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ENVIRONMENTAL

MANAGEMENT PROGRAMME

(EMP)

for the

MANAGEMENT OF ACTIVIES RELATING TO THE PROTECTION OF THE NATURAL ENVIRONMENT DURING THE CONSTRUCTION MAINTENANCE AND DECOMMISIONING PHASES

of the

KEIMOES

KEREN ENERGY SOLAR PLANT

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KEIMOES KEREN ENERGY SOLAR PLANT

1. INTRODUCTION

An Environmental Management Programme (EMP) is defined as "an environmental management tool used to ensure that undue or reasonably avoidable adverse impacts of the construction, operation and decommissioning of a project are prevented or mitigated, and that the positive benefits of the projects are enhanced."

This Environmental Management Plan (EMP) serves as a guideline and baseline information document for both the construction, operational and decommisioning phases of the proposed development and comply with Section 24N of the Act (Act no 107 of 1998) as well as the Environmental Impact Assessment Regulatiions Notice No R 543 (33) and the additional specific information requested by the Department of Enviromental Affairs (DEA) which must be included in Environmental Management Plans for Solar Site Development, released on 8 May 2010 (Refer to Paragraph 1.5.3). It aims to identify and evaluate all possible significant environmental impacts associated with the specific activity(s) and to prescribe mitigation measures. The EMP 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 an open-ended document in that information gained during the construction activities and/or monitoring of procedures on site could lead to changes in the EMP.

1.1 PURPOSE

The purpose of the EMP is to give direction and guidance to all responsible parties, which are in turn expected to co-operate closely to minimise or avoid unnecessary environmental impacts or delays. The ECO will ensure compliance with the EMP (and other Environmental issues) and will visit the site on a regular basis during the construction phase, with additional visits at the professional, project-linked, discretion of the ECO or relevant authority.

This CEMP binds all contractors, sub-contractors and other persons working on the site to adhere to the terms and conditions of the CEMP throughout the construction activities of the **Keimoes Keren Energy Solar Plant** and any other construction activities associated with the construction of the upgrade of the site.

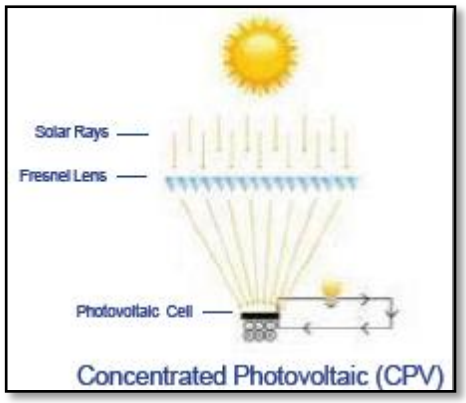
Any other Site Specific additional activities decided and agreed upon at the "On Site Start-Up Meeting" must be included to form part of the CEMP.

1.2 SCOPE

This EMP addresses the construction phase (CEMP) , operational phase (OEMP) and decomissioning phase (DEMP) and all activities associated with the development of the proposed **Keimoes Keren Energy Solar Plant** construction and management. In addition it will deal with all the requirements of regulation 33 of the regulations (R. 385, 21 April 2006) as well as the additional specific information requested by the Department of Enviromental Affairs (DEA) which must be included in Environmental Management Plans for Solar Site Development, released on 8 May 2010 (Refer to Paragraph 1.5.3) and all the requirements of the Environmental Authorisation.

Compliance to this EMP (which serves as a basis for all the phases of the development) will be monitored by the Environmental Control Officer (ECO). The Construction Engineer/Project Managers, the Contracting Agent(s) and the Cleint will be responsible for the implementation of this Environmental Management Plan

1.3 PROJECT DESCRIBTION



CPV Concentrating photovoltaic (CPV) systems convert light energy into electricity in the same way conventional PV technology does. The difference lies in the addition of an optical system that focuses a large area of sunlight onto each cell for providing reduced energy costs and improved manufacturability and reliability. Final site Layout plans will be commissioned once the project has been approved and the Engineers and Project planners had been able to establish the conditions of approval, with environmental constraints taken into account (Refer to Appendix 2.1).

FIGURE 1: ILLUSTRATING METHOLOGY

1.3.1 OPTICAL SYSTEM

CPV technology utilizes an optical element to collect the sun's light, and concentrate it at between 250-1000 suns (times) onto high efficiency solar cells that are 1 square centimeter in size. The basic concept is to replace expensive solar cell material with optical elements created from less expensive, readily available materials such as glass. In the example to the left SolFocus uses a primary mirror to collect the sunlight, focuses it on a secondary mirror, and then down the optical rod onto the high efficiency III-V cell.

1.3.2 HIGH EFFICIENTCY CELLS

The cells used in CPV systems are over twice the efficiency of traditional silicon-based PV cells, approaching 40% compared with 15% - 19% for traditional silicon. The use of these cells provides much higher energy yield with less photovoltaic material.

1.3.3 TRACKING SYSTEM

CPV systems must track the sun in order to ensure the focusing of sunlight on the multi-junction cells.

CPV stands for concentrator photovoltaics. A concentrating photovoltaic (CPV) system converts light energy into electrical energy in the same way that conventional photovoltaic technology does. The difference in the technologies lies in the addition of an optical system that focuses a large area of sunlight onto each cell.

Solar concentrators of all varieties may be used with the base technology either being refractive or reflective. The other primary difference is in the cells. Traditional PV systems utilize large amounts of silicon solar cells. In contrast, CPV systems utilize a small amount of high-efficiency solar cell material. These cells used in high concentration CPV systems are referred to as multijunction or III-V cells. The CPV panels are mounted on to keep the focal point on the cell as the sun moves across the sky. CPV is sometimes confused with CSP – Concentrating Solar Power.

Whereas PV converts light energy directly to electricity, CSP systems utilize heat from the system to generate power in a traditional steam engine power plant environment.

1.3.4 DESCRIPTION OF FACILITIES

The proposed facilities include an array of integrated high concentration photovoltaic (IHCPV) systems, which would generate approximately 10 megawatts (MW). The site would include approximately 140 units. Each system includes a 6m-tall vertical pedestal with five 15m-long, 3.2m-wide photovoltaic (PV) modules, which are mounted across a 17m-wide horizontal tube installed at the top of the pedestal. Each system typically has a 30m tracker clearance zone.

The solar arrays would be circumscribed by a perimeter fire access road. In addition to the solar arrays, the project proposes two to four concrete transformer pads, a fenced construction staging area, a maintenance shed, and a switch panel for connection to the power grid. The project site would be accessed via an existing access road.

1.3.5 TRANSPORT INGRASTRUCTURE (ACCESS ROADS)

Access is to be taken off the existing road. A traffic management plan for the site access roads to ensure that no hazards would results from the increased truck traffic and that traffic flow would not be adversely impacted, must be implimented. This plan must include measures 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.

1.3.6 DESCRIBTION OF CONSTRUCTION, OPERATION AND MAINTENANCE

1.3.6.1 Construction

1.3.6.2 Pedestals

The pedestals are a 1 metre diameter hollow steel tube supports for the solar equipment that is embedded into the ground. The height of the pedestal would be approximately 6 metres above ground level. The embedment depth of the pedestal would depend on the quality of the site soils. A drilling company would excavate a one to one and a half-metre hole typically ranging from six to seven metres in depth and place 20 cm of compacted gravel beneath the pedestal. The hole would be backfilled with concrete around the pedestal to hold it in place. A concrete footing holder would be installed above the hole and imbedded 20 cm in the ground. A 1 metre diameter plate would be welded to the bottom. The ground surrounding the pedestal would be leveled and any excess dirt would be removed.

Depending on site soils, a reinforced steel cage may be installed for additional support. After drilling, the pedestal is positioned in the hole and concrete is poured around it to hold it in place.

