of the fuel tank in order to maximise its capability to contain spillages and leakages.
- The fuel distributor must also be located within bunded area to better prevent against accidental spillages during refuelling.
- In addition, drip trays are to be used during refuelling.
- All vehicles, equipment, fuel and petroleum services and containers must be maintained in a good condition that prevents leakage and possible contamination of soil or water supplies.
- Fuel storage areas must comply with general fire safety requirements.

Storing of smaller quantities of fuel or oil

Any fuel storage proposals must be cleared by the ECO before any storage or stockpiling takes place. If the contractor proposes to use only small fuel storage facilities (< 200 litres) the following basic requirements must be adhered to:

- Fuels and oils must be safely located out of harm's way from the elements and safety and fire prevention must be strictly adhered to.
- All fuel oil containers must be placed within suitable drip trays to prevent accidental spillage of oils and fuels.
- A suitable leak proof container for the storage of oiled equipment (filters, drip tray contents and oil changes etc.) must be established.
- All spills are to be recorded in the ECO/ESO diary.

7.10.16 Storing of hazardous substances

If potentially hazardous substances are to be stored on site, the Contractor must submit a Method Statement detailing the substances and/or materials to be used, together with the storage, handling and disposal procedures of the materials to the ECO.

- Hazardous materials must be stored under lock and key in designated areas with properly displayed and visible warning signs.
- No works related to the submitted Method Statement may commence until the Method Statement has been studied and approved in writing.
- An effective monitoring system to detect any leakage or spillage of all hazardous substances during their transportation, handling, use and storage must be implemented. This must include precautionary measures to limit the possibility of oil and other toxic liquids from entering the soil or storm water systems.
- Measures to protect hydrological features such as streams, rivers, pans, wetlands, dams and their catchments, and other environmental sensitive areas from construction impacts including the direct or indirect spillage of pollutants must be implemented.
- **Paints:** - No paint products may be disposed of on Site and brush/roller wash facilities must be established to the satisfaction of the Engineer and the ECO/ESO. Oil based paints and chemical additives and cleaners such as thinners and turpentine must be strictly controlled. A Method Statement detailing the paint management procedures is required.
- **Hazardous building materials:** -Hazardous building materials (e.g. asbestos, fibre claddings, refrigerants, coolants, sub-station cooling oils, etc.) must be identified and dealt with in accordance with the relevant safety and health legislation. All such material must be separated on Site and disposed of at appropriate licensed disposal sites. The Contractor must supply the ECO/ESO with a certificate of disposal.

7.10.17 Use of cement or concrete

The Contractor is advised that cement and concrete are highly hazardous to the natural environment because of the high pH levels of the material, and the chemicals contained therein. Wash-out water with high pH is the number one environmental issue for the ready mix concrete industry. The alkalinity levels of wash water can be as high as pH 12, which is toxic to fish and other aquatic life.

The Site Supervisor or Contractor must indicate the need for and the proposed location of concrete batching plants which includes the location of cement stores, sand and aggregate stockpile areas. A Method Statement indicating the layout, type of concrete batching preparation (dry or wet mix). The site agent must indicate on the Method Statement proposed total volume of concrete that is needed for the completion of the entire project.

Concrete/cement mixing:

- Concrete and cement may only be mixed on existing hard surfaced areas, or edged mortar boards or a suitable container. Concrete may not be mixed or stored directly on the ground under any circumstances;
- The visible remains of the batch and concrete, either solid, or from washings, must be physically removed immediately and disposed of as hazardous waste.
- Washing of equipment shall be done in a container to prevent any runoff of contaminated washing water.
- Extreme care must be taken to limit the amount of water contaminated by washing equipment. Water from concrete washing can be re-used in concrete mixes or must be stored in drums, then removed from the site and disposed of at a licensed municipal dump site.

Concrete batching plants

The following procedures must be implemented to control waste water run-off from concrete batching plant locations:

- The location of concrete batching areas must be approved by the ECO/ESO (if possible/appropriate, the use of ready-mix concrete is preferred).
- Concrete batching facilities must have suitable bunding methods in place to ensure minimal waste water run-off occurs during batching operations.
- Contaminated water may not enter a natural or man-made (e.g. trench / sloop or dam) water system. Preventative measures include establishing sumps from where contaminated water can be either treated in situ or removed to an appropriate waste site.
- Dry mixing batching areas to be carefully placed in consultation with the ECO/ESO.
- Cement bags are to be stored securely out of harm's way from the elements (wind and rain). Bags have to be covered and placed on plastic sheeting. Used cement bags must be disposed of on a regular basis via the solid waste management system, and must not be used for any other purpose.
- Sand and stone used for cement or concrete batching must be stored on plastic layers (or on ECO/ESO approved disturbed areas) in order to prevent contamination of the natural environment.
- Cleaning of equipment and flushing of mixers must not result in pollution of the surrounding environment. All wastewater resulting from batching of concrete must be disposed of *via* the contaminated water management procedure.
- Excess or spilled concrete must be confined within the works area and all visible remains of excess concrete must be physically removed and disposed of on completion of cement work. Washing the remains into the ground is not acceptable. All excess aggregate must also be removed.
- Wash-down areas must be confined to within the concrete batching areas only.

7.10.18 Blasting/drilling

In the event where blasting or rock drilling is required, the following must be implemented:

- A Method statement must be provided for each case separately **prior** to commencement of blasting works.
- The contractor must take all necessary precautions to prevent damage to special features and the general environment, which includes the removal of fly rock.
- The contractor must ensure that no pollution results from drilling operations, either as a result of oil and fuel drips, or from drilling fluid. The contractor must take all reasonable measures to limit dust generation as a result of drilling operations.
- The ECO/ESO must be given 24-hour notice before blasting events.

7.10.19 Fire fighting

Adequate firefighting equipment according to the fire hazard during the construction period must be available on site and in good working order (at least one type ABC (all purpose) 2.5 kg extinguisher and 3 fire beaters per working area). The persons on site must be trained in the use of such equipment.

- The main contractor must provide a list of all authorities involved in firefighting in the region. This list must include emergency contact numbers and must be visible at the site office.
- Welding, gas cutting or cutting of metal will only be permitted inside the working areas.
- The Contractor must pay the costs incurred to organizations called to put out any fires started by him. The Contractor must also pay any costs incurred to reinstate burnt areas as deemed necessary by the land owner.
- It is required that contractors have available the emergency telephone numbers of the nearest local Fire Fighting Station and that an emergency firefighting re-action plan has been drawn up with onsite workers and the resident land-owner / farmer.

7.10.20 Emergency Procedures

It is the responsibility of the contractor to assess the potential risks to the environment as a result of the project. As such, the contractor must have the necessary standard emergency operating procedures in place to deal with any potential emergency such as oil spills or fire.

- All staff must be made aware of the necessary basic emergency procedures in the event of an emergency including injuries to staff. The appropriate equipment and identified personnel to deal with such basic emergencies must be available on site.
- **Fire:** The Contractor must advise the relevant authority of a fire as soon as one starts and must not wait until he can no longer control it. The Contractor must ensure that his employees are aware of the procedure to be followed in the event of a fire.
- **Hazardous Material Spills:** The Contractor must ensure that his employees are aware of the procedure to be followed for dealing with spills and leaks, which must include notifying the Engineer, the ECO and the relevant authorities. Treatment and remediation of the spill areas must be undertaken to the reasonable satisfaction of the ECO and Local Authority.

7.10.21 Solid waste management

Waste refers to all solid waste, including domestic waste, hazardous waste and construction debris. The Contractor are responsible for the establishment of a refuse control system (which must consider recycling wherever possible) that is acceptable to the ECO. Disposal arrangements must be made in advance and cleared with the ECO before construction starts.

- No littering or on-site burying or dumping of any waste materials, vegetation, litter or refuse may occur.
- All solid waste must be disposed of offsite at an approved landfill site in terms of section 20 of the Environment Conservation Act (Act No. 73 of 1989). The Contractor must supply the ECO with a certificate of disposal.
- The Contractor must provide problem animal- and weatherproof bins with lids of sufficient number and capacity to store the solid waste produced on a daily basis. The lids must be kept firmly on the bins at all times. Bins must not be allowed to become overfull and must be emptied regularly.
- Waste from bins may be temporarily stored on Site in a central waste area that is weatherproof and scavenger proof and which the Engineer and the ECO has approved.
- All hazardous waste must be disposed of at a registered hazardous waste disposal site and certificates of safe disposal must be obtained.

- All waste generated during the decommissioning and reconstruction activities must be removed by the Contractor as soon as possible, and within the period specified in the EMPr and disposed of at a registered landfill site.
- The Contractor must make provision for workers to clean up the Contractor's camp and working areas on a daily basis so that no litter is left lying around and so that the site is in a neat and tidy state. The Contractor must remove from site the refuse collected at least once a week.
- All sewage as well as any waste generated during the construction phase, must be collected, contained and disposed of at the permitted and/or licensed facilities of the Local Authority. Please note that proof of the agreement between the Applicant and the concerned Local Authority must be submitted to the Department of Water and Sanitation (Tel: 054 338 5800).

7.10.22 Toilets & Ablution Facilities

The Contractor must provide suitable sanitary arrangements at designated points of the construction site for all site employees. A minimum of one toilet must be provided per 15 persons at each working area (station) or as stipulated in the Management plan.

- The toilet must be within easy reach (max 300m) of the working area and be in good working condition and cleaned on a daily basis. Toilet paper must be provided. The toilets must be emptied on a weekly basis or when full or when instructed by the ECO/ESO on site.
- Disposal arrangements must be made in advance and cleared with the ECO/ESO before construction starts. Sanitation provision and servicing must be to the satisfaction of the ECO/ESO.
- The Contractor must ensure that toilets are emptied prior to any builders' holidays, and/or weekends.
- Toilets must be of a neat construction and must be provided with doors and locks and must be secured to prevent them blowing over.
- NB: No burying of any waste material on or near the construction site nor anywhere on the surrounding property is permitted.
- Eating areas that are allocated for workers must be established in an environmentally acceptable manner and in line with all OH & Safety Act regulations. All on site and on route workers temporary eating areas must have acceptable toilet and refuse management systems in place and these areas must have suitable refuse receptacles' available for the containment and disposal of general litter and refuse.

7.10.23 Discharge of construction water

Potential pollutants of any kind and in any form must be kept, stored, and used in such a manner that any escape can be contained and the water table not endangered. This particularly applies to water emanating from runoff from fuel depots/workshops/truck washing areas.

- The contractor, being responsible for the construction and effective containment and maintenance of settlement ponds must ensure that the surrounding environment is not adversely affected as a result of construction activities.
- Wash down areas must be placed and constructed in such a manner so as to ensure that the surrounding areas are not polluted. Contaminated water includes water that is carrying excess sediment due to construction activities.
- Contaminated water storage facilities must not be allowed to overflow and appropriate protection from rain and flooding must be implemented.
- Contaminated water that is removed from site must be disposed of at a facility approved by the ECO/ESO and Local Authority.

- No contaminated water that does not meet the water quality standards and criteria under the National Water Act may be released into a natural system, whether it is to surface or groundwater.
- All cement effluent from mixer washings, and run-off from batching areas and other work areas must be contained in suitable sedimentation ponds.
- Sedimentation ponds must be allowed to dry out on a regular basis to allow for solid material to be removed.
- This material must be disposed of in a suitable manner, depending on the nature of the material, and to the discretion of the ECO

7.10.24 Treating (flushing/testing) of pipelines (if required)

Cleaning/sterilization/flushing of pipelines shall not impair surrounding environmental quality.

- Any contaminated water from such activities shall be contained until it complies with the standards contained in the National Water Act or other relevant Acts, as well as those laid down by the Local Authority.
- Alternatively, it shall be removed from site and disposed of at an approved waste disposal site.

7.10.25 Eating facilities

The Contractor must designate eating areas for the approval of the ECO, which must be clearly demarcated. No eating of meals must take place outside these designated areas without the approval of the Contractor/ESO.

- The feeding or leaving of food for animals is strictly prohibited.
- Sufficient waste bins must be present in this area and emptied regularly.
- The contractor must supply cooking facilities that are suitable for the environment and are not liable to cause the outbreak of fires.
- No overnight camping/stay on site allowed. If overnighing is necessary for security purposes then it must be cleared with the ECO on site.
- No washing in dams or streams are allowed.

7.10.26 Dust Control

The Contractor must take all reasonable measures to minimize the generation of dust as a result of construction activities resulting from along-construction-route activities (but must also take into account possible water constrictions of the area).

- The onsite construction site agent must take into account prevailing wind strength and wind direction and must have preventative measures on standby to minimize dust pollution that may cause damage to people and property.
- Limit vehicle movement to absolute minimum (since road are dirt roads).
- Implement dust suppression strategies, such as tanker truck spraying of the roads, as appropriate.

7.10.27 Restoration and rehabilitation

The Contractor must ensure that all structures, equipment, materials and facilities used or created on site for or during construction activities are removed once the project has been completed. On completion of the project or phase, all areas impacted by the construction activities must be reinstated and/or rehabilitated to the satisfaction of the ECO with emphasis on the following:

- Immediately after the demolition of the camp site, the contractor shall restore the site to its original state, paying particular attention to its appearance relative to the general landscape.
- The contractor's procedure for rehabilitation shall be approved by the ECO and Engineer.
- Site offices must be removed and the areas rehabilitated or reinstated to the satisfaction of the ECO.
- Labourer's facilities (if applicable) must be removed and the areas rehabilitated or reinstated to the satisfaction of the ECO/ESO.
- All construction site areas must be rehabilitated or reinstated to the satisfaction of the ECO/ESO.
- All temporary fencing and demarcation must be removed and the areas reinstated to the satisfaction of the ECO/ESO.
- Temporary storage areas must be rehabilitated or reinstated to the satisfaction of the ECO.
- All remaining construction material must be removed and the areas rehabilitated or reinstated to the satisfaction of the ECO.

Any additional **disturbed** areas must be rehabilitated or reinstated to the satisfaction of the ECO/ESO. This shall include but not be limited to:

- Earthworks to reinstate the physical characteristics of the site. Here attention to the natural vertical and lateral heterogeneity in landform shall guide the reinstatement of natural areas.
- Replacement of topsoil material – care shall be taken to ensure that the same material that was removed from each area is replaced there, since this will carry the seed complement appropriate for re-establishment of each plant community type.
- Final landscaping by machine, but landscaping by hand may be required in many areas under rehabilitation.
- Re-seeding and / or replanting of rehabilitated areas.
- The Contractor shall not be permitted to use fertilisers or pesticides.
- It is imperative that any potential erosion problems are addressed. This may require subsequent site visits to monitor the efficacy of erosion control measures.

7.10.28 Land Management

- Vehicles accessing the construction site must be made aware of driving in hazardous road conditions, sharp bends, narrow roads, bad weather, on or near children or domestic animals along the road.
- Vehicle movements must be kept to a minimum during rain to avoid damage to access roads.
- No fences or gates on the relevant construction property must be damaged. All access gates to the property (construction site) to be kept closed at all times to prevent domestic and or wild animals from getting out. Access by unauthorised personnel must be controlled. The access gates to the construction areas must always be closed.
- Soil erosion must be prevented at all times along the access roads and around construction areas.

7.10.29 Installation of Power and/or Communication Lines:

In the event of the installation of an overhead power and/or communication line such as a line to tie-in to, or be handed over to, Eskom or Telkom (overhead lines or the furrowing/trenching of optic fibre/AC cables), the proposed route must be pre-determined prior to the On Site Start-Up Meeting and application must be made to the South African Civil Aviation Authority.

Discussions at the Eskom power or Telkom line installation Start-Up Meeting include the following but not restricted to:

- EMPr and contents thereof

- Establishing the location of the “TAP-OFF” point
- Arranging a time for the physical “Walk-In” and inspection of the Eskom power line / Telkom line route with the contractor, and the site ECO/ESO. [If required a representative from the Applicant/Client may be present as well as the property owner/occupier]
- Establishing suitable stockpile areas for poles, machinery and accessories.
- Placing of poles on heavy duty plastic.
- Exit and entry points along the Eskom power / Telkom line route
- Method of Pole Drilling, Pole Planting and Stringing phases
- Method of approach to pole hole location [i.e. Drive in - Reverse out]
- Specific requests from property owner/occupier or the Applicant
- Mandatory Site Equipment
- Placement and type of site toilets.
- AC / optic fibre cable furrowing / trenching
- Site Specific agreements emanating from the On Site Start-Up Meeting

In addition, any Eskom tie-in or handover overhead power line, **or any development near Eskom infrastructure**, must meet the Eskom requirements for works and developments at or near Eskom servitudes as per Appendix 16 of the EMPr

7.10.30 **Socio-Cultural Issues**

- Property owners or property occupiers must be treated with respect and courtesy at all times.
- The cultural lifestyles of the communities living in close proximity to the construction areas must be respected.