FIGURE 4: ILLUSTRATIONS OF UNIT COMPONENTS AND CONSTRUCTION SEQUENCE

1.3.6.3 Ground assembly

Materials for the solar arrays would be individually delivered to the site for assembly. The solar panels are attached to a large structural support, called a torque tube, which is horizontally positioned to the drive head that in turn is assembled on top of the pedestal. Smaller attachment pieces, called outriggers, on which the solar panels connect, must be installed on the torque tube before it can be placed on the pedestal; this operation would include ground pre-assembly of the outriggers onto the torque tube.

1.3.6.4 Install Drive Head

The drive head is a mechanical subassembly installed on top of the pedestal. The drive head provides the ability to maneuver the solar panels laterally (side-to-side) and vertically so that they are always perpendicular to the sun's rays. The drive head weighs approximately 3000 kgs and would be set in place using a rough terrain crane or boom forklift. Laborers in man-lifts would align and bolt the drive head to the pedestal. The elevation actuator can be installed at this point of the installation or at a later date before the installation of the torque tube by lifting and placing the elevation actuator onto the elevation actuator mounting blocks.

1.3.6.5 Install Torque Tube

The torque tube is a 1m-diameter hollow steel tube that is placed horizontally on the drive head. The tube measures 17 metres in length. Three to four torque tubes can arrive on a single truck. It includes the outriggers on which the solar panels attach. The torque tube weighs in excess of 7000 kgs and will be set in place using a rough terrain crane. It will be set on top of the pedestal and welded in place. The tube has two pin connections to the drive head and one to an elevation actuator, which is the hydraulic component on the drive head.

1.3.6.6 Solar Panels

The solar panels fasten to the outriggers. There are seven modules per system and their approximate dimensions are 3.2 metres wide by 15 metres long. Each module weighs 1700 kgs and is connected to the supports (outriggers) on the torque tube via four bolt connections per outrigger. The solar panels would be "flown" in place using a crane and attached by labourers in man lifts. These modules would arrive by truck. Four modules can be transported per truck.

1.3.6.7 Install Cages and Encoders

The main infrastructure to the solar unit is complete after the panels are installed on the torque tube; the remaining installation includes connection of the inverter, hydraulic system, and support caging. The support caging, also called the service module, consists of a steel lattice that supports from the drive head and nearly extends to the ground. The hydraulic system, which includes an encoder that controls module movement, and the inverter are installed on the service module. A small labour crew using a forklift and a man lift would install the service module and ancillary components. The support caging would be installed at the base of the pedestal. Multiple cages can be transported on a single truck.

1.3.6.8 Site Electrical System

Development of the electrical systems would take place in conjunction with installation of the rest of the structures. In brief terms, it includes all electrical cabling and trenching (field trenching in and around the entire site where the units will be installed should take place after the installing the pedestals) that connects all solar units, collects the energy from them, and then routes it to a point of connection with the utility infrastructure system.

1.3.6.9 Access Road and Accessory Structures

This solar facility would include an unpaved road with vehicular access to each individual system. In addition, concrete transformer pads for each row of solar panels, a switch panel for connection to the power grid, and a 3m x 6m control shed would be constructed on site.

Please refer to DEA specific conditions with regards to a Traffic Management Plan and Transportation Plan requirements (Paragraph 1.5.3 and Appendix

1.3.6.10 Personnel

Approximately 30 people are envisaged to be required during the construction phase, which is expected to last for 6-8 months. Positions will be filled by mostly local labour from the area where possible and are not to be housed onsite.

1.3.6.11 Operations

The proposed solar arrays would track the sun and be operated either automatically or remotely. During periods of high wind or when undergoing maintenance, the solar arrays would be shifted to a stand-by mode, where the panels are placed in a horizontal position (facing upward and parallel to the ground).

1.3.6.12 Maintenance

Maintenance activities may entail replacing non-functioning cells or other mechanical parts essential to the operation of the arrays. However, these trips would occur on an as-needed basis.

Maintenance visits may not occur immediately after a cell ceases to function or a lense becomes damaged, but rather the Project Applicant would determine whether the benefit of the maintenance trip outweighed the cost of that additional trip. It is assumed, however, that maintenance visits would occur four to six times per year. Individuals responsible for maintenance activities would most likely commute from regional offices or nearby operating facilities.

Since sunlight can be absorbed by dust and other impurities on the surface of the photovoltaic panels, washings would periodically be needed. An estimated 1000 cubic metres of water per year would be required for cleaning the photovoltaic panels.

1.3.6.13 Personnel

Approximately 10 workers (7 direct and 3 indirect) are envisaged to be required during the operational phase of the proposed solar development. The lifespan of the development is expected to last for +-25 years. Positions will be filled by mostly local labour from the area and are not to be housed onsite.

1.3.6.14 Decommissioning

The solar energy facility is expected to have a lifespan of +-25 years. The facility would only be decommissioned and the site rehabilitated once it has reached the end of its economic life. It would most likely be due to the enhancement of technology/infrastructure in the future of renewable energy. Recycling will be done as far as possible.

1.4 SITE LOCATION

Keimoes is located in the Northern Cape Province (Kai !Garib Local Municipality), just north of the N14 approximately 40 km west of Upington. The propose solar facility will be located approximately 2 km north-east of Keimoes (just east of the Keimoes Golf course) on a 20 ha potion of the Remainder of Farm 666. Please refer to appendix A & B of the Basic Assessment Report for more detailed locality maps and plans.

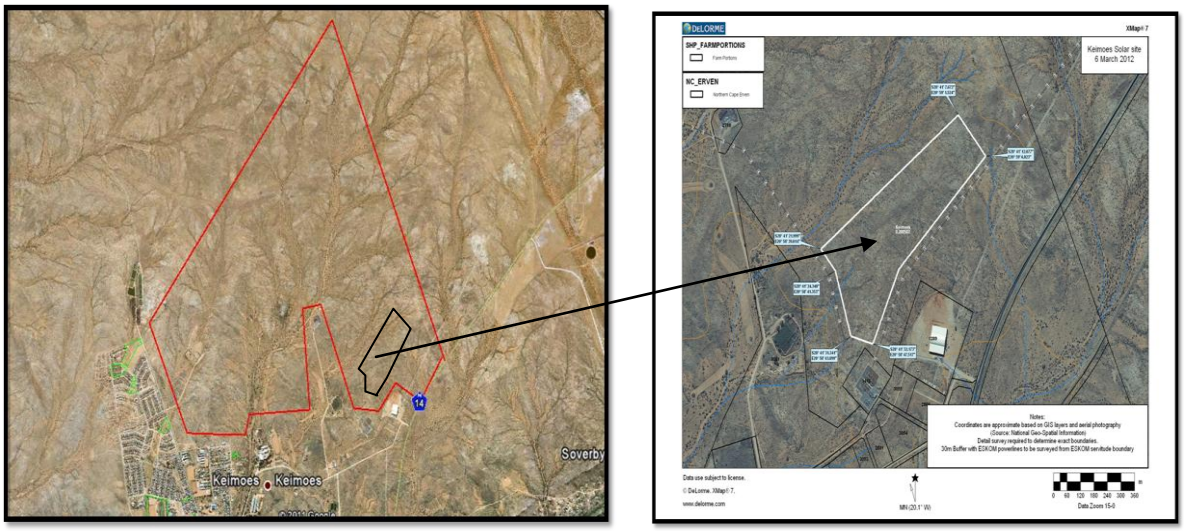


FIGURE 5: LOCALITY MAPS WITH REGARDS TO THE PROPOSED KEIMOES SOLAR SITE FACILITY

1.5 THE RECIEVING ENVIRONMENT

All environmental features are addressed in the Basic Assessment Report (BAR) and the relavant specialist studies which are attached as appendices to the BAR. Underneath a short overview of significant environemtal features encountered.

1.5.1 ENVIRONMENTAL FEATURES ENCOUNTERED

1.5.1.1 Land-use

The study area is situated on communal grazing land, with no development or agricultural practices (apart from some grazing) observed. Both the Keimoes waste disposal site as well as Cemetery are located to the north but in the vicinity of the larger study area. To the north of the site, sand mining activities was also observed in some of the non-perennial streams crossing the property. Natural vegetation forms a sparse cover over the entire area of the study area. Various non-perennial streams cross the property to the north of the final proposed study area. A number of smaller drainage channels are also present to the east of the proposed final site.

1.5.1.2 Vegetation

In accordance with the 2006 Vegetation map of South Africa, Lesotho and Swaziland (Mucina & Rutherford, 2006) only one broad vegetation type is expected in the proposed area and its immediate vicinity, namely Bushmanland Arid Grassland. This vegetation type was classified as "Least Threatened" during the 2004 National Spatial Biodiversity Assessment (NSBA). More than 99% of this vegetation still remains in its natural state, but at present only 4% is formally protected (Augrabies Falls National Park) throughout South Africa. Recently the *National list of ecosystems that are threatened and in need of protection* (GN 1002, December 2011), was promulgated in terms of the National Environmental Management Biodiversity Act (NEM: BA), Act 10 of 2004. According to this National list, **Bushmanland Arid Grassland, remains classified as Least Threatened**.

1.5.1.3 Threatened or protected species

Three protected tree species have a distribution which could overlap with the general site location of the solar facility namely: *Acacia erioloba* (Camel thorn) *Boscia albitrunca* (Witgat) and *Acacia haematoxylon* (Grey camel thorn). Of these 3 species only *Acacia erioloba* was observed and then only associated with the deeper red sands next to the main dry watercourses. The final site location was specifically chosen to avoid these watercourses and as such also effectively avoid all the Camel thorns observed.

1.5.1.4 Rivers and wetlands

Various non-perennial or dry watercourses and drainage lines have been observed, especially to the north of the final solar site location (which has been chosen specifically to avoid these features. Towards the south-eastern side of the final proposed site location a small stream is still present, but the activities are not expected to irreversibly impact on these drainage channels. With care permanent impact could be fully negated.

1.5.1.5 Invasive alien plant infestation

Invasive alien rates are generally very low for most of this area. Problem areas are usually associated with river systems and other wetland areas. None have been observed in the study area.

1.5.2 RECOMMENDATIONS AND MITIGATION

The mitigation, management measures and recommendations listed in this Basic Assessment Report for construction and operational phases should be implemented in order to minimise potential environmental impacts. The following aditional mitigation measures should also be implemented.

1.5.2.1 General

- 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 of the solar plant in terms of the EMP and the Biodiversity study recommendations as well as any other conditions which might be required by the Department of Environmental Affairs.
- An integrated waste management system must be implemented during the construction phase.
- All rubble and rubbish (if applicable) must be collected and removed from the site to a suitable registered waste disposal site.
- All alien vegetation should be removed from the property, as is legally required (if applicable)
- Adequate measures must be implemented to ensure against erosion.
- An application for all permits with respect to protected tree species or protected plant species need to be submitted to the relevant authority prior to the commencement of construction activities.
- All declared aliens must be identified and managed in accordance with the Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983), the implementation of a monitoring programme in this regard is recommended.
- Before development can continue the regions need to be checked for the presence of bird nesting sites, particularly those of ground nesting species.
- Areas of prime reptile habitat (e.g. extensive areas of flat rock, boulders fields) should be avoided. Reptiles present on the study site could potentially also be trapped and translocated.
- Limit construction, maintenance, and inspection activities to dry periods.
- Develop emergency maintenance operational plan to deal with any event of contamination, pollution, or spillages, particularly in riparian areas.

1.5.2.2 Site specific Mitigations

- Pylons should be placed at least 32 m away from any of the main watercourses on the property. Care should also be taken to protect drainage lines (by controlling the pylon placement).
- Only existing access roads should be used for access to the terrain (solar site).
- The internal network of service roads (if needed) must be carefully planned to minimise the impact on the remaining natural veld on the site. The number of roads should be kept to the minimum and should be only two-track/ twee-spoor roads (if possible). If possible the construction of hard surfaces should be avoided.
- Access roads and the internal road system must be clearly demarcated and access must be tightly controlled (deviations must not be allowed).

- Indiscriminate clearing of areas must be avoided, only pylon sites and sites where associated infrastructure needs to be placed must be cleared (all remaining areas to remain as natural as possible).
- All topsoil (the top 15-20 cm at all excavation sites), must be removed and stored separately for re-use for rehabilitation purposes. The topsoil and vegetation should be replaced over the disturbed soil to provide a source of seed and a seed bed to encourage re-growth of the species removed during construction.
- Once the construction is completed all further movement must be confined to the access tracks to allow the vegetation to re-establish over the excavated areas.
- 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 archaeologist (Jonathan Kaplan 082 321 0172), or the South African Heritage Resources Agency (SAHRA) (Att Ms Mariagrazia Galimberti 021 462 4502). Burials must not be removed or disturbed until inspected by the archaeologist.
- Should any substantial fossil remains (e.g. vertebrate bones and teeth) be encountered during excavation, however, these should be reported to SAHRA for possible mitigation by a professional palaeontologist.

1.5.3 DEA SPESIFIC REQUIREMENTS

On the 8th of May 2012, the Department of Environmental Affairs released a set of specific requirements that must be addressed within Solar Facility Applications, which also included very specific issues that must be addressed within the Environmental Management Plan (EMP), which states that the Environmental Management Programme (EMPr) to be submitted as part of the EIR must include the following:

- All recommendations and mitigation measures recorded in the EIR (Refer to Paragraph 1.5.2).
- The final site layout plan (Refer to Appendix 2).
- Measures as dictated by the final site lay-out plan and micro-siting (Refer to Appendix 2).
- An environmental sensitivity map indicating environmental sensitive areas and features identified during the EIA process (Refer to Appendix 2)
- A map combining the final layout plan superimposed (overlain) on the environmental sensitivity map (Refer to Appendix 2)
- An alien invasive management plan to be implemented during construction and operation of the facility. The plan must include mitigation measures to reduce the invasion of alien species and ensure that the continuous monitoring and removal of alien species is undertaken (Refer to Paragraph 3.10.8).
- A plant rescue and protection plan which allows for the maximum transplant of conservation important species from areas to be transformed. This plan must be compiled by a vegetation specialist familiar with the site and be implemented prior to commencement of the construction phase (Refer to Paragraph 3.10.2, 3.10.3, 3.10.4 & 3.10.26).
- A re-vegetation and habitat rehabilitation plan to be implemented 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 (Refer to Paragraph 3.10.2, 3.10.3, 3.10.4 & 3.10.26).
- An open space management plan to be implemented during the construction and operation of the facility (Refer to Paragraph 3.10.2, 3.10.3, 3.10.4 & 3.10.26).

- A traffic management plan for the site access roads to ensure that no hazards would results from the increased truck traffic and that traffic flow would not be adversely impacted. This plan must include measures 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 (Refer to Paragraph 3.10.2 & 3.10.10 & Appendix 11).
- A transportation plan for the transport of solar components, main assembly cranes and other large pieces of equipment (Refer to Paragraph 3.10.2 & 3.10.10 & Appendix 11).
- A storm water management plan to be implemented during the construction and operation of the facility. The plan must ensure compliance with applicable regulations and prevent off-site migration of contaminated storm water or increased soil erosion. The plan must include the construction of appropriate design measures that allow surface and subsurface movement of water along drainage lines so as not to impede natural surface and subsurface flows. Drainage measures must promote the dissipation of storm water run-off (Refer to Paragraph 3.10.5)
- An erosion management plan for monitoring and rehabilitating erosion events associated with the facility. Appropriate erosion mitigation must form part of this plan to prevent and reduce the risk of any potential erosion (Refer to Paragraph 3.10.5).
- An effective monitoring system to detect any leakage or spillage of all hazardous substances during their transportation, handling, use and storage. This must include precautionary measures to limit the possibility of oil and other toxic liquids from entering the soil or storm water systems Refer to Paragraph 3.10.17, 3.10.18, 3.10.12 & 3.10.13).
- An avifauna monitoring programme to document the effect of the operation of the energy facility on avifauna. This must be compiled by a qualified specialist (Refer to Paragraph 3.10.6).
- 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 (Refer to Paragraphs: 3.10.2, 3.10.4 & 3.10.5).