7.11 **EMERGENCY PREPAREDNESS & RESPONSE**

The following potential emergency situations have been identified and include the procedure for responding to, and for preventing and mitigating the environmental impacts that may be associated with them (also refer to Penalties and Fines).

7.11.1 **Accidental fires**

Fire safety is a very real risk and must be stringently controlled. No fires will be permitted on site for any reason. If required, a designated smoking area will be provided, and clearly demarcated and signposted, with a facility for safe containment and disposal of cigarette butts.

The following measures must be implemented:

- Adequate firefighting equipment must be available on site and in good working order (including at least one type ABC (all purpose) 2.5 kg fire extinguisher and 3 fire beaters per working area). The persons on site must be trained in the use of such equipment.
- The main contractor must provide a list of all authorities involved in firefighting in the region. This list must include emergency contact numbers and must be visible at the site office.
- The contractors must establish an emergency procedure (with contact numbers) to the satisfaction of ECO/ESO (whenever work is done in any fire prone areas).

7.11.2 **Hydrocarbon spills**

Since the project is in proportion relative small, no fuel storage or distribution facilities will be established. As a result the significance of any spill is much reduced. The following must be observed:

- Vehicles will arrive on site already fuelled for the project.
- If additional fuel is needed, it will be brought in as needed (minimal volumes) and refuelling will be done using a pump and not a funnel (to minimize the risk of spills).
- Spill trays shall be used during re-fuelling.
- In the case of accidental spillages or leakage, the contractor will be responsible for immediate containment and corrective action (e.g. stopping the leakage), and to inform the Construction Supervisor and ECO/ESO.
- The ECO/ESO will recommend the best possible environmental solution.
- The Contractor will be liable for any costs incurred.

7.11.3 Concrete/cement spillages

The Contractor/supplier will be liable for the safe and correct deliverance of substantial loads of concrete or cement.

- Should a spill occur the Contractor/supplier will be liable for all costs of the rehabilitation needed.

8. OPERATIONAL PHASE EMPr

The most important part of the operational phase will be to ensure that the site is meticulously maintained and that the operations are carefully monitored. The applicant will remain overall responsible for the environmental performance of the site and must be aware of the legal requirements and obligations. The applicant must also be aware of the legal action that can be taken against him/her as a person with regards to negligence leading to environmental pollution.

The owner or delegated responsible person must implement an operational and maintenance management plan which must include:

Access management and control;
Energy management and monitoring;
Water management and monitoring;
Waste and pollution management;
Sewerage management;
Fire Management;
Minimise dust and air emissions;
Protection of indigenous natural vegetation and fauna;
Specific monitoring and operational instructions;
Emergency plans which will cover all reasonable aspects of the operations which might lead to environmental pollution or degradation.

8.1 TRAFFIC ACCESS ROUTES & HAUL ROADS

The Operator of the site must control the movement of all vehicles and plant including that of his suppliers so that they remain on designated routes. In addition such vehicles and plant must be so routed and operated as to minimise disruption to regular users of the routes not on the Site.

- On public roads adjacent to the Site vehicles/ fuel delivery trucks will adhere to municipal and provincial traffic regulations.
- Only approved access roads may be used.
- All measures must be implemented to minimize impacts on local commuters e.g. limiting fuel delivery vehicles travelling on public roadways during the morning and late afternoon commute time and avoid using roads through densely populated built-up areas so as not to disturb existing retail and commercial operations.

8.2 **ENERGY MANAGEMENT**

Even though energy supply will be derived from the Solar PV facility itself, all reasonable steps must be taken to ensure the efficient management of energy. Energy management and conservation measures must be propagated and encouraged. The objective of energy management will be to encourage the conservation of energy, for example:

- Ensure that cooling units are located and operated to conserve energy. If refrigerant are to be used, please note that R22 as a refrigerant is being phased out (due to negative impacts on the ozone layer) and that the following gasses are more environmentally friendly options: ammonia, R134a, R143a, R404A, R407C, R410A, and R507A.
- Install energy-efficient appliances (e.g. a grade one refrigerator is at least 35% more energy-efficient than a grade three one).
- Install energy efficient lightning (which uses less energy to give the same amount of illumination and last longer than conventional incandescent bulbs).
- Insulate water heaters and hot water pipes (insulating hot water pipes from the water heater to the source are another way to conserve).
- Disconnect or switch- off units/appliances which are not in use.
- Monitor different energy uses (e.g. electricity, fuels and gas).

8.3 **WATER MANAGEMENT**

- Ensure that all additional water uses are correctly registered with the Department of Human Settlement, Water and Sanitation (e.g. agri-industrial use).
- Water conservation measures such as low flow taps, high pressure hoses, dual flush toilets, water wise gardens, rainwater tanks etc. must be encouraged and implemented.
- Every reasonable effort must be made to reduce the long term water demand.
- Environmental training of personnel must include water conservation awareness.
- A monthly water monitor program with the aim of ever reducing the water usage must be implemented (records must be kept).

8.4 **WASTEWATER MONITORING PROGRAM**

In terms of the National Water Act, 1998 (Act 36 of 1998), the Discharge of waste or water containing waste is a controlled activity for which a Licence or General Authorization must be obtained. The applicant/legal operator must ensure that wastewater (if applicable) is legally disposed by applying for a General Authorization, a License or exemption in terms of the Water Act.

- Wash-water used for cleaning of instruments or equipment must not contain any chemicals or hazardous materials that will increase the risk of soil and water contamination.
- Wash-water used to clean panels must be recycled as far as possible.
- Measures to prevent erosion must be implemented.

- A wastewater monitoring program may be required, which must include monitoring of quantities disposed of (on a monthly basis) and compliance of treated wastewater quality after treatment but before disposal.

8.5 WASTE & POLLUTION MANAGEMENT

An integrated waste management approach based on waste minimisation (e.g. reduction, recycling, re-use and disposal) must be encouraged. Poor waste management can lead to adverse environmental impacts (e.g. odours, pollution and visual impact) as well as health risks. Sound waste management is thus non-negotiable.

- No on-site burying or dumping of any waste materials, vegetation, litter or refuse may be allowed.
- Domestic waste must be stored in approved containers (e.g. bins with removable lids).
- All solid waste will be disposed of at a registered landfill licensed in terms of either the Environment Conservation Act, No. 73 of 1989, or the National Environmental Management: Waste Act, No. 59 of 2008.

8.5.1 Recycling

Whenever possible, a suitable recycle arrangement must be negotiated with a local recycle agent to ensure the re-use of recyclable material. Recycling must aim at sorting as much of the following materials as practical:

- Paper and cardboard
- Aluminium
- Copper
- Metals (other than aluminium and copper)
- Glass
- Organic waste
- Batteries
- Electronic equipment

8.5.2 Pollution management

All possible pollution sources must be identified and all reasonable steps taken to prevent pollution or accidental spillages.

- Ensure that all concentrated potential sources of pollution are protected (bunded) in order to minimise the risk of accidental spillage or pollution. Storage tanks must be bunded in such a way to contain at least 120% of the storage tank's capacity.

8.6 SEWERAGE MANAGEMENT

If applicable sewerage must be installed in accordance with the Municipal regulations and Department of Human Settlement, Water and Sanitation (DHSW&S) requirements.

- Sewerage management must aim at the prevention of pollution and must be maintained on a regular basis.
- Maintenance records must be kept.

8.7 FIRE MANAGEMENT

Refer to emergency preparedness and response paragraph 8.9.1

8.7.1 Accidental fires

Fire safety is a very real risk and must be stringently controlled. No fires will be permitted on site for any reason. If required, a designated smoking area will be provided, and clearly demarcated and signposted, with a facility for safe containment and disposal of cigarette butts.

The following measures must be implemented:

- Adequate firefighting equipment must be available on site and in good working order (including at least one type ABC (all purpose) 2.5 kg fire extinguisher and 3 fire beaters per working area). The persons on site must be trained in the use of such equipment.
- The operator must provide a list of all authorities involved in firefighting in the region. This list must include emergency contact numbers and must be visible at the site office.

8.8 EMISSION MANAGEMENT

Minimisation of fugitive dust emissions: Dust suppression methods as appropriate for the region and approved by the ECO/ESO in line with the EA, must be employed. Refer to erosion and sedimentation control paragraph 7.10.10 and Dust Control paragraph 7.10.26 above.

Gaseous and point source emissions shall be kept to a minimum by ensuring vehicles/generators are:

- well maintained/serviced,
- only used when required and
- not left to idle when not in use.

8.9 GENERAL OPERATIONS OF THE SOLAR PV FACILITY

8.9.1 Emergency/contingency preparedness

Responsible management and operation and the adoption of best practice during the operation of the solar PV facility must take place.

- A list of contact details of suitably qualified technicians (fitters, electricians etc.) must be on site.
- All relevant municipal and provincial water authorities are to be immediately notified in case of flooding, accidental overflow or leakage from the solar PV facility tanks or fuel tankers.
- In terms of the Occupational Health and Safety Act (OHSA), the solar PV facility must have a safety representative, all personnel on the site must know who the safety representative is and safety meetings should take place regularly.
- Maintenance and management roles should be clearly defined.
- All new operational staff and maintenance contractors to undergo general environmental awareness training before working on site, as well as health and safety induction. All staff to be suitably qualified and have the necessary training.
- Suitable response protocols implemented to ensure optimum and safe operation of the solar PV facility and corrective actions must be implemented in the event of any hydrocarbon leaks or spills.
- Hydrocarbon spill remediation product (eg. spill sorb, drizzat mats) must be available on site at all times.
- All staff required to wear the appropriate Personal Protective Equipment and clothing.

- All chemicals must be safely stored with controlled access. Adequate accessibility must be provided to all parts of the plant that need maintenance.
- Communication opened to the general public and a complaints register kept at the site office.
- All emergency equipment to be checked at least every 6 months and serviced as required. A record of this check must be kept.
- All associated records, documentation and registers, reports, monitoring data must be stored on file and available for audit purposes.
- Emergency plans/procedures must indicate revisions (dates reviewed and approved by the OM).
- Any spillage of any hazardous materials including diesel that may occur during construction and operation must be reported immediately to the Department of Water and Sanitation (Northern cape Region: Lower Orange Water Management Area. Tel: 054 338 5800)

8.9.2 Chemical Management (if required)

Proper chemical management is required to minimize or eliminate the risk of environmental damage, as well as the risk of fatalities, illnesses, injuries and incidents arising from the storage, handling, transport and disposal of hazardous material.

- Compliance with the Occupational Health and Safety Act of 1983
- An emergency plan must be made to comply with section 30 (Control of emergency incidents) of the National Environmental Management Act (NEMA), No. 107 of 1997.
- In case of a spill or leak of product, such incident must be reported to all relevant authorities and the Directorate: Pollution Management in accordance with Section 30 (10) of NEMA, No. 107 of 1997.
- All staff on the site must be well trained and have the appropriate PPE in all aspects of the Occupational Health and Safety procedures pertaining to activities of the solar PV facility.
- Access to chemical storage areas must be strictly restricted authorised personnel.
- Material Safety Data Sheets (MSDSs) shall be readily available on site for all chemicals and hazardous substances to be used on site. Where possible the available, MSDSs must additionally include information on ecological impacts and measures to minimise negative environmental impacts during accidental releases or escapes.
- A system shall be in place to ensure that MSDS are available to all personnel (including first-aiders and medical personnel) involved in the transportation, storage, handling, use and disposal of hazardous materials on site.
- Labelling shall be in place on all storage vessels, containers and tanks, where significant risks exist (based on a risk assessment). Labelling shall clearly identify the stored material.
- Personnel using and handling chemicals shall have received proper training for this purpose, using information available from the MSDS.
- For each site establishment, yard or other temporary chemicals storage area, a map indicating the potential sources of pollution and corresponding location of spill kits will be prepared. Spill kits will be placed at sufficient proximity in accordance with the degree of risk for spillage, and a responsible person designated for each.
- Emergency response equipment for spillage containment, fires, explosions, burns, first aid, etc. must be made available.
- Visible safety signs must be placed in areas of potential hazard, e.g. where tap water is not to be used for drinking purposes, indicating the dangers of chlorine or informing of the safety equipment to be worn when entering a certain area, etc.

- Where chemicals such as chlorine are being dosed self contained breathing apparatus (SCBA) must be available and the expiry date is relevant. This apparatus must be kept out of the chlorine room.
- Appropriate response arrangements with external medical providers e.g. ambulance, hospitals, fire brigade etc. must be made and emergency numbers must be easily available and prominently displayed.
- Emergency response procedures appropriate to the hazardous materials and the disposal of the hazardous material must be drafted.
- All emergency equipment to be checked at least every 6 months and serviced as required. A record of all checks must be kept.
- All associated records, documentation and registers, reports, monitoring data relating to the chemical management plan must be stored on file and available for audit purposes.
- Simulation exercise are to be monitored for areas of improvement.

9. DECOMMISSIONING PHASE EMPr

The facility is expected to have a lifespan of 20+ years (i.e. with routine maintenance). The facility infrastructure would only be decommissioned and rehabilitated if it becomes outdated or inadequate, in which case the facility will normally be upgraded and not decommissioned.

It is thus considered unlikely that the facility will be decommissioned. However, it is likely that the facility may be upgraded or enlarged as part of maintenance and replacement of individual components with more appropriate technology/infrastructure available at that time.

However, should decommissioning of the site after approximately 20 years take place, then **the relevant mitigation measures contained under the Construction Phase EMPr above (Section 8) must be applied during decommissioning and therefore is not repeated in its entirety in this section, bar the following general principles:**

- Site preparation activities will include confirming the integrity of the access to the site to accommodate required equipment, preparation of the site (e.g. lay down areas, construction platform) and the mobilisation of construction equipment.
- Disassembled components will be reused, recycled, or disposed of in accordance with best practise or any relevant legislation at the time.
- Specific consideration must be given to ways to minimise waste and wastage in maintenance and the decommissioning phase of the proposed development.
- Equipment used in the plant must be recycled and re-used where possible to avoid the filling of already limited landfill space.
- Batteries must be re-used or recycled.
- As far as possible, local labour must be used for the disassembly and sorting of components for recycling.
- A final public road integrity inspection in conjunction with the provincial traffic authority must take place to ensure that roads which serviced the facility are not left in a degraded state.

APPENDIX 1: DECLARATION OF UNDERSTANDING

VISSERSPAN SOLAR PV FACILITY

DECLARATION OF UNDERSTANDING

I _____

Representing: _____

Declare that the conditions of the Environmental Management Plan/Programme (EMPr) were brought to my attention and that I have read and understood the contents of this EMPr and that a copy of this EMPr has been made available to me.

Site: _____

Date: _____

I also declare that I understand my responsibility in terms of enforcing and implementing the Environmental Specifications as set out in this EMPr.

I also undertake to inform all persons under my supervision of these specifications and the contents of the EMPr.

Signed: _____

Place: _____

Date: _____

Witness 1: _____

APPENDIX 2: START-UP REPORT

To be included after start-up meeting.

APPENDIX 3: ENVIRONMENTAL EDUCATION

ENVIRONMENTAL TRAINING FOR CONSTRUCTION.

The why, what and how...

BUT WHY...

... should we care about the environment?

The environment provides us with everything we need to survive – food, water, fuel, air, etc. Human activity uses resources and has an impact on those resources. Managing our resource use and ensuring that our impact is minimized will ensure that these resources are not depleted.

The Constitution says that all people in South Africa have the right to a healthy environment. If you damage the environment, you are taking away that basic right of others as well as future generations – your children and grandchildren!

...environmental management if there is already conservation?

Historically, development and environmental conservation have been in conflict, because conservation was understood as the protection of resources, and development as the use, or exploitation of resources. The two competed for the same resources, but both are needed! Enter: *SUSTAINABLE DEVELOPMENT*.

Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

Sustainable development thus aims to improve the quality of human life while living within our ecological means = the wise use of resources!

...environmental management of construction?

South Africa's effort to attain sustainable development is based on the concept of Integrated Environmental Management (IEM). The purpose of IEM is to resolve or lessen any negative environmental impacts and to enhance positive aspects of development.

IEM is designed to ensure that the environmental consequences of development proposals are understood and adequately considered in the planning, implementation and management of all developments.

It is intended to guide, rather than impede the development process by providing a method of gathering, analysing and utilising information about the environmental impacts of development. IEM and other principles of Environmental Management are set out in the National Environmental Management Act (No. 107 of 1998) & National Environmental Management Amendment Act (No. 62 of 2008)

BUT WHAT...

...exactly is the 'environment'? What if we're not working near rivers or fynbos or leopard toad habitat?

The environment is not only the 'conservation-worthy' such as rare plants and endangered animals. The environment is everything around you!

It is made up of living things (e.g. people, plants & animals) and non-living things (e.g. soil, water, buildings & cars). People and man-made things are also important parts of the environment.

Protection of the environment means that all living and non-living things are protected. During construction, Environmental Management Programmes (EMPrs) are implemented not only to protect fynbos or leopard toads but also to protect people (both on site and off), property (houses, cars, etc.) as well as natural resources such as water, air and soil.

...do Environmental Management Programmes (EMPrs) do? What does this mean for my contract?

EMPs are tools to facilitate environmental management during the construction phase of development projects and thereby avoid *unnecessary* impacts to the environment.

In the past, the functionality and efficiency of EMPs was hampered by resistance from contractors and engineers, the difficulties of costing for compliance and the lack of legal enforceability.

Now Environmental Management Programmes (EMPs) are stipulated in the Environmental Authorisations (previous RoD) as a condition of the approval to go ahead with the development, in other words it is legally binding.

When you sign a contract to work on a project with an EMP, you are legally bound to comply with that EMP!

Methods of implementing EMPs are becoming more and more stringent and issues of enforceability are being addressed. Those individuals and companies that are familiar with compliance with EMPs will be at a competitive advantage!

...do EMPs consist of?

EMPs usually contain an environmental policy statement, organisational structure detailing the responsibilities and authorities involved in the project, procedures for communication and record-keeping and environmental specifications.

EMPs are adapted to the scale and sensitivity of the construction project. They can be thick documents detailing specifications for every eventuality specifically adapted to the project, or they can be short and brief documents setting out standard environmental procedures and controls. Sometimes EMPs include extensive penalty and incentive schemes.

A WORD ON METHOD STATEMENTS:

A method statement can be requested or proposed when an activity is either not included in the EMP at all, if the EMP specifications for an activity are not deemed adequate, if an activity is required that is not allowed by the EMP, etc. In other words, when the EMP does not give enough information to manage the environmental impact of a specific activity.

A method statement is defined as a written submission by the Contractor setting out the plant, materials, labour and method proposed to carry out an activity. Method statements must provide enough detail that the environmental impact of the activity can be assessed. Method statements must therefore be submitted well in advance of the activity (usually at least 5 days but sometimes more).

Method statements are therefore an extension of the EMP, are also legally binding and are intended to ensure that the environmental implications of an activity outside of the EMP can be addressed.

Method statements usually require the approval by the engineer, the ECO/ESO/DEO, etc. before the activity can take place. If such an activity takes place without approval and results in environmental damage, the contractor is responsible for the cost of rehabilitation/clean-up/etc.

...is an ECO, ESO, DEO, etc.?

EMPs usually require the appointment of an ECO, ESO, DEO, etc. to oversee the implementation of and compliance with the EMP on behalf of the engineer or the contractor(s). Ultimate responsibility for compliance with the EMP lies with the contractor(s) and the engineer.

ESO = Environmental Site Officer – usually on site permanently or often. Can be independent consultant or from contractor/engineer.

ECO = Environmental Control Officer – usually visits site on a regular basis and audits compliance with the EMP. Usually independent consultant.

DEO = Designated Environmental Officer – usually on site permanently, usually member of contractor or engineer site staff.

Organisational structures and responsibilities differ from project to project and depend on environmental sensitivity of the project, scale of the project, etc. Increasingly nowadays, each party is required to appoint their own person responsible for environmental management on site, e.g. the engineer would have an ESO/ECO and the main contractor(s) would have an ESO/DEO etc.

It is therefore important to familiarise yourself with that part of the EMP that deals with organisation and responsibilities for each contract that you are involved in.

BUT HOW...

...do EMPs promote sustainable development?

They don't!

It is the people on site that protect the environment. The EMP, like any other plan or policy, is not worth anything if there isn't a commitment from those working on the project to compliance with the EMP.

...can I ensure my work comply with the EMP?

Environmental specifications in different EMPs can vary from vague to very detailed.

- Firstly, it is obviously important to know what those specifications are, vague or not, so READ THE DOCUMENT! Ignorance does not absolve you from your responsibility. A copy of the EMP must be kept at the site office at all times.
- It also helps to understand WHY those specifications are there – some things are obvious but others may not be. Some EMPs may have specifications that are not relevant. Don't be afraid to question the EMP; it can only increase its efficiency!
- Know where the sensitive areas on site are – watercourses, wetland areas, residential areas, etc. – and be extra vigilant when working in these areas.

Mostly environmental management of construction activities and compliance with EMPs require only common sense and with good housekeeping the battle is half won!

The enclosed environmental hand-out sets out the standard environmental specifications

DO'S AND DON'TS (1)

**Workers & equipment must stay inside the site boundaries at all times.
Nobody may enter areas marked as No-go areas.**

Why? Construction activities, equipment and people cause damage and disturbance to the area surrounding the site. As small an area as possible will be affected if all workers and equipment stay within the site boundaries. This is especially important if there are people who live around the site or natural areas around the site which should not be disturbed.



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

Why? River water may be polluted which could make you sick.
Oil, petrol, diesel, concrete or rubbish will kill plants and animals living in the water. They may also make people who may drink the water downstream sick. Rubbish in the stream also makes it look ugly.
People and machinery working in the stream will damage it and kill plants and animals living in the stream.
It may also cause erosion, which is expensive to repair.
The plants on the edge of the stream bind the soil together and prevent soil from getting washed away.
Soil washed into a stream may affect people using the water downstream (e.g. for irrigation).



**Protect animals on the site.
Ask your supervisor to remove animals found on site.**

Why? Animals are an important part of the environment. All animals have a purpose, even snakes which catch mice and rats. Other important animals are owls, chameleons and frogs.



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

Why? Some plants are rare and may take a long time to grow back, if at all. Plants in the "no go" areas should not be damaged.
Some plants will die if their flowers are picked. Rare plants may be lost.



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

Why? Leaving a burning cigarette butt on the ground may lead to runaway fires which are dangerous to construction workers, people living around the site, equipment, houses, plants and animals.
Smoking near flammable material is dangerous and may cause an explosion.
Lighting a fire without permission may cause a runaway fire (see above).
Reacting quickly to fires that break out will prevent them from spreading and causing damage.

DO'S AND DON'TS (2)



**Work with petrol, oil & diesel only in designated areas.
Report any petrol, oil & diesel leaks or spills.
Use a drip tray under vehicles & machinery.
Empty drip trays after rain & throw away were instructed.**

Why? Designated areas should have measures to protect against petrol, oil & diesel spills. Oil, petrol and diesel can drip onto the soil and soak into it. Plants will not grow and animals will not live in dirty soil. It also looks ugly to people living around the area.

Drip trays will prevent oil, petrol or diesel from soaking into the soil and killing plants and animals.

If drip trays are not emptied they may overflow and pollute the surrounding soil. If oil, petrol or diesel is put into a stream, plants and animals living in the stream will be killed. They may also make people who may drink the water downstream sick. Ask your supervisor where drip tray water may be disposed of on site.

Try to avoid producing dust – wet dry ground and stockpiles.

Why? Dust can be irritating to people and can reduce production on site. It can cause problems such as eye irritations and coughs. It also reduces visibility on and around the site, which can be dangerous to drivers and pedestrians, and can cause damage to the surrounding environment.

Soil should not be made too wet because that will cause safety problems and soil may be washed away.



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

Loud noises are irritating to workers and people living around the site. Loud noise can also be harmful to people (especially children) and affect their hearing.

By keeping vehicles in good condition, loud noise can be prevented.



Use the toilets provided.
Report full or leaking toilets.

Why? Sewage attracts flies and other irritating pests. If the site is near a river or stream, sewage makes the water smell and people who swim in it or use it to wash their clothes will get sick. It also causes plants to grow too much which blocks the river, which may cause flooding of houses and property.

Regular emptying of toilets is hygienic and will also prevent overflows.



Make sure that you eat where there is a rubbish bin nearby.
Never eat near a river or stream.
Put packaging & leftover food into rubbish bins.

Why? Eating areas generate a lot of rubbish and litter (e.g. bottles and packets) which will pollute the site and surrounding areas. Therefore, eating must be done near bins which are placed in the eating.

Rubbish in a stream looks ugly and can be harmful to people's health. It may also kill the plants and animals living in the stream. Rubbish and food left lying around will attract pests (such as rats) which are dangerous to people and cause a health hazard. Also, rubbish left lying around is ugly and unpleasant to look at.



Do not litter—put all rubbish (especially cement bags) into the bins provided.
Ask your supervisor for a bin if there is none. Bins must be provided.
Report full bins to your supervisor.
The responsible person should empty bins regularly.

Why? Litter is ugly. It is also dangerous and unhealthy to adults, children and animals walking around the area.

Not putting the lid back on the bin will cause rubbish to be blown away.

Regularly emptying bins will prevent litter and rubbish flying around the site.



Always keep to the speed limit.
Drivers - check & report leaks.
Ensure loads are secure & do not spill.

Why? Speeding is dangerous to people who live in the area, especially children. Speed kills!
Faulty vehicles are dangerous to the driver, pedestrians and other motorists. Leaks can also pollute the ground and water and smoke from vehicles can cause health problems.
This is a potential danger to other motorists. Also, do not overload vehicles.



Know all the emergency phone numbers.

Why? Prompt reaction to an accident, fire or spill will reduce the risk of serious damage to the environment and to workers.



If rules are broken:

- **Spot fines**
- **Removal from site.**
- **Construction may be stopped.**

Why? Failure to adhere to the EMPr may result in spot fines being issued to the company. It is then the Site Agent's responsibility to collect these fines from guilty individuals and he may even deduct fines off your wages.

The fines are meant to act as an incentive for workers to take the EMPr seriously.

A person may be removed from site if they continually disregard the specifications in the EMPr.

If the EMPr is not adhered to, the local Environmental Authority may stop construction.



Report any breaks, floods, fires, leaks and injuries to your supervisor.

Ask questions!

Thank you for your attention.

APPENDIX 4: BASIC RULES OF CONDUCT

BASIC RULES OF CONDUCT

The following list represents the basic Do's and Don'ts towards environmental awareness, which all participants in this project must consider whilst carrying out their tasks. These are not exhaustive and serve as a quick reference aid.

NOTE: **ALL new site personnel must** attend an environmental awareness presentation. Please inform your foreman or manager if you have not attended such a presentation or contact the ESO.

DO:

- Use the toilet facilities provided – report dirty or full facilities
- Clear your work areas of litter and building rubbish at the end of each day – use the waste bins provided and ensure that litter will not blow away.
- Report all fuel or oil spills immediately & stop the spill continuing.
- Dispose of cigarettes and matches carefully. (Littering is an offence.)
- Confine work and storage of equipment to within the immediate work area.
- Use all safety equipment and comply with all safety procedures.
- Prevent contamination or pollution of streams and water channels.
- Ensure a working fire extinguisher is immediately at hand if any “hot work” is undertaken e.g. welding, grinding, gas cutting etc.
- Report any injury of an animal.
- Drive on designated routes only.
- Prevent excessive dust and noise.

Do not:

- Remove or damage vegetation without direct instruction.
- Make any fires.
- Injure, trap, feed or harm any animals – this includes birds, frogs, snakes, lizards etc.
- Enter any fenced off or marked area.
- Allow cement or cement bags to blow around.
- Speed or drive recklessly
- Allow waste, litter, oils or foreign materials into the stream
- Swim in the dam.
- Litter or leave food laying around

Notes:

If any animals such as tortoises, chameleons or snakes be encountered then do not harm them. The ECO or Site Supervisor must be contacted to remove these safely. The harming of any animal will result in disciplinary action.

Construction and heavy machine operators must be particularly sensitive to staying within access routes and prevention of unnecessary damage. Dust and noise is also of particular concern. Ensure that vehicles and machinery do not leak fuel or oils. Refuelling or maintenance must be done within the maintenance camp area only.

Alien plant clearing and control work teams must be closely supervised.

BASIESE GEDRAGSKODES

Die volgende lys verteenwoordig die moets en moenies vir omgewingsbewustheid wat alle deelnemers aan hierdie projek in ag moet neem tydens die uitvoer van hul take. Hierdie lys is nie volledig nie en dien slegs as 'n vinnige verwysing.

Nota: **alle nuwe terreinpersoneel moet** 'n aanbieding ten opsigte van omgewingsbewustheid bywoon. Indien u nog nie so 'n aanbieding bygewoon het nie, lig asseblief u voorman of bestuurder in of kontak die omgewings terreinbeampte.

Moets:

- Gebruik die beskikbare toilet-geriewe – rapporteer vuil of vol geriewe.
- Maak u werkplek skoon van rommel of bourommel aan die einde van elke dag – gebruik beskikbare vullisdromme en verseker dat rommel nie rondwaai nie.
- Rapporteer alle brandstof- en olie stortings onmiddellik – stop verdere storting.
- Wees versigtig met die wegdoen van sigarette en vuurhoutjies. (rommelstrooi is 'n oortreding.)
- Beperk werkaktiwiteite en die stoor van toerusting tot die onmiddellike werkarea.
- Gebruik veiligheidstoerusting en voldoen aan alle veiligheids-maatreëls.
- Voorkom besoedeling van strome en waterbane
- Verseker dat 'n brandblusser in werkende toestand byderhand is wanneer "warm" werk verrig word bv. Sweis, wegslyp, gasny, ens.
- Rapporteer beseerde diere.
- Ry slegs op aangewese roetes.
- Voorkom oormatige stof en geraas.

Moenie:

- Plantegroei verwyder of beskadig sonder direkte instruksie nie.
- Enige vure maak nie.
- Enige diere dood, beseer, vang of voer nie, insluitende voëls, paddas, slange, akkedisse, ens.
- Enige omheinde of afgesperde areas binnetree nie.
- Sement of sementsakke laat rondwaai nie.
- Vinnig of roekeloos bestuur nie.
- Enige rommel, afval, olie of enige vreemde materiaal in strome laat beland nie.
- In die dam swem nie.
- Rommelstrooi of kos laat rondlê nie.

Notas:

Indien enige diere soos skilpaaie, verkleurmannetjies of slange teëgekom word, moet hulle nie beseer of dood nie. Kontak die otb of ri om hulle veilig te verwyder. Die besering van diere sal lei tot dissiplinêre optrede.

Operateurs van konstruksie- en swaar masjiene moet veral versigtig wees om binne toegangsroetes te bly en om enige onnodige skade te voorkom. Verseker dat voertuie en masjiene nie olie of brandstof lek nie. Brandstofaanvulling en voertuigonderhoud mag slegs binne die onderhoudsarea gedoen word.

Streng toesig moet gehou word oor indringerplantbeheerspanne.

EZIPPHAMBILI EKUNYANZELEKILEYO UKUBA ZENZIWE

Zonke ezi zinto zilandelayo zizinto ekufuneka zenziwe nekufuneka zingenziwanga.

Wonke umntu ofikayo kufuneka afundiswe ngemigaqo kupala. Needa yazisa iforman yakho ikuba awukhange uye kufundiswa.

Izinto emazenziwe

- Sebenzisa izindlu zangasese, yazisa xa kukho umonakalo.
- Zama ukucoca apho ubusebenza khona.
- Sebenzisa imigqomo yenkukuma ungayeki iphaphatieke.
- Yazisa xa ubona ioil echithskalayo okanye ipetrol.
- Cima lozoli cigarette xa ugqibibile ukutshaya
- Zonke izixhobo usebenza zibuyisele apho zihlaka khona xa ucgibile apho zihlala khona xa ugqibibile ukuzisebenzisa.
- Zisebenzise izikhuselixa uzinkiwe.
- Sukugalela izinto emlanjeni.
- Masibekho isicima mlilo xausebenza ngomlilo.
- Yazisa msinyane xa ubone isilwanyana ezonzakeleyo.
- Xauqhuba isithuthi hamba endleleni qha ungafathulinje.
- Naphina zamaungenzi thuli okanye ingxolo xa usebenza.

Emazingenziwa

- Sukususa nesiphina isityalo ungakhange uxelelwe
- Sukwenza mlilo nokuba sekubanda
- Amagqara ukubulala izilwanyana nokuzifida akuvumelekanga
- Sukungena xa kuvaliwe ngaphandle kwe mvume
- Ingxowa zesamente mazincedwe zingahlwa nje
- Sukuqhuba ngesantya esiphakamileyo
- Sukugalele nayiphi into phaya emlanjeni
- Sukuqhuba edameni q oqosha yonk inkukuma

APPENDIX 5: PENALTIES FOR NON-COMPLIANCE

PENALTIES FOR NON-COMPLIANCE

The contractors / sub-contractors must contact the ECO at any stage if unsure about any matter, or if a pollution incident occurs, or vegetation or animals are damaged.