1.5.4 ENVIRONMENTAL AUTHORIZATION – CONDITIONS OF APROVAL

The Conditions of approval of the Environmental Authorization (EA) and other relavant approvals/licences from other authorities will be included as a appendix in the final EMP. The conditions of approval must be adhered to as part of the EMP.

- EA (Environmental Authorization) Conditions Of Approval – Appendix 9
- FBAR Report Recommendations, which has been included in this EMP (Refer to paragraph 1.5.2).

1.5.5 ESKOM REQUIREMENTS

For Eskom requirements for work in or near Eskom servitudes with regards to solar facilities please refer to Appendix 12.

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 ROD.

Audit (Site Completion): Environmental Site Inspection and verification of construction activities to CEMP

Bund: Enclosure under / around a storage facility to contain any spillage

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

Construction: means the period of the project during which the actual works are carried out, deemed to include site establishment, site preparation, the works, maintenance period and decommissioning.

Construction phase: The construction phase period of a cellular communications Construction site is defined as from the commencement of site establishment up to and including the practical site handover.

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 budged and that the Contractor fulfils his obligations in terms of the EMP.

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 CEMP and site-specific additions to the CEMP.

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 registered Environmental Scientist (*in terms of section 20(3) of the Natural Scientific Professions Act, 2003 (Act 27 of 2003)*) responsible for overseeing the environmental aspects of the Construction phase of the EMP.

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

Method statement – A statement by the Contractor, describing the scope of intended construction works step-by-step, in order for the ECO and Construction Supervisor to understand the Contractors intentions and be able to comment on, 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 ROD) will be performed.

Stop Works Order – An order which can be issued either by the ECO 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 ECO.

Site – The area and extent of the development works and infrastructure, including any areas off the main site on which works are to be carried out in order to allow the development to proceed successfully.

Site meetings – Periodic (weekly or monthly) meetings between the ECO, 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 CEMP and determine site specific additions that will be included as the basis for the CEMP.

Potentially hazardous substance: is a substance, which, in the reasonable opinion of the Engineer, can have a deleterious (detrimental) effect on the environment.

Method statement: is a written submission by the Contractor to the Engineer or relevant responsible person

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 Environmental Management Act (Act No 107,1998).

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).

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.

2.2 ABBREVIATIONS

CARA	Conservation of Agricultural Resources Act, 1983 (Act no. 43 of 1983)
CEMP	Construction phase Environmental Management Plan
DEMP	Decommisioning phase Environmental Managemt Plan
DEADP	Department Environmental Affairs & Development Planning
DTEC	Department Of Tourism, Environment And Conservation [Northern Cape Province]
ECO	Environmental Control Officer: - Must be a suitably qualified independent environmental consultant appointed to ensure compliance to the CEMP
EMP	Environmental Management Plan or Programme
ESO	Environmental Site Officer - . Must be a person with adequate environmental knowledge to understand and implement the CEMP by conducting on site inspections determined by the ECO and the client.
ER	Engineers representative or Main contractors representative
EA	Environmental Authorization (Record Of Decision) issued by relevant authority for the authorisation to commence construction under certain environmental compliances
MSDS	Material Safety Data Sheet(s)
NEMA	National Environmental Management Act, 1998 (Act no. 107 of 1998)
OEMP	Operational Environmental Management Plan
OSSM	On-site Start-up Meeting
ROD	Record of Decision
SAHRA	South African Heritage Resources Agency

3. CONSTRUCTION PHASE EMP

3.1 STRUCTURE AND RESPONSIBILITY

Implementation of the EMP 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 and the Contractor. All role players must familiarize themselves with the prescriptions of the EMP.

3.1.1 THE APPLICANT

The Owner (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 EMP.

3.1.2 THE CONSTRUCTION SUPERVISOR

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

The responsibilities of the Construction Supervisor include:

- To issues site instructions to the Contractor.
- To serve as conduit for all communication between the ECO and the Contractor *[The only exception is where the ECO 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. If 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.
- When the ECO is not on site the Construction Supervisor will be responsible for the implementation of the EMP.

3.1.3 THE CONTRACTOR

The Contractor shall be responsible to:

- ensure that all sub-contractors, employees, suppliers, agents etc. are fully aware of the environmental issues detailed in the EMP
- 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 EMP
- carry out instructions issued in the site instruction book
- assist with solutions to environmental problems that may arise during the construction phase
- ensure that all "**No-Go**" areas are adequately fenced off.

NB: All contractors must sign the "Declaration of understanding" (page i) of this Environmental Management Plan before construction commences.

3.1.4 THE ENVIRONMENTAL CONTROL OFFICER (ECO)

ECO will be responsible for overseeing the environmental aspects of the Construction phase and will work in close co-ordination with the Construction Supervisor.

3.1.4.1 ECO 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.

3.1.4.2 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 daily basis for the first 4 weeks and thereafter on weekly 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 precence during the demarcation of the necessary areas for storage of materials, ablutions, eating areas o 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.
- The ECO will record his findings and all environmental non-conformances in a environmental completion report (which will be forwarded to the Client and the Construction Supervisor).
- Conduct a closing down visit ASAP after completion of the Development
- The environmental consultant to commision an independent Environmental Compliance Audit within 6 months after completion of the contract.

The ECO 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 is to inform the client/developer and site representative of the reasons for the stoppage as soon as possible. A relevant reason should 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 ie. wilfull 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

3.2 COMMENCEMENT OF WORKS

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

This CEMP must be included to form part of the Contractors site specification documentation.

A copy of the CEMP 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 CEMP 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 refers to: Camp Establishment, Earthmoving activities and any pre-liminary construction activities.

3.3 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 compound.
- Above ground bulk fuel storage facilities.
- Ablution & Toilet Facilities.
- Refuse Management.
- Concrete works & batching plant facilities
- Soil erosion & sediment control.
- Fire fighting equipment & emergency fire reaction plan.
- Use and storing of hazardous substances.

3.4 SITE SPECIFIC ARRANGEMENTS & CONSTRUCTION PROCEDURES

Please note that all recommendations summarized in the Basic Assessment Report must be addressed and read as part of the site specific arrangements & construction procedures as described under paragraph 1.5.2 and wich include:

- General recommendations;
- Site specific mitigations;
- DEA specific requirements, and the
- Conditions of approval of the Environmental Authorization.

3.4.1 ON-SITE START-UP MEETING

The mandatory **On-Site Start-Up Meeting** must be conducted at least **14 days but not less than 5 working days** prior to commencement of any site/camp establishment, earthworks and/or construction activities and will relate to additional discussed information that must be complied with during the entire construction phase.

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

- The Construction EMP & 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
- Fire fighting procedures
- Mandatory fire fighting 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.

3.4.2 START-UP MEETING PARTICIPANTS

- Applicants Representative.
- Main Contractor’s Representative.

- Resident Engineer
- Site foreman.
- Environmental Consultant.
- Environmental Control Officer.