ECO = Environmental Control Officer ESO= Environmental Site Officer

PHASE	Penalty for Non-compliance	
	Bottom range	Top Range*
PRE-CONSTRUCTION PHASE		
Construction area to be marked off before construction starts.		5000
The demarcated area must be maintained throughout the construction phase	500	1000
Site area for stock piling of building material must be demarcated	500	5000
Site area for storing of waste material must be demarcated	500	5000
Fencing off the construction site with mesh fencing of 1.8m, where necessary or other suitable material as agreed on by ECO	500	1000
Sitting of access road/s to be approved by ECO & demarcated with stakes before any construction starts (if applicable)		5000
Temporary route used for construction must be determined on site with ECO (if applicable)	1000	5000
Telecommunications & AC power routes must be determined with the ECO (if applicable)	1000	5000
Sensitive features that may be harmed must be clearly marked or demarcated.	500	2000
Vegetation that may not be removed must be clearly marked or demarcated.	500	5000
Contractor must make the Construction team and all sub-contractors aware of all environmental aspects that could lead to imposition of penalties	100	5000
Contractor to sign Declaration of understanding (DOU) before construction starts		5000
Contractor to assure that all subcontractors be informed and signed DOU	1000	5000
Method statements must be provided on request by the ECO. No work may commence until the Method Statement is accepted by the ECO and Engineer	1000	5000
CONSTRUCTION PHASE		
Information		
A copy of the EMPr & EA or RoD with all the conditions of approval, and the relevant Method Statements must be at site at all times.	200	5000

Construction crew behaviour		
Construction crews may not overnight on site.	200	5000
No amplified music allowed on site	100	200
Construction crew must stay within the demarcated construction area. (Applicable in sensitive sites)	50	500
Eating of meals only allowed in demarcated area	50	500
No pets permitted on site		100
Driving, Parking & Storing of machinery and vehicles are only allowed inside demarcated areas and existing roads	1000	5000
Machinery may only be used on the road and may not disturb the vegetation on the sides of the road except if cleared by ECO. Machinery used must be carefully considered to limit environmental damage	500	5000
No vegetation other than that agreed on may be damaged - i.e. no access to areas outside construction area.	500	2000
No individual may cause unnecessary damage to flora and fauna on, around or near the site	20	2000
No littering allowed (incl. cigarette butts)	50	500
Excavations		
No topsoil may be removed or altered outside the demarcated area and/or which was not specified.		2000
Commercial sources of sand, rock and gravel to be cleared with ECO	200	5000
All surplus material to be taken off-site and be disposed of at approved site	500	5000
Toilets		
Sufficient ablution facilities must be provided		3000
Toilets to be secured to prevent them from falling or blowing over.	100	1000
They must be serviced regularly, (according to the manufacturer's instructions) and kept clean.	100	1000
Everybody on site must make use of ablution facilities	50	1000
Fire Prevention		
All mandatory firefighting equipment (as specified at start-up) must be on site at all times	500	4000
Firefighting equipment to be in good working order and serviced.	500	2000

No fires, including cooking fires, allowed on site	1000	5000
Cement		
Concrete may only be mixed within the boundaries of the demarcated area and/or where was agreed on by the ECO.	500	5000
All excess cement & concrete mixes to be contained on construction site prior to disposal off site	200	5000
Any cement / concrete spillage to be cleaned up immediately.	500	5000
Ready-mix delivery trucks must not carry out the wash down of their trucks on or around the site unless arranged with ECO.	1000	3000
Dust pollution control		
Ensure that loose building material is covered to prevent dust pollution	100	1000
Water run-off		
Contamination of water bodies, rivers, dams or wetlands must be prevented at all cost	500	5000
Rainwater from construction & building site/s must be channelled, contained & allowed to dry out, so as not to transport any pollutants into the surrounding area. Temporary trenches, straw stabilising, brush cutting can be used	500	5000
Waste control		
Sufficient refuse bins must be placed on site	500	2000
Refuse bins must be cleaned on a regular basis	100	1000
General litter / building refuse must be cleaned up on a regular basis from the site	500	3000
Cement-contaminated water; paint; oil; cement slurries etc. must be stored in watertight containers or as agreed with ECO	500	5000
Store all refuse & waste material in wind & animal proof containers	100	1000
Waste must be disposed of at an official waste deposit site on a regular basis.	500	5000
The absence of or inadequate drip trays or bunding facilities	500	5000
Failure to address oil/fuel leaks from on-site machinery	200	5000
Herbicides		
No herbicides or pesticides whatsoever may be used.	200	2000
Construction road		

Road must be upgraded to prevent degradation and erosion of the road and surrounds.	500	5000
Power and Telecommunications supply		
Demarcate power supply route	500	5000
No vehicles to drive through vegetation unless authorised by ECO	500	5000
Storage of equipment may only take place at an area demarcated by the ECO.	500	5000
Working must be done in phases to prevent trampling of vegetation	N/A	
Use of generators and fuel powered equipment		
A watertight cover must be place under the power generator equipment to prevent accidental spillage of fuel & oil seeping into the soil.	500	5000
Drip tray must be able to take 120% of fuel on site	500	5000
All waste material generated from the use of this equipment must be contained and removed from the site	500	5000
Mobile fuel powered equipment must be well maintained and must not have any fuel or oil leaks.	200	5000
Soil Stabilisation		
Ensure that soil material for filling and stabilisation comes from a source that does not contain seeds alien to the area. The source must be cleared with the ECO.	100	2000
Rehabilitation		
Remove rocks and stones and stock pile in area recommended by ECO	500	5000
Remove all plants that can be used for rehabilitation and store on- or off-site in appropriate manner as agreed with ECO	200	5000
Removal of all old concrete and alien materials from site	500	5000
Site must be cleared of all waste and building material	500	5000

*(Large scale / repeated offence)

APPENDIX 6: INFORMATION ON METHOD STATEMENTS

INFORMATION ON METHOD STATEMENT

Method Statements are to be completed by the person undertaking the work (i.e. the Contractor). The Method Statement will enable the potential negative environmental impacts associated with the proposed activity to be assessed.

The Method Statement can only be implemented once approved by the ECO

The Contractor (and, where relevant, any sub-contractors) must also sign the Method Statement, thereby indicating that the works will be carried out according to the methodology contained in the approved Method Statement.

The ECO will use the Method Statement to audit compliance by the Contractor with the requirements of the approved Method Statement.

Changes to the way the works are to be carried out must be reflected by amendments to the original approved Method Statement; amendments require the signature of the ECO denoting that the changed methodology or works are necessary for the successful completion of the works, and are environmentally acceptable. The Contractor will also be required to sign the amended Method Statement thereby committing him/herself to the amended Method Statement.

This Method Statement **MUST** contain sufficient information and detail to enable the ECO to apply their minds to the potential impacts of the works on the environment. The Contractor will also need to thoroughly understand what is required of him/her in order to undertake the works.

THE TIME TAKEN TO PROVIDE A THOROUGH, DETAILED METHOD STATEMENT IS TIME WELL SPENT. INSUFFICIENT DETAIL WILL RESULT IN DELAYS TO THE WORKS WHILE THE METHOD STATEMENT IS REWRITTEN TO THE ER'S AND ESO'S SATISFACTION.

The page overleaf provides a *pro forma* method statement sheet, which needs to be completed for each activity requiring a method statement in terms of the EMPr.

APPENDIX 7: EXAMPLE OF METHOD STATEMENT

PRO-FORMA METHOD STATEMENT

CONTRACT:..... **DATE:**.....

PROPOSED ACTIVITY (give title of method statement and reference number):

--

WHAT WORK IS TO BE UNDERTAKEN (give a brief description of the works):

--

WHERE ARE THE WORKS TO BE UNDERTAKEN (where possible, provide an annotated plan and a full description of the extent of the works):

--

START AND END DATE OF THE WORKS FOR WHICH THE METHOD STATEMENT IS REQUIRED:

Start Date:

End Date:

HOW ARE THE WORKS TO BE UNDERTAKEN (provide as much detail as possible, including annotated maps and plans where possible):

Note: please attach extra pages if more space is required

--

DECLARATIONS

1) ENVIRONMENTAL CONSULTANT AND/OR ENVIRONMENTAL CONTROL OFFICER

The work described in this Method Statement, if carried out according to the methodology described, is satisfactorily mitigated to prevent avoidable environmental harm:

(Signed) (Print name)

(Signed) (Print name)

Dated: _____

2) PERSON UNDERTAKING THE WORKS

I understand the contents of this Method Statement and the scope of the works required of me. I further understand that this Method Statement may be amended on application to other signatories and that the ESO will audit my compliance with the contents of this Method Statement

(Signed) (Print name)

Dated: _____

3) THE APPLICANT

The works described in this Method Statement are approved.

(Signed) (Print name) (Designation)

Dated: _____

APPENDIX 8: CONTRACTOR ENVIRONMENTAL CHECKLIST

CONTRACTOR/S REPRESENTATIVE: ENVIRONMENTAL WEEKLY CHECKLIST

SITE: _____

PHASE OF WORK AND % OF COMPLETION: _____

ENVIRONMENTAL ASPECT	YES/ NO (✓ or X)	COMMENTS
How many workers are on site		
All new personnel on site are aware of the contents of the EMPr and have been through the environmental awareness course.		
Contractor's camp is neat and tidy and the labourers' facilities are of an acceptable standard.		
Sufficient and appropriate firefighting equipment is visible and readily available.		
Waste control and removal system is being maintained.		
Refuse bins in place and maintained		
Toilets are in place and clean		
Demarcation and other fences are being maintained.		
What machinery are on site		
Drip trays are being utilised where there is a risk of incidental spillage		
Bunds/ drip trays are being emptied on a regular basis (especially after rain).		
No leakages (oil & fuel) are visible from construction vehicles		
No go areas, remaining natural features and trees have not been damaged.		
Dust control measures (if necessary) are in place and are effectively controlling dust.		
Noise Control measures (if necessary) is in place and is working effectively.		
Erosion control measures (if necessary) are in place and are effective in controlling erosion. (Access road, site areas etc.)		
Stockpiles are located within the boundary of the site, do not exceed 2 m in height and are protected from erosion.		

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

To be submitted at the end of each week to the Environmental Site Officer (ESO)

Received by:

Environmental Site Officer: :..... Sign:..... Date:.....

APPENDIX 9: ECO/ESO REPORT/CHECKLIST

ECO CONSTRUCTION SITE ENVIRONMENTAL INSPECTION REPORT

Project Name: _____

Report no _____

Main Contractor: _____

Date _____

ECO/ESO: _____

EnviroAfrica Ref. no. _____

ENVIRONMENTAL ASPECT	RATING	FINDINGS & RECOMMENDATIONS
RATING: 1 = EXTREMELY POOR 2 = POOR 3 = AVERAGE 4 = GOOD 5 = EXCELLENT		
1. DEMARCATION Boundaries of "No-Go" areas, construction sites, -offices, temporary storage areas as well as labourer's facilities must be demarcated (EMP and ECO requirements) and maintained for the length of the construction period.		
2. NO-GO AREAS Identified "No-Go Areas", must be demarcated for protection from construction damage (including secondary impact). <ul style="list-style-type: none"> • All areas outside of the demarcated construction site(s) and access road(s) to be regarded as No-Go areas, including remaining natural veld identified trees. • Special attention to identified areas with significant vegetation. 		
3. SEARCH & RESCUE All flora identified for search & rescue must be removed before any construction take place and re-used in pre-approved way.		
4. VEGETATION & TOPSOIL REMOVAL Before any construction or earthworks, topsoil must be stripped (>150mm) and stockpiled for rehabilitation/ landscaping. Stockpiles: <ul style="list-style-type: none"> • must be protected (erosion) and stored separately. • may not be moved further than 50m or mixed with any other soil. • must be convex and should not exceed 2m in height. In addition: <ul style="list-style-type: none"> • Cleared areas must be stabilized. 		

ENVIRONMENTAL ASPECT	RATING	FINDINGS & RECOMMENDATIONS
RATING: 1 = EXTREMELY POOR 2 = POOR 3 = AVERAGE 4 = GOOD 5 = EXCELLENT		
<ul style="list-style-type: none"> Burning or burying of cleared vegetation is prohibited (may be used for mulch or slope stabilisation on site). 		
5. CONSTRUCTION CAMP & SITE OFFICES Must be demarcated, organised and free of day-to-day litter (good housekeeping standards).		
6. LABOURER'S FACILITIES Facilities must be of acceptable standards suitably demarcated, well maintained, neat and tidy and with adequate ablution facilities.		
7. ENTRANCE AND HAUL ROADS Only approved entrance and haul roads may be used. No new roads or parking areas may be developed without written approval from the ECO.		
8. MANDATORY SITE EQUIPMENT Mandatory site equipment must be in place, well maintained and in accordance with EMPr and ECO requirements. <ul style="list-style-type: none"> Sufficient refuse bins, well placed and cleaned regularly. Sufficient fire extinguishers, readily available, maintained and functional. Drip trays must be used at all fuel and oil storage and refuelling sites. Toilets and sanitation facilities must be kept clean neat and hygienic. 		
9. FUEL STORAGE Fuel storage areas must be situated within the demarcated construction camp site (or an area approved by the ECO). <ul style="list-style-type: none"> Larger containers must be banded (containment of accidental spillages). Drip trays must be used during refuelling or under stationary refuelling vehicles. Fuel and oil storage and refuelling sites must be maintained. 		
10. STOCKPILING & TEMPORARY STORAGE May only be placed on pre-approved sites, demarcated, stabilised or organised and neat.		
11. WASTE CONTROL The contractor is expected to control all construction related waste material and general litter on actual construction sites and its immediate surroundings.		

ENVIRONMENTAL ASPECT	RATING	FINDINGS & RECOMMENDATIONS
RATING: 1 = EXTREMELY POOR 2 = POOR 3 = AVERAGE 4 = GOOD 5 = EXCELLENT		
<ul style="list-style-type: none"> Waste management must be in accordance with the EMP, of acceptable standards, with regular removal of general waste, hazardous waste as well as construction waste (e.g. concrete waste and spoil). 		
12. CEMENT MIXING & BATCHING AREAS Mixing areas must be approved by the ECO, suitably demarcated and may not result in pollution. <ul style="list-style-type: none"> Polluted cement water may only be released into sedimentation ponds. Sedimentation ponds must be maintained and cleaned regularly (and reinstated after use). 		
13. CONSTRUCTION VEHICLE MAINTENANCE Construction vehicles must be in good working order and well maintained to prevent oil and fuel leakages and to reduce noise levels.		
14. HEAVY EARTHMOVING EQUIPMENT Construction vehicles and equipment may only operate <u>within</u> the demarcated site boundaries (and approved access roads), especially heavy earthmoving vehicles.		
15. DUST CONTROL Adequate control measures must be in place to prevent dust nuisance or pollution (entrance-, haul roads and exposed surfaces). <ul style="list-style-type: none"> Areas of concern must be watered regularly during construction AND periods of strong winds, BUT must take water saving into account. 		
16. EROSION CONTROL Erosion resulting from works must be controlled. <ul style="list-style-type: none"> Temporary and permanent drainage areas must be maintained. Erosion damage and damage in drainage courses must be reinstated. 		
17. NOISE CONTROL Effective noise control measures must be in place and acceptable working hours must be kept (deviations must be approval by the ECO).		

ENVIRONMENTAL ASPECT	RATING	FINDINGS & RECOMMENDATIONS
RATING: 1 = EXTREMELY POOR 2 = POOR 3 = AVERAGE 4 = GOOD 5 = EXCELLENT		
18. ARCHAEOLOGICAL & HERITAGE FINDS Should any archaeological or heritage remains be exposed during excavations or any activity on site, these must immediately reported to The site agent/engineer, the ECO HWC or SAHRA.		
19. METHOD STATEMENTS Method statements must be submitted and approved before commencement of the works. Possibly Required: <ol style="list-style-type: none"> 1. Demarcation & No-Go Areas (Map) 2. Clearing of vegetation & topsoil conservation 3. Stockpiling & temporary storage 4. Construction camp & site offices 5. Labourer's facilities 6. Mandatory site equipment 7. Fuel storage 8. Entrance & haul roads 9. Waste management 10. Cement/Concrete mixing 11. Dust control 12. Erosion control 13. Noise control 14. Rehabilitation Additional Method Statements		
20. ENVIRONMENTAL CONDUCT Environmental conduct of construction personnel must be acceptable (e.g. no burning or burying of refuse; no littering and no cement bags or other construction waste material lying around).		
21. ENVIRONMENTAL CHECKLIST The contractor must ensure that the weekly environmental checklist is completed at the end of each week and it must be available at the site offices.		
22. REHABILITATION On completion of the project or phase, all areas impacted by the construction activities must be reinstated and/or rehabilitated to the satisfaction of the ECO with emphasis on the following:		

ENVIRONMENTAL ASPECT	RATING	FINDINGS & RECOMMENDATIONS
RATING: 1 = EXTREMELY POOR 2 = POOR 3 = AVERAGE 4 = GOOD 5 = EXCELLENT		
<ul style="list-style-type: none"> • Site offices must be removed and the areas rehabilitated or reinstated to the satisfaction of the ECO. • Labourer's facilities must be removed and the areas rehabilitated or reinstated to the satisfaction of the ECO. • All construction site areas must be rehabilitated or reinstated to the satisfaction of the ECO. • All temporary fencing and demarcation must be removed and the areas reinstated to the satisfaction of the ECO. • Temporary storage areas must be rehabilitated or reinstated to the satisfaction of the ECO. • All remaining construction material must be removed and the areas rehabilitated or reinstated to the satisfaction of the ECO. • Any additional disturbed areas must be rehabilitated or reinstated to the satisfaction of the ECO. 		
23. SPOT FINES & PENALTIES Spot fines and penalties must be recorded and documented by the ECO (in accordance with the EMPr).		
24. FIXED POINT PHOTOS Photographs must be taken by the ECO, Site Engineer and or Site Manager, prior to, during and immediately after construction as visual reference. These photographs must be stored with other records relating to the EMPr.		

ECO COMMENTS

(Additional page/s for comments may be added)

End of report

ECO/ESO Signature:_____

APPENDIX 10: Environmental incident report format

ENVIRONMENTAL INCIDENT REPORT

No. _____

PROJECT NAME

PROJECT LOCATION

SITE AGENT

DATE OF INCIDENT

TIME

BRIEF DESCRIPTION AND CAUSE OF INCIDENT:

WHAT IMMEDIATE ACTIONS / CONTROL MEASURES WERE TAKEN:

WHAT CORRECTIVE ACTIONS WERE TAKEN TO ENSURE NO REPEATS OF THE INCIDENT:

ECO/ESO RESPONSE TO INCIDENT AND RECOMMENDATIONS:

IS THIS INCIDENT A: ☐ FIRST OFFENCE ☐ SECOND OFFENCE ☐ THIRD OFFENCE

SIGNATURE OF SITE AGENT: _____

DATE _____

SIGNATURE OF ECO/ESO _____

DATE _____

REMEMBER TO BE FACTUAL WHEN DESCRIBING THE INCIDENT

APPENDIX 11: Environmental complaints register

COMPLAINTS REGISTER FORM

(To be completed by Site Agent/Supervisor)

[illegible]

APPENDIX 12: Method statement register

METHOD STATEMENT REGISTER

SITE AGENT:

PROJECT NAME:

CONTRACTOR:

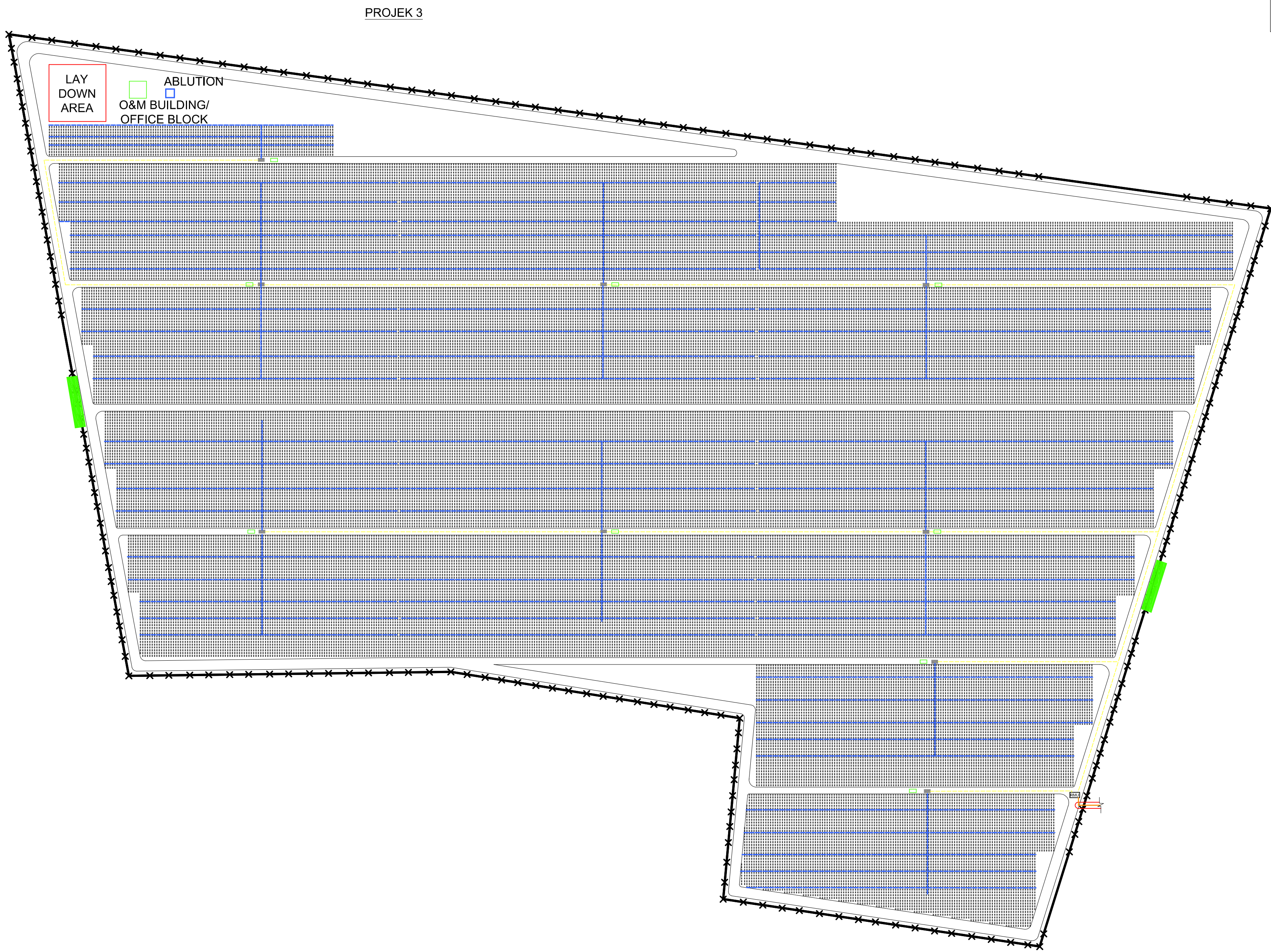
PROJECT LOCATION:

No.	METHOD REFERENCE	STATEMENT	ACTIVITY	DATE CREATED	DATE RECEIVED	CREATED BY	ACCEPTED / REJECTED	DATE APPROVED	APPROVED BY
1			Demarcation						
2			Clearing of vegetation and topsoil removal						
3			Stockpiling						
4			Temporary storage facilities						
5			Construction camp and site offices						
6			Fuel storage						
7			Labourer's facilities						
8			Entrance and haul roads						
9			Mandatory site equipment						
10			Waste management/control						
11			Cement mixing and batching areas						
12			Construction vehicle maintenance						
13			Dust control						
14			Erosion control						
15			Noise control						
16			Chance Finds Procedure (archaeological / heritage)						
17			Rehabilitation						
18			Additional Method Statements (waste site licence) ...						

APPENDIX 13: Maps & Drawings

LEGEND	
SYMBOL	DESCRIPTION
	CENTRALISED INVERTER/TRANSFORMER STATION
	MAIN RING UNIT
	SOLAR MODULE
	MV CABLE UNDER GROUND
	LV PVC CABLES
	FENCE
	ACCESS GATES
	CABLE SLEEVE
	12m x 6m BATTERY BANK
	MV CABLE TO SUBSTATION

PROJECT 3	
FENCING LENGTH	6 695.95 m
MV CABLE LENGTH	5 662.43 m



NOTES / LEGEND

GENERAL

- THE CONTRACTOR IS RESPONSIBLE FOR ENSURING THAT ALL MATERIALS AND WORKMANSHIP CONFORM WITH THE DETAILS AND SPECIFICATIONS SHOWN ON THIS DRAWING AND ALL RELEVANT SABS SPECIFICATIONS, IRRESPECTIVE OF WHETHER THE ENGINEER HAS INSPECTED THE WORKS ON SITE OR NOT.
- ALL DIMENSIONS AND LEVELS TO BE CHECKED ON SITE AND CORRELATED WITH THE ENGINEER'S DRAWINGS BEFORE CONSTRUCTION COMMENCES.
- NO SCALING WITH SCALE RULER FROM THE DRAWING IS PERMITTED. THE CONTRACTOR MUST ENSURE THAT HE GETS THE CORRECT DIMENSIONS FROM THE ENGINEER BEFORE CONSTRUCTION COMMENCES.

DRAWING NOT PRINTED TO SCALE
REDUCED FROM A0 TO A3.

ISSUE DATE: 25 Aug 2020
DRAWING SIZE: A0
REVISION: 1

X PRELIMINARY
INFO ONLY
FOR TENDER
FOR CONSTRUCTION
AS-BUILT

LAYERS USED

PEN 2

NUMBER	REVISION	DRAWING DESCRIPTION
--	--	--

APPROVED BY COUNCIL / CLIENT

CITY ENGINEER / CLIENT

REG. NO.

DATE

AMENDMENTS CODE

A.B.C. / BEFORE TENDER	A. BY CLIENT
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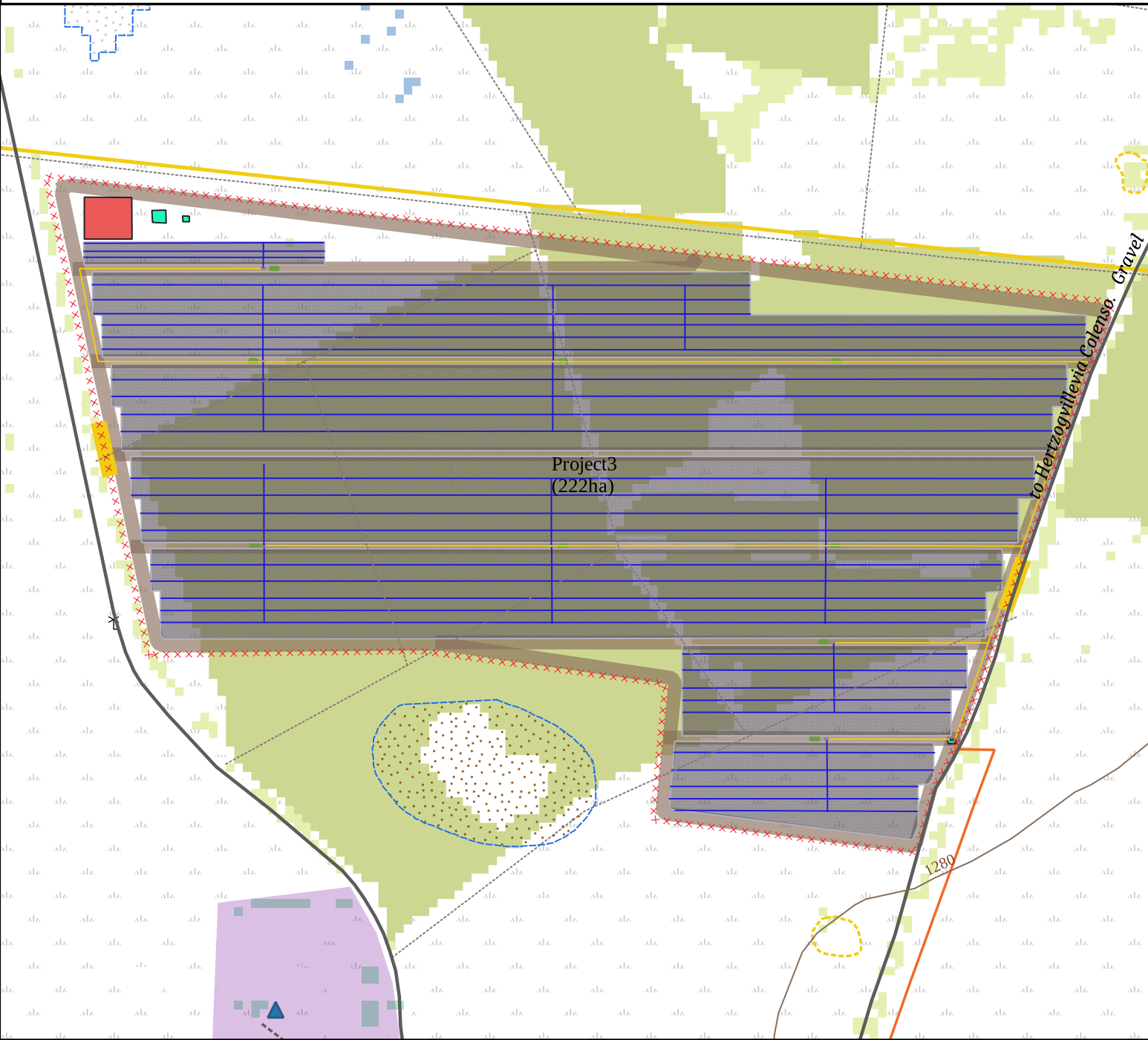
CLIENT

bvi Engineering & Construction
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Upington 0820 889999

DBBEE Level 1

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Layout overlay to indicate relation to sensitive areas, as per the requirements of the relevant authority, for the development of a Solar Facility on Visserspan, Farm 40, Dealesville, Free State.



SITE LAYOUT (Visserspan Farm No 40)

Legend

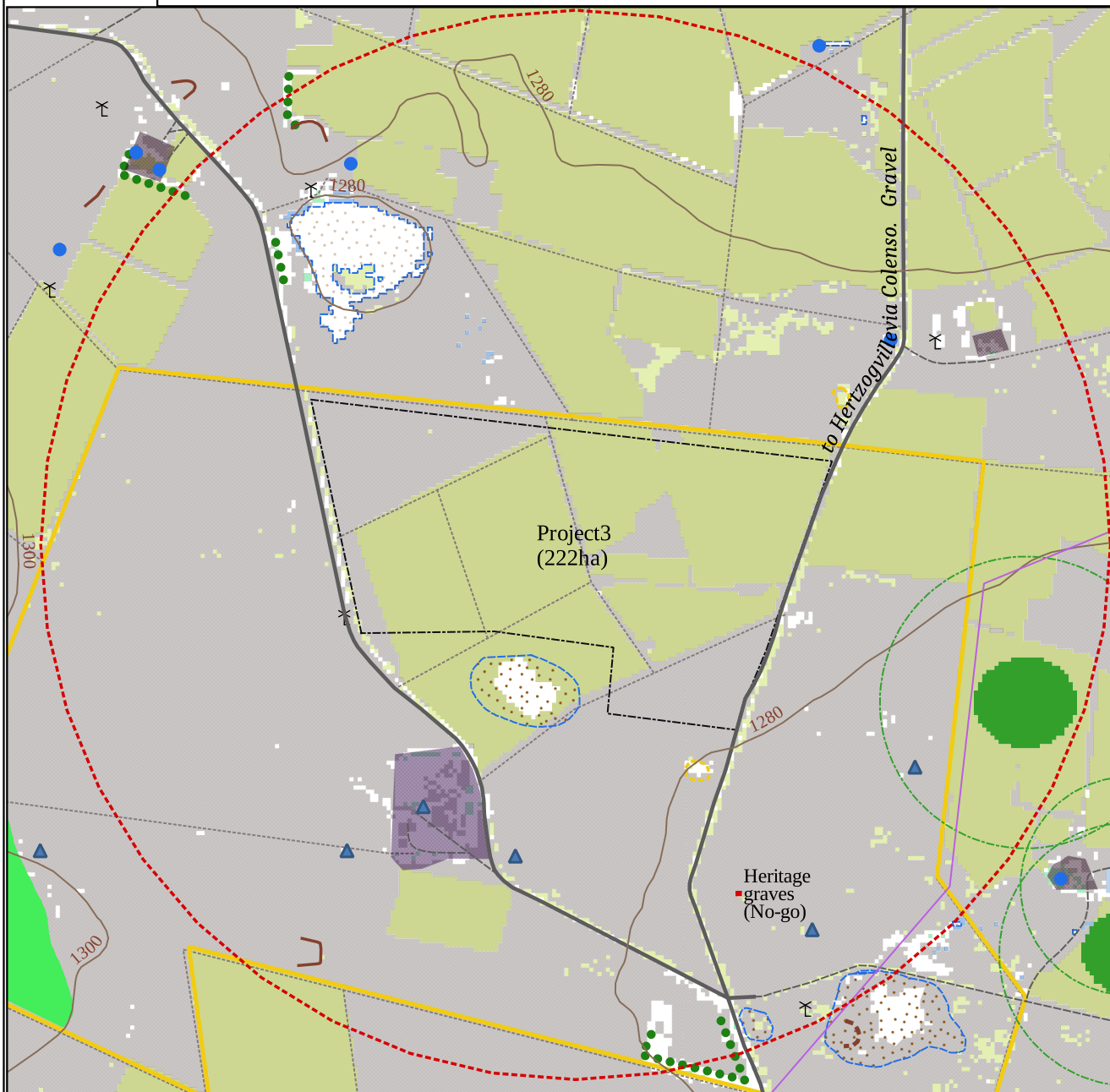
- Farm40Boundary
- Roads
 - OTHER ACCESS
 - SECONDARY ROAD
 - On-site Boreholes
 - Contours
- WaterPoints
 - Wind Pump
- Site Elements
 - Homestead
 - Pan
- Structures
 - Fence
- Landcover2018
 - commercial annual crops rain-fed / dryland
 - contiguous & dense plantation forest
 - dry pans
 - herbaceous wetlands (currently mapped)
 - low shrubland (other)
 - natural grassland (used for grazing)
- Layout
 - LV_cables
 - LV PVC cables
- MV cable Underground
 - MV cables
- LaydownArea
 - Laydown Area
- Access
 - Gates
- Buildings
 - O&M, Office, Ablution
- RMU
 - RMU
- MV cable to substation
 - To substation
- Transformer
 - Transformer station
- Solar Array
 - PV Arrays
- Internal Roads
 - Roads
- BatteryBank
 - Battery banks

Notes:
All Natural Grassland is used for grazing
Layout per drawing 87309.00 dated 25 Aug 2020 by bvi Engineers

Description

Status Quo Map to describe the on-site attributes as per the requirements of the relevant authority, for the development of a Solar Facility on Visserspan, Farm 40, Dealesville, Free State.