Minutes of the on site 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 also form part of this Environmental Management Plan. If any discrepancies between the start-up report and the EMP arise then the EMP will take precedence until clarification on the discrepancy is clarified. If any discrepancies between the CEMP and the EA then the EA will take precedence until clarification on the discrepancy is clarified.

NB: IT IS THE RESPONSIBILITY OF THE MAIN CONTRACTORS TO ENSURE THAT ALL SUB-CONTRACTORS, THAT WORK ON THE SITE DURING AND AFTER THE CIVILS CONTRACT, ARE INFORMED OF THE ENVIRONMENTAL CONDITIONS PERTAINING TO THE SITE.

3.5 ENVIRONMENTAL- & AWARENESS TRAINING

3.5.1 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 EMP, the time lost and the cost of the course would be for the account of the Contractor.

3.5.2 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).

3.6 MEHTOD 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 EMP documentation and are subject to all terms and conditions contained within the EMP 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 asses whether the contractor's proposal is in accordance with the specifications and/ or will pEAuce 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 solar 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

3.6.1 ADDITIONAL METHOD STATMENTS

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.

3.7 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.

3.7.1 CORRECTIVE ACTION INSTRUCTION

The ECO may issue an on site 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.

3.7.2 WRITTEN WARNING

In instances of non-compliance with the EMP 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 on site ECO must issue a written warning indicating the non-conformance to the contractor.

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

3.7.3 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.

Applicant, in consultation with the ECO 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 and site engineer.

In serious cases, at the discretion of Applicant and the Environmental Consultant/ECO, any multiple offences can be added together.

3.7.4 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.

3.8 CHANGES TO EMP

Although care has been taken to address all known relevant environmental issues for the construction phase, it may become necessary to add or amend certain procedures or instructions to improve the efficiency of the Environmental Management Programme (EMP).

Only those additions or amendments of this EMP 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 DEA (if so requested) after the ECO has consulted with the Environmental Consultant and Applicant.

No deviation from the contents of the EMP is allowed without the above-named prescribed procedures

3.9 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.

3.10 MANAGEMENT SPECIFICATIONS

3.10.1 DEMARCATING AND FENCING

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:	Environmental Consultant.
Main Contractor:	Project Site Manager
Sub-contractor:	Project contractor
ECO:	Environmental Control 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, ect.

- The site will be demarcated with appropriate strong steel 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 steel 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: 3.10.2; 3.10.3; 3.10.4; 3.10.5; 3.10.6; 3.10.7.
- The Contractor must maintain in good order all demarcation, fencing and barriers for the duration of construction activities, or as otherwise instructed. 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.
- Demarcation may not be moved, re-located or altered or changed without the approval of the ECO.

3.10.2 PROTECTION OF NATURAL VELD AND CORRIDORS

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 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.
- All “No-Go” areas must be demarcated and all contractors must be made aware of the importance of these features and the consequences of non-compliance.
- 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. Any features affected by the Contractor in contravention of this clause must be restored/rehabilitated to the satisfaction of the Engineer and the ECO.

All incidents of harm to any animal or natural vegetation (apart from the agreed upon areas) must be reported to the ECO.

3.10.3 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 implimented.

- The areas of vegetation that are to be protected during construction must be demarcated and indicated on a site plan. A Method Statement is to be submitted to the ECO by the Contractor, detailing the method of fencing for protection of the conservation areas.
- A vegetation specialist (familiar with the vegetation of the area) must assess each construction site before any construction has taken place (the specialist must be familiar with the final layout plans and access routes). The purpose of this assessment must be to identifiy all significant plant species as well as any other viable species which could be transplanted or re-used for rehabilitation purposes from the areas to be disturbed.
- All flora identified during construction 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 quidelines (Refer to paragraph **Error! Reference source not found.**).

3.10.4 “NO-GO” AREAS

“NO-GO” areas, if so designated by the CEMP, EA or ON SITE START-UP MEETING, are certain pre-determined or as a result of the OSSM must be “NO-GO” areas. The contractor must ensure that no person, machinery, equipment enter the “NO-GO” areas at any time during the contract period.

If so required by specifications in the CEMP, certain areas must be "No go" areas. 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.

Areas of special importance will be decided upon between the Engineer, Contractor and the ECO and demarcated as “No go” areas on a site plan and fenced off. Such areas are out of bounds to the

Contractor and his staff, sub-contractors and their staff or suppliers and their staff and to any other person involved in the construction, without the written permission specified by the ECO.

3.10.5 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. 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. Include the area under the canopy of trees so that tree roots will not be damaged by soil compaction.
- 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 downslope 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 revegetation. Never store topsoil around trees as this may kill them. Spread the topsoil back when the work is finished and revegetate the site as soon as possible to control erosion. Remove the sediment and erosion controls only after revegetation 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 stormwater 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.

3.10.6 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.

- 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 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.
- The loss and degradation of habitat continues to be the biggest threat to avian biodiversity. As such a avi-fauna specialist must assess each construction site and implement an avian monitoring program if bird species of significance is find in the site or expected to be impacted by the site.

3.10.7 CLEARING OF VEGETATION, STRIPPING & CONSERVATION OF TOPSOIL

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.

- 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.
- Prior to any activities within the demarcated work areas, topsoil material shall be removed to a depth of 300mm or deeper if specified by the engineer in consultation with the ECO, 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 should 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/m^2 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 should 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.

3.10.8 ALIEN INVASIVE MANAGEMENT PLAN

An alien invasive management plan to be implemented during construction and operation of the facility. The plan must include mitigation measures to reduce the invasion of alien species and ensure that the continuous monitoring and removal of alien species is undertaken. Although very few invasive alien trees

were encountered on the property, a number of grasses, herbs and climbers are also considered to be highly invasive and should also be identified and controlled. Wetlands and rivers are especially susceptible to many of species.

The invader status of the various invasive alien species in South Africa is descrived 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).

3.10.8.1 Category 1 (Declared Weed)

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

3.10.8.2 Category 2 (Declared Invader – commerscial 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

3.10.8.3 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.

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.

3.10.9 PROTECTION OF ARCHAEOLOGICAL & PALEONTOLOGICAL REMAINS

If remains or artefacts are discovered on Site during earthworks, work in the vicinity must cease and the Contractor must immediately inform the Engineer and the ECO who must contact the South African Heritage Resources Agency (SAHRA) for information on the appropriate course of action to be taken.

- In the event that previously unknown archaeological features are exposed during the construction phase, the Contractor should inform the Engineer and the ECO who will advise Applicant on the necessary course of action.
- 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.

3.10.10 TRAFFIC ACCESS ROUTES & HAUL ROADS

The Contractor 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 gravel or earth roads on Site, the vehicles of the Contractor and his suppliers must not exceed a speed of 25 km/h. On public roads adjacent to the Site vehicles will adhere to municipal and provincial traffic regulations.

- A traffic management plan for the site access roads to ensure that no hazards would results from the increased truck traffic and that traffic flow would not be adversely impacted must be implemented. This plan must include measures 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.
- A transportation plan for the transport of solar components, main assembly cranes and other large pieces of equipment must be implemented
- As far as possible any access routes/haul roads must utilise existing roads or tracks. 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 temporary access routes must be rehabilitated at the end of the contract to the satisfaction of the ECO.
- Method Statements for any new access/ haul roads must be submitted.

3.10.11 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.
- 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
- 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.
- Appropriate 2.5 kg (minimum requirement) dry powder SABS approved and service certified fire fighting 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.

3.10.12 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.

- 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. 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 off at appropriate licensed disposal sites. The Contractor must supply the ECO with a certificate of disposal.

Hazardous materials should 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.