STATUS QUO MAP (Visserspan Farm No 40)



Legend

Farm40Boundary	Artificial Landforms
Project Boundaries	Excavation
Project3-(222ha)	Landcover 2018_1km Buffer
Contours	commercial annual crops pivot irrigated
Water Points	commercial annual crops rain-fed / dryland
Water Reservoir	contiguous & dense plantation forest
Wind Pump	dry pans
On-site Boreholes	herbaceous wetlands (currently mapped)
Structures Within Buffer	herbaceous wetlands (previously mapped)
Homestead	low shrubland (other)
Site Elements	* natural grassland (used for grazing)
Homestead	Irrigation 500m Buffer
No Go area	Contours
Pan	Roads
Historical Sites	Other Access
Barrier Structures within Buffer	Secondary Road
Anti Erosion Wall	
Avenue	
Dam Wall	
Fence	

Notes

Data sources:
Dept of Rural Development and Land Reform, Eskom holdings, Specialist reports for applications

The following attributes do not occur on site or within 1km -
Ridgelines, High potential Agricultural land, Tourism facilities.

* All Natural Grassland is used for grazing. Patches severely degraded.
Rotation grazing practiced. Timelapse satellite imagery indicates degradation.

DATUM "World Geodetic System 1984"

Compiled by
SC Lategan for EnviroAfrica
July 2020



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REGIONAL MAP (Visserspan Farm No 40)





















Description

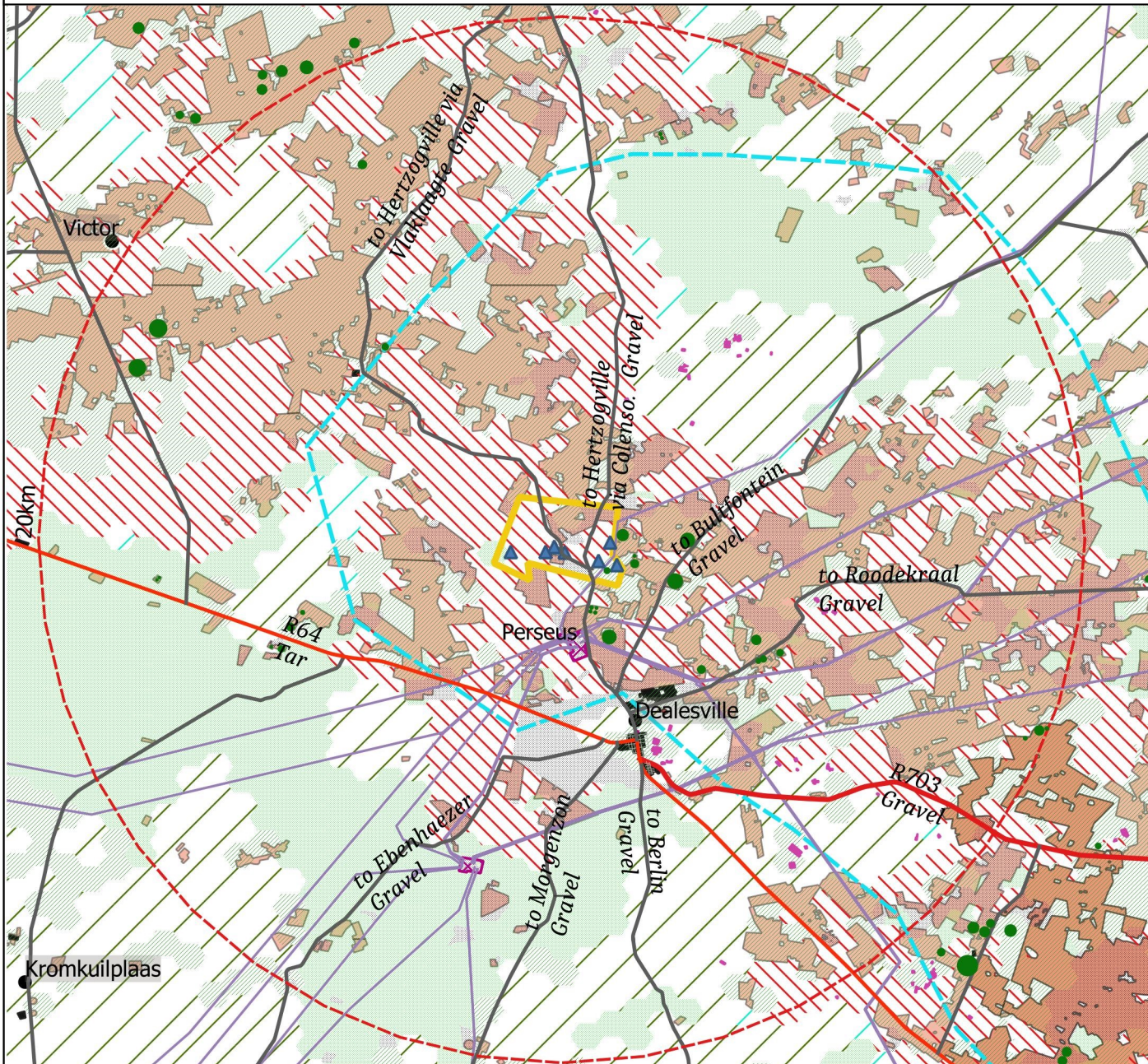
Regional Map to describe the regional attributes as per the requirements of the relevant authority, for the development of a Solar Facility on Visserspan, Farm 40, Dealesville, Free State.

Notes

20 km Radius from centroid of Farm 40
Boreholes to be used for respective projects
Source RDLF, 2017 - Cultivated land, Infrastructure facilities, Industrial installations, Residential Areas, Roads
Irrigated - manually digitized from Google Earth Satellite image (latest available 2016)
Potential Viewshed from VIA by SC Lategan. Read with full report.
Terrestrial CBA source SANBI, 2015

Legend

	20km Radius	Roads	
	Farm 40 Boundary		Arterial Road
	Boreholes (to be used for project)		Main Road
	Electricity Transmission lines		Secondary Road
Infrastructure Facilities		Terrestrial CBA's (2015)	
	Sewage works		CBA1
	Electrical Substation		CBA2
	Industrial Installations		Degraded
	Residential Areas		ESA1
	Cultivated land (2017)		ESA2
	Irrigated (only Pivot)		Other
	Potential Viewshed		



0 2.5 5 km

DATUM "World Geodetic System 1984"

Compiled by SC Lategan for EnviroAfrica
July 2020



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APPENDIX 14: Specialist studies

APPENDIX 15: Proof of EMPr Compliance

APPENDIX 16: Eskom Requirements

Eskom requirements for work in or near Eskom servitudes.

1. Eskom's rights and services must be acknowledged and respected at all times.
2. Eskom shall at all times retain unobstructed access to and egress from its servitudes.
3. Any Eskom consent which may be received does not relieve the developer from obtaining the necessary statutory, land owner or municipal approvals.
4. Any cost incurred by Eskom as a result of non-compliance to any relevant environmental legislation will be charged to the developer.
5. If Eskom has to incur any expenditure in order to comply with statutory clearances or other regulations as a result of the developer's activities or because of the presence of his equipment or installation within the servitude restriction area, the developer shall pay such costs to Eskom on demand.
6. The use of explosives of any type within 500 metres of Eskom's services shall only occur with Eskom's previously written permission. If such permission is granted the developer must give at least fourteen working days prior notice of the commencement of blasting. This allows time for arrangements to be made for supervision and/or precautionary instructions to be issued in terms of the blasting process. It is advisable to make application separately in this regard.
7. Changes in ground level may not infringe statutory ground to conductor clearances or statutory visibility clearances. After any changes in ground level, the surface shall be rehabilitated and stabilised so as to prevent erosion. The measures taken shall be to Eskom's satisfaction.
8. Eskom shall not be liable for the death of or injury to any person or for the loss of or damage to any property whether as a result of the encroachment or of the use of the servitude area by the developer, his/her agent, contractors, employees, successors in title, and assignees. The developer indemnifies Eskom against loss, claims or damages including claims pertaining to consequential damages by third parties and whether as a result of damage to or interruption of or interference with Eskom's services or apparatus or otherwise. Eskom will not be held responsible for damage to the developer's equipment.
9. No mechanical equipment, including mechanical excavators or high lifting machinery, shall be used in the vicinity of Eskom's apparatus and/or services, without prior written permission having been granted by Eskom. If such permission is granted the developer must give at least seven working days' notice prior to the commencement of work. This allows time for arrangements to be made for supervision and/or precautionary instructions to be issued by the relevant Eskom Manager

Note: Where and electrical outage is required, at least fourteen work days are required to arrange it.

10. Eskom's rights and duties in the servitude shall be accepted as having prior right at all times and shall not be obstructed or interfered with.
11. Under no circumstances shall rubble, earth or other material be dumped within the servitude restriction area. The developer shall maintain the area concerned to Eskom's satisfaction. The developer shall be liable to Eskom for the cost of any remedial action which has to be carried out by Eskom.

12. The clearances between Eskom's live electrical equipment and the proposed construction work shall be observed as stipulated by *Regulation 15* of the *Electrical Machinery Regulations of the Occupational Health and Safety Act, 1993 (Act 85 of 1993)*.
13. Equipment shall be regarded electrically live and therefore dangerous at all times.
14. In spite of the restrictions stipulated by Regulation 15 of the Electrical Machinery Regulations of the Occupational Health and Safety Act, 1993 (Act 85 of 1993), as an additional safety precaution, Eskom will not approve the erection of houses, or structures occupied or frequented by human beings, under the power lines or within the servitude restriction area.
15. Eskom may stipulate any additional requirements to highlight any possible exposure to Customers or Public to coming into contact or be exposed to any dangers of Eskom plant.
16. It is required of the developer to familiarise himself with all safety hazards related to Electrical plant.
17. Any third party servitudes encroaching on Eskom servitudes shall be registered against Eskom's title deed at the developer's own cost. If such a servitude is brought into being, its existence should be endorsed on the Eskom servitude deed concerned, while the third party's servitude deed must also include the rights of the affected Eskom servitude.

Information regarding Eskom requirements (EMPr, Appendix 16) obtained from:

John Geeringh (Pr Sci Nat), Senior Consultant Environmental Management, Eskom GC: Land Development, MegaWatt Park

APPENDIX 17: Licences, Authorisations and Permits/Permissions

APPENDIX 18: BirdLife South Africa Position Statement – Solar Developments
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BirdLife South Africa

Position Statement on the effect of solar power facilities on birds

- BirdLife South Africa supports the use of renewable energy resources, including solar energy generation, in reducing greenhouse gas emissions.
- BLSA acknowledges that South Africa has been identified as one of the top 10 developing countries which needs to reduce its carbon emissions significantly.
- BLSA acknowledges the increased rate of energy demand in South Africa of 3% per year and thus the importance of solar energy and other renewable energy resources as sources of alternative energy.
- BLSA acknowledges that South Africa is amongst the top 10 countries in the world most suited for the generation of solar energy due to the percentage of incoming shortwave radiation.
- Two types of solar power generation are currently available:
 - o Solar photovoltaic (PV) electricity generation involves turning solar radiation directly into electricity in a solar panel.
 - o Concentrated Solar Power (CSP) farms (plants) consist of a series of mirrors/heliostats/trough panels which reflect sunlight. The reflected heat is concentrated onto a central receiver tower and standby focal points. The heat is used to raise steam to drive turbines and generators.
- BLSA's main concerns with PV and CSP farms are the displacement or the exclusion of nationally and/or globally threatened, rare, endemic, or range-restricted bird species from important habitats.
- CSP farms potentially have greater impact on birds than PV farms because of the associated central receiver tower, standby focal points and heliostats.
- Anticipated avifaunal issues concerned with the CSP farms are:

Issues relating to the CSP itself:

- Collision with heliostats (mirrors) and the central receiver tower. Reflective surfaces act as attractants for approaching birds. These surfaces may be confused for large water bodies (and can have similar effects as windows) and causes disorientation of flying birds, resulting in injury and/or death.
 - Mirrors are used to concentrate sunlight to create large amounts of heat and the heat could cause mortalities of close overflying birds.
 - Birds could be burnt when in the vicinity of the central receiver or when entering the standby focal points (specifically relevant to swallows, swifts and martins which spend most of their time in flight).
 - Pollution caused by leaching of chemical substances into waste water evaporation ponds. This could be lethal to birds using these ponds. Artificial evaporation ponds serve as an additional attractant to waterbirds, which could increase cumulative collision, burning or poisoning impacts.
 - Roosting, foraging, and nesting on or around the CSP plant infrastructure (i.e. attracting more birds to the solar facility).
 - Loss of habitat and disturbance of resident bird species caused by construction, operation and maintenance activities (of CSP and PV).
- BLSA acknowledges that the above impacts became significant only when a great number of birds occur within the vicinity of the CSP and are thus exposed to these mortality factors.

Issues relating directly to the associated infrastructure (CSP and PV):

- Collision and electrocution caused when perching on or flying into powerline infrastructure.
 - Habitat destruction and disturbance/exclusion of avifauna through construction (short-term) and maintenance (long-term) of new powerline infrastructure.
 - Habitat destruction and disturbance of birds caused by the construction and maintenance of new roads, pipelines and visitor centres.
- BLSA is also greatly concerned that avifaunal attractants may amplify the above impacts.

These attractants may be:

- Open water evaporation ponds on or in the vicinity of the CSP.
 - Heliostats (mirrors) and/or parabolic troughs.
 - Foraging spots under or around the panelling.
- Birds attracted to the above sources may enter one or more focal points when descending and, as a result, they could be burnt to death.
- BLSA recommends mitigation of avifaunal impacts by:

- Not constructing CSP plants in formally or informally protected areas or Important Bird Areas (IBAs), but in areas of low relevance for nature conservation.
 - Constructing CSP farms in already degraded areas.
 - Avoiding construction near drainage lines with trees where birds will be concentrated (e.g. in Karoo where most CSP farms are likely to be constructed).
 - Avoiding construction near large trees (e.g. in the Karoo) which serve as nesting and roosting sites for raptors and vultures.
 - Building solar arrays (a linked assembly of heliostats) outside known waterbird flight paths.
 - Not using chemicals/pesticides for the maintenance of land/vegetation and rather use mowing or grazing to retard vegetation growth.
 - Keeping evaporation ponds clean of pollutants.
 - Constructing new powerlines in such a way that they have minimal impact on birds (i.e. bird-friendly designs, appropriate wire marking devices).
 - Deconstruction of the plant after the expected life span of 20 years.
- The above mitigation factors should be rigorously applied to ensure minimal disruption of key bird species and their habitats.

References:

- Gunerhan, H., Hepbasli, A. & Giresunli, U. 2009. Environmental impacts from the solar energy systems. *Energy Sources, Part A: Recovery, Utilization and Environmental Effects* 31: 131-138.
- McCrary, M.D., McKernan, R.L., Schreiber, R.W., Wagner, W.D. & Sciarotta, T.C. 1986. Avian mortality at a solar energy power plant. *Journal of Field Ornithology* 57: 135-141.
- Tsoutsos, T., Frantzeskaki, N. & Gekas, V. 2005. Environmental impacts from solar energy technologies. *Energy Policy* 33: 289-296.
- Wachholz, C. & Coath, M. 2009. Birdlife European Climate Change Coordination Group: Guidelines for good practices to deploy Solar energy.