3.10.13 STORING OF PETROCHEMICALS

Basic guidelines to follow if any fuels are to be stored on site and used on an on-going basis are as follows:

- These areas must comply with general fire safety requirements.
- If the contractor proposes to have above-ground bulk fuel storage tank the tank must be placed within a containment structure of an impermeable concrete base with an impermeable wall around the storage tank that will contain at least 110% of the total volume contents of the tank. A Method Statement must be submitted to the ECO and accepted prior to the installation of above ground fuel storage facilities.
- 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. Drip trays are to be used in these storage areas to prevent contamination of the ground in the event of spillages or leak
- All plants / fuel tanks must have a drip tray present to use in the event off accidental spillage of oils and fuels and must contain a capacity level of 120% of the capacity of the plant fuel and oil tanks.
- A suitable leak proof container for the storage of oiled equipment (filters, drip tray contents and oil changes etc.) must be established.
- Fuels and oils must be safely located out of harms way from the elements and safety and fire prevention must be strictly adhered to.
- All spills are to be recorded in the ECO diary.

Fuel Storage proposals must be cleared by the ECO before any storage or stockpiling takes place.

3.10.14 CONCRETE BATCHING PLANT FACILITIES

The Engineer or Site Agent 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.

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

- The concrete batching facilities must have suitable bunding methods in place to ensure minimal waste water run-off occurs during batching operations.
- Concrete batching to take place at identified areas only in consultation with the ECO
- Cement contaminated water may not enter a natural or man-made (e.g. trench / sloot 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
- If possible/appropriate ready mix concrete must be used.
- Cement bags are to be stored securely out of harms way from the elements (wind and rain). Bags has to be covered and placed on plastic sheeting
- Sand and stone to be stored on plastic if it is stored outside the future fenced off site.
- 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.
- Used cement bags must be stored in weatherproof containers to prevent wind dispersion and water contamination. 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.
- 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 area only.

3.10.15 BLASTING / DRILLING

In the event where blasting or rock drilling is required, the following recommendations 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 must be given 24-hour notice before blasting events.

3.10.16 FIRE FIGHTING

Adequate fire fighting 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 fire fighting 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 Applicant.
- It is required that contractors have available [if there is cell pone reception] the emergency telephone numbers of the nearest local Fire Fighting Station and that an emergency fire fighting re-action plan has been drawn up with on site workers and the resident land-owner / farmer.

3.10.17 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 should 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 should 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.

3.10.18 SOLID WASTE MANAGEMENT

No on-site burying or dumping of any waste materials, vegetation, litter or refuse must occur.

- 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 at least once a day.
- 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 solid waste must be disposed of off site 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. All hazardous waste must be disposed of at a licensed hazardous waste 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.
- The Contractor must be responsible for the establishment of a refuse control system that is acceptable to the ECO.
- Disposal arrangements must be made in advance and cleared with the ECO before construction starts.

3.10.19 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 on site.
- Disposal arrangements must be made in advance and cleared with the ECO before construction starts. Sanitation provision and servicing must be to the satisfaction of the ECO.
- 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 be have acceptable toilet and refuse management systems in place and these areas must have suitable refuse recpectacles available for the containment and disposal of general litter and refuse.

3.10.20 MATERIALS STOCKPILING

Any 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.

- The Contractor must indicate the proposed areas for such operations and method of undertaking such operations in a Method Statement to be submitted to the ECO for approval before any such activity begins.
- Any area used for stockpiling and not covered by building development must be returned to at least the state they where 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.

3.10.21 PREPARATION OF BUILDING MATERIAL

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.
- Also refer to the traffic- and transportation management plans and their requirements.

3.10.22 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. 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.

- 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.
- 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 and Local Authority. N
- o 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

3.10.23 TREATING (FLUSHING / TESTING) OF PIPELINES

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.

3.10.24 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 are 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 overnighting is necessary for security purposes then it must be cleared with the ECO on site.
- No washing in dams or streams are allowed.

3.10.25 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 taken into account possible water constrictions of the area).

- The on site 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.

3.10.26 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 it's original state, paying particular attention to it's 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 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.

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.

3.10.27 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 should 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 should 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.

3.10.28 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.

3.11 EMERGENCY PREPAREDNESS & RESPONCE

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).

3.11.1 ACCIDENTAL FIRES

Although the risk of environmental damage as a result of accidental fires is deemed to be almost insignificant as a result of the location of the project, the following measures will be implemented:

- Fire fighting equipment will be available to help with accidental fires.

3.11.2 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.
- The ECO will recommend the best possible environmental solution.
- The Contractor will be liable for any costs incurred.

3.11.3 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.

4. OPERATIONAL EMP (OEMP)

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. In order to achieve this, the owner must appoint a suitably qualified and trained manager with the necessary executive powers.

This person must be overall accountable for the environmental performance of the site and must be aware of the legal requirements and obligations that went with the job. The person must also be aware of the legal action that can be taken against the owner and **him 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 for the Solar Plant facility. This plan must include:

- Access management and control
- Energy management and monitoring.
- Water management and monitoring.
- Erosion management
- Wastewater quality monitoring program before discharge of wastewater.
- 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.

4.1 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 gravel or earth roads on Site, the vehicles of the Contractor and his suppliers must not exceed a speed of 25 km/h. On public roads adjacent to the Site vehicles will adhere to municipal and provincial traffic regulations.

- Only approved access roads may be used.
- A traffic management plan for the site access roads to ensure that no hazards would results from the increased traffic and that traffic flow would not be adversely impacted must be implemented. This plan must include measures 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.
- A transportation plan for the transport of solar components, assembly cranes and other large pieces of equipment must be implemented

4.2 ENERGY MANAGEMENT

The project will provide electricity to Eskom. 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 are being phased out (due to negative impact on the ozone) and that the following gasses are more environmentally friendly options: ammonia, R134a, R143a, R404A, R407C, R410A, 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 use 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).

4.3 WATER MANAGEMENT

Water will be supplied by the property owner, which will also install the internal network. The internal water network must be installed in accordance with the local municipal regulations.

- Ensure that all additional water uses are correctly registered with the Department of Water Affairs (e.g. Agri-industrial use).
- Water conservation measures such as low flow taps, high pressure hoses, duel 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).

4.4 EROSION & SEDIMENT CONTROL

Soil erosion (through wind & water) removes valuable top soil which is the most productive part of the soil profile (containing plant nutrients, seeds and bulbs). Development disturbs and loosens soils which can easily lead to erosion. The plants and animals that depended on that soil can no longer survive, and the plants that once grew the cannot re-establish itself because the seedstore are gone. Soil may then have to brought back from elsewhere, increasing the cost of the project and the risk of importing weeds and other waste or toxic material. In accordance with the Conservation of agricultural Resources Act, 1983 (Act No. 43 of 1983) (CARA), the aim of erosion management is to prevent any form of soil erosion through proactive thinking and prevention as well as immediate rehabilitation.

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

- Inspect and maintain erosion and sediment controls on a regular basis and ensure that it can accommodate the upslope catchment.
- Leave as much vegetation as possible.
- Install permanent fences to define 'no go' areas in those areas that are not to be disturbed.
- Install sediment catchment controls downslope of the site to catch sediment (if applicable).
- Limit vehicle movement to the site and control access points. Clearly mark such access points and inform all suppliers.

4.5 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 owner of the Solar Plant must ensure that wastewater is legally disposed by applying for a General Authorization, a License or exemption in terms of the Water Act. A wastewater management plan must be drafted as part of the application. The authorization will stipulate specific disposal and monitoring programs (if applicable) on information given within the wastewater management plan. If applicable the owner or delegated responsible person will be responsible for the implementation of the wastewater management plan and monitoring program.

The monitoring program should monitor at least the following:

- Wastewater quantities disposed of (on a monthly basis).
- Compliance of treated wastewater quality after treatment but before disposal.

4.6 SLUDGE HANDLING AND DISPOSAL

If applicable, all sludge and must be handled in accordance with the DWAF *Guidelines for the Utilization and Disposal of Wastewater Sludge*. These guidelines were developed to encourage the implementation of beneficial us of sludge and are available from the DWAF – Department: Resource protection and waste (www.dwaf.gov.za).