APPENDIX 19: Chance Fossil Finds Procedure

APPENDIX. CHANCE FOSSIL FINDS PROCEDURE: PV solar projects on Farm Viisserspan No. 40 near Dealesville, Free State Province	
Province & region:	Free State Province, Tokologo Local Municipality
Responsible Heritage Resources Agency	SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Phone: +27 (0)21 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za)
Rock unit(s)	Permian Tierberg Formation (Ecca Group), Late Caenozoic pan sediments, calcrete hardpans.
Potential fossils	Petrified wood, rare vertebrate remains in Tierberg mudrocks. Mammalian teeth, bones and horncores (e.g. associated with hyaena dens), fossil peats, non-marine molluscs and trace fossils (e.g. calcretised termitaria, burrows) within Caenozoic sediments.
ECO protocol	1. Once alerted to fossil occurrence(s): alert site foreman, stop work in area immediately (<i>N.B.</i> safety first!), safeguard site with security tape / fence / sand bags if necessary.
	2. Record key data while fossil remains are still <i>in situ</i> : <ul style="list-style-type: none"> • Accurate geographic location – describe and mark on site map / 1: 50 000 map / satellite image / aerial photo • Context – describe position of fossils within stratigraphy (rock layering), depth below surface • Photograph fossil(s) <i>in situ</i> with scale, from different angles, including images showing context (e.g. rock layering)
	3. If feasible to leave fossils <i>in situ</i> : <ul style="list-style-type: none"> • Alert Heritage Resources Agency and project palaeontologist (if any) who will advise on any necessary mitigation • Ensure fossil site remains safeguarded until clearance is given by the Heritage Resources Agency for work to resume
	3. If <i>not</i> feasible to leave fossils <i>in situ</i> (emergency procedure only): <ul style="list-style-type: none"> • <i>Carefully</i> remove fossils, as far as possible still enclosed within the original sedimentary matrix (e.g. entire block of fossiliferous rock) • Photograph fossils against a plain, level background, with scale • Carefully wrap fossils in several layers of newspaper / tissue paper / plastic bags • Safeguard fossils together with locality and collection data (including collector and date) in a box in a safe place for examination by a palaeontologist • Alert Heritage Resources Agency and project palaeontologist (if any) who will advise on any necessary mitigation
	4. If required by Heritage Resources Agency, ensure that a suitably-qualified specialist palaeontologist is appointed as soon as possible by the developer.
	5. Implement any further mitigation measures proposed by the palaeontologist and Heritage Resources Agency
Specialist palaeontologist	Record, describe and judiciously sample fossil remains together with relevant contextual data (stratigraphy / sedimentology / taphonomy). Ensure that fossils are curated in an approved repository (e.g. museum / university / Council for Geoscience collection) together with full collection data. Submit Palaeontological Mitigation report to Heritage Resources Agency. Adhere to best international practice for palaeontological fieldwork and Heritage Resources Agency minimum standards.

APPENDIX 20: Traffic Management Plan (High Level)

APPENDIX 20

TRAFFIC MANAGEMENT PLAN (HIGH LEVEL)

It is important to minimise the impact of increased traffic flow generated by the development during the construction, operational and possible decommissioning phases.

Therefore, the following mitigating measures as outlined in the table below must be adhered to at a minimum.

The measures proposed below constitute a high-level traffic management plan. A detailed traffic management plan adhering to legislated requirements and containing specific contact details for responsible parties and regulating authorities (local, provincial and/or national), must include the mitigation measures listed in the table below and must be developed by each contractor during construction, operational and decommissioning phases. that incorporates the guidelines set out in this section of the report should be developed by each contractor.

High-level Traffic Management Plan / Increased Traffic Impact Mitigating Measures

Vehicle Type	Impact	Mitigating Measure
Construction Vehicles/Abnormal Load Vehicles during Construction and Possible Decommissioning Period (local impact)	Traffic Delay	Indicate areas where heavy vehicles will be expected with adequate signage. For vehicle slowing down for site access, employ local personnel for traffic management/flagging, in potentially dangerous areas. Limit impact on local commuters by restricting abnormal loads/heavy construction vehicle use of public roads to out of morning and afternoon peak traffic times. Avoid using roads in built up areas if possible.
	Adequate turning lane lengths / safety	Provide adequate turning lanes at all access points to the development site. For vehicle slowing down for site access, employ local personnel for traffic management/flagging, in potentially dangerous areas.
	Generation of Dust (from excavations and regional and internal roads)	Cover excavated sand piles/materials generating dust with tarpaulins where possible. Alternatively, wet sand and/or provide other means of dust

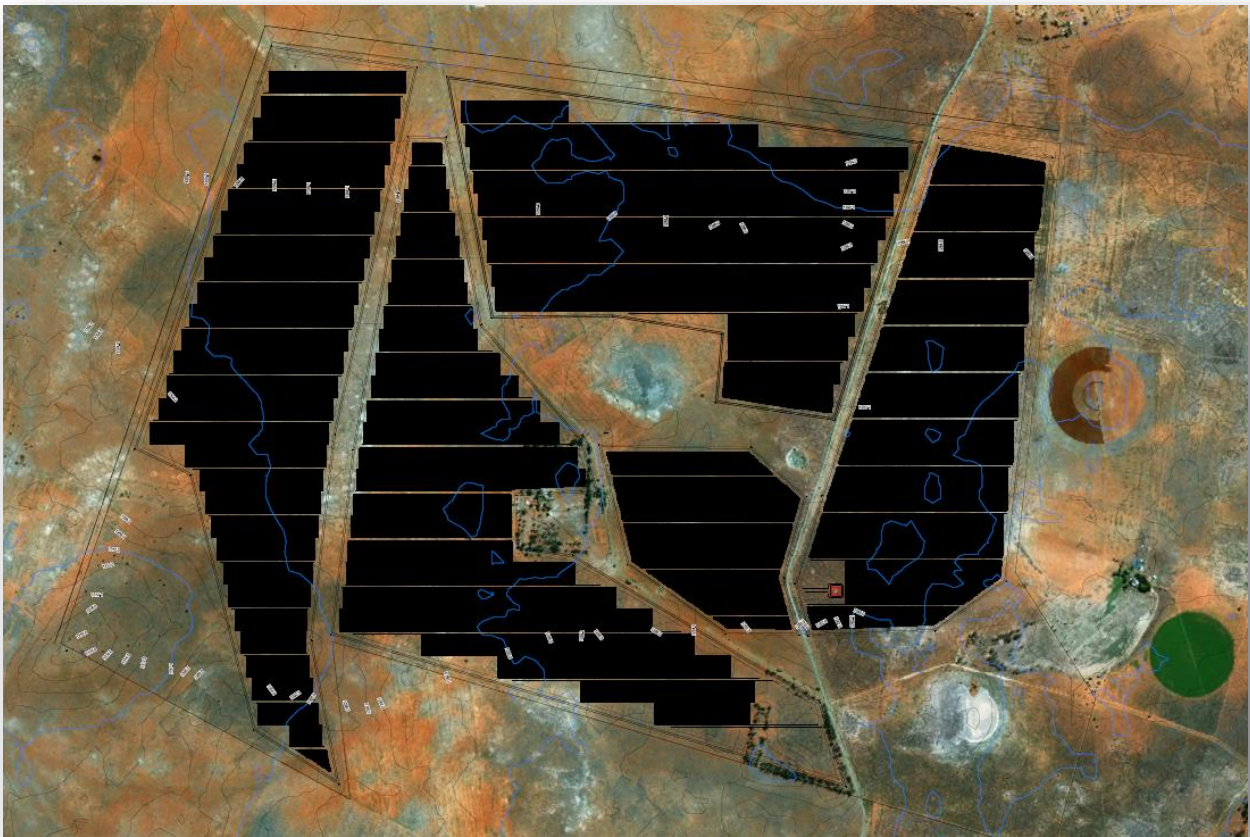
		suppression on exposed areas and dirt roads.
		Possible treatment of dirt/sand roads near communities would be advisable
	Risk of vehicle collision	Indicate areas where heavy vehicles will be expected with adequate signage
	Risk of pedestrian accidents	Clearly indicate pedestrian crossings. Educate drivers on potential areas of high pedestrian and cyclist activity. Educate community on dangers of construction vehicles new to their area.
	Degradation of Public Roads	The deterioration over time must be monitored on a monthly basis and a maintenance plan must be negotiated with the Provincial Authority. Avoid using roads in built up areas if possible.
Operational Vehicles	Traffic Delay	None required
	Generation of Dust (from internal roads)	Provide dust suppression on exposed areas and internal dirt roads.
	Risk of Vehicle Collision	None required other than that prescribed by the local authority for this class of road.
	Degradation of Public Roads	The deterioration over time must be monitored on a monthly basis and a maintenance plan must be negotiated with the Provincial Authority.
	Risk of pedestrian accidents	None required other than that prescribed by the local authority for this class of road already prescribed and implemented.

APPENDIX 21: Stormwater Management Plan

REPORT NO: VIS-REP001

VISSERSPAN SOLAR FARM DEVELOPMENT

STORMWATER REPORT



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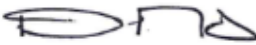
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Approval

The following Signatories approve this document:

NAME	ROLE	SIGNATURE	DATE
FD MARIRZ Pr. Eng.	Engineering Consultant		23 August 2020

Revision History

REV	DATE	DESCRIPTION	AFFECTED PAGES	ORIGINATOR
0	23/08/2020	Visserspan PV Solar Plant Development: SWMP	All	FD Maritz

1. Introduction

The envisaged Visserspan Photo Voltaic Solar development is located 8 km north of Dealsville in the Free State Province of South Africa.

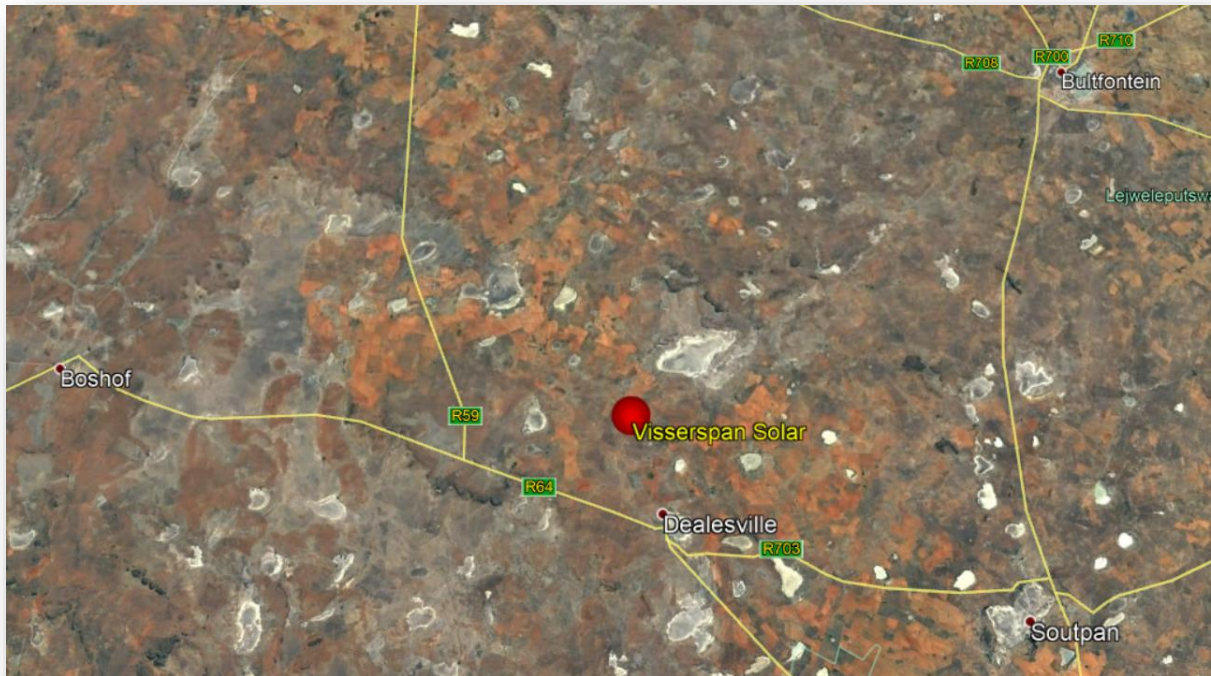


Figure 1: Location map for the Visserspan Solar Development

One of the requirements of the Environmental Impact Assessment process is that a stormwater management plan be drafted for the Visserspan Solar operation.

The Visserspan Solar Development is located at 1200m above mean sea level. The Mean Annual Precipitation in the area is given as 500mm per annum, with a h_N (1h,25 a) of 60mm.

The phased Solar operation covers approximately **950 ha**. The salt mining operation, therefore, covers approximately 6.5% of the total pan area.

This Report/ Storm Water Magement Plan addresses four phases of the Visserspan Solar Development as it is integrated in terms of stormwater.

2. Scope of Works

2.1. Project initiation and management

The need for a Stormwater Management Plan arose during the EIA process. Subsequently, BVi Consulting Engineers were contacted by the Client through Enviro Afica to conduct said stormwater management plan.

2.2. Hydrology review

A desktop hydrology review was undertaken by the Engineer to assess the catchment characteristics and delineation.

2.3. Stormwater Investigation and report

Close to a hundred percent of the area is covered by photovoltaic panels and identified as a “clean” area in terms of the water runoff. The “dirty” areas is limited to the sewer related infrastructure and diesel storage at the operations centre, which covers less than 0.1% of the total area.

The purpose of this Report/Stormwater Management Plan is to assess the impact of the proposed PV infrastructure in terms of the risk for potential damage during rainstorms. The further purpose is to propose measures and stormwater-related infrastructure, if necessary, to manage stormwater effectively and protect the environment.

3. Methodology

The methodology in compiling this document was as follows:

- Acquiring information on the envisaged infrastructure that form part of the Visserspan PV Solar development.
- Determining and assessing the characteristics of the target area in terms of stormwater drainage and hydrodology.
- Assessing of the impact of the solar related infrastructure.
- Reccomendations for the management of stormwater.

4. Description of site and installation

4.1. General

The target area can generally be described as flat and sandy. Stormwater drainage generally takes place overland from West to East. No rivers or small streams is running through the project area. The district roads running through the area perpendicular to the stormwater flow direction has no formal stormwater structures. Stormwater flows thus over the roads with the help of a windrow here and there.

Figure 2 shows the farming activities in and around the project areas as well as the two district roads running in a northerly direction.

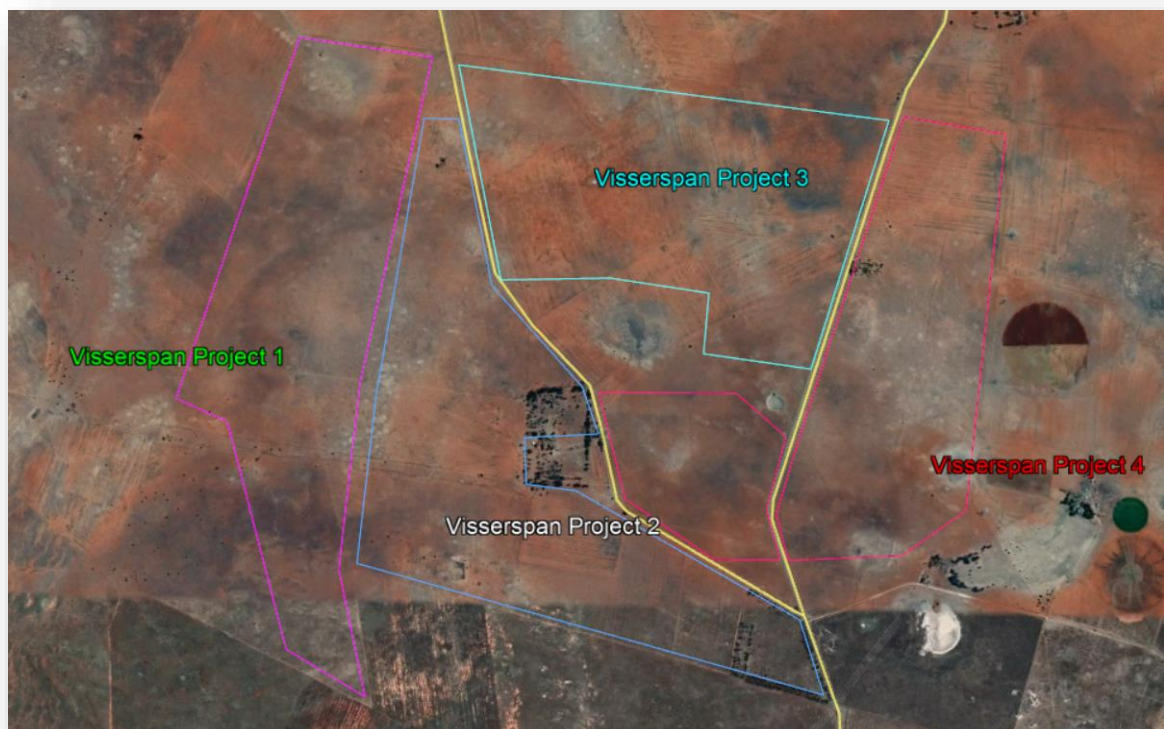


Figure 2: The four Visserspan Solar Plant project areas

4.2. The proposed development

A drawing (**Figure 3**) of the proposed development that shows the positions of the PV solar panels, electrical cables, O&M building, sub-station and lay-down areas:

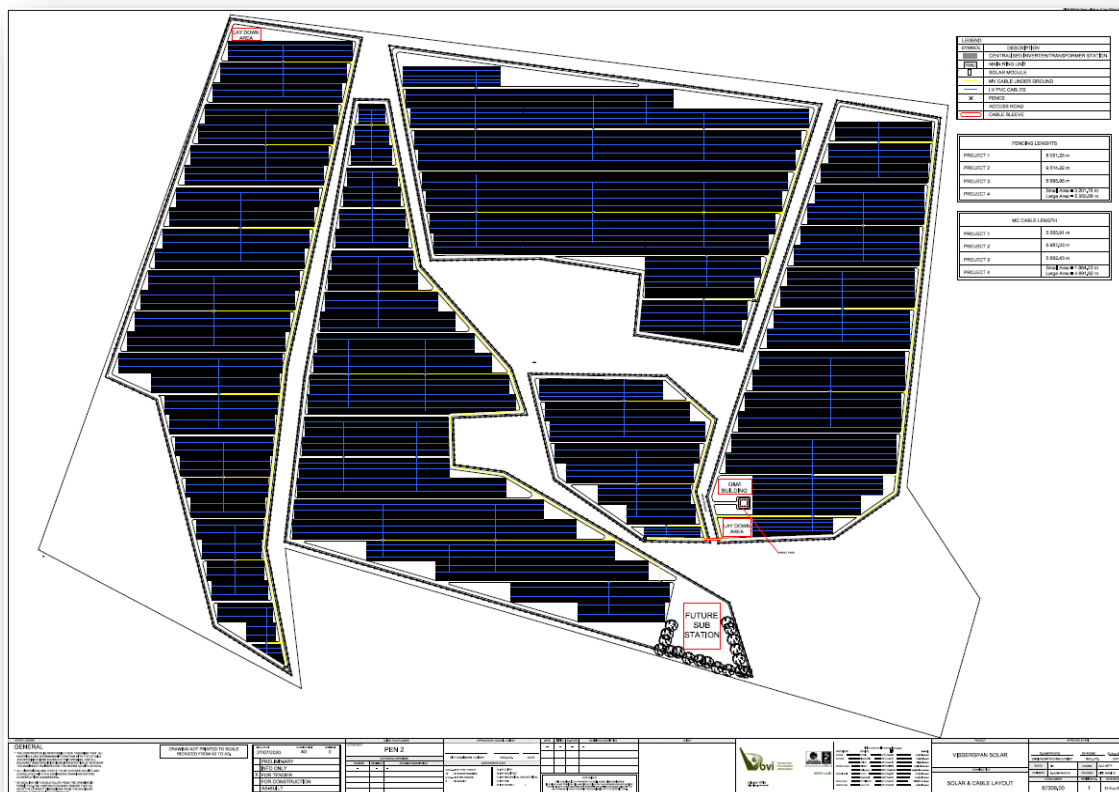


Figure 3: Viesserspan PV Plant Layout

The installation is based on a single-axis vertical solar tracker system where the rows of panels are installed in a north-south direction to track the sun from the East to the West around a static axel.



Figure 4: Single-axis vertical solar tracker system

All electrical cables to the sub-station will be underground. **Figure 5** below shows a zoomed section of the installation and electrical cable routes.

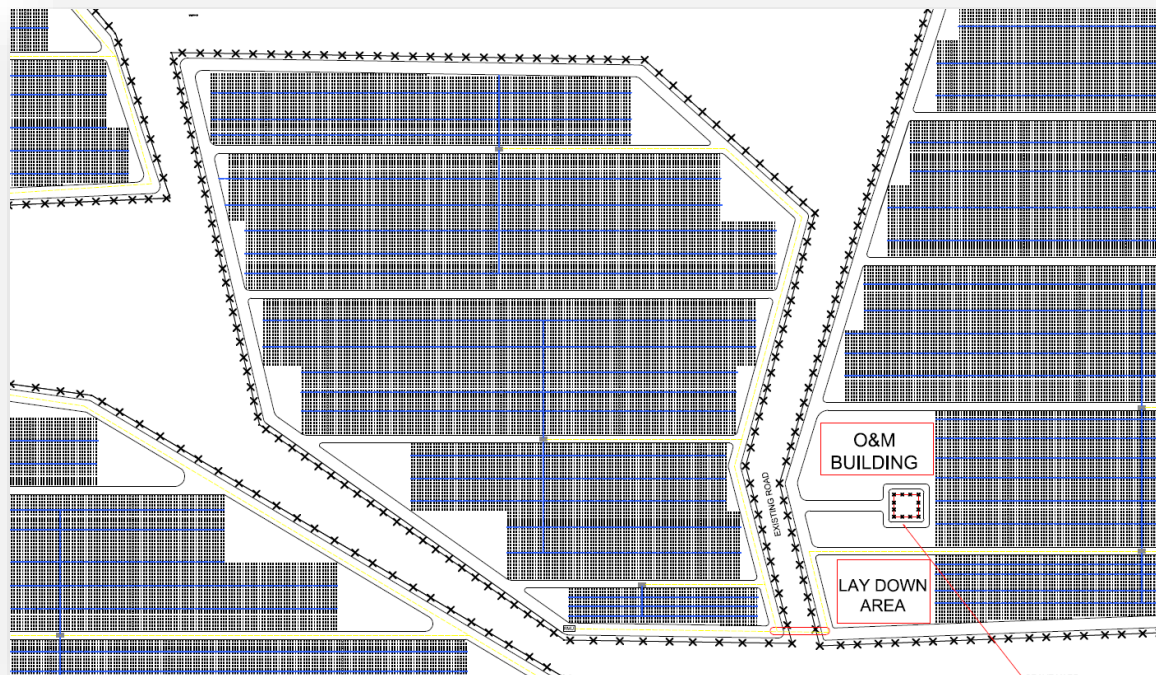


Figure 5: Zoomed Section of PV Plant showing the North-South orientation of the PV solar panels

5. Hydrology

5.1. Drainage region and description of the area.

Visserspan is located in Primary Drainage Region C that falls in a summer rainfall region.

Visserspan PV Solar development area is only 9 km². Given this fact, it covers only of a very small part of the catchment area.

Figure 6 below shows that the Visserspan Project target -, as well as surrounding areas, drains to large pans in the vicinity. There no rivers in the areas

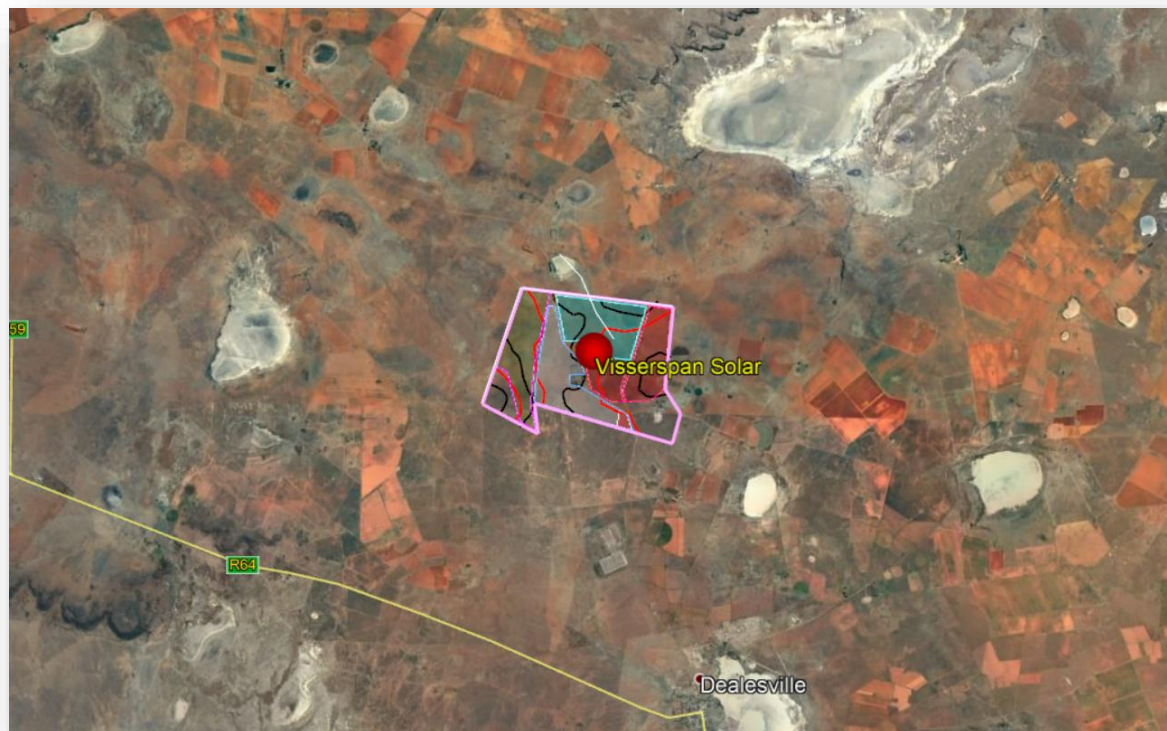


Figure 6: Visserspan and surrounding areas

5.2. Hydrological data applicable to Visserspan and drainage of the project target areas

Figure 7 below shows the following important information in terms of hydrology of the Vissershoek Solar development area.

- The catchment areas outside of the Visserspan PV solar development area that affects stormwater within the development area (**red lines**).
- The natural overland drainage lines applicable to the development area (**thin blue lines**)
- **Blue arrows** show the West-East direction of the drainage.

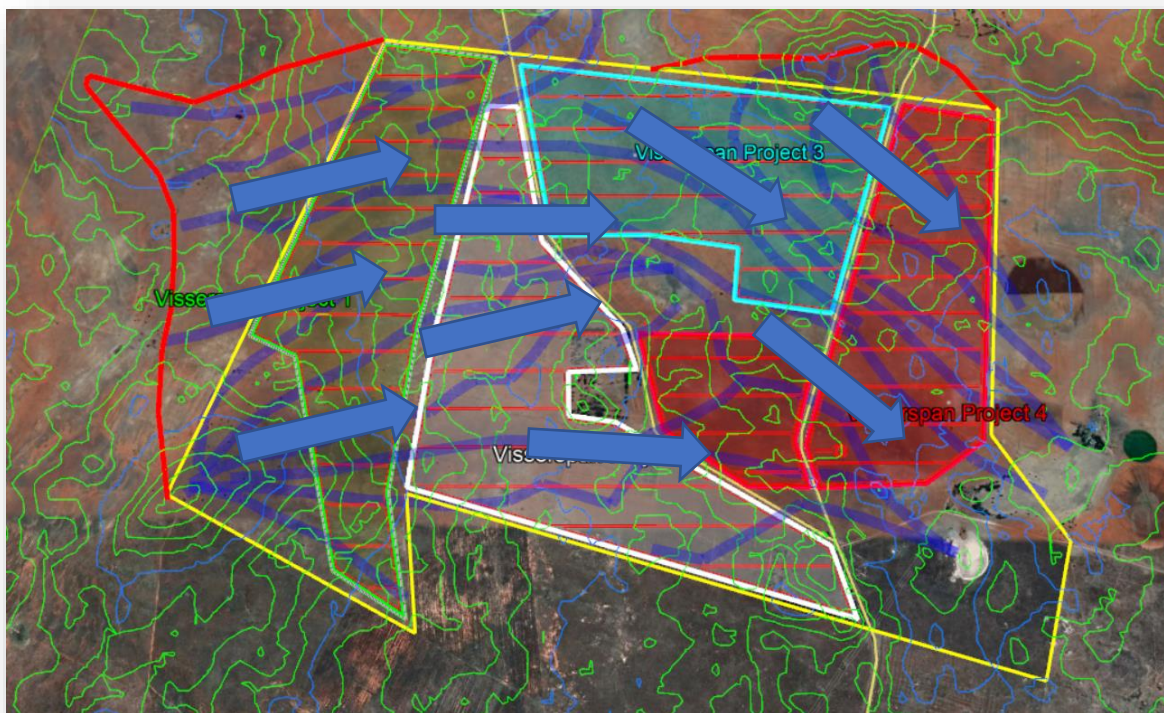


Figure 7: Visserspan drainage

The following describes the Visserspan Solar Development area in terms of stormwater drainage:

- Stormwater runoff can be described as 100% overland flow to pans outside of the development area. There is no natural watercourses or significant obstructions.
- Existing district roads cross the development in the same direction as the natural contours (perpendicular to the overland water-flow), and there are no significant stormwater structures on the roads. Stormwater crosses the roads naturally. The only thing that can be seen is a few wind-rows next to the road to take the stormwater through.
- The solar plant PV panels installation will not affect the natural runoff of stormwater on the site in any way. The above-ground installation is limited to steel poles supporting the solar panels. This will have no influence on the natural stormwater overland drainage.
- Rain will run off the solar panels and reach the ground less than two meters from where it would have fallen. It will also not affect the runoff.
- Slopes over the whole Visserspan Solar development area are very flat (0.5% or 1:200) with highly permeable soil (Large areas were previously used for agricultural activities), resulting in maximum overland runoff velocities of 0.3m/s and very little erosion. No erosion is currently visible.

The following hydrological data applies to the area.

Mean Annual Precipitation	500 mm per annum.
Mean Annual Evaporation	1800 mm per annum.
1-hour peak rainfall depth for a 25 year return period	50 mm
24-hour peak rainfall depth for a 25 year return period	90 mm
Catchment area	9 sq.km
Longest stormwater runoff (overland)	5 km

5.3. Hydrological calculations

The whole area is subjected to overland flow, and hydrological calculations are therefore not applicable.

5.4. Downstream Water Users

The Visserspan Solar development area is surrounded by agricultural land.

6. Conceptual Storm Water Management Plan

6.1. Principles of this Report/Storm Water Management Plan

A Storm Water Management Plant (SWMP) is a statutory requirement for a solar plant development in South Africa.

The purpose of a SWMP is primarily to prevent stormwater damage and pollution of water resources in and around the solar plant development area. The regulations define a methodical approach to be followed for the prevention and /or containment of pollution on target development areas during construction and operation of the plant. The regulations also set design standards and specify measures that must be taken to monitor and evaluate the efficacy of pollution control measures that are implemented.

The principles of this report/SWMP include:

- **Management of “clean” and “dirty” water**
- **Preventing the pollution of water resources**
- **Prevent stormwater damage to land and solar-related infrastructure**

6.2. Applicability of the “principles” to the Visserspan Solar Development

With this in mind, each of the requirements of a Storm Water Management Plan is tested in terms of its possible applicability at Visserspan as follows:

Managing of clean “clean” and “dirty” water

During the construction phase, the Environmental Management Plan will prescribe and dictate actions to prevent pollution of the site and laydown areas.

When construction is completed, pollution from “dirty” water will be limited to the following that is addressed in the Environmental Impact Assessment:

- Sewer (concealed septic tanks) that will be emptied at an approved sewer treatment works.
- Oil storage installations with bunding walls around it.

Subsequently, stormwater will not pollute any natural resources as a result of the management of “dirty” water.

- Preventing the pollution of water resources

During the construction phase, the Environmental Management Plan will prescribe and dictate actions to prevent pollution to water resources.

Water sources will not be polluted as a result of stormwater when the plant is operational if the sewer, oil and solid waste are handled as described in the Environmental Impact Assessment.

Stormwater will not pollute any water sources if preventative matters as described in the Environmental Impact Assessment and Environmental Management Plan.

Prevent stormwater damage to nature and solar-related infrastructure

This is probably the only issue of significance at Visserspan with regards to Storm Water Management.

Measures to address this issue is proposed as in Section 7 of this report/Stormwater Management Plan.

7. Proposed Storm Water Infrastructure at Visserspan Solar Development

Although the Visserspan Solar Development area is fairly large (9 km²) in terms of hydrology, the risk of stormwater damage is very little as all water drains overland at very low velocities. Altering of the natural flow and concentrating stormwater will not only be costly but will increase the risk of damage.

Our proposal that relates to stormwater management measures are therefore limited to the following:

- **That the building (Operation and Maintenance buildings and the Operational Centre) as well as the electrical related infrastructure (Sub-Stations, Mini-sub, etc.), be constructed on a platform that enables stormwater to flow away from the infrastructure. This will be addressed during final design.**
- **Excavations for PV panel infrastructure support will be done in such a manner that the natural ground level will only be disturbed in small areas. The ground must be repaired to the natural ground level.**
- **Trenches for cables and pipelines must be compacted and backfilled to the natural ground level**
- **Internal roads must be constructed as close as possible to the natural ground level. This will ensure that the natural flow of water will not be influenced. If necessary, gravel with the right properties can be used to create a smooth durable surface.**

We believe that these measures will address the management and handling of stormwater in a natural and simple way.

8. Conclusion

We trust that this report will provide the necessary information to make an informed decision with regards to that management of stormwater during the construction and operational phase of the Visserspan PV Solar Development.