- Volume 1: Selection of Management options
- Volume 2: Requirements for the agricultural use of sludge
- Volume 3: Requirements for the on-site and off-site disposal of sludge
- Volume 4: Requirements for the beneficial use of sludge
- Volume 5: Requirements for thermal sludge management practices and for commercial products containing sludge

4.7 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 landfill licensed in terms of section 20 of the Environment Conservation Act (Act No. 73 of 1989).

4.7.1 RECYCLING

Whenever possible, a suitable recycle arrangement must be negotiated with a local recycle agent to ensure the re-use of recyclable material.

Recycling should 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

4.7.2 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 should be bunded in such a way to contain at least 110% of the storage tank's capacity.

4.8 SEWERAGE MANAGEMENT

If applicable sewerage must be installed in accordance with the Municipal regulations and Department of Water Affairs (DWA) requirements.

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

4.9 FIRE MANAGEMENT

Refer to emergency preparedness and response paragraph 4.12.

4.10 MINIMISE DUST AND AIR EMISSIONS

Refer to erosion and sedimentation control paragraph 4.4.

4.11 MANAGEMENT OF NATURAL AREAS AND GARDENS

The objective regarding the management of natural areas and gardens are to identify critical or conservation worthy features and to manage such areas and gardens in such a manner as to promote biodiversity and ecological processes.

- Natural areas must be managed as close to natural as possible (no interference wherever possible).

- No garden areas will be allowed.
- All listed invasive alien vegetation must be removed in accordance with CARA legislation (The Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983)) as revised.

4.12 EMERGENCY PREPAREDNESS AND 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.

4.12.1 ACCIDENTAL FIRES

Although the risk of environmental damage as a result of accidental fires is deemed to be almost insignificant as a result of the location of the project, the following measures will be implemented:

- Fire fighting equipment will be available to help with accidental fires.

4.12.2 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 client will be responsible for immediate containment and corrective action (e.g. stopping the leakage) and will be liable for any costs incurred.

5. DECOMMISIONING EMP (DEMP)

The Solar plant is expected to have a lifespan of 25+ years (i.e. with routine maintenance). The power plant infrastructure would only be decommissioned and rehabilitated once it has reached the end of its economic life. It is most likely that decommissioning activities of the infrastructure of the Solar plant considered in this EIA process would comprise the disassembly and replacement of the individual components with more appropriate technology/infrastructure available at that time.

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

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

APPENDIX 1: ENVIRONMENTAL AUTHORIZATION

To be included on approval (before construction begins).

APPENDIX 2: MAPS & DRAWINGS

Appendix 2.1: Site layout plans

Appendix 2.2: Environmental sensitivity map

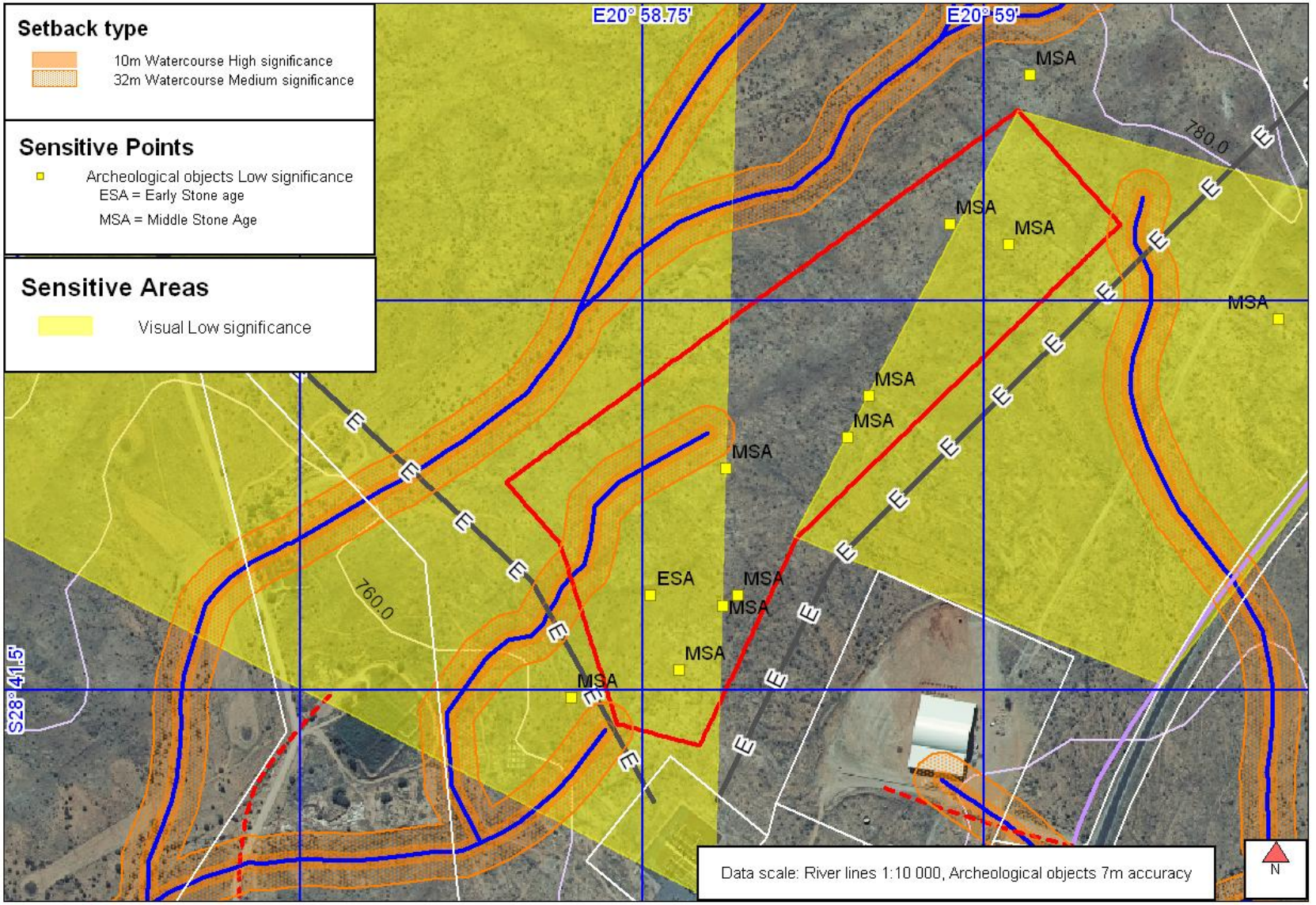
Appendix 2.3: Final layout plans overlain on the environmental sensitivity map

All outstanding maps to be included on approval (before construction begins).

View from above

View from the South

XMap® 7



GeoStratics

Keimoes Solar site: Sensitivity Map

0 40 80 120 160 200 240 280 m

Data Zoom 14-1

APPENDIX 3: START-UP REPORT

To be included after start-up meeting.

APPENDIX 4: 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	**5.1.2**	
PRE-CONSTRUCTION PHASE	**Penalty for Non-compliance**	
	Bottom range	Top Range*
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 CEMP & Record of Decision 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 fire fighting equipment (as specified at start-up) must be on site at all times	500	4000
Fire fighting 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 washdown 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 5: DECLARATION OF UNDERSTANDING

DECLARATION OF UNDERSTANDING

I, _____

Representing _____

Declare that the conditions of the authorisation were brought under my attention and that I have read and understood the contents of the Environmental Management Plan (which includes all documents as per Record of Decision).

SITE: _____

Record of Decision :

I also declare that I understand my responsibilities in terms of enforcing and implementing the Environmental Specifications as set out in the various documents for the aforementioned site.

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

Signed: _____

Place: _____

Date: _____

Witness 1: _____

Witness 2: _____

APPENDIX 6: INFO 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 EMP.

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: _____

4) APPROVING AUTHORITY

The works described in this Method Statement are approved.

_____ _____ _____

(Signed) (Print name) (Designation)

Dated: _____

APPENDIX 8: CONTACTOR: ENVIRONMENTAL WEEKLY CHECKLIST

CONTACTOR/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 EMP 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 fire fighting 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 were 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 ect.)		
• 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: 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:
1. Must any animals such as tortoises, chameleons or snakes be encountered then do not harm them. The ESSO or RE must be contacted to remove these safely. The harming of any animal will result in disciplinary action.
2. 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.
3. Alien plant clearing and control work teams must be closely supervised.

BASIESE GEDRAGSKODES

Die volgende lys vertenwoordige 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 OR ENIGE VREEMDE MATERIAAL IN STROME LAAT BELAND NIE.
- IN DIE DAM SWEM NIE.
- ROMMELSTROOI OF KOS LAAT RONDLÊ NIE.

Notas:

1. 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.
2. 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.
3. Streng toesig moet gehou word oor indringerplantbeheerspanne.

EZIPPHAMBILI EKUNYANZELEKILEYO UKUBA ZENZIWE

Zonke ezi zinto zilandelayo zizinto ekufuneka zenziwe nekufuneka zingenziwanga.
Wonke umntu ofikayo kufuncka 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 IPHAPHTIEKE.
- 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 UGQIBILE 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 ZINGALAHLWA NJE
- SUKUQHUBA NGESANTYA ESIPHAKAMILEYO
- SUKUGALELE NAYIPHI INTO PHAYA EMLANJENI
- SUKUQUBHA EDAMENI Q OQOSHA YONK INKUKUMA

APPENDIX 10: ECO/ESO REPORT/CHECKLIST

ECO / ESO SITE VISIT CHECKLIST / REPORT:

PROJECT NAME: **DATE** _____

PROJECT & PHASE: _____ **LOCATION** _____

ENVIRONMENTAL ASPECT	**1-3 NA**	**COMMENTS**
Note: **1 = Poor,** **2 = Average,**		**3 = Good** **NA = Not Applicable**
1. DEMARCATION METHOD STATEMENT 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/PROTECTION OF FAUNA & FLORA Identified "No-Go Areas", remaining natural veld and indigenous- or significant trees are protected features and must be demarcated for protection from construction damage (including secondary impact). • All areas outside of the demarcated construction sites and access roads to be regarded as NO-GO areas unless otherwise agreed upon with the client and ECO. • All flora identified to be rescued must be removed and placed in an area specifically allocated and taken care off until re-used in pre-approved way. • Identified areas with significant vegetation must be protected as NO-GO areas.		
3. CLEARING OF VEGETATION & TOPSOIL REMOVAL METHOD STATEMENT Before any construction or earthworks, topsoil must be stripped (>150mm) and stockpiled for rehabilitation/ landscaping. Stockpiles: • must be protected (may not blow or wash away or gets compacted) 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: • Cleared areas must be stabilized. • Burning or burying of cleared vegetation is prohibited, but may be used for mulch or slope stabilisation on site.		
4. STOCKPILING METHOD STATEMENT Top- and subsoil's from trenches must be located within site boundaries, stabilised and may not exceed 2m in height.		
5. TEMPORARY STORAGE FACILITIES METHOD STATEMENT Must be demarcated, organised, neat and tidy and of acceptable standards.		

ENVIRONMENTAL ASPECT	1-3 NA	COMMENTS
Note: **1 = Poor,** **2 = Average,**		**3 = Good** **NA = Not Applicable**
6. CONSTRUCTION CAMP & SITE OFFICES METHOD STATEMENT Must be demarcated, organised and free of day-to-day litter (maintaining good housekeeping standards).		
7. FUEL STORAGE METHOD STATEMENT Fuel storage areas must be situated within the demarcated construction camp site (or an area approved by the ECO). • Bunds must be built (EMP and ECO requirements) around larger fuel storage areas (accidental spillages). • Drip trays must be used (in accordance with EMP) at all fuel and oil storage and refilling sites and must be cleaned regularly, especially after rain.		
8. LABOURER'S FACILITIES METHOD STATEMENT Facilities must be of acceptable standards suitably demarcated, well maintained, neat and tidy and with adequate ablution facilities.		
9. ENTRANCE AND HAUL ROADS METHOD STATEMENT Only approved entrance and haul roads may be used (existing roads and infrastructure). No new roads or parking areas may be developed without written approval from the ECO.		
10. MANDATORY SITE EQUIPMENT METHOD STATEMENT Mandatory site equipment must be in place, well maintained and in accordance with EMP and ECO requirements. • Sufficient refuse bins must be on site (well placed and conspicuous) and must be cleaned regularly. • Fire extinguishers must be readily available, maintained and functional. • Drip trays must be used (in accordance with EMP) at all fuel and oil storage and refilling sites and must be cleaned regularly, especially after rain. • Toilets and sanitation facilities must be kept clean neat and hygienic (toilet paper must be available).		
11. WASTE CONTROL METHOD STATEMENT The contractor is expected to control all construction related waste material and general litter on actual construction sites and its immediate surroundings. • 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).		

ENVIRONMENTAL ASPECT	1-3 NA	COMMENTS
Note: **1 = Poor,** **2 = Average,**		**3 = Good** **NA = Not Applicable**
12. CEMENT MIXING & BATCHING AREAS METHOD STATEMENT Mixing areas must be approved by the ECO, suitably demarcated and may not result in pollution. • 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 METHOD STATEMENT Construction vehicles must be in good working order and well maintained to prevent oil and fuel leakages and to reduce noise levels. • Maintenance areas must be approved by ECO. • Refuelling must be done in accordance with the EMP, using drip trays.		
14. HEAVY EARTHMOVING EQUIPMENT Construction vehicles and equipment may only operate within the demarcated site boundaries (and approved access roads), especially heavy earthmoving vehicles.		
15. DUST CONTROL METHOD STATEMENT Adequate control measures must be in place to prevent dust pollution as a result of construction activities (especially with regard to entrance-, haul roads and exposed surfaces). • Areas of concern must be watered regularly during construction AND periods of strong winds, BUT must take water saving into account.		
16. EROSION CONTROL METHOD STATEMENT Erosion resulting from works must be controlled. • Temporary and permanent drainage works must be maintained. • Erosion damage and damage in drainage courses must be reinstated.		
17. NOISE CONTROL METHOD STATEMENT Effective noise control measures must be in place and acceptable working hours must be kept (deviations must be approval by the ECO).		
18. 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).		

ENVIRONMENTAL ASPECT	1-3 NA	COMMENTS
Note: **1 = Poor,** **2 = Average,**		**3 = Good** **NA = Not Applicable**
19. ARCHAEOLOGICAL & HERITAGE FINDS METHOD STATEMENT 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.		
20. REHABILITATION METHOD STATEMENT 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: • 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.		
21. ADDITIONAL METHOD STATEMENTS Method statements must be submitted and approved before commencement of the works and must be available at the site offices.		
22. 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.		
23. SPOT FINES & PENALTIES Spot fines and penalties must be recorded and documented by the ECO (in accordance with the EMP).		
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 EMP.		

ECO: _____ _____

ECO OBSERVATION SHEET

APPENDIX 11: TRAFFIC & TRANSPORT MANAGEMENT

Too be included on approval by local authority (before construction starts)

APPENDIX 12: 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. Eskom's consent 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 previous written permission. If such permission is granted the developer must give at least fourteen working days prior notice of the commencement of blasting. This allows time for arrangements to be made for supervision and/or precautionary instructions to be issued in terms of the blasting process. It is advisable to make application separately in this regard.

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.

